1000 Projects later

Security Code Scans at SAP

OWASP
The Open Web Application Security Project

About Us

OWASP
The Open Web Application Security Project

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SAP

Agenda

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Why is SAP using Static Code Analysis?

Secure Development Lifecycle at SAP

Static Code Analysis at SAP

Challenges and Outlook

Security Code Scans at SAP Overview

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- Started rollout in June 2010
- Centrally guided by a project team
  - Definition of Security Requirements
  - Establishment of Scan Infrastructure
- Support of the most important languages
- SAP development and third party code

Insecure Software

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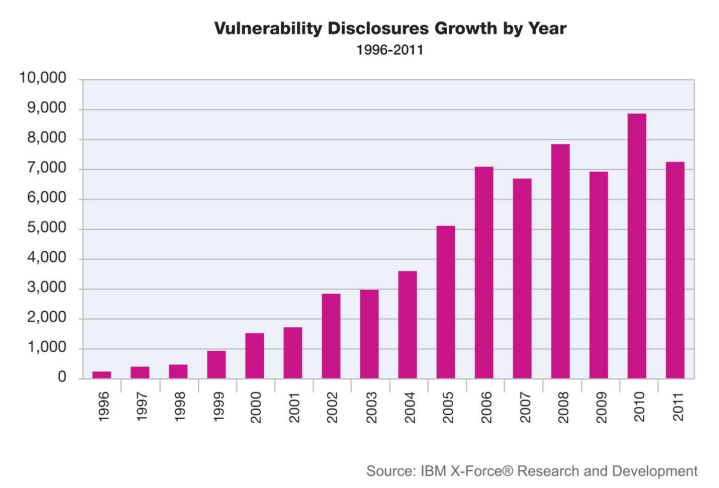

Evolution of Code

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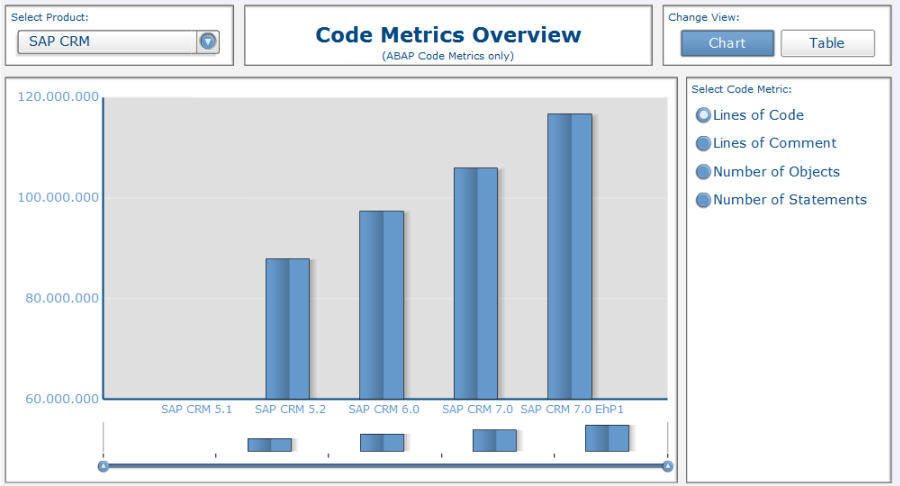

Security Testing

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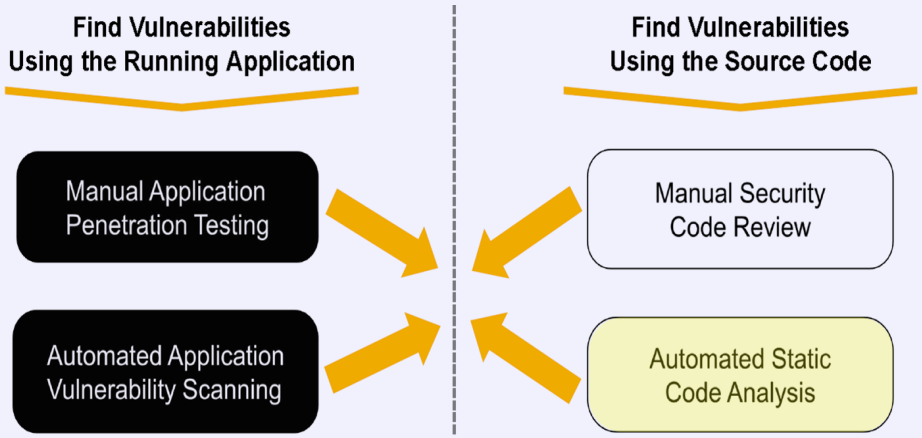

