



Department of Health and Human Services



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MicroStrategy 8 Guidelines

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1. Introduction

CMS is migrating to a three-zone, web-enabled, and secure infrastructure based on a standard set of criteria documented in the *CMS Internet Architecture*. In addition, in the document *CMS Target Architecture*, CMS identifies a set of standard commercial off-the-shelf (COTS) products for new applications being deployed in the CMS Internet Architecture. CMS selected MicroStrategy as one of the standard tools for creating and managing reports.

MicroStrategy 8, the focus of this document, is an integrated set of business intelligence products for reporting, analysis, ad hoc query, and alerts and notifications. Using MicroStrategy's relational online analytical processing (ROLAP) technology, users are able to perform slice-and-dice analysis against very large databases to view business performance from many different perspectives.

MicroStrategy has completed a Voluntary Product Accessibility Template (VPAT) for MicroStrategy Web, MicroStrategy 8's Web browser-based interface, and it is considered Section 508 compliant.

This document, *MicroStrategy 8 Guidelines*, is one in a set of documents aimed at providing architecture-compliant recommendations for successful integration of COTS-based applications into the CMS Internet Architecture. This document addresses specific recommendations for the deployment of MicroStrategy 8 into the CMS Internet Architecture.

To the extent practical, the guidance provided in this document tries to prescribe specific implementation detail and conventions, but it is by no means all inclusive, and where appropriate should be adapted to individual projects based on the cost, complexity, and criticality of the proposed solution.

The *MicroStrategy 8 Guidelines* are intended for teams involved in system development, for project managers, and for the CMS IT offices, government contractors, and product vendors participating in the COTS product reviews.

2. MicroStrategy Products Architecture

The MicroStrategy 8 platform consists of a set of integrated products that provide the following functionality (MicroStrategy products licensed by CMS are listed in parentheses):

- Report serving (Intelligence Server Universal, Web Universal, Narrowcast Server)
- Interactive reporting and analysis (Web Universal, Desktop, OLAP Services, Report Services)
- Information delivery and alerting (Narrowcast Server)
- Design and administration (Architect, Administrator)
- Integration with other applications (SDK)

Intelligence Server Universal Edition and Web Universal are UNIX-based server products which are compliant with CMS Internet Architecture and the focus of this document.

2.1 MicroStrategy Intelligence Server Universal Edition

The MicroStrategy Intelligence Server Universal Edition is the architectural foundation of the MicroStrategy 8 platform. Using a centralized metadata repository, Intelligence Server converts report requests into optimized multi-pass SQL queries for relational databases and performs any additional analytical calculations not available in the databases.

MicroStrategy Intelligence Server Universal Edition is a scalable, parallel-processing server, with automatic system tuning, full clustering capability and automatic failover. It controls all interactions with the databases and provides a central point for security and administrative control. Intelligence Server manages data access through four levels of caching, load distribution, resource prioritization and connection pooling.

2.2 MicroStrategy Web Universal

MicroStrategy Web Universal provides an interactive business intelligence user interface for Web browser users with features ranging from report viewing, formatting, drilling, and ad hoc querying to report design and creation. MicroStrategy Web Universal runs on UNIX operating systems (Sun Solaris) and on a variety of application servers including IBM WebSphere.

MicroStrategy Web Universal accomplishes all of its functionality through an HTML/DHTML interface, without resorting to any ActiveX or Java downloads. Therefore, MicroStrategy Web Universal works seamlessly through all standard Web firewalls.

Figure 1 shows the Intelligence Server Universal Edition and Web Universal in context with the integrated products of the MicroStrategy 8 platform.

