System software

Revision/version control systems

Source code management

- Management
  - of changes to documents (source code files)
  - storage and retriveal of documents (and their snapshots in time)
- Why?
  - size (e.g., line count) of source code
  - to increase lifespan of source code
  - log and track history of changes
  - branching (patches, parallel development, etc.)
  - multi-user development

Basic notions

- Revision (izvedba)
  - snapshot in time of a document (source code)
- Change, diff, delta (spremembe)
  - set of modifications to a document
- Version (različica)
  - label given to a **revision**
  - usually follows some numbering system, hash value
    - e.g., 0.1, 0.2, …, 1.0, 1.1

Basic notions

- Tag (oznaka)
  - (human-friendly) label given to a version
- Timestamp (časovna oznaka)
  - time and date of a revision
- Author (avtor)
  - author/maker of a change to revision
- Log message
  - description of a (change to) revision

Basic notions

- Repository (skladišče)
  - „place“ where the documents and thier changes are stored
  - working copy
    - copy of a specific version from the repository which user is currently working on
  - remote repository
  - local repository

Some revision control systems

- Revision Control System, RCS, 1982
- Concurrent Versions Systems, 1990
- Subversion, 2000
- Git, 2005
- Bazaar, 2005
- Mercurial, 2005
- wp>List_of_revision_control_software

Types of systems

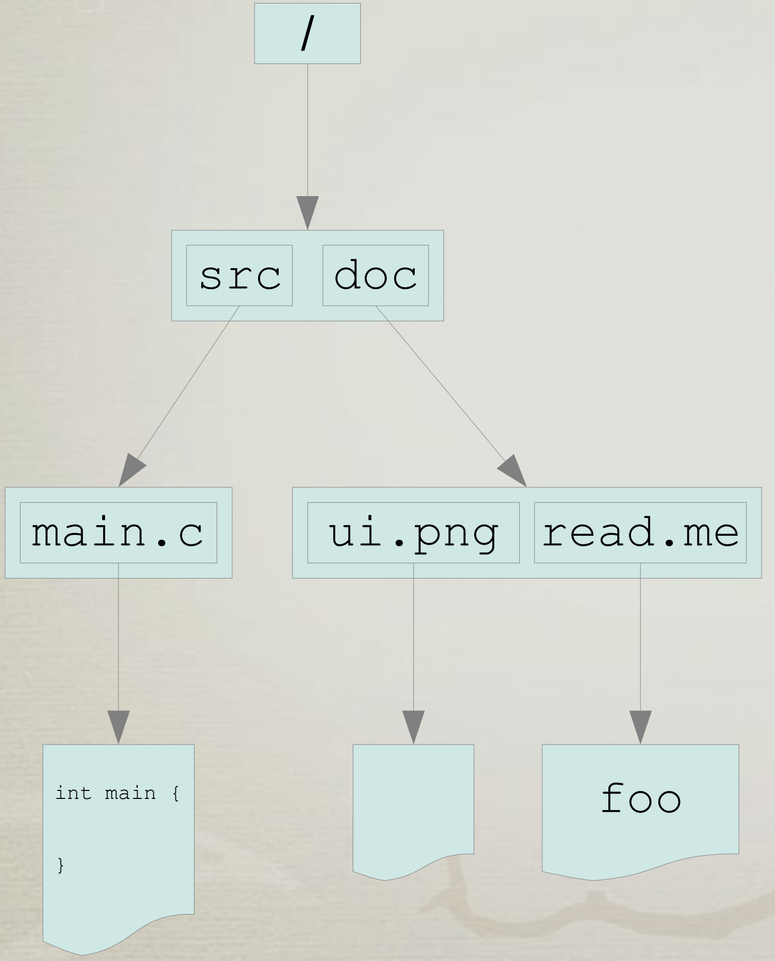
- Local
  - edited files and thier history is stored in the same file system (e.g., two files in the same directory)
- Centralized, client-server
  - single shared repository
  - needs file locking, revision merging, etc.
- Distributed, decentralized
  - each developer has its own local repository
  - changes may be shared between several repositories (e.g. via a remote repository)

Subversion

- Snapshots as a tree of directories and files
  - revision control of directories, symbolic links, renames, copies etc.
  - can also efficiently store *binary files* and *metadata*
- Atomic commits
  - transfer of a set of files into the repository is atomic
- Acces protocols
  - file:, svn:, svn+ssh:, http:, https:
- Simple versioning
  - 0, 1, 2, 3, …

