Software Engineering Essentials

Version Control Systems

Bernd Bruegge, Stephan Krusche, Andreas Seitz, Jan Knobloch
Chair for Applied Software Engineering — Faculty of Informatics

Learning goals

1) Explain different architectural styles for version control
2) Compare centralized with distributed version control

Version control systems (VCS)

Version control is part of promotion management in software configuration management

History:

- Many tools in the history starting with local version control
- Centralized version control tools allowed collaboration
- Distributed version control are used mostly nowadays

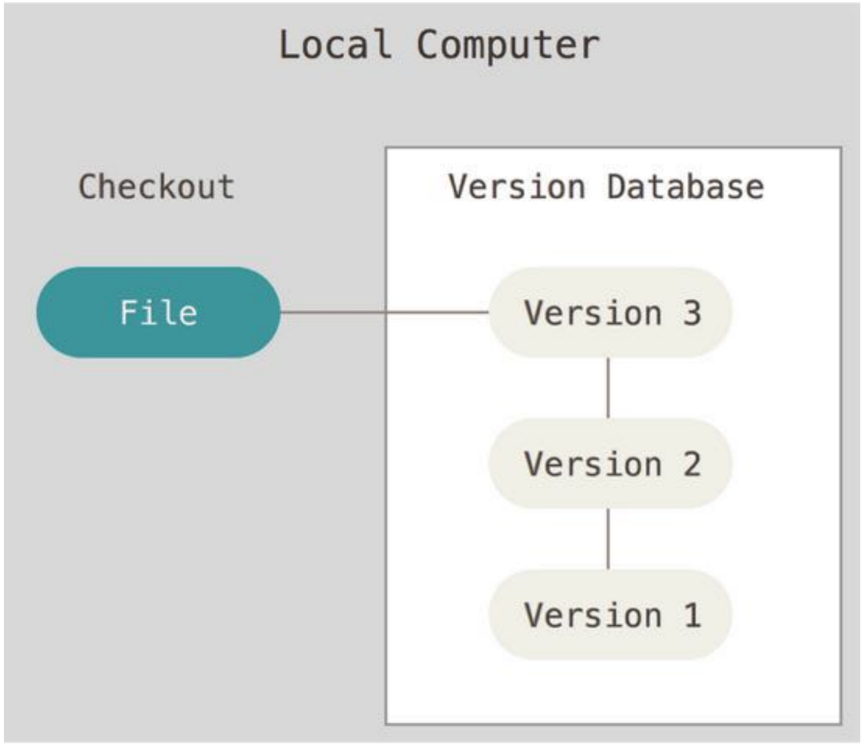
Properties:

- Simplify collaboration on configuration items
- Store versions in a commit history
- Allow to restore previous versions

➡ Distributed version control systems (DVCS)
provide more flexibility and features

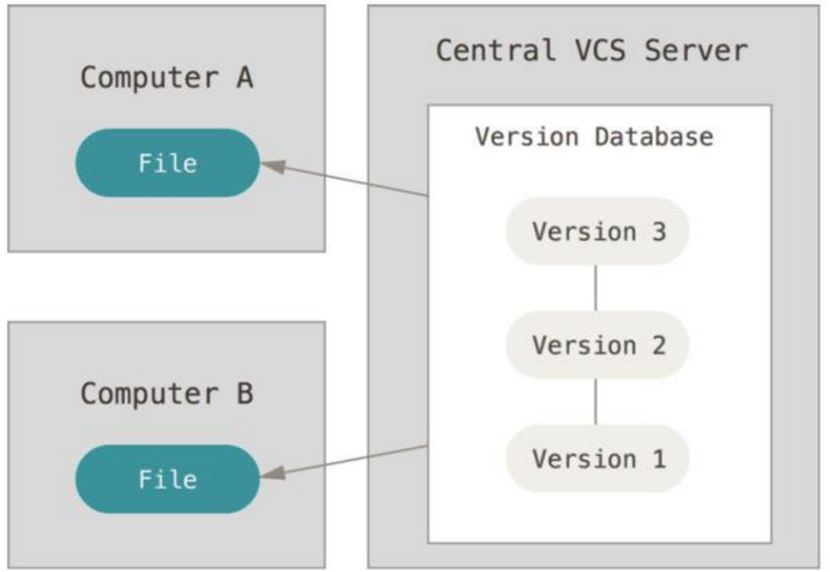
Monolithic architecture for version control

