

Introduction to Git — Fall 2021

Lecture 1: Why use version control?



UMEÅ
UNIVERSITET



HPC2N



SNIC

What is version control?

In software engineering, version control (also known as revision control, source control, or source code management) is a class of systems responsible for **managing changes** to computer programs, documents, large web sites, or other collections of information.

— Wikipedia

Version control systems (VCS)

... systems responsible for managing changes ...

Why use version control?

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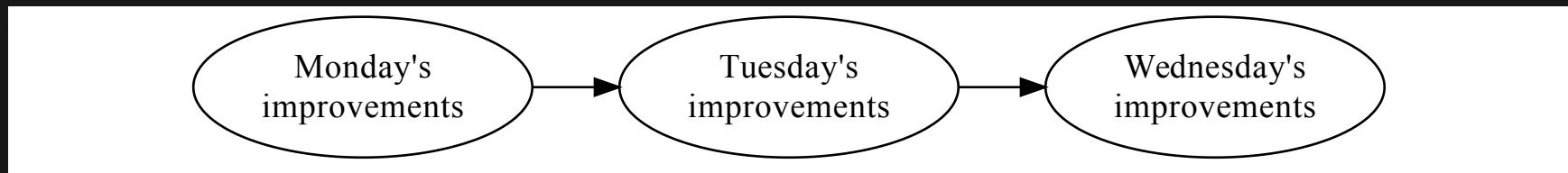
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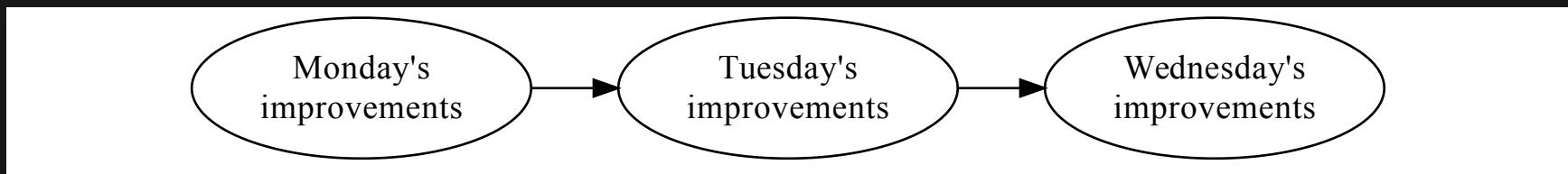
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- In the end, things are simply finished.



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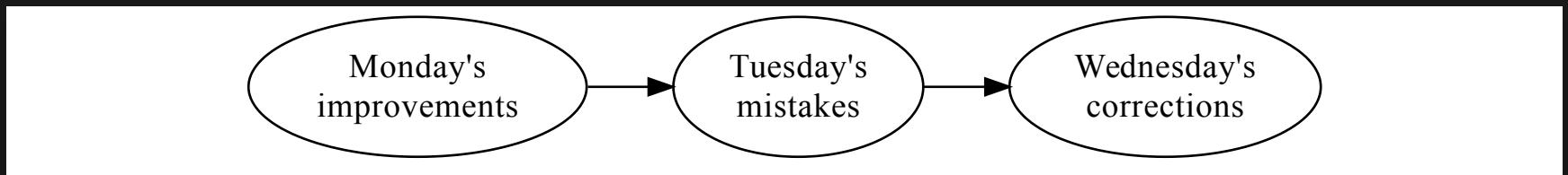
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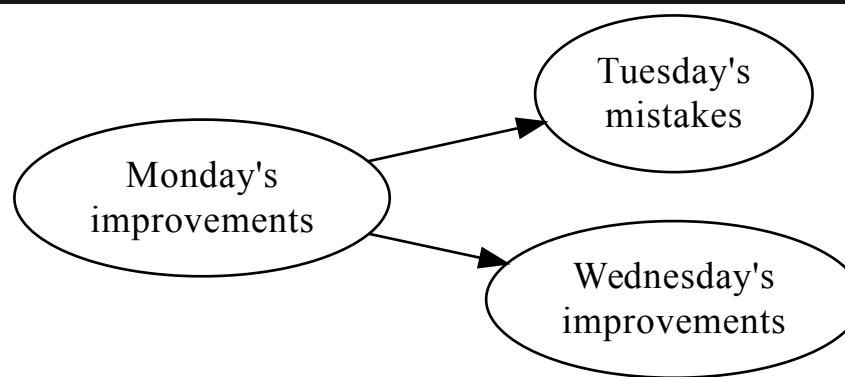
In the real world, things develop non-linearly:

- A new version can be anything between
 - a complete catastrophe and
 - a major breakthrough.
- People do not know what others are doing
- Sometimes we are simply fixing earlier mistakes...



