Information about this Replacement

Replacement	The April 2008 *MasterCard® Expert Monitoring System™ User Guide* replaces your existing document.
What is in the new version?	This manual contains information on how to use the MasterCard® Expert Monitoring System™. Please refer to "Using this Manual" for a complete list of the contents of this manual.
Billing	MasterCard will not bill the principal member for the first copy of this manual – the MasterCard Expert Monitoring System license fee covers all costs associated with production and distribution.
Questions?	If you have questions about this manual, please contact the Customer Operations Services team or your regional help desk. Please refer to "Using this Manual" for more contact information.
MasterCard is Listening…	Please take a moment to provide us with your feedback about the material and usefulness of the *MasterCard® Expert Monitoring System™ User Guide* using the following e-mail address: publications@mastercard.com We continually strive to improve our publications. Your input will help us accomplish our goal of providing you with the information you need.

Summary of Changes

MasterCard Expert Monitoring System User Guide, April 2008

Description of Change	Where to Look
Added chapter "EMS Audit, Field Encryption and Data Access"	Chapter 3
Added CSV format import	Chapter 2
Added custom links in EMS Main window	Chapter 2
Added filtering principles for lists, trees and tables	Chapter 2
Updated messaging in EMS	Chapter 2
Added access profiles	Chapter 2
Changed granted users to grant access profiles	Chapter 2
Added storage settings for datasources	Chapter 2
Added drillable fields for datasources	Chapter 2
Added record filtering (display in analysis tool, import)	Chapter 2, Chapter 4
Added rule test processing	Chapter 2
Added export encryption	Chapter 2
Added rule transfer	Chapter 2
Added tuning parameters	All

MasterCard® Expert Monitoring System™ User Guide

April 2008

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Media

This document is available:

- In printed format
- In PDF format

Using this Manual

Chapter 1   Overview

Chapter 2   MasterCard Expert Monitoring System Interface

Chapter 3   EMS Audit, Field Encryption and Data Access

Chapter 5   Viewing Results

Chapter 6   Investigating Cases

Chapter 7   Profiling

Chapter 8   Sending Notifications

Appendix A Reference Information

Using this Manual

This chapter contains information that helps you understand and use this document.

Purpose

The *MasterCard® Expert Monitoring System™ User Guide* describes the interface of the MasterCard® Expert Monitoring System™ (EMS) and helps users to perform the main tasks required for the proper operation of the system.

Audience

MasterCard provides this manual for the use of all personnel who work with the MasterCard Expert Monitoring System (EMS).

Overview

The following table provides an overview of this manual:

Chapter	Description
Table of Contents	A list of the manual's chapters and subsections. Each entry references a chapter and page number.
Using this Manual	A description of the manual's purpose and its contents.
1. Overview	This chapter provides an overview of MasterCard® Expert Monitoring System™ and its main functionalities. It also provides information about the various training courses that are available.
2. MasterCard Expert Monitoring System Interface	This chapter provides a detailed description of the MasterCard® Expert Monitoring System™ interface. Explanations of how to use MasterCard Expert Monitoring System are provided in Chapters 3, 4, 5, 6, 7 and 8.
3. EMS Audit, Field Encryption and Data Access	This chapter describes the functionalities added to EMS to comply with the Payment Card Industry Data Security Standard.
4. Defining and Processing Jobs	This chapter is designed for high-level users responsible for configuring input source descriptions, rules and jobs to be processed by MasterCard® Expert Monitoring System™.
5. Viewing Results	This chapter explains how to view the results after MasterCard® Expert Monitoring System™ has processed the input source data.
6. Investigating Cases	This chapter explains how to configure and use the case tracking and investigation functionality of the MasterCard® Expert Monitoring System™.

Chapter		Description
7.	Profiling	This chapter explains how to configure and use the profiling functionality of MasterCard® Expert Monitoring System™ and how to view profiles.
8.	Sending Notifications	This chapter explains how to configure the notification functionality of MasterCard® Expert Monitoring System™ to send notifications when required.
A.	Reference Information	This appendix provides reference information for MasterCard® Expert Monitoring System™ users.

Excerpted Text

At times, this document may include text excerpted from another document. A note before the repeated text always identifies the source document. In such cases, we included the repeated text solely for the reader's convenience. The original text in the source document always takes legal precedence.

Language Use

The spelling of English words in this manual follows the convention used for U.S. English as defined in *Merriam-Webster's Collegiate Dictionary*. MasterCard is incorporated in the United States and publishes in the United States. Therefore, this publication uses U.S. English spelling and grammar rules.

Related Information

The following document provides information related to the subjects discussed in this manual:

- *MasterCard Expert Monitoring System Technical Guide*

For definitions of key terms used in this document, please refer to the *MasterCard Dictionary* on the Member Publications home page (on MasterCard OnLine® and the *MasterCard Europe Electronic Library* CD-ROM).

To order MasterCard manuals, please use the Ordering Publications service on MasterCard OnLine®, or contact publications@mastercard.com.

Support

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Please address your questions to the EMS Helpdesk, as follows:

Phone: 32-2-352 5832

Fax: 32-2-352 5519

E-mail: risk_products_support@mastercard.com

1 Overview

This chapter provides an overview of MasterCard® Expert Monitoring System™ and its main functionalities. It also provides information about the various training courses that are available.

Introduction

As part of its commitment to help customers to control and reduce fraud losses, MasterCard has created a suite of applications to help members to combat fraud:

- MasterCard® Expert Monitoring System™ (EMS), which uses rules-based technology, is a real-time web-based early fraud detection service. Through a simple Graphical User Interface (G.U.I.), your fraud and risk experts can easily add new rules to identify new fraud trends, thus allowing you to keep your fraud database fully up-to-date. MasterCard Expert Monitoring System is a Thin-Client application making deployment easier and thereby reducing the IT resources required in managing the solution. It can be combined with iPrevent® (see below) to create a real-time online system with the ability to evaluate the risk associated with any particular transaction, and to deny suspicious authorization requests.

- iPrevent is based on an artificial intelligence suite, designed and developed over fifteen years, in different sectors of the industry (defense, industry, banking, etc). It uses the most advanced technologies in its field, such as data mining, business rules, neural networks, case base reasoning, fuzzy logic, statistics optimization suite, velocity analyzer and text mining. iPrevent is a truly advanced product using state of the art technology.

How MasterCard Expert Monitoring System Works

EMS can be used for a variety of transaction monitoring types. Due to its flexibility, it can process various types of business data. For purposes of fraud detection, EMS requires transaction data (authorization and/or clearing data) and/or master file data (cardholder or merchant demographic data). Rules are used to extract the required information from this data.

EMS performs two very important functions. Firstly, it provides a real-time, offline, platform that can be tailored for customer specific needs and fraud strategies. In addition it provides a user interface designed to address the needs of our customers. The user interface allows customers to profile behavior patterns, datamine and confine accounts at risk, manage fraud case workflow and communicate with customers using SMS and/or e-mail.

EMS can be combined with iPrevent software which will provide a real-time online scoring platform that allows for customized scoring modeling and can interact with the authorization response. This combined solution provides true Fraud Prevention by endowing the Fraud Manager with the ability to refer or stop suspicious transactions.

EMS Database

EMS loads all data into the EMS database. This feature allows the user the capability to perform comprehensive datamining, benchmarking of rules and behavior patterning.

Features of EMS

EMS is a flexible and scalable transaction monitoring solution. It provides the user with the option of deploying it as a rules-based system in a real-time or batch mode.

The complete solution hosts the following features:

- Real-time per transaction monitoring

- Multiple Rule and Profile fraud detection

- Automated SMS sending and a SMS reply function, fully integrated into the fraud alerts case management suite

- Fully customizeable user screens which can be tailored to your individual analysts requests

- Data enhancement with the ability to create user defined fields, or computation on existing fields, and add them to the transactional record

Support of Multiple Operating Systems

EMS is a web-based application using standard web browsers to connect to the application which can be Windows or UNIX based. EMS can function on the following platforms:

- Microsoft Windows 2000

- Microsoft Windows 2003

- Microsoft Windows XP

- HP-UX 11

- Sun Solaris 9

- Sun Solaris 10

- IBM AIX 5.3

EMS supports the following web browsers:

- Mozilla Firefox 2.0

- Internet Explorer 6.0

However, MasterCard recommends that you use Mozilla Firefox 2.0, as it provides better performance than Internet Explorer 6.0.

The client-server configuration includes a 'server' and a number of 'clients'. The EMS machines connected into a local area network (LAN) can be Unix or Windows based – they do not all have to use the same operating system.

Support of Multiple Input Formats

EMS can process data from different input formats, with any field in any order. You can use data coming from many sources (such as authorization, clearing, chargebacks and MIS systems), allowing you to achieve the most efficient levels of fraud detection. You can load data into EMS from a fixed-length file, a Microsoft Excel file, a comma separated value (CSV) or from an existing Oracle or Microsoft SQL Server database.

Powerful Rule Options

As a user, you define the 'rules' that EMS will apply when processing the input files. EMS will identify all transactions that correspond to the rule.

You can apply each rule individually, or you can combine two or more rules together in order to refine the type of fraud you want to identify. This will allow you to save time, and will help your analysts to identify fraud more effectively.

For example, you may want to identify high-value transactions coming from outside Europe at high-risk merchant categories (identified by their merchant category code) such as jewelry, hi-fi and household appliance stores.

In this example, three rules, 'outside Europe', 'high-risk MCC', and 'high amount', would be applied together. When processing data, EMS will identify all transactions that meet the criteria of the combined rules.

Ability to Run Multiple Jobs

An EMS job is a classification environment containing:

- Input data ('what' to classify)
- Rules ('how' to classify).

It is possible to import data from a database using the database extraction functionality, from a data file by using a file description to specify the format of that data file or from a Microsoft Excel file using the Excel file description.

You can define as many jobs as you require. For example, you may wish to create one job to analyze your authorization data and another to analyze your clearing data.

Support of Manual or Scheduled Jobs

You can start a job manually via the EMS interface, or you can schedule it to run at a given date and time through the operating system's scheduler function.

Easy Identification of Fraud

Once it has finished processing, EMS generates reports that show the results of each job.

For example, when EMS has processed data to monitor the 'outside Europe', 'high-risk MCC', and 'high amount' rules described earlier, it will produce a report showing how many transactions matched the criteria.

You can analyze any matching transactions in more detail using the **Job Analysis** pages.

Bad Transactions List

When EMS is loading the input data from files, it will reject all transactions that do not exactly meet the requirements of the file description. The user can specify a tolerance percentage, so that when the number of bad transactions exceeds the tolerance threshold, EMS will stop processing the input file.

EMS will generate a list of all 'bad transactions'. The user can correct the rejected transactions and input them into EMS again. It is important to re-enter only the corrected transactions, and not the whole input file, to avoid incorrect or duplicated results (such as an excessive number of matching transactions).

Support of Multiple Transaction Datasources

With EMS, you can have multiple datasources associated with the same job.

Tracking Cases

With the case tracking functionality in EMS, it is possible to:

- Create cases with default values assigned automatically.
- Add new cases identified by other sources.
- Investigate cases.
- Provide investigation results.

During the classification process, EMS identifies all transactions that match one or more rules. Transactions are placed into cases in work queues and made available to analysts for investigation.

Profiling

EMS allows you to automatically categorize behavior patterns for specific entities. An entity may be any field from inside the database or a group of combined results, such as a merchant, an account holder, a BIN range, a supplier, a dealer, an employee, a geographical location, a Point of Sale entry mode, a specific type of transactions, etc. The EMS profiling functionality helps to detect behavior patterns outside of an expected customers behavior pattern (for example, an account has been grouped in the " Inactive Account" category due to the past transaction volume and velocity, but is suddenly transferring funds to countries in more than three different continents).

Storage

Imagine a bank with 10 million accounts producing about 33 million transactions each of 800 bytes, per month. Within five years, the storage of all these transactions would require about 1,600 Gigabytes. The EMS profiling functionality allows you to deal with this amount of data on an ordinary workstation because it has the ability to collect and build profiles based on daily transactions. The profile data is an aggregated data set, and is stored in a separate table. Once profiled, the transaction data used is no longer required. The profiles can be stored and archived over a period of years. Thus you have the added functionality of keeping historic data over long periods of time without the need to keep large amounts of transactional data in the database.

Profiles and Time

Profiles can be compared over specific periods of time, e.g. how does my current account profile compare to the account profile this time last year? Deviations in profiles can be automatically monitored and highlighted, once an individual threshold has been reached.

Profiles can be aggregated for many time scales: seconds, minutes, hours, days, weeks, months, years, decades, centuries, millennia and eternity. Profile updates can be scheduled according to the business needs, allowing for optimal use of available resources.

A profile can contain a number of profile values, for example, an account profile may contain profile elements such as:

- Top **n** beneficial entities or accounts for transfers out of the account while keeping both transaction count and volume

- Top **n** countries involved in transactions with an account based on count or volume

- Number of distinct accounts from which deposits were received

- Total amount volume per account which could be specified for incoming or outgoing funds, or for both

- Total number of transactions per account which could be specified for incoming or outgoing funds, or for both

Another profile targeted at countries may contain the following elements:

- Number of transactions with country as beneficiary

- Number of transactions with country as sender

- Top **n** accounts or customers receiving money from country

- Top **n** accounts or customers sending money to country

- Total volume of business related to country

- Total number of transactions related to country

Using the country profile allows the user to monitor high risk countries instead of being limited to monitoring account behavior only. For example, in a money laundering environment, this profile feature allows the Compliance Officer to monitor Non-Cooperative Countries and Territories (NCCTs) individually for any deviations in the transaction profile between the financial institution and the country.

Apart from using the profiles to identify and track deviations, the profiles can also be accessed and viewed by investigators and analysts. This feature will enhance the investigator or analyst's understanding of the entity's behavior. When reviewing a customer account, the analyst can view the profile in a separate window displaying all the values, as well as a graphical display reflecting changes in one or more of the profile elements to assist them in their fraud detection or anti-money laundering decisions.

PCI Compliance

The PCI Data Security Standard is applicable to systems that store, process or transmit cardholder data. The Standard applies to all system components. There are 12 PCI Compliance requirements relating to the following categories:

- Security of the network

- Protection of cardholder data

- Vulnerability management

- Access control

- Monitoring of networks

- Information security policies

With regard to specific software solutions such as EMS, MasterCard reminds customers that software in itself cannot bring about a PCI compliant environment. Software products are only individual components in a company's information management system. It is, therefore, not possible for a single software program to be PCI compliant but rather, the total information management system of a company.

EMS has the possibility to process financial transactions and is regarded as a system component with regard to the PCI Standards. Depending on the application and use of the solution, the impact of the PCI Standard on the control and use of the applications will vary.

Therefore, EMS has features which provide the user with options to meet PCI Standards in as far as the application is concerned.

EMS has a detailed Audit functionality. Audit can be parameterized such that the user can choose what action types to audit. The audit logs can then be reviewed and monitored in a separate job.

In addition, sensitive data, such as the PAN can be encrypted in the database, but it can also be encrypted when being imported to EMS or exported from EMS.

Access to data can be closely managed, and an administrator can define what datasource fields an analyst can see. Access to specific records or groups of records can also be controlled by defining datasource filters, for example, on BIN ranges.

Training

MasterCard offers a wide range of training options.

EMS Training

MasterCard provides you with a comprehensive user-training course on EMS. The cost of the course is included in the EMS implementation fee.

During this training session you will receive instruction on your live EMS production system. This training includes the implementation of the rules that comply with the mandatory MasterCard and Visa minimum monitor requirements.

Other Training

The Academy offers high quality professional training on a wide range of subjects. It is particularly active in the area of fraud and risk, and the following courses are available:

- A one-day course on the Business of Fraud Detection, which provides an in-depth look at the principles of fraud detection, and how to minimize the financial loss due to payment card fraud. Various key aspects are discussed in a workshop environment focused on sharing best practices.

- A two-day course (Fraud & Risk Management) which explains the risks involved in the card business and sets out all the different MasterCard fraud types as well as the protective measures that can be taken to combat them. The MasterCard fraud management toolbox comprising services such as SAFE, the electronic warning bulletin, MC Alerts, etc is described and issuer and acquirer fraud control systems are discussed. Participants will gain an understanding of the criminal modus operandi and will see how to initiate and support police investigations into criminal activity.

- A two-day graduate program (Fraud & Risk Management Graduate) which provides an advanced assessment in the Risk Management procedure. It examines the points of vulnerability for issuers and acquirers and showcases best practices in the Risk Management area. Participants must have a basic knowledge of the Risk Management program, tools, rules and regulations to attend this course as it will use this knowledge to build a coherent Fraud and Risk Management structure. This course also includes Fraud and Risk Management for issuing and acquiring and provides the opportunity to share and discuss best practices.

- A one-day course (ATM & POS Risk Management) which provides participants with an understanding of how fraudsters operate at the ATM and POS terminal level and explores the various technical and procedural measures to combat them. The course also identifies the rules, legal and dispute resolution environments surrounding fraudulent transactions at the ATM and POS.

Contact MasterCard Europe Risk Solutions (risksolutions@mastercard.com) for customized post-implementation EMS training. The Risk Solutions department also offers consultancy services on running an effective fraud detection operation.

Contact the Academy (academy@mastercard.com) about other training courses.

2 MasterCard Expert Monitoring System Interface

This chapter provides a detailed description of the MasterCard® Expert Monitoring System™ interface. Explanations of how to use MasterCard Expert Monitoring System are provided in Chapters 3, 4, 5, 6, 7 and 8.

MasterCard Expert Monitoring System Home Page

When you log in to the MasterCard® Expert Monitoring System™ (EMS), the **Home** page appears. The **Home** page contains messages posted by any user with editing rights for the **Home** page. These messages can be:

- Messages posted by an appropriate user to be viewed by all users. Every user that logs in to the system will view the messages (news).

- Messages posted by an appropriate user to be viewed only by you. No user other than you will see messages posted for you (reminders).

A list of useful links is available on the right-hand side of the page.

Figure 2.1—MasterCard Expert Monitoring System Home page
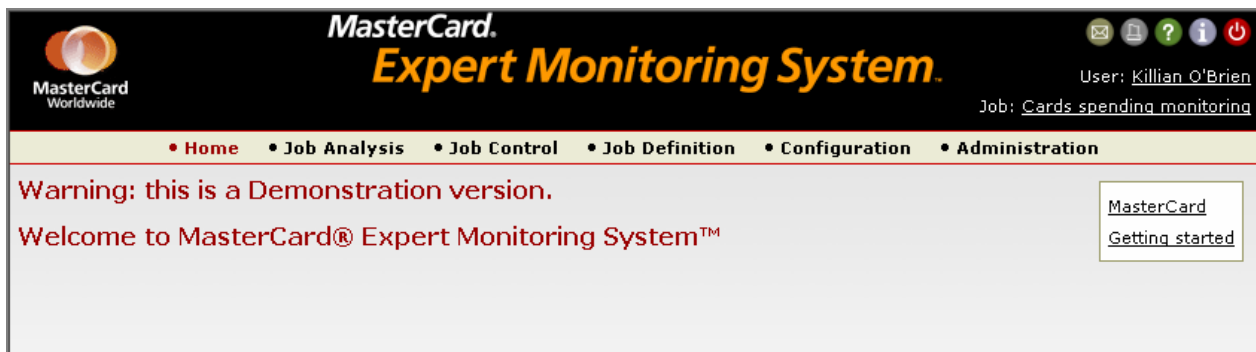
Common Components of the Interface

Figure 2.2—Components of the EMS interface

With the exception of the **Home** page, all pages of the EMS interface have a similar appearance, with the screen divided into the following components:

- **Navigation bar** at the top of the screen. Controls access to the core components of the system:

    - Administration

    - Configuration

    - Job Definition

    - Job Control

    - Job Analysis

    See Figure 2.2.

- **Navigation tree** on the left-hand side of the screen. This contains links to all the pages associated with the core component currently selected in the **Navigation bar**. See Figure 2.2.

- **Main content area** the main central area of the screen. This contains the currently selected page. See Figure 2.2.

- **Toolbar** in the top right-hand corner of the screen. Contains buttons for the following:

Figure 2.3—Toolbar, User and Job information
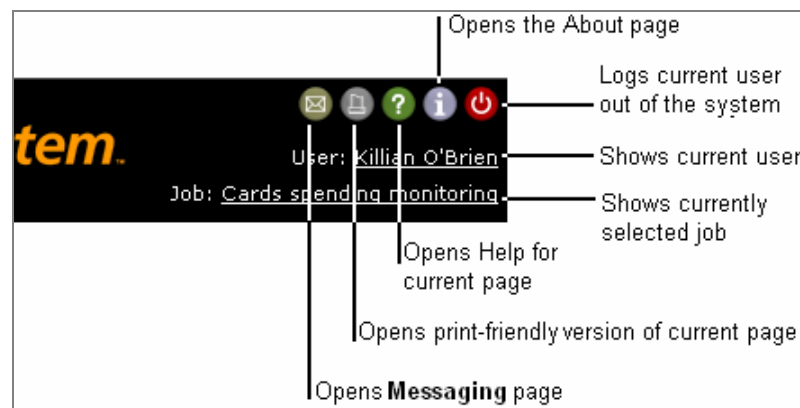
Table 2.1—Toolbar

Button	Function
✉	Opens the **Post a message** page allowing a user with the appropriate rights to post a message, either for one individual user, or a general message visible to all users.
	To add a reminder, click the envelope button in the **Toolbar.** When the **Post a new reminder** page appears, select the user for whom the reminder is intended in the **Remind** drop-down list and add the date and time at which you wish the reminder to be triggered. Add the text of the message in **Message** field. Click the **Post reminder** button.
	To add a news item, click the envelope button in the **Toolbar.** When the **Post a new reminder** page appears, click **News** in the **Navigation tree**. Add the text of the required news item in **News text** field. Select a publish date in the **Publish at** field and an expiration date in the **Expires on** field. Click the **Create** button.
🖨	Opens a printer-friendly version of the current page, allowing the user to print the page.
❔	Opens the Help topic associated with the active page of the application.

Button	Function
ℹ	Opens the **About MasterCard Expert Monitoring System** page which provides information about the application.
⏻	Logs current user out of the system.

- **User and Job information** in the top right-hand corner of the screen. Displays the names of the current user and the current job. The first time you log in, the Job information displays the message "No job selected".

Viewing Mode and Editing Mode

Each user of the system is assigned one or more roles. Each role has rights assigned to it, for example, to view or modify a page. Therefore, the user has the rights associated with the role to which he is assigned.

Figure 2.4—Editing mode
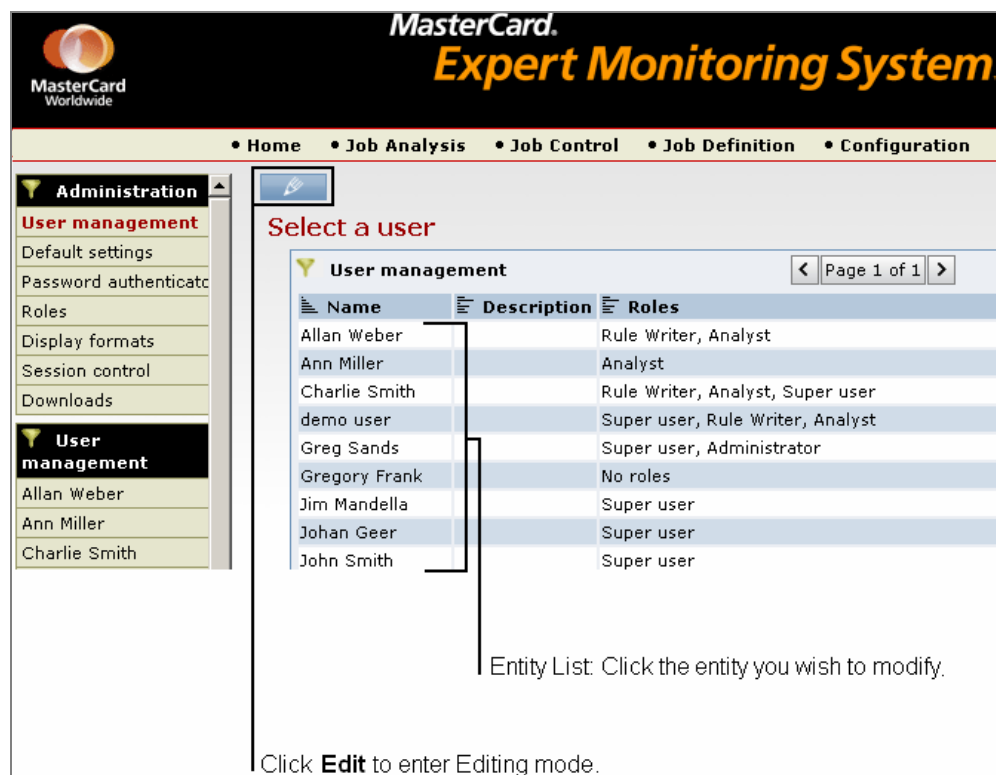
If a user has editing rights for a page, the **Edit** icon is displayed in the top left-hand corner of the current page (see Figure 2.4). Clicking the **Edit** icon opens a **Create** page allowing you to create a new entity (see Figure 2.5). Clicking an entity in the entity list opens the entity allowing you to modify it.

Figure 2.5—Creating a new entity
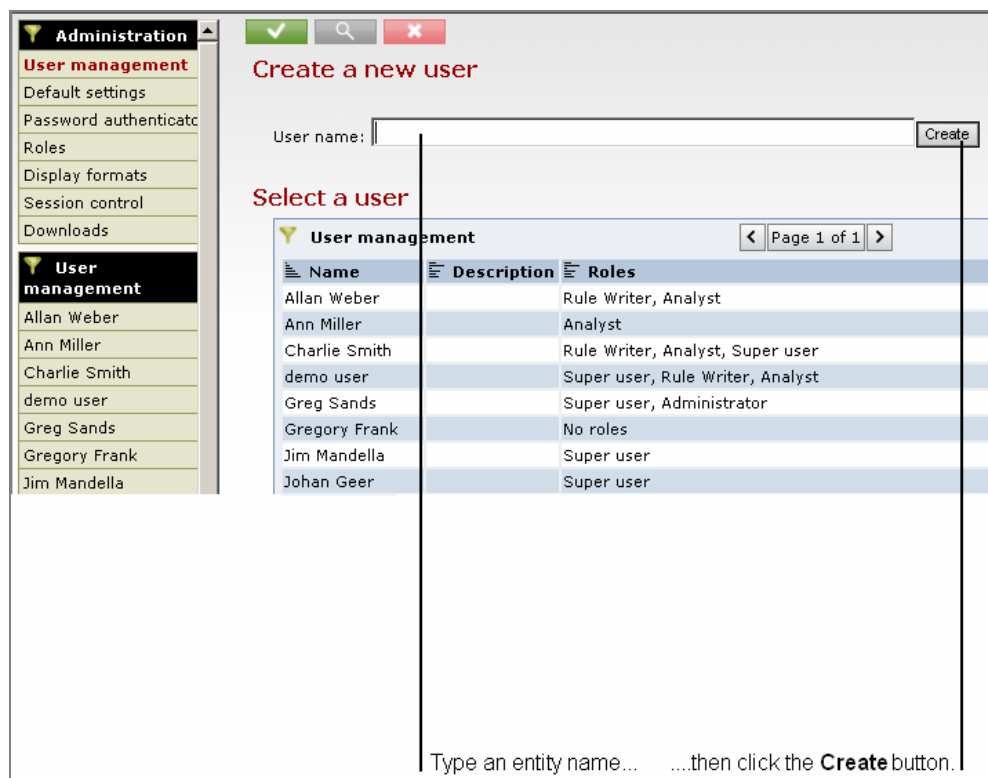
If a user does not have editing rights for a page, the **Edit** icon is replaced by the **View** icon ∞.

When working in Edit mode, the contents of the **Navigation bar** are replaced by the core component currently in edit.

The following icons are displayed:

Table 2.2—Icons

Item	Description
✔ Save Changes	Saves submitted changes. If the user clicks the **Save** icon, the application returns to Viewing mode.
🔍 Review Changes	Displays a list of submitted changes.
✖ Cancel Changes	Cancels submitted changes. If the user clicks the **Cancel** icon the application returns to Viewing mode.
↩ Return to list page	Only available when displaying a detailed form, clicking the return button displays the list of items currently edited.

Filtering Principles

The EMS interface has a new filtering functionality. It allows the user to filter lists of configuration items by attaching tags to the items. These tags can then be used as filtering criteria.

📖 **Definition** **A Tag is a label that allows the user to categorize configuration and job definition elements.**

There are two kinds of tags:

- **Standard tags:** saved in the **Tags** field, they are defined simultaneously with the configuration item by the creator of the item. Standard tags are visible to all users who have access to the configuation item, and are saved when an item is edited.

- **Personal tags:** saved in the **My tags** field, they are defined by a specific user who needs regular access to the configuration item. Personal tags are always editable and are specific for each user.

Any list or drop-down box where the **Filter** symbol (▼) is displayed, is filterable by clicking the **Filter** symbol and adding one or more tags. The user can then filter large lists of configuration items in tables, in the **Navigation tree** or in drop-down lists.

The **Filter** box helps the user by suggesting existing tag names similar to the text the user is entering in the **Filter** field. Several tags can be entered in the **Filter** field, separated by commas (see Figure 2.6).

Figure 2.6—Filter box
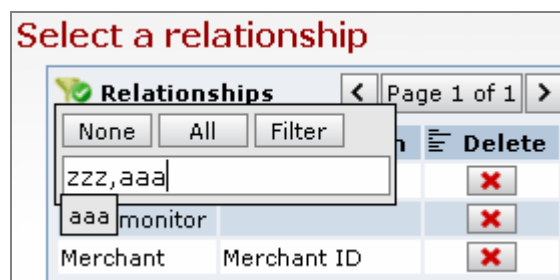
The resulting list displays all items for which **all** the tags entered appear in the **Tags** field, the **My Tags** field, the **Name** field, or a combination of all three.
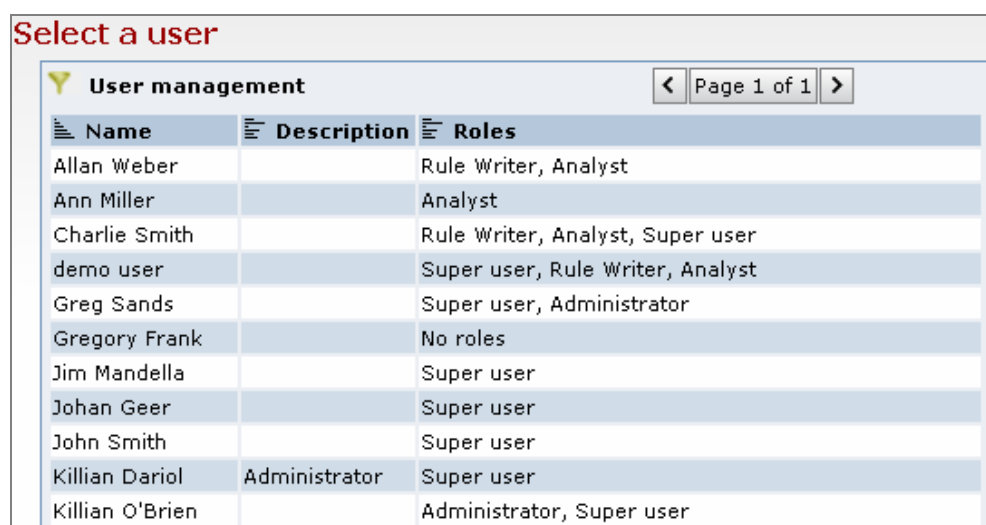
Tags are case insensitive.

Administration of MasterCard Expert Monitoring System

The **Administration** page provides access to the configuration of system-wide administrative features. The **Navigation tree** contains links to each of these features.

The **Administration** page can only be viewed by users that have the "View administration" rights defined for their assigned roles, and can only be edited by users that have the "Edit administration" rights defined for their assigned roles.

Figure 2.7—Administration main page

Name	Description	Roles
Allan Weber		Rule Writer, Analyst
Ann Miller		Analyst
Charlie Smith		Rule Writer, Analyst, Super user
demo user		Super user, Rule Writer, Analyst
Greg Sands		Super user, Administrator
Gregory Frank		No roles
Jim Mandella		Super user
Johan Geer		Super user
John Smith		Super user
Killian Dariol	Administrator	Super user
Killian O'Brien		Administrator, Super user

Select a user — User management — Page 1 of 1

User Management Page

Users have Roles that give them certain Rights or Permissions.

The **User management** page allows an administrator to define users. It contains the common information about a user. At the top of the page, there are links to sub-pages for the following associated features:

- **Roles**   Define here which roles are assigned to a user.

- **Password**   Use this page to reset the password of a user.

- **User settings**   Define specific settings for a user.

Figure 2.8—User management page

The interface items on this page are as follows:

Item	Description
Name	Name of the user, as displayed in the author field of other configuration items (e.g. John Smith).
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the user (optional).
Login	Login of the user. When using password authentication, this is the login to use in the **Login** page. When using RSA SecurID® authentication, it is the login declared on the RSA server.
Maximum number of sessions	If this option is selected (☑), the user cannot open more than the specified number of sessions. Sessions are normally released when logging out. If the user does not log out, the session is closed after a timeout defined on the **Configuration|Parameters** page. The **Session control** page allows administrators to interrupt sessions.
Expires on	If this option is selected (☑), the user cannot connect to the application after the specified date.
Revoked	If this option is selected (☑), the user cannot connect to the application. It must be disabled to allow the user to re-connect. A freetext field allows the administrator to specify the reason for the revocation.

Assign Roles Page

The **Roles** sub-page of the **User management** page allows an administrator to assign specific roles to a user.

Figure 2.9—Assign roles page

The interface items on this page are as follows:

Item	Description
Role	Name of the role displayed in the row.
Description	Description of the role as defined in the **Roles** page (optional).
Assigned	Indicates whether or not the user has the role assigned. When editing, a button toggles the status of the role for the user.

Password Page

The **Password** sub-page of the **User management** page allows an administrator to reset any user password.

Figure 2.10—Password page

The interface items on this page are as follows:

Item	Description
Password	Enter the new password.
Retype password	Re-enter the new password. If the password is valid the administrator is informed that the password has been changed.

User Settings Page

The **User settings** sub-page of the **User management** page allows an administrator to define or reset any user setting. It overrides any existing default setting (for more information on default settings, refer to the section "Default Settings Page", later in this chapter). It can be replaced by the user himself with a personal setting if the administrator allows it.

Figure 2.11—User settings page

The interface items on this page are as follows:

Item	Description
Name	Name of the user setting.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Description of the user setting (optional).
Setting	Type of setting defined by this setting.

Item	Description
Miscellaneous	Depending on the selected setting type, additional fields are available.
Take personal settings into account	When selected, this option allows the user to replace the setting by a personal setting.

Default Settings Page

The **Default settings** page allows an administrator to define default settings.

- A default setting is a setting that applies to all users unless explicitly configured otherwise.

- A default setting can be replaced with a different value by an administrator, by defining a user setting, if permitted by the administrator.

- A default setting can be replaced by the user himself with a personal setting, if permitted by the administrator.

Figure 2.12—Default settings page

The interface items on this page are as follows:

Item	Description
Name	Name of the default setting.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Description of the default setting (optional).
Setting	Type of setting defined by this setting.
Miscellaneous	Depending on the selected setting type, additional fields are available.
Take personal settings into account	If this option is selected (☑), it allows the user to replace the setting by a personal setting. If a User setting overrides the default setting, it also overrides this option for the given user.

✎ **Note**   **If a default setting is overridden by a user setting, the user setting is active.**

Password Authenticator Page

The **Password authenticator** page allows an administrator to configure the password authenticator.

The password authenticator settings are taken into account when a user changes his password and when the administrator resets a user password.

Figure 2.13—Password authenticator page

The interface items on this page are as follows:

Item	Description
Maximum password age	The maximum time allowed to elapse before a user must change his password. This setting forces the user to change his password after the indicated time interval has elapsed. The time interval is measured from the last time the password was changed.
Maximum number of failed logins	If a user tries to log in using the wrong password, more than the indicated number of times, his account is revoked and can only be reactivated by an administrator.
Password history length	When changing a password, the new password must be different from a previous one. This number indicates how many different passwords are required. If the administrator enters zero, the system will ignore this check.
Minimum password length	Minimum number of characters permitted in a password.
Password must contain at least one lower case letter	If this option is selected (☑), a password must contain at least one lower case letter.
Password must contain at least one upper case letter	If this option is selected (☑), a password must contain at least one upper case letter.
Password must contain at least one digit	If this option is selected (☑), a password must contain at least one digit.
Password must contain at least one special character	If this option is selected (☑), a password must contain at least one special character (such as comma, parenthesis, etc).

Roles Page

A role is a set of rights that can be attributed to one or more users.

The **Roles** page allows an administrator to define roles. It contains a sub-page (**Rights**) to define the rights associated with each role.

Figure 2.14—Roles page

The interface items on this page are as follows:

Item	Description
Name	Name of the role.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Description of the role (optional).

Rights Page

A right is a specific authorization or permission for a user to perform a certain action in the system, such as viewing or editing a certain page. The existing rights are described in the table on the **Rights** sub-page of the **Roles** page. The **Rights** sub-page of the **Roles** page allows an administrator to grant or deny these rights to a role.

Figure 2.15—Grant rights page

The interface items on this page are as follows:

Item	Description
Right	Name of the right displayed in the row.
Domain	Area of the application to which the right allows access.
Description	Description of the right.
Granted	Indicates if the role grants the right or not. When editing, a button toggles the status of the right for the role.

Display Formats Page

A display format is the format in which data must be displayed, such as in the **Show records** page. Each user can select a different display format by configuring the "Format of displayed data" personal setting (if permitted by the administrator). The **Display formats** page allows an administrator to define display formats.

Figure 2.16—Display formats page

The interface items on this page are as follows:

Item	Description
Name	Display format name.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the display format (optional).
Integer number pattern	Number format pattern to use when displaying integer numbers.
Example	Shows the number 123456789 displayed using the submitted integer number pattern.

Item	Description
Decimal number pattern	Number format pattern to use when displaying decimal numbers.
Example	Shows the number 123456789.123456789 displayed using the submitted decimal number pattern.
Date pattern	Date format pattern to use when displaying dates and times.
Time zone	Time zone in which to display the dates and times. Internally, times are kept in absolute terms (same point in time, wherever on Earth). The server time zone is used when importing dates, but users living in a different time zone could access the server and want to see the time displayed in their own time zone.
Example	Shows the current time using the submitted date format and time zone.

Number Patterns

A number pattern contains a positive and negative sub-pattern, for example, "#,##0.00;(#,##0.00)". Each sub-pattern has a prefix, numeric part, and suffix. The negative sub-pattern is optional. If absent, the positive sub-pattern prefixed with the localized minus sign (usually '-') is used as the negative sub-pattern. That is, "0.00" alone is equivalent to "0.00;-0.00".

If there is an explicit negative sub-pattern, it serves only to specify the negative prefix and suffix. The number of digits, minimal digits, and other characteristics are all the same as the positive pattern. That means that "#,##0.0#;(#)" produces precisely the same behavior as "#,##0.0#;(#,##0.0#)".

The grouping separator is commonly used for thousands, but in some countries it separates ten-thousands. The grouping size is a constant number of digits between the grouping characters, such as 3 for 100,000,000 or 4 for 1,0000,0000. If you supply a pattern with multiple grouping characters, the interval between the last one and the end of the integer is the one that is used. So "#,##,###,####" == "######,####" == "##,####,####".

Decimal number formats use half-even rounding for formatting.

Table 2.3 shows the tokens that can be part of the format:

Table 2.3—Number patterns

Symbol	Location	Meaning
0	Number	Digit.
#	Number	Digit, zero shows as absent.
.	Number	Decimal separator.
-	Number	Minus sign.

Symbol	Location	Meaning
,	Number	Grouping separator.
E	Number	Separates mantissa and exponent in scientific notation. Doesn't have to be quoted in prefix or suffix.
;	Sub-pattern boundary	Separates positive and negative sub-patterns.
%	Prefix or suffix	Multiply by 100 and show as percentage.
'	Prefix or suffix	Used to quote special characters in a prefix or suffix, for example, " ' # ' # " formats 123 to "#123". To create a single quote itself, use two in a row: "# o''clock".

Scientific Notation

Numbers in scientific notation are expressed as the product of a mantissa and a power of ten, for example, 1234 can be expressed as 1.234×10^3. The mantissa is often in the range $1.0 <= x < 10.0$, but it doesn't need to be. The decimal number format can be instructed to use scientific notation. The exponent character immediately followed by one or more digit characters indicates scientific notation. Example: "0.###E0" formats the number 1234 as "1.234E3".

- The number of digit characters after the exponent character gives the minimum exponent digit count. There is no maximum. Negative exponents are formatted using the localized minus sign, **not** the prefix and suffix from the pattern. This allows patterns such as "0.###E0 m/s".

- The minimum and maximum number of integer digits are interpreted together:

  - If the maximum number of integer digits is greater than their minimum number and greater than 1, it forces the exponent to be a multiple of the maximum number of integer digits, and the minimum number of integer digits to be interpreted as 1. The most common use of this is to generate **engineering notation**, in which the exponent is a multiple of three, e.g., "##0.#####E0". Using this pattern, the number 12345 formats to "12.345E3", and 123456 formats to "123.456E3".

  - Otherwise, the minimum number of integer digits is achieved by adjusting the exponent. Example: 0.00123 formatted with "00.###E0" yields "12.3E-4".

- The number of significant digits in the mantissa is the sum of the **minimum integer** and **maximum fraction** digits, and is unaffected by the maximum integer digits. For example, 12345 formatted with "##0.##E0" is "12.3E3". To show all digits, set the significant digits count to zero. The number of significant digits does not affect parsing.

- Exponential patterns may not contain grouping separators.

Date and Time Patterns

Date and time formats are specified by **date and time pattern** strings. Within date and time pattern strings, unquoted letters from 'A' to 'Z' and from 'a' to 'z' are interpreted as pattern letters representing the components of a date or time string. Text can be quoted using single quotes (') to avoid interpretation. "''" represents a single quote. All other characters are not interpreted; they're simply copied into the output string during formatting or matched against the input string during parsing.

The following pattern letters are defined (all other characters from 'A' to 'Z' and from 'a' to 'z' are reserved):

Table 2.4—Date and Time patterns

Letter	Date or Time Component	Presentation	Examples
G	Era designator	Text	AD.
y	Year	Year	1996; 96.
M	Month in year	Month	July; Jul; 07.
w	Week in year	Number	27.
W	Week in month	Number	2.
D	Day in year	Number	189.
d	Day in month	Number	10.
F	Day of week in month	Number	2.
E	Day in week	Text	Tuesday, Tue.
a	Am/pm marker	Text	PM.
H	Hour in day (0-23)	Number	0.
k	Hour in day (1-24)	Number	24.
K	Hour in am/pm (0-11)	Number	0.
h	Hour in am/pm (1-12)	Number	12.
m	Minute in hour	Number	30.

Letter	Date or Time Component	Presentation	Examples
s	Second in minute	Number	55.
S	Millisecond	Number	978.
z	Time zone	General time zone	Pacific Standard Time; PST; GMT-08:00.
Z	Time zone	RFC 822 time zone	-0800.

Pattern letters are usually repeated, as their number determines the exact presentation:

- Text: If the number of pattern letters is 4 or more, the full form is used; otherwise a short or abbreviated form is used if available.

- Number: The number of pattern letters is the minimum number of digits, and shorter numbers are zero-padded to this amount.

- Year: If the number of pattern letters is 2, the year is truncated to 2 digits; otherwise it is interpreted as a number.

- Month: If the number of pattern letters is 3 or more, the month is interpreted as text; otherwise, it is interpreted as a number.

- General time zone: Time zones are interpreted as text if they have names. For time zones representing a GMT offset value, the following syntax is used:

```
GMTOffsetTimeZone:
        GMT Sign Hours : Minutes
Sign: one of
        + -
Hours:
        Digit
        Digit Digit
Minutes:
        Digit Digit
Digit: one of
        0 1 2 3 4 5 6 7 8 9
```

Hours must be between 0 and 23, and *Minutes* must be between 00 and 59. The format is locale independent and digits must be taken from the Basic Latin block of the Unicode standard.

```
RFC 822 time zone: The RFC 822 4-digit time zone format is used:
    RFC822TimeZone:
            Sign TwoDigitHours Minutes
    TwoDigitHours:
            Digit Digit
```

TwoDigitHours must be between 00 and 23. Other definitions are as for general time zones.

Examples

The following examples show how date and time patterns are interpreted in the U.S. region. The given date and time are 2001-07-04 12:08:56 local time in the U.S. Pacific Time zone.

Table 2.5—Date and Time pattern examples

Date and Time Pattern	Result
yyyy.MM.dd G 'at' HH:mm:ss z	2001.07.04 AD at 12:08:56 PDT
EEE, MMM d, ''yy	Wed, Jul 4, '01
h:mm a	12:08 PM
hh 'o''clock' a, zzzz	12 o'clock PM, Pacific Daylight Time
K:mm a, z	0:08 PM, PDT
yyyyy.MMMMM.dd GGG hh:mm aaa	02001.July.04 AD 12:08 PM
EEE, d MMM yyyy HH:mm:ss Z	Wed, 4 Jul 2001 12:08:56 -0700
yyMMddHHmmssZ	010704120856-0700
yyyy-MM-dd'T'HH:mm:ss.SSSZ	2001-07-04T12:08:56.235-0700

Session Control Page

A session is an existing connection between a logged in user and the application. By inspecting sessions, it is possible to know who is accessing what part of the application, and disable potential system threats. The **Session control** page allows an administrator to control all sessions that are currently active.

