CODING

- **Coding- The objective of the coding phase is to transform the design of a system into code in a high level language and then to unit test this code.**

- The programmers adhere to standard and well defined style of coding which they call their coding standard.

- The main advantages of adhering to a standard style of coding are as follows:
  - A coding standard gives uniform appearances to the code written by different engineers
  - It facilitates code of understanding.
  - Promotes good programming practices. For implementing our design into a code, we require a good high level language.

Challenges of Large Code Base

- How to ensure…
  - Maintainable code?
  - DRY code?
  - Readable code?
  - Bug-free code?

- Average defect detection rate for various testing
  - Unit testing: 25%
  - Function testing: 35%
  - Integration testing:45%

  How can this be improved?

Code Reviews

- **code review**: A constructive review of a fellow developer's code. A required sign-off from another team member before a developer is permitted to check in changes or new code.

- Analogy: writing articles for a newspaper

  What is the effectiveness of…
  - Spell-check/grammar check
  - Author editing own article
  - Others editing others' articles

Mechanics of code reviews

- ***who***: Original developer and reviewer, sometimes together in person, sometimes offline.

- ***what***: Reviewer gives suggestions for improvement on a logical and/or structural level, to conform to previously agreed upon set of quality standards.
  - Feedback leads to refactoring, followed by a 2nd code review.
  - Eventually reviewer approves code.

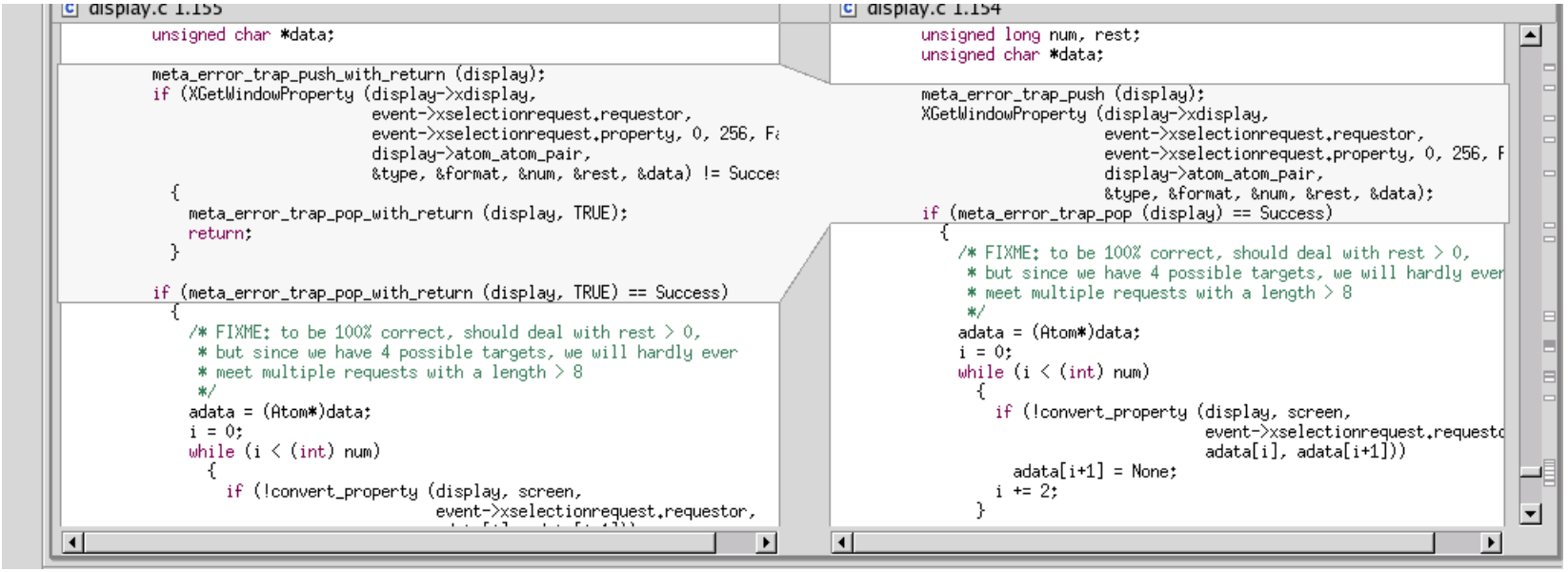
- ***when***: When code author has finished a coherent system change that is otherwise ready for checkin
  - change shouldn't be too large or too small
  - *before* committing the code to the repository or incorporating it into the new build

Why Bother?

- > 1 person has seen every piece of code
  - Prospect of someone reviewing your code raises quality threshold.
- Forces code authors to articulate their decisions
- Hands-on learning experience for rookies without hurting code quality
  - Pairing them up with experienced developers
- Team members involved in different parts of the system
  - Reduces redundancy, enhances overall understanding
- Author and reviewer both accountable for committing code

Code reviews in industry

- Code reviews are a **very** common industry practice.
- Made easier by advanced tools that:
  - integrate with configuration management systems
  - highlight changes (i.e., diff function)
  - allow traversing back into history
  - E.g.: Eclipse, SVN tools



Code review variations

- **inspection**: A more formalized code review with:
  - roles (moderator, author, reviewer, scribe, etc.)
  - several reviewers looking at the same piece of code
  - a specific checklist of kinds of flaws to look for
    - possibly focusing on flaws that have been seen previously
    - possibly focusing on high-risk areas such as security
  - specific expected outcomes (e.g. report, list of defects)

- **walkthrough**: informal discussion of code between author and a single reviewer

- **code reading**: Reviewers look at code by themselves (possibly with no actual meeting)