CYBER SECURITY DIVISION

2013 PRINCIPAL INVESTIGATORS'

SWAMP – The Software Assurance Market Place

Morgridge Institute for Research and University of Wisconsin - Madison

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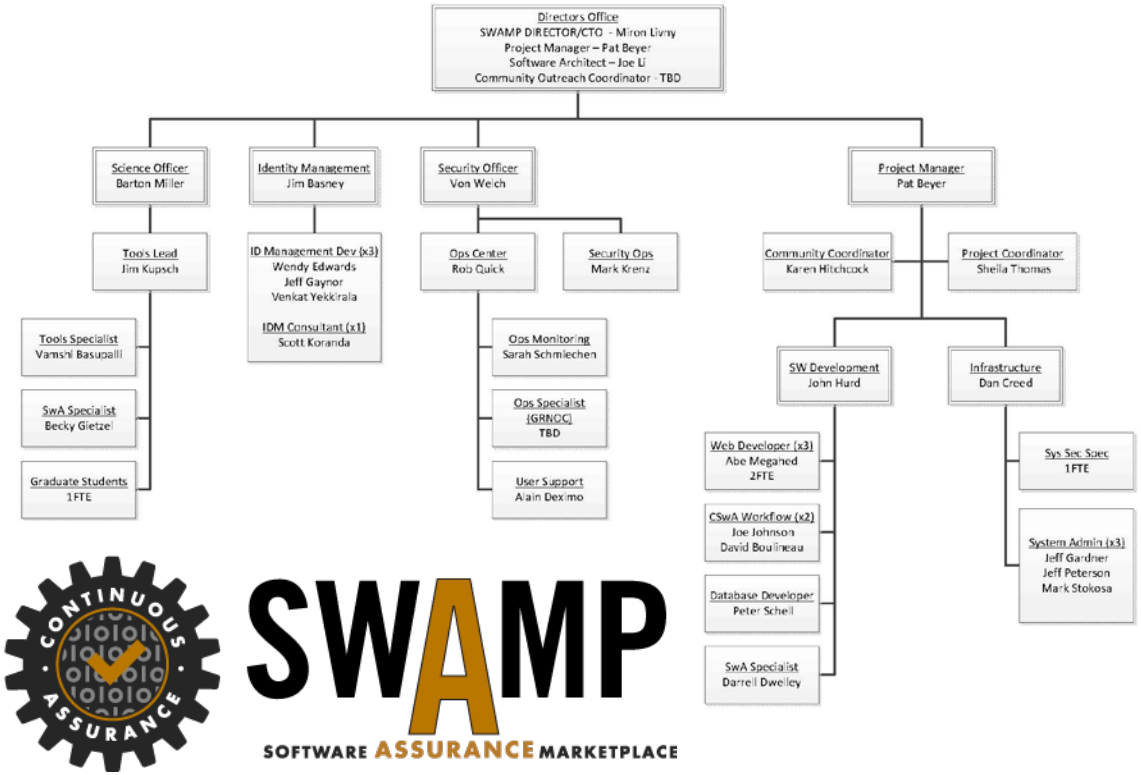
Homeland Security

Science and Technology

Team Profile

Building and Operating the SWAMP is a joint effort of four research institutions – Morgridge Institute for Research (lead), Indiana University, University of Illinois Urbana Champaign and University of Wisconsin – Madison



A Facility for the SwA community

Our target customers are all the members of the Software Assurance (SwA) community – tool developers, software developers, facility managers, researchers and educators

The community needs a **continuous assurance** facility that will enable significant improvement in the quality of SwA tools and that will lead to a broader adoption of SwA tools and SwA methodologies.