Figure 2.17—Session control page

The interface items on this page are as follows:

Item	Description
User	Name of the user connected in the session.
Started at	Time at which the user initiated the session.

Item	Description
Last used at	Time at which the user last used the session.
Last requested document	Document that was requested last time the session was used.
Close session	When editing, **Close session** closes the session - forces the session to be authenticated again.
Disable account	When editing **Disable account** disables the user's account.

Downloads Page

The **Downloads** page contains buttons to downloadable files that must be attached to support requests. For the support team to understand what the problem is, these files are very helpful. Therefore, to gain time when requesting support, consider attaching the environment and log files to your request.

Figure 2.18—Downloads page
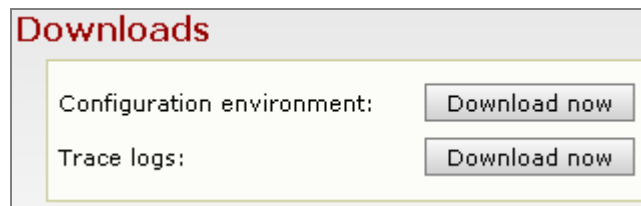
The interface items on this page are as follows:

Item	Description
Configuration environment	This allows the support team to understand your configuration and job definition.
Trace logs	This allows the support team to analyze why a problem occurred. It contains low-level messages like database queries and program execution logs.

Configuration of MasterCard Expert Monitoring System

The **Configuration** page provides access to pages which allow the administrator to define elements that can be used in jobs. The **Navigation tree** contains links to each of these pages.

The **Configuration** page can only be viewed by users that have the "View configuration" permission defined for their assigned roles, and can only be modified by users that have the "Edit configuration" permission defined for their assigned roles.

Figure 2.19—Main Configuration page
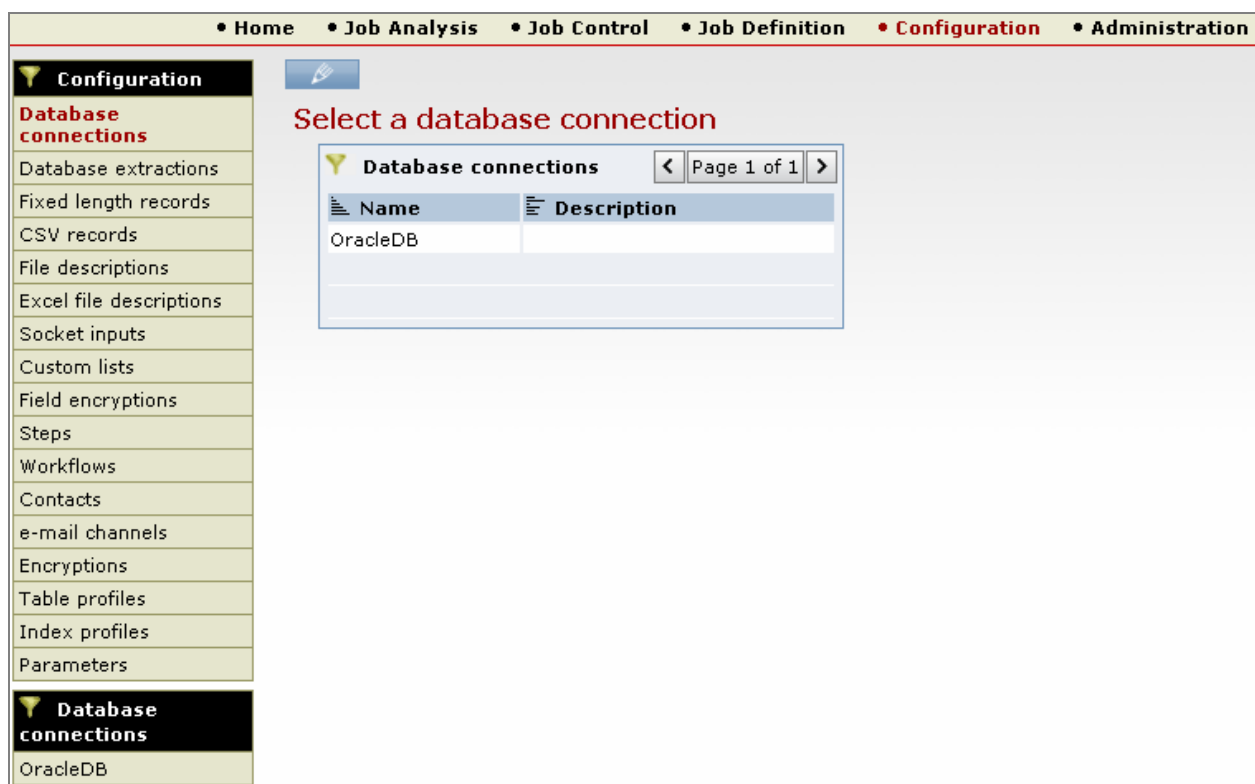
Database Connections Page

The **Database connections** page allows the user to define database connections. A database connection contains all the settings required to establish a JDBC connection to a SQL database.

- It can be used as the internal database connection for the job, which means that all the job tables will be created through it.

- It can also be used by a database extraction to execute queries on existing tables, in order to import records into a datasource.

- It can be used by the Export module to execute inserts that will fill a target table.

Figure 2.20—Database connections page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the database connection.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ☑ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the database connection (optional).
User	Valid user name for connection to the target database.

Item	Description
Password	Valid password for connection to the target database.
	If this option is selected (☑) and no password is entered in the field, the previously defined password will remain valid.
	If this option is selected (☑) and a new password is entered in the field, the password will be updated.
	If it is not selected no password will be set.
Driver	JDBC Driver used for connection to the target database.
URL	For a new database connection, the driver fills in a template specifying all necessary parameters for the database connection. The technician has to fill in all database installation specific information.
Expiration interval for unused connections	Time after which an unused connection to the database will be terminated.
Validity	Indicates whether or not the connection to the database is valid.

Database Extractions Page

The **Database extractions** page allows the user to define database extractions. A database extraction contains a SQL select statement that defines the specific fields and records that must be imported from an existing database into a datasource. The data can be loaded either during the batch processing of a Job, or when the user clicks the **Load now** button on the **Database maintenance** page.

Figure 2.21—Database extractions page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the database extraction.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the database extraction (optional).

Item	Description
Database connection	Database connections are defined in the **Database connections** page of the **Configuration** page. Select the database connection of the database from which data will be extracted.
Select	"Select" clause of the SQL statement.
From	"From" clause of the SQL statement.
Where	"Where" clause of the SQL statement.
Group by	"Group by" clause of the SQL statement.
Validity	Indicates whether or not the extraction is valid.

Fields Page

The **Fields** sub-page of the **Database extractions** page allows the user to define field names for the database extraction and to map existing columns in the database (which have been defined in the select statement) to these fields.

Figure 2.22—Fields page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the field, which is by default equal to the database column name.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the field.
Column name	Original database column name. This field is not editable.
Description file	If this option is selected (☑), it allows the user to associate a description file with the database extraction field. When the analyst is in the **Job Analysis** page and rolls the mouse over one of the codes, after a few seconds the description of the code is displayed in a tool tip. Description files are user-defined and are located in the description file folder. The location of the description file folder is defined within the 'Description files directory' parameter, in the **Parameters** page.
Decrypt field on import	If this option is selected (☑), the user may select a Field encryption that will be used to decrypt the field content.

Fixed Length Records Page

The **Fixed length records** page allows the user to define fixed length records.

A fixed length record is a record composed of fixed length fields. This record description is used during data import to convert bytes into record fields that can be saved in the internal database.

It is used by file descriptions to import records into a datasource during the batch processing of a Job, or, at the request of the user, from the **Database maintenance** page, using the **Load now** button.

Figure 2.23—Fixed length records page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the fixed length record.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the fixed length record (optional).
Computed record length	Actual length of the record, automatically calculated by MasterCard Expert Monitoring System, based on the fields defined.
Override record length	If this option is selected (✔), the users have the possibility to enter the record length manually. In this case MasterCard Expert Monitoring System will check that the manually entered record length is greater or equal to the computed record length, and will raise a warning message during the validation if otherwise. It can be used to skip end of line characters at the end of every record.

Item	Description
Character encoding	Select one of the available character set that will be used to map incoming bytes to characters. The system character set is selected by default.
Test record	Optional field to validate the record description. Enter a record as it exists in the input files. The text is parsed according to the actual description. If the text is too long, it will be truncated. If the text is too short, any missing test record field is empty. Any parsing error is displayed in the "Test record" column of the corresponding field.

Fields Page

The **Fields** sub-page of the **Fixed length records** page allows the user to define fixed length fields. A fixed length field describes the format of a field that can be extracted from bytes.

Figure 2.24—Fields page

The interface items on this page are as follows:

Item	Description
Name	User defined name of the field. It is recommended to use different names for fields in the same record.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the

Item	Description
	✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the field (optional).
Start offset	Position at which the field starts in the record.
Field type	The type of field (Character, Date Time, Decimal or Integer). The types Integer and Decimal should only be specified for fields on which calculations will be made (for example volume or average of amounts). Integer base type is limited to 18 digits and therefore numerical codes such as PAN that are 19 digits long should be stored using the "Character" field type.
Format	The length or composition of the field.
	The format description enables the user to create fields which are part of another field, or to create fields that concatenate disjointed fields. The offset definition already permits the existence of overlapping fields. For example, it is possible to extract the BIN part of the PAN.
	It is sometimes not sufficient to concatenate fields. For all field formats, it is possible to insert cursor movement between parentheses. For instance, the Character format "4(2)3" means that starting at the offset, the field must contain the four first bytes, must skip the next two bytes and must include the next three bytes. The final string will be created using the seven bytes.
	It is also possible to move the cursor backwards. For instance, the date format "YYYYMMDD(-18)HHMISS" means that the field must contain the first eight bytes, return 18 bytes backwards and read the next six bytes.
	Example: A record containing "120250XXXX20050731" will be read as "20050731120250" representing 31st July 2005 at 12h 02m 50s. Of course, the result will be the same using the format "HHMISS(4)YYYYMMDD". Going backwards can be useful for importing a family name and a first name in one column in the desired order.
Description file	If this option is selected (☑), it allows user to associate a file with a fixed length field. This file is defined by the user and is located in the description file folder. The location of the description file folder is defined within the "Description files directory" parameter, in the **Parameters** page.

Item	Description
Decrypt field on import	If this option is selected (☑), the user may select a Field encryption that will be used to decrypt the field content.
End offset	Position at which the field ends in the record. It is a read-only field, automatically calculated by MasterCard Expert Monitoring System, based on the start offset and the field format.
Test record	Content of the field that has been read from the test record. The field displays error messages if the field content cannot be obtained.

Format

The tokens available in the format are displayed in Table 2.6.

Table 2.6—Fixed length record field tokens

Token	Type	Description
Positive number (such as 6 or 125)	Character, Integer, Decimal	Reads the given number of bytes from the input. Example: if input is ABCD and format is 2, it will import AB.
(Integer number) (such as (3) or (-12))	All	Skips the given number of bytes. A negative number indicates to move the cursor backward in the input. Example: if input is ABCD and format is 1(2)1(-3)2, it will import ADBC.
.	All	Skips one character. Equivalent to (1). Example: YYYY.MM.DD.HH.MI.SS
.Positive number (such as .2)	Mandatory Decimal suffix	Indicates at the end of a decimal to divide the parsed number by 10 the given number of times. Example: if input is 123456 and format is 6.2, it will import 1234.56. If format is 6.0, it will import 123456. If input is 123.45, the same formats will respectively import 1.2345 and 123.45.
YYYY	Date Time	Year in four bytes from 0000 to 9999.
YYY	Date Time	Year in three bytes from 000 to 999. The pivot date can be specified in the **Parameters** page.
YY	Date Time	Year in two bytes from 00 to 99. The pivot date can be specified in the **Parameters** page.
MMM	Date Time	Month in three letters: JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV or DEC.

Token	Type	Description
MM	Date Time	Month in two bytes from 01 to 12.
DD	Date Time	Day within the month in two bytes from 01 to 31.
JJJ	Date Time	Julian day (day number within the year) in three bytes from 001 to 366.
HH	Date Time	Hours in two bytes from 00 to 23.
MI	Date Time	Minutes in two bytes from 00 to 59.
SS	Date Time	Seconds in two bytes from 00 to 59.
FILE[file name,inner format,length]	Character, Integer, Decimal	This token imports a value taken from a lookup file. The file must contain lines with couples 'key=value'. The inner format is used on the incoming data to obtain the key. The value is imported (with its length adjusted to the given length). Example: FILE("desc/mcc.txt",4,6) imports 5944. In the file mcc.txt, there is a line with '5944=Jewelry'. Therefore, the value imported value is Jewelry, truncated at a length of 6: Jewelr Empty space in the key must be preceded by ". Surrounding space must not be included in the key.

CSV Records Page

The **CSV records** page allows the user to define CSV records. A CSV record is a record description composed of CSV fields (CSV stands for Comma Separated Values). This record description is used during data import to convert incoming comma separated data into record fields that can be saved in the internal database. It is used by file descriptions to import records into a datasource during the batch processing of a job. It is also used by socket inputs to import records into a datasource during the live processing of a job. A sub-page Fields allows the user to define CSV fields.

Figure 2.25—CSV records page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the CSV record.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ![button] button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the CSV record (optional).
Number of columns	Number of columns within each record to be imported.
Field separator	Character used as separator between fields.
Character field encloser	Character used to enclose text fields.
Character encoding	Select one of the available character set that will be used to map incoming bytes to characters. The system character set is selected by default.

Item	Description
Test record	Optional field to validate the record description. Enter a record as it exists in the input files. The text is parsed according to the actual description. If the text is too long, the rest is ignored. If the text is too short, any missing test record field is empty. Any parsing error is displayed in the "Test record" column of the corresponding field.
Truncate cell content to fit in field format	If this option is selected (☑), any cell content that surpasses the format (or length) defined for Character CSV field will be truncated to fit in the defined field. If this option is not selected, a cell content that surpasses the field length will make the import fail.

Fields Page

The CSV fields page allows the user to define CSV fields. A CSV field describes the format of a field that can be extracted from bytes within a CSV record.

Figure 2.26—CSV fields page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the CSV field.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the CSV field.
Column	Index of the column where the field is located inside the imported field.
Field type	The type of the field: Character, Date Time, Decimal and Integer.
Format	Format of the field. For Character fields, this is the maximum length of the text. For numeric fields, the format is described in Number patterns. For date fields, the format is described in Date and Time patterns.
Description file	If this option is selected (☑), the user may select the name of a file containing descriptions related to the field content.
Decrypt field on import	If this option is selected (☑), the user may select a Field encryption that will be used to decrypt the field content.
Test record	Content of the field that has been read from the test record. The field displays error messages if the field content can not be obtained.

File Descriptions Page

The **File descriptions** page allows the user to define file descriptions. A file description defines the format of files that can be imported into a datasource. The data can be loaded during batch processing, or when the user clicks the **Load now** button on the **Database maintenance** page.

Figure 2.27—File descriptions page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the file description.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the [✓] button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the file description (optional).
Record format	Select one of the defined records.
File header length	The number of bytes that must be skipped from beginning of each input file.
File footer length	The number of bytes that must be skipped from the end of each input file.

Excel File Descriptions Page

The **Excel file descriptions** page allows the user to define Excel file descriptions. An Excel file description defines the format of Excel files that can be imported into a datasource during batch Job processing. A sub-page, **Excel fields** allows the user to describe the format of a field that can be extracted.

Figure 2.28—Excel file descriptions page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the Excel file description.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the Excel file description.
Number of rows in file header	The number of rows that must be skipped from beginning of each Excel file sheets.

Item	Description
Behavior for empty rows	Select a behavior to be followed when an empty row is encountered during the import. The possible values are:
	Error: fail the import and terminate job processing.
	Import row: import the row with no data, this might fail if a key field or a time field requires data.
	Skip row: do not import the empty row, but continue processing the file.
	End of file: do not import any more row, consider the file as completely imported.
Truncate cell content to fit in field format	If this option is selected (☑), the cell content that surpasses the format (or length) defined for Character Excel field will be truncated to fit in the defined field. If this option is not selected, a cell content that surpasses the field length will make the job run fail.

Excel Fields Page

The **Excel fields** page allows the user to define Excel fields. An Excel field is the format description for a field that can be extracted from an Excel file.

Figure 2.29—Excel fields page

The interface items on this page are as follows:

Item	Description
Name	User defined name of the field. It is recommended that you use different names for fields in the same record.

Item	Description
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ☑ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the field (optional).
Column number	Number of the column to be read for the field. First column is column 1.
Field type	The type of the field: Character, Date Time, Decimal and Integer.
Format	Format of the field.
Description file	If this option is selected (☑), user may select a file containing descriptions related to the field content. This file is defined by the user and is located in the description file folder. The location of the description file folder is defined within the 'Description files directory' parameter, in the **Parameters** page.

Format

The tokens available in the format are described in Table 2.7:

Table 2.7—Excel field tokens

Token	Type	Description
Positive number (such as 6 or 125)	Character	Length of the field. Longer cell content in the input will make the job run fail. If the Truncate cell content to fit in field format option is selected in the **Excel file descriptions** page, the cell content will be truncated to this length. Example: if input is ABCD and format is 2, it will import AB.
Date time patterns	Date Time	For Date Time field, the format can be left blank, in case the field is defined as a Date field in Excel. The format will be extracted from the cell. If the field is defined as a Character field in Excel, and has to be loaded as a Date Time, a date format needs to be provided. Refer to the Date and time display format in "Display Formats Page" section earlier in this chapter.

Socket Inputs Page

The **Socket inputs** page allows the user to define socket inputs. A socket input is the definition of a network entry point where incoming records will be posted. These records will be imported into a datasource during live processing.

- The socket input can behave like a server waiting for incoming records on a specified port, from different clients.

- Additionally, the socket input can behave like a client connecting to a specified server(s) on a specified port.

Figure 2.30—Socket inputs page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the socket input.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
Description	Freetext description of the socket input (optional).
Record format	Select the record layout out of the defined records. The record describes the fields to be imported.
Server port	If this option is selected (☑), define the port on the MasterCard Expert Monitoring System server to be opened by the system to receive incoming connection and incoming records.

Client Sockets Page

The **Client sockets** page allows the user to define client sockets. A client socket defines a network point where incoming records will be available for live processing, to import into a datasource.

Figure 2.31—Client sockets page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the client socket.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ☑ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
Description	Freetext description of the client socket (optional).
Host	The IP address of the server socket.
Port	The port of the server socket.
Delay	The time interval, pause between two connection attempts.

Custom Lists Page

The **Custom lists** page allows the user to define custom lists. A custom list is a list of custom values. These values will be possible values for any editable fields that have been defined as "custom" field types in the datasource.

Figure 2.32—Custom lists page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the custom list.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the custom list (optional).

Custom Values Page

The **Custom values** page allows the user to define custom values. A custom value is one of the values within a custom list. Custom values are ordered by priority in the list, "1" being the highest priority. The user can select a custom value for any editable fields of type "custom".

Figure 2.33—Custom values page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the custom value.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the custom value (optional).

In the list view, the following items are available:

Table 2.8—List view

Item	Description
Position	Position in the list.
Name	Name defined by the user when creating the custom value.
Description	Description defined by the user when creating the custom value.
Up	▲ Move up in the list.
Down	▼ Move down in the list.
Delete	✖ Delete value.

Figure 2.34—Custom values page list view
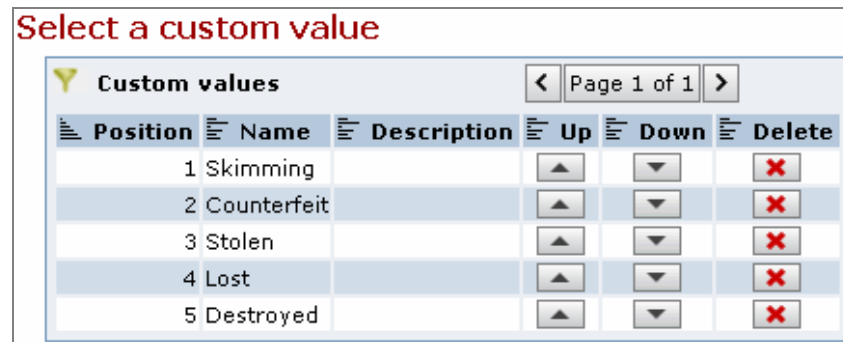
Field Encryptions Page

The **Field encryptions** page allows the user to define an interface to call an encryption / decryption mechanism that transforms text data contained in a field. For more information, please refer to Chapter 3.

Figure 2.35—Field encryptions page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the field encryption.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the field encryption (optional).
Encoder	Select an encoder type. Depending on the encoder selected, additional parameters are available. The settings below, "Key" and "Pattern" are only valid for the sample encoder delivered with EMS. This is a sample encoder only and does not provide strong encryption.
Key	If this option is selected (✔), a key is specified for the encoding. For security reasons, the key field is always displayed as empty. If the page is submitted with an empty key field, the old key is displayed. To remove an existing key, deselect the checkbox and click the **Submit this page** button. Any free text can be entered to initiate the random part of the encryption.

Item	Description
Pattern	Masking pattern to apply to the text data. All "_" characters will mark positions in the string that need to be hidden. All other character will be displayed. Characters beyond the pattern length will be hidden. E.g.: In the case of PANs, a possible pattern value is "123456_____1234". This pattern would keep the first six digits BIN and the last four digits intact. Other characters will be hidden.

Steps Page

The **Steps** page allows the user to define steps. These steps will be grouped into workflows.

A step is an action that is part of case investigation. A step can be associated with the launching of an external program and execution of an action in that program.

Figure 2.36—Steps page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the step.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✓ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the step (optional).
Execute the following command	If required, you can select an external command that will be launched when the step is called in the **Investigation** page. The commands are defined in files, one command per file. These files must be stored in the "stepcommandfile" folder located in the root folder on the server installation.
	Commands can be entered in the files, followed by parameters. To add case datasource fields, or values to the command line, embed the names of the fields between ampersand (&) characters. Based on your system requirements, you may need to add single or double quotes if the command name contains space characters. In addition to these case datasource fields, three other parameters exist:
	• &current_user&: name of the user that has executed the step.
	• &current_time&: date and time at which the step is executed, and the command is called.
	• &case_matches&: calculated column from the Cases datasource that contains the name of the rules that match the case.
	Command file content example:
	BlockCard.exe &ACCOUNT_NBR& &current_user& &current_time&
	In this example, the user has developed his own program with the name BlockCard.exe, which accepts three parameters: the card number, the user and the date. This program will immediately register the card into the blocked cards list.
Redirect command output to server console	If this option is selected (☑), any output generated by the called command will be written in the server console. If it is not selected, nothing regarding this command will be written in the server console.
Execute command synchronously	If this option is selected (☑), once the step is called, the hand will only be returned to the user after the command has been completely executed. If it is not selected, once the step is called, the hand is immediately returned to the user, the command will continue to be executed in background.

Workflows Page

The **Workflows** page allows the user to define workflows. A workflow is a sequence of investigative steps. These workflows will be assigned to work queues and will guide the analysts in their case investigation work.

Figure 2.37—Workflows page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the workflow.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the workflow (optional).

Workflows Steps Page

The **Workflows steps** page displays all steps in a workflow and allows the user to add steps to a workflow, delete steps from a workflow, change the order of the steps, or mark the steps that are mandatory. These steps are defined in the **Steps** page.

Figure 2.38—Workflows steps page
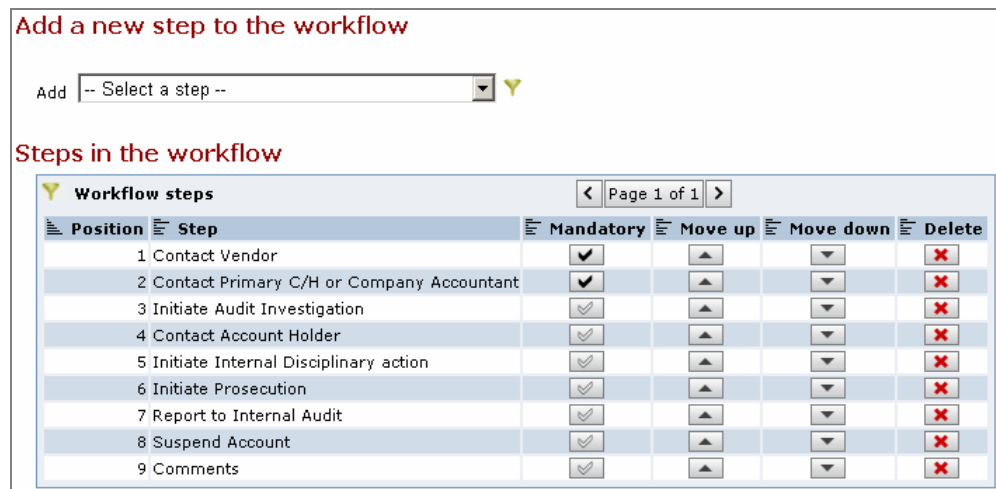
The interface items on this page are as follows:

Item	Description
Add	Allows the user to add a step, defined in the **Steps** page, to the workflow.
Position	The position of the step in the workflow. The order of the steps can be defined by the user but will not be enforced for the analyst.
Step	Name of the step as defined by the user in the **Steps** page.
Mandatory	If this option is selected (☑), the investigation cannot be closed until the step has been completed.
Move up	▲ Move up in the list.
Move down	▼ Move down in the list.
Delete	✖ Delete value.

Contacts Page

The **Contacts** page allows the user to define contacts. A contact represents a contact and its different addresses.

It is a message item that can be included in a message template, to receive messages, or to display its contact information in the message content.

Figure 2.39—Contacts page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the contact.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the contact (optional).

Addresses Page

The **Addresses** page is used to create one or more addresses for a contact. A contact can have multiple addresses for one or several of the available communication media.

Figure 2.40—Addresses page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the address.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the address (optional).
Address type	Available media types.
Address	Address details in a format suitable for the media type.

e-mail Channels Page

The **e-mail channels** page allows the user to define e-mail server connections. An e-mail channel is a connection to an STMP mail server. e-mail channels do not support the reception of responses in this version of MasterCard Expert Monitoring System.

Figure 2.41—e-mail channels page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the e-mail channel.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
Description	Freetext description of the e-mail channel (optional).
SMTP settings	
SMTP host	IP address of the mail server.
SMTP port number	Port number of the mail server on the host.
Use a user name and a password	If this option is selected (☑), the user has to define a user and a password to define the connection.
SMTP user	User login to a mailbox on the mail server.
SMTP password	If this option is selected (☑), a password to connect to the SMTP server is specified. For security reasons, the **SMTP password** field is always displayed as empty. If the page is submitted with an empty password field, the old password is kept. To remove an existing password, deselect the checkbox and submit the page.
Connection type	Select a connection type amongst "Unsecured", "TLS" and "SSL".
Validity	Read-only field indicating whether or not connection is valid for provided parameters.

Encryptions Page

The **Encryptions** page allows the user to define an interface to call an encryption system. It will allow users to encrypt files that are sent with messages. Bytes will be sent to the standard input of the encryption system, and encrypted files will be collected at the standard output of the system.

Figure 2.42—Encryptions page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the encryption.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ☑ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the encryption (optional).
Encryption type	Select an encryption interface type. The Command line encryption allows to define the script to be called and the parameters, if any, to pass to the script.
Script	Select the command file to call to connect to an encryption system. The command files need to be stored on the server in a folder named "encryptioncommandfile", to be displayed in the list.
Buffer size	Size of the buffer used to store bytes to be sent to the encryption system standard input.
Number of parameters	Number between 0 and 20. Number of parameters that need to be passed to the script.
Parameter name [1-20]	Name of the parameters (if any). Parameters value origin will be defined within the message template it is used.

Table Profiles Page

The **Table profiles** page allows the user to define table profiles. A table profile contains additional parameters used during the creation of tables.

Figure 2.43—Table profiles page

The interface items on this page are as follows:

Item	Description
Name	Name of the table profile.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the table profile (optional).
Database connection	Database connection within which the table profile will be used.
Profiling clause	Clause appended in the construction of tables for which this table profile is selected. The editor depends on the database driver used in the database connection. A typical table profile indicates the use of a specific tablespace of the database. No validation is done on the entered text. Make sure to verify syntax by referring to the relevant documentation for the database that is used.
Use automatic statistics recomputation	If this option is selected (☑), recomputation of database statistics will be automatically performed by the application.
Ratio low water mark	Lower bound threshold below which the statistics will be recomputed. The ratio is (current number of records in table / number of records in table last time statistics were computed). E.g. with a ratio of 0.5, statistics will be recomputed when the number of records in the table becomes less than half what it was last time the statistics were computed on the table.
Ratio high water mark	Higher bound threshold above which the statistics will be recomputed. The ratio is (current number of records in table / number of records in table last time statistics were computed). E.g. with a ratio of 2.0, statistics will be recomputed when the number of records in the table becomes more than twice what it was last time the statistics were computed on the table.
Tail SQL	Clause appended in the statement that computed statistics. In Oracle, the statement will be in the form: **ANALYZE TABLE <table name> <tail SQL clause>** E.g. in Oracle: **ANALYZE TABLE A_JOB_A_TABLE Compute Statistics For Table** indicate **Compute Statistics For Table** in the tail clause. When automatic statistics recomputation is activated, the tail clause is mandatory.

Index Profiles Page

The **Index profiles** page allows the user to define index profiles. An index profile contains additional parameters used during the creation of indexes.

Figure 2.44—Index profiles page

The interface items on this page are as follows:

Item	Description
Name	Name of the index profile.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✓ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
Description	Freetext description of the index profile (optional).
Database connection	Database connection within which the index profile will be used.
Head profiling clause	Clause inserted after the "create" keyword in the construction of indexes for which this index profile is selected. No validation is done on the entered text. Make sure to verify the correct syntax in the user guide of the database that is used, as well as the fact that some feature of the database do really work.
Tail profiling clause	Clause appended in the construction of indexes for which this index profile is selected. The editor depends on the database driver used in the database connection. A typical index profile indicates the usage of a specific tablespace of the database. No validation is done on the entered text. Make sure to verify the correct syntax in the user guide of the database that is used.

Parameters Page

The **Parameters** page allows the user to define parameters that are used by the application.

Figure 2.45—Parameters page

The parameters are as follows:

Parameter	Description
Kernel	
Expiration interval for an inactive session	This interval specifies when the time out of a session will happen after a certain period of inactivity. By default, it is set to 15 minutes.
InFile function files loader buffer size	This number is the size in bytes of the buffer used when loading a file during the processing of an InFile function. By default, it is set to 100000.
Pivot year for three digits years	Pivot year used when using the YYY format token. If the pivot is 1950, 950 to 999 will be interpreted as 1950 to 1999, while 000 to 949 will be interpreted as 2000 to 2949. By default, it is set to 1900.
Pivot year for two digits years	Pivot year used when using the YY format token. If the pivot is 1950, 50 to 99 will be interpreted as 1950 to 1999, while 00 to 49 will be interpreted as 2000 to 2049. By default, it is set to 1950.
Rule Station	
Description files directory	This indicates which folder is searched by the system when accessing the description files. By default, it is set to "descriptionfile/".
History function process record block maximum size	During rule processing, records sometime need to be grouped following a given field. Each group's processing can be done in parallel. This constant indicates the maximum number of records that can be held in the memory for one group. If this number is exceeded, the processing will be done via temporary files. By default, it is set to 5000.
History function process record block size	During rule processing, records sometimes need to be grouped following a given field. Each group's processing can be done in parallel. This constant indicates the minimum number of records in one group. Handling too many small groups can take more time than a few big ones. By default, it is set to 1000.
InFile function files directory	This indicates in which folder the files are looked for by the InFile function. By default, it is set to "infile/".
Live record maximum size	This number is used when purging the live processing working memory persistence. It will keep a history of the working memory based on size in bytes: required number of records times this number. By default, it is set to 10000.
Rule match insertion batch size	Number of matching record identifier inserted in one insert execution. By default, it is set to 1000.

Parameter	Description
Safe keeping insertion batch size	This number defines the number of records inserted in one go in the datasource safe keeping storage table. By default, it is set to 1000.
Safe keeping matching rules column size	This number defines the length of the column storing matching rules for records stored in the datasource safe keeping storage table. By default, it is set to 500.
Communicator	
Maximum number of time triggers in buffer	During communication processing, there are time-based events that can trigger effects. This parameter indicates the maximum number of time events to keep in a time-line in memory. By default, it is set to 10000.
Message fields columns size	Communicator has text fields in its Inbox and Outbox. This parameter indicates the size of those message field columns. By default, it is set to 1000.

Job Definition

The **Job Definition** page allows you to create, or modify jobs. You open the **Job Definition** page by clicking **Job Definition** in the **Navigation bar**. The page displays a **Job name** field and a **Create** button, and a table containing a list of existing jobs.

- If you want to create a new job, enter a name in the **Job name** field and click the **Create** button.

- If you want to edit an existing job, click the job in the job table.

- If you want to change the currently selected job, click the job name under the **Toolbar**. The **Select a job** page will be displayed allowing you to select an alternative job.

Figure 2.46—Job selection page

In either case, the **Basic options** page appears allowing you to create or modify the basic options of the job. Links to all the **Job Definition** pages are displayed in the **Navigation tree** on the left-hand side of the page, as follows:

Basic options	**Case managers**
Datasources	**Archives**
Relationships	**Profiles**
Views	**Messages**
Filters	**Notifications**
Rules	**Access profiles**
Export contents	**Rule transfer**
Exports	**Tables**

Basic Options Page

The **Basic options** page allows the user to define basic job options. It contains a link to the **Granted users** sub-page which allows the job owner to grant access for his job to other users.

Figure 2.47—Basic options page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the job.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the job (optional).
Database connection	List of all database connections defined in the **Database connections** sub-page of the **Configuration** page.
Delete log data after	Interval specifying the period for which log information must be retained for this job.

Granted Users Page

The **Granted users** page allows the user to grant access to other users.
It is accessible as a sub-page of the job **Basic options** page.

A granted user is a user who has been granted access to a given job. This means that the user will be able to view or edit this job in the pages for which he has been granted rights. For more information on profiles, roles and rights, refer to the section "Access Profiles Page", later in this chapter, and to the section "Access Profiles" in Chapter 3.

The job list displays to that user, only the jobs to which access has been granted.

On the **Granted users** page, all users are shown in a table with the following columns:

Table 2.9—Granted users table

Column	Description
User	Name of the user.
Access profile	Type of access granted to the user.
Revoke	❌ Revokes user access.

Figure 2.48—Grant users page

To grant or revoke access rights, the user must be in edit mode (click the **Edit** icon).

A user with sufficient rights can grant access for a user by selecting the user in the **Grant user** drop-down list, then selecting the required access profile from the **Access profile** drop-down list.

A user with sufficient rights can revoke access for a user by clicking the () button in the **Revoke** column.

Datasources Page

A datasource defines a storage for records within the internal database. Records are imported into this storage during the job processing. Rules use datasource fields during the classification process. Records stored in datasources can be analyzed using the job analysis tools.

The **Datasources** page allows a user to define a datasource. It contains general information about a datasource and six sub-pages containing more specific information about the datasource:

- **Source description** page: defines options that are specific to the chosen source description.

- **Computed fields** page: defines computed fields using the different computations available.

- **Editable fields** page: defines fields that can be filled in by users during reviewing.

- **Safe keeping** page: defines the safe keeping options.

- **Storage** page: defines the field encryption use to protect private data.

- **Drillable fields** page: defines fields that will be used to navigate through the data.

Figure 2.49—Datasources page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the datasource.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the datasource (optional).
Source description	Format of the datasource. It can be a database extraction, a file description, an Excel file description, a profile, cases management, steps management, an outbox, an inbox or a socket input.

Item	Description
Unique key field	If this option is selected (☑), a field must be selected in the drop down list box. When using a unique key, the import replaces old records by imported records having the same key values. Importing duplicate keys is then forbidden and will result in the cancellation of the job run.
Replace datasource completely	If this option is selected (☑), the datasource previous content is dropped before the new content is imported.
Ignore duplicates	If this option is selected (☑), job run is not interrupted if duplicate keys are found, while importing datasources with unique keys.
Index profile	Index profile to use on a temporary table when avoiding duplicates (Tuning parameter).
Receive time from field	Defines the field in the datasource which will be used as the transaction time.
Delete data after	If this option is selected (☑), the user can choose a time interval specifying the period for which the data will remain in the datasource.

The appearance of the **Source description** page depends on the type of source description chosen in the **Datasources** page. The following options are available:

- Database extraction

- File description

- Excel file description

- Socket input

- Profile

- Case manager

- Step manager

- Outbox

- Inbox

Source Description Options for Database Extraction

If a database extraction is selected as source description, the **Source description** sub-page of the **Datasources** page allows the user to define database extraction options that are specific to a datasource.

Figure 2.50—Source description options for database extraction

The interface items on this page are as follows:

Item	Description
Import during batch run	If this option is selected (☑), datasource will be imported during batch job run.
Import as a lookup	If this option is selected (☑), datasource will be completely refreshed. Previously imported data will be deleted. As a result, the datasource can be used by the Lookup function.
Filter import with	If this option is selected (☑), the datasource will only import records that are accepted by the selected Filter.
Import thread	Tuning parameter that represents the maximum number of concurrent threads used to import data.
Batch size	Tuning parameter that represents the number of records that can be inserted in one go during the import.
Resume key field	If this option is selected (☑), the selected resume key field will be used to avoid importing twice the same record. The selected field should be a sequence in the table.
Load limit	If this option is selected (☑), the number of imported records per import run is limited to the number specified in the adjoining field. Once the number is reached, the import stops the extraction and the job processing continues on the imported records.
Frequency limit	If this option is selected (☑), it ensures that the extraction is not repeated within the given interval.

Source Description Options for File Description

If a file description is selected as source description, the **Source description** sub-page of the **Datasources** page allows the user to define file description options that are specific to a datasource.

Figure 2.51—Source description options for file description

The interface items on this page are as follows:

Item	Description
Import during batch run	If this option is selected (☑), datasource will be imported during batch job run.
Import as a lookup	If this option is selected (☑), datasource will be completely refreshed. Previously imported data will be deleted. The loaded file will not be deleted. As a result, the datasource can be used by the Lookup function.
Filter import with	If this option is selected (☑), datasource data will be filtered using the selected filter.
Input folder	Folder on the server from which to import the files. The path to the folder can be defined in a relative or absolute way. This folder should be unique for each datasource, since by default the data files are deleted after upload.
Import thread	Tuning parameter that represents the maximum number of concurrent threads used to import data.
Batch size	Tuning parameter that represents the number of records that can be inserted in one go during the import.
File chunk	Tuning parameter that represents the number of parts of a file that can be imported in parallel during the import.

Item	Description
Continue when import errors occur	If this option is selected (☑), continues the import until the threshold of erroneous records is not reached.
Max % of erroneous records	Threshold percentage of records that may be rejected before the import fails.
Output folder	Folder into which to write rejected records. The path to the folder can be defined in a relative or absolute way. If no folder is specified, the file containing the rejected records will be saved on the server, in the folder from which MasterCard Expert Monitoring System has been started. If the folder has been specified, but does not exist on the server, the folder will be created during the job run, if some files need to be saved.

Source Description Options for Excel File Description

If an Excel file is selected as source description, the **Source description** sub-page of the **Datasources** page allows the user to define Excel file description options that are specific to a datasource.

Figure 2.52—Source description options for Excel file description

The interface items on this page are as follows:

Item	Description
Import during batch run	If this option is selected (☑), datasource will be imported during batch job run.
Import as a lookup	If this option is selected (☑), datasource will be completely refreshed, previously imported data deleted but the source of data will be preserved. For instance, the loaded file will not be deleted. As a result, the datasource can be used by the Lookup function.
Filter import with	If this option is selected (☑), datasource data will be filtered using the selected filter.
Import thread	Tuning parameter that represents the maximum number of concurrent threads used to import data.
Batch size	Tuning parameter that represents the number of records that can be inserted in one go during the import.
Input folder	Folder on the server from which to import the files. The path to the folder can be defined in a relative or absolute way. This folder should be unique for each datasource, since by default the data files are deleted after upload.

Source Description Options for Socket Input

If a socket input is selected as source description, the **Source description** sub-page of the **Datasources** page allows the user to define socket input options that are specific to a datasource.

Figure 2.53—Source description options for socket input

The interface items on this page are as follows:

Item	Description
Working memory options	
Initial load size	Initial size to which the working memory is preloaded.
Use synchronous loading	If this option is selected (☑), ensures the initial size is reached before accepting incoming records.
Required size	Number of records to keep in the working memory. Once reached, the working memory size will not go below this limit.

Item	Description
Maximum size	Maximum number of records admitted in the working memory. Once reached, no more record is admitted in the working memory until enough records have been freed.
Resume folder	Folder in which the working memory stores its resume data.
Storage options	
Store incoming records in the internal database	If this option is selected (☑), the records are stored in the internal database.
Store only records matching rule	If this option is selected (☑), only the records matching the selected rule are stored in the internal database.
Buffering options	
Parser buffer size	Number of records admitted in the buffer preceding the record parsing.
Working memory feeder buffer size	Number of records admitted in the buffer preceding the working memory feeding.
Working memory saver buffer size	Number of records admitted in the buffer preceding the working memory saving.
Classifier buffer size	Number of records admitted in the buffer preceding the classification.
Output dispatcher buffer size	Number of records admitted in the buffer preceding the output dispatcher.
Storage output buffer size	Number of records admitted in the buffer preceding the storage.
Processing options	
Filter import with	If this option is selected (☑), datasource data will be filtered using the selected filter.
Stop whole live process as soon as an error occurs	If this option is selected (☑), live job processing will be stopped as soon as an error occurs.
Do not reconnect to hosts that have fed errors during current process	If this option is selected (☑), no reconnection will be attempted to hosts that have produced errors during job run.
Add log entries for each established connection	If this option is selected (☑), an entry will be added in the log for each established connection.

Source Description Options for Profile

If a profile is selected as source description, the **Source description** sub-page of the **Datasources** page allows the user to define profile options that are specific to a datasource.

Figure 2.54—Source description options for profile

The interface items on this page are as follows:

Item	Description
Profiling thread	Tuning parameter that represents the maximum number of concurrent threads used for the profiling.
Batch size	Tuning parameter that represents the number of records that can be inserted in one go during the profiling.
Update profile only on first job run after every ... of every ... at ...	Parameter to limit the profile update frequency.

Source Description Options for Case Management

If case management is selected as source description, the **Source description** sub-page of the **Datasources** page allows the user to define case management options that are specific to a datasource.

Figure 2.55—Source description options for case management

The interface items on this page are as follows:

Item	Description
Generate cases during batch job run	If this option is selected (☑), cases will be generated during batch job run.
Maximum cases activated per job run	If this option is selected (☑), it limits the maximum number of cases activated, created or reopened, per job run. If reached the batch job run will stop.
Maximum cases kept in database	If this option is selected (☑), it limits the maximum number of cases accepted in the database. If reached the batch job run will stop.
Generate cases during live job run	If this option is selected (☑), cases will be generated during live job run.
Live buffer size	Number of records admitted in the buffer for live processing (Tuning parameter).
Close 'stand by', 'new' and 'reactivated' cases older than	If this option is selected (☑), it defines the time interval after which cases in Stand by, New or Reactivated state will be closed.

Source Description Options for Outbox

The **Source description** page of the Outbox datasource allows the user to indicate which communication channels will be used by the communication processing on the job.

Figure 2.56—Source description options for outbox

By selecting a communication channel in the **Add** list, the selected entry is added to the "Channels enabled for sending" table.

The list of selected communication channels is displayed in a table:

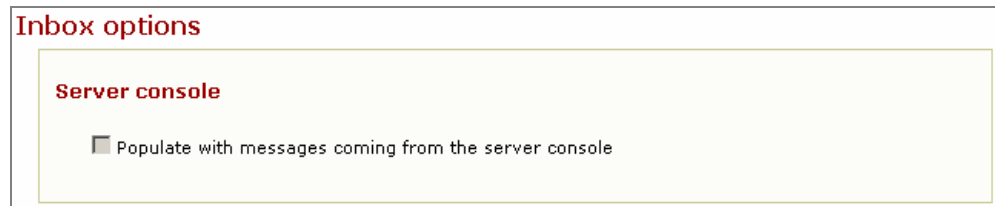| Column	Description
Channel name	Name of the communication channel.
Channel group	Group of the communication channel.
Description	Description of the communication channel.
Remove	![x] Removes the value from the list.

Source Description Options for Inbox

The **Source description** page of the Inbox datasource allows the user to indicate which incoming messages must reach this job's inbox.

The communication channels selected in the Outbox **Source description** page will be opened during the communication process.

In this page, the user can indicate if those communication channels must also listen for incoming messages.

Figure 2.57—Source description options for inbox

The options are specific to each type of channel.

Computed Fields Page

The **Computed fields** sub-page of the **Datasources** page allows the user to define computed fields.

A computed field is an additional calculated field that is created using computation functions. It can be based on existing datasource fields, literals or process time.

