Introduction to Git — Fall 2021

Lecture 1: Why use version control?

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** …

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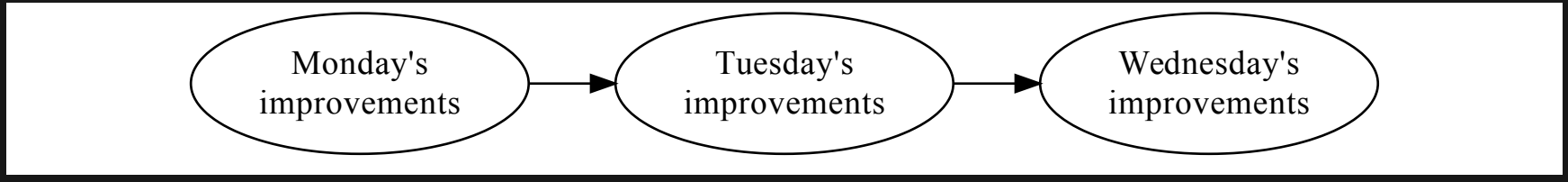

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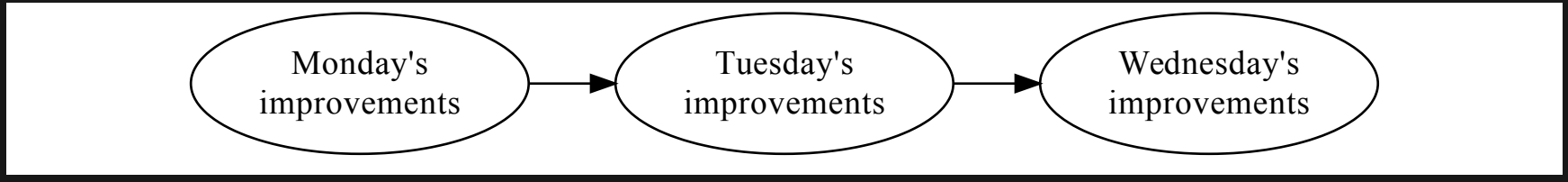

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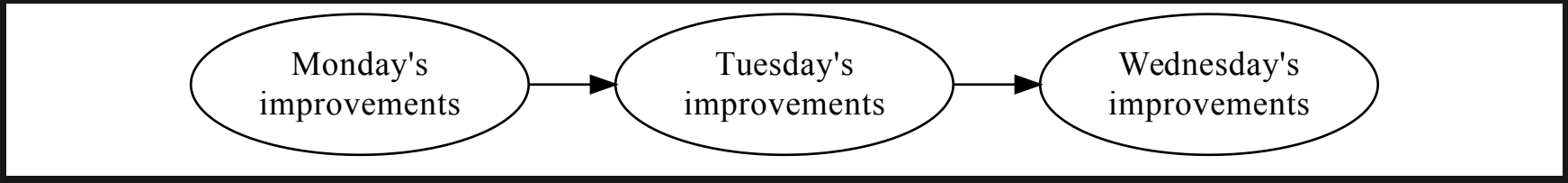

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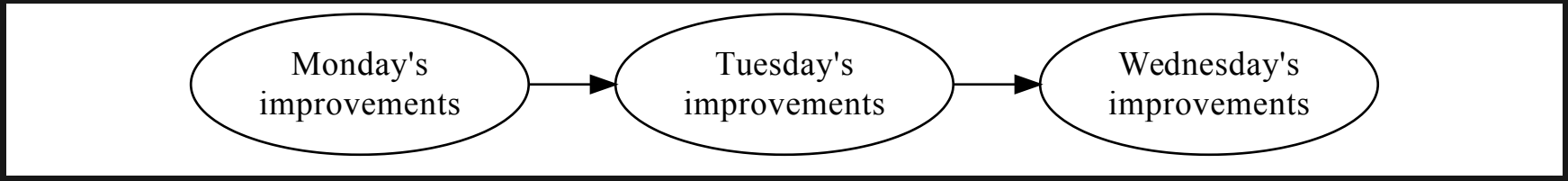
  - No need to backtrack.
- Everyone knows what everyone else is doing
- In the end, things are simply finished.