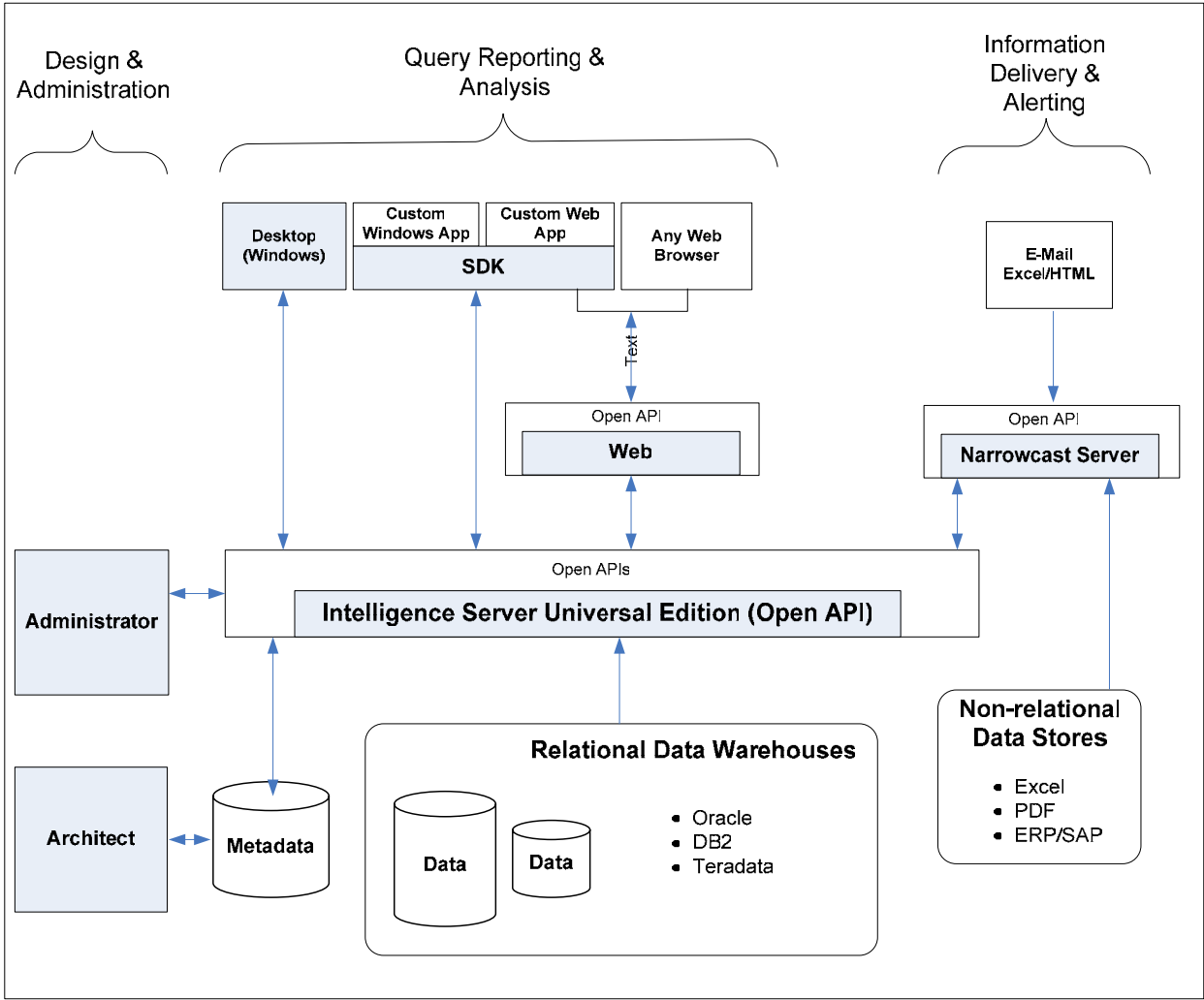


Figure 1 MicroStrategy 8 Product Architecture

3. MicroStrategy 8 Components

This section focuses on the major components of the enterprise infrastructure that comply with the CMS Internet Architecture and the J2EE three-zone architecture Guidelines. As a Web-based reporting and analysis platform, MicroStrategy 8 (*MicroStrategy Web Server and MicroStrategy Intelligence Server Universal Edition*) supports the CMS internet security requirements. By incorporating a multi-tier architecture as its foundation, MicroStrategy 8 conforms to the CMS Internet Architecture Standards.

Figure 2 depicts the CMS recommendations for MicroStrategy configuration in a three-zone architecture that conforms to the CMS Internet Architecture:

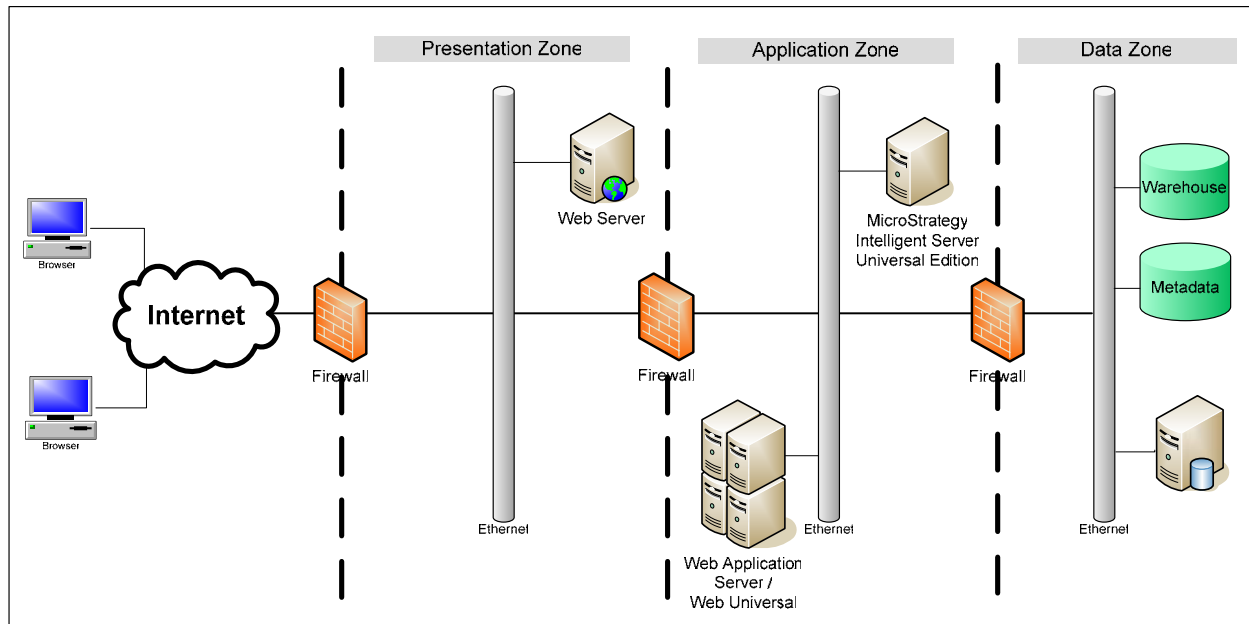


Figure 2 MicroStrategy Infrastructure Components Mapped to the CMS 3-Zone Architecture

The following sections describe in more detail the components depicted in Figure 2.

3.1 Presentation Zone Components

The Presentation Zone provides presentation services to users who interface with MicroStrategy from a web browser.

- **Web Server**

The Web Server proxies HTTP requests from the user's web browser to the Web Universal web application running on the Web Application Server in the Application Zone.

3.2 Application Zone Components

The Application Zone contains the business and control logic for report generation, query and analysis services.

- **Web Application Server**

The WebSphere Application Server hosts both the Web Universal Web application and custom J2EE applications. The Web Universal web application communicates requests to the Intelligence Server Universal Edition.

- **Intelligence Server Universal Edition**

The Intelligence Server Universal Edition is a UNIX-based stand-alone server that controls all interactions with the databases and provides a central point for security and administrative control.

3.3 Data Zone Components

The Data Zone consists of content management and data servers.

- **Metadata**

MicroStrategy 8 metadata is used for all aspects of Business Intelligence, including defining the multidimensional model, building reports, executing reports, manipulating data and delivering information to end users.

Metadata consists of tables that contain the definitions for nearly all MicroStrategy objects, including database logins, server definitions, database instances and connections, reports, metrics, facts, and so on. The metadata repository, or database, contains information that facilitates the transfer of data among MicroStrategy applications and between those applications and the data warehouse. MicroStrategy applications use the metadata database to transform user requests into SQL queries and to translate the results of those queries back into MicroStrategy objects such as reports and documents.

- **Data Warehouse**

In combination with MicroStrategy tools and products, the data warehouse can provide the foundation for a robust online analytical processing (OLAP) system. A data warehouse is populated with data from the existing operational systems using an extraction, transformation, and load (ETL) process.

3.4 MicroStrategy 8 Limitations

There are some limitations to implementing MicroStrategy 8 components in the CMS Internet Architecture including:

- Not all MicroStrategy 8 components are UNIX-based. Several components require Microsoft Windows.
- The MicroStrategy Intelligence Server Universal Edition in the Application Zone uses ODBC and SQL to communicate directly with the data warehouse in the Data Zone. There is no support for WebSphere MQ.