Computed fields are not stored in the MasterCard Expert Monitoring System internal database. They are calculated automatically, when needed, for example:

- for batch processing, based on the run start time

- for live processing, based on the import time of each transaction

- for job analysis, based on the last batch run start time

The available computation functions are as follows:

- Arithmetic

- Concatenation

- Now

- Substring

- Today

- ToUpper

Arithmetic

This function allows the user to perform arithmetic operations using datasource numeric fields and numeric literals. The available operators are as follows:

- + addition

- - subtraction

- * multiplication

- / division

- % percentage

Concatenation

This function allows the user to concatenate two datasource fields, or a datasource field with a literal.

Example: If you want to concatenate the Merchant ID with the Card number.

```
First operand: String field – MerchantID
Second operand: String field - PAN
```

Now

This function returns a time stamp based on the date and time of the job run.

Example: if today is the 25th March 2006, job runs at 3.30 pm

```
Interval: -3h
Computed date: 25 March 2006, 12.30 pm

Interval: 5h
Computed date: 25 March 2006, 8.30 pm

Interval: 0d
Computed date: 25 March 2006, 3.30 pm

Interval: -1d
Computed date: 24 March 2006, 3.30 pm
```

✎ **Note**   **Now is related to the time of the server. It is not related to a time zone. It may appear differently in the Analysis pages if the display format is configured for a different time zone.**

Substring

This function returns a part of the original datasource text field.

Example : to extract the BIN, in other words the six first characters, from a PAN field.

```
Computation: Substring
Field: PAN
Start offset: 1
Length: 6

PAN: "1234567890000000"
BIN: "123456"
```

Today

This function returns a time stamp based on the date of the job run.

Example: if today is the 25th March 2006, job runs at 3.30 pm

```
Interval: -3h
Computed date: 24 March 2006, 9.00 pm

Interval: 5h
Computed date: 25 March 2006, 5.00 am

Interval: 0d
Computed date: 25 March 2006, midnight

Interval: -1d
Computed date: 24 March 2006, midnight
```

Note	**Today in based on GMT time zone values. It truncates the hours, minutes and seconds of the processing time to reach 00:00:00 GMT. It may appear differently in the Analysis pages if the display format is configured for a different time zone.**

ToUpper

This function returns the original datasource text field, or text literal, with all characters converted to upper case. It is used to avoid unknown or unclear use of a character's case in text fields, such as merchant name, merchant city or cardholder name.

Example: to transform merchant name datasource text field into uppercase equivalents.

```
Computation: ToUpper
ToUpper: String field - MERCHANT_NAME

Original values: "The WEB Store", "internet supplies", "A Shop"
Computed values: "THE WEB STORE", "INTERNET SUPPLIES", "A SHOP"
```

Figure 2.58—Computed fields page

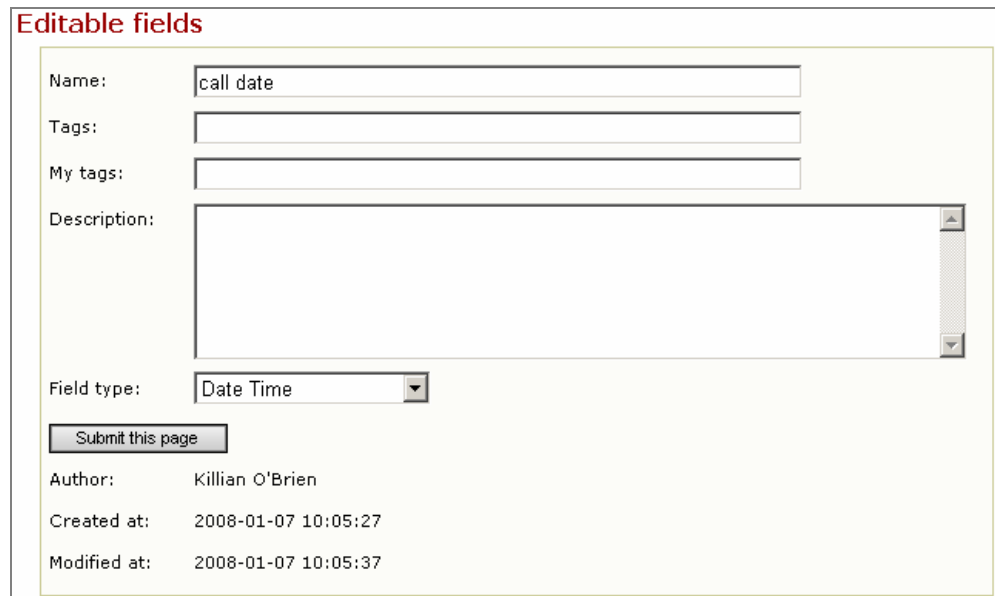The interface items on this page are as follows:

Item	Description
Name	Name of the computed field.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Description of the computed field (optional).
Computation	The required computation function. The available computation functions are as follows: • Arithmetic • Concatenation • Now • Substring • Today • ToUpper The fields which appear below the **Computation** field depend on the computation function selected.

Item	Description
Arithmetic	
First operand	If "Numeric Field" is selected in the first drop-down box, a second drop-down box appears listing all the numeric fields in the datasource. If "Numeric literal" is selected in the first drop-down box, a field appears in which to enter the numeric value.
Operator	The following operators are available: • + addition • - subtraction • * multiplication • / division • % percentage
Second operand	If "Numeric Field" is selected in the first drop-down box, a second drop-down box appears listing all the numeric fields in the datasource. If "Numeric literal" is selected in the first drop-down box, a field appears in which to enter the numeric value.
Concatenation	
First operand	Select one of the available datasource fields or literals.
Second operand	Select one of the available datasource fields or literals.
Now	
Interval	Time interval to add or remove to the date and time of the process. For negative values, the function subtracts the interval from process time. For positive values, it adds the interval to process time.
Substring	
Field	Original datasource text field to truncate.
Start offset	Whole number equal to or greater than 1. Start position of the extraction. Attention: The counting of the position within the text starts at 1.
Length	Whole number equal to or greater than 1. Number of characters to extract.
Today	
Interval	Time interval to add or remove to midnight on the day the classification starts. For negative values, the function subtracts the interval from midnight. For positive values, it adds the interval to midnight.
To Upper	
Field/Literal	Original datasource text field or text literal to switch to upper cases.

Editable Fields Page

The **Editable fields** sub-page of the **Datasources** page allows the user to define editable fields on a datasource. An editable field is an additional field that can be edited in the **Investigation** page.

Figure 2.59—Editable fields page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the editable field.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the editable field (optional).
Field type	Type of value for the editable field. Either an import type (Character, Date Time, Decimal or Integer) or Custom for custom lists.
Freetext length	If the type is Character, the length of the string.
Custom value list	If the type is Custom, the specific custom list.

Safe Keeping Page

Safe Keeping means retaining records in a data storage. It keeps track of old datasource records and their classification results. It may not be used as a datasource for rule processing, but it can be reviewed using the analysis tools.

The **Safe keeping** sub-page of the **Datasources** page allows the user to configure the safe keeping options of the datasource.

Figure 2.60—Safe keeping page

The interface items on this page are as follows:

Item	Description
Activate datasource safe keeping	If this option is selected (☑), the safe keeping is activated for the datasource. By default, if no other option is selected, all newly imported records of the datasource are retained, once they have been classified, at each job run.
Retain only records matching rule	If this option is selected (☑), it restricts the safe keeping to records matching the selected rule. If it is not selected, all the newly imported records of the datasource will be retained.
Retain records only every	If this option is selected (☑), it restricts the safe keeping to the first job run after the given setting. All records that have been imported since last safe keeping will be taken into account. If it is not selected, safe keeping will be done at each job run.
Delete retained records after	If this option is selected (☑), it indicates an expiration time interval after which retained records are deleted from the database. The time interval is applied to the value of the time field of the datasource, as defined in the **Datasources** page.
Purge retained records only every	If this option is selected (☑), it restricts the purge of retained records to the first job run after the given setting. All records that have expired since the last purge will be deleted from the database. If it is not selected, the purge of expired records will occur at each job run.

Item	Description
Maximum retained records per job run	If this option is selected (☑), it limits the number of retained records per job run. If the threshold is exceeded, the job processing is interrupted.
Maximum retained records in total	If this option is selected (☑), it limits the number of retained records contained in the safe keeping storage. If the threshold is exceeded, the job processing is interrupted.

Storage Page

Datasource character fields can be stored in the database in an encrypted format. The **Storage** page allows the user to define the encryption that will be used to store field data in the EMS internal database.

Figure 2.61—Storage page

The interface fields on this page depend on the source description type of the datasource. Only character fields are encryptable. Therefore only character fields will be displayed on this page.

Choosing different encryption types within one job should be avoided if possible as it can cause problems when using the application. For example, the Comparison rule will generate a warning when comparing fields that are not based on the same encryption type.

This encryption setting will apply to fields stored in the datasource table and in the safe keeping table. The fields are encrypted in the database, but will be decrypted to be displayed in the analysis tools. Whether the field should be visible or not to an analyst is defined by access profiles. Some specific application fields (such as ImportID, Case State,...) are not available for encryption.

Drillable Fields Page

A drillable field is a datasource field displayed in the analysis tools as a link. The link leads to the other records of the datasource having the same value in that field. The new record selection is displayed in the **Show records** page.

The **Drillable fields** page allows the user to select which field will be used to navigate automatically through the data by converting the data in links in the analysis tools.

Figure 2.62—Drillable fields page

The datasource fields are not drillable by default, they need to be selected one by one. Once a field is selected as drillable, an index will be suggested on the datasource column to improve the performance of the execution of the drill in the analysis tools. The index is only suggested to the user. To be created in the database, the index needs to be activated.

The interface items on this page are as follows:

Item	Description
Add	The user opens the drop-down list and selects a field to be drillable. The drillable fields are displayed in a list.

Existing drillable fields are displayed in a table with the following colums:

Column	Description
Field name	Name of the field.
Remove	The delete button allows the user to delete the drillable field.

Relationships Page

The **Relationships** page allows the user to define relationships. A relationship is a group of datasource fields that share certain characteristics.

The **Relationships** page allows the user to enter a name and a description for the relationship.

Figure 2.63—Relationships page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the relationship.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the relationship (optional).
Fields	List of all fields linked by the relationship. Fields can be linked by the user in the **Relationship fields** page.

Relationship Fields Page

The **Relationship fields** sub-page makes it possible to define the list of fields within the relationship, to add new fields to the relationship, or to move the field up or down in the list.

Figure 2.64—Relationship fields page

The interface items on this page are as follows:

Item	Description
Add	Adds a field from the current datasource or any related datasources. Click the arrow to the right of the **Add** field and select a field from the drop-down list.

Once the relationship fields exist they are displayed in a table with the following columns:

Column	Description
Position	Position of the field within the relationship. The order of the relationship fields controls the order in which the information appears in the **Detail view selection** drop-down list box on the **Investigation** page.
Datasource	Name of the datasource of the field.
Field	Name of the field.
Move up	▲ Move up in the list.
Move down	▼ Move down in the list.
Delete	✖ Delete value.

Views Page

Users who often perform similar types of queries while reviewing results, can define views. A view is a query template which allows a user to save a query type for possible future use.

Views make it possible to define form templates for finding records in analysis tools. All defined views are available in the views analysis tool to find and examine records.

The **Views** page allows the user to define views.

Figure 2.65—Views page

The interface items on this page are as follows:

Item	Description
Name	Name of the view.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ☑ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the view (optional).
Datasource	Datasource from which the view will show records.
Storage	Storage from which the data will be retrieved. Either Forced or Required influence and choice between Datasource or Safe keeping storages.
Display results before page is submitted	If this option is selected (☑), the view content will be displayed as soon as the view is accessed, without requiring the user to submit the form.
Matching criteria	A rule that will restrict the view results. Any influence can be selected for this parameter.
Matching filter	A filter that will restrict the view results. Any influence can be selected for this parameter.
Time criteria	A field that will be used to restrict the view results on a time basis. Any influence can be selected for this parameter.
Use specific time range	If this option is selected (☑),the initial range can be specified with a Start and a Duration interval. If it is not selected, the default time range will be initially set according to the "Default analysis range" setting.
Field base criteria	For each field of the datasource, any influence and value can be specified.
Influence parameters	
Skipped	Does not restrict the view with the parameter.
Optional	Optionally restricts the view with the parameter. The view form will show the parameter preceded by a checkbox to allow the user to choose to use the parameter or not.
Required	Restricts the view with the parameter. The user will have to specify a value.
Forced	Restricts the view with the parameter, but the value is forced, and will not be available in the view form.

Filters Page

The **Filters** page allows the user to define filters. A filter is a specific subset of a set of records such as a datasouce. The available options depend on the filtering type of the filter.

Figure 2.66—Filters page

The interface items on this page are as follows:

Item	Description
Name	Name of the filter.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ☑ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
Description	Freetext description of the filter (optional).
Datasource	Datasource from which the filter will show records.
Filtering Type	Select the filtering type that must be applied. See the sections below for the specific options of each filtering type.

Value range

The filter will match records having a field value between the "from" and the "to" values. The specific fields are described below:

Table 2.10—Value range

Item	Description
Negate filter	If this option is selected (☑), the filter will return the records having a field value outside the defined range.
Field	Select the field on which the filter must be based.
From	Minimum value of the field to be included in the filter.
To	Maximum value of the field to be included in the filter.

Value equals

The filter will match records having in the field a value that is inside the list. The specific fields are described below:

Table 2.11—Value equals

Item	Description
Negate filter	If this option is selected (☑), the filter will return the records having a field value that is not inside the list.
Field	Select the field on which the filter must be based.
Value count	Number of values, between 1 and 20, to which the field has to be compared. The corresponding number of value fields is automatically displayed below.
Value [1-20]	Values to which the field will be compared. The field type is automatically adapted according to the selected field. The number of fields displayed is automatically set according to the selected value count.

Value like

The filter will match records having in the field a value that is like one of the values inside the list, using % and _ wildcards. The specific fields are described below:

Table 2.12—Value like

Item	Description
Negate filter	If this option is selected (☑), the filter will return the records having a field value that matches none of the defined patterns.
Field	Select the field on which the filter must be based.
Pattern count	Number of patterns, between 1 and 20, to which the field has to be compared. The corresponding number of pattern fields is automatically displayed below.
Pattern [1-20]	Patterns to which the field will be compared. Wildcards are "_" to accept a single character and "%" to accept multiple characters. The number of fields displayed is automatically set according to the selected Pattern count.

Filter union

The filter will match all records that are matched by at least one of the selected sub-filters. The specific fields are described below:

Table 2.13—Filter union

Item	Description
Number of sub-filters	Number of filters that must be included in this filter.
Sub-filter [1-10]	Select a filter that is a sufficient criteria for the records to be included in this filter.

Filter intersection

The filter will match all records that are matched by all of the selected sub-filters. The specific fields are described below:

Table 2.14—Filter intersection

Item	Description
Number of sub-filters	Number of filters that must be included in this filter.
Sub-filter [1-10]	Select a filter that is a mandatory criteria for the records to be included in this filter.

Rules Page

The **Rules** page allows the user to define rules.

A rule is a set of parameters which defines the way records are classified. This classification is based on the function that is used. Records within a datasource will either match the rule, or not match the rule.

Figure 2.67—Rules page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the rule.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ☑ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the rule (optional).
Negation	If this option is selected (☑), it will generate negated results.

Item	Description
Function	Select one of the available functions. Four families of functions exist: Operators, History functions, Statistical functions and Other functions. According to the selected function new fields will be displayed on the page. For more information on these fields, refer to Appendix A.
Rule text	Read-only field that contains a textual description of the rule, according to the parameters that have been set.

Batch Processing Page

The **Batch processing** sub-page of the **Rules** page allows the users to activate and configure the batch processing of a rule.

Figure 2.68—Batch processing page

The interface items on this page are as follows:

Item	Description
Generate results during batch processing	If this option is selected (☑), results are computed during the batch job run and stand in the database for further investigation. If it is is not selected, the job batch process will not compute any results.
Processing thread group	Enter a name that represents a rule group. To optimize the performances of the rule engine, rules can be grouped. The different groups are processed simultaneously. Inside a group, rules are processed one at a time.
Maximum number of matching records per datasource	Maximum number of records of a datasource that can be matched by this rule. If the threshold is surpassed, no result at all will be calculated for this rule. This threshold is set to avoid a misconfigured rule to match way too many records.

Item	Description
Restrictions for the rule processing in case of rule change or new record import	This section contains a list of possible restrictions that can be applied to the current rule during its processing. A rule is only processed when at least one of the following options is verified: • it is a new rule. • its function and/or its function parameters have changed. • new records have been imported since last classification of this rule. In other words, rules that have not changed are not processed if no new data is imported. There are several scenarios to determine what records will be classified. • The rule has changed: the complete record history will be classified if no other options are set. • The rule has not changed: the records imported since the last classification of the rule will be classified. When history functions are used, the classified records also include history records that are covered by the history function interval parameter. In all cases, history data can be used to process these records, depending on the function parameters. The selected set of records can still be shortened by the next two options.
Do not generate results for last … records	If this option is selected (☑), the rule engine will not process records included in the defined interval. This restriction can be useful for historical function requiring that all records of a period of time are for sure inserted in the database. For instance, it is pointless to compute daily average when the day is not fully completed.
Do not generate results for more than … of records	If this option is selected (☑), the rule will not process records that are older than the defined interval. This restriction is used to limit the computation to recent records.
Process only records imported since the last successful classification	If this option is selected (☑), results will only be created for records inserted in the database since the last classification. The historical data will still be used to process these records, depending on the function parameters. When this option is not selected, the records imported since the last processing of the rule will be classified.
Always delete all old results	If this option is selected (☑), all results are deleted before being recomputed. When disabled, all results that will not be recomputed are kept.

Live Processing Page

The **Live processing** sub-page of the **Rules** page allows the users to activate and configure the live processing of a rule.

Figure 2.69—Live processing page

The interface items on this page are as follows:

Item	Description
Generate results during live processing	If this option is selected (☑), the live job process will compute results during the live job running time.
Processing thread group	Enter a name that represents a rule group. To optimize the performances of the rule engine, rules can be grouped. The different groups are processed simultaneously. Inside a group, rules are processed one at a time.
Store live results	If this option is selected (☑), results generated during live processing will be stored in the internal database, with batch processing results. There will be no way to tell if a rule match was generated by batch processing or live processing. If this option is not selected, no live result from live processing will be stored in the internal database. But classification results will still be available for live records exports.

Test Processing Page

The **Test processing** page allows the user to test rule execution before activating the rule for batch or live processing. The number of results and the time the rule needs to be executed is measured.

The rule test occurs at the end of the batch job.

Figure 2.70—Test processing page

The interface items on this page are as follows:

Item	Description
Test rule during batch processing	If this option is selected (☑), the rule is computed during the batch job run and metrics of this processing are stored. If it is not selected, the job test process will not compute any results.
Do not test after	If this option is selected (☑), the test will not occur anymore after the specified date and time.
Do not process records older than	If this option is selected (☑), the test will only be done on records that are more recent than the specified interval.

Test results

The test results are displayed within the page itself.

Table 2.15—Global results

Item	Description
Number of tests	Number of times the test has been executed.
Total test time	Total processing time of all executed tests.
Average test time	Average processing time of a single test.

Table 2.16—Results per datasource

Column	Description
Datasource	Datasource to which the table row is related.
Matching records	Number of matching records within the datasource.
Evaluated records	Number of evaluated records within the datasource.
Matching percentage	Percentage of matches within the datasource.

Export Contents Page

The **Export contents** page allows the user to define export contents. An export content defines the layout of the records that will be sent to an output.

The content consists of content items that are based on the selected datasource, classification results, constants and other export contents.

Figure 2.71—Export contents page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the export content.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the export content (optional).
Datasource	Select the datasource that will provide the records to be exported.

Content Items Page

The **Content items** page allows the user to define the export content items.

Figure 2.72—Content items page

The interface items on this page are as follows:

Item	Description
Name	Name of the content item.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✓ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the content item (optional).

Item	Description
Content type	Type of content item. The available types are: • **Field**: allows a user to add a datasource field content item. • **Rule**: allows a user to add a rule result content item. • **Matching rules**: allows a user to add the matching rule names in a comma separated format as one output item. • **Constant**: allows a user to add a constant content item. • **Composite**: allows a user to merge the items of another content item as one item of the current content item. • **Substring**: allows a user to add a part of another content item to the current content item based on length. • **Padded**: allows a user to add a padded version of another content item to the current content item. • **Split**: allows a user to add a part of another content item to the current content item based on a split character. The fields which appear after the **Content type** field depend on the content type chosen.

Field Content Item

The output value of a field content item will be the content of the datasource field. In a fixed length format, the value will be truncated or expanded using white space to the defined length.

Item	Description
Field	Select the datasource field.
Encryption	If this option is selected (☑), the field value can be encrypted during export.
Default length	Length of the field content (read-only).
Override length	If this option is selected (☑), the default length will be overridden. Longer content will be truncated. Shorter content will be extended using white spaces.

Rule Content Item

The output value of a rule content item will be the result of a selected rule. It is defined by two constants, one representing a match, the other representing a non-match. The length of the rule content item must be specified to ensure a fixed length output.

Item	Description
Rule	Select one of the available rules.
Rule match text	Value that will be exported if the selected rule is matching the record being exported.
Rule non-match text	Value that will be exported if the selected class is not matching the record being exported.
Default length	Length of the largest match or non-match text (read-only).
Override length	If this option is selected (☑), the default length will be overridden. Longer content will be truncated. Shorter content will be extended using white spaces.

Matching Rules Content Item

The output value is a comma separated list of matching rules names.

Item	Description
Fixed length	Enter the length of the output. Longer text will be truncated. Shorter text will be extended using white spaces.

Constant Content Item

The constant text will be exported in each record. White spaces can be used to obtain the appropriate length.

Item	Description
Constant text	The value to be exported. Be aware that end of line characters can be inserted in the field. This can be used at the end of the record to separate records in a file export.
Default length	Length of the defined constant (read-only).
Override length	If this option is selected (☑), the default length will be overridden. Longer content will be truncated. Shorter content will be extended using white spaces.

Composite Content Item

The purpose of composite item is to export several pieces of information into one field. For instance, several classification results can be combined into one reason code field. The composite item is based on another content. Recurrent use of contents is forbidden.

Item	Description
Content	Select another export content to be exported as one unique item.

Format	Select one of the available format to be used for this composite. The following formats are available:
	
	• **Fixed length** This format concatenates all the content item values without separators.
	
	• **Comma separated values (,)** This format surrounds each content item value by double quotes and separates content items using a comma.
	
	• **Semi-colon separated values (;)** This format surrounds each content item value by double quotes and separates content items using a semi-colon.
	
	• **Vertical bar separated values (|)** This format surrounds each content item value by double quotes and separates content items using a vertical bar.
	
	• **XML** The XML format uses the following template to export records. There are no outputs other than records.
	
	`<Record [content item name]="[content item value]"`
	`        [content item name]="[content item value]" ... />`

Default length	Length of the selected content for the selected format (read-only).
Override length	If this option is selected (☑), the default length will be overridden. Longer content will be truncated. Shorter content will be extended using white spaces.

SubString Content Item

The purpose of subString item is to export a part of another content by taking a set of characters given by a start position and a length. The subString item is based on another content. Recurrent use of contents is forbidden.

Item	Description
Content	Select another export content to be exported as one unique item.
Start position	Position of the first character to keep (count starts at one).
Fixed length	Number of characters to keep.

Padded Content Item

The purpose of padded item is to enlarge an item using a specific character. For instance, a card number 16 digits long can be preceded by "0" to make it 19 characters long. The padded item is based on another content. Recurrent use of contents is forbidden.

Item	Description
Content	Select another export content to be padded.
Padding side	Left or Right. It indicates where the padding characters have to be added.
Padding character	Character to be used to complete the too short content.
Default length	Length of the selected content (read-only).
Override length	If this option is selected (☑), the default length will be overridden. Longer content will be truncated. Shorter content will be extended using the padding character.

Split Content Item

The purpose of split item is to export a selected part of content. The original content is split at each occurrence of the given split character. The result is the part having the given part number. For instance, an amount having a decimal point can be split in integer part and decimal part. The integer part is the part number one. The split item is based on another content. Recurrent use of contents is forbidden.

Item	Description
Content	Select another export content to be split.
Split part number	Part number to keep.
Split character	Character to be used to split the selected content.
Fixed length	Length of the end result.

Exports Page

The **Exports** page allows the user to define exports.

An export defines how to output records to targets. Output records can be filtered. Output records will be formatted according to the export content chosen. See the section "Export Contents Page", earlier in this chapter.

The options available depend on the selected export target. The following targets are available:

- **Attachment:** Exports records to message attachment.

- **File**: Exports records to files in a directory.

- **Reply**: Exports records to the socket from which a live record came. (Makes sense only for socket input datasources.)

- **Socket**: Exports records to a socket.

- **Table**: Exports records to an existing SQL table. The table name must be specified in the **Table name** field, and the column names must be the names of each export content item.

Figure 2.73—Exports page

The interface items on this page are as follows:

Item	Description
Name	Name of the export.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Description of the export (optional).
Datasource	Datasource to export.
Content	Exported records content.
Target	Type of target to which to export.

Additional fields are displayed, depending on the selected export target.

Attachment Target

Figure 2.74—Attachment target

The interface items for an Attachment export are as follows:

Item	Description
Format	Format to use: Fixed-length, Comma separated values, Semi-colon separated values, Vertical bar separated values or XML.
Character set	Character set into which to export.
Maximum records per file	Maximum number of records per file. If this number is reached, the attachment won't be generated.
Filter data using field	If this option is selected (☑), only records having a specific value for the selected field will be exported. The value can be specified in the Message template in a new replaceable parameter named following the export attachment and the selected field (e.g.: Export_Field).
Newly imported records	If this option is selected (☑), restricts export to only newly import records.
Relative time span	If this option is selected (☑), restricts the export to only the records in the range specified by the Start and Duration intervals.
Matching	If this option is selected (☑), restricts the export to only the records matching the given rule.

File Target

Figure 2.75—File target

The interface items for a File export are as follows:

Item	Description
Path	Directory into which to create files.
Format	Format to use: Fixed-length, Comma separated values, Semi-colon separated values, Vertical bar separated values or XML.
Character set	Character set into which to export.
Records per file	Maximum number of records per file. A new file will be created each time this number is reached.

Item	Description
Newly imported records	If this option is selected (☑), restricts export to only newly imported records.
Relative time span	If this option is selected (☑), restricts the export to only the records in the range specified by the Start and Duration intervals.
Matching	If this option is selected (☑), restricts the export to only the records matching the given rule.
Use during batch processing	If this option is selected (☑), enabled during the batch processing.
Use during live processing	If this option is selected (☑), enabled during the live processing.
Live processing buffer size	Size of the buffer preceding this export in the live processing (tuning parameter).

Reply Target

Figure 2.76—Reply target

The interface items for a Reply export are as follows:

Item	Description
Format	Format to use: Fixed-length, Comma separated values, Semi-colon separated values, Vertical bar separated values or XML.
Matching	If this option is selected (☑), restricts the export to only the records matching the given rule.

Item	Description
Use during live processing	If this option is selected (☑), enabled during the live processing.
Live processing buffer size	Size of the buffer preceding this export in the live processing.

Socket Target

Figure 2.77—Socket target

The interface items for a Socket export are as follows:

Item	Description
Host	Host to which to connect.
Port	Port onto which to send records.
Format	Format to use: Fixed-length, Comma separated values, Semi-colon separated values, Vertical bar separated values or XML.
Character set	Character set into which to export.

Item	Description
Newly imported records	If this option is selected (☑), restricts export to only newly imported records.
Relative time span	If this option is selected (☑), restricts the export to only the records in the range specified by the Start and Duration intervals.
Matching	If this option is selected (☑), restricts the export to only the records matching the given rule.
Use during batch processing	If this option is selected (☑), enabled during the batch processing.
Use during live processing	If this option is selected (☑), enabled during the live processing.
Live processing buffer size	Size of the buffer preceding this export in the live processing.

Table Target

Figure 2.78—Table target

The interface items for a Table export are as follows:

Item	Description
Database connection	Connection able to access the table.
Table name	Name of the table into which to export.
Inserts group size	Number of records inserted at once. This is a tuning parameter.
Newly imported records	If this option is selected (☑), restricts export to only newly imported records.
Relative time span	If this option is selected (☑), restricts the export to only the records in the range specified by the Start and Duration intervals.
Matching	If this option is selected (☑), restricts the export to only the records matching the given rule.
Use during batch processing	If this option is selected (☑), enabled during the batch processing.
Use during live processing	If this option is selected (☑), enabled during the live processing.
Live processing buffer size	Size of the buffer preceding this export in the live processing.

Case Managers Page

The **Case managers** page allows the user to define case managers. A case manager is a tracking environment. It consists of the monitored item, the investigation work queues, the dedicated analysts and the case generation triggers.

The **Case managers** page contains basic case manager information. Case management settings can be defined on the following three sub-pages:

- **Work queues:** Used to define the different work queues in which cases can be investigated, by a defined set of analysts.

- **Source fields**: Used to define which datasources will trigger case creation or case reopening.

- **Source rules**: Used to define which rules will trigger case creation or case reopening.

Figure 2.79—Case managers page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the case manager.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✓ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the case manager (optional).
Case identifier	Name of the item to monitor. It will become the label of the case key field. E.g. Account number.
Relationship	The relationship that links the different datasources, using the monitored element. E.g: If the Account is monitored, select the relationship that links the Authorization datasource with the Cardholder datasource.
Cases datasources	Read-only name of the datasource that contains the cases generated for this case manager. The Case datasource is automatically generated once the case identifier and the relationship have been defined.
Steps datasources	Read-only name of the datasource that contains the investigation steps generated during the investigation of the cases of this case manager. The Step datasource is automatically generated once the case identifier and the relationship have been defined.

Work Queues Page

The **Work queues** page allows the user to define work queues. A work queue is an investigation environment. It will guide a defined group of analysts through case investigation, providing them with a workflow of investigation steps. Steps can be mandatory or not. The order of the steps is not enforced for the analyst.

Figure 2.80—Work queues page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the work queue.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the work queue (optional).

Item	Description
Workflow	The workflow that contains the list of investigation steps recommended for this work queue's case investigation.
Granted users	The list of analysts that are allowed to open and carry case investigations in the work queue. Non granted analysts will only be able to view cases in read-only mode, as long as they have been granted with the required role rights.
	The list of granted users is obtained from the granted access profiles.

Source Fields Page

The **Source fields** page allows the user to update source fields. A source field is a field defined in the case manager relationship that may be used as a case activation trigger if required. For each defined relationship field a source field will be automatically created, with the exception of the cases and steps datasource fields.

Figure 2.81—Source fields page

The interface items on this page are as follows:

Item	Description
Name	Read-only name of the source field.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Read-only description of the source field.
Generate cases, with this relationship field as case key, for matching records in this datasource	If this option is selected (☑), case will be generated for any source rule matches on records from this source field's datasource. The source field's value will be used as case key.
Restrict cases generation to last processing results	If this option is selected (☑), case activation will be restricted to source rule matches generated during current job run.
Restrict cases generation to records from ... over ...	If this option is selected (☑), case activation will be restricted to source rule matches generated during the specified time range.
Display records from this datasource in the Case report	If this option is selected (☑), records from the source field's datasource will be displayed in the case report, if they are related to an existing case, through the relationship fields.
Display records from this datasource safe keeping storage in the Case report	If this option is selected (☑), retained records from the source field's datasource safe keeping storage will be displayed in the case report, if they are related to an existing case.

Source Rules Page

The **Source rules** page allows the user to create source rules. A source rule is a rule that is marked as being a case creation or a case re-opening trigger. Source rule matches on activated source fields' datasources, will create or reopen cases. Activated cases can be set in a defined work queue and editable fields can be updated automatically.

Figure 2.82—Source rules page

The interface items on this page are as follows:

Item	Description
Name	Read-only name of the source rule.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Read-only description of the source rule (optional).
Rule	The rule which will trigger case activation.
Create cases if rule is matching	If this option is selected (☑), cases will be created for any rule matches on any activated source fields' datasources.
Put cases in work queue	If this option is selected (☑), created cases will be set in the specified work queue, in "Stand by" state. If it is not selected, cases will be created with "New" state.
Reopen cases if rule is matching records newer than cases close date	If this option is selected (☑), cases will be reopened for any rule matches on any activated source fields' datasources. Matching records must be newer than case previous close date.
Put cases in work queue	If this option is selected (☑), reopened cases will be set in the specified work queue, in "Stand by" state. If it is not selected, cases will be reopened with "Reactivated" state.
Update editable fields (upwards only)	If editable fields have been defined in the case datasource, they will be displayed and available for update specifications. The user can define default values to be set on the case creation or reopening. These fields are still editable during case investigation. If the editable field is of Custom type, it can only be updated upwards, according to the values position. **Example:** The user has defined a CasePriority editable field and has associated it to the custom list "Priority": 1.Highest 2.High 3.Medium 4.Low 5.Lowest If a match to the rule A, is defined as being a High priority, the CasePriority field will be updated with the value High. But if the case already exists, and the CasePriority field is already set to a higher value in the list, because it is matching a more important rule, CasePriority will not be updated to High, because it already set to the value Highest.

Archives Page

The **Archives** page allows users to define archives. An archive is a storage medium for accumulated data. Archiving is the job processing operation by which an archive is populated with accumulated records data.

Records of a datasource are grouped according to a given field, and their values are grouped into archive fields by using aggregate functions. Records stored in archives can be examined using the archive record viewer analysis tools. Profiles can be extracted from the archive.

The **Archives** page contains the common information about an archive and links to the following sub-pages, which contain more detailed information:

- **Archive fields**: Used to define fields that compose the archive records using the different aggregates available.

- **Archive structure changes**: Used to define what migration behavior must be adopted whenever the original datasource's structure has changed.

Figure 2.83—Archives page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the archive.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ☑ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.

Item	Description
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the archive (optional).
Archived datasource	Datasource on which the archive is based.
Grouping field	Field of the datasource that is used to group records in the archive. It serves as key to archive records.
Time field	Field of the datasource that is used to sort records through time.
Archive start offset	A time interval specifying the most recent time of the archive. By default, the archive begins on the current time and covers the past. When creating an archive on old data, it is pointless to keep years of empty data in the archive, in that case, this setting can indicate that the archive begins only at some point in the past.
Generate archive	If this option is selected (☑), the archive will be updated during the job processing.
Update archive only on first job run after every… of every… at…	If this option is selected (☑), it restricts the archiving frequency. If it is not selected, archiving occurs at each job run.

Archive Fields Page

The **Archive fields** page is used to define fields that make up the archive records using the different aggregates available.

Figure 2.84—Archive fields page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the archive field.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the archive field (optional).
Filter rule	If this option is selected (☑), it restricts the accumulation of records matching the specified rule.
Aggregate function	Selection of the aggregate function. Additional parameters depend on the selected aggregate function. The archive aggregate functions are described below.
Archiving periods	Number of time periods to be archived for each time scale. A total number of time periods is also shown.

Archive Aggregate Functions

The following archive aggregates are available:
- Average
- Category
- Count
- Maximum
- Minimum
- Sum
- Top Count
- Top Sum

Average

The Average aggregate will keep, for each time period, the sum of values of a given field and the the number of agglomerated records so that averages can be computed.

The fields are described below:

Item	Description
Archived field	Field from which to sum values.
Supports standard deviation	If this option is selected (☑), will keep necessary data to allow Profile Average aggregation based on this archive field to use the standard-deviation option.

Category

A category associates a rule with a user defined name. Categories are ordered by priority - the highest priority comes first.

The Category aggregate will keep for each time period the highest category reached by records fitting in the time period.

The fields are described below:

Item	Description
Category count	Number of defined categories (up to 20).
Category [1-20]	Name of the category.
for rule [1-20]	Rule associated with the category.
Default category	If this option is selected (☑), gives a default category name for records that passed the filter rule but did not pass any of the category rule.

Count

The Count aggregate will keep for each time period the number of agglomerated records.

No additional item can be specified.

Maximum

The Maximum aggregate will keep for each time period the maximum value of a given field.

It contains one field:

Item	Description
Archived field	Field from which to take the maximum value.

Minimum

The Minimum aggregate will keep for each time period the minimum value of a given field.

It contains one field:

Item	Description
Archived field	Field from which to take the minimum value.

Sum

The Sum aggregate will keep for each time period the sum of the values of a given field.

It contains one field:

Item	Description
Archived field	Field from which to sum values.

Top Count

The Top Count aggregate will keep for each time period the top values of a given field, ordered by the number of records having that value.

The fields are described below:

Item	Description
Archived field	Field from which to obtain the top values.
Maximum archived values	Maximum number of entries in the top. This value ensures that the top ranking does not grow indefinitely.
Calculate both Sum and Count for later display	If this option is selected (☑), the sum of the values of a field will also be kept for each top entry.
Sum field	Field from which to sum values.

Top Sum

The Top Sum aggregate will keep for each time period the top values of a given field, ordered by the sum of values of a given field.

The fields are described below:

Item	Description
Archived field	Field from which to obtain the top values.
Sum field	Field from which to sum values.
Maximum archived values	Maximum number of entries in the top. This value ensures that the top ranking does not grow indefinitely.
Calculate both Sum and Count for later display	If this option is selected (☑), the number of agglomerated records will also be kept for each top entry.

Archive Structure Changes Page

The **Archive structure changes** page is used to define the migration behavior that must be adopted whenever the original datasource's structure has changed.

The **Structure changes** page shows changes in the structure of the archived datasource that happened since the archive was created. The archive is invalid as long as there are decisions to be taken regarding what should happen to the data that has changed. Following the cases, an explanatory text describes each structural change and shows the possible action to take. It is expected that either a decision is taken to select one of the suggested behaviors, or that some action is taken to undo the structural change (e.g. revert a column type to its previous type).

Figure 2.85—Archive structure changes page

Profiles Page

The **Profiles** page allows users to define profiles. It contains the common information about the profile and a sub-page for all details forming the profile.

A profile is a source description on which a datasource can be based. The profile organizes data that has been collected in an archive, into profile fields.

Profiling is the job processing operation by which a profile-based datasource is populated.

Figure 2.86—Profiles page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the profile.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the profile (optional).
Archive	Archive onto which to base the profile.

Profile Fields Page

The **Profile fields** page allows users to define profile fields. A profile field is a field in a profile. Using a profile aggregation, it extracts data from an archive into a datasource.

Figure 2.87—Profile fields page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the profile field.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the profile field (optional).
Aggregation function	Selection of the aggregation function.

✎ **Note**   **Profiling options can be specified in the Source description sub-page of the Datasources page.**

Profile Aggregation Functions

Additional parameters depend on the aggregation function selected. The following profile aggregations are available:

- Average
- Direct Access
- Maximum
- Minimum
- Period Average
- Period Count
- Period Velocity
- Sum
- Top Count
- Top Entry

Average

The Average aggregation will compute an average for a given time span, based on an archive field.

The fields are described below:

Item	Description
Archive field	Archive field onto which to base the average.
Average deviation	Percentage from which to deviate of the exact average.
Deviation type	Indicates what the percentage is about. It can either be the average itself or the standard deviation (if the option in the archive field permits it).
Time span type	Select the time span onto which the average must be computed. For more information on time span types, refer to the "Time span" section, later in this chapter.

Example

In the first period, the archive average is equal to 15, it is calculated based on the sum 45 divided by the count 3.
To calculate the Average aggregation, the sum of the period sums is divided by the sum of the period counts, as illustrated below:

Direct Access

The Direct Access aggregation extracts a given value from a period of a scale of an archive field.

The fields are described below:

Item	Description
Archive field	Archive field from which to extract the value.
Period scale	Time scale from which to extract the value.
Period selection	Time period from which to extract the value. Most recent period is period 1.

Example

If Period scale is 'Day' and the Period selection is equal to '2', the value of the period number 2 is returned, as illustrated below:

Maximum

The Maximum aggregation will compute the maximum value of an archive field for a given period selection.

The fields are described below:

Item	Description
Archive field	Archive field from which to obtain the maximum value.
Period scale	Time scale from which to extract the value.
Period selection	Select the time periods for which the maximum must be computed.

Example

The maximum value of the selected periods is returned, it can be a numerical maximum or a character (sorted alphabetically) maximum, according to the archive field type, as illustrated below:

Minimum

The Minimum aggregation will compute the minimum value of an archive field for a given period selection.

The fields are described below:

Item	Description
Archive field	Archive field from which to obtain the minimum value.
Period scale	Time scale from which to extract the value.
Period selection	Select the time periods for which the minimum must be computed.

Example

The minimum value of the selected periods is returned, it can be a numerical minimum or a character (sorted alphabetically) minimum, according to the archive field type, as illustrated below:

Period Average

The Period Average aggregation computes an average of the used periods within a period selection. Empty periods do not impact the average.

The fields are described below:

Item	Description
Archive field	Archive field from which to obtain the period average.
Average deviation	Percentage from which to deviate of the exact average.
Deviation type	Indicates what the percentage is about. It can either be the average itself or the standard deviation (if the option in the archive field permits it).
Period scale	Time scale from which to extract the value.
Period selection	Select the time periods for which the period average must be computed.

Example

The Period Average is calculated based on used periods: the values are summed and then divided by the number of used periods, as illustrated below:

Period Count

The Period Count aggregation computes the number of used periods (periods within which records have been aggregated) within a selection of periods.

The fields are described below:

Item	Description
Archive field	Archive field from which to obtain the period count.
Period scale	Time scale from which to extract the value.
Period selection	Select the time periods for which the period count must be computed.

Example

The Period Count is the number of used periods, as illustrated below:

Period Velocity

The Period Velocity aggregation computes the maximum number of used periods within the selection, within all possible occurrences of the period span, within the selection.

The fields are described below:

Item	Description
Archive field	Archive field from which to obtain the period velocity.
Period span	Number of periods for which the period velocity must be computed.
Period scale	Time scale from which to extract the value.
Period selection	Select the time periods for which the period velocity must be computed.

Example

In our example of a 5 days Period selection, if the Period span is set to 3, the number of used periods, within 3 days is calculated. In the first three days, 3 periods are used, in the second three days period, only 2 are used and in the third three days period, 2 periods are also used. The Period velocity will thus be equal to 3, as it is the maximum number of used periods, as illustrated below:

Sum

The Sum aggregation will compute the sum of the values of an archive field within a given time span.

The fields are described below:

Item	Description
Archive field	Archive field from which to obtain the values to sum. Only numerical fields can be used.
Time span type	Select the time span onto which the sum must be computed. For more information on time span types, refer to the "Time span" section, later in this chapter.

Example

The Sum is the sum of the period values, as illustrated below:

Top Count

The Top Count aggregation will extract the number of entries appearing in a Top archive field within a given time span.

The fields are described below:

Item	Description
Archive field	Archive field from which to obtain the Top Count.
Time span type	Select the time span from which the Top Count must be extracted. For more information on time span types, refer to the "Time span" section, later in this chapter.

Example

The Top Count aggregation will recalculate a top from the periods to take into account. For each value appearing in the different period tops, the values are summed (A: 20 + 8 + 7 + 30 = 65, B: 15, C: 10 + 8 = 18, ...) and a new top can be rebuilt, as illustrated below:

According to this new top, the Top Count will be equal to the number of entries in the top: 5.

Top Entry

The Top Entry aggregation will extract a given entry appearing in a Top archive field within a given time span.

The fields are described below:

Item	Description
Archive field	Archive field from which to obtain the Top Entry.
Entry position	Position of the entry within the top ranking. Highest entry is 1.
Time span type	Select the time span from which the top entry must be extracted. For more information on time span types, refer to the "Time span" section, later in this chapter.

Example

The Top Entry aggregation will recalculate a top from the periods to take into account. For each value appearing in the different period tops, the values are summed (A: 20 + 8 + 7 + 30 = 65, B: 15, C: 10 + 8 = 18, ...) and a new top can be rebuilt, as illustrated below:

According to this new top, the Top Entry will return the value from a specified position. For example, the Entry position '1', is the first value of the top: 'A'.

Time Span

Two types of time span exist:

Time Range

The fields are described below:

Item	Description
Period start	Negative time interval indicating the oldest time of the range.
Duration	Positive time interval indicating the length of the range.
Aligned on boundaries to the most specific time scale	If this option is selected (☑), the boundaries of the range are aligned to the units used in the start and duration. Otherwise, the range starts at any second in time. It is the processing time minus the negative interval.

Period Selection

The fields are described below:

Item	Description
Period scale	Scale in which the selection is expressed.
Period selection	Selection of periods within the scale. The selection is expressed with numbers designating periods (most recent period is period 1). • '1-5' means periods from 1 to 5. • '1-' means all periods from period 1. • '-3' means all periods up to period 3. Several groups of periods can be specified, separated by a comma. For example: '-3,7,10-'.

Example

In the archive, 10 daily values and 10 weekly values are stored for a specific archive field.

If a profile field selects a time range that starts 2 weeks (-2w) before the beginning of the archive and has a duration of 2 weeks (2w), and if the boundaries are aligned to the most specific time scale, the time range taken into account will be the two first complete weeks available in the archive, in this case, week 2 and 3, because week 1 is not yet completed.

For the profile field calculation, the most accurate values are taken into account, in this example it means that 8 daily values will be taken into account, as well as a ratio of the third week value, as illustrated below:

If the boundaries are not aligned, the two weeks will be calculated from the start of the archive. In our example, it covers week 1, 2 and partially week 3.

For the profile field calculation, 10 daily values will be taken into account as well as a ratio of week 3.

Messages Page

A message is the definition of information that will be sent to different recipients through different communication channels (e.g. Console, e-mail, SMS). The message template can contain different kind of replaceable parameters. Their values will be calculated at message triggering time.

