

COMP 10066

Week 7 Lecture

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Software Quality from the Programmer's
Perspective

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Lecture Overview

- Introduce Source Control
 - Look at GIT

- Look at Software Quality Standards
 - Readable Code
 - Commenting

- Reference Material for Lecture
 - Java Style Programming Guidelines
 - <http://geosoft.no/development/javastyle.html>
 - C#.Net Programming Guidelines
 - <https://www.dofactory.com/reference/csharp-coding-standards>

What is Source Code Control?

- Sometimes called version control or source code control - is the management of changes to documents, computer programs, large web sites, and other collections of information.
- Changes are usually identified by a number or letter code, termed the "revision number," "revision level," or simply "revision."

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What is the purpose of using a Version Control System

- Version control systems (VCS) most commonly run as stand-alone applications, but revision control is also embedded in various types of software such as word processors and spreadsheets.
- Revision control allows for the ability to revert a document to a previous revision, which is critical for allowing editors to track each other's edits, correct mistakes, and defend against vandalism.

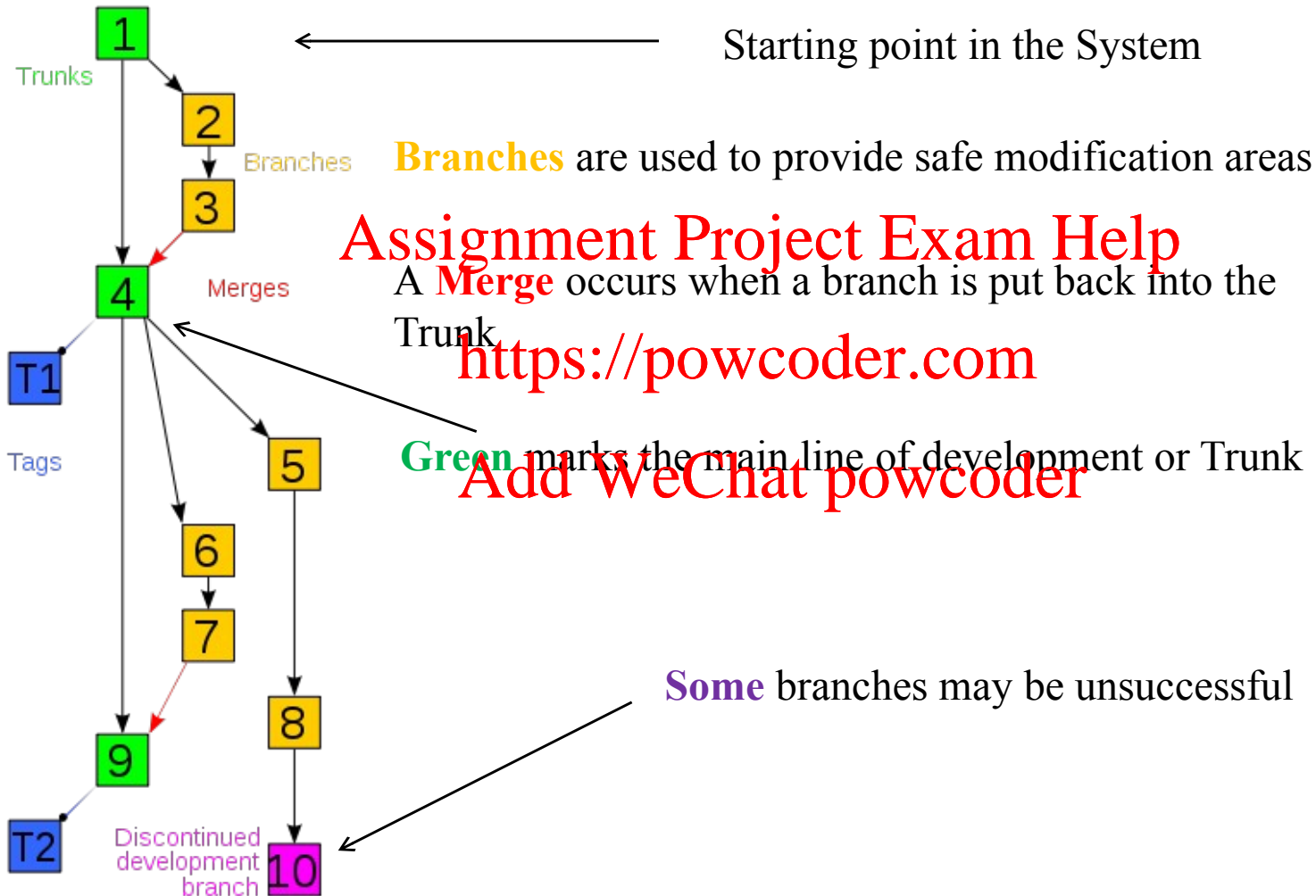
Reference: https://en.wikipedia.org/wiki/Version_control