4. J2EE Application Integration with MicroStrategy 8

The MicroStrategy 8 platform provides a set of programming language extensions—application programming interfaces or APIs—that allow a J2EE application developer to embed MicroStrategy intelligence into a Web-based application. The MicroStrategy SDK presents this set of APIs and includes documentation, tools, and sample code so that the developer may quickly learn and create applications using the MicroStrategy APIs.

The MicroStrategy Web APIs communicate to the Intelligence Server via TCP/IP-based socket connections. The governing of the creation and destruction of the connections is handled by the Web APIs and a set of parameters entered by the user and administrator.

In addition to the core APIs that are part of the MicroStrategy platform, the MicroStrategy SDK includes a layer of API helper components. These assist the developer by simplifying common operations such as XML manipulation, and present a logical and object-oriented interface to the MicroStrategy platform.

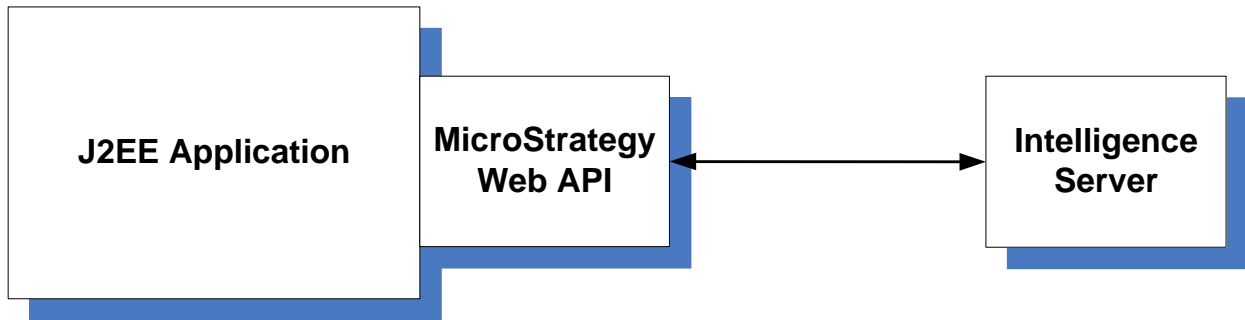


Figure 3 J2EE Application Interface with MicroStrategy

5. Recommended MicroStrategy 8 Configuration

This section presents the recommended configuration for the deployment of MicroStrategy 8 in a CMS Internet Architecture compliant implementation. The recommended configuration includes the hardware and software along with the security and data architectural components.

5.1 Hardware and Software Recommendations

Within the CMS Internet Architecture, MicroStrategy will run on the Sun Solaris platform and the server components can reside on one or multiple machines. Table 1 lists specific minimum hardware and software requirements for configuring MicroStrategy in a UNIX environment.

Table 1: MicroStrategy Intelligence Server Universal Edition 8 System Recommendations

MicroStrategy Intelligence Server Universal Edition	
Requirement	Recommendation
Server	Minimum: Sun UltraSparc II
Processor	Minimum: 1 CPU at 450 MHz
RAM	Minimum: 1 GB
Swap Space	Minimum: 2GB
Available Hard Drive Space	Minimum: 2GB
Operating System	Sun Solaris 9 with Sun recommended patch clusters dated 01/21/04 or later and the following patch: 111712-05 or higher.
Databases Supported	Oracle 8.1.7 or later. IBM DB2 UDB for z/OS v8.1 or later. IBM DB2 UDB 7.2 for Windows & UNIX with Fixpak 12 or later
Database Connectivity	Oracle: 32-bit MicroStrategy 5.1 Wire Protocol ODBC Driver for Oracle DB2: 32-bit MicroStrategy 5.1 Wire Protocol ODBC Driver for DB2 UDB
MicroStrategy Web Universal	
Requirement	Recommendation
Processor	Minimum: 450 MHz
RAM	Minimum: 512 MB
Hard Disk Space	Minimum: 500 MB
Application Server	IBM WebSphere 4.x or later.

5.2 Security Recommendations

This section addresses security in relation to guidance set forth in the CMS Internet Architecture document dated July 2003. The CMS Internet Architecture outlines the CMS Internet Architecture using a 3-zone secure architecture commonly used to isolate the client, application and data layers. Following are the security concerns and issues with introducing MicroStrategy 8 into a 3-zone architecture, as deployed by CMS.

Recommendation 1

MicroStrategy provides basic functionality to take advantage of clustering technology in its Intelligence Servers and web servers. Leveraging these advanced functions of the MicroStrategy design should be used to ensure availability of the application.