Going back to an earlier version

Sometimes, it is easier to simply backtrack to an *earlier version...*



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- Daily home directory backup

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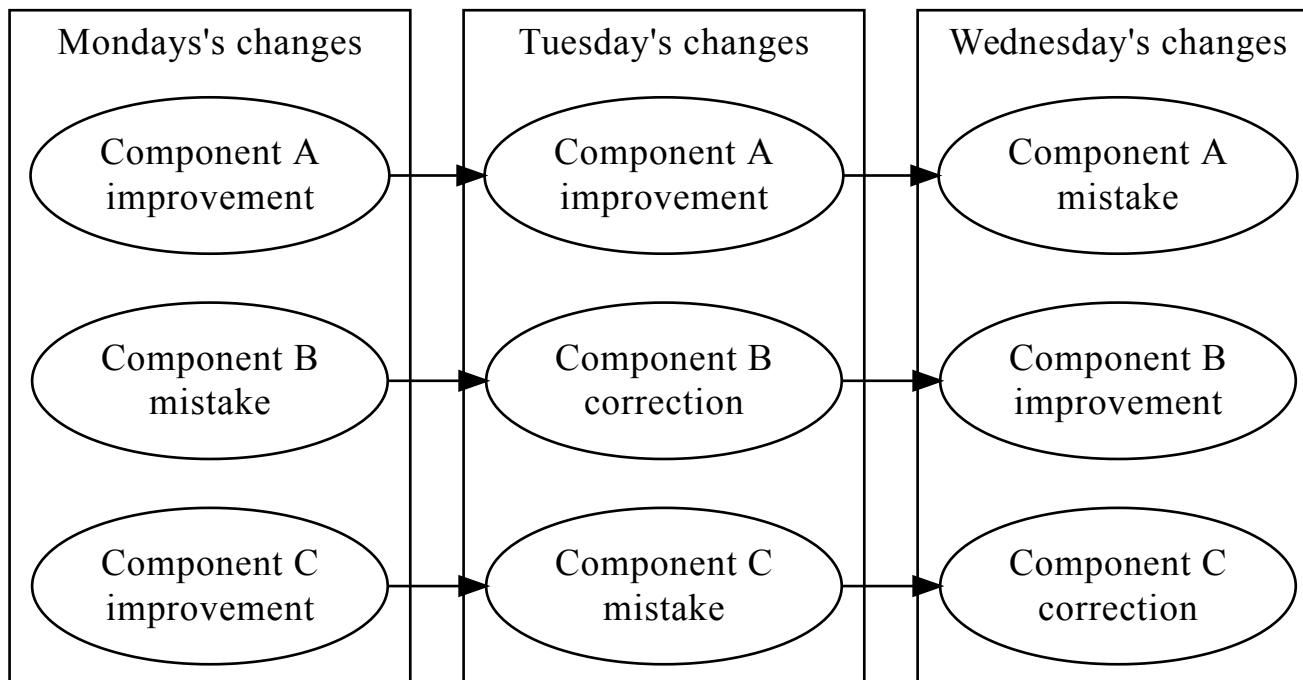
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Overall, difficult to manage!

What about the granularity?



This compounds the problems!

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- Can handle multiple development paths (branches)

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 - Bisection search
- VCS also allows the joining (merging) of different snapshots
 - Easy to experiment with ideas

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 - People work locally and send (push) the changes to the server
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- Safer since mistakes can be easily remedied
- The contributions of several people can be merged

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- Globally, lost files can be recovered from the server

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- Services such as GitHub can do almost everything for you
 - Store history, distribute, testing / continuous integration, bug reports, milestones, website, ...

Summing up

Version control systems

- keeps track of your files and other output
- tracks what is created and modified
- tracks who made the modifications
- tracks why the modifications were made (if you make good commit comments)

Practical use cases

What are the practical use cases for VCS?

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- But also for: writers, artists, composers...

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- Collaboration between several authors

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- Track different version of your batch scripts
 - Easy to check the used configuration afterwards
- Track input and output files
 - Limited to smallish files

Examples of VCS

- SCCS: The first VCS. Created in 1972 at Bell Labs. Was available only for UNIX and worked with Source Code files only.
- RCS (Revision Control System): First release July 1985. Usually superseded by other systems such as CVS, which began as a wrapper on top of RCS.
- CVS (centralized version control system): First release July 1986; based on RCS. Expands on RCS by adding support for repository-level change tracking, and a client-server model.

- Apache Subversion (SVN): First release in 2004 by CVS developers with the goal of replacing CVS.
- BitKeeper: Initial release May 2000.
Distributed version control. Was shortly used for developing the Linux kernel. Proprietary.
No longer maintained.
- **Git**: Started by Linus Torvalds in April 2005, originally for developing the Linux kernel.
Distributed version control. Open source.
- ...

