Increase Adoption of Secure Coding Standards

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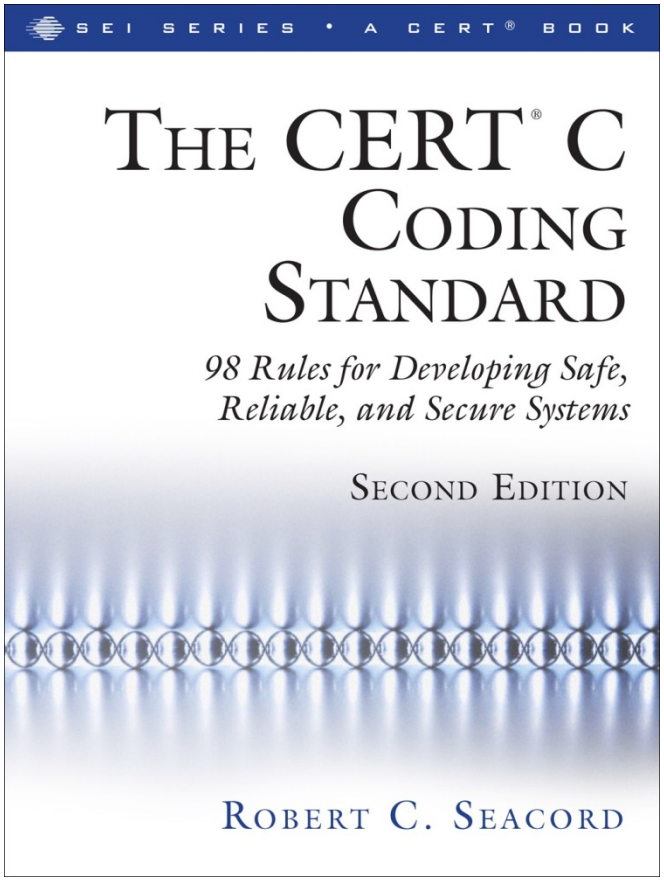
Outline

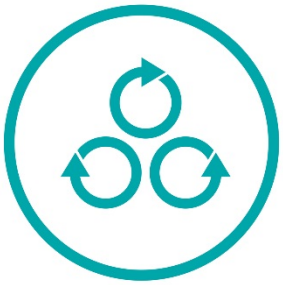
- **Fundamentals: Prescriptive Rules**
  - Maintain the C rules
  - New computation models: threads
  - Major language updates: C++
- **Reducing friction of adoption**
  - Improving analyst productivity
  - Immediate feedback and correction
  - Catching more violations
- **Summary**

Fundamentals: C Coding Rules



- Specific, prescriptive advice for programmers, checkers and IDEs
- Collected wisdom of programmers and tools vendors
  - Fed by community wiki started in Spring 2006
    - 1,576 registered contributors
  - Basis for ISO Standard
- Continuously updated to reflect best practices and language evolution

Fundamentals: Expanding Coverage



New computation model: C threads

- 9 unspecified behaviors representing programming weaknesses in two broad categories
  - Inter-thread communication
  - Thread-specific storage

Example: the `tss_create` function which creates thread-specific storage and assigns a destructor but does not specify when the destructor is called.