Messages can either be triggered automatically by notifications during the job run or manually by the analyst form the **Investigation** page. The generation of a first message can trigger different other actions, such as sending another message, update an editable field, etc.

The **Messages** page allows users to define messages. It contains two sub-pages:

- **Message template**: to define the message template according to the communication channel used.

- **Triggered effects:** to define triggering events and their effects.

Figure 2.88—Messages page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the message.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the [✓] button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the message (optional).
Datasource	Datasource on which the message is based. It must be the same as the one selected in a notification triggering the message. The message template is able to reference fields belonging to the datasource directly.
Communication channel	Communication channel through which the message will be sent. The content of the **Message template** page depends on this selection.
Priority	Priority used at sending time. Higher priority messages will be sent before lower ones.

Item	Description
Number of sending attempts	Number of times the sending must be tried in case it is unsuccessful. After that many unsuccessful sending attempts, the message status will be set to failed, and it will not be retried anymore.
Interval between two attempts	Minimum time interval that has to be elapsed before a new sending attempt is made after an unsuccessful sending.
Do not send messages older than	Time interval that restricts the sending of messages that are inside the Outbox for more time than the given time interval.
Remove attachments from Outbox when message is sent or discarded	If this option is selected (☑), attachments data will be removed from the Outbox as soon as the message will either be sent successfully, or definitely failed being sent.
Available for manual sending	If this option is selected (☑), this message will be available for manual sending in the **Investigation** page.

Message Template Page

The **Message template** page gives access to actual message content definition.

Figure 2.89—Message template page

Depending on the communication channel of the message, the available fields will be different.

Text fields in this page are preceded by a visibility option for the manual sending.

- **Edit**: this field will be editable during manual sending in the **Investigation** page.

- **Show**: this field will be displayed in read-only during manual sending in the **Investigation** page.

- **Hide**: this field will not appear during manual sending in the **Investigation** page.

The text within the message template text fields can contain replaceable parameters.

They are defined by surrounding a word with curly brackets ({}).

Example:

```
Message: Dear {Name}, how are you?
```

When the form is submitted, the words between curly brackets define replaceable parameters.
The same word can be used in several fields.

Replaceable Parameters

The replaceable parameters will be substituted during the message generation by data that can be defined here.

For each replaceable parameter, you can select its type. A specific form is displayed depending on the selected type.

Here is the list of available replaceable parameters types, and their respective parameters:

- Freetext
- Field
- Related field
- Contact
- Grouping count
- Matching rules
- Triggering time
- File attachment
- Export attachment

Freetext

The parameter will be substituted by some freetext.

Item	Description
Text	User-defined freetext.

Field

The parameter will be substituted by the value contained in a field of the message datasource.

Item	Description
Field	Field of the message datasource.
Format	Display format in which to convert value. The format must only be specified if selected field is a number or a date.

Related Field

The parameter will be substituted by the value contained in a field of a datasource related to the message datasource.

Item	Description
Link from	Field of the message datasource, from which to take the value to reach the **Link to** field.
Link to	Key field of the target datasource, which will be used to link a record from the **Link from** field value.
Use field	Field of the target datasource, from which to use the value.
Format	Display format in which to convert value. The format must only be specified if selected **Use field** is a number or a date.

Contact

The parameter will be substituted by a contact address.

Item	Description
Contact	Contact to select the address from.
Address	Address of the contact.

Grouping Count

The parameter will be substituted by the number of records that are within the group that triggered the message.

Item	Description
Format	Display format in which to convert value.

Matching Rules

The parameter will be substituted by the list of rules that are matching, separated by commas.

Triggering Time

The parameter will be substituted by the time when the message is generated.

Item	Description
Format	Display format in which to convert value.

File Attachment

The parameter will be substituted by an attachment taken from a file.

Item	Description
File	File stored within the server installation in the 'attachmentfile' folder.
Encryption	Encryption to use on file before attaching it to the message.
Inline	If this option is selected (☑), the attachment will use the 'Inline' disposition within an e-mail.

Export Attachment

The parameter will be substituted by an attachment taken from an export.

Item	Description
Export	Export having an attachment target that will generate the data to attach to the message.
Encryption	Encryption to use on export before attaching it to the message.

Triggered Effects Page

A triggered effect is an additional action (called effect) that can be performed after a specific result (called triggering) of the original message sending. Several actions can be programmed for one specific trigger. For example, another message can be sent, and/or different datasources can be updated, depending on whether the original message has been triggered, sent or no response to the message has been received.

The **Triggered effects** page allows the user to define triggered effects. Additional drivers may add additional triggers or effect types.

Figure 2.90—Triggered effects page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the triggered effect.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✅ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the triggered effect (optional).
Triggering type	Select a triggering type from the list of available triggers. This list is populated based on the installed communication drivers. Different options may appear according to the selected trigger. Here is the list of default triggers: • **Time out** trigger will request a time interval after which the time out will take effect. If a response is received before the time out, the effects will not be triggered. • **Response received** will trigger the effects when a response is received. • **Message triggered** will trigger the effects when the message is added in the Outbox to be sent. Note: the message is not in the Outbox yet - it may therefore not be used as base for a Send message effect. • **Message sent** will trigger the effects as soon as the message is sent on the channel. • **Message sending failed** will trigger the effects when the message definitively could not be sent through the channel.
Effects	This sub-section contains all the actions that will be executed when the trigger has occurred. According to the selected effect, different options will appear.
Effect count	Number between 1 and 10. Number of effects that will be executed when the trigger has occurred.
Effect [1-10]	Select an effect type from the list. The selection of an effect type will make different fields appear. The field list will vary from one effect to another. The effects are described below.

Effects

The available effects are as follows:

- Send a message

- Update an editable field

- Assign a case to a work queue

- Add an investigation step to a case

Send a Message

To describe the sending of a message, you must indicate what message definition to use, and what record to base the message upon.

This is achieved with the following parameters:

Item	Description
Message	Select the message to send, amongst the available ones. As soon as the message has been selected, the key field name of the message datasource is displayed in the (Key field of message datasource) from and the (Key field of message datasource) labels.
(Key field of message datasource) from	Choose between "Direct field" and "Related field".
	You need to specify on which record of the message datasource the message will be based. Therefore you need to define where the value of the identifier of this record can be found. It can either be the unique key field as defined in the **Datasources** page, or the default recordId provided by EMS. As soon as the message has been selected, the label is updated with the current message datasource key field name, to help you identifying it.
	You can either select a field from the Inbox/Outbox, then choose the "Direct field" option, or you can select a field from another datasource, then choose the "Related field" option.
Link from (Inbox / Outbox)	For a related field, indicates in which Inbox or Outbox field to find the link value.
Link to	For a related field, indicates which datasource key field must be reached from the Link from.
(Key field of message datasource)	Field containing the value of the message datasource key field. For direct field, it must be a field of the Outbox (or of the Inbox if the triggering type is "Response received"). For related field, it must be a field of the datasource reached by Link to.
	As soon as the message has been selected, the label is updated with the current message datasource key field name.

Update an Editable Field

To describe the update of an editable field, you must indicate what field to update and what value to put inside.

This is achieved with the following parameters:

Item	Description
Editable field from	Choose between "Direct field" and "Related field". You need to specify to which datasource the editable field belongs. You can either select a field from the Inbox/Outbox, then choose the "Direct field" option, or you can select a field from another datasource, then choose the "Related field" option.
Link from (Inbox / Outbox)	For a related field, indicates in which Inbox or Outbox field to find the link value.
Link to	For a related field, indicates which datasource key field must be reached from the Link from.
Editable field	Editable field to update. For direct field, it must be a field of the Outbox (or of the Inbox if the triggering type is "Response received"). For related field, it must be a field of the datasource reached by Link to.
Value from	Choose between "Inbox field" and "Literal".
Value	Either an Inbox field from which to take the value, or a literal of the type of the editable field.

Assign a Case to a Work Queue

To describe the assignation of a case to a work queue, you must indicate what work queue and what case are involved. If the case does not exist, it will be created. If the case already exists, it will be moved into the specified work queue.

This is achieved with the following parameters:

Item	Description
Work queue	Select in which work queue you want to set the case. As soon as the work queue has been selected, the case key name is displayed in the case key from and the case key labels.
Case key (field name) from	Choose between "Direct field" and "Related field". You need to define where the value of the case key can be found. You can either select a field from the Inbox/Outbox, then choose the "Direct field" option, or you can select a field from another datasource, then choose the "Related field" option. As soon as the work queue has been selected, the label is updated with the current case key name.

Item	Description
Link from (Inbox / Outbox)	For a related field, indicates in which Inbox or Outbox field to find the link value.
Link to	For a related field, indicates which datasource key field must be reached from the Link from.
Case key (field name)	Field containing key value of the case that needs to be assigned in the work queue. For direct field, it must be a field of the Outbox (or of the Inbox if the triggering type is "Response received"). For related field, it must be a field of the datasource reached by Link to.
	As soon as the work queue has been selected, the label is updated with the current case key name.

Add an Investigation Step to a Case

To describe the creation of an investigation step, you must indicate what case manager to work with, what case to add the investigation step to, what type of step you want to add and what comment to add to the investigation step.

Note   **If the case does not exist, it will not be created. Only the Assign a case to work queue effect can create a non existing case.**

This is achieved with the following parameters:

Item	Description
Case manager	Select the case manager with which to work.
Case key (field name) from	Choose between "Direct field" and "Related field".
	You need to define where the value of the case key can be found. You can either select a field from the Inbox/Outbox, then choose the "Direct field" option, or you can select a field from another datasource, then choose the "Related field" option.
	As soon as the case manager has been selected, the label is updated with the current case key name.
Link from (Inbox / Outbox)	For a related field, indicates in which Inbox or Outbox field to find the link value.
Link to	For a related field, indicates which datasource key field must be reached from the Link from.

Item	Description
Case key (field name)	Field containing the key value of the case to which to add the investigation step. For direct field, it must be a field of the Outbox (or of the Inbox if the triggering type is "Response received"). For related field, it must be a field of the datasource reached by Link to.
	As soon as the case manager has been selected, the label is updated with the current case key name.
Step type	Select the type of the step to add.
Step comment from	Choose between "Inbox field" and "Literal".
Step comment	Either an Inbox field from which to take the step comment, or a text literal to fill the step comment.

Notifications Page

A notification is an automatic message generation environment. It defines which triggers will send which messages.

The **Notifications** page allows users to define notifications. The **Notifications** page has two sub-pages:

- **Triggering rules**: the list of rules that will trigger the message sending. If the list is empty the message is triggered by every record of the datasource.

- **Messages:** the list of messages that will be sent by the notification.

Figure 2.91—Notifications page

The interface items on this page are as follows:

Item	Description
Name	User defined name for the notification.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Freetext description of the notification (optional).
Datasource	Datasource on which the notification is based.

Item	Description
Triggering options	
Triggered by	Read-only list of rules that will trigger the message sending. These rules can be selected in the Triggering rules sub-tab. If no rule is selected, the message is triggered by every record of the datasource.
Do not trigger for records older than	If this option is selected (☑), it is a time interval defining a moment in the past beyond which records will not be taken into account to trigger a notification. It ensures, for example, that old records matching during a new computation of a rule do not trigger undesired notification.
Grouping options	
Grouping type	Select the type of grouping for the notification amongst:
	No grouping: triggers a notification for every record (or for every matching record, if the notification is triggered by rules).
	By rule: triggers one notification for each matching rule.
	By all rules: triggers one notification for all matching records.
	By fields: triggers one notification for a set of records having the same values in all the selected fields.
Number of grouping fields	This field is only available when Grouping type is set to "By fields". Number between 1 and 20. Number of fields that will be used to group the triggering records.
Grouping field [1-20]	This field is only available when Grouping type is set to "By fields". Select datasource fields that are involved into the grouping of triggering records. Records that have identical values in the grouping fields will be gathered in the same group.
Group life time	This field is only available when Grouping type is set to "By rule", "By all rules" or "By fields". If this option is selected (☑), it defines an interval after which a new group has to be created, and therefore a new notification has to be triggered.
Processing options	
Trigger during batch processing	If this option is selected (☑), the notification will be triggered during the batch processing of the job.
Trigger only on first job run after every...of every...at...	If this option is selected (☑), it restricts the frequency of the notification triggering. If it is not selected, the notification will be triggered at every job run.

Item	Description
Trigger during live processing	If this option is selected (☑), the notification will be triggered during the live processing. No grouping is permitted for live processing. Moreover, the notification needs to be based on a live datasource and can only be triggered by every record, or by live rules.
Live buffer size	Size of the buffer preceding this notification triggering in the live processing.

Triggering Rules Page

The **Triggering rules** page allows the user to indicate which rules will trigger the notification.

Selecting a rule in the **Add** drop-down list, will add the rule to the **Triggering rules** table.

Figure 2.92—Triggering rules page

The list of selected rules is displayed in a table:

Item	Description
Rule name	Name of the rule.
Description	Description of the rule.
Remove	✖ Removes the rule from the **Trigering rules** list.

Messages Page

The **Messages** page allows the user to indicate which messages will be triggered by the notification.

Selecting a message in the **Add** drop-down list, will add the message to the **Messages** table.

Figure 2.93—Messages page

The list of selected messages is displayed in a table:

Column	Description
Message name	Name of the message.
Communication channel	Communication channel through which the message will be sent.
Remove	❌ Removes the message from the list.

Access Profiles Page

The **Access profiles** page allows a user to define an access profile. An access profile defines what tools and data are accessible by a user. It contains general information about an access profile and four sub-pages containing more specific information about the access profile:

- **Datasource access** page: Defines which records are accessible for each datasource.

- **Field access** page: Defines which fields are accessible for each datasource.

- **View access** page: Defines which views are accessible.

- **Work queue access** page: Defines which work queues are accessible.

✎ **Note**   **An access profile can only be deleted if it has not been granted to any user.**

Figure 2.94—Access profiles page

The interface items on this page are as follows:

Item	Description
Name	Name of the access profile.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Desription of the access profile (optional).

Datasource Access Page

The **Datasource access** page allows the user to indicate which records of a datasource are accessible for an access profile.
To add an entry: select a datasource and a filter then press the **Add** button.
An entry "-- All records --" in the filter list makes all records available for a datasource.

Figure 2.95—Datasource access page

Accessible records are displayed in a table:

Column	Description
Datasource	Name of the datasource.
Accessible records	Records that are accessible for the datasource. If several filters are set for the same datasource, all records of all filters are accessible.
Remove	✖ Removes the datasource from the list.

Field Access Page

The **Field access** page allows the user to indicate which fields of a datasource are accessible for an access profile. To change an entry: select a field of the datasource and an access level, then press the **Set** button. An entry "-- All fields --" in the fields list makes the change on all fields.

Figure 2.96—Field access page

Fields and access levels are displayed in a table:

Column	Description
Field	Name of the field.
Access	The available access levels are: • **Hidden:** The field is not accessible in any way. • **Navigable:** The field can be used for drill operations in analysis tools, but its value will not be shown to the user. • **Visible:** The field value can be read by the user, but even if the field is an editable field, it can not be modified. • **Editable:** The field value can be read by the user, and modified where applicable. • **Default:** In the Default access profile it is equivalent to Editable. In other access profiles it is equivalent to Hidden.

View Access Page

The **View access** page allows the user to indicate which views and analysis tools are accessible for an access profile. To change an entry: select a view or an analysis tool and an access level then press the **Set** button. An entry "-- All views and analysis tools --" in the views list makes the change on all views and tools.

Figure 2.97—View access page

Views and access levels are displayed in a table:

Column	Description
View	Name of the view or analysis tool.
Access	The available access levels are: • **Hidden:** view is not accessible. • **Visible:** view is accessible. • **Default:** in the Default access profile it is equivalent to Visible, in other access profiles it is equivalent to Hidden.

Work Queue Access Page

The **Work queue access** page allows the user to indicate which case work queues are accessible for an access profile. To change an entry, select a work queue and an access level, then press the **Set** button. An entry "-- All work queues --" in the work queues list makes the change on all work queues.

Figure 2.98—Work queue access page

Work queues and access levels are displayed in a table:

Column	Description
Work queue	Name of the work queue.
Access	The available access levels are: • **Hidden:** work queue is not accessible. • **Visible:** work queue is accessible.

Rule Transfer Page

The **Rule Transfer** pages, **To file** and **From file** allow the user to export and import rule sets.

To File Page

The **To file** page makes it possible to export a set of rules to an external file.

Figure 2.99—To file page

The interface items on this page are as follows:

Item	Description
Add	Allows individual or collective selection of the rules.
Submit	Adds the selected rule(s) to the list.
Selected rules	List the content of the rule set to be exported.
Export now	Performs the actual export.
Remove all	Empties the list of selected rules.

From File Page

The **From file** page makes it possible to import a set of Rules from an external file.

Figure 2.100—From file page

The interface items on this page are as follows:

Item	Description
Choose rule XML-file to import	Allows user to type the path to the file to be processed.
Browse	Provides the user with a dialog that will help to locate the file to be processed.
Submit	Loads the XML file containing the rules. The rules will be displayed in the drop-down list of rules. (see below)

Item	Description
Drop-down list of rules	Allows the user to select one or more rules.
Add	Adds the selected rule(s) to the list of rules to be imported.
Rule selection	List the set of rules to be imported, and manage possible name collisions.
Rule mappings	This section is used to manually reconcilliate un-mapped entities (Datasource and Fields). As soon as the mapping has been completely defined, the user will have to click the **Import rule(s)** button to complete the rule import.

Tables Page

The **Tables** page allows users to attach a table profile to a table definition. The page collects all tables created by the application (datasource tables, classification result tables, temporary tables, etc). A table assigns specific parameters from a table profile to table creations.

Figure 2.101—Tables page

The interface items on this page are as follows:

Item	Description
Name	Display name of the table as defined by MasterCard Expert Monitoring System. The **Name** field is not modifiable.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✔ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Text describing the table defined by MasterCard Expert Monitoring System. The **Description** field is not modifiable.
SQL table name	Table name used inside the database as defined by MasterCard Expert Monitoring System. The **SQL table name** field is not modifiable.
Table profile	The table profile that the table must use when it is first created. This is selected from the list of table profiles created for the job database connection in the **Table profiles** page.

Indexes Page

The **Indexes** page allows users to configure indexes. An index assigns specific parameters from an index profile to index creations. It also specifies the columns of the index and the activation/deactivation moments.

Figure 2.102—Indexes page

The interface items on this page are as follows:

Item	Description
Name	Display name of the index.
Tags	Freetext used to categorize the defined element. The tag is defined simultaneously with the configuration item and saved when the ✓ button is clicked. For more information, refer to the section "Filtering Principles" earlier in this chapter.
My tags	Freetext used to categorize the defined element. The tag is always editable and specific for each user. For more information, refer to the section "Filtering Principles" earlier in this chapter.
Description	Text describing the index (optional).
SQL index name	Index name used inside the database as defined by MasterCard Expert Monitoring System. The **SQL index name** field is not modifiable.
Index profile	The index profile that must be used while creating the index in the database. The index profiles are defined in the **Index profiles** page.

Item	Description
Activate	If this option is selected (☑), the index will be activated at a user defined point in the job process.
Deactivate	If this option is selected (☑), the index will be deactivated at a user defined point in the job process.

SQL order	SQL order that contains the list of columns on which to create the index, and the index order (ascending or descending). This SQL order will be added into the SQL index creation command.
	
	`CREATE INDEX <schema>.<index_name>`
	`ON <schema>.<table_name>(<SQL_ORDER>)`
	`TABLESPACE <tablespace_name>`
	
	The structure of the SQL order should be as follows:
	
	`<column_name1> {ASC|DESC} [, <column_name2> {ASC|DESC} [, <column_name3> ... ]]`
	
	An index can be created on a column associated with a SQL function. For example, you can create an index on a last name column with uppercase function. The SQL order will then look like:
	
	`upper(LASTNAME) ASC`
	
	The tree displayed during modification serves as a quick reference. It shows the fields and their keys. If you click on a field, its key is added to the SQL order. If you click on a sort direction, the token (asc or desc) is added to the SQL order.

Job Control

When the user clicks **Job Control** in the **Navigation bar** when no job is selected, the **Job Creation** page is displayed.

If a user has editing rights for the **Job Definition** page, the **Create a new job** field is displayed in the top left-hand corner of the current page allowing the user to create a new job, and a job list is displayed below it.

If a user does not have editing rights for the **Job Definition** page, the **Create a new job** field will not be present.

2.103—Job creation page

- If the user enters a new job name and clicks the **Create** button, the **Job Definition** page is displayed. See the "Job Definition" section earlier in this chapter.

- If the user clicks a job in the job list, the **Job Control** page is displayed, showing the status of the job, and allowing the user to run the job either in Batch mode or Live mode. The other pages in the **Job Control** section are displayed in the **Navigation tree**.

✏ **Note** **The Job Control page can only be viewed by users that have the "View job control" permission in their assigned roles.
Actions available in the Job Control page can only be performed by users with corresponding permissions in their assigned roles. The following actions are available: "Batch process", "Live process", "Manage communications", "Manage database", "Manage index".**

Processing Status Page

The **Processing status** page displays the status of the selected job for Batch processing, Live processing, and Communicator processing, and contains buttons to manage all processes.

Figure 2.104—Processing status page

Batch Processing

The **Run** button launches the batch processing of the job.

Live Processing

- The **Start** button launches the live processing of the job.
- The **Synchronize** button replaces the job configuration of a running live process job, with a new job configuration.
- The **Stop** button interrupts the live processing.

Communicator Processing

- The **Start** button launches the Communicator processing of the job. This enables the communication channels required for sending and receiving messages.
- The **Stop** button interrupts the Communicator processing.

Processing Logs Page

The **Processing logs** page displays the processing log for the selected job. The **Processing logs** page shows the log of the last job started. If multiple logs exist, **Previous log** and **Next log** buttons allow the user to view other logs.

Figure 2.105—Processing logs page

Each processing log contains the following information:

Column	Description
Message	Processing activity.
Status	Status of the processing activity.
Start time	Start time of the processing activity.
End time	End time of the processing activity.

Validation Page

The **Validation page** is used to display the validation report of the selected job. The validation report is used to check the validity of the datasources, rules, exports and job properties.

Only a valid job can be started. Validation is performed before a job run. If a job contains errors, it will not be started. Warnings, however, will not block the process. The validation report contains an error table and a warning table.

Figure 2.106—Validation page

The validation report contains the following information:

Column	Description
Source	Link(s) to the invalid item(s). There might be several levels of indented links, to reflect the item indentation.
Description	Detailed error or warning message.

Report Page

The **Report** page contains all details of the configuration of the currently selected job. A printer-friendly version can be obtained by clicking the **Printer** button in the **Toolbar**.

Figure 2.107—Report page

Database Maintenance Page

The **Database maintenance** page displays information about all the tables for the selected job, and allows a user with sufficient rights to perform actions on them.

Figure 2.108—Database maintenance page

Delete Whole Internal Database

Warning   **Using the Delete whole internal database command will completely delete the internal database. All tables used by the selected job will be removed (datasources and results).**

To delete the whole internal database, click the **Delete** button. A confirmation page is displayed forcing to user to click a **Confirm** button.

Clean the Database by Removing Temporary Tables

Warning   **Using the Clean the database by removing temporary tables command will completely delete the temporary tables remaining in the internal database.**

To clean the database by removing temporary tables, click the **Clean** button. A confirmation page is displayed forcing to user to click a **Confirm** button.

Note   **This operation requires substantial processing resources.**

Table Information

Information is displayed in a table with the following columns:

Table 2.17—Table Information

Column	Description
Name	Name of the table.
Table SQL name	Name of the table in the SQL database.
Records	Number of records in the table.
Oldest record	Time of the oldest record in the table.
Newest record	Time of the newest record in the table.
Delete	Clicking the **Delete** button removes all table records. A confirmation page is displayed forcing to user to click a **Delete** button a second time.
Cleanup	Clicking the **Clean up archive** button cleans up the archive. For full details, see the "Clean Up Archive" section below.
Load	Clicking the **Load now** button will immediately load the available data (only available on main datasource tables).

Clean up Archive

The Clean-up archive functionality works as follows:

- The Clean-up archive functionality reads all archive records and rewrites them in the latest archive record structure.

- When all records have been converted, the Clean-up archive functionality removes the meta data about the old record structures that are no longer used.

Warning **The Clean-up archive functionality should be used only once after the definition of an archive is stabilized. It is a resource-heavy procedure and it makes no sense to run it if the archive structure has not changed.**

Index Maintenance Page

The **Index maintenance** page allows the user to create or delete an index on an internal database table.

Figure 2.109—Index maintenance page

Each defined index is shown in a table with the following columns:

Column	Description
Index	Name of the index, as defined in the **Indexes** page. The index definition can be reached by clicking on the link. If the index has a description, it appears as a tool tip.
Table	Name of the table to which the index belongs, as defined in the **Tables** page.
Index SQL name	Name of the index in the SQL database.
Exists	'Yes' or 'No' depending if the index currently exists on the internal database table.
Create	**Create index** button creates the index on the table in the internal database.
Delete	**Delete index** button removes the index from the table in the internal database.

Job Analysis

When the user clicks **Job Definition** in the **Navigation bar** and no job is selected, the **Job creation** page is displayed.

If a user has editing rights for the **Job Definition** page, the **Create a new job** field is displayed in the top left-hand corner of the current page allowing the user to create a new job, and a job list is displayed below it.

If a user does not have editing rights for the **Job Definition** page, the **Create a new job** field will not be present.

- If the user enters a new job name and clicks the **Create** button, the **Job Definition** page is displayed. See the Job Definition section earlier in this chapter.

- If the user clicks a job in the job list, the **Views** page is displayed. The other pages in the Job Analysis section are displayed in the **Navigation tree**.

Note **Views are only visible for user having been granted to the appropriate access profile.**

Figure 2.110—Job analysis page

View	Description	Datasource
Clearing		Clearing
CNP Trxs		Authorisation
Merchant All Cases		Merchant monitoring cases
Merchant Closed Cases		Merchant monitoring cases
Merchant matching Rule CNP Fraud		Authorisation
Merchant Standby Cases		Merchant monitoring cases
Merchants matching Rule Increased number of trx with 200%		Merchant Profile
Outbox		Outbox
PAN matching Rule Same PAn Same MCC		Authorisation
Pan X CLose monitoring		Authorisation

Note **The Job Analysis page can only be viewed by users that have the "View job analysis" permission in their assigned roles.**
The Job Analysis page can only be edited by users that have the "Investigation" permission in their assigned roles.

Views Page

The Job Analysis **Views** page allows analysts to display the contents of the internal database through a defined view.

Analysts must first select a view to display its corresponding query form.

The number and type of query criteria shown on the page, which are taken into account for the query, depend on the influence parameter associated with each datasource field.

- 'skipped' fields do not appear in the form because they may not be specified.

- 'optional' fields appear in the form, preceded by a checkbox. They are ignored unless the checkbox is selected.

- 'required' fields appear in the form and require to have a value set.

- 'forced' fields do not appear in the form, because their value is imposed by the selected view.

Figure 2.111—Views page

After the query is submitted, the results are shown in a table with the following columns:

Column	Description
Details	Contains a 'Details' link that leads to the **Investigation** page.
Matches	Comma separated list of matching rule names.
(Each displayed field name)	Value of the field in the record. Values are displayed according to the "Format of displayed data" setting which allows the selection of a display format.

If the fields have associated description files, the descriptions will appear as tool tips over the data. These tool tips can be disabled using the "Use description files when showing records" setting.

The table is limited to a maximum number of rows per page. You can view more results using the ◄ and ► buttons. Clicking the "Page x of y" buttons gives you direct access to any available page. The maximum number of records per page is specified by the "Number of records per page" setting.

By default, all accessible datasource fields are displayed in the table. Field access is specified in the **Field access** page. The field column displayed can be specified by the "Visible datasource columns" setting for the appropriate job and datasource.

For fields that are specified in the **Drillable fields** page, the user can select the specified field and value and click on a cell to navigate to the **Show records** page. For fields that are only navigable, the values are replaced by an icon (➡).

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⌄ button downloads the currently displayed records. Clicking the ⌄⌄ button downloads all records for the query, independent of the maximum number of records per page.

Find Matches Page

The **Find matches** page allows the analysts to query the internal database for records that match criteria defined in the rules.

Analysts must specify the following criteria:

- The field from which the matching values must be displayed.

- The rule that must be matched.

- The time range in which to search. The time range is initially set according to the "Default analysis range" setting.

Figure 2.112—Find matches page

After the query is submitted, the results are shown in a table with the following columns:

Column	Description
Details	The column contains a button which opens the **Show records** page displaying all records which have a matching value for the selected field. In figure Figure 2.112, the selected field is "PAN".
Matching value	Value of the selected field for the matching records.
Number of matches	Number of matching records for that value of the field.
Number of records	Number of records for that value of the field.

The table is limited to a maximum number of rows per page. You can view more results using the ◄ and ► buttons. Clicking the "Page x of y" buttons gives you direct access to any available page. The maximum number of matches per page is specified by the "Number of matches per page" setting.

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⌄ button downloads the currently displayed records. Clicking the ⌄⌄ button downloads all records for the query, independent of the maximum number of records per page.

✎ Note **The column counting functionality is resource intensive. If this functionality is not required, it can be disabled by using the "Display records count in match finding view" setting.**

Show Records Page

The **Show records** page allows the analysts to display the contents of the internal database.

Analysts must specify the following criteria:

- The field on which to base the reviewing.

- The storage from which the records must be retrieved (either the datasource itself, or the datasource safe keeping storage).

- The rule to apply (either all records should appear, only matching records or only records matching a specific rule).

- The filter to select only a subset of records (optional).

- The value of the reviewing field for which to retrieve records.

- The time range in which to search. The time range is initially set according to the "Default analysis range" setting.

Figure 2.113—Show records page

After the query is submitted, click the **Show/Refresh** button. The results are shown in a table with the following columns:

Column	Description
Details	Contains a **Details** button that leads to the **Investigation** page.
Matches	Comma separated list of matching rule names.
(Each displayed field name)	Value of the field in the record. Values are displayed according to the "Format of displayed data" setting which allows the selection of a display format.

If the fields have associated description files, the descriptions will appear as tool tips over the data. Those tool tips can be disabled using the "Use description files when showing records" setting.

The table is limited to a maximum number of rows per page. You can view more results using the ◄ and ► buttons. Clicking the "Page x of y" buttons gives you direct access to any available page. The maximum number of records per page is specified by the "Number of records per page" setting.

By default, all accessible datasource fields are displayed in the table. Field access is specified in the **Field access** page. The displayed fields columns can be specified by the "Visible datasource columns" setting for the appropriate job and datasource.

For fields that are specified in the **Drillable fields** page, the user can select the specified field and value and click on a cell to navigate to the **Show records** page. For fields that are only navigable, the values are replaced by an icon (➡).

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ▾ button downloads the currently displayed records. Clicking the ⤓ button downloads all records for the query, independent of the maximum number of records per page.

Investigation Page

The **Investigation** page allows the analysts to investigate a specific record in the internal database.

Figure 2.114—Investigation page

When accessed directly, analysts must specify the following criteria:

- The datasource from which to obtain the record.

- The storage from which the records must be retrieved (either the datasource itself or the datasource safe keeping storage).

- The record key field value (in the example in Figure 2.114 it is "PAN").

When accessed through the 🔍 button ● in the results of **Show records** or **Views** page, the investigation selection is done automatically, and the form is not even displayed.

Figure 2.115—Investigation page – details link

Investigation of RecordId 12337802 in TE transaction Datasource

Change investigation subject: [Change]

Send message: -- Select a message --

Detail view selection: Record detail

Record details

Matching rules:	TE_Cash volume
5TimeAmount:	1500.00
Acq ICA:	3004
Acq Ref number:	30041
Choose name:	
Company number:	0012431
Corp ID:	15329
Debit credit code:	D
Destination country:	
Destination postal:	
Duty amt:	0.00
Freight amt:	0.00
ICA:	1031
ImportTime:	30/01/08 11:47:14

Depending on the record being investigated, series of possible actions is displayed, as follows:

- **Change investigation subject** It leads to the form originally displayed when accessing this page directly.

- **Detail view selection** By default, it shows the record detail.

- Related datasources can also be selected. Datasource relations are defined by in the **Relationships** page. The drop-down list gives access to all possible targets for all defined relationship fields.

Below the actions, the selected detail view is displayed.

For the record detail view, the record details are shown in a form showing fields and respective values. The displayed fields can be specified by the "Visible datasource detail fields" setting for the appropriate job and datasource.

Clicking the **Edit record** button displays the record details in edit mode. Each editable field can be modified. A **Save changes** button applies the changes to the editable fields. A **Cancel changes** button cancels all changes and returns the application to view mode.

If a related datasource is selected, a table displays the records obtained through the relation.

Analysts can specify the following criteria:

- **<Datasource_date_field> from / to:** the time range in which to search. The time range is initially set according to the "Default analysis range" setting.

- **Inside:** the storage from which the records must be retrieved (either the datasource itself or the datasource Safe keeping storage).

The table has the following columns:

Column	Description
Details	Contains a button that leads to the **Investigation** page, but investigating that specific record.
Matches	Comma separated list of matching rule names.
Each displayed field name	Value of the field in the record. Values are displayed according to the setting "Format of displayed data" which allows the selection of a display format.

If the fields have associated description files, the descriptions will appear as tool tips when you roll the mouse over the data. Those tool tips can be disabled using the "Use description files when showing records" setting.

The table is limited to a maximum number of rows per page. You can view more results using the and buttons. Clicking the "Page x of y" buttons gives you direct access to any available page. The maximum number of records per page is specified by the "Number of records per page" setting.

By default, all accessible datasource fields are displayed in the table. Field access is specified in the **Field access** page. The displayed fields columns can be specified by the "Visible datasource columns" setting for the appropriate job and datasource.

For fields that are specified in the **Drillable fields** page, the user can select the specified field and value and click on a cell to navigate to the **Show records** page. For fields that are only navigable, the values are replaced by an icon ( ).

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the button downloads the currently displayed records. Clicking the button downloads all records for the query, independent of the maximum number of records per page.
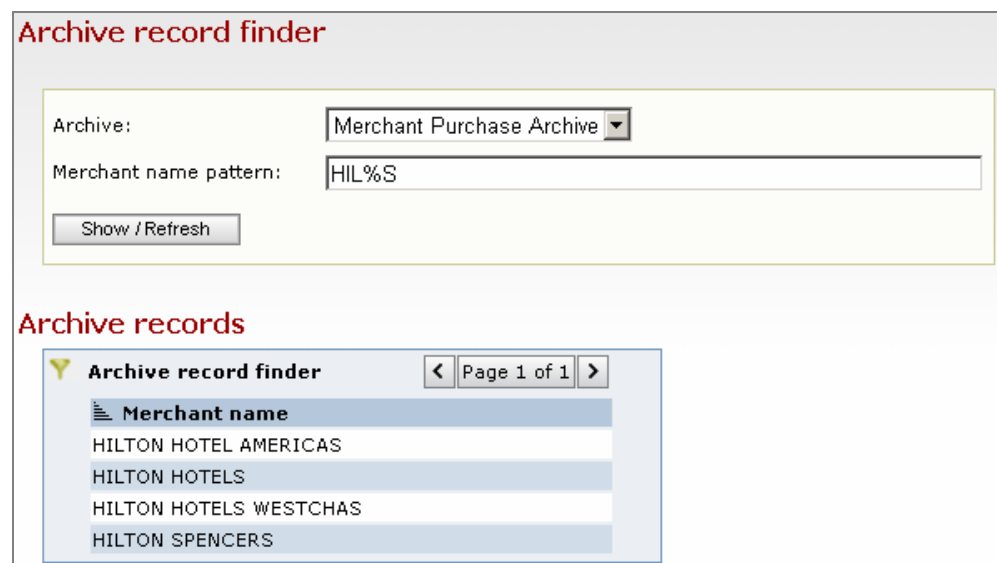
Case Investigation Page

When the **Investigation** page displays a case, its layout changes slightly, and it becomes the **Case investigation** page. The top section of the page displays additional fields containing actions the analyst can take on cases, such as:

- Open a case

- Add investigation steps

- Move a case to another work queue

- Add a reminder on a case

- Update a case's editable fields

- Close a case

Figure 2.116—Case investigation page

For more information on cases, refer to Chapter 6, "Investigating Cases".

Statistics Page

The **Statistics** page allows the analysts to display statistics concerning matching records in the internal database. Analysts must specify the following criteria:

- The datasource on which to base the statistics.

- The slice size: this is a time unit measurement defined as a time interval. Statistics will be calculated for each time slice that exists in the selected time range.

- The time range for which the statistics are required.

The time range is initially set according to the "Default analysis range" setting.

Figure 2.117—Statistics page

After the query is submitted using the **Show/Refresh** button, the statistics are shown in a table with the following columns:

Column	Description
Time	Starting time of each time slice.
Total matching records	Total number of matching records in the time slice.
<Rule name> matches (absolute)	Number of records matching the rule within the time slice.
<Rule name> matches (%)	Percentage of records matching the rule within the time slice.

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⊻ button downloads the currently displayed records. Clicking the ⊻ button downloads all records for the query, independent of the maximum number of records per page.

Archive Record Finder Page

The **Archive record finder** page allows the analysts to find archive records by user defined record key.

Analysts must specify the following criteria:

- The archive to search: Select the required archive from the drop-down menu.

- A search pattern matching the record key: Enter the record key to search for. If the exact record key is unknown, wildcards (% and _) can be used to retrieve several record keys.

Figure 2.118—Archive record finder page

After the query is submitted by clicking the **Show/Refesh** button, matching records keys are shown.

Each key is a link leading to the **Archive record viewer** page for that record.

The maximum number of records per page is specified by the "Number of archive records per page" setting.

Archive Record Viewer Page

The **Archive record viewer** page allows analysts to view details of a single archive record.

Analysts must specify the following criteria:

- The archive from which the record must be displayed

- The time scale to observe

- The key of the record

- The desired orientation of the results

Figure 2.119—Archive record viewer page

After the query is submitted by clicking the **Show/Refresh** button, the record is shown in a table.

If the **Show archive fields as columns** checkbox is selected, each column is an archive field and each row is a time period.

If it is not selected, each column is a time period and each row is an archive field. The field names are links leading to the **Archive details viewer** page.

The data can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⬇ button downloads the currently displayed data.

Archive Details Viewer Page

The **Archive details viewer** page allows analysts to view details of a top field of a single archive record, and details of other fields as a bar chart.

Analysts must specify the following criteria:

- The archive field from which the content must be displayed
- The time scale to observe
- The key of the record

Figure 2.120—Archive details viewer page – Ranking detail

After the query is submitted by clicking the **Show/Refresh** button, the top ranking of the field is shown in a table.

If the top field contains both Sum and Count information, the **Sort using secondary number** checkbox is displayed.

- If this option is selected (☑) ranking is done using the secondary number. The secondary number is the Sum for a Top count field. It is the Count for a Top sum field.

- If it is not selected, the ranking is ordered on the primary number. It is the Count for a Top count field. It is the Sum for a Top sum field.

The data can be downloaded as a CSV file (readable by tools like Excel). Clicking the ☒ button downloads the table content.
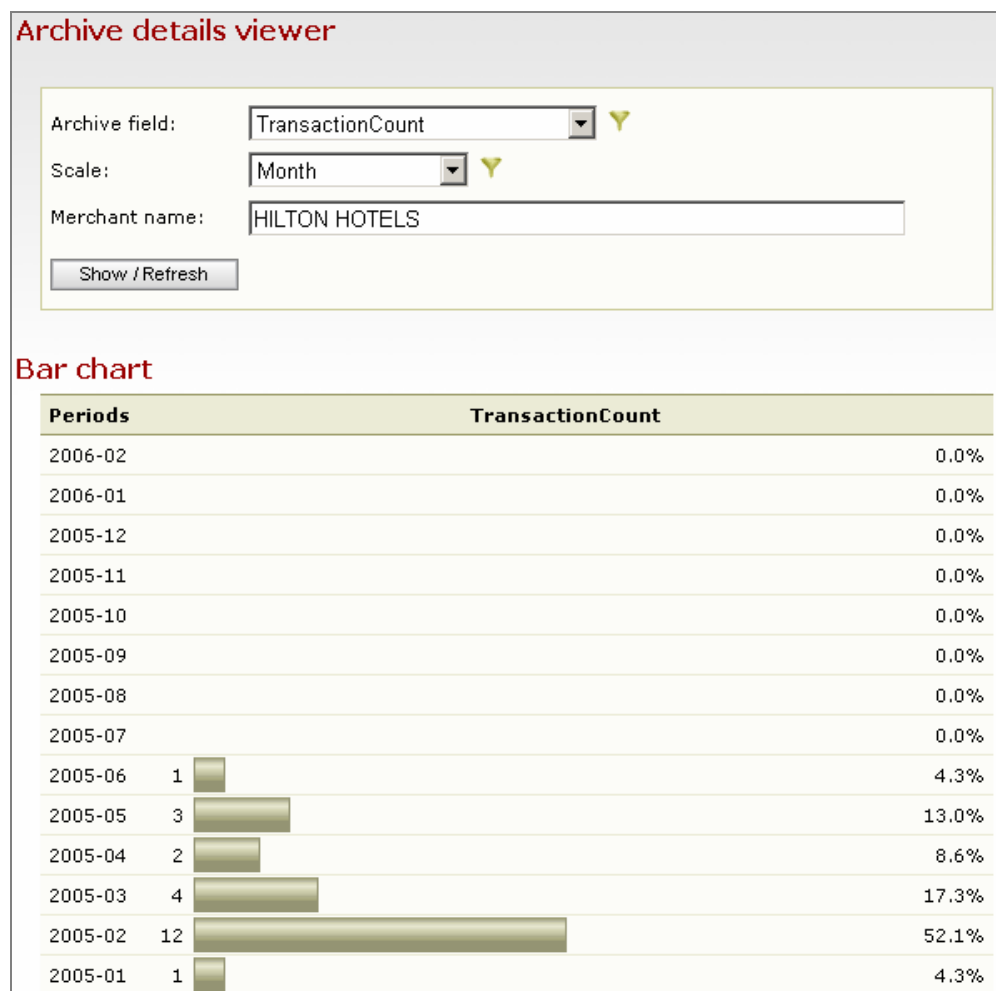
Bar Chart

For numeric archive fields, the values are displayed in a bar chart.

Analysts must specify the following criteria:

- the archive field from which the content must be displayed
- the time scale to observe
- the key of the record

After the query is submitted by clicking the **Show/Refresh** button, the targeted values are displayed in a bar chart.

Figure 2.121—Archive details viewer page – Bar chart

Case Report Page

The **Case report** page allows analysts to view details of a case, the investigation steps and all related data from the different datasources.

Analysts must specify the following criteria:

- The Case datasource from which the case must be displayed

- The filter rule to apply (either all records should appear, only matching records or only records matching a specific rule). The filter rule is applied to all datasources except the Cases datasource and the case investigation steps datasource

- The key of the case

- The time range in which to search. Time range does not apply to master datasources (Datasources with a unique key)

After the query is submitted by clicking the **Show/Refresh** button, case report will be shown

Figure 2.122—Case report page

The datasources displayed will depend on the source fields settings in the case manager. The user can define which datasources and which safe keeping datasource must be displayed in this report.

3 EMS Audit, Field Encryption and Data Access

This chapter describes the functionalities added to EMS to comply with the Payment Card Industry Data Security Standard.

Introduction

MasterCard has added certain functionalities to Expert Monitoring System (EMS) to provide the customer with options to meet the Payment Card Industry Data Security Standard (PCI DSS) in terms of the application. This standard was developed by the major credit card companies as a guideline to help organizations that process card payments prevent credit card fraud, hacking and various other security vulnerabilities and threats.

The new functionalities are as follows:

- Audit Process

- Field Encryption

- Access Profiles

- Web Browser Secure Socket

Audit Process

EMS has an in-built auditing capability which when activated, tracks some or all processes performed with the system. This is achieved using an audit job. All operations possible for normal jobs are possible for the Audit job. Consequently, rules can be defined to control all aspects of the auditing process.

The auditing process allows an administrator to record and, if necessary, investigate the actions of any one user or group of users.

The auditing process is active by default. For information on how to deactivate the auditing process, refer to the *MasterCard Expert Monitoring System (EMS) Technical Guide.*

Configuration of the Audit Job

Before the Audit job can be activated, it must be configured. The following configuration operations are possible:
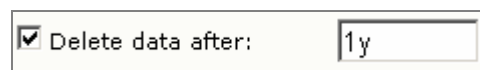
Configure Database Connection

The Audit job, like all jobs, requires a valid database connection. The Audit job database connection is defined in the same way as the database connection for any other job. For a description of how to define a database connection, refer to the section "Create a Database Connection" in Chapter 4.

Change Expiration Date of the Audit Datasource

To change the expiration date of the data in the Audit job, proceed as follows:

1. Select the Audit Job.

2. Click on **Job definition** in the **Navigation bar** and select **Datasources** in the **Navigation tree**. The existing datasources for that job are displayed in a table.

3. Select the Action datasource.

4. Click the **Edit** icon.

5. Select the **Delete data after** option and enter a time value in the field provided.

Figure 3.1—Expiration date

6. Click the **Submit this page** button.

7. Click the **Save** icon.

⚠ **Warning** **If the Audit job is activated but not operational for any reason (e.g. the database server is down), the user will not have access to any jobs other than the Audit job.**

Configure Audit Datasource Source Description Options

Users can define which pre-defined rules will be run on the audit datasource content to verify its integrity.

To configure audit datasource source description options, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select the Audit job. The Job **Basic options** page opens.