The SWAMP will:

- **Profile** the ability of your SwA tool to identify (possible) software defect every time you commit a change
- **Identify** new (possible) defects in your software every time you commit a change
- **Identify** new (possible) defects in a software/library/module you are using every time a new version is released
- **Expose** your tools and software to the SwA communit

Continuous Assurance Requires

- **Automation** – perform assessment runs with as many SwA tools as possible for every commit
- Compute and storage **resources** to meet the demand
- **Scheduling** capabilities to support priorities and deadlines
- **Integration** of assessment results from different tools and from different versions
- **Analytics** to profile impact of software engineering practices and quality of SwA tools and methodologies
- For tool developers, a **rich set** of software packages and and reference suites

Technologies needed

Some Key Technology Areas:

- Components that simplify the job of applying SwA tools to arbitrary software packages (the “plumbing”).
- Centralized and unified repository of assessment tool results.
- Automation and capacity to provide *continuous assurance* capabilities.
- A full spectrum of tools: static/dynamic/hybrid, source/byte code/binary, mobile web.
- Infrastructure that preserves privacy and confidentiality.

Customer Need

For SwA tool developers: Enabling technologies

- Managing the realities of modern, complex builds
- Supporting for the small tool project

For SwA tool users: Simplifying access to tool technologies

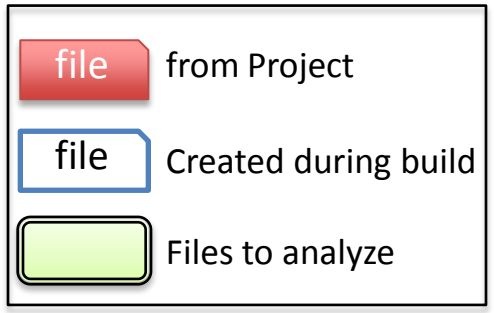
- Once you get your software package to build, we automate the rest.

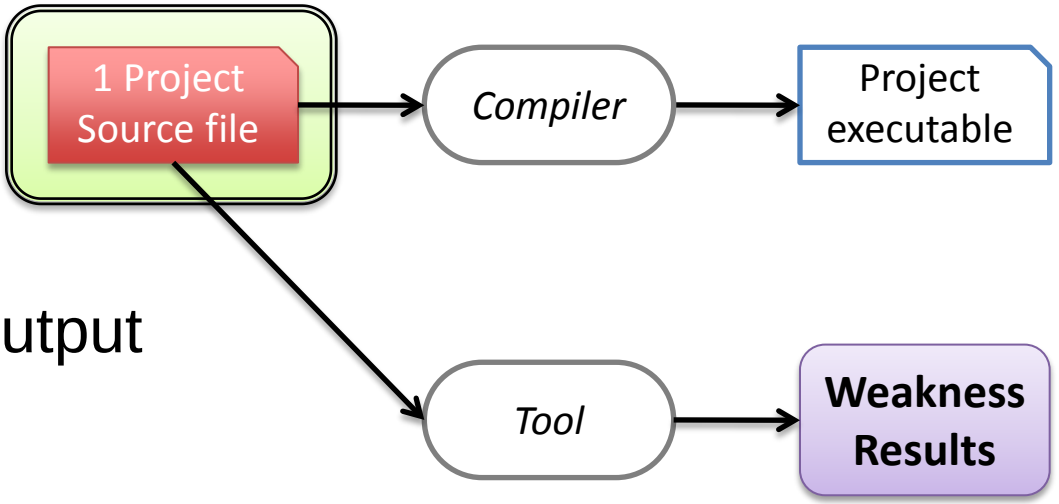
For the whole community: Assessment data in a single archive in a single format.

Approach

Building Software: The Ideal

- One directory, one executable
- Source code
  - Few files
  - Standard include files
- Standard libraries
- One tool
  - Source as input
  - Weaknesses as output