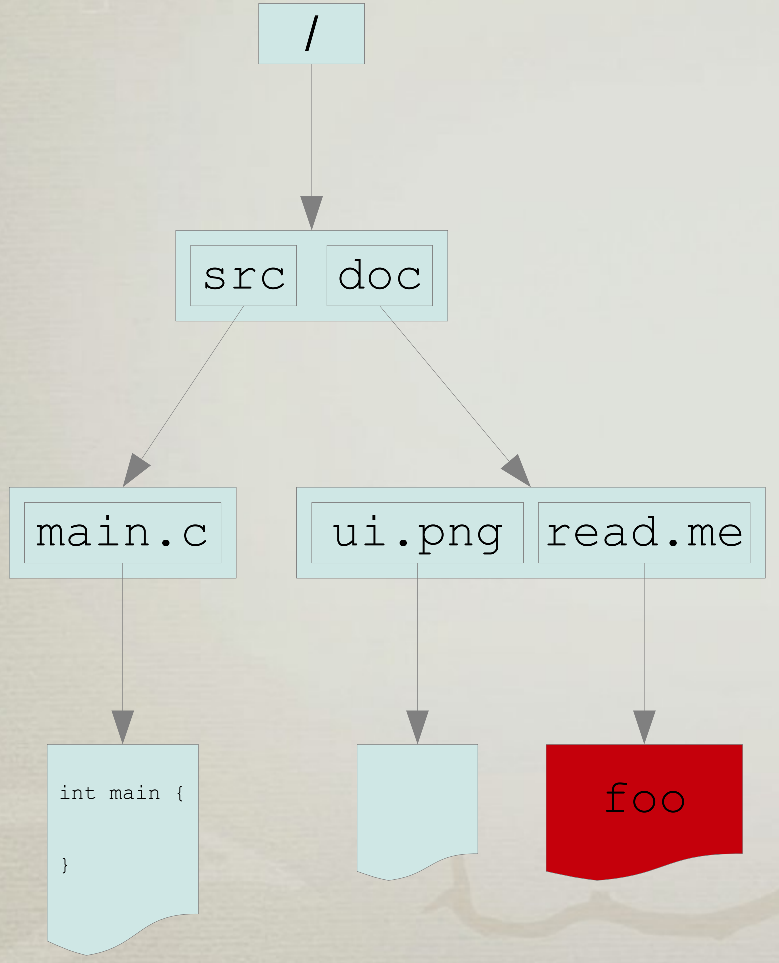
Snapshots as a tree

0 1 2 3 4 **5**



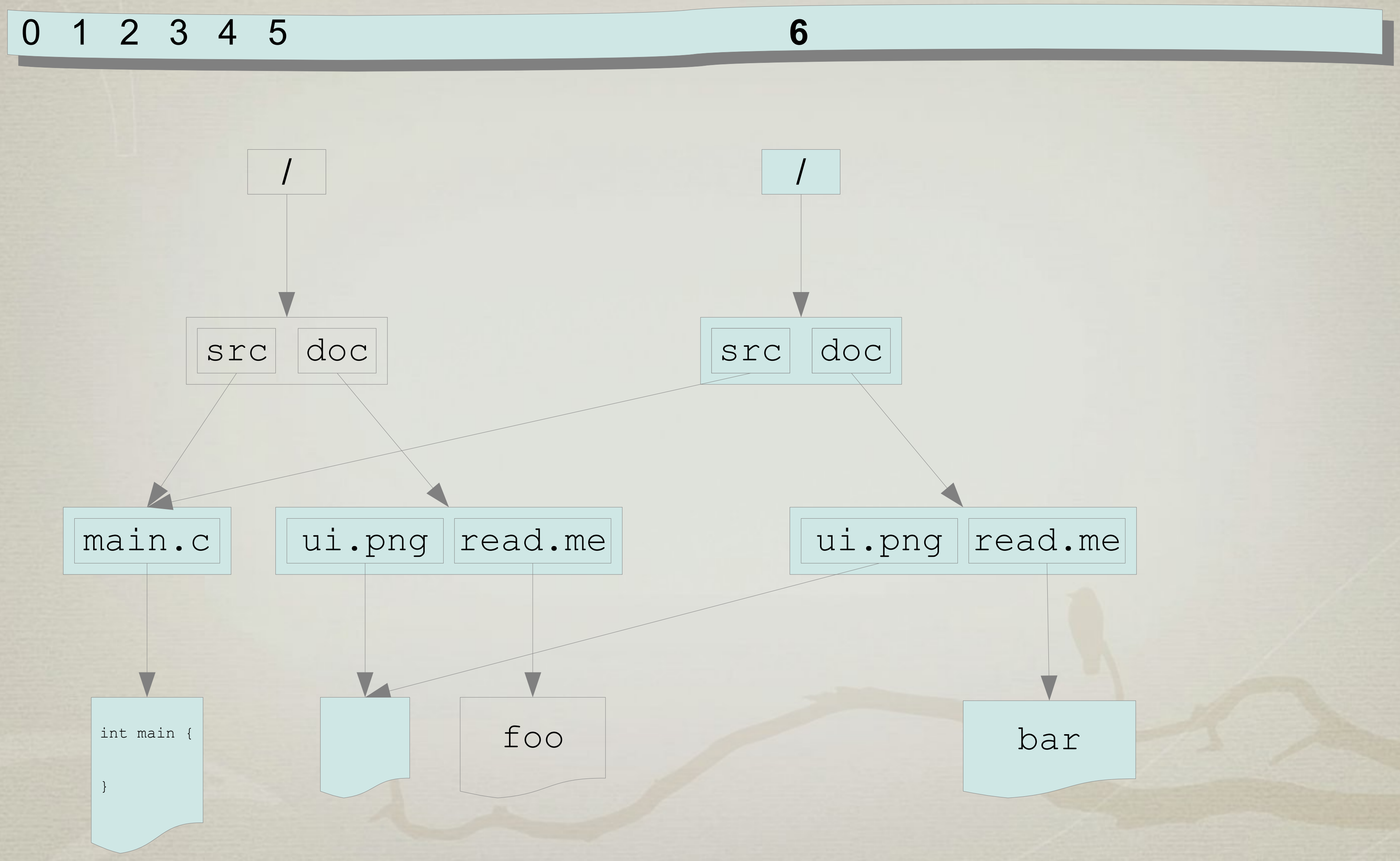
Snapshots as a tree

0 1 2 3 4 **5**

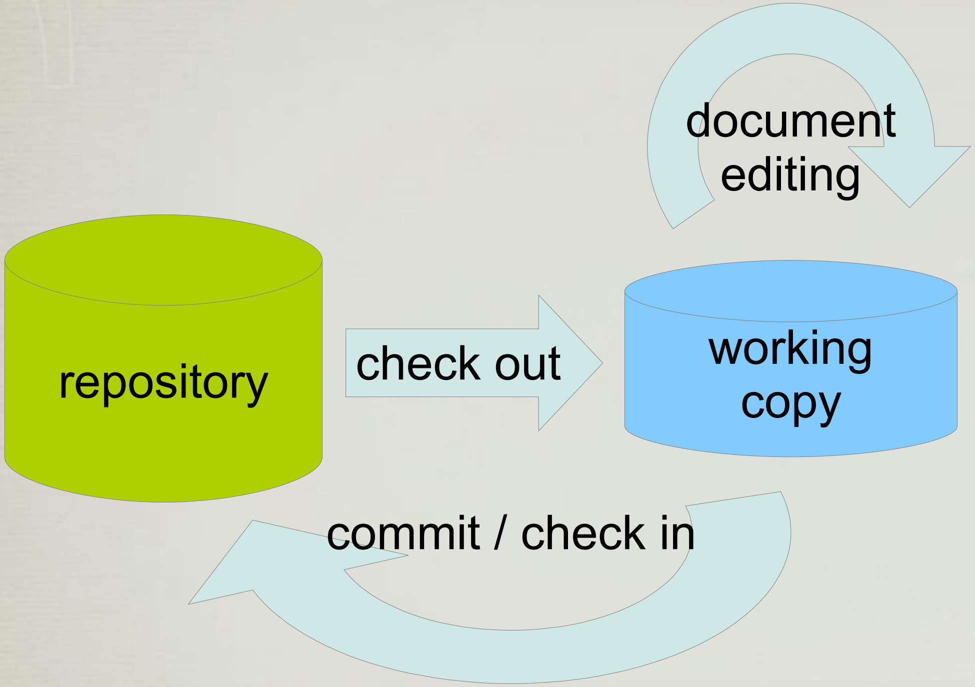


A new revision of a file `read.me`.

Snapshots as a tree



Basic workflow



document editing

repository

check out

working copy

commit / check in

Working copy contains files from the selected snapshot as well as a subdirectory .svn

Repository structure

- Arbitrary organization vs. standard convention

- One project

  - trunk
  - tags
  - branches

Multiple projects

- project1
  - trunk
  - tags
  - branches
- project2
  - trunk
  - tags
  - branches

Repository structure for tutorials

- `https://lalgec.fri.uni-lj.si/spo/`*USER*
  - `exe1`
  - `exe2`
  - …
  - `ass1`
  - `ass2`
  - …
  - `tags` … tags for submitted assignments/exercises
    - `exe1`
    - `ass1`
    - …