2. Click on **Datasources** in the **Navigation tree**. The **Select a datasource** page for the audit job opens.

3. Select the Action datasource. The **Datasources** page opens for the action datasource.

4. Click on the **Source Description** page, then click the **Edit** icon. The **Audit options** page opens in Edit mode.

Figure 3.2—Source description options for audit action

The following items are configurable:

Item	Description
Check if digest does not match	Verify that the integrity check of each record is correct.
Check if sequence number is used several times	Verify that sequence numbers do not appear several times.
Check if a seqence number is missing	Verify that no sequence number is missing.
Check if the time of records is not in the same order as the sequence	Verify that the sequence order and the time order are the same.

5. Select or deselect the options as required then click the **Submit this page** button.

6. Click the **Save** icon.

Use Cases for the Audit Job

The following are some possible uses for the Audit job:

Profile Actions Performed per User

Use the Profiler functionality on the Audit job to view the number of actions performed per user:

1. Define an archive grouped on the User column of the audit Action datasource.

2. Define a top count archive field in the archive that counts the occurrences of the Action type column.

Investigate the Behavior of a User

Use the CaseTracker functionality to investigate the actions of an EMS user.

1. Define a case manager based on the User column of the audit Action datasource.

2. Define rules that detect events inside the audit (e.g. velocity of record CSV downloads).

3. Generate cases based on the rules.

Inform about User Creation

Use the Audit job to inform the administrator if a user creates an audit record:

1. Define a rule that marks audit records that have been created by a user.

2. Define a notification that sends an e-mail or an SMS to the administrator when the rule matches.
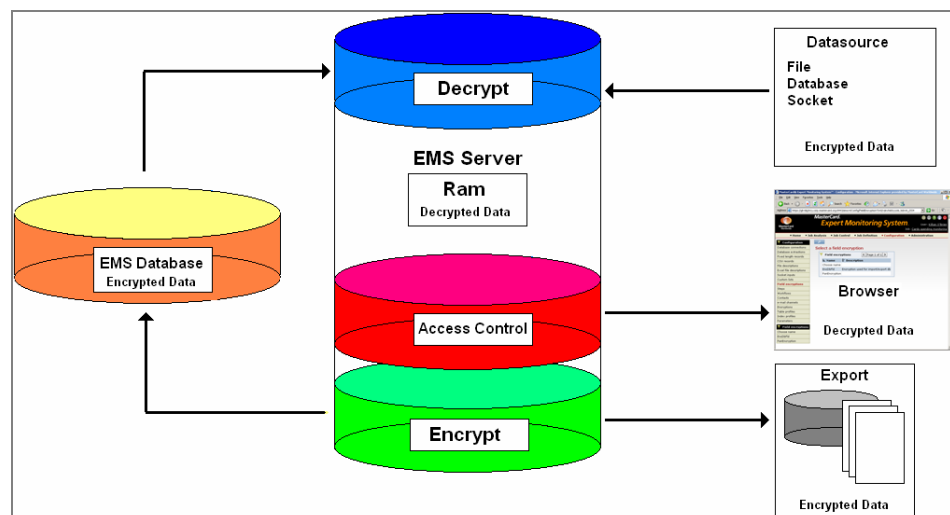
Field Encryption

EMS has an encryption capability which allows text fields (i.e. fields with field format CHAR) to be encrypted. Field encryption can be used in the following situations:

- Import: all imported text fields can be decrypted on import.

- Internal database storage: all text datasource fields can be stored in encrypted form.

- Export: all exported text content item fields can be encrypted on export.

Figure 3.3 describes the encryption and decryption cycle for EMS:

Figure 3.3—EMS Encryption and Decryption

✏ **Note** **The data displayed in the web browser will always be in clear text, but the access to the data can be restricted by defining Access profiles.**

Define an Encryption System

Field encryption systems are defined in the **Field encryptions** page.

To define a field encryption system, proceed as follows:

1. Click on **Configuration** in the **Navigation bar** and select **Field encryptions** in the **Navigation tree**. The existing field encryptions list will be shown in a table. It will be empty if no field encryptions are defined.

2. Click the **Edit** icon to open the **Create a new Field encryption** page.

3. Enter a name for your field encryption and press the **Create** button.

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the field encryption (optional).

Figure 3.4—Field encryptions page

6. Click the arrow to the right of the **Encoder** field and select an encoder from the drop-down list. In our example we have selected the Sample encoder provided with EMS, but other encoders may be available. Please see the "Field Encryption" section in Chapter 1 of the *MasterCard Expert Monitoring System (EMS) Technical Guide*.

✎ **Note** **The final parameters to be configured will depend on the encoder selected by the user. The sample encoder is configured by the key and pattern parameter, as shown in Steps 7 and 8.**

7. If the encoder has a key, select the **Key** option and enter the key in the field provided.

8. In the **Pattern** field, enter a pattern appropriate to the type of encryption required. In this example, we are encrypting a PAN. The underscored character spaces indicate the characters which will be encrypted.

9. Click the **Submit this page** button.

10. Click the **Save** icon.

Encrypt a Datasource Field

To encrypt a datasource field, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select **Datasources** in the **Navigation tree**. The existing datasources list will be shown in a table.

2. Select the datasource in which you wish to encrypt fields. The **Datasource** page opens.

3. Choose the **Storage** tab. The **Storage** page appears showing all encryptable fields in the datasource.

Figure 3.5—Storage page

4. Click the arrow to the right of the required field and select a field encryption system from the drop-down list.

5. Click the **Submit this page** button.

6. Click the **Save** icon.

Encrypt Export Content Items

For security reasons, you may wish to encrypt data you are exporting.

To encrypt export content items, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select **Export contents** in the **Navigation tree**. The existing Export contents list will be shown in a table.

2. Select the export content in which you wish to encrypt fields. The **Export contents** page opens.

3. Choose the **Content Items** tab. The **Select an export content item** page appears showing all content items.

4. Click on the required field. The **Content items** page appears.

Figure 3.6—Content items page

5. Click the arrow to the right of the **Encryption** field and select an encryption system from the drop-down list.

6. Click the **Submit this page** button.

7. Click the **Save** icon.

Decrypt Imported Fields

It is possible to configure imported fields to be decrypted on import.

The following imported fields can be decrypted on import:

- Extraction fields of database extractions

- Fixed length fields of fixed length records

- CSV fields of CSV record descriptions

- Excel fields of Excel file descriptions

Configure Extraction Fields to Decrypt on Import

To configure extraction fields to decrypt on import, proceed as follows:

1. Click on **Configuration** in the **Navigation bar** and select **Database extractions** in the **Navigation tree**.

2. Click the **Edit** icon. The **Select a database extraction** page appears.

3. Select the required database extraction from the list. The **Database extractions** page appears.

4. Choose the **Fields** tab. The list of fields is displayed.

5. Select the required field. The **Fields** page appears.

6. Select the **Decrypt field on import** option, click the arrow to the right of the **Select a field encryption** field and select the encryption system used to encrypt the field.

Figure 3.7—Database extraction fields page

7. Click the **Submit this page** button.

8. Click the **Save** icon.

Configure Fixed length Fields to Decrypt on Import

To configure fixed length fields to decrypt on import, proceed as follows:

1. Click on **Configuration** in the **Navigation bar** and select **Fixed length records** in the **Navigation tree**.

2. Click the **Edit** icon. The **Select a fixed length record** page appears.

3. Select the required fixed length record from the list. The **Fixed length records** page appears.

4. Choose the **Fields** tab. The list of fields is displayed.

5. Select the required field. The **Fields** page appears.

6. Select the **Decrypt field on import** option, click the arrow to the right of the **Select a field encryption** field and select the encryption system used to encrypt the field.

Figure 3.8—Fixed length record fields page

7. Click the **Submit this page** button.

8. Click the **Save** icon.

Configure CSV Fields to Decrypt on Import

To configure CSV fields to decrypt on import, proceed as follows:

1. Click on **Configuration** in the **Navigation bar** and select **CSV records** in the **Navigation tree**.

2. Click the **Edit** icon. The **Select a CSV record** page appears

3. Select the required CSV record from the list. The **CSV records** page appears.

4. Choose the **Fields** tab. The list of fields is displayed.

5. Select the required field. The **Fields** page appears.

6. Select the **Decrypt field on import** option, click the arrow to the right of the **Select a field encryption** field and select the encryption system used to encrypt the field.

Figure 3.9—CSV record fields page

7. Click the **Submit this page** button.

8. Click the **Save** icon.

Configure Excel Fields to Decrypt on Import

To configure extraction fields to decrypt on import, proceed as follows:

1. Click on **Configuration** in the **Navigation bar** and select **Excel file descriptions** in the **Navigation tree**.

2. Click the **Edit** icon. The **Select an Excel file description** page appears.

3. Select the required Excel file description from the list. The **Excel file descriptions** page appears.

4. Choose the **Excel fields** tab. The list of Excel fields is displayed.

5. Select the required field. The **Excel fields** page appears.

6. Select the **Decrypt field on import** option, click the arrow to the right of the **Select a field encryption** field and select the encryption system used to encrypt the field.

Figure 3.10—Excel fields page

7. Click the **Submit this page** button.

8. Click the **Save** icon.

Situations not Supported by Field Encryption

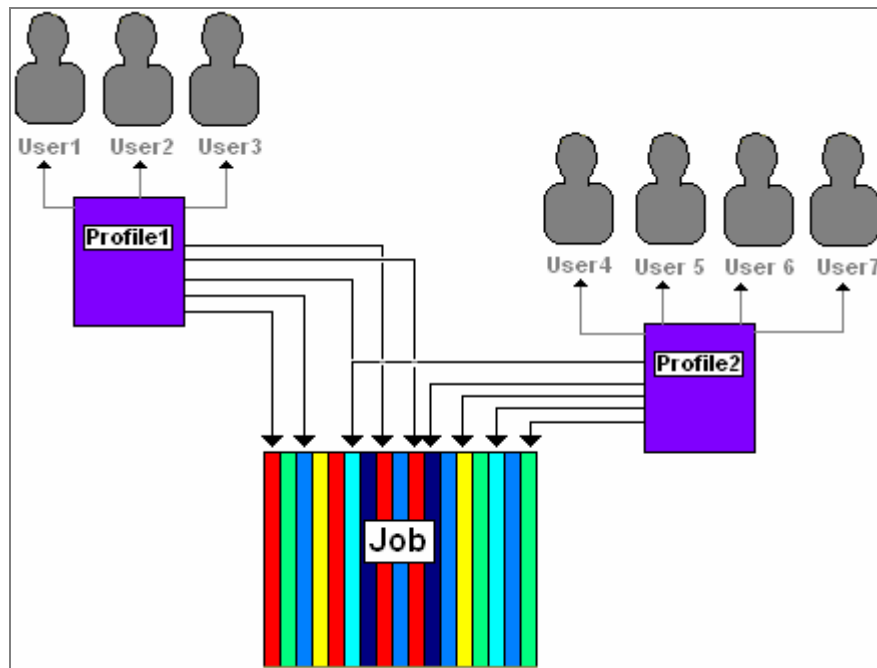The following are situations where field encryption is not possible:

- Archives do not support encryption. If an encrypted field is archived (e.g.: as the archive key, or as a minimum or maximum), it will not be encrypted inside the archive storage.

- Joining two tables where field encryptions are different will not work.

- Batch processing of the "Account Generated" function will not work.

Access Profiles

Access to a job or any part of a job is controlled using access profiles. The administrator creates an access profile allowing access to certain parts of the job. A user is then granted access to the job based on the access profile. The user has access only to the parts of the job allowed by the access profile assigned. Figure 3.11 provides a basic example of how the process works.

Figure 3.11—How user access to a job is controlled

⚠️ **Warning** **The default access profile allows total access to the job. This access profile can be modified, however, if it is deleted, it cannot be recreated.**

Job access can be controlled as follows:

- **Datasource access**: One or more of the job datasources can be assigned to the access profile.

- **Field access**: One or more of the fields in any of the job datasources can be assigned to the access profile.

- **View access**: One or more of the job views and/or analysis tools can be assigned to the access profile.

- **Work queue access**: One or more of the work queues can be assigned to the access profile.

Create an Access Profile

1. Click on **Job definition** in the **Navigation bar** and select **Access profiles** in the **Navigation tree**. The existing Access profiles will be shown in a table.

2. Click the **Edit** icon. The **Create a new access profile** page appears.

3. Enter a name for the access profile and click the **Create** button. The **Access profiles** page appears.

Figure 3.12—Access profiles page

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the access profile (optional).

6. Click the **Submit this page** button.

7. Click the **Save** icon.

Add Datasource Access to an Access Profile

To add datasource access to an access profile, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select **Access profiles** in the **Navigation tree**. The existing Access profiles will be shown in a table.

2. Click the access profile to which you wish to add datasource access. The **Access profiles** page appears for that access profile.

3. Click the **Edit** icon, then click the **Datasource access** tab. The **Add datasource access** page appears.

Figure 3.13—Add datasource access page

4. Click the arrow to the right of the **Add to datasource** field and select a datasource from the drop-down list.

5. Click the arrow to the right of the **accessible records** field and select a filter, that is a subset of datasource records, from the drop-down list. Any datasource filter must be created in the **Filters** page. If you have not created a datasource filter, your only option is to select the entire datasource.

   To create a datasource subset, see the section "Create a Datasource Filter", later in this chapter.

6. Click the **Add** button. The datasource is added to the list of datasources accessible by the access profile.

7. Click the **Save** icon.

Create a Datasource Filter

To create a datasource filter, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select **Filters** in the **Navigation tree**. Any existing filters will be shown in a table.

2. Click the **Edit** icon, enter a name for the filter and click the **Create** button. The **Filters** page appears.

Figure 3.14—Filters page

3. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

4. Enter a description for the filter (optional).

5. Click the arrow to the right of the **Datasource** field and select a datasource from the drop-down list.

6. Click the arrow to the right of the **Filtering type** field and select a Filtering type from the drop-down list. For full information on filtering types, see the section "Filters Page" in Chapter 2.

7. Complete the remaining fields. The remaining fields depend on the filtering type selected. For full information on filtering types, see the section "Filters Page" in Chapter 2.

8. Click the **Submit this page** button.

9. Click the **Save** icon.

Add Field Access to an Access Profile

To add field access to an access profile, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select **Access profiles** in the **Navigation tree**. The existing Access profiles will be shown in a table.

2. Click the access profile to which you wish to add field access. The **Access profiles** page appears for that access profile.

3. Click the **Edit** icon, then click the **Field access** tab. The **Select a Datasource** page appears.

4. Click the datasource from which you wish to select accessible fields. The **Set field access** page appears.

Figure 3.15—Set field access page

5. Click the arrow to the right of the **Set access** field and select an access type from the drop-down list. There are five options:

   - Hidden

   - Navigable

   - Visible

   - Editable

   - Default

6. Click the arrow to the right of the **To field** field and select a field from the drop-down list.

7. Click the **Set** button. The field is added to the list of fields accessible by the access profile.

8. Click the **Save** icon.

Add View Access to an Access Profile

To add view access to an access profile, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select **Access profiles** in the **Navigation tree**. The existing Access profiles will be shown in a table.

2. Click the access profile to which you wish to add view access. The **Access profiles** page appears for that access profile.

3. Click the **Edit** icon, then click the **View access** tab. The **Set view access** page appears.

Figure 3.16—View access page

4. Click the arrow to the right of the **Set access** field and select an access type from the drop-down list. There are three options:

   - Default

   - Hidden

   - Visible

5. Click the arrow to the right of the **To view** field and select a view or analysis tool type from the drop-down list.

6. Click the **Set** button. The view or analysis tool is added to the list of views accessible by the access profile.

7. Click the **Save** icon.

Add Work Queue Access to an Access Profile

To add work queue access to an access profile, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select **Access profiles** in the **Navigation tree**. The existing Access profiles will be shown in a table.

2. Click the access profile to which you wish to add work queue access. The **Access profiles** page appears for that access profile.

3. Click the **Edit** icon, then click the **Work queue access** tab. The **Select a case manager** page appears.

4. Click on the case manager containing the required work queue. The **Set work queue access** page appears.

Figure 3.17—Work queue access page

5. Click the arrow to the right of the **Set access** field and select an access type from the drop-down list. There are two options:

   • Hidden

   • Visible

6. Click the arrow to the right of the **To work queue** field and select a work queue from the drop-down list.

7. Click the **Set** button. The work queue is added to the list of work queues accessible by the access profile.

8. Click the **Save** icon.

Grant a Profile to a User

To grant an access profile to a user, proceed as follows:

1. Click on **Job definition** in the **Navigation bar** and select **Basic options** page in the **Navigation tree**. The **Basic options** page appears.

2. Click the **Edit** icon, then click the **Granted users** tab. The **Grant access** page appears. The existing users and their access profiles for that job are displayed in a table.

Figure 3.18—Grant access page

3. Click the arrow to the right of the **Grant user** field and select a user from the drop-down list.

4. Click the arrow to the right of the **Access profile** field and select an access profile from the drop-down list.

5. Click the **Grant** button. The user and their access profile are added to the list of granted users.

6. Click the **Save** icon.

Note   **To grant or revoke access rights, the user must be in edit mode (click the Edit link). A user with sufficient rights can revoke access for a user by clicking the ✖ icon in the Revoke column.**

Web Browser Secure Socket

Information passing between datasources and the web browser must be secure. This is achieved by means of a secure socket. For more information on the web browser secure socket, see the section "HTTPS Connections" in Chapter 1 of the *MasterCard Expert Monitoring System(EMS) Technical Guide*.

4 Defining and Processing Jobs

This chapter is designed for high-level users responsible for configuring input source descriptions, rules and jobs to be processed by MasterCard® Expert Monitoring System™.

Overview

This chapter describes all the procedures required to set up your system to define and run jobs, and to analyze the results.

MasterCard® Expert Monitoring System™ (EMS) helps to identify records that match specific rules. The user defines the record structures and the rules. Records can be processed in two different modes:

- **Batch mode**   In batch mode, a job run handles a complete batch of records at one time. First, records are read from files or from an SQL database, and are inserted into an internal database. Then, records are classified, as a whole, according to the user-defined rules.

- **Live mode**   In live mode, records are read from an incoming socket stream, and handled one by one. Records are stored in an internal working memory and processed by the user-defined rules. Following classification, records and their results can be stored in the internal database, if required.

We will look at the entire process under the following headings:

- Setup

- Job definition

- Running the job

- Reviewing results

Setup

This section covers the setup of the following items:

- User accounts

- Database connections

- Database extractions

- Fixed length records

- CSV records

- File descriptions

- Excel file descriptions

- Field encryptions

User Accounts

The first time the application is launched, you are connected as a default administrator. The first task you must perform is to change restrictions related to authentication.

Authenticate Password

To change restrictions related to authentication, proceed as follows:

1. Click on **Administration** in the **Navigation bar**.

2. Click on **Password authenticator** in the **Navigation tree**.

Figure 4.1—Password authenticator

3. Click the **Edit** icon to edit the page. The texts in the **Navigation bar** have changed.

4. Change the settings you require, then press the **Submit this page** button. Submitting a page sends the page content to the web server, so that the information is stored in temporary edit memory.

5. If you are satisfied with your changes, click the **Save** icon.

Create a User Account

Now, if you click on **User management** in the **Navigation tree**, you will see a table showing the existing user accounts. If you have not yet created a user account, only the default administrator account will be displayed.

To create a new user account, proceed as follows:

1. Click the **Edit** icon.

2. Type a user name in the **Create a new user** field, and press the **Create** button. The **User management** page will be displayed.

Figure 4.2—Creating a user

3. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

4. Fill in the **Login** field, deselect the **Revoked** checkbox to enable the account and submit the page.

5. Click on the **Roles** link above the page. A table showing all defined roles will be displayed.

Figure 4.3—Role assignment

6. Click on the button in the **Assigned** column for each role you want to assign to the user account.

7. Click on the **Password** link above the table.

8. Type in the initial password of the user in both fields and submit the page.

9. If you want to create another account, click on the **Return to User management list** link to return to the list.

10. Once you have created the user accounts you require, click the **Save** icon.

If you have created an account for yourself, with administrator rights, you should logout from the default administrator account by clicking the Logout link in the **Toolbar**. You can then login again with your personal account before proceeding to the next steps.

Create a Database Connection

Next, you must define a database connection.

To define a database connection, proceed as follows:

1. Click on **Configuration** in the **Navigation bar** and select **Database connections** in the **Navigation tree**. The existing database connections list will be shown in a table. It will be empty if no connections are defined.

2. Click the **Edit** icon to open the **Create a new database connection** page.

3. Enter a name for your database connection and press the **Create** button. A page is displayed in which you can specify the connection to your database.

Figure 4.4—Creating a database connection

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the database connection (optional).

6. Enter the user name and password to use to connect to the database. For more information, refer to the section "Database Connections Page" in Chapter 2.

7. Click the arrow to the right of the **Driver** field and select the database driver to use from the drop-down list. (Oracle® Driver to connect to an Oracle database or SQL Server Driver for Microsoft® SQL Server database.)

8. Type in a valid JDBC URL to connect to your database.

    A JDBC URL is an URL that describes how to connect to a database via JDBC. The format of such an URL for Oracle is as follows:

    `jdbc:oracle:thin:@<host>:<port>:<sid>`

    where :

    `<host>` must be replaced by the host name to which to connect
    `<port>` must be replaced by the port number to which to connect
    `<sid>` must be replaced by the name of the database instance to which to connect

    The format for such an URL for Microsoft SQL Server is as follows:

    `jdbc:sqlserver:<host>:<port>;databaseName=<database name>;`

    where:

    `<host>` must be replaced by the host name to which to connect
    `<port>` must be replaced by the port number to which to connect
    `<database name>` must be replaced by the name of the database instance to which to connect

9. Click the **Submit this page** button button.

10. Click the **Save** icon.

If the connection works, 'Connection is valid' is displayed in green beside the **Validity** label. If an error occurs, an error message is displayed in red.

Create Database Extraction

You are now ready to define database extractions.

To define database extractions, proceed as follows:

1. Click on **Database extractions** in the **Navigation tree**.

2. Click the **Edit** icon to open the **Database extractions creation** page.

3. Enter a name for the database extraction and click the **Create** button.
    The **Database extractions** page will be displayed.

Figure 4.5—Creating a database extraction

Database extractions

Name:	BlackList
Tags:	
My tags:	
Description:	List of known fraudsters
Database connection:	OracleDB
Select:	FirstName, LastName, ZipCode, Country
From:	BlackList
Where:	
Group by:	
Validity:	✓ Extraction is valid
	Submit this page
Author:	Charlie Smith, Lucie Knight
Created at:	2006-10-19 16:09:15
Modified at:	2006-10-31 09:55:25

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more
    information on tags and filtering, refer to the section "Filtering Principles"
    in Chapter 2.

5. Enter a description for the database extraction (optional) in the **Description**
    field.

6. Click the arrow to the right of the **Database connection** field and select the
    database connection to use from the drop-down list.

7. Define the select statement to extract the records.

8. Click the **Submit this page** button.

9. Click the **Save** icon.

✎ **Note**   **After submitting the page, the Validity field indicates if the query is valid or
not. If it is valid, you can see the fields that have been identified by clicking on
the Fields link above the page.**

Create Fixed Length Records

Next, you should define fixed length records.

To define fixed length records, proceed as follows:

1. Click on **Fixed length records** in the **Navigation tree.**

2. Click the **Edit** icon to open the **Fixed length record creation** page.

3. Enter a name for the fixed length record then press **Create**.
   The **Fixed length records** page will be displayed.

Figure 4.6—Creating a fixed length record

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the fixed length record (optional).

6. If you already know your record length (including the record separator such as line feeds), select the **Override record length** checkbox and enter the record length in the field.

7. Choose the appropriate character encoding. (Cp1252 is the encoding used by default by Windows in Western Europe and North America.)

8. If you have an example record that can be parsed by the format, insert it in the **Test record** field.

9. Click the **Submit this page** button.

10. Click on the **Fields** link above the page to display the **Field creation** page and a table showing existing fields.

11. Enter name for the field, then press the **Create** button.

Figure 4.7—Creating a fixed length record field

12. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

13. Enter a description for the field (optional) in the **Description** field.

14. Enter a start offset (0 indicates no offset, i.e. the beginning of the record).

15. Click the arrow to the right of the **Field type** field and select a field import type from the drop-down list.

    There are four field types (or field import types):

    - Integer: integer numbers, up to 18 digits

    - Decimal: decimal numbers

    - Character: character strings

    - Date Time: date and time

16. Enter the field format. It usually is the field length, but it can be a much more complex expression. For more information on field formats, refer to Appendix A.

17. If you wish to specify a file containing descriptions related to the field content, select the **Description file** checkbox, then click the arrow to the right of the field and select a description file from the drop-down list.

18. If you wish to decrypt the field whenever it is imported, select the **Decrypt field on import** checkbox, then click the arrow to the right of the field and select an encryption system from the drop-down list.

19. Click the **Submit this page** button.

20. Click on **Back** icon to return to the list to create more fields, if required.

21. Click the **Save** icon.

On the **Fields list** page, if the field definitions correspond to your test record, the **Test record** column will show how each field parses the test record.

Create CSV Records

Next, you should define comma separated value (CSV) records.

To define CSV records, proceed as follows:

1. Click on **CSV records** in the **Navigation tree.**

2. Click the **Edit** icon to open the **CSV record creation** page.

3. Enter a name for the CSV record then press **Create**.
   The **CSV records** page will be displayed.

Figure 4.8—Creating a CSV record

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the CSV record (optional).

6. Enter the number of columns in the file in the **Number of columns** field.

7. Enter the required field separator in the in the **Field separator** field. The default value is a comma (,).

8. Enter the character you wish to use to enclose text fields in the **Character field encloser** field. The default value is double-quotes (").

9. If required, click the arrow to the right of the **Character encoding** field and select a character set from the drop-down list. However, EMS will select the character set used by your operating system by default.

10. If you have an example record that can be parsed by the format, insert it in the **Test record** field (optional).

11. If you wish to truncate the contents of cells to fit in the field format, select the **Truncate cell contents to fit in field format** checkbox.

12. Click the **Submit this page** button.

13. Click on the **Fields** link above the page to display the **Field creation** page and a table showing existing fields.

14. Enter name for the field, then press the **Create** button.

Figure 4.9—Creating a CSV field

15. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

16. Enter a description for the field (optional) in the **Description** field.

17. Click the arrow to the right of the **Field type** field and select a field import type from the drop-down list.

    There are four field types (or field import types):

    - Integer: integer numbers, up to 18 digits

    - Decimal: decimal numbers

    - Character: character strings

    - Date Time: date and time

18. Enter the field format. It usually is the field length, but it can be a much more complex expression. For more information on field formats, refer to Appendix A.

19. If you wish to specify a file containing descriptions related to the field content, select the **Description file** checkbox, then click the arrow to the right of the field and select a description file from the drop-down list.

20. If you wish to decrypt the field whenever it is imported, select the **Decrypt field on import** checkbox, then click the arrow to the right of the field and select an encryption system from the drop-down list.

21. Click the **Submit this page** button.

22. Click on **Back** icon to return to the list to create more fields, if required.

23. Click the **Save** icon.

On the **Fields list** page, if the field definitions correspond to your test record, the **Test record** column will show how each field parses the test record.

Create a File Description

Next you should create a file description.

To create a file description, proceed as follows:

1. Click on **File descriptions** in the **Navigation tree**.

2. Click the **Edit** icon to open the **File description creation** page.

3. Enter a name for the file description and click the **Create** button.

Figure 4.10—Creating a file description

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the file description (optional).

6. Click the arrow to the right of the **Record format** field and select a record format from the drop-down list.

7. Enter the file header and footer lengths in the **File header length** and **File footer length** fields.

8. Click the **Submit this page** button.

9. Click the **Save** icon.

Create Excel file descriptions

Next, you should define Excel file descriptions.

To define Excel file descriptions, proceed as follows:

1. Click on **Excel file descriptions** in the **Navigation tree.**

2. Click the **Edit** icon to open the **Excel file description creation** page.

3. Enter a name for the Excel file description, then press **Create**.
   The **Excel file descriptions** page will be displayed.

Figure 4.11—Creating an Excel file description

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the Excel file description (optional).

6. Enter the number of rows used by the file header in the **Number of rows in the file header** field.

7. Click the arrow to the right of the **Behavior for empty rows** field and select a behavior type from the drop-down list. The options are as follows:

   • Error

   • Import row

   • Skip row

   • End of file

8. If you wish to truncate the contents of cells to fit in the field format, select the **Truncate cell content to fit in field format** checkbox.

9. Click the **Submit this page** button.

10. Click on the **Excel fields** tab to display the **Excel field creation** page and a table showing existing fields.

11. Enter name for the field, then press the **Create** button.

Figure 4.12—Excel fields page

12. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

13. Enter a description for the field (optional) in the **Description** field.

14. Click the arrow to the right of the **Field type** field and select a field import type from the drop-down list.

There are four field types (or field import types):

- Integer: integer numbers, up to 18 digits

- Decimal: decimal numbers

- Character: character strings

- Date Time: date and time

15. Enter the field format. It usually is the field length, but it can be a much more complex expression. For more information on field formats, refer to Appendix A.

16. If you wish to specify a file containing descriptions related to the field content, select the **Description file** checkbox, then click the arrow to the right of the field and select a description file from the drop-down list.

17. If you wish to decrypt the field whenever it is imported, select the **Decrypt field on import** checkbox, then click the arrow to the right of the field and select an encryption system from the drop-down list.

18. Click the **Submit this page** button.

19. Click on **Back** icon to return to the list to create more fields, if required.

20. Click the **Save** icon.

Job Definition

The next step is to define a job that will use the configuration.

This section explains how to define:

- A Batch Job

- A Live Job

Create a Batch Job

We can create a basic batch job using the following pages:

- **Basic options**

- **Datasources**

- **Relationships**

- **Rules**

- **Export contents**

- **Exports**

- **Access profiles**

To start job definition, proceed as follows:

1. Click on **Job Definition** in the **Navigation bar**. The **Job creation** page is displayed.

2. If you have no job selected, you will be shown a job list. The list will be empty if no job has yet been created.

3. Enter a name for the job and click the **Create** button. The **Basic options** page is displayed, allowing you to begin the creation of the job.

Figure 4.13—Defining basic options

Define Basic Options

To complete the fields on the **Basic options** page, proceed as follows:

1. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

2. Enter a description for the job (optional).

3. Click the arrow to the right of the **Database connection** field and select a database connection from the drop-down list.

4. In the **Delete log data after** field, enter a time period after which data logs will be deleted. For more information refer to the "Interval" section in Appendix A.

5. Click the **Submit this page** button to submit your changes.

6. Click on the **Granted users** link to select which users to grant access to the job. For more information on access profiles and how to grant them to a user, refer to the section "Access Profiles" in Chapter 3.

Create a Datasource

To define a datasource, proceed as follows:

1. Click on **Datasources** in the **Navigation tree**, then click the **Edit** icon. The **Datasource creation** page is displayed.

Figure 4.14—Datasources page

2. Enter a name for the datasource and press the **Create** button. The **Datasources** page is displayed.

3. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

4. Enter a description for the datasource (optional).

5. Click the arrow to the right of the **Source description** field and select a source description from the drop-down list. You can select either a database extraction, a file description, or an Excel file description. Once you have chosen a source description, the following new fields appear:

   - **Unique key field**

   - **Replace datasource completely**

   - **Ignore duplicates**

   - **Index profile**

   - **Receive time from field**

   - **Delete data after**

6. Click the arrow to the right of the **Receive time from field** field and select a time field from the drop-down list.   This time field will be used for expiration, historical functions and result reviewing.
If you do not have a meaningful time field, select **ImportTime** which is a field added during the import and containing the time at which the record was imported.

7. In the **Delete data after** field, enter a time interval after which data must be deleted. For more information on the EMS interval format refer to Appendix A.

8. Click the **Submit this page** button.

9. Click on the **Source description** link at the top of the page. The appearance of this page depends on the type of source description you selected.

Figure 4.15—Source description page

If you selected a **File description**, you must define the path to the file, and an output folder.

10. Click the **Save** icon.

Create Computed Fields

Computed fields can be added to datasources. Computed fields make it possible to access values that are not explicitly available in the datasource, but may be produced by applying functions to fields of the datasource.

For example: a BIN field can be defined as a substring of a PAN field, or a UNIFIED_AMOUNT field can be LOCAL_AMOUNT * CHANGE_RATE.

Computed fields can be used in rules like any other field.

Figure 4.16—Computed fields page

To create a computed field, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Select **Datasources** in the **Navigation tree**. The **Select a datasource** page is displayed.

3. Select the datasource for which you wish to create a computed field. The **Datasources** page opens for the selected datasource.

4. Click on the **Computed fields** link. The **Select a field** page is displayed.

5. Click the **Edit** icon to open the **Computed field creation** page.

6. Enter a name for the computed field and click the **Create** button. The **Computed fields** page is displayed.

7. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

8. Enter a description for the computed field.

9. Click the arrow to the right of the **Computation** field and select the type of computation you wish to perform. Subsequent fields depend on the type of computation selected. All available computations are described in the "Computed Fields Page" section of Chapter 2.

10. Complete the required fields.

11. Click the **Submit this page** button.

12. Click the **Save** icon.

Create Editable Fields

Editable fields can be added to datasources. They make it possible for analysts to add information to each record. They can be edited in the **Investigation** page.

For example, they can be used to add a fraud related tag such as "Suspicious" or "Genuine", and/or to add a text comment such as "Called customer, line was busy". Editable fields can be used in rules like any other field.

Figure 4.17—Editable fields page

To create an editable field, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Select **Datasources** in the **Navigation tree**. The **Select a datasource** page is displayed.

3. Select the datasource for which you wish to create an editable field. The **Datasource** page opens for the selected datasource.

4. Click the **Editable fields** link. The **Select an editable field** page is displayed.

5. Click the **Edit** icon to open the **Editable fields creation** page.

6. Enter a name for the editable field and click the **Create** button. The **Editable fields** page is displayed.

7. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

8. Enter a description for the editable field (optional).

9. Click the arrow to the right of the **Field type** field and select the field type. In our example in Figure 4.17, it is a Date Time field type. Another possibility is Custom type. See the "Create a Custom Value" section later in this chapter.

📝 **Note**   **The subsequent fields depend on the field type selected.**

10. Complete any subsequent fields.

11. Click the **Submit this page** button.

12. Click the **Save** icon.

Create a Custom Value List

Custom lists of values can be defined by users. These lists can be used as values for editable fields of type Custom. For example: If an editable field is used to add a fraudulent tag such as "Suspicious" or "Genuine", it will enforce the use of the defined values. During modification, it is then possible to select the value from a drop-down list.

To create a custom list and custom values, proceed as follows:

1. Click **Configuration** on the **Navigation bar**, then click **Custom lists** in the **Navigation tree**. The **Select a custom list** page is displayed.

2. Click the **Edit** icon. The **Custom list creation** page is displayed.

3. Enter a name for the custom list and press the **Create** button. The **Custom lists** page is displayed.

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the custom list (optional).

Figure 4.18—Custom lists page

6. Click the **Submit this page** button.

7. Click the **Custom values** link. The **Custom value creation** page is displayed.

Figure 4.19—Custom values page

8. Enter a name for the new custom value and click the **Create** button. The **Custom values** page is displayed.

9. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

10. Enter a description for the custom value (optional).

11. Click the **Submit this page** button.

12. Click the **Back** icon to return to the **Custom value creation** page, then repeat steps 8-11 until you have created all the required custom values.

13. Click the **Save** icon.

Configure Safe Keeping Settings

To avoid reduced processing efficiency due to large volumes of data, old records can be transferred to a data storage vault. These records will not be classified by rules anymore. They will only be accessible for reviewing in analysis tools.

The editable fields of stored records are still editable.

Figure 4.20—Safe keeping page

To store data in the data vault, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Select **Datasources** in the **Navigation tree**. The **Select a datasource** page is displayed.

3. Select the datasource for which you wish to create a storage vault. The **Datasource** page opens for the selected datasource.

4. Click the **Safe keeping** link. The **Safe keeping** page is displayed.

5. Click the **Edit** icon to allow you to edit the safe keeping options.

6. Select the **Activate datasource safe keeping** checkbox. This activates the storage functionality.

7. Use the options displayed to filter the data you wish to store in the data vault. To use an option, select the checkbox to the left of it. Use the fields to the right of the option to define configuration details.

   The options are described in the "Safe Keeping page" section in Chapter 2.

8. Click the **Submit this page** button.

9. Click the **Save** icon.

Create a Relationship

To help navigating between datasources, relationships can be defined. Relationships associate a set of fields across datasources that are linked with a similar concept. For example, a PAN relationship can be defined to associate authorization, clearing and customer master data.

Navigation is then possible through relationships in the Investigation analysis tool.

To create a relationship, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Select **Relationships** in the **Navigation tree**. The **Select a relationship** page is displayed.

3. Click the **Edit** icon. The **Relationship creation** page is displayed.

4. Enter a name for the relationship and click the **Create** button. The **Relationships** page is displayed.

Figure 4.21—Relationships page

5. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

6. Enter a description for the relationship (optional).

7. Click the **Submit this page** button.

8. Click the **Relationship fields** link. The **Add a new field to the relationship** page appears.

Figure 4.22— Add a new field to the relationship page

9. Click the arrow to the right of the **Add** field and select the field you want to add to the relationship.

10. Repeat step 9 until all the required fields have been added to the relationship.

11. Click the **Save** icon.

Create a Rule

For records to be classified, rules must be created.

To create rules, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Click on **Rules** in the **Navigation tree**. The **Rule creation** page appears.

3. Enter a name for the rule, then click the **Create** button.
   The **Rules** page appears.

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the rule (optional).

6. Click the arrow to the right of the **Function** field and select a function from the drop-down list. Several parameter fields will appear for the function.

7. Complete the parameter fields, referring to Appendix A where necessary.

Figure 4.23—Rules page

8. Click the **Submit this page** button.

9. Click on the **Batch processing** link above the page to reach the batch processing parameters.

Figure 4.24—Batch processing page

10. Check the **Generate results during batch processing** checkbox.

11. Click the **Submit this page** button.

12. Click the **Save** icon.

The job is now ready to be run.

✏️ **Note**   **More details on functions are available in Appendix A.**

Exporting Batch Results

With a batch job you can export results to various targets. To do this, you must:

* Define the export content that will be used for each record

* Define an export type

Create an Export Content

To create an export content, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Select **Export contents** in the **Navigation tree**. The **Select an export content** page is displayed.

3. Click the **Edit** icon. The **Export content creation** page is displayed.

4. Enter a name for the export content and click the **Create** button. The **Export contents** page is displayed.

Figure 4.25—Export contents page

5. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

6. Enter a description for the export content (optional).

7. Click the arrow to the right of the **Datasource** field and select a datasource from the drop-down list.

8. Click the **Content items** link at the top of the page to open the **Content items creation** page.

9. Enter a name for the content item and click the **Create** button. The **Content items** page is displayed.

10. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

11. Enter a description for the content item (optional).

12. Click the arrow to the right of the **Content type** field and select a content type from the drop-down list. The fields which appear on the remainder of the page depend on which content type you select. For more information on content types, refer to the section "Export Contents Page" in Chapter 2.

Figure 4.26—Content items page

13. Complete the remaining fields and click the **Submit this page** button.

14. Click on **Return to Content items list** to add further content items.

15. Click the **Save** icon.

Define an Export

Once your export content is defined, you can define an export in the **Exports** page. To define an export, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Select **Exports** in the **Navigation tree** to open the **Exports** page.

3. Click the **Edit** icon to open the **Export creation** page.

4. Enter a name for the export and click the **Create** button. The **Exports** page appears.

5. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

6. Enter a description for the export (optional).

7. Click the arrow to the right of the **Datasource** field and select a datasource from the drop-down list.

8. Click the arrow to the right of the **Content** field and select an export content from the drop-down list.

Figure 4.27—Exports page

9. Click the arrow to the right of the **Target** field and select a target from the drop-down list. The remaining fields on this page depend on the type of target selected. For information on target types see the section "Exports" in Chapter 2.

10. Complete the remaining fields.

11. Click the **Submit this page** button.

12. Click the **Save** icon.

Define Access Profiles

For full details on how to define an access profile, refer to the section "Access Profiles" in Chapter 3.

Live Job

This section explains how to set up live processing. We can create a live job using the following pages:

- **Basic options**

- **Datasources**

- **Rules**

- **Export contents**

- **Exports**

- **Access profiles**

To start Live job definition, proceed as follows:

1. Click on **Job Definition** in the **Navigation bar**. The **Job creation** page is displayed.

2. If you have no job selected, you will be shown a job list. The list will be empty if no job has yet been created.

3. Enter a name for the job and click the **Create** button. The **Basic options** page is displayed, allowing you to begin the creation of the job.

Figure 4.28—Basic options page

Define Basic Options

To complete the fields on the **Basic options** page, proceed as follows:

1. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

2. Enter a description for the job (optional).

3. Click the arrow to the right of the **Database connection** field and select a database connection from the drop-down list.

4. In the **Delete log data after** field, enter a time period after which data logs will be deleted. For more information refer to the "Interval" section in Appendix A.

5. Click the **Submit this page** button to submit your changes.

6. Click on the **Granted users** link to select which users to grant access to the job. For more information on access profiles and how to grant them to a user, refer to the section "Access Profiles" in Chapter 3.

Live Datasources

To define a live datasource, we need to:

- Create a socket through which live records will enter the system

- Create a datasource to use that socket

Create a Socket Input

To create a socket input, proceed as follows:

1. Click **Configuration** on the **Navigation bar**, Then click **Socket inputs** in the **Navigation tree**. The **Select a socket input** page is displayed.

2. Click the **Edit** icon. The **Socket input creation** page is displayed.

3. Enter a name for the socket input and press the **Create** button. The **Socket inputs** page is displayed.

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the socket input (optional).

6. Click the arrow to the right of the **Record format** field and select a record format from the drop-down list.

Figure 4.29—Socket inputs page

7. If you want the system to act as a server socket listening for incoming live data, select the **Server port** checkbox and specify the server port in the field beside it.

8. If you want the system to act as client sockets to receive live data, click the **Client sockets** link. The **Create a new client Socket** page is displayed.

Figure 4.30—Client sockets page

9. Enter a name for the client socket and click the **Create** button.

10. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

11. Enter a description for the client socket (optional).

12. Enter the **Host**, the **Port** and specify a reconnection **Delay** in the appropriate fields. For more information refer to the "Interval" section in Appendix A.

13. Click the **Submit this page** button.

14. Click the **Save** icon.

Create a Live Datasource

To create a datasource to use the socket input, proceed as follows:

1. Click **Job Definition** in the **Navigation bar** and select the job for which you wish to use the socket input.

2. Select **Datasources** in the **Navigation tree**.

3. Click the **Edit** icon to open the **Datasource creation** page.

4. Enter a name for the datasource and click the **Create** button.

5. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

6. Enter a description for the datasource (optional).

7. Click the arrow to the right of the **Source description** field.
   The drop-down displays the socket input you defined earlier, under **Socket input**. Select it.

8. Click the arrow to the right of the **Receive time from field** field and select a time field from the drop-down list. This time field will be used for expiration and historical functions.
   If you do not have a meaningful time field, select **ImportTime** which is a field added during the import and containing the time at which the record was imported.

9. Select the **Delete data after** checkbox, and enter a time interval in the field, after which data must be deleted (optional). Deletion occurs only during batch processing of the job. For more information on time intervals, refer to the "Interval" section in Appendix A.

Figure 4.31—Datasources page

10. Click the **Submit this page** button.

11. Click the **Source description** link at the top of the page.
    The **Source description** page appears.

Figure 4.32—Source description page for socket input

12. If you want to be able to use the reviewing tools, select the **Store incoming records in the internal database** option.

13. Click the **Submit this page** button.

14. Click the **Save** icon.

Create a Live Rule

Live rules must be enabled for live processing.

To define a live rule, proceed as follows:

1. Define a new rule in the **Rules** page, as described in the "Batch Job" section, earlier in this chapter.

2. Click on the **Live processing** link to open the **Live processing** page.

Figure 4.33—Live processing page

3. Select the **Generate results during live processing** checkbox.

4. If you want to store the results, select the **Store live results** checkbox.
   If you do not store the results, the matches will not appear in the reviewing tools.

5. Click the **Submit this page** button.

6. Click the **Save** icon.

Exporting Live Results

With a live job you can also export results on the socket through which records enter the system. To do this, you must:

- Define the export content that will be used for each record

- Define an export type

Create an Export Content for a Live Job

Creating an export content for a live job is the same as creating an export content for a batch job. To create an export content, follow the procedures in the "Create an Export Content" section earlier in this chapter.

Define an Export for a Live Job

Once your export content is defined, you can define an export in the **Exports** page. To define an export, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Select **Exports** in the **Navigation tree** to open the **Exports** page.

3. Click the **Edit** icon to open the **Export creation** page.

4. Enter a name for the export and click the **Create** button. The **Exports** page appears.

Figure 4.34—Exports page

5. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

6. Enter a description for the export (optional).

7. Click the arrow to the right of the **Datasource** field and select a datasource from the drop-down list.

8. Click the arrow to the right of the **Content** field and select a content from the drop-down list.

9. Click the arrow to the right of the **Target** field and select a target from the drop-down list.

10. Select the **Use during live processing** option to enable the export during live processing.

11. Click the **Submit this page** button.

12. Click the **Save** icon.

Define Access Profiles

For full details on how to define an access profile, refer to the section "Access Profiles" in Chapter 3.