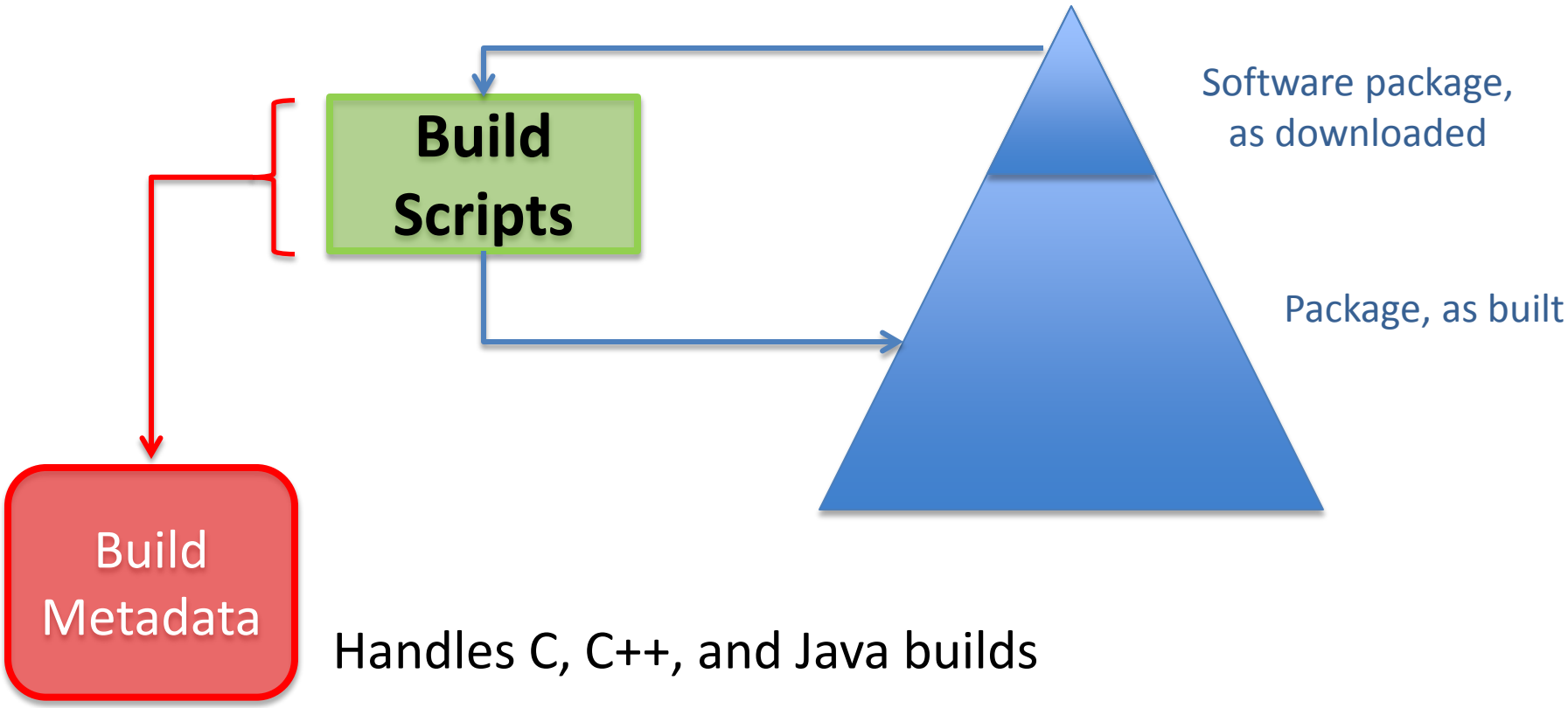
Approach

Building Software: The Complexities of the Real World

- Build generators, multi-level makefiles, custom scripts, complex conditional compiling criteria.
- Source files
  - From a variety of directories
  - Contents controlled by options, macros and includes
  - Generated by frameworks and tools
- Multiple executables
- Not obvious what to assess (no easily obtained list)
- Binaries:
  - Difficult to determine what source files were used in the creation of the executable
  - Also difficult to determine which object and library files used.