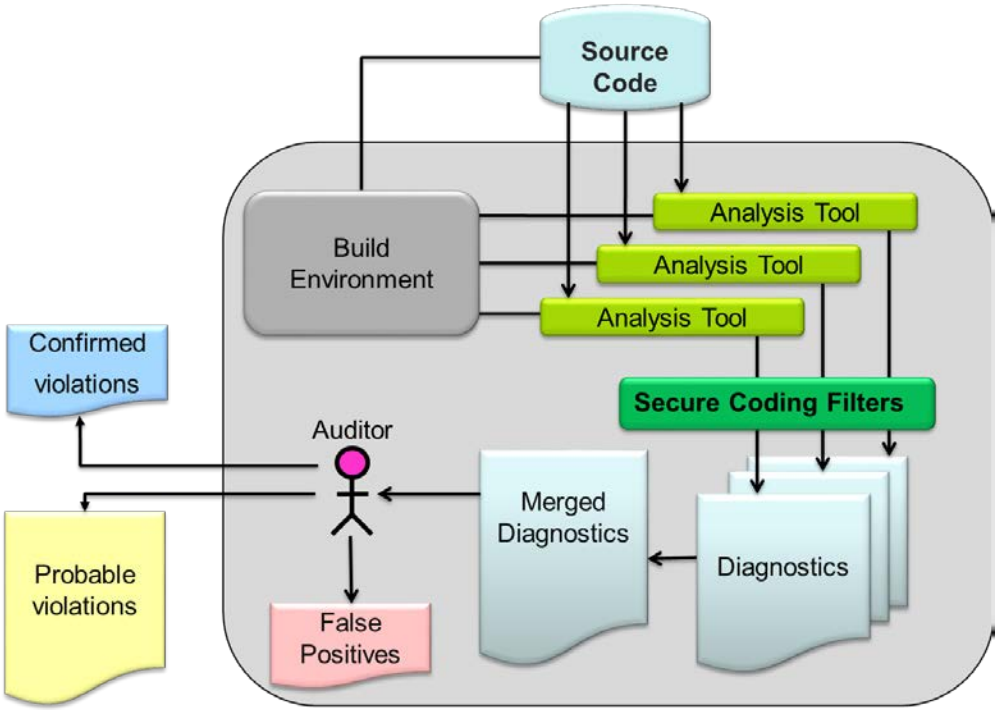
Major language updates for C++

- 24 new rules in FY15 specifying C++ weaknesses
- 60 existing C++ rules updated in FY15

New and updated rules published on

http://www.cert.org/secure-coding/publications/secure-coding-enewsletter.cfm

Adoption: Improving Analyst Productivity



Improve expert review productivity by focusing on high priority violations

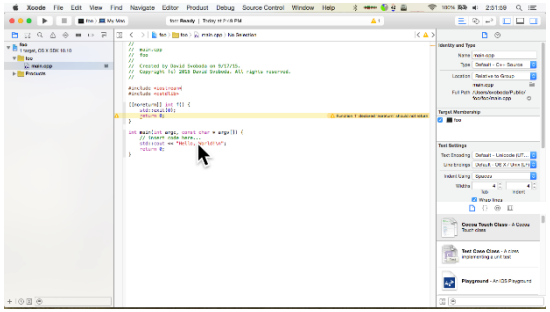
Filter select secure coding rule violations

- Eliminate irrelevant diagnostics
- Convert to common CERT Secure Coding rule labeling

Provide single view into code and all diagnostics

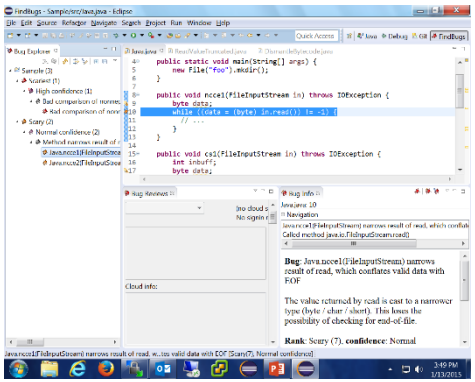
Maintain record of decisions

Adoption: Immediate Feedback



Moving rules into IDE improves application of secure coding

- Early feedback corrects errors on introduction
- Exceptions are understood in context
- Exceptions can be marked as resolved to eliminate redundant consideration



Clang static analyzer (C based languages)

- Widely used open source front end for popular compilers and IDEs
- Checkers available now in “Top-of-Tree” by early adopters
- Expect to be generally available in Clang’s yearly release

FindBugs (Java)

- Integrated into Eclipse and Jdeveloper

Adoption: Catching More Violations Thru Checkers

Increase adoption through automated checkers of rule violations

- Checking C/C++ rule violations
  - Exception
  - Function return
  - Evaluation ordering / side effects
  - Constructor
  - Assertion

```
Example:
int a = 14;
int b = sizeof(a++);
std::cout << a << ", " << b << std::endl;
a is still 14 after b has been initialized
```

- Checking Java rule violations
  - Override
  - I/O

```
Example:
byte data;
while ((data = (byte) in.read()) != -1) {
  // ...
}
```

Summary

- Maintained C Coding rules - updated to reflect best practices and language evolution
- Developed 25 new rules for C++ and updated 60 existing C++ rules
- Developed a web application to improve analyst productivity
- Introducing checking earlier in the development process
  - ✓ developed checkers for clang and FindBugs