- Programmer has a simple local database that keeps all the changes to files under revision control
- Example: RCS



Repository architecture for version control

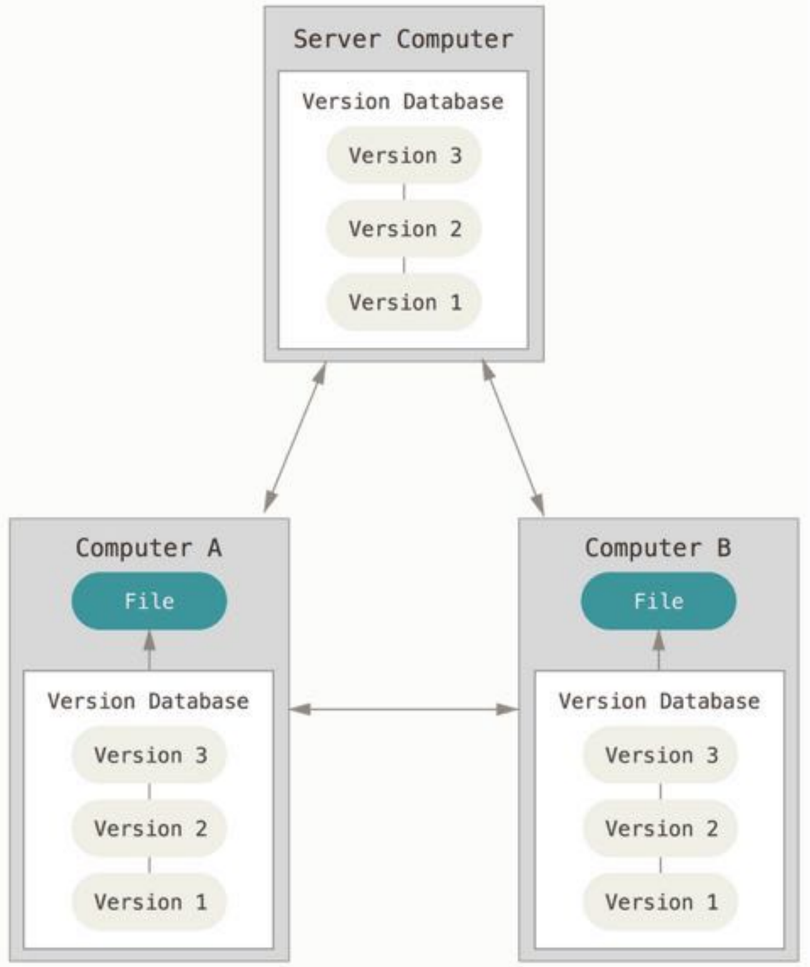
- A single server contains all the versioned files
- Programmers check out files from to the server to their computer, change them and check them back into the server
- Problem: single point of failure in the central VCS server: possibility of loosing all the versions and their history if the server crashes
- Example: subversion



Peer-to-peer architecture for version control

- Addresses the single point of failure problem
- Each programmer's computer fully mirrors the repository
- Programmers can work offline on their own versions and create commits
- Example: Git

➡ Nowadays the most used architectural style



Comparison of distributed vs. centralized VCS

Advantages of DVCS

+ Work offline (local commits)
+ Work incrementally (smaller commits)
+ Switch the context more efficiently (lightweight branching)
+ Exploratory code more efficiently (lightweight branching)

Disadvantages of DVCS

- High learning curve (more commands)
- Scaling issues with large files and large repositories