Approach

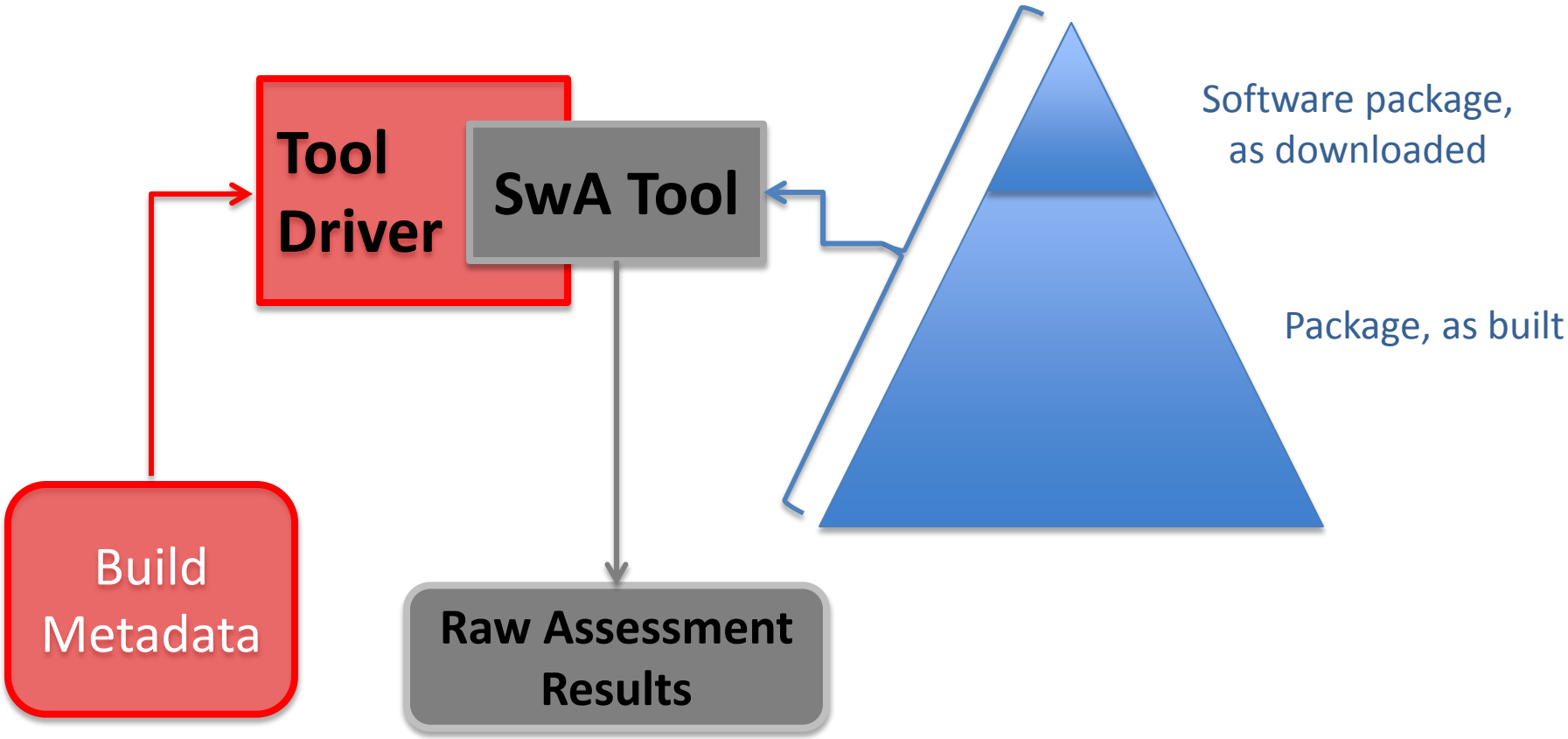
Plumbing to Track All: An Open Source SWAMP Product