Running the Job

Validate the Job

Only valid jobs can be run.

To ensure that your job is valid, you must check the validation report:

1. Click on **Job Control** in the **Navigation bar**.

2. Click on **Validation** in the **Navigation tree**.

Figure 4.35—Job validation page

3. If the page reads 'No error found' then your job is valid.

4. Otherwise, a table shows all errors and warnings. The **Source** column of the table contains links to the definition of the invalid item. You can click on it to reach the page where the item is defined.

5. To fix a problem, click the **Edit** icon, edit the page, submit the page, then click the **Save** icon.

Run the Job

If the job is valid, you can process it:

1. Click on **Job Control** in the **Navigation bar**.

2. Click **Processing status** to open the **Processing status** page.

3. To process a batch job, click on **Run** in the **Batch processing** section.

Figure 4.36—Batch processing section

4. To process a live job, click on **Start** in the **Live processing** section.

Figure 4.37—Live processing section

While the job is running, you will see its progress in the **Processing logs** page.

- When a processing step is finished, the word "completed" appears beside the step in the **Status** column. When all steps are completed, the job has finished processing.

- If a processing error occurs, details will be displayed in the **Status** column.

- If the job processes correctly, you can review the results.

5. To process any notifications you have defined for the job, click on **Start** in the **Communicator processing** section.

Figure 4.38—Communicator processing section

Review Results

If the job processes correctly, you can review the results.

1. Click on **Job Analysis** in the **Navigation bar**.

2. Select the tool you want to use in the **Navigation tree**.

For more information, see Chapter 5, "Viewing Results".

5 Viewing Results

This chapter explains how to view the results after MasterCard® Expert Monitoring System™ has processed the input source data.

Job Analysis

When the user clicks **Job Analysis** in the **Navigation bar**, the **Job Analysis** page is displayed.

If a user has the "Edit Job" rights for the application, the **Create a new job** field is displayed in the top left-hand corner of the current page allowing the user to create a new job, and a job list is displayed below it.

If a user does not have the "Edit Job" rights for the application, the **Create a new job** field will not be present.

- If the user enters a new job name and clicks the **Create** button, the **Job Definition** page is displayed.

- If the user clicks a job in the job list, the **Views** page is displayed. The other pages in the Job Analysis section are displayed in the **Navigation tree**.

Figure 5.1—Job analysis page

✎ Note   **The Job Analysis page can only be viewed by users that have the "View job analysis" rights in their assigned roles.**
The Job Analysis page can only be edited by users that have one of the "Edit Record" permission in their assigned roles.

Views Page

Users who often do similar types of queries while reviewing results, can define views. A view is a query template which allows a user to save a query type for possible future use. Views are defined by the users in the **Job Definition Views** page. See the "How to create a view" section, later in this chapter.

Views make it possible to define form templates for finding records in analysis tools. All defined views are available in the Views analysis tool to find and examine records.

The **Views** page allows analysts to display the contents of the internal database through a defined view.

Analysts must first select a view from the list to display its corresponding query form. The number and type of query criteria that are displayed on the form, and that are taken into account for the query, depends on the influence parameters associated with each datasource field:

- 'forced' fields do not appear in the form because their value is imposed by the selected view.

- 'skipped' fields do not appear in the form because they may not be specified.

- 'required' fields appear in the form and must have a value specified.

- 'optional' fields appear in the form, preceded by a checkbox. They are ignored unless the checkbox is selected.

Figure 5.2—Views page

After the query is submitted, the results are shown in a table with the following columns:

Table 5.1—Results table

Column	Description
Details	Contains a 🔍 button that leads to the **Investigation** page.
Report	If the datasource being reviewed is a case datasource, it contains a 📄 button that leads to the **Case report** page.
Download	If the datasource being reviewed is the Outbox datasource, it contains a ⬇ button that downloads the attachments of the message.
Matches	Comma separated list of matching rule names.
(Each displayed field name)	Value of the field in the record. Values are displayed according to the "Format of displayed data" setting which allows the selection of a Display format.

If the fields have associated description files, the descriptions will appear as tool tips over the data. These tool tips can be disabled using the "Use description files when showing records" setting.

The table is limited to a maximum number of rows per page. You can view more results using the ‹ and › buttons. The maximum number of records per page is specified by the "Number of records per page" setting.

By default, all accessible datasource fields are displayed in the table. Field access is specified in the **Field access** page. The field column displayed can be specified by the "Visible datasource columns" setting for the appropriate job and datasource.

For fields that are specified in the **Drillable fields** page, the user can select the specified field and value and click on a cell to navigate to the **Show records** page. For fields that are only navigable, the values are replaced by an icon (➡).

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⬇ button downloads the currently displayed records. Clicking the ⬇ button downloads all records for the query, independent of the maximum number of records per page.

Create a View

To create a view, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**.

2. Select **Views** in the **Navigation tree**. The **Select a view** page is displayed.

3. Click **Edit**. The **View creation** page is displayed.

4. In the **Name** field, enter a name for the view, then click the **Create** button. The **Views** page is displayed.

5. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

6. In the **Description** field, enter a description for the view.

7. Click the arrow to the right of the **Datasource** field and select a datasource on which the view will be based. The fields of the datasource are displayed on the page.

8. If you select the **Display results before form is submitted** checkbox, the form will be submitted as soon as the view is selected from the view list. The user does not have to click the **Show/Refresh** button.

9. If you wish to filter the results to see only records matching a specific rule, click the arrow to the right of the **Matching criteria** field and select one of the influence parameters from the drop-down list. Then select the filter rule from the rule drop-down list, beside it.

10. If you wish to filter the results to see only records matching a specific filter, click the arrow to the right of the **Matching filter** field and select one of the influence parameters from the drop-down list. Then select the filter from the filter drop-down list, beside it.

11. If you wish to use a specific time range, select the **Specific time range** checkbox and enter the time range criteria in the **Start** and **Duration** fields.

Figure 5.3—Views page

12. For each of the datasource fields, click the arrow to the right of the influence parameter field and select "Forced", "Required", "Optional" or "Skipped", and add the field criteria in the adjoining field.

13. Click **Submit this page.**

14. Click **Save Changes**.

Find Matches Page

The **Find matches** page allows the analysts to query the internal database for records that match criteria defined in the rules.

To view the **Find matches** page, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Find matches** in the **Navigation tree**. The **Find matches** page appears.

2. In the **Field** field, specify the field from which the matching values must be displayed.

3. In the **Rule** field, specify the rule that must be matched.

4. In the **Time from** field, specify the time range in which to search. The time range is initially set according to the "Default analysis range" setting.

5. Click the **Show/Refresh** button.

Figure 5.4—Find matches page

After the query is submitted, the results are shown in a table with the following columns:

Table 5.2—Results table

Column	Description
Details	Contains a 🔍 button that leads to the **Show records** page.
Matching value	Value of the selected field for the matching records.
Number of matches	Number of matching records for that value of the field.
Number of records	Number of records for that value of the field.

The table is limited to a maximum number of rows per page. You can view more results using the ◁ and ▷ buttons. The maximum number of matches per page is specified by the "Number of matches per page" setting.

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⬇ button downloads the currently displayed records. Clicking the ⬇ button downloads all records for the query, independent of the maximum number of records per page.

✎ Note **The column counting functionality is resource intensive. If this functionality is not required, MasterCard recommends that you disable it, using the "Display records count in match finding view" setting.**

Show Records Page

The **Show records** page allows the analysts to display the contents of the internal database.

To view the **Show records** page, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Show records** in the **Navigation tree**. The **Show records** page appears.

2. In the **Field** field, specify the field on which to base the reviewing.

3. In the **From** field, specify the storage from which the records must be retrieved (either the datasource itself, or the datasource safe keeping storage).

4. In the **Rule** field, specify the rule that must be matched by the displayed records.

5. Select the **Filter** checkbox, click the arrow on the drop-down list, and select a filter option.

6. In the **Value** field, specify the value of the reviewing field for which to retrieve records.

7. In the **Time from** field, specify the time range in which to search. The time range is initially set according to the "Default analysis range" setting.

8. Click the **Show/Refresh** button.

Figure 5.5—Show records page

After the query is submitted the results are shown in a table with the following columns:

Table 5.3—Results table

Column	Description
Details	Contains a ⊞ button that leads to the **Investigation** page.
Report	If the datasource being reviewed is a case datasource, it contains a ⊞ button that leads to the **Case report** page.
Download	If the datasource being reviewed is the Outbox datasource, it contains a ⊞ button that downloads the attachments of the message.
Matches	Comma separated list of matching rule names.
(Each displayed field name)	Value of the field in the record. Values are displayed according to the "Format of displayed data" setting which allows the selection of a Display format.

If the fields have associated description files, the descriptions will appear as tool tips over the data. Those tool tips can be disabled using the "Use description files when showing records" setting.

The table is limited to a maximum number of rows per page. You can view more results using the ◄ and ► buttons. The maximum number of records per page is specified by the "Number of records per page" setting.

By default, all accessible datasource fields are displayed in the table. Field access is specified in the **Field access** page. The displayed fields columns can be specified by the "Visible datasource columns" setting for the appropriate job and datasource.

For fields that are specified in the **Drillable fields** page, the user can select the specified field and value and click on a cell to navigate to the **Show records** page. For fields that are only navigable, the values are replaced by an icon (⮕).

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⯆ button downloads the currently displayed records. Clicking the ⯆ button downloads all records for the query, independent of the maximum number of records per page.

Investigation Page

The **Investigation** page allows the analysts to investigate a specific record in the internal database.

Figure 5.6—Investigation page

The **Investigation** page can be accessed directly, or through the 🔍 button in the **Show records** results page or the **Views** results page.

To view the **Investigation** page directly, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Investigation** in the **Navigation tree**. The **Investigation** page appears.

2. In the **Datasource** field, specify the datasource from which to obtain the record.

3. In the **From** field, specify the storage from which the records must be retrieved (either the datasource itself, or the datasource safe keeping storage).

4. Enter a value in the record key field (in the example in Figure 5.6 the record key field is "PAN").

5. Click the **Investigate** button.

When accessed through the 🔍 button in the results of the **Show records** or the **Views** page, the investigation selection is done automatically, and the **Investigation** query page is not displayed.

Figure 5.7—Investigation page – Record details

Depending on the record being investigated, the series of possible actions is displayed, as follows:

*   **Change investigation subject** It leads to the form originally displayed when accessing this page directly.

*   **Detail view selection** By default, it shows the record detail.

*   Related datasources can also be selected. Datasource relations are defined in the **Relationships** page. The drop-down list gives access to all possible targets for all defined relationship fields.

Below the actions, the selected detail view is displayed.

For the Record detail view, the record details are shown in a table showing fields and respective values. The displayed fields can be specified by the "Visible datasource detail fields" setting for the appropriate job and datasource.

Clicking the **Edit record** button displays the record details in edit mode. Each editable field can be modified. A **Save changes** button applies the changes to the editable fields. A **Cancel changes** button cancels all changes and returns the application to View mode.

If a related datasource is selected, a table displays the records obtained through the relation.

Analysts can specify the following criteria:

* **<Datasource_date_field> from / to:** the time range in which to search. The time range is initially set according to the "Default analysis range" setting.

* **Inside:** the storage from which the records must be retrieved (either the Datasource itself or the datasource Safe keeping storage).

The table has the following columns:

Table 5.4—Related record

Column	Description
Details	Contains a 🔍 button that leads to the **Investigation** page, but investigating that specific record.
Report	If the datasource being reviewed is a case datasource, it contains a 📄 button that leads to the **Case report** page.
Download	If the datasource being reviewed is the Outbox datasource, it contains a ⬇ button that downloads the attachments of the message.
Matches	Comma separated list of matching rule names.
Each displayed field name	Value of the field in the record. Values are displayed according to the setting "Format of displayed data" which allows the selection of a display format.

If the fields have associated description files, the descriptions will appear as tool tips when you roll the mouse over the data. Those tool tips can be disabled using the "Use description files when showing records" setting.

The table is limited to a maximum number of rows per page. You can view more results using the ◄ and ► buttons. The maximum number of records per page is specified by the "Number of records per page" setting.

By default, all accessible datasource fields are displayed in the table. Field access is specified in the **Field access** page. The displayed fields columns can be specified by the "Visible datasource columns" setting for the appropriate job and datasource.

For fields that are specified in the **Drillable fields** page, the user can select the specified field and value and click on a cell to navigate to the **Show records** page. For fields that are only navigable, the values are replaced by an icon ().

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the button downloads the currently displayed records. Clicking the button downloads all records for the query, independent of the maximum number of records per page.

Case Investigation Page

When the **Investigation** page displays a case, its layout changes slightly, and it becomes the **Case investigation** page. The top section of the page displays additional fields containing actions the analyst can take on cases, such as:

- Open a case

- Add investigation steps

- Move a case to another work queue

- Add a reminder on a case

- Update a case's editable fields

- Close a case

Figure 5.8—Case investigation page

Some actions will modify the state of the case. There are six possible states:

- **Stand by** Cases that are waiting in one or more work queues to be investigated.

- **New** Newly created cases that are not assigned to any work queue.

- **Working** Cases that are under investigation following the workflow of the selected work queue.

- **Closed** Cases that have been completely investigated.

- **Reactivated** Previously created cases that should be investigated again but not assigned to any work queue.

- **Transferred** Cases that are moved to a new work queue while being investigated, but not taken over in the new work queue.

Figure 5.9 illustrates these state changes.

Case Creation

According to the case generation parameters defined in the case managers **Source rules** page, a case can be created or reopened and it can be set in a work queue or not. Cases can be manually created, if the user queries for a case key that does not exist.

Cases can be generated with three different states:

- **Stand by** if the case is created or reopened in a specific work queue.

- **New** if the case is created but not set in a work queue.

- **Reactivated** if the case is reopened but not set in a work queue.

Figure 5.9—Case state life cycle

Case Investigation

According to user actions on the case, its state can be modified:

- The user can assign a work queue to a New, Stand by or Reactivated case. This changes the case state to Stand by.

- He can also directly open a Stand by, New, Reactivated, or Transferred case in a specific work queue. This changes the case state to Working.

- He can move a working case to another work queue. This changes the case state to Transferred.

- When the case investigation is complete, the user can close the case. This changes the case state to Closed.

Case Investigation Steps

The analyst can view the investigation steps by navigating to the related datasource. The Steps datasource will only be visible in the **Navigation tree** if the Cases and Steps datasources have been linked within the case manager relationship.

Once the case is in Working state, steps can be added by the analyst. The user must select a step from the workflow steps list. He can also create a new "comment" step to provide information regarding step execution. This comment will later be read-only. The user then clicks on the submit button to add the step to the investigation step list. A case can only be closed if all mandatory steps have been executed.

A case can only be assigned to another work queue if all mandatory steps have been executed or some mandatory steps are available in the new work queue, meaning these missing mandatory steps will be executed in the other work queue investigation.

Statistics Page

The **Statistics** page allows the analysts to display statistics concerning matching records in the internal database.

To view the **Statistics** page, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Statistics** in the **Navigation tree**. The **Statistics** page appears.

2. In the **Datasource** field, enter the datasource on which to base the statistics.

3. In the **Time slice size interval** field, enter the slice size. This is a time unit measurement defined as a time interval. Statistics will be calculated for each time slice that exists in the selected time range.

4. In the **Time from** fields, enter the time range for which the statistics are required.

5. Click the **Show/Refresh** button.

The time range is initially set according to the "Default analysis range" setting.

Figure 5.10—Statistics page

After the query is submitted the statistics are shown in a table with the following columns:

Table 5.5—Statistics table

Column	Description
Time	Starting time of each time slice.
Total matching records	Total number of matching records in the time slice.
<Rule name> matches (absolute)	Number of records matching the rule within the time slice.
<Rule name> matches (%)	Percentage of records matching the rule within the time slice.

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⬇ button downloads the currently displayed records. Clicking the ⬇ button downloads all records for the query, independent of the maximum number of records per page.

Archive Record Finder Page

The **Archive record finder** page allows the analysts to find archive records by key.

To view the **Archive record finder** page, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Archive record finder** in the **Navigation tree**. The **Archive record finder** page appears.

2. Click the arrow to the right of the **Archive** field and select from the drop-down list, an archive to search.

3. In the **Record key pattern** field, enter the record key to search for. If the exact record key is unknown, wildcards (% and _) can be used to retrieve several record keys. You can use "%" to replace zero or more characters, and "_" to replace exactly one character (e.g. search on MCC: _01_ can be 6011, 6010, etc. %01% can be 0113, 7001, 6011, etc.).

4. Click the **Show/Refresh** button.

Figure 5.11—Archive record finder page

After the query is submitted, matching records keys are shown.

Each key is a link leading to the **Archive record viewer** page for that record.

The maximum number of records per page is specified by the "Number of archive records per page" setting.

Archive Record Viewer Page

The **Archive record viewer** page allows analysts to view details of a single archive record.

To view the **Archive record viewer** page, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Archive record viewer** in the **Navigation tree**. The **Archive record viewer** page appears.

2. Click the arrow to the right of the **Archive** field and select from the drop-down list, an archive from which the record must be displayed.

3. Click the arrow to the right of the **Scale** field and select the time scale to observe from the drop-down list.

4. In the **Record key** field, enter the exact record key for the required record.

5. If you wish to display the results as columns, select the **Show archive fields as columns** checkbox.

6. Click the **Show/Refresh** button.

Figure 5.12—Archive record viewer page

Archive record viewer

Archive: Merchant Purchase Archive

Scale: Month

Merchant name: HILTON HOTELS

☐ Show archive fields as columns

Show / Refresh

Record detail

Archive fields	2005-08	2005-07	2005-06	2005-05	2005-04	2005-03	2005-02	2005-01	2004-12
Sum amt			238.87	1354.16	1019.68	5721.89	8264.14	383.04	
Sum amt credit							239.40		
Sum amt debit			238.87	1354.16	1019.68	5721.89	8024.74	383.04	
TopCity			NEW ORLEANS	SAN FRANCISCO, NEW ORLEANS	EL PASO, NEW ORLEANS	WAIKOLOA, MC LEAN, SAN ANTONIO	WAIKOLOA, OAKLAND, NEW ORLEANS	OAKLAND	
TransactionCount			1	3	2	4	12	1	

After the query is submitted, the record is shown in a table.

If the **Show archive fields as columns** checkbox is selected, each column is an archive field and each row is a time period.

If it is not selected, each column is a time period and each row is an archive field. The field names are links leading to the **Archive details viewer** page.

The data can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⬇ button downloads the currently displayed data.

Clicking an item in the Archive fields column opens the **Archive details viewer** page for that field.

Archive Details Viewer Page

The **Archive details viewer** page allows analysts to view details of a Top field of a single archive record, and details of other fields as a bar chart.

To view the **Archive details viewer** page, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Archive details viewer** in the **Navigation tree**. The **Archive details viewer** page appears.

2. Click the arrow to the right of the **Archive field** field and select from the drop-down list, an archive field for which the details must be displayed.

3. Click the arrow to the right of the **Scale** field and select the time scale to observe from the drop-down list.

4. In the **Record key** field, enter the exact record key for the required record.

5. Click the **Show/Refresh** button.

Figure 5.13—Archive details viewer page – ranking detail

After the query is submitted by clicking the **Show/Refresh** button, the top ranking of the field is shown in a table.

If the top field contains both Sum and Count information, the **Sort using secondary number** checkbox is displayed.

- If this option is selected (▣) ranking is done using the secondary number. The secondary number is the Sum for a Top count field. It is the Count for a Top sum field.

- If it is not selected, the ranking is ordered on the primary number. It is the Count for a Top count field. It is the Sum for a Top sum field.

The query results can be downloaded as a CSV file (readable by tools like Excel). Clicking the ⬇ button downloads the table content.

For numeric archive fields, the values are displayed in a bar chart.

Figure 5.14—Archive details viewer page – bar chart

Case Report Page

The **Case report** page allows analysts to view details of a case, the investigation steps and all related data from the different datasources.

To view the **Case report** page, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Case report** in the **Navigation tree**. The **Case report** page appears.

2. In the **Case datasource** field, specify the Cases datasource from which the case must be displayed.

3. In the **Rule** field, specify the filter to apply (either all records should appear, only matching records or only records matching a specific rule). The filter rule is applied to all datasources except the Cases datasource and the Case Investigation Steps datasource.

4. In the **Case key** field, specify the key of the case.

5. In the **Time from** fields, specify the time range in which to search. Time range does not apply to datasources with a unique key.

6. Click the **Show/Refresh** button.

Figure 5.15—Case report page

The datasources displayed will depend on the settings defined in the **Case manager Source fields** page. The user can define which datasources and which safe keeping datasource must be displayed in this report.

6 Investigating Cases

This chapter explains how to configure and use the case tracking and investigation functionality of the MasterCard® Expert Monitoring System™.

Introduction

CaseTracker is the case tracking and investigation tool built into MasterCard® Expert Monitoring System™ (EMS). It is a complete case management tool which allows the user to manage a case from start to finish.

With CaseTracker, it is possible to:

- Create cases and assign a priority.

- Add new cases identified by other sources.

- Investigate cases.

- Provide investigation results.

CaseTracker generates cases based on rule matches and logs case investigation steps. The tracking environment is completely configurable by the user, within a Case manager. Different case managers can be used in one job, monitoring different types of things.

Creation of Cases

During the classification process, EMS identifies all records that match one or more rules.

If CaseTracker identifies six transactions for the same merchant, for example, it opens a single merchant 'case'. When an analyst opens the case, all transactions for that merchant are displayed.

Custom-built Investigation Procedures

You can custom-design investigation procedures by creating a workflow containing the steps and actions that your analysts will use. All your analysts will input data to each investigation case using the same procedures.

This ensures that the process will not allow incomplete cases or missing steps.

Configuration

To prepare the system for case investigation, the following configuration operations must be performed:

- Create an Investigation Step
- Creating Command Files
- Create a Workflow
- Create a Case Manager
- Create a Work Queue
- Configuring Datasources
- Configure Source Fields
- Configure Source Rules
- Activate a Case Manager

Create an Investigation Step

You pre-define the set of investigation steps that will be available to the analyst. The analyst can then select the step as required when following a workflow during an investigation.

To create an investigation step, proceed as follows:

1. Click on **Configuration** in the **Navigation bar**. Then click on **Steps** in the **Navigation tree**. The **Select a step** page is displayed.

   Figure 6.1—Select a step page

2. Click the **Edit** icon. The **Create a new step** page is displayed. Enter a name for the step in the **Step name** field, then click the **Create** button. The **Steps** page is displayed.

3. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

4. Enter a description for the step in the **Description** field.

5. If you wish to launch an action in an external application as part of this step, select the **Execute the following command** checkbox, click the arrow to the right of the drop-down list box and select one of the administrator defined commands from the list.

6. If you wish to watch the progress of the external command in the console window, select the **Redirect command output to server console** checkbox.

7. If you select the **Execute command synchronously** checkbox, the analyst cannot continue until the step has been either successfully completed, or the step has failed and execution has finished.

Figure 6.2—Creating a step

8. Click the **Submit this page** button. Your new step will appear in the **Navigation tree** under **Steps**.

9. Click the **Save** icon.

Creating Command Files

It is possible to create a command file and associate it with a step in an investigation. The command will be launched as part of the step. For example, the command could be to launch a third party application or open a webpage. For more information on creating command files, refer to the "Steps Page" section in Chapter 2.

Create a Workflow

You can define workflows, adding investigation steps from the list of steps you have defined.

To create a workflow, proceed as follows:

1. Click on **Configuration** in the **Navigation bar**. Then click on **Workflows** in the **Navigation tree**. The **Select a workflow** page is displayed.

Figure 6.3—Select a workflow page

2. Click the the **Edit** icon. The **Create a new workflow** page is displayed. Enter a name for the workflow in the **Workflow name** field, then click the **Create** button. The **Workflows** page is displayed.

3. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

4. Enter a description for the workflow in the **Description** field.

5. Click the **Submit this page** button. Your new workflow will appear in the **Navigation tree** under **Workflows**.

6. Click the **Workflow steps** link. The **Add a new step to the workflow** page is displayed.

Figure 6.4—Add a new step to the workflow page

7. Click the arrow to the right of the **Add** field, select the required step from the drop-down list.

8. Repeat step 7 until you have added all required steps to the workflow.

9. If you wish to make a step mandatory for the workflow, click the **icon** in the "Mandatory" column.

Figure 6.5—Make a step mandatory

✎ **Note**   **You can define an order for the steps, but the analyst is not forced to follow this order.**

10. Click the **Save** icon.

Create a Case Manager

A case manager is the tracking environment in which the item being monitored, the work queues, the datasources, and rules that will trigger cases creation, are managed.

To create a case manager, proceed as follows:

1. Click on **Job Definition** in the **Navigation bar**. Then click on **Case managers** in the **Navigation tree**. The **Select a case manager** page is displayed.

Figure 6.6—Select a case manager page

2. Click the **Edit** icon. The **Create a new case manager** page is displayed. Enter a name for the case manager in the **Case manager name** field, then click the **Create** button. The **Case manager** page is displayed.

3. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

4. Enter a description for the case manager in the **Description** field.

5. Enter a case identifier for your case manager. The case identifier is the name of the monitored item, for example, Account, Merchant or Employee.

6. Click the arrow to the right of the **Relationship** field and select a relationship from the drop-down list. A relationship, which is previously defined by the administrator, defines how the different datasources are linked by the item being monitored. It identifies the monitored item in each datasource, and therefore will indicate the field type of this monitored item.

Figure 6.7—Defining a case manager

7. Click the **Submit this page** button. Your new case manager will appear in the **Navigation tree** under **Case managers**. Two new datasources are automatically created. The first will contain the cases and the second will contain the investigation steps.

Create a Work Queue

You can define a work queue in the **Work queues** page. A work queue is a work environment comprising a defined set of investigation steps, the workflow, with one or more analysts who are granted rights to work on cases in the work queue.

To create a work queue, proceed as follows:

1. In the **Case managers** page, click the **Work queues** link. The **Create a new work queue** page is displayed.

2. Enter a name for the work queue in the **Work queue name** field and click the **Create** button. The **Work queues** page is displayed.

Figure 6.8—Defining a work queue

3. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

4. Enter a description for the work queue in the **Description** field.

5. Click the arrow to the right of the **Workflow** field and select a workflow from the drop-down list of pre-defined workflows.

6. Click the **Submit this page** button to submit your changes.

7. Click the **Save** icon.

Configuring Datasources

When you define a case manager, two datasources are automatically generated.

- **Cases datasource** This contains any cases generated by the case manager. It is named xxxx_cases, where xxxx is the case manager name.

- **Steps datasource** This contains the investigation steps. It is named xxxx steps, where xxxx is the case manager name.

If you click on **Datasources** in the **Navigation tree** in the **Job Definition** page, you will see that the two datasources have been added to the datasource list.

Configuring the Cases Datasource

The Cases datasource contains the following automatically generated fields:

Column	Description
<case_identifier>	Unique key of the datasource. Value of the monitored item.
Record ID	EMS unique sequence number of the case.
Creation date	Date of the case creation.
Modification date	Date of the last modification of the case.
Investigation start date	Date at which analyst opens the case to start its investigation.
Matching rules	Any rules for which matches were found.
Owner	Current owner of the case.
Current queue	Work queue in which the case is currently in investigation. It indicates which workflow must be followed.
Case state	Current state of the case. Six different states exist: New, Stand by, Reactivated, Working, Transferred and Closed.
<existing work queue>	One column per defined work queue in the case manager. If the case has been assigned to a work queue, prior to investigation, a true flag is available in the column. A case can be assigned to more than one work queue in the Investigation page.

As the datasource has been automatically created, some fields in the **Datasources** page are not editable:

- The **Source description** has been set to "Cases of <case_manager_name>".

- The **Unique key field** checkbox is selected and the field is populated with the case key field value. Its name and type have been defined from the case identifier.

- The **Receive time from field** field has been set to "Modification date".

You must then define the cases expiration interval, in the **Delete data after** field.

Figure 6.9—Configuring the cases datasource

Add Editable Fields to the Cases Datasource

You may wish to define additional datasource fields to extend the functionality of the system. For example, you could add a field indicating the priority of a case in the work queue. Table 6.1 provides some examples of useful editable fields.

Table 6.1—Examples of editable fields

Editable field	Type	Description
Priority	Custom	Custom list containing the following user defined values: Highest, High, Medium, Low, Lowest.
Result	Custom	Custom list containing the following user defined values: Fraudulent, Suspicious, Genuine, Not investigated.
Amount saved	Decimal	Amount saved by investigation.
First date of fraud	Date Time	Date of first fraudulent transaction.
Comment	Character	A comment field allowing freetext.

To add an editable field to the cases datasource, proceed as follows:

1. Create a custom list (for example, "Priority"), with custom values (for example, "Highest", "High", "Low" and "Lowest"). For details on how to create a custom list and add custom values, refer to the "Custom lists and custom values" section in Chapter 4.

2. In the **Job Definition** page, click **Datasources** in the **Navigation tree** and open the Cases datasource.

3. Click the **Editable fields** link. The **Editable fields** page is displayed.

4. Create an editable field, choosing "Custom" as the field type. The **Custom value list** field is displayed. Click the arrow to the right of the **Custom value list** field and choose the custom list created in step 1 ("Priority") from the drop-down list. For full details on how to create an editable field, refer to the "Editable fields" section of Chapter 4.

Figure 6.10—Creating a priority editable field

5. Click the **Submit this page** button.

6. Click the **Save** icon.

Configuring the Steps Datasource

The Steps datasource contains the following automatically generated fields:

Column	Description
<case_identifier>	Unique key of the case it is related to.
Record ID	EMS unique sequence number of the step.
Creation date	Date of the step creation.
Owner	Analyst who executed the step.
Step type	Type of the step.
Step comment	Comment provided by the analyst at the step creation time. It is the only moment this field is editable. After that it is visible in read-only mode. If the analyst wishes to have a comment field editable at all time, an editable field can be configured to do so.
Step action result	If the step called an external program, the result of this call, if any, will be stored in this column.

As the datasource has been automatically created, some fields in the
Datasources page are not editable:

- The **Source description** has been set to "Steps of <case_manager_name>".

- No **Unique key field** field can be selected.

- No steps expiration interval can be defined. Steps will be deleted when
  their related case is deleted.

The user must then define a time field, in the **Receive time from field** field.

Figure 6.11—Configuring the steps datasource

Add Editable Fields to the Steps Datasource

You may wish to define an additional datasource field such as a freetext
comment field, allowing the analyst to add further information about the
investigation.

To add an editable field to the steps datasource, proceed as follows:

1. In the **Job Definition** page, click **Datasources** in the **Navigation tree** and open the Steps datasource.

2. Click on the **Editable fields** link.

3. Create an editable field, choosing "Character" as the field type. The **Freetext length** field is displayed. The default value is 100 characters but you can increase or decrease as required. For full details on how to create an editable field, refer to the "Editable fields" section of Chapter 4.

4. Click the **Submit this page** button.

5. Click the **Save** icon.

Update a Datasource Relationship

The Cases and Steps datasources must be linked together, and linked to other datasources so that navigation in the **Investigation** page is possible between all relevant datasources. We do this by using the relationship of the case manager.

A relationship defines how the different datasources are linked by the monitored item. It identifies the monitored item in each datasource.

To create a relationship between datasources, proceed as follows:

1. In the **Job Definition** page, click on **Relationships** in the **Navigation tree**.

2. Select the relationship for the relevant Case manager and click the **Edit** icon.

3. Click the **Relationship fields** link.

4. Add the Cases datasource **Case key field** value to the relationship field list.

5. Add the Steps datasource **Case key field** value to the relationship field list.

6. Click the **Save** icon.

Figure 6.12—Relationship fields page

Configure Source Fields

By configuring source fields, you can define which rule matches will generate cases.

For each relationship field (with the exception of cases and steps datasources), a source field is automatically defined. By default every datasource is marked as a trigger to case activation. In other words, if one or more records belonging to the source field's datasource match a source rule, the field selected as relationship field will be used as case key, for case generation.

✎ Note   **This behavior can be disabled, for example, for reference datasources.**

The user can also define whether the records of the source field's datasource are displayed in the Case report.

To configure source fields, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**, then click **Case managers** in the **Navigation tree**. The **Select a case manager** page is displayed.

2. Select the required case manager. The **Case managers** page opens displaying details for the required case manager.

3. Click on the **Source fields** link. The **Select a source field** page is displayed showing all the source fields that are part of the relationship for that case manager.

4. Select the required source field. The **Source fields** page is displayed.

5. Click the **Edit** icon to modify the page.

Figure 6.13—Configuring source fields

You have the following options:

*   Generate cases, with this relationship field as case key, for matching records in this datasource

*   Restrict case generation to last processing results

*   Restrict case generation to records from ... over ...

*   Display records from this datasource in the Case report

*   Display records from this datasource safe keeping storage in the Case report

    For full details on these options, refer to the "Source Fields Page" section of Chapter 2.

6. Click the **Submit this page** button.

7. Click the **Save** icon.

Configure Source Rules

By configuring source rules, you can define which rule will generate cases in which work queue.

You must select a rule and specify whether a new case needs to be created and/or reopened for records matching the selected rule. You can also indicate in which work queue the cases must be stored (optional) and provide the default value for any case datasource editable fields that you have created, such as "priority", as illustrated in Figure 6.15.

To configure source rules, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**, then click **Case managers** in the **Navigation tree**. The **Select a case manager** page is displayed.

2. Select the required case manager. The **Case managers** page opens displaying details for the required case manager.

3. Click on the **Source rules** link. The **Select a source rule** page is displayed showing any existing source rules.

Figure 6.14—Select a source rule page

4. Select the required source rule. The **Source rules** page is displayed.

5. Click the **Edit** icon to modify the page.

Figure 6.15—Configuring source rules

You can configure the following:

*   **Rule** The rule which will trigger case activation.

*   **Create cases if rule is matching**   If this option is selected (☑), cases will be created for any rule matches on any activated source fields' datasources.

*   **Put cases in work queue**   If this option is selected (☑), created cases will be set in the specified work queue, in "Stand by" state.
    If it is not selected, cases will be created with "New" state.

- **Reopen cases if rule is matching records newer than cases close date**   If this option is selected (☑), cases will be reopened for any rule matches on any datasources for any activated source fields. Matching records must be newer than case previous close date.

- **Put cases in work queue**   If this option is selected (☑), reopened cases will be set in the specified work queue, in "Stand by" state.
  If it is not selected, cases will be reopened with "Reactivated" state.

- **Update editable fields (upwards only)**   If editable fields have been defined in the Case datasource, they will be displayed and available for update specifications. The user can define default values to be set on the case creation or reopening. These fields are still editable during case investigation.

  If the editable field is of Custom type, it can only be updated upwards, according to the values position.

  Example:

  The user has defined a Case Priority editable field and has associated it to the custom list "Priority":
  1. Highest
  2. High
  3. Medium
  4. Low
  5. Lowest

  If a match to the rule A is defined as being a high priority, the **Case Priority** field will be updated with the value "High". But if the case already exists, and the **Case Priority** field is already set to "Highest", which is a higher value in the list, case priority will not be updated to "High".

Activate a Case Manager

You have already defined a case manager. But you have not yet activated it.

To activate a case manager, proceed as follows:

1. In the **Job Definition** page, click on **Datasources** in the **Navigation tree**. The **Select a datasource** page appears.

2. Select the Cases datasource.

3. Click the **Source description** link. The **Case management options** page is displayed.

Figure 6.16—Activating a case manager

4. Select the **Generate cases during batch job run** checkbox for batch processing or the **Generate cases during live job run** checkbox for live processing.

5. You also have the option to define the following:

   - The maximum number of cases activated per job

   - The maximum number of cases kept in a database

   - The live buffer size for a live job

   - The time interval after which "stand by", "new" and "reactivated" cases will be closed

6. Click the **Submit this page** button.

7. Click the **Save** icon.

The case manager is now completely configured.

Viewing Results

Once configuration is complete, you can run the job and view the results.

Views

To easily query the Cases datasource, MasterCard recommends that you use views. Create a view based on the Cases datasource, and select the case state as the query parameter. For more information on creating views, see the "Views" section of Chapter 4, "Defining and Processing Jobs". For more information on using the **Views** page, refer to Chapter 5, "Viewing Results".

View Cases

Select the view you have previously defined on the Cases datasource. You can view the following:

- All newly created cases

- All cases in a specific state

- All cases from a specific work queue

For example, the user can choose to view all Stand by cases in a specific work queue.

To view a case, proceed as follows:

1. In the **Navigation bar**, click on **Job Analysis**.

2. In the **Navigation tree**, click on **Views**.

3. Select a view in the **Select a view** table.

4. Enter the required parameters (if any).

Figure 6.17—Viewing cases

5. Press the **Show / Refresh** button.

6. Cases are listed in a table named **View content**.

   - To access **Investigation** page, click the **Action** button

   - To access **Case report** page click the **Action** button

For more information on using the **Views** page, refer to Chapter 5, "Viewing Results".

Investigating a Case

When the **Investigation** page displays a case, additional actions are displayed in the Actions section:

- Open a case

- Add investigation steps

- Move a case to another work queue

- Add a reminder on a case

- Update a case's editable fields

- Close a case

- Add a comment

Figure 6.18—Case investigation page

Some actions will modify the state of the case. There are six possible states:

- **Stand by**   Cases that are waiting in one or more work queues to be investigated.

- **New**   Newly created cases that are not assigned to any work queue.

- **Working**   Cases that are under investigation following the workflow of the selected work queue.

- **Closed**   Cases that have been completely investigated.

- **Reactivated**   Previously created cases that should be investigated again but not assigned to any work queue.

- **Transferred**   Cases that are moved to a new work queue while being investigated, but not taken over in the new work queue.

Figure 6.19 illustrates these state changes.

Case creation

According to the case generation parameters defined in the case manager **Source rules** page, a case can be created or reopened and it can be set in a work queue or not. Cases can be manually created, if the user queries for a case key that does not exist.

Cases can be generated with three different states:

- **Stand by** if the case is created or reopened in a specific work queue.

- **New** if the case is created but not set in a work queue.

- **Reactivated** if the case is reopened but not set in a work queue.

Figure 6.19—Case state life cycle

Case investigation

According to user actions on the case, its state can be modified:

- The user can assign a work queue to a New, Stand by or Reactivated case. This changes the case state to Stand by.

- He can also directly open a Stand by, a New or a Reactivated case in a specific work queue, it changes the case state to Working.

- He can move a working case to another work queue, it changes the case state to Transferred.

- When the case investigation is complete, the user can close the case, it changes the case state to Closed.

Case investigation steps

The analyst can view the investigation steps by navigating to the related datasource. The Steps datasource will only be visible in the **Detail view selection** picklist if the Cases and Steps datasources have been linked within the case manager relationship.

Once the case is in Working state, steps can be added by the analyst. The user must select a step from the workflow steps list. He can also provide a comment regarding step execution. This comment will later be read-only. The user then clicks on the **Create** button to add the step to the investigation step list. A case can only be closed if all mandatory steps have been executed.

A Case can only be assigned to another work queue if all mandatory steps have been executed or same mandatory steps are available in the new work queue, meaning these missing mandatory steps will be executed in the other work queue investigation.

Create a Case Manually

The analyst can also create a case manually:

1. In the **Navigation bar**, click on **Job Analysis**.

2. In the **Navigation tree**, click on **Investigation**.

3. In the **Datasource** field, select the "Cases" datasource.

4. In the **Case key** field, enter the key of the case to be created.

5. The message "Case does not exist. Create case?" is displayed.

6. Click the **Submit this page** button.

Figure 6.20—Manual case creation

View a Case Report

The case report displays details of a case, the investigation steps and all related data from the different datasources, as previously configured in the **Case manager Source fields** page.

To display a case report, proceed as follows:

1. In the **Navigation bar**, click on **Job Analysis**.

2. In the **Navigation tree**, click on **Case report**.

3. In the **Case datasource** field, select the cases datasource.

4. In the **Rule** field, select which rule must be used to filter the data.

5. In the **Case key** field, enter the key of the case to be displayed.

6. Press the **Show / Refresh** button.

Figure 6.21—Case report page

For more information on the **Case report** page, refer to Chapter 5, "Viewing Results".

7 Profiling

This chapter explains how to configure and use the profiling functionality of MasterCard® Expert Monitoring System™ and how to view profiles.

Introduction

The purpose of the Profiler functionality in the MasterCard® Expert Monitoring System™ (EMS) is to allow institutions to automatically categorize behavior patterns for specific entities. An entity may be a merchant, an account holder, a supplier, a dealer, an employee, a geographical location, a specific type of transactions, etc. Profiler helps to detect behavior patterns outside of an expected profile (for example, an account has been grouped in the "Occasional Use" category due to the past transaction volume and velocity, but is suddenly transferring funds to countries in more than three different continents).

Storage

Imagine a bank with 10 million accounts producing about 33 million transactions each of 800 bytes, per month. Within five years, the storage of all these transactions would require about 1,600 Gbytes. Profiler allows you to deal with this amount of data because it has the ability to collect and build profiles based on daily transactions. The profile data is an aggregated data set. Once archived, the transaction data used is no longer required by the Profiler. The archives can be stored and archived over a period of years. Thus you have the added functionality of keeping historic data over long periods of time without the need to keep large amount of transactional data in the database.

Profiles and Time

Profiles can be compared over specific periods of time, e.g. how does my current account profile compare to the profile, this time last year. Deviations in profiles can be automatically monitored and highlighted, once an individual threshold has been reached.

Profiles can be aggregated for many time scales: seconds, minutes, hours, days, weeks, months, years, decades, centuries, millennium and eternity. Profile updates can be scheduled according to the business needs, allowing for optimal use of available resources.

A profile can contain a number of profile values, for example, an account profile may contain profile elements such as:

- Top **n** beneficial entities for transfers out of the account while keeping both transaction count and volume

- Top **n** countries involved in transactions with an account based on count or volume

- Number of distinct accounts from which deposits were received

- Total amount volume per account which could be specified for incoming or outgoing funds, or for both

- Total number of transactions per account which could be specified for incoming or outgoing funds, or for both

Another profile targeted at countries may contain the following elements:

- Number of transactions with country as beneficiary

- Number of transactions with country as sender

- Top **n** accounts or customers receiving money from country

- Top **n** accounts or customers sending money to country

- Total volume of business related to country

- Total number of transactions related to country

Using the country profile allows the user to monitor high risk countries instead of being limited to monitoring account behavior only. In a money laundering environment, this profile feature allows the Compliance Officer to monitor Non-Cooperative Countries and Territories (NCCTs) individually for any deviations in the transaction profile between the financial institution and the country.

Apart from using the profiles to identify and track deviations, the profiles can also be accessed and viewed by investigators and analysts. This feature will enhance the investigator or analyst's understanding of the entity's behavior. When reviewing a customer account, the analyst can view the profile in a separate window displaying all the values, as well as a graphical display reflecting changes in one or more of the profile elements.

Configuration

Profiler aggregates data from datasources into archives. Archives group records having an identical key field. Archive fields define which information must be retained from the original records, and in what form. Each archive field uses an aggregate function to compute its value from the original record data.

The user must define a "profile" that will be a new kind of source description. A profile is based on an archive. It makes it possible to create datasources containing accumulated data from the archives.

Profile fields define what information must be extracted from the archive into the datasource. Each profile field uses an aggregation function to compute its value out of the archived data.

Profile-based datasources can then be used in the same way as any other datasource, and compared against rules. Archives will be computed during the batch or live job processing, according to the options you choose. Profiles are only computed during batch job processing.

Note   **Live archiving is only possible for Archives based on live datasources.**

Create an Archive

To create an archive, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**, then click **Archives** in the **Navigation tree**. The **Select an archive** page is displayed.

2. Click the **Edit** icon. The **Create an archive** page is displayed.

3. Enter a name for the archive and click the **Create** button. The **Archives** page is displayed.

Figure 7.1—Creating an archive

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the archive (optional).

6. Click the arrow to the right of the **Archived datasource** field and select a datasource from the drop-down list. This is the datasource on which the archive will be based.

7. Click the arrow to the right of the **Grouping field** field and select a grouping field from the drop-down list. This is the datasource field that is used to group records in the archive. It serves as the key to archive records.

8. Click the arrow to the right of the **Time field** field and select a time field from the drop-down list. This is the field that is used to order the records by time.

9. Enter a time interval in the **Archive start offset** field. This is a time interval specifying the most recent timestamp of the archive. By default, the archive begins at the current time and covers the past. When creating an archive on old data, it is pointless to keep years of empty data in the archive. Therefore, this setting can specify that the archive begins at some point in the past, or in the future.

10. Select the **Generate archive** checkbox. This ensures that the archive will be updated during job processing.

11. If the archived datasource is a live datasource, configure the live datasource parameters as follows:

Parameter	Description
Live archiving buffer size	Size of the buffer preceding this archiving in the live processing.
Archive live datasource during batch job run instead of live processing	Select this option (☑), if you want the archive to be updated during the batch job processing (despite the fact that it is a live datasource).

12. If you do not want archiving to occur at every job run, select the **Update archive only on first job run after every…** checkbox and specify the archiving frequency using the date and time fields.

Figure 7.2—Creating an archive – date and time

13. Click the **Submit this page** button.

14. Click the **Save** icon.

Create an Archive Field

To create an archive field, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**, then click **Archives** in the **Navigation tree**.

2. Select an archive in the **Select an archive** page.

3. Click the **Fields** link. The **Select a field** page is displayed.

4. Click the **Edit** icon. The **Create a field** page is displayed.

5. Enter a name for the field and click the **Create** button. The **Fields** page is displayed.

Figure 7.3—Creating an archive field

6. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

7. Enter a description for the archive field (optional).

8. If you wish to use a filter rule, select the **Filter rule** option, click the arrow to the right of the field and select a filter rule from the drop-down list (optional).