Rationale: Using clustering technology allows flexibility in that servers can be maintained without disruption of service and allows users access to the application with minimal downtime. System owners will meet service level requirements of availability.

Recommendation 2

The MicroStrategy 8 system should be backed up frequently and needs assurances on availability.

Rationale: The design documentation should reflect periodic computer system backups of mission-critical data and archives to ensure the data is adequately preserved and protected against data loss and destruction.

Recommendation 3

Careful consideration on database security should be employed. MicroStrategy uses ODBC drivers to access the database. The domain level account used to access the data warehouse should be secured against interactive logons and strong password should be changed frequently to ensure that only the application server is using this ODBC connector account. Furthermore, the account used by the 8 Intelligence Server to access the database should be given limited permission in the domain (e.g. User permission not Domain Admin); and, in addition, the account should be given only read access to the database. Assign only trusted users to maintain the database.

Rationale: These assurances will protect the integrity and the health of the database and the overall CMS network. This recommendation will ensure that the domain account used to access the database will abide by the basic security premise of “least privileged”. Using this basic security premise will protect the enterprise as a whole if this account should be compromised.

Recommendation 4

The MicroStrategy 8 application should use the security framework offered by CMS LDAP services for user authentication to enable an integrated authentication mechanism for the CMS Architecture.

Rationale: Use of the CMS enterprise-wide LDAP services to perform user authentication for MicroStrategy 8 application will enable a practical solution of using a single authentication system for user IDs and passwords for all CMS systems.

Recommendation 5

The MicroStrategy 8 makes available running and manipulating reports and the ability to browse objects by anonymous users. Careful consideration should be given before enabling this function.

Rationale: Depending on the sensitivity of the data, allowing anonymous access could lead to unauthorized access to sensitive data.

Recommendation 6

The MicroStrategy 8 Administrator is a powerful tool that allows centralized administration of all pieces of the MicroStrategy infrastructure, including user administration, application and core infrastructure management. This administration tool should reside on a *hardened* and *secure* workstation.

Rationale: MicroStrategy 8 Administrator holds the “keys to the castle” and should be protected to maintain the integrity of the system as a whole. Unauthorized access to the Administrator would lead to undesirable consequences, such as data loss, system denial of service, loss of system integrity, et al.

Recommendation 7

For securing the data warehouse, MicroStrategy 8 offers an alternative to the traditional method using security views. According to MicroStrategy, the built in 8 security filters feature will improve application performance and allow a comparable level of security. Careful consideration and further assessment of the use of the 8 security filters is recommended. Also recommended is security testing to determine if 8 security filters provide adequate security for the sensitivity of the data being queried.

Rationale: Database security is normally handled by the built in security features of the database. The use of alternative means such as 8 security filters must be proven by thorough testing. Application level security could become the weak link to the security of the data warehouse. Allowing an application to control database security can often times lead to unauthorized data disclosure or compromise of the system. This risk can be minimized by security testing of the application.

Acronyms

API	Application Programming Interface
CMS	Centers for Medicare & Medicaid Services
COTS	Commercial Off-the-Shelf
COTS	Commercial Off-the-Shelf
ETL	Extract, Transform and Load
J2EE	Java 2 Platform, Enterprise Edition
LDAP	Lightweight Directory Access Protocol
OLAP	Online Analytical Processing
ROLAP	Relational Online Analytical Processing
SDK	Software Development Kit
SQL	Structured Query Language
UDB	Universal Database
VPAT	Voluntary Product Accessibility Template

List of References

1. *CMS Internet Architecture*, CMS-CIO-STD-INT01, Centers for Medicare & Medicaid Services, July 2003.
2. *CMS Enterprise Messaging Infrastructure*, CMS-CIO-STD-INT02, Centers for Medicare & Medicaid Services, December 2003.
3. *CMS Web-Enabled Application Architecture*, CMS-CIO-STD-INT03, Centers for Medicare & Medicaid Services, March 2004.
4. *CMS Target Architecture*, CMS-CIO-STD-ARC01, Centers for Medicare & Medicaid Services, September 2004.
5. *MicroStrategy 8: Setup Guide for MicroStrategy Universal Products*, 2005
6. *MicroStrategy 8: System Administration Guide*, 2005
7. *MicroStrategy 8: Basic Setup Guide*, 2005
8. *MicroStrategy 8: Setup Guide for MicroStrategy Universal Products*, 2005