Handles C, C++, and Java builds

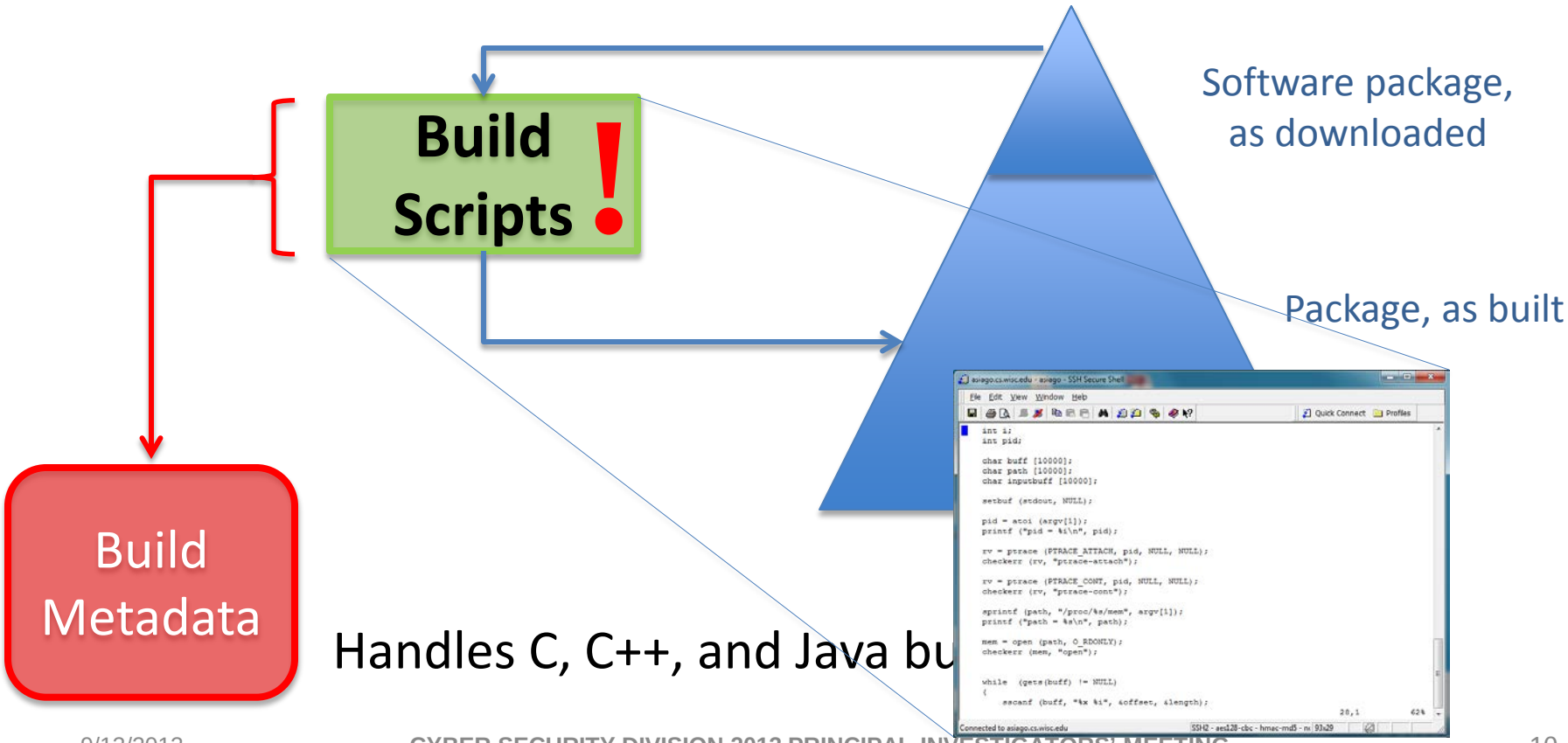
Approach

Plumbing to Track All: An Open Source SWAMP Product



Approach

Interactive Access to Supporting Building in the SWAMP



Benefits

Applying SwA Tools to Software Packages

- For the tool developer, you need to only understand the simple case of applying your tool to a known file.
  The SWAMP plumbing does the rest for you.
- For the software package developer, you only need to get your code to build.
  The SWAMP plumbing automates the steps of apply tools to your package.
- For the tool researcher, your results will get wide use.
  The SWAMP allows you to be good at one thing, providing the context for the tool user.

Current Status

- Building the environment in which to run assessments.
  Virtual machines containers, identity management, web interfaces.
- Selected initial set of five tools and run them in the SWAMP
  Findbugs, PMD, cppcheck, Clang, and Oink.
- The Java version of our “plumbing” has been released to the implement team (supporting Ant and Maven).
- Initial package selection in progress, with over 60 chosen so far.
  Goal is a variety of languages, frameworks, services, and usage communities.
- Active outreach, with TTA-1 performers, SwA tool developers, and analysis/viz tool developers.

Next Steps

- Pre-IOC (1/2014)
  - Recruiting and engaging beta users – fourth quarter of 2013.
  - Developing “plumbing” for C/C++ builds –fourth quarter of 2013.
  - Results visualization: integrating external tools and developing internal one.
- Post IOC
  - Handling multi-language builds
  - SwA tools for binary code
  - Dynamic tools
  - Tools for mobile code
  - …

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