Dynamic Security Testing

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- Characteristics
  - Black box approach
  - Sends input to applications and analyses response
- Advantages
  - Provides concrete examples (attacks)
  - Analyze dataflows accross multiple components
- Disadvantages
  - Coverage unclear
  - Requires test system

Static Security Testing

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- Characteristics
  - White box approach
  - Analyses abstraction of the source (binary)
- Advantages
  - Explores all data paths / control flows
  - Can analyse single modules (unit test)
- Disadvantages
  - High false positive rate (not exploitable findings)
  - Does not consider application environment

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Secure Development Lifecycle at SAP

Static Code Analysis at SAP

Challenges and Outlook

First Step: Security Training

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- Education:
  The prerequisite for achieving a high security quality
- Security awareness:
  Reducing the number of “built-in” security problems
- Trained persons:
  Analyze and fix vulnerabilities much more efficiently
- Trainings:
  Secure Programming, Build & Scan, Auditing, ….

Secure Development Lifecycle (SDLC) at SAP

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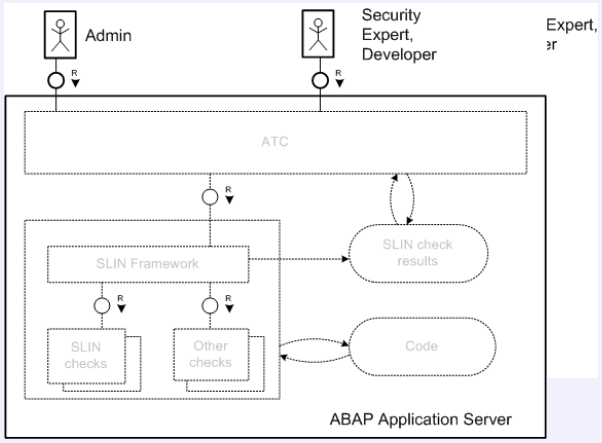
- Structure the investment of time and resources
  - to safeguard a high level of security
  - to ensure security standards across all areas
- Security requirements
  - are taken into account and
  - are implemented

  in all phases of product development

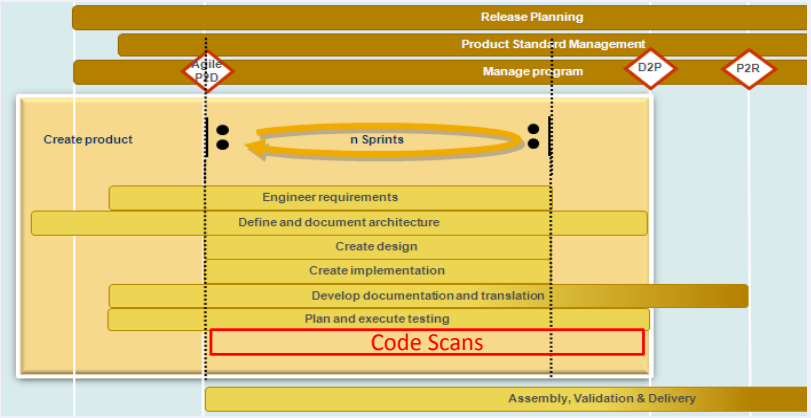
The Different Roles

- Developer
  - fixes software security issues
- Security Expert
  - review scan results, decides on fixes
- Build Master
  - scans the source code, manages results
- Scrum Master
  - requests scan, assigns vulnerabilities to developers

Infrastructure



SAP Secure Software Development Life Cycle



For passing D2P Q-gate, evidence has to be provided that the source code has been scanned and exploitables have been fixed.

P2D: Planning to Development. / D2P: Development to Production. /

P2R: Production to Ramp-up (gradual roll-out to customers).