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- A new version can be anything between
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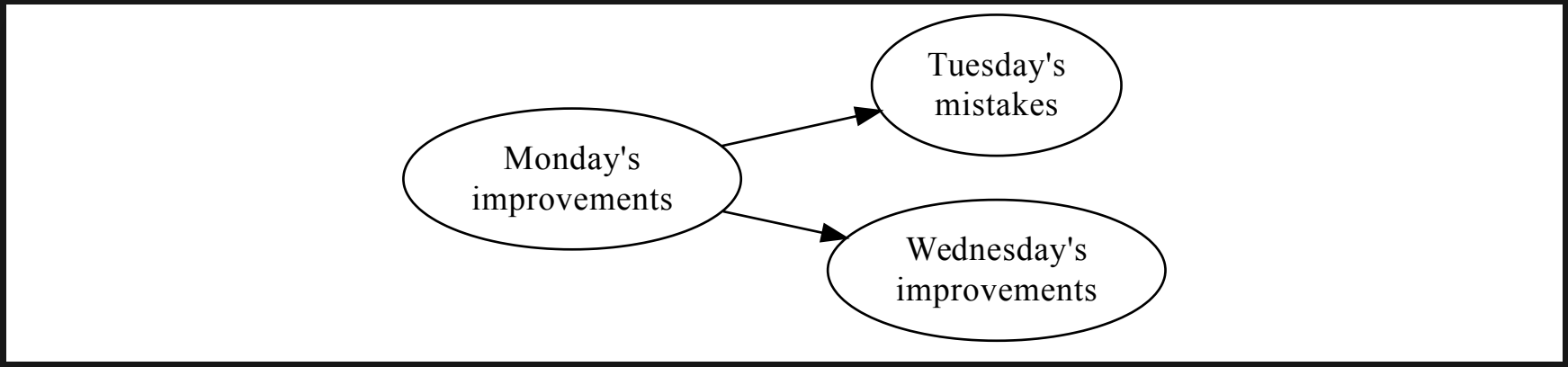
- People do not know what others are doing
- Sometimes we are simply fixing earlier mistakes…

Going back to an earlier version

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



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  - …
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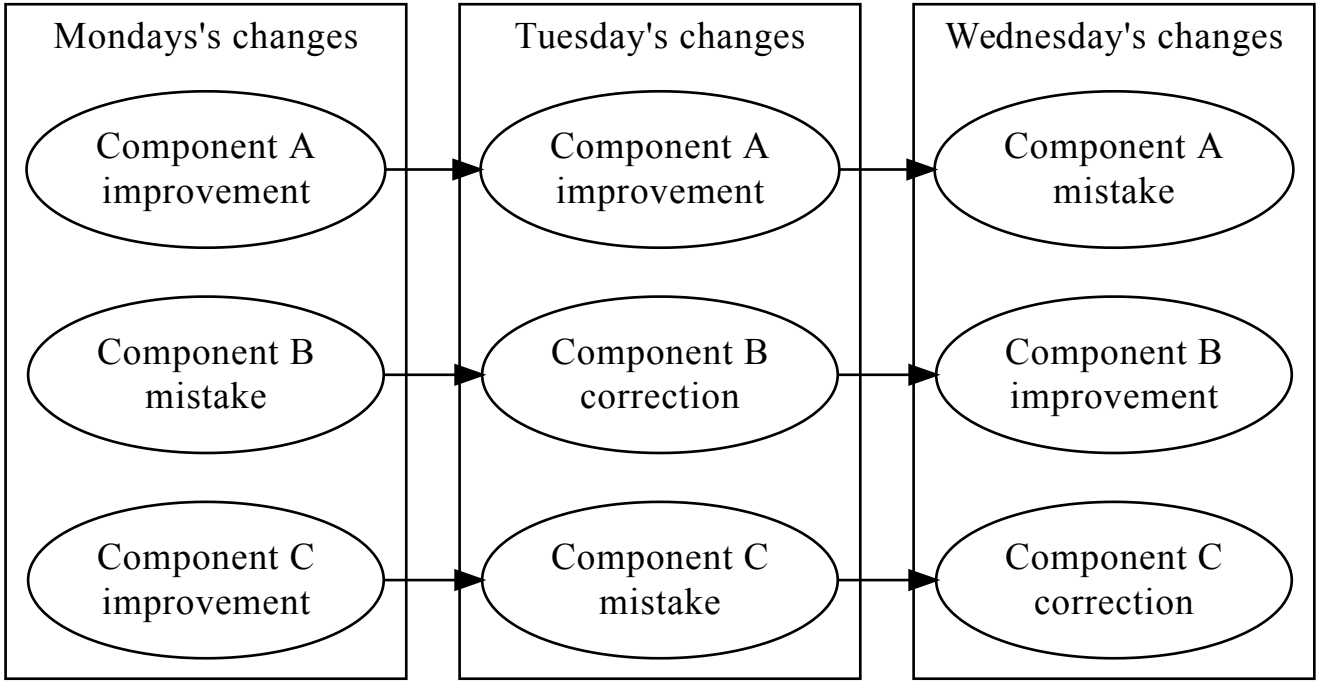
Overall, difficult to manage!

What about the granularity?



This compounds the problems!

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- Can handle different degrees of granularity
- Can handle multiple development paths (branches)

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

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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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  - HackMD, Overleaf, …
- 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.
- …