History of Source Code Control Systems for Software

Generation	Networking	Operations	Concurrency	Examples
First	None	One file at a time	Locks	SCCS – 1972 RCS – 1980
Second	Centralized (Requires connection)	Multi-file	Merge before commit	CVS - 1986, SourceSafe - 1994 , SVN - 2000 , Team Foundation Server - 2005
Third	Distributed (Local and remote repository support)	Changesets	Commit before merge	Bazaar - 2005 , Git - 2005, Mercurial - 2005

Source : http://ericsink.com/vcbe/html/history_of_version_control.html

Example



Git – Key Terminology

- **Git** - is command line client software that supports access to both local and remote repositories.
- **GitHub** - is a Web-based Git repository hosting service.
- **Repo** – Acronym for a repository – a set of files that are grouped together as a project.

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Git – Key Commands

- **Init** – Creates a Git repo.
- **Add** – adds in files
- **Commit** – The act of adding source code changes to the repo.
- **Clone** – clones a repo in a new directory – useful for starting a new branch from a remote repo.
- **Checkout** – switches branches
- **Merge** – merges changes back to the head

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Programming Guideline

- A document that describes best practices for a particular programming language or technology

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- Guides a programmer to produce a program that can easily be understood by others using the same language or technology

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- Many companies have internal programming guideline documents for their programmers
- Some guidelines are standard to a language
 - Think of your Documentation Standards document from COMP 10062 – Programming in Java

Why is a Programming Guideline useful?

- Naming
- General Readability
- Statement Order
 - example : location of declaration of variables
 - at top of a block or when they are needed.
- General programming rules
 - Positive vs. Negative logic, which looping construct is best suited to a particular task.
- Comments
 - In-line, To support automated documentation
- Minimized duplication
 - Code is refactored into Classes/Functions to maximize re-use!

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Code Review

- Peer Review

- General informal review process, where the code is viewed by another programmer
- Usually a more senior programmer will do this review.

- Walkthrough

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- More systematic / detailed review of work
- Typically done by a group
- Will code meet required specification.
 - Did some aspect of the specification get missed or misunderstood?

- Inspections

- Fairly formal – review of application of standard / specific guidelines
- Typically done on systems that impact human safety
 - Nuclear reactor, space shuttle

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Code Review – What you are looking for?

- Data Reference Errors
 - Is the correct variable being used?
- Data Declaration Errors
 - Is the correct type being used?
 - In many cases the compiler (strongly typed) will assist in detecting problems with data type
 - This can be an issue in loose type programming languages (e.g. PHP / Javascript)

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Code Review – What you are looking for?

- Computation Errors – Is the calculation correct
 - Need to verify with another method
 - Hand, Calculator, A separate application
- Comparison
 - Are all conditions correct
 - Need to be careful when creating multiple condition expression and when using negative logic.
- Control of Flow
 - Loop entry and exit
 - Are entry and exit conditions for flow control set correctly

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Code Review – What you are looking for?

- Parameter Errors
 - Are the parameters used within a function call correctly specified
 - Is there a verification of the values – range checking
- Input / Output
 - Are the data input / outputs matched to the appropriate variables.

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Code Reviews are useful for many reasons, but are not a replacement for Formalized Testing

Commenting

- Types of Comments:

1. Overall Descriptive
2. Code Explanation
3. Documentation

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Overall Comments

- Description of what the module / component accomplishes or does from a high level
- Typically at the top of a module
- For example, in Java or C#, this would be the class level comment

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Code Explanation Comments

- Details on “non-trivial” code that may be unclear to a junior level programmer within that environment.
- Not intended to comment every line of code
- Well-written code should be somewhat self-explanatory.
- Sometimes it is important to document work-arounds, bug-fixes

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Examples of Coding Standards

- C#

- <https://www.dofactory.com/csharp-coding-standards>
- <https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/xml/doc/recommended-tags>

- These two links above will be used for Assignment 3

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- Java

- <https://www.oracle.com/java/technologies/javase/codeconventions-contents.html>
- <https://google.github.io/styleguide/javaguide.html>