Third Party Code

- Third party code
  - Open Source libaries and frameworks
  - Freeware
  - other third party components
- Different approaches
  - SAST analysis by SAP
  - Certificate from vendor
  - SLA with vendor

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Challenges and Outlook

Code Scan Facts

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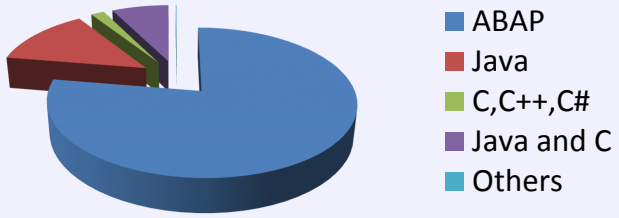
- Over 2000 developers are using SAST tools
- Over 500 MLOC scanned



Statistics Jan 2012

Security Scan Tools used at SAP

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Language	Scan Application
ABAP	SAP
C/C++	Coverity
Others	HP/Fortify

Security Requirements

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- SAP on Corporate Security Requirements
  - SAP Applications shall be free of backdoors
  - SQL injection vulnerabilities shall be avoided
  - Cross-Site Scripting vulnerabilities shall be prevented
  - Directory traversal vulnerabilities shall be prevented
  - The system shall be protected against buffer overflow vulnerabilities
- OWASP Top 10
- CWE/SANS Top 25 2011
- CVE

Continuous Improvement

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- Collect feedback from the
  - Product Security Response Team
  - Development Teams
- Develop rules/models to improve the scans
- Continuously improve the infrastructure
- Continuously improve the rollout process

Input to Improve Code Scans

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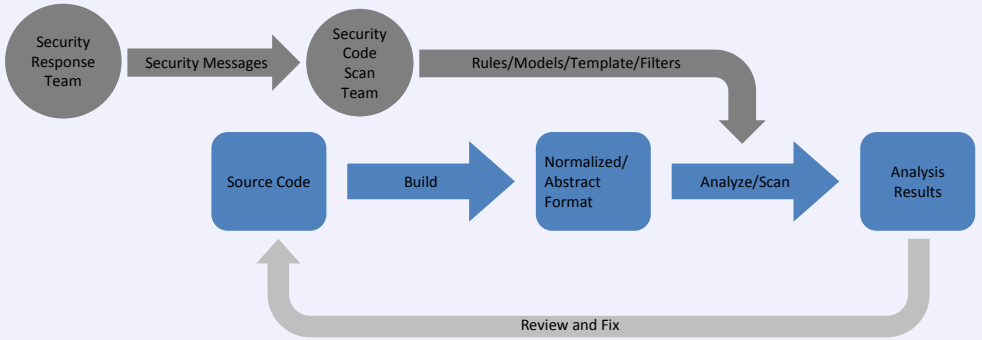

•Further input channels: Development teams, internal research, scan reviews, code reviews

Lessons Learned

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- Scans have to be obligatory
  but not introduced 'brute force'
- Establish Secure Development Life Cycle
  make scans a natural part of development
- Plan carefully
  – Do not start with scans right before Dev. Close
  – Do it regularly (nightly)
- Do not introduce changes during development

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Challenges and Outlook

Challenges

JavaScript I
Unerstand the DOM

- Assume the following index.html:

```
<TITLE>Welcome!</TITLE>
Hi
  <SCRIPT>
     var pos=document.URL.indexOf("name=")+5;
     document.write(document.URL.substring(pos,document.URL.length));
  </SCRIPT>
Welcome to our system
```

and a call

```
index.html?name=<script>alert(document.cookie)</script>
```

- resulting in a DOM-based XSS attack
- DOM implementations are Browser specific

JavaScript II
Dynamic Evaluation

- A simple script statement

```
<script language="javascript">
   document.write("<script>src='other.js'></script>");
</script>
```

- Dynamically creating script tags

```
<script>
  var oHead = document.getElementsByTagName('HEAD').item(0);
  var oScript= document.createElement("script");
  oScript.type = "text/javascript";
  oScript.src="other.js";
  oHead.appendChild( oScript);
</script>
```

- Or using eval() directly (not shown here)

JavaScript III
Server-Side JavaScript

- Combining the comlexity of two worlds

```
var entry=JSON.parse(data);
query = "insert into \"FOO(".NAME")\";
var conn = $.db.getConnection();
conn.execute(query);
```

Challenges: Current Trends

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- SAST works very well for
  - "traditional" programming languages
  - Analyzing data paths within one technology
- Many new development uses JavaScript
  - HTML5/JavaScript UIs
  - Server-side JavaScript
- JavaScript
  - Untyped
  - Dynamic programming model

Conclusion

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You cannot pay people well enough, to do proper code audits.

I tried.

(Yaron Minsky, Jane Street Capital)

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Thank you!