9. Click the arrow to the right of the **Aggregate function** field and from the drop-down list select an aggregate function. Depending on the function selected, different fields will be displayed. For more information on aggregate functions see the "Archive Aggregate Functions" section below.

10. In the **Archiving periods** field, enter the number of values (of the field) you want to keep for each time period. In our example in figure 7.3, we have chosen to keep the last 10 weekly values and the last 10 monthly values of the field.

11. Click the **Submit this page** button.

12. Click the **Save** icon.

Archive Aggregate Functions

An archive aggregate is a function used to agglomerate data into archive field periods.

The following archive aggregate functions are available:

- Average
- Category
- Count
- Maximum
- Minimum
- Sum
- Top Count
- Top Sum

For more information on archive aggregate functions, refer to the "Archive Aggregate Functions" section in Chapter 2.

Create a Profile

Once the archive is created, you can create a profile.

To create a profile, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**. Then click **Profiles** in the **Navigation tree**. The **Select a profile** page is displayed.

2. Click the **Edit** icon. The **Create a profile** page is displayed.

3. Enter a name for the profile and click the **Create** button. The **Profiles** page is displayed.

Figure 7.4—Creating a profile

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the profile (optional).

6. Select the archive on which the profile is based.

7. Click the **Submit this page** button.

8. Click the **Save** icon.

You have now created an empty profile. For the profile to be useful, it must contain profile fields.

Create a Profile Field

A profile field is a field in a profile. Using a profile aggregation function, it extracts data from an archive and puts it in a datasource.

To create a profile field, proceed as follows:

1. Click **Job Definition** in the **Navigation bar**. Then click **Profiles** in the **Navigation tree**.

2. Select a profile.

3. Click the **Fields** link. The **Create a new field** page is displayed. Enter a name for the field in the **Name** field and click the **Create** button. The **Fields** page is displayed.

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the field (optional).

6. Click the arrow to the right of the **Aggregation function** field and select an aggregation function from the drop-down list. An aggregation function is a function used to collect data from an archive field, or calculate a new value from several archive field values. For more information, refer to the "Aggregation Functions" section later in this chapter.

Figure 7.5—Creating a profile field

7. Click the arrow to the right of the **Archive field** field and select an archive field from the drop-down list. This is the field in the archive to which the aggregation function will be applied. Depending on the function selected, different fields will be displayed. Depending on the function type, different time span types can be used. For more information, refer to the "Time Span Types" section in Chapter 2.

8. Click the **Submit this page** button.

9. Click the **Save** icon.

✏️ **Note**   **Other fields which appear on this page depend on the aggregation function selected. For more information, refer to the "Aggregation Functions" and "Time Span Types" sections in Chapter 2.**

Profile Aggregation Functions

An aggregation function is a function used to collect data from an archive field, or calculate a new value from several archive field values.

The following aggregation functions are available:

- Average

- Direct Access

- Maximum

- Minimum

- Period Average

- Period Count

- Period Velocity

- Sum

- Top Count

- Top Entry

For more information on profile aggregation functions, refer to the "Profile Aggregation Functions" section in Chapter 2.

Profile-based Datasources

Once profiles are defined, they can be used as a source description for datasources.

To define a datasource based on a profile:

1. Select **Datasources** in the **Navigation tree**.

2. Click the **Edit** icon to open the **Datasource creation** page.

3. Enter the datasource name and click the **Create** button. The datasource page is displayed.

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. Enter a description for the datasource in the **Description** field (optional).

6. Click the arrow to the right of the **Source description** field and select a profile from the drop-down list. The **Unique key field** field is automatically selected, and displays the Archive Grouping field.

7. Click the arrow to the right of the **Receive time from field** field and select "ImportTime" from the drop-down list.

Figure 7.6—Creating a profile-based datasource

8. Click the **Submit this page** button.

9. Click the **Save** icon.

Processing the Job and Viewing Results

Once you have created a job with a datasource which is based on a profile, you can run the job and view the results.

•   For more information on processing jobs, refer to Chapter 4, "Defining and Processing Jobs".

•   For more information on viewing results, refer to Chapter 5, "Viewing Results".

Analysing Archives

EMS provides the following tools for analyzing archive records.

•   Archive record finder

•   Archive record viewer

•   Archive details viewer

Figure 7.7—Job analysis menu

Archive Record Finder

The **Archive record finder** page allows the analysts to find archive records by using the user defined record key.

To find an archive record with the **Archive record finder**, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Archive record finder** in the **Navigation tree.** The **Archive record finder** page appears.

2. Click the arrow to the right of the **Archive** field and select the required archive from the drop-down list.

3. In the field below the **Archive** field enter the record key to search for. If the exact record key is unknown, wild cards can be used. The name of this field depends on the record key of the selected archive. In our example, the record key is Merchant name, so the field is called **Merchant name pattern**. You can use "%" to replace zero or more characters, and "_" to replace exactly one character (e.g. search on MCC: _01_ can be 6011, 6010, etc. %01% can be 0113, 7001, 6011, etc.).

4. Click the **Show/Refresh** button.

Figure 7.8—Archive record finder page

After the query is submitted, all matching record keys are displayed. Each key is displayed as a live link which opens the record in the **Archive record viewer** page.

The maximum number of records per page is specified by the "Number of archive records per page" setting.

Archive Record Viewer

The **Archive record viewer** page allows analysts to view details of a single archive record.

To use the **Archive record viewer**, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Archive record viewer** in the **Navigation tree.** The **Archive record viewer** page appears.

2. Click the arrow to the right of the **Archive** field and select the required archive from the drop-down list.

Figure 7.9—Archive record viewer page

3. Click the arrow to the right of the **Scale** field and select a time scale from the drop-down list.

4. In the field below the **Scale** enter the record key to be displayed. The record key must be exact. No wildcards can be used. The name of this field depends on the record key of the selected archive. In our example, the record key, and therefore the field, is called **Merchant name**.

5. Select the **Show archive fields as columns** checkbox if you wish to display the archive fields as columns.

6. Click the **Show/Refresh** button.

✎ **Note**   **You can also search for a record using the Archive record finder page. Each matching record key will be displayed as a live link which opens the record in the Archive record viewer page.**

The record is shown in a table.

Figure 7.10—Archive record viewer page

- If the **Show archive fields as columns** checkbox is selected, each column is an archive field and each row is a time period.

- If the **Show archive fields as columns** checkbox is not selected, each column is a time period and each row is an archive field. The field names are links leading to the **Archive details viewer** page for that given field on the same record.

- Click on a field in the **Archive fields** column to go to the **Archive details viewer** page for that field.

- Click the **Download** icon to download the data displayed in the table as a .CSV file.

Archive Details Viewer

The **Archive details viewer** page allows analysts to view details of a single archive record field in a graphical format.

To use the **Archive details viewer**, proceed as follows:

1. Click **Job Analysis** in the **Navigation bar**, then click **Archive details viewer** in the **Navigation tree.** The **Archive details viewer** page appears.

2. Click the arrow to the right of the **Archive field** field and select the required archive field from the drop-down list.

Figure 7.11—Archive details viewer page

3. Click the arrow to the right of the **Scale** field and select a time scale from the drop-down list.

4. In the field below the **Scale** enter the record key to be displayed. The name of this field depends on the record key of the selected archive. In our example, the record key, and therefore the field, is called **Merchant name**.

5. If the record details do not display immediately, click the **Show/Refresh** button.

    •   If the profile field is based on a Top archive field, its details are displayed in a table.

Figure 7.12—Archive details viewer page – ranking detail

- For other profile fields, the details are displayed as a bar chart.

Figure 7.13—Archive details viewer page – bar chart

Click the **Download** icon ⌄ to download the data displayed in the table as a .CSV file.

8 Sending Notifications

This chapter explains how to configure the notification functionality of MasterCard® Expert Monitoring System™ to send notifications when required.

Introduction

Using the Notification functionality in MasterCard® Expert Monitoring System™ (EMS), it is possible to trigger a notification message whenever records from a given datasource match user-defined rules.

For example, an issuing bank which has just issued a new card to one of its customers could trigger a message to be sent to the customer the first time the card is used. The message could welcome the customer, but also request that the bank be contacted immediately, should the transaction be fraudulent.

Alternatively, if a particular type of suspicious activity occurs, an e-mail or sms text could be sent to an analyst or administrator.

Creating Notifications

Notifications can be set up in the **Notifications** page, assuming that the required rules and datasources already exist.

If new rules or datasources are required, they must be created in the **Rules** and **Datasources** pages, respectively. For more information, refer to Chapter 4, "Defining and Processing Jobs".

Grouping Matching Rules

To avoid sending a notification message for every matching record, Communicator allows the user to group matching records into categories. Matching records can be grouped by:

- **Rules** Only one notification is generated for each rule for which there are matching records.

- **All Rules** A single notification is generated for all records that match at least one of the rules. No notification will be generated if no match occurred on any of the rules.

- **Fields** Only one notification is generated for each group of records which have the same value for a defined set of fields.

  For example, if Merchant Name and Merchant Town are defined as our field set, all records which have the same values for Merchant Name and Merchant Town respectively, will be grouped into one notification message.

Creating Message Content

The content of a message can be created by selecting fields from user defined datasources, and/or typing text. Message content can consist of one or more of the following:

- Fields selected from sources defined in the **Datasources** page

- One or more placeholders, such as a triggering time, grouped records count or matching rules

- One or more text strings

- Contacts defined by users in **Contacts** page

- File attachments

- Export attachments, defined in the **Exports** page

Configuration

The following configuration operations are recommended before using the Notification functionality in EMS.

- Creating contacts

- Adding address details for the contacts

- Defining e-mail channels

- Defining encryption types

Create Contacts

You must create contacts to whom notifications can be sent, and then assign addresses to those contacts.

To create a contact, proceed as follows:

1. Click **Configuration** in the **Navigation bar** and then click **Contacts** in the **Navigation tree.** The **Select a contact** page appears.

2. Click the **Edit** icon. The **Create a new contact** page appears.

3. In the **Name** field, enter a name for the contact, then click the **Create** button. The **Contacts** page appears.

Figure 8.1—Creating a contact

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. In the **Description** field, enter a description for the contact (optional).

6. Click the **Submit this page** button.

7. Click **Addresses** at the top of the page. The **Create a new address** page appears.

8. In the **Name** field, enter a name for the address, then click the **Create** button. The **Addresses** page appears.

9. In the **Description** field, enter a description for the address (optional).

Figure 8.2—Creating an address

10. Click the arrow to the right of the **Address type** field and select an address type from the drop-down list.
    Additional address types may appear with the installation of other drivers.

✎ **Note**   **The fields below the Address type field depend on the address type selected. In our example, we have chosen an e-mail address type.**

11. In the **e-mail address** field, enter the contact's e-mail address.

12. Click the **Submit this page** button.

13. Click the **Save** icon.

Define e-mail Channels

You must define an e-mail channel, through which e-mails will be sent.

To define an e-mail channel, proceed as follows:

1. Click **Configuration** in the **Navigation bar** and then click **e-mail channels** in the **Navigation tree.** The **Select an e-mail channel** page appears.

2. Click the **Edit** icon. The **Create a new e-mail channel** page appears.

3. In the **Name** field, enter a name for the e-mail channel, then click the **Create** button. The **e-mail channels** page appears.

Figure 8.3—Creating an e-mail channel

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4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. In the **Description** field, enter a description for the e-mail channel (optional).

6. In the **SMTP host** field, enter the TCP/IP address of the e-mail server.

7. In the **SMTP port number** field, enter the port number of the e-mail server.

8. Select the **Use a user name and a password** checkbox and enter the user name and password for the SMTP server. For security reasons, the password field is cleared after submitting the page. Nevertheless, the password is stored on the server. To use an empty password, this option must be unselected.

9. Click the arrow to the right of the **Connection type** field and select a connection type from the drop-down list.

10. Click the **Submit this page** button.

11. Click the **Save** icon.

Define Encryption Methods

If you wish to encrypt the e-mails attachments sent by the system, you must define the encryption to be used. The command line encryption allows the user to define a script to encrypt attachments. The script is a file which contains a command which, when executed, calls the customer's local encryption service. These command files must be stored in a specific folder on the server. Certain parameters can be passed to these command files.

To define an encryption, proceed as follows:

1. Click **Configuration** in the **Navigation bar** and then click **Encryptions** in the **Navigation tree.** The **Select an encryption** page appears.

2. Click the **Edit** icon. The **Create a new encryption** page appears.

3. In the **Name** field, enter a name for the encryption, then click the **Create** button. The **Encryptions** page appears.

Figure 8.4—Creating an encryption

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. In the **Description** field, enter a description for the encryption (optional).

6. Click the arrow to the right of the **Encryption type** field and select an encryption type from the drop-down list.

✎ **Note** **If no third party encryption methods are installed, only the "Command line encryption" is available, as shown in Figure 8.4.**

7. If you wish to pass parameters to the command file, click the arrow to the right of the **Number of parameters** field and select the appropriate number from the drop-down list. A field will appear for each parameter.

8. Enter a name for each parameter. These parameters will be available for update in the definition of the message whenever an attachment needs to be encrypted.

9. Click the **Submit this page** button.

10. Click the **Save** icon.

Select Outbox Communication Channels

The **Source description** page of the Outbox datasource allows the user to select the communication channels to be used by the Communicator for the current job. These include any e-mail channels defined in the **e-mail channels** page (see the section "Define e-mail Channels" earlier in this chapter).

To select Outbox communication channels, proceed as follows:

1. In the **Navigation bar**, select **Job definition**, then select **Datasources** in the **Navigation tree**.

2. Select the Outbox datasource from the **Datasource list** in the **Navigation tree**. The **Datasources** page for the Outbox datasource is displayed.

3. Click the the **Edit** icon, then click the **Source description** link. The **Add a channel** page is displayed.

Figure 8.5—Add a channel page

4. Click the arrow to the right of the **Add** field and select a communication channel from the drop-down list. The new channel appears in the **Channels enabled for sending** list.

Figure 8.6—Newly added channels

5. Click the **Save** icon.

Set Options for the Inbox

The communication channels selected in the **Outbox source description** page will be opened during the communication process, with the exception of the messages sent from the Server Console. By default, messages from the Server Console are prevented from appearing in the Inbox. However, if you wish Server Console messages to appear in the Inbox, there is an option that can be enabled in the **Source description** page of the Inbox datasource.

To allow console messages to appear in the Inbox, proceed as follows:

1. In the **Navigation bar**, select **Job definition**, then select **Datasources** in the **Navigation tree**.

2. Select the Inbox datasource from the **Datasource list** in the **Navigation tree**. The **Datasources** page for the Inbox datasource is displayed.

3. Click the the **Edit** icon, then click the **Source description** link. The **Inbox options** page is displayed.

Figure 8.7—Inbox options page

✏️ **Note**   **If additional communication drivers are installed, this screen may contain additional options regarding the reception of messages in the Inbox.**

4. Select the **Populate with messages coming from the server console** option, then click the **Submit this page** button.

5. Click the **Save** icon.

Sending Notifications

Sending a notification using EMS involves three main elements:

- Creating a message
- Creating a notification
- Including the message in the notification

Create a Message

To create a message, proceed as follows:

1. Click **Job definition** in the **Navigation bar** and then click **Messages** in the **Navigation tree.** The **Select a message** page appears.

2. Click the **Edit** icon. The **Create a new message** page appears.

3. In the **Name** field, enter a name for the message, then click the **Create** button. The **Messages** page appears.

Figure 8.8—Creating a message

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. In the **Description** field, enter a description for the message (optional).

6. Click the arrow to the right of the **Datasource** field and select a datasource from the drop-down list.

7. Click the arrow to the right of the **Communication channel** field and select a communication channel from the drop-down list.

8. Click the arrow to the right of the **Priority** field and select a priority level from the drop-down list. This priority represents the order in which messages in the queue will be sent.

9. In the **Number of sending attempts** field, enter the number of times the system should try to send the message in the event of the first attempt failing.

10. In the **Interval between 2 attempts** field, enter the time that the system should wait before attempting to resend the message.

11. In the **Do not send messages older than** field, enter the period of time after which the system should no longer attempt to send this message. For example, if you enter the value "1d", the system will not try to send this message after one day.

12. If you select the **Remove attachments from Outbox** checkbox, attachments will be deleted from the message if the message is sent, or if the message becomes older than the interval value defined in the **Do not send messages older than** field.

13. If you select the **Available for manual sending** checkbox, you will be able to send the message manually from the **Investigation** page.

14. Click the **Submit this page** button.

15. Click the **Save** icon.

Define a Message Template

You can define a message template for reusable messages, in the **Message template** page. The **Message template** page allows you to define the structure of the message, using, if required, replaceable parameters. To define a message template, proceed as follows:

1. Click **Job definition** in the **Navigation bar** and then click **Messages** in the **Navigation tree.** The **Select a message** page appears.

2. Click the **Edit** icon. Existing messages are displayed in the table. Select the message you defined previously (refer to the section "Create a Message" above).

3. Click the **Message template** link. The **Message template** page is displayed. The available fields will depend on the type of channel selected in the **Communication channel** field on the **Messages** page.

4. Click the arrow to the right of each text field and select a visibility option from the drop-down list. The visibility options are as follows:

   - Edit: this field will be editable during manual sending in the **Investigation** page.

   - Show: this field will be displayed in read-only during manual sending in the **Investigation** page.

   - Hide: this field will not appear during manual sending in the **Investigation** page.

Figure 8.9—Creating a message template

5. If you wish to add replaceable parameters within the message template text fields, the parameter must be placed between curly brackets ({}).

   To include curly brackets in the text, it must be placed between curly brackets itself. The table below shows the possible inputs results:

Type this…	..to get this
{{}	{
{}}	}

   When the page is submitted, a new drop-down list appears on the page, for each parameter you have defined. You can assign a type to the parameter by selecting from the drop-down list.

   The parameter types are as follows:

   - **Freetext**   Freetext that will be used for all occurrences of the parameter.

   - **Field**   The parameter will be substituted by the value contained in a field of the message datasource.

- **Related field**   The parameter will be substituted by the value contained in a field of a datasource related to the message datasource.

- **Contact**   The parameter will be substituted by a contact address.

- **Grouping count**   The parameter will be substituted by the number of records that are within the group that triggered the message.

- **Matching rules**   The parameter will be substituted by the list of rules that are matching, separated by commas.

- **Triggering time**   The parameter will be substituted by the time when the message is generated.

- **File attachment**   The parameter will be substituted by an attachment taken from a file.

- **Export attachment**   The parameter will be substituted by an attachment taken from an export.

The replaceable parameters will be substituted during the message generation by data that can be defined in this field. For more information on replaceable parameters, please see the "Message Template Page" section in Chapter 2.

Figure 8.10—Creating a replaceable parameter

6. Click the **Submit this page** button.

7. Click the **Save** icon.

Create a Triggering Effect

A triggered effect is a user defined action which is triggered by one of the following:

- Message triggered

- Message sent

- Message sending failed

- Time out

- Response received

Possible effects could include a datasource field being updated, an additional message being sent or an investigation step being added to an investigation case.

Up to 10 effects can be added for each triggering effect. For example, if a message is sent to a customer, the effects could be:

1. Mark an investigation step as "completed".

2. Send a message to supervisor advising that message has been sent.

To create a triggered effect, proceed as follows:

1. Click **Job definition** in the **Navigation bar** and then click **Messages** in the **Navigation tree.** The **Select a message** page appears.

2. Select a message from the list and click the **Triggered effects** link. The **Create a new effect** page is displayed.

3. Enter a name for the effect and click the **Create** button. The **Triggered effects** page is displayed.

Figure 8.11—Creating a triggered effect

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. In the **Description** field, enter a description for the effect (optional).

6. Click the arrow to the right of the **Triggering type** field and select a triggering type from the drop-down list.

7. Click the arrow to the right of the **Effect count** field and select the required number of effects from the drop-down list.

8. Click the arrow to the right of the **Effect #** field and select an effect from the drop-down list. The fields displayed will depend on the effect type selected. For more information on these effect types, refer to the section "Triggered Effects Page" in Chapter 2.

9. Complete the fields and click the **Submit this page** button.

10. Click the **Save** icon.

Create a Notification

To send messages automatically during job run, you need to create a notification. The message can then be included in the notification (see "Include the Message in the Notification" section later in this chapter). To create a notification, proceed as follows:

1. Click **Job definition** in the **Navigation bar** and then click **Notifications** in the **Navigation tree.** The **Select a notification** page appears.

2. Click the **Edit** icon. The **Create a new notification** page appears.

3. In the **Name** field, enter a name for the notification, then click the **Create** button. The **Notifications** page appears.

Figure 8.12—Creating a notification

4. Add tags in the **Tags** and **My Tags** fields, as required (optional). For more information on tags and filtering, refer to the section "Filtering Principles" in Chapter 2.

5. In the **Description** field, enter a description for the notification (optional).

6. Click the arrow to the right of the **Datasource** field and select a datasource from the drop-down list.

✎ Note   **The Triggered by field indicates whether the notification is triggered by each record, or for a set of rule matches. By default, it is triggered by each record. If you have selected any rule in the Triggering rules page, the list will be displayed. Any record matching one of the rules selected will trigger the notification.**

7. In the **Do not trigger for records older than** field, enter a time interval value for how old a record must be before it fails to trigger the system.

8. Click the arrow to the right of the **Grouping type** field and select a grouping type from the drop-down list. The options are described in the "Grouping Matching Rules" section earlier in this chapter.

9. Select the **Trigger during batch processing** checkbox to trigger the notification during batch processing.

10. Select the **Trigger only on first job run after every** field and specify a time interval, if you do not want this notification to be triggered every time the job is run.

11. Select the **Trigger during live processing** checkbox to trigger the notification during live processing.

12. Enter a buffer value in the **Live buffer size** field.

13. Click the **Submit this page** button.

14. Click the **Save** icon.

Add a Triggering Rule to the Notification

A triggering rule is a rule which if matched by a record or group of records, will trigger the sending of the notification. To add a triggering rule to a notification, proceed as follows:

1. Click **Job definition** in the **Navigation bar** and then click **Notifications** in the **Navigation tree.** The **Select a notification** page appears.

2. Select a notification and click the **Triggering rules** link. The **Add a triggering rule** page is displayed.

Figure 8.13—Adding a triggering rule

3. Click the arrow to the right of the **Add** field and select a triggering rule from the drop-down list.

4. Click the **Save** icon.

Include the Message in the Notification

To add the message to the notification, proceed as follows:

1. Click **Job definition** in the **Navigation bar** and then click **Notifications** in the **Navigation tree.** The **Select a notification** page appears.

2. Select a notification and click the **Messages** link at the top of the page. The **Add a message** page appears.

Figure 8.14—Adding the message to the notification

3. Click the arrow to the right of the **Add** field and select a message from the drop-down list.

4. Click the **Save** icon.

Send a Message Manually from the Investigation Page

It is possible to send a message manually from the **Investigation** page. There are two conditions:

- The message must be based on the same datasource as the record being investigated in the **Investigation** page.

- The message must be enabled for manual sending. That is, the **Available for manual sending** option in the **Messages** page must be selected.

To send a message manually from the **Investigation** page, proceed as follows:

1. Create a message based on a datasource from which you wish to investigate a record, selecting the **Available for manual sending** option (see the "Create a Message" section earlier in this chapter).

2. Click **Job analysis** in the **Navigation bar**, then select a view based on the relevant datasource from the **Views** section of the **Navigation tree**. If no view exists, create one (see the "Views Page" section in chapter 5.) The **Views** page appears.

3. Click the **Show/Refresh** button. The records in the datasource are displayed.

Figure 8.15—Datasource record list

Details	Matches	ImportTime	RecordId	Trans Identifier	ICA	Issuer	Company number	PAN	Acq
🔍	TE_Cash volume	30/01/08 11:47:14	12301878	49728924	1031	2982	0012431	1234567830099737	30002
🔍	TE_Cash volume	30/01/08 11:47:14	12301879	49728925	1031	2982	0012431	1234567830099737	30002
🔍	TE_Cash volume	30/01/08 11:47:14	12301880	49728926	1031	2982	0012431	1234567830099737	30002
🔍	TE_Cash volume	30/01/08 11:47:14	12337801	57172991	1031	2982	0012431	1234567830120681	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12337802	57172992	1031	2982	0012431	1234567830120681	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12337803	57172993	1031	2982	0012431	1234567830120681	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12356028	57173003	1031	2982	0012431	1234567830127611	13606
🔍	TE_Cash volume	30/01/08 11:47:14	12356029	57173004	1031	2982	0012431	1234567830127611	13606
🔍	TE_Cash volume	30/01/08 11:47:14	12356030	57173005	1031	2982	0012431	1234567830127611	13606
🔍	TE_Cash volume	30/01/08 11:47:14	12379710	47109058	1031	2982	0012431	1234567830141679	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12379711	47109059	1031	2982	0012431	1234567830141679	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12379712	47109060	1031	2982	0012431	1234567830141679	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12379713	47109061	1031	2982	0012431	1234567830141679	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12379714	47109062	1031	2982	0012431	1234567830141679	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12392038	31234041	1031	2982	0012431	1234567830150977	G0607z
🔍	TE_Cash volume	30/01/08 11:47:14	12392039	31234042	1031	2982	0012431	1234567830150977	G0607z
🔍	TE_Cash volume	30/01/08 11:47:14	12392040	31234043	1031	2982	0012431	1234567830150977	G0607z
🔍	TE_Cash volume	30/01/08 11:47:14	12417343	54833581	1031	2982	0012431	1234567830170454	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12417344	54833582	1031	2982	0012431	1234567830170454	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12417345	54833583	1031	2982	0012431	1234567830170454	30041
🔍	TE_Cash volume	30/01/08 11:47:14	12429852	62974598	1031	2982	0012431	1234567830179729	30002
🔍	TE_Cash volume	30/01/08 11:47:14	12429853	62974599	1031	2982	0012431	1234567830179729	30002
🔍	TE_Cash volume	30/01/08 11:47:14	12429854	62974600	1031	2982	0012431	1234567830179729	30002
🔍	TE_Cash volume	30/01/08 11:47:14	12429855	62974601	1031	2982	0012431	1234567830179729	30002
🔍	TE_Cash volume	30/01/08 11:47:14	12429856	62974602	1031	2982	0012431	1234567830179729	30002

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4. Click the 🔍 button beside the record you want to investigate. The **Investigation** page is displayed.

Figure 8.16—Investigation page

5. Click the arrow to the right of the **Send message** field and select the message from the drop-down list. The message sending page is displayed.

Figure 8.17—Message sending page

6. Complete the fields as required and click the **Send** button.

✏ **Note**　　**Manually sent messages are only generated in the Outbox. They will be sent when the communicator processing is activated. For information on communicator processing, see the section "Running the job" in Chapter 4, "Defining and Processing Jobs".**

Download an Attachment From an Outbox Message

To view the EMS Outbox for a job, you must first create a view based on the Outbox datasource for the job. To create a view, refer to the section "Create a View" in Chapter 5, "Defining and Processing Jobs".

To download an attachment from a message in the Outbox, proceed as follows:

1. Click **Job analysis** in the **Navigation bar**, then select the outbox view that you created, from the **Views** section of the **Navigation tree**. The **Views** page appears.

2. Click the **Show/Refresh** button. The outbox table appears showing the messages in the Outbox. Messages with one or more attachments contain a download icon (◯) in the **Download** column. You can click on the download icon to download the attachment(s), or you can open the message and download the attachment(s) from the **Investigation** window (as illustrated in step 3).

Figure 8.18—View outbox page

3. Click the **Details** icon ( ) for the message from which you wish to download an attachment. The **Investigation** page for that message appears.

Figure 8.19—Investigation of an Outbox record with an attachment

4. Click the **Download** button. The operating system save function will allow you to save the attachment to a location of your choice.

A Reference Information

This appendix provides reference information for MasterCard® Expert Monitoring System™ users.

Literals

Literals are typed directly into the rule by the user in the **Rules** page. They have a constant value during the transaction classification process.

Date Literals

A date literal is defined in two separate fields: one contains the date, the second the time.

In the **Date** field, a calendar editor can appear to allow an easy calendar day selection.

The **Time** field is a combobox containing a list of possible hours of the day, from 00:00 to 23:45, every 15 minutes.

Interval Literals

This data type is used to define time intervals, either as values for specific fields or as values within a rule. An interval is a text composed like:

`{[+,-]}? {[0-9]}+ [mi | h | d | w | mo | y]`

For example: `-10mi, +10mi, 24h, 32d, 45w, 12mo, 5y`

Where:

mi=minute	
h=hour	
d=day	
w=week	1w is identical to 7d.
mo=month	Because the month length is loosely defined, it is necessary to take the interval start date into account while calculating the actual length of a period defined as one or several months. For instance, an interval of -1mo starting on the 20th of February 2009 has the length of 31 days, the interval 1mo starting the same day has the length of only 28 days. Since 2004 is a leap year an interval of 1mo starting the same day in the year 2008 has 29 days.
y=year	

The units are case insensitive. A missing sign is taken to be positive. As for all time-related operations within EMS, the interval ignores time zone issues as well as the daylight saving time (DST). All computations are based on the elapsed number of milliseconds and therefore, one day is always equal to 24 hours.

This is important when considering the two Sundays in spring and autumn that are used to switch between standard time and daylight saving time. A period starting on the Sunday at 13:00 and lasting for 1w will not end at 13:00 on the Saturday before but at 12:00 (spring) or 14:00 (autumn).

Number Literals

A number literal has the following structure:

• an optional minus sign

• one or more digits

• an optional decimal part, itself consisting of a decimal point followed by one or more digits

The plus sign (+) is not allowed.

Text Literals

Text literals can be composed of all Unicode characters.

Wildcards

MasterCard Expert Monitoring System recognizes the following characters as "wildcards" i.e. as a substitute for any character.

• % for zero or more characters

• _ for exactly one character

You may use wildcards when comparing string values to widen comparison criteria and, for example, ensure that part of the string matches a given value. The "Like" operator is used instead of the "=" Comparison operator to inform MasterCard Expert Monitoring System that wildcards are used.

Table A.1—Wildcards

Item	Description
London%	Covers "London", "London West End" etc. but also "Londonderry".
%net	Covers "Internet", "ITnet", "3net" etc.
%est%	Covers "West ", "Brest", "Westland", "est city" etc.
%EST%	Applied on a ToUpper computed field to deal with the different cases, it will match "Estonia", "ESTHONIA", "Brest" etc.
56__33%	Covers all PANs starting with "5" directly followed by "6" followed by two unspecified characters (digits, letters or any other character) followed by twice the digit "3" and optional further not closer specified characters.

Fields

A field is a part of a datasource record description. There are several kinds of fields:

- **Fixed length fields** Used for fixed length file import datasource.

- **CSV fields** Used for CSV (comma separated values) file import datasource.

- **Database extraction fields** Used for database extraction datasource.

- **Excel fields** Used for Excel file import datasource.

- **Computed fields**: Defined per datasource, based on other fields, to transform the data.

- **Editable fields** Defined per datasource by the user to enrich the datasource records.

- **Case management fields** Used by the case management datasources.

- **Message fields** Used by the Outbox and Inbox datasources of the Messages functionality.

- **Profile fields** Used by the profile datasources.

- **Import ID fields** Used by the application to identify records.

- **Import time fields** Used by the application to store import process time.

Imported fields have one of the following data types:

- Character

- Date Time

- Decimal

- Integer

Fixed length fields, CSV fields and Excel fields also require a format.

Fixed Length Field Formats

Field formats must be defined for the import of data from files. All numbers mark bytes and not characters. If the import file is based on a multi-byte code page, the file import reads the defined number of bytes and converts this byte sequence in characters according to the given code page before analyzing the imported data. The format definition supports:

- Multiple read of identical record parts

- Concatenation of distant record parts

- Gaps and ignored parts of the record

The format defines the layout of simple or combined fields. Simple field formats use only one number to describe the length of one field. Combined fields use lists of numbers inside or outside of parentheses to define which bytes have to be read from the input file and which have to be ignored. Numbers outside of parentheses mark bytes to be read, numbers within parentheses mark bytes to be jumped. Therefore the numbers in parentheses can be negative too, marking a jump backwards.

For instance, the Character format `4(2)3` means that starting at the offset, the field is composed of the four first bytes, must skip the next two bytes and must include the next three bytes. The final string will be created using the seven bytes. The leading and ending spaces in the final string will be removed.

It is also possible to move the cursor backwards. For instance, the Character format `10(-40)15` on a record having first the family and then the given name allows EMS to swap the names into the order used for addressing a person in a letter.

The main reason for introducing gaps into fields had been the date field. Often, day and time were at different positions within the record and a format such as `HHMISS(23)YYYYMMDD` allows EMS to read separated date/time values as one value.

Character Field

The format must be defined as described above.

Date Time Field

The simple Date Time field consists of one or more of the following case insensitive items:

- YY - last two digits of the year (values of 0-49 are taken to mean years 2000-2049. Values 50-99 are taken to be years 1950-1999).

- YYY - last three digits of the year (values of 900-999 are taken to mean years 1900-1999 and values of 000-899 are taken to be years 2000-2899).

Note   **The 'Pivot year for 3 digits years' and 'Pivot year for 2 digits years' parameters are used to define the pivot year for the above two formats. These parameters may be updated in the Configuration Parameters Page.**

- YYYY - last four digits of the year.

- MM - month as number 1 to 12.

- MMM - month as abbreviated English word with three letters (Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec).

- JJJ - day in the year.

- DD - day as number 1 to 31.

- HH - hour in 24 hour system as number 0 to 23.

- MI - minute as number 0 to 59.

- SS - second as number 0 to 59.

- . - place holder character (the '.' character).

The following example shows the date 1 December 2007 in several variants and shows the different format definitions necessary to read it. All conversions will lead to identical internal values.

```
01122007              DDMMYYYY
01/12/2007            DD.MM.YYYY
01/12/2007            DD(1)MM(1)YYYY
01-Dec-2007          DD.MMM.YYYY
01-Dec-2007          DD(1)MMM(1)YYYY
335-2007             JJJ.YYYY
335-007              JJJ.YYY
335-07               JJJ.YY
2007x x x x12x x x01  YYYY(7)MM(5)DD
```

Decimal Field

The format "nn.dd" describes a decimal number where "nn" is the total length including the number of decimal positions and "dd" is the number of digits in the decimal part of the number. "nn" can be a combined field using parantheses to jump gaps but it must be assured that the combined number has no spaces between any of its digits.

The value in the field might start with a minus sign but the digits have to follow suit. Spaces between the minus sign and the digits are not permitted. Decimal numbers are limited to 15 significant digits.

Table A.2—Examples of Decimal formats

Input value	Format	Result
###100022[*]	9.2	1000.22
##1000.22	9.0	1000.22
100022###	9.2	1000.22
1000.22##	9.2	10.0022
#-1000.22	9.0	-1000.22
#1,000.22	2(1)6.0	1000.22
####1,000	5(1)3.0	1000
####1,000	5(1)3.2	10.00

* (# denotes an input field space)

Integer Field

For technical reasons, the computer's internal representation of numbers leads to a loss of precision or performance. In accordance with the main task of EMS and contrary to financial applications, performance has a higher priority than precision. Whole numbers are limited to values with 18 digits.

The format "nn" describes a whole number composed of "nn" digits. "nn" can be a combined field using parantheses to jump gaps but you must ensure that the combined number has no spaces between any of its digits. The value in the field might start with a minus sign but the digits have to follow suit. Spaces between the minus sign and the digits are not permitted.

CSV Fields Format

A CSV field describes the format of a field that can be extracted from bytes within a CSV record.

For Character fields, the format is the maximum length of the text.

For Numeric fields and Date Time fields a format pattern is required. For more information on these formats, please refer to "Display Formats Page" in Chapter 2.

Excel Fields Format

An Excel field describes the format of a field that can be extracted from bytes.

Character fields and Date Time fields require a format pattern. The tokens available for these formats are as follows:

Table A.3—Excel field format

Token	Type	Description
Positive number (such as 6 or 125)	Character	Length of the field. Longer cell content in the input will make the job run fail. If the Truncate cell content to fit in field format option is selected in the Excel file descriptions page, the cell content will be truncated to this length. Example: if input is ABCD and format is 2, it will import AB.
Date time patterns	Date Time	For Date Time field, the format can be left blank, in case the field is defined as a Date field in Excel. The format will be extracted from the cell. If the field is defined as a Character field in Excel, and has to be loaded as a Date Time, a date format needs to be provided. Refer to the Date and time display format in the "Display Formats Page" in Chapter 2.

Functions

Operators

MasterCard Expert Monitoring System offers several functions to perform simple queries on datasource fields and/or rules.

The functions inside the Operators family are:

- And

- Between

- Comparison

- In

- InFile

- IsNull

- Like

- Lookup

- Or

And Function

The And function is a boolean operator. This function will match records for which all conditions in all selected rules are verified.

Table A.4—And function

Item	Description
Clause count	Number, between 2 and 20, of clauses that will compose the conditions to satisfy to generate matches.
Clause [1-20]	Select one of the available rules.

Example

The following rule will return all authorized transactions at jewelry stores for an amount greater than 20.000 monetary units.

```
Function: And
Clause count: 3
Clause 1: isAuthorized
Clause 2: jewelry
Clause 3: amountOver20000
```

This rule will **not** return transactions like:

- an authorized transaction at a jewelry store for 200 monetary units (does not verify clause 3).

- an authorized transaction at a casino for 25.000 monetary units (does not verify clause 2)

- a refused transaction, because of insufficient funds, at a jewelry store, for an amount of 21.000 monetary units (does not verify clause 1)

Negated And

The negation of the And boolean operator has the effect to match all records for which at least one of the conditions of the rules is not verified.

```
☑  Generate negated results
Function: And
Clause count: 3
Clause 1: isAuthorized
Clause 2: jewelry
Clause 3: amountOver20000
```

This will return all transactions that are either not authorized, or not at a jewelry store or not an amount over 20.000 monetary units. It will return all above mentioned examples that did not verify at least one clause.

Between Function

This function marks all records as matching for which the second values lies between the first and third values. Each value can either be a datasource field or a literal. But they all need to be of comparable type i.e. compare date field with date values, compare numerical field with decimal fields, etc. The validation will check this condition. If the comparison involves fields from different datasources, all involved datasources will contain matches if the condition is verified.

Table A.5—Between function

Item	Description
First value	Select one of the available datasource fields or literals.
First operator	Select one of the available comparison sign : "<" or "<=".
Second value	Select one of the available datasource fields or literals.
Second operator	Select one of the available comparison sign : "<" or "<=".
Third value	Select one of the available datasource fields or literals.

Example

Find all records where the transaction amount lies between 1000 and 1999 monetary units.

Such an expression could be used as filter rule for historical functions.

```
Function: Between
First value: Numeric literal | 1000
First operator: <=
Second value: Numeric field | tx.amount
Second operator: <
Third value: Numeric literal | 2000
```

Negated Between

The negation of the function matches all records for which the test value lies outside the limits.

Comparison Function

Comparison operators are usually applied to the numeric types Integer and Decimal. However, they can be used on the base type Character and Date Time as well. The Character values are compared according to their position in the Unicode table. Therefore no general rule can be given about the behavior of the comparison operators towards Character values. It is recommended that you use only the equal and not equal operator for Character values.

Table A.6—Comparison function

Item	Description
First operand	Select one of the available fields or literals. It has to be of comparable type with Second operand.
Operator	Select one of the following operators: • "<" Less than operator. • ">" Greater than operator. • "<=" Less than or equal to operator. • ">=" Greater than or equal to operator. • "=" Equal to operator. • "<>" Not equal to operator.
Second operand	Select one of the available fields or literals. It has to be of comparable type with First operand.

Example

This first rule will return all records where the transaction amount is over 2000 monetary units.

```
Function: Comparison
First operand: Numeric field | tx.amount
Operator: >=
Second operand: Numeric literal | 2000
```

This next rule will return all customers born before the 1st of July 1980.

```
Function: Comparison
First operand: Date field | customer.birth_date
Operator: <
Second operand: Date literal | 1980-07-01 00:00
```

This other rule will return all local market transactions.

```
Function: Comparison
First operand: String field | tx.original_currency
Operator: =
Second operand: String field | tx.billing_currency
```

Negated Comparison

The negation of the Comparison function returns all records that wouldn't be returned without the negation.

In Function

The function marks all records as matching for which the Compare field value is mentioned in the list of values. This function performs similar operations to the InFile function. You should use the In function if number and value of the items are fixed over time. The comparison operation is case-sensitive. Use a ToUpper computed field to convert the characters to upper case.

Table A.7—In function

Item	Description
Compare field	Select one of the available datasource fields.
Value count	Number of values, between 1 and 20, to which the Compare field has to be compared. The corresponding number of value fields is automatically displayed below.
Value [1-20]	Values to which the Compare field will be compared. The field type is automatically adapted according to the selected Compare field. The number of fields displayed is also automatically set according to the selected Value count.

Example

Select all transactions that took place at one of the MCC displayed in the list of values.

```
Function: In
Compare field: tx.mcc
Value count: 5
Value 1: 4816
Value 2: 5045
Value 3: 5734
Value 4: 7372
Value 5: 7379
```

Select all transactions that have been tagged as 'Suspicious' or 'Fraudulent' in the user-defined transaction_tag Editable field.

```
Function: In
Compare field: tx.transaction_tag
Value count: 2
Value 1: Suspicious
Value 2: Fraudulent
```

Negated In

The negation of the In function matches all records for which the Compare field value is not mentioned in the list of values.

InFile Function

The function marks all records as matching if the Compare field value is equal to at least one entry stored within the File. This function performs operations similar to the In function. You should use the Infile function if the number of entries exceeds ten or the values are variable over time. By placing the variable entries into an external file the rule definition stays unchanged but the query can be adapted to different entries by creating a new version of the file. The comparison operation is case sensitive. Use a ToUpper computed field to convert the characters to upper case.

Table A.8—InFile function

Item	Description
Compare field	Select one of the available datasource fields.
File	Select one of the available files. These files are saved on the server. The exact location of this file is specified by the "InFile function files" directory (default value infile/) parameter which may be configured in the Parameters page. This function will not match any transactions if the file does not exist or is empty at the time of the classification process. MasterCard Expert Monitoring System loads the file at every job run. The file must be created according to the following definition: • The values within the file must comply to the definition of literals with the exception that double quotes are not permitted. • The file has to consist only of characters coming from currently selected operating system code page. • Each line contains exactly one entry. • Leading and trailing spaces will be ignored. • The wildcard characters (%) are treated as normal characters. No wildcard search will be performed.

Example

The file blacklist.txt contains names of fraudulent businesses:
```
McBurglar Ltd.
Micro-Loft Security plc.
Crash Airlines
Embezzlement and Associates
Squatter Housing
Fraudster and Partners
Con-Man Inc.
```

This rule matches transactions if they had been done at a merchant mentioned in the black list:
```
Function: InFile
Compare field: tx.merchant_name
File: blacklist.txt
```

Negated InFile

The negation of the InFile function matches all records for which the Compare field value is not mentioned in the File.

IsNull Function

Use this function to mark all records where the selected Compare field is null.

Table A.9—IsNull function

Item	Description
Compare field	Select one of the available datasource fields.

Example

This function will mark all pending documents where the signature is missing.

Function: IsNull
Compare field: pendingDocuments.signature

Negated IsNull

The negation of the IsNull function marks all records as matching where the selected Compare field is not empty.

Like Function

The function marks all records as matching for which the Compare field value is covered by the list of values containing wildcards. The comparison operation is case sensitive. Use a ToUpper computed field to convert the characters to upper case.

Table A.10—Like function

Item	Description
Compare field	Select one of the available datasource Character fields.
Value count	Number of values containing wildcards, between 1 and 20, to which the Compare field has to be compared. The corresponding number of Value fields is automatically displayed below.
Value [1-20]	Values containing wildcards to which the Compare field will be compared. The number of fields displayed is automatically set according to the selected Value count.

Example

Select all transactions where the merchant name seems to have a relation to computers or the Internet.

```
Function: Like
Compare field: tx.merchant_name
Value count: 5
Value 1: Comp%
Value 2: Internet%
Value 3: %@%
Value 4: %web%
Value 5: %data%
```

Negated Like

The negation of the Like function matches all records for which the test value is not covered in the list of values containing wildcards.

Lookup Function

This function accepts as many groups of three parameters as needed. If all conditions are fulfilled for one given incoming record by at least one of the reference records, the incoming record will match. Note that using the Lookup function will be more efficient than the InFile function if the same file is used several times because the lookup reference data is only loaded once per job run.

Table A.11—Lookup function

Item	Description
Lookup datasource	Select one of the available lookup datasources. Datasource must be enabled for lookup, meaning that the "Import as a lookup" checkbox on the Datasources Source description page must be selected. Source files will not be deleted when data has been loaded.
Compare datasource	Select one of the available datasources.
Comparison count	Number of conditions, between 1 and 10, a record must fulfill to be a match. The corresponding number of comparisons will be automatically displayed.
Comparison [1-10]	
Lookup field	Select one of the available fields. It must come from the same datasource as the lookup datasource.
Comparator	Select one of the operators: Equals, Contains, Starts with or Ends with.
Compare field	Select one of the available fields. It must come from the same datasource as the Compare datasource.

