Software Assurance Tools to Improve Evidence Strength

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Disclaimer – Any products/companies mentioned are for information only - no endorsement implied

How Much Evidence is Enough to Certify systems?

- - Users need information to establish required metrics (acceptance criteria)
  - e.g. Reliability, Trustworthiness, etc.
- - Produce evidences to support argument
  - Test results
  - Artifacts

Measurement of Evidence that the operational and maintenance requirements and constraints are identified correctly and satisfied

Outline

- Software Metrics and Measurement
- Software Assurance Tool Evaluation
- Software Code Label
- Research leading to Scoring

Some Current SAMATE Activities

- Static Analysis tool Exposition (SATE)
- SAMATE Reference Dataset (SRD)
- Precisely Define Some Common Weakness Enumeration (CWE) Entries (CWE Formalization/Effectiveness)
- Statistics and Universe of Program Workshop Planning (SUPER Workshop)

Software Metrics Classification

For Product Metrics:

- Size Metrics (No. of elements)
- Structure Metrics (component and structure levels)
- Complexity Metrics (computational, algorithmic, logical, functional, etc.)
- Quality Metrics (functional, non-functional, reliability, usability, efficiency, maintainability, portability)

Measurement Scales

Nominal:

placing it into a category of some kind

Ordinal:

Ranking the various data values

Interval

Can be ranked between values

Ratio

possess an absolute zero

Measurement Methods

Measurable with units:

i.e., LOC, No. of Source Files, No. of defects per thousand LOC

Measurable with scales:

i.e., Cyclomatic complexity, risk (H,M,L)

Assurance Case with claims, arguments, evidence

i.e., Safety case

Scoring and checklist

i.e., SCAP, CVSS

Determine the Strength of the Evidence Data

- Application of Software Assurance tools based upon the tool types

Software Assurance Tool Types

- Static Source Code Analysis Tool
- Dynamic Analysis Tool
- Special Purpose Tool
  - Security-orient tool
  - Compliance-orient tool
  - Pedigree analysis tool

Static Analysis tools

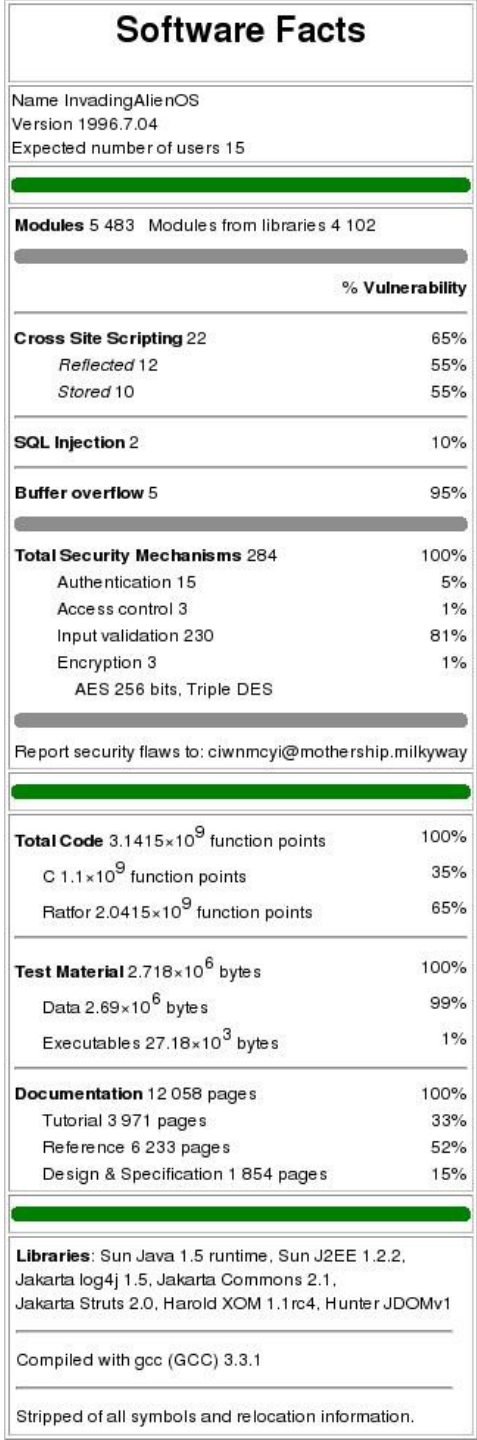
- Grep-like (pattern matching, lots of False Positive, not smart)
- Smart tool (understand flow, discriminate)
- General tool (broad coverage of weaknesses)
- Specialized tool (cover only a few weakness but more depth)

Dynamic Analysis tool

- Web application scanner
- Penetration tester
- Fuzzing tool

Software Label

- Software Facts should be:
  - Voluntary
  - Absolutely simple to produce
  - In a standard format for other claims
- What could be easily supplied?
  - Source available? Yes/No/Escrowed
  - Default installation is secure?
  - Accessed: network, disk, ...
  - What configuration files? (registry, ...)
  - Certificates (e.g., "No Severe weaknesses found by CodeChecker ver. 3.2")
- Cautions
  - A label can give false confidence.
  - A label shut out better software.
  - Labeling diverts effort from real improvements.



Software Rating systems

- OWASP Application Security Verification Standard (ASVS)

  4 levels of security rating: L1 – verified by SwA tools
  L2 – Verified manually
  L3 - Verified at design phase
  L4 – Verified internally

- Veracode Security Rating System
  - e.g. AAA (First A represents testing by static analysis.
    - Second A represents testing by dynamic analysis.
    - Third A represents human testing)
- Coverity Software Integrity Rating
  - Level 1, Level 2 (determined by Coverity static analysis)

How Are Facts Verified and Certified

- Government versus Private
- Mandatory versus voluntary
- Self-claimed versus Third Party
- Open versus Closed

Scoring Systems with CWRAF

- Business Value Context
- Technical Impact scorecard
- Example of Scoring
  - CVSS
  - CWSS

How Much Evidence is Enough?

- Progress in tool capabilities
- Standardized dictionary of weaknesses (CWEs)
- Quality of analysis
- Independent V&V
  - Labeling
  - Scoring