Example

Find records for which the 3 conditions are fulfilled by one record of the lookup datasource.

```
Function: Lookup
Lookup datasource: highRiskUsers
Compare datasource field: authorization
Comparison count: 3
Comparison 1
Lookup field: user_first_name
Comparator: Contains
Compare field: cardholder_first_name
Comparison 2
Lookup field: user_last_name
Comparator: Starts with
Compare field: cardholder_last_name
Comparison 3
Lookup field: nationality_country_code
Comparator: Equals
Compare field: cardholder_nationality_country_code
```

Lookup file extract

```
(user_first_name | user_last_name | nationality_country_code)
...
1. A. John | Smith     | 256
2. Johnny  | Smithson  | 256
3. Joey    | Smithson  | 256
4. John    | Smit      | 256
...
```

Authorization file extract

```
(cardholder_first_name | cardholder_last_name |
cardholder_nationality_country_code)
...
John | Smith | 256  -> 3 conditions fulfilled by lookup records
(1) & (2).
Jon  | Smith | 256  -> 1st condition not fulfilled by any lookup
record.
John | Smith | 352  -> 3rd condition not fulfilled by any lookup
record.
...
```

Negated Lookup

The negation of the Lookup function marks all records as matching that will not be marked by this function without using the negation.

Or Function

The Or function is a boolean operator. This function will match records for which at least one of the selected rules is verified.

Table A.12—Or function

Item	Description
Clause count	Number, between 2 and 20, of clauses that will compose the conditions. At least one of the rules has to be verified to generate matches.
Clause [1-20]	Select one of the available rules.

Example

This rule will return all transactions that either happened during the night, or with a blocked card, or at high risk MCC.
```
Function: Or
Clause count: 3
Clause 1: night
Clause 2: blockedCard
Clause 3: highRiskMcc
```

This rule could return transactions like:

- a blocked card used during the day at a grocery store (verify clause 2)

- a card used at a casino at night (verify clause 1 & 3)

- a card used during the night at a gas station (verify clause 1)

- a blocked card used at a casino at night (verify clause 1, 2 & 3)

Negated Or

The negation of the Or boolean operator has the effect to match all records that verify none of the selected rules.
```
☑ Generate negated results
Function: Or
Clause count: 3
Clause 1: night
Clause 2: blockedCard
Clause 3: highRiskMcc
```

This will return all transactions that are neither done during the night, nor with a blocked card nor at a high risk MCC.

History Functions

MasterCard Expert Monitoring System offers a range of functions allowing the user to consider historical information for cards, merchants or any other entities that should be monitored closely. You can combine history functions with other condition-based statements. For instance, an issuing bank may want to focus on the velocity of transactions for cards originating from a given country. An acquiring bank may want to closely monitor the daily merchant activity in a given city.

The timestamp for the Interval consideration is taken from the field defined in the "Receive time from field" field in the Datasources page of the Job definition page.

The rule negation has no influence on the Filter rule parameter. In both cases, the function considers only records that pass the filter rule. The negated version of the function marks all records as matching that will not be marked by this function without negation. No entry in one result set will be present in the other result set and the union of both sets forms the set of all records having passed the filter rule.

The History functions are as follows:

- Average
- Difference
- PeriodAverageExceeded
- RatioExceeded
- Same
- SerialGeneration
- SumRatioExceeded
- Velocity
- Volume

Average Function

Use this function to find groups of records where an average value exceeds a pre-defined threshold. This threshold is identical for all entities (e.g. merchants, cardholders, etc.). If you need an individual threshold per entity consider using the AverageDeviationValue function.

Table A.13—Average function

Item	Description
Grouping field	Select one of the available datasource fields. It must be part of the same datasource as the Average field.
Average field	Select one of the available Decimal or Integer datasource fields. It must be part of the same datasource as the Grouping field.
Threshold	Threshold that the average of the Average field must reach or surpass to generate matches. A negative threshold is allowed.
Interval	Time interval for which the average will be calculated.
Filter rule	If this option is selected (☑), select one of the available rules. Primary restriction for average calculation, only records that had been matching the rule before will be considered during the average calculation. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

Find records, within a 3h time window, where the average amount of authorized transactions is greater than or equal to 3000 monetary units.
```
Rule isAuthorized: tx.response_code = "01"
Function: Average
Grouping field: tx.pan
Average field: tx.amount
Threshold: 3000
Interval: 3h
☑ Filter rule: isAuthorized
```

Negated Average

The rule negation has no influence on the Filter rule parameter. In both cases, the function considers only records that pass the filter rule. The negated version of the function matches all records that will not match without negation.

Difference Function

Use this function to find groups of records where the number of different values of one characteristic (e.g. country) per entity (e.g. card) exceeds a fixed threshold. This threshold is the same for all entities.

Table A.14—Difference function

Item	Description
Grouping field	Select one of the available datasource fields. It must be part of the same datasource as the Compare field.
Compare field	Select one of the available datasource fields. It must be part of the same datasource as the Grouping field.
Threshold	Minimum number of different values that must be found in the Compare field to generate matches.
Interval	Time interval for which the different values must be present.
Filter rule	If this option is selected (☑), select one of the available rules. Primary restriction for Difference calculation, only records that had been matching the rule before will be considered during the difference calculation. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

Find cards that have been used in 3 different countries within a 12h time window.
```
Function: Difference
Grouping field: tx.pan
Compare field: tx.country_code
Threshold: 3
Interval: 12h
☐ Filter rule
```

Negated Difference

The rule negation has no influence on the Filter rule parameter. In both cases, the function considers only records that pass the filter rule. The negated version of the function matches all records that will not match without negation. In the above example, it would return all cards that have been used in less than three countries within a 12 hour time window.

PeriodAverageExceeded Function

Use this function to find single records that exceed the expected behavior of an individual entity (e.g. merchant) by a given percentage. The calculation of this individual threshold at each job run requires a high level of processing power. To increase the performance of such an analysis one could restrict the number of processed transactions by selecting a Filter rule.

The PeriodAverageExceeded function will only consider available data and ignore missing data. If, for example 30 daily values are requested in the function parameters but the database stores only ten days of transactions, the PeriodAverageExceeded will use the available data and not raise an error due to the fact that it can never calculate the average of all 30 requested values.

If none of the selected periods contains any transaction for the average calculation then no transaction will match. For instance, if the number of days of a Daily function is set to 1, the transactions of Monday will not match when no transaction had occurred on Sunday.

Table A.15—PeriodAverageExceeded function

Item	Description
Grouping field	Select one of the available datasource fields. It must be part of the same datasource as the Average field.
Average field	Select one of the available Decimal or Integer datasource fields. It must be part of the same datasource as the Grouping field.
Percentage	Percentage to add to the calculated average. If the percentage is 200, the threshold is the average plus 200 percent of the average or -with other words- three times the average.
Period length	One of: Yearly, Monthly, Weekly, Daily, Hourly or Minutely; defines the length of the periods used for the calculation of the averages. The periods go backwards from the transaction time rounded down to an exact period and for the given number of periods: • Yearly: same year but on the 1st January at 0 o'clock • Monthly: same month but on the 1st day at 0 o'clock • Weekly: same week but on the locale based 1st day of the week at 0 o'clock • Daily: same day but at 0 o'clock • Hourly: same hour but 0 minute • Minutely: same minute but 0 second

Item	Description
Period count	Number of Period length units to be used to calculate the average of the averages.
Filter rule	If this option is selected (☑), select one of the available rules. Primary restriction for average calculation, only records that had been matching the rule before will be considered during the calculation. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

Find merchants from gas station that have a transaction with an amount 3 times bigger than the average transaction amount over the last 7 days.

```
Rule gasStation: tx.MCC = 5541

Function: PeriodAverageExceeded
Grouping field: tx.merchant_id
Average field: tx.amount
Percentage: 200
Period length: Daily
Period count: 7
☑ Filter rule: gasStation
```

The example merchant in the diagram below keeps the business open on five days the week. During this time the transactions have had amounts in the range of 20 to 70. The job is running on a Friday importing the data for Thursday. MasterCard Expert Monitoring System is now checking for each transaction of each high-risk merchant if the transaction amount is above three times the average.

To create the merchant individual threshold, the tx.amount average per tx.merchant_id and per day (DAILY) over the last 7 days before the day of the currently checked transaction is calculated.

Then MasterCard Expert Monitoring System sums all existing averages (215) and divides them by their number (5). The result is the average of averages (43). To this final average, the given percentage (200) of this average is added to create the merchant individual threshold (129). This threshold is then applied to all new transactions of this merchant and subsequently the transaction having an amount of 140 will match the rule above.

If the import had contained data for the days Wednesday and Thursday then MasterCard Expert Monitoring System would have calculated the merchant threshold for the Wednesday transactions for the period from last Wednesday to Tuesday and for the Thursday transactions as described above.

Negated PeriodAverageExceeded

The rule negation has no influence on the Filter rule parameter. In both cases, the function considers only records that pass the filter rule. The negated version of the function matches all records that will not match without negation.

Applied to the same data as the example above, the negated variant would mark the transactions having the amounts of 40 and 60.

RatioExceeded Function

Use this function to find groups of records where the number of records within a period of time (e.g. one day) per characteristic (e.g. declined transactions) exceeds a percentage of the number of records within the same period of time for another characteristic (e.g. authorized transactions).

This function has four optional parameters leading to sixteen different valid combinations. For all parameter combinations this function will mark only the records that had been matching the Match rule.

The ratio is composed of a numerator divided by a denominator.
The numerator has 2 variants:

1. Total number of records matching the Match rule

2. Total number of records matching the Match rule grouped by Match field values

The denominator has 4 variants:

1. Total number of records in the database

2. Total number of records matching the Compare rule

3. Total number of records matching the Compare rule, grouped by Compare field values

4. Total Number of records grouped by Compare field values

These numerator and denominator variants can be combined to create a ratio. Moreover, a time interval can be applied to the ratio to restrict it to records belonging to a specific period of time. If no time interval is applied to the ratio, all available records in the database will be taken into account.

Table A.16—RatioExceeded function

Item	Description
Match rule	Select one of the available rules. Only records matching this rule might generate matches.
Match field	If this option is selected (☑), select one of the available datasource fields. It must be part of a datasource used in the Match rule. The field must be of comparable type to the Compare field, if any. The number of records having the same value in the Compare field, and matching the Match rule, will be used to calculate the ratio numerator.
Percentage	Percentage that has to be reached or surpassed by the ratio to generate matches.
Interval	If this option is selected (☑), time interval for which the ratio will be calculated. If it is not selected, the ratio is calculated on the whole database.
Compare rule	If this option is selected (☑), select one of the available rules. The number of records matching this rule will be taken into account to calculate the ratio denominator.
Compare field	If this option is selected (☑), select one of the available fields. The field has to be of comparable type to the Match field. It must be part of a datasource used in the Compare rule, if any selected. The number of records having the same value in the Compare field will be used to calculate the ratio denominator. When not defined or selected, the match field will be used if it is defined or selected.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

Find merchants for which the number of fraudulent transactions on key-entered transactions is greater than 10 percent of their total number of key-entered transactions within a three months period of time.

```
Function: RatioExceeded
Match rule: isKeyEnteredFraud
☑ Match field: safe.merchant_id
Threshold: 10
☑ Interval: 3mo
☑ Compare rule: isKeyEntered
☑ Compare field: clearing.merchant_id
```

Find merchants where the number of chargeback transactions is greater than 1.5 percent of their total number of transactions, within a one month period of time.

```
Function: RatioExceeded
Match rule: isChargeBack
☑ Match field: clearing.merchant_id
Threshold: 1.5
☑ Interval: 1mo
☐ Compare rule
☑ Compare field: clearing.merchant_id
```

Find transactions where the number of refused transactions is greater than 30 percent of the number of authorized transactions.

```
Function: RatioExceeded
Match rule: refused
☐ Match field
Threshold: 30
☐ Interval
☑ Compare rule: authorized
☐ Compare field
```

Negated RatioExceeded

If the negation is applied to the RatioExceeded function, it will mark transactions as matching if they are matching the Match rule but their number is strictly smaller than the individual thresholds of each of the variants.

```
Rule myBank: tx.card_company_id = "example bank"

☑ Generate negated results
Function: RatioExceeded
Match rule: myBank
☐ Match field
Threshold: 5
☑ Interval: 1mo
☐ Compare rule
☐ Compare field
```

By marking all transactions of the "example bank" as matching, this function informs the user if the market share of the "example bank" card company fell below 5 percent during the last month. If a bank enters its own name as "example bank" this function helps this bank to monitor the usage of its own customer card. If the usage drops below five percent, the bank might want to increase customer awareness. You should keep in mind when applying this example that it can mark a large number of records as matching.

Same Function

Use this function to find groups of records where the number of identical values of one characteristic (e.g. country) per entity (e.g. card) exceeds a fixed threshold. This threshold is the same for all entities.

Table A.17—Same function

Item	Description
Grouping field	Select one of the available datasource fields. It must be part of the same datasource as the Compare field.
Compare field	Select one of the available datasource fields. It must be part of the same datasource as the Grouping field.
Threshold	Minimum number of identical values that must be found in the Compare field to generate matches.
Interval	Time interval for which the identical values must be present.
Filter rule	If this option is selected (☑), select one of the available rules. Primary restriction for Same calculation, only records that had been matching the rule before will be considered during the calculation. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

Find cards that have been used 4 times at the same merchant within a 3h time window.

```
Function: Same
Grouping field: tx.pan
Compare field: tx.merchant_id
Threshold: 4
Interval: 3h
☐ Filter rule
```

Negated Same

The rule negation has no influence on the Filter rule parameter. In both cases, the function considers only records that pass the filter rule. The negated version of the function matches all records that will not match without negation. In the above example, it would retrieve cards that have only been used three times or less at the same merchant in three hours.

SerialGeneration Function

Use this function to find groups of records where the number of records showing the same pattern in a field within a period of time (e.g. one day) per entity (e.g. merchant) exceeds a given threshold.

Table A.18—SerialGeneration function

Item	Description
Grouping field	Select one of the available datasource fields. This field must be in the same datasource as the Originator field, if any.
	It does not necessarily have to have the same length as the pattern. Only characters within the length of the pattern will be taken into account during the classification process. Surplus characters will be ignored. Missing characters will be considered as not existing characters and they will be treated as being different to a space character.
	Attention: When importing from a file, leading and trailing spaces will be purged automatically and silently. When importing from a database extraction, these spaces will be kept.
Threshold	Threshold that the number of records showing the same pattern must reach or surpass to generate matches.
Interval	Time interval for which the records having same pattern must appear.
Pattern	The pattern must consist only of case-insensitive characters 'X' and '-' and contain at least one of each. 'X' represents a digit that needs to be identical for different field values; '-' represents a digit that may be different for different field values.
Use originator	If this option is selected (☑), the 3 originator fields become enabled.
Originator field	Select one of the available datasource fields. The field must be part of the same datasource as the Grouping field.

Item	Description
Originator threshold type	Select one of the key words 'Absolute' or 'Relative'. • Absolute: Within a group, the count of distinct values in the Originator field has to be less than or equal to the Originator threshold to mark any records as matching. • Relative: Within a group, the count of distinct values in the Originator field has to be less than or equal to the Originator threshold percentage of the count of the distinct values of the Grouping field to mark any records as matching.
Originator threshold	Threshold representing the maximum absolute or relative number of distinct values that may be available in the Originator field for the record to be matching.
Filter rule	If this option is selected (☑), select one of the available rules. Primary restriction for SerialGeneration calculation, only records that had been matching the rule before will be considered during the calculation. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example 1

This function marks records as matching if, within 1 week, the number of distinct postal codes having the same 3 first digits is greater or equal to 3. Postal codes values are placed within the same group if their fixed parts of the pattern (marked by "X") are identical.

```
Function: SerialGeneration
Grouping field: customer.postal_code
Threshold: 3
Interval: 1w
Pattern: XXX---
☐ Use originator
☐ Filter rule


ABC12
EFG987    x
ABC123
AA 52
AB 456    x
EFG856    x
AB 45     x
ABC1234
DB 856
EFG754    x
AB 4      x
ABC1235
```

All records above took place within the interval of one week. While processing the records five groups are formed and the occurrence of their members is counted:

```
ABC - 2 (ABC1234 and ABC1235 are treated as ABC123 because the
Pattern only has six characters)
EFG - 3
AA  - 1
AB  - 3
DB  - 1
```

Since the user defined the threshold as three, only the records for EFG and AB will be marked as matching.

The analysis of postal codes can detect application fraud. In some countries the postal code denotes not only the quarter of the town but resolves the address down to street or block level. To market credit cards, banks sometimes start advertisement campaigns where application forms are included into a brochure and the application for such a credit card can be done without personal presence of the applicant in any branch. Perpetrators commit application fraud by sending in applications for credit cards using addresses from neighbors which are on holiday. If the fraudsters manage to obtain the letters with the credit cards before their neighbors return, they can use them for a short while buying goods or services. Home delivery and Internet stores experience similar problems with deliveries required to addresses of absent persons. If the postal code system permits it, this function can detect activity hot-spots allowing the analysts to have a closer look at the persons involved before making possibly costly decisions.

Example 2

If the perpetrators, for example, test on six merchants only one transaction every five minutes, they will test 72 transactions per hour but only 12 per hour and per merchant. They hope that this small number of transactions per hour and per merchant will get lost within the legitimate transactions. The following function, although, can detect this approach.

```
Function: SerialGeneration
Grouping field: tx.card_number
Threshold: 50
Interval: 1h
Pattern: XXXXXXXXXXXX----
☑ Use originator
 Originator field: tx.merchant
 Originator threshold type: Absolute
 Originator threshold: 10
☑ Filter rule: myBinApproved
```

This function matches transactions if, within one hour, 50 or more cards where approved by 10 or less merchants and they match the pattern. The pattern allows only four variable digits. This permits at the most 10000 different values, but the check digit restricts the number of valid structured card numbers within this range to 1000. If 250 of these card numbers were issued, the function above would match if 20 percent of the issued cards are used within one hour at less than ten merchants.

If 70 cards have been used at these 10 or less merchants the rate would be 14 percent: more likely to be fraud but less likely to be caught. If the risk estimation defined the pair of (50, 10) with regard to the percentage of 20, the function should represent this behavior:

```
Function: SerialGeneration
Grouping field: tx.card_number
Threshold: 50
Interval: 1h
Pattern: XXXXXXXXXXXX----
☑ Use originator
  Originator field: tx.merchant
  Originator threshold type: relative
  Originator threshold: 20
☑ Filter rule: myBinApproved
```

This function marks transactions as matching if 50 cards had been used at ten or less merchants but also if 70 cards have been used at 14 or less merchants etc. The number of distinct Originator field values is related to the actually occurring number of distinct Grouping field values.

Negated SerialGeneration

The rule negation has no influence on the Filter rule parameter. In both cases, the function considers only records that pass the filter rule. The negated version of the function matches all records that will not match without negation.

SumRatioExceeded Function

Use this function to find groups of records where the sum of the content of a numerical field of several records within a period of time (e.g. one day) per characteristic (e.g. declined transactions) exceeds a percentage of the sum of the content of a numerical field of several records within the same period of time for another characteristic (e.g. authorized transactions).

This function has four optional parameters leading to sixteen different valid combinations. For all parameter combinations this function will mark only the records that had been matching the Match rule.

The ratio is composed of a numerator divided by a denominator.
The numerator has 2 variants:

1. Sum of the content of the Match sum field of all records matching the Match rule

2. Sum of the content of the Match sum field of all records matching the Match rule grouped by Match field values

The denominator has 4 variants:

1. Sum of the content of the Compare sum field of all records in the database

2. Sum of the content of the Compare sum field of all records matching the Compare rule

3. Sum of the content of the Compare sum field of all records matching the Compare rule, grouped by Compare field values

4. Sum of the content of the Compare sum field of all records grouped by Compare field values

These numerator and denominator variants can be combined to create a ratio. Moreover, a time interval can be applied to the ratio to restrict it to records belonging to a specific period of time. If no time interval is applied to the ratio, all available records in the database will be taken into account.

Table A.19—SumRatioExceeded function

Item	Description
Match rule	Select one of the available rules. Only records matching this rule might generate matches.
Match field	If this option is selected (☑), select one of the available datasource fields. It must be part of a datasource used in the Match rule. The field must be of comparable type to the Compare field, if any. The records having the same value in the Compare field, and matching the Match rule, will be used to calculate the ratio numerator.
Match sum field	Select one of the available Decimal or Integer datasource fields. It must be part of the same datasource as the Match field.
Percentage	Percentage that has to be reached or surpassed by the ratio to generate matches.
Interval	If this option is selected (☑), time interval for which the ratio will be calculated. If it is not selected, the ratio is calculated on the whole database.

Item	Description
Compare rule	If this option is selected (☑), select one of the available rules. The records matching this rule will be taken into account to calculate the ratio denominator.
Compare field	If this option is selected (☑), select one of the available fields. The field has to be of comparable type to the Match field. It must be part of a datasource used in the Compare rule, if any selected. The records having the same value in the Compare field will be used to calculate the ratio denominator. When not defined or selected, the match field will be used instead of the compare field, if a match field is defined or selected.
Compare sum field	Select one of the available Decimal or Integer datasource fields. It must be part of the same datasource as the Compare field.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

Find merchants for which the volume of fraudulent transactions on key-entered transactions is greater than 10 percent of their total volume of key-entered transactions within a three months period of time.

Function: SumRatioExceeded
Match rule: isKeyEnteredFraud
☑ **Match field: safe.merchant_id**
Match sum field: safe.amount
Threshold: 10
☑ **Interval: 3mo**
☑ **Compare rule: isKeyEntered**
☑ **Compare field: clearing.merchant_id**
Compare sum field: clearing.amount

Find merchants where the volume of chargeback transactions is greater than 1.5 percent of their total volume of transactions, within a one month period of time.

Function: SumRatioExceeded
Match rule: isChargeBack
☑ **Match field: clearing.merchant_id**
Match sum field: clearing.amount
Threshold: 1.5
☑ **Interval: 1mo**
☐ **Compare rule**
☑ **Compare field: clearing.merchant_id**
Compare sum field: clearing.amount

Find transactions where the volume of refused transactions is greater than 30 percent of the total volume of authorized transactions.
Function: SumRatioExceeded
Match rule: refused
☐ **Match field**
Match sum field: tx.amount
Threshold: 30
☐ **Interval**
☑ **Compare rule: authorized**
☐ **Compare field**
Compare sum field: tx.amount

Negated SumRatioExceeded

The negation of the SumRatioExceeded function will mark transactions as matching if they are matching the Match rule but their total volume is strictly smaller than the individual thresholds of each of the variants.
Rule myBank: tx.card_company_id = "example bank"

☑ **Generate negated results**
Function: SumRatioExceeded
Match rule: myBank
☐ **Match field**
Match sum field: tx.amount
Threshold: 5
☑ **Interval: 1mo**
☐ **Compare rule**
☐ **Compare field**
Compare sum field: tx.amount

By marking all transactions of the "example bank" as matching this function informs the user if the market share, in volume, of the "example bank" card company fell below 5 percent during the last month. If a bank enters its own name as "example bank" this function helps this bank to monitor the usage of its own customer card. If the usage drops below five percent in volume, the bank might want to increase customer awareness. You should keep in mind when applying this example that it can mark a large number of records as matching.

Velocity Function

Use this function to find groups of records where the number of records within a period of time (e.g. one day) per entity (e.g. cardholder) exceeds a pre-defined threshold. This threshold is identical for all entities.

Table A.20—Velocity function

Item	Description
Grouping field	Select one of the available datasource fields.
Threshold	Minimum number of records that must be reached or surpassed to generate matches.
Interval	Time interval for which the number of records must be present.
Filter rule	If this option is selected (☑), select one of the available rules. Primary restriction for Velocity calculation, only records that had been matching the rule before will be considered during the calculation. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

Find cards having 5 transactions within a 30 minutes time window.

```
Function: Velocity
Grouping field: tx.pan
Threshold: 5
Interval: 30mi
☐ Filter rule
```

Negated Velocity

The rule negation has no influence on the Filter rule parameter. In both cases, the function considers only records that pass the filter rule. The negated version of the function matches all records that will not match without negation. In the above example, it would return cards that have four or less transactions in 30 minutes.

Volume Function

Use this function to find groups of records where the sum of a field (e.g. transaction amount) of records within a period of time (e.g. one day) per entity (e.g. cardholder) exceeds a pre-defined threshold. This threshold is identical for all entities.

Table A.21—Volume function

Item	Description
Grouping field	Select one of the available datasource fields. Must be part of the same datasource as the Sum field.
Sum field	Select one of the available Decimal or Integer datasource fields. Must be part of the same datasource as the Grouping field.
Threshold	Threshold that the sum of the Sum field values must reach or surpass to generate matches.
Interval	Time interval for which the sum will be calculated.
Filter rule	If this option is selected (☑), select one of the available rules. Primary restriction for Volume calculation, only records that had been matching the rule before will be considered during the calculation. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

Find cards where the total amount spent reaches 1000 euro in a 1 day time window.

```
Rule isAuthorized: tx.code = "01"

Function: Volume
Grouping field: tx.pan
Sum field: tx.amount
Threshold: 1000
Interval: 24h
☑ Filter rule: isAuthorized
```

Negated Volume

The rule negation has no influence on the Filter rule parameter. In both cases, the function considers only records that pass the filter rule. The negated version of the function matches all records that will not match without negation. In the above example, it would return cards where the total amount spent in one day is less than 1000 euros.

Statistical Functions

MasterCard Expert Monitoring System offers a range of functions allowing you to consider statistical information for entities that you wish to monitor closely, e.g. individual cards or merchants. You can combine statistical functions with other condition-based statements. For instance, as an issuer you may want to focus on the long term card usage of your cardholders. As an acquirer, you may want to closely monitor the development of merchant activity over a long term.

The Statistical functions are as follows:

- AverageDeviationOccurence
- AverageDeviationValue
- StandardDeviationOccurence
- StandardDeviationValue

The statistical functions calculate for each distinct item of the analyzed entity averages over the whole database for its occurrence or a related numerical value. It is also possible to use the standard deviation instead of the average.

By default, the records are grouped in slices of 24 hours. The slices start every six hours to avoid that groups of records placed by coincidence around the end of one slice and the beginning of another are distributed over two slices. In such a case the average-raising effect of the group of records might be ironed out by the fact that they are distributed over two slices, which would lead to missed matches.

The difference between the statistical and the history functions is that in the latter one threshold value has to suit all merchants or cardholders regardless their individual profiles. The statistical functions create an individual profile for each merchant, cardholder or other similar value for the period of the whole database and compare each time slice with this individual profile.

The PeriodAverageExceeded function will provide for some parameter settings similar results too, but might be faster and offer more advanced features than the statistical functions.

AverageDeviationOccurrence Function

Use this function to find groups of records where the number of records for the same item (e.g. cardholder, merchant etc.) and within a period exceeds the average number of records within any such period in the whole database. The threshold is calculated out of the item individual average multiplied with a percentage. This percentage is a fixed value for all items. The functions StandardDeviationOccurrence and StandardDeviationValue use an item individual threshold calculation.

Table A.22—AverageDeviationOccurrence function

Item	Description
Grouping field	Select one of the available datasource fields.
Deviation	Percentage threshold that is calculated out of the average of all slices multiplied with this parameter. For a value of 50 the threshold will be at 50 percent of the average.
Boundary	The key words Upper or Lower. • Upper: will mark records as matching if their number within one slice is greater than or equal to the threshold. • Lower: will mark records as matching if their number within one slice is less than or equal to the threshold.
Slice size	Positive interval. The process of this function starts at the beginning of the previous interval, e.g. for 1d the first slice starts at 00:00. It makes no difference if 1d or 24h is entered. For 6h the first slice starts at 00:00, 06:00, 12:00 or 18:00, whichever is the most previous border time.
Slice start	Positive interval. It must be possible to divide Slice size by this value without remainder, e.g. 1d/6h, 15h/5h, 1w/1d etc. but not 1d/7h, 1mo/1w etc. Attention: 1mo/1w will be valid in February of non-leap years because this month has 28 days and can be divided by 1w (7d) intervals without remainder. But, as times goes by and at latest in March, this interval combination will become invalid. It is also possible to use a Slice size that is shorter than this value, e.g. 1d/1w. In this case it must be possible to divide the Slice start interval by the Slice size interval without remainder.
Use filter rule	If this option is selected (☑), select of the available rules. Primary restriction for record matching, only records that had been matching the rule will be considered for this function. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example
```
Function: AverageDeviationOccurence
Grouping field: tx.merchant_id
Deviation: 50
Boundary: Upper
Slice size: 1d
Slice start: 6h
☑ Use filter rule: internetMerchants
```

The following picture contains five days with four bars each marking the number of transactions. For the example, the rule parameter suppresses all but the Internet businesses. Therefore the business is also operational on 24 hours a day and seven days a week. The brackets at the top mark each day and the sum of transactions per day. Within the five days, 145 transactions where performed leading to a daily average of 29 transactions. The analyst decided that business might be suspicious if the number of transactions of one day is greater than 150 percent of the average of the other days. Therefore the function contains the values 50 and upper to shift the threshold from to 150 percent of the average. This threshold will be calculated at each job run and is 43.5 for the currently available data.

No day as counted on the top of the picture will exceed the threshold because the two tallest bars are assigned to two different days. The merchant could intend to divert the attention of the analyst or, the Internet business is located in another time zone and the peak correspondences with the day time at the merchant primary customer base. Either way, the analyst will not find out about this peak if only the full days would be taken into account.

To avoid problematic slice border behavior, MasterCard Expert Monitoring System allows users to calculate more slices each being delayed for the Slice start interval. In the example, it means that for each day, four slices will be calculated, each starting six hours after the preceding slice. The important slices are marked at the bottom of the picture starting with the slice for the complete day three. Like the slice on the top, it starts on day three at 00:00 and ends on day three at 23:59. The next slice starts on day three at 06:00 and ends on day four at 06:00 and has a transaction sum of 48. The next slice starts and ends six hours later and contains 49 transactions and so on.

All the three slices that cover the whole night from day three to day four have a transaction count above the shifted threshold and therefore their transactions will be marked as matching to this function. Of course, each transaction is marked as matching only once. This example is valid for many but not for all businesses. Especially merchants with a business fluctuation between the week and the week-end will pose problems to the analyst if this function is applied as described in the example above. The following picture shows the business levels of a merchant in an entertainment resort.

The bars describe the number of transactions on the different days of the week. The week-ends are marked by the darker gray. This shop has its peak days clearly on Saturday and Sunday. Because of this imbalance between the week and the week-end each Saturday and Sunday exceeds the function as described above and therefore MasterCard Expert Monitoring System would mark many legitimate transactions as matching and hence forcing the analyst to spend a long time disregarding them.

On the other hand, the "suspicious Wednesday" would escape the analyst's attention because its number of transactions is smaller than the average. It would not mark the involved transactions as matching although this particular Wednesday has more than double the business of any other Wednesday. The following function solves these issues. The rule weekendMerchants restricts the transactions to merchants that are known to have an unproportional relation between the different days of the week.

Function: AverageDeviationOccurence
Grouping field: tx.merchant_id
Deviation: 50
Boundary: Upper
Slice size: 1d
Slice start: 1w
☑ **Use filter rule: weekendMerchants**

Here the Slice start interval is greater than the Slice size. If the database starts at any moment on a Tuesday, due to the parameter 1d the first slice starts at the first Tuesday 00:00. The next slice in this calculation starts at the first Tuesday plus one week - which is the Tuesday 00:00 of the second week and so on. This function will also divide the Slice start interval by the Slice size creating a number of groups in which the values have to be compared with each other. In the example the groups would fall on each day of the week, hence Mondays are compared with other Mondays, Tuesdays are compared with other Tuesdays and so on.

Because this function would also compare any Wednesday with all other Wednesdays, it detects the unusual behavior of the "suspicious Wednesday" and the related transactions would be marked as matching.

In some circumstances, you may want to highlight unusual decrease of activity for a given entity. In that case, by switching the direction parameter from Upper to Lower, it highlights merchant having performed 50 percent less transactions than their average daily activity.

Function: AverageDeviationOccurence
Grouping field: tx.merchant_id
Deviation: 50
Boundary: Lower
Slice size: 1d
Slice start: 6h
☐ **Use filter rule**

Negated AverageDeviationOccurrence

The negation has no influence on the filter rule. In both cases, the function regards only records that pass the filter rule. The negated version of the function matches all records that will not match without using the negation.

In the examples below, the two functions from above are negated. The slices detected by the functions are displayed in darker grey and their records would be marked as matching.

☑ **Generate negated results**
Function: AverageDeviationOccurence
Grouping field: tx.merchant_id
Deviation: 50
Boundary: Upper
Slice size: 1d
Slice start: 6h
☑ **Use filter rule: internetMerchants**

☑ **Generate negated results**
Function: AverageDeviationOccurence
Grouping field: tx.merchant_id
Deviation: 50
Boundary: Upper
Slice size: 1d
Slice start: 1w
☑ **Use filter rule: weekendMerchants**

AverageDeviationValue Function

Use this function to find groups of records where the sum of a field of records for the same item (e.g. cardholder, merchant etc.) and within a period exceeds a threshold. The threshold is calculated out of the item individual average of all slices in the database plus or minus a given percentage of this average.

Behavior and parameters are identical to the AverageDeviationOccurrence function except for the Value field and the fact that the results are not based on the number of records but on the sum and averages of the Value field.

Table A.23—AverageDeviationValue function

Item	Description
Value field	Select one of the available datasource fields. This field must come from the same datasource as the Grouping field.

StandardDeviationOccurrence Function

Use this function to find groups of records where the number of records for the same item (e.g. cardholder, merchant etc.) and within a period exceeds a threshold. The threshold is calculated out of the item individual average of all slices in the database plus or minus the standard deviation per individual item multiplied with a given percentage. This percentage is a fixed value for all items. Although this percentage is fixed, it is applied to an individual standard deviation. Therefore, this function reacts stronger to the behavior of one particular item than the functions AverageDeviationOccurrence and AverageDeviationValue.

Table A.24—StandardDeviationOccurrence function

Item	Description
Grouping field	Select one of the available datasource fields.
Deviation	The threshold is calculated out of the average of all slices plus or minus the standard deviation multiplied with this parameter. For a value of 50 and the boundary set to Upper the threshold will be at the individual average plus 50 percent of the individual standard deviation.
Boundary	The key words Upper, Lower or Both.
	Upper: will mark records as matching if their number within one slice is greater than or equal to the threshold.
	Lower: will mark records as matching if their number within one slice is less than or equal to the threshold.
	Both: will mark records as matching if their number within one slice is greater than or equal to the upper threshold or less than or equal to the lower threshold. Hence it marks records that are outside the band of usual activities.
Slice size	Positive interval. The process of this function starts at the beginning of the previous interval, e.g. for 1d the first slice starts at 00:00. It makes no difference if 1d or 24h is entered. For 6h the first slice starts at 00:00, 06:00, 12:00 or 18:00, whichever is the most previous border time.

Item	Description
Slice start	Positive interval. It must be possible to divide Slice size by this value without remainder, e.g. 1d/6h, 15h/5h, 1w/1d etc. but not 1d/7h, 1mo/1w etc. Attention: 1mo/1w will be valid in February of non-leap years because this month has 28 days and can be divided by 1w (7d) intervals without remainder. But, as times goes by and at latest in March, this interval combination will become invalid. It is also possible to use a Slice size that is shorter than this value, e.g. 1d/1w. In this case it must be possible to divide the Slice start interval by the Slice size interval without remainder.
Use filter rule	If this option is selected (☑), select of the available rules. Primary restriction for record matching, only records that had been matching the rule will be considered for this function. This parameter is optional.
Thread count	Performance tuning parameter that defines the maximum number of additional parallel threads available to insert matching records in the database.

Example

The image below shows five bars representing the count of records per slice. The dotted line represents the average and the horizontal band the standard deviation.


```
Function: StandardDeviationOccurrence
Grouping field: tx.merchant_id
Deviation: 100
Boundary: Upper / Lower / Both
Slice size: 1d
Slice start: 6h
☐ Use filter rule
```

This example illustrates the differences between the different boundaries:

- The **Upper** boundary would mark the records that have led to the tallest bar.

- The **Lower** boundary would mark the records of the smallest bar.

- The **Both** boundary would mark both of the above mentioned bars.

A percentage of less than 100 would make the horizontal band slimmer, and it might increase the number of matches. A percentage greater than 100 would widen the horizontal band, and it might decrease the number of matches. This gives supervisors the possibility to limit the number of matches according to the work capacity of their analysts.

The two parameters Slice size and Slice start behave similar to the explanations provided in the AverageDeviationOccurrence function.

Negated StandardDeviationOccurrence

The negation of the function has no influence on the rule parameter. In both cases, the function regards only records that pass the filter rule. The negated version of the function matches all records that will not match without using the negation. No entry in one result set will be present in the other result set and the union of both sets forms the set of all records having passed the filter rule.

In the examples below, the functions from above are negated.

```
☑ Generate negated results
Function: StandardDeviationOccurrence
Grouping field: tx.merchant_id
Deviation: 100
Boundary: Upper / Lower / Both
Slice size: 1d
Slice start: 6h
☐ Use filter rule
```

This example illustrates the differences between the different boundaries:

- The **Upper** boundary would mark all but the records that have led to the tallest bar.

- The **Lower** boundary would mark all but the records of the smallest bar.

- The **Both** boundary would mark the records of the bars within the horizontal band.

StandardDeviationValue Function

Use this function to find groups of records where the sum of a field of records for the same item (e.g. cardholder, merchant etc.) and within a period exceeds a threshold. The threshold is calculated out of the item individual average of all slices in the database plus or minus the standard deviation per individual item multiplied with a given percentage.

Behavior and parameters are identical to the StandardDeviationOccurrence function above except for the Value field and the fact that the results are not based on the number of records but on the sum and averages of the Value field.

Table A.25—StandardDeviationValue function

Item	Description
Value field	Select one of the available datasource fields. This field must come from the same datasource as the Grouping field.

Other Functions

This section contains functions that cannot be related to the other groups.

The functions are as follows:

- InInterval
- IsInFields
- IsToday
- MatchRule
- Sequence

InInterval Function

The function will mark all transactions as matching for which End date field is within the Interval after Start date field. The two additional linking fields are required when the two Date Time fields come from different datasources. The link fields will be used to link the two datasources. One could imagine that for each transaction of the two datasources having the same value in Start link field and End link field one combined transaction is formed and the interval is checked. If the End date field value is on either boundary of the interval the transaction still matches.

Table A.26—InInterval function

Item	Description
Start date field	Select one of the available Date Time fields, as a start interval value.
End date field	Select one of the available Date Time fields, as a check date value.
Interval	Interval to add to the Start date field.
Link datasources	If this option is selected (☑), Start link field and End link field become enabled and allow to link two datasources.
Start link field	Select one of the Start date field datasource fields. Selected field must be a unique key field, of comparable type as End link field.
End link field	Select one of the End date field datasource fields. Selected field must be a unique key field, of comparable type as Start link field.

Example

Check if a card has been used within one day after issuing date.
```
Function: InInterval
Start date field: cardholder.issuing_date
End date field: tx.transaction_date
Interval: 1d
☑ Link datasources
 Start link field: cardholder.pan
 End link field: tx.pan
```

Negated InInterval

The negation of the function matches all transactions for which the End date field value is strictly outside the specified interval.

IsInFields Function

This function returns all records that contain a specified value in one of its fields. Use this function to optimize the work of the Or operator. The IsInFields function provides a higher performance where it is applicable. This function can be used for queries within one or two datasources.

Table A.27—IsInFields function

Item	Description
Value field	Date, Numeric or String literal or field. The value to search in the check fields.
Check field count	Number of check fields, between 2 and 20, that will be tested to see if they contain the value of the Value field. The corresponding number of check fields will then be displayed.
Check field [1-20]	Datasource fields to be checked. There will be as many Check fields as mentioned in the Check field count field. These fields must be of same type as the Value field. All check fields must come from the same datasource, but they might be from a different datasource from the Value field.
Link datasources	If this option is selected (☑), the Value and Check link fields become enabled. It allows to link the datasources of the Value field and the Check fields.
Value link field	Select one of the Value field datasource fields. The selected link field needs to be a unique key field of comparable type as Check link field.
Check link field	Select one of the Check field datasource fields. The selected link field needs to be a unique key field of comparable type as Value link field.

Example

Find all records that are either performed in the cardholder's home country, or in the cardholder's nationality country or in the invoice country.

```
Function: IsInFields
Value field: tx.pos_country_code
Check field count: 3
Check field 1: cardholder.home_country_code
Check field 2: cardholder.nationality_country_code
Check field 3: cardholder.invoice_country_code
☑ Link datasources
 Value link field: tx.pan
 Check link field: cardholder.pan
```

Negated IsInFields

The negation of the IsInFields function matches all records that will not match without using the negation.

IsToday Function

The function will mark all transactions as matching for which the value of Date Time field is from the day the classification process has been started, regardless of the time.

Table A.28—IsToday function

Item	Description
Date field	Select one of the available Date Time fields.

Example

To restrict the analysis to only the transactions of the day.

```
Function: IsToday
Date field: transaction_date
```

Negation IsToday

The negation of the function matches all transactions for which the value of the parameter is not during the same day as the classification process has been started.

MatchRule Function

Use this function to mark records as matching if they fulfill some but not necessarily all conditions. This function can combine information from several datasources. Several records form a combined record if they have identical link field values. If the combined record matches the function, all original records will be marked as matching this function.

Table A.29—MatchRule function

Item	Description
Rule count	Number of rules, between 2 and 10, that are part of the conditions. The corresponding number of rules and link fields will be displayed.
Matching threshold	Number of rules that have to be matched by a record to be an alert. This number has to be greater than 0 and smaller or equal to the number of rules. Three options are available to define this threshold: • At least: a record has to match at least a certain number of rules to be an alert. • At most: a record has to match at most a certain number of rules to be an alert. • Exactly: a record has to match exactly a certain number of rules to be an alert.
Rule [1-10]	Select one of the available rules. There will be as many rules as mentioned in the Rule count field.
Link datasources	If this option is selected (☑), the Link fields become enabled and allow the datasources used in the different rules to be linked.
Link field [1-10]	Select one of the corresponding rule datasource fields. Selected field must be a unique key field, of comparable type as other Link fields. For example, Link field 3 must contain a unique key field that belongs to a datasource used in Rule 3.

Example

Find transactions that comply with at least 3 rules amongst these 5 rules.

```
Function: MatchRule
Rule count: 5
Matching threshold: At least 3
Rule 1: highAmount
Rule 2: asia
Rule 3: highRiskMcc
Rule 4: night
Rule 5: keyEntered
```

Negated MatchRule

The negation of the function matches records that do not comply with the threshold. If a transaction does not match any rule, it will not match the function. In the above example, a negated rule would return transactions that match 1 or 2 of the rules, so it would be the same as an 'At most 2' matching threshold without negation.

Sequence Function

Use this function to mark transactions as matching if they occurred in a sequence of activities. This function can identify the well-known card fraud pattern Probing: a sequence of transactions where a card number is used to conduct a transaction for a small amount before it is used to perform transactions for larger amounts.

In general, this function marks transactions as matching if any of the transactions matching Rule 2 occurred within the interval after any match to Rule 1 for identical link fields values. The exact behavior depends strongly on the value of the Match type parameter and is explained in detail below.

Table A.30—Sequence function

Item	Description
Rule 1	This rule has to use at least one field from the same datasource as Rule 1 link field. This rule must be different to Rule 2.
Rule 1 link field	This field has to be of comparable type to Rule 2 link field.
Rule 2	This rule has to use at least one field from the same datasource as Rule 2 link field. This rule must be different to Rule 1.
Rule 2 link field	This field has to be of comparable type to Rule 1 link field.
Interval	Time interval for which matches on the two rules have to happen.
Match type	The following three options are available: • First: marks a transaction as matching if it matches the Rule 1 and there is at least one transaction matching Rule 2 that occurred after it but within the interval from its timestamp. • Second: marks a transaction as matching if it matches the Rule 2 and it occurred after at least one transaction matching Rule 1 but within the interval from the timestamp of Rule 1. • Both: marks transactions 1 and 2 as matching if a transaction1 has matched Rule 1 and there exists a transaction2 which matched Rule 2 and occurred after transaction1 but within the interval starting at the timestamp of transaction1.

Example

```
Rule probingLocations: tx.mcc In (5541, 5542, 7542)
Rule useLocations: tx.mcc In (5094, 5944, 5946)

Function: Sequence
Rule 1: probingLocations
Rule 1 link field: tx.pan
Rule 2: useLocations
Rule 2 link field: tx.pan
Interval: 3h
Match type: Both
```

The image represents the probing example. Both example rules match single transactions. The filled arrows are transactions matching Rule 1, the others match Rule 2.

To match the rule, transaction 1 has to be followed by a match to useLocations within the interval. The next match to useLocations is transaction 3 which is outside the interval marked by the horizontal bracket. Transactions 2 and 3, although, are both placed within the same interval and therefore match. Transaction 4 had not been preceded by a match to probingLocations within an interval ending at its timestamp and does therefore not match the rule.

Negated Sequence

The result of this function depends on the value of the Match type parameter:

- **First**: marks a transaction as matching if it matches the Rule 1 and there exists no transaction matching Rule 2 within the interval counting from its timestamp. With regard to the example above: transactions 1 would match.

- **Second**: marks a transaction as matching if it matches the Rule 2 and there exists no transaction matching Rule 1 within the preceding interval. With regard to the example above: transactions 4 would match.

- **Both**: marks transactions as matching if they fulfill either the conditions of first or second from above. With regard to the example above: transactions 1 and 4 would match.