Git and GitHub primer

What is version control?

- Aka revision control, source control
- Version control is the management and tracking of changes to source code, documents, data, etc.
- Allows collaborative development
- Keeps track of who made a change, when the change was made, and what the change was
- Permits reverting any change and rolling back to a previous state

- Many systems available: CVS, Subversion (SVN), Perforce, git, Mercurial,…

What is git?

- Distributed revision control system
  - Speed
  - Data integrity
  - Distributed, non-linear work flows
- Created in 2005 by Linus Torvalds to support the Linux kernel development

- Main characteristics:
  - the entire code and history is kept on the client (user) machine
  - users can work (make changes to code) even without internet connection
  - internet connection required only for pushing and pulling from remote server (remote repository)

Git basics – commits

- Git keeps track of code history in snapshots
  - record of what all files look like at a given point in time
- User decides when to take a snapshot (commit) and what files should be included
- Allows going back and visiting any past snapshot
  - later snapshots are not lost
- A project is made out of a series of commits
- Each commit contains:
  1. information on how the files changed from previous commit (diff)
  2. a reference to the previous commit (parent commit)
  3. a hash code name

Git basics – repositories

- A repository (or ‘repo’) is a collection of all the files and their commit history
  - contains all commits
  - can be local or remote
- Copying a repository from a remote server is called cloning
- Cloning allows teams to develop collaboratively
- Pulling: downloading commits that do not exist on the local machine from a remote repository
- Pushing: adding local changes (commits) to a remote repository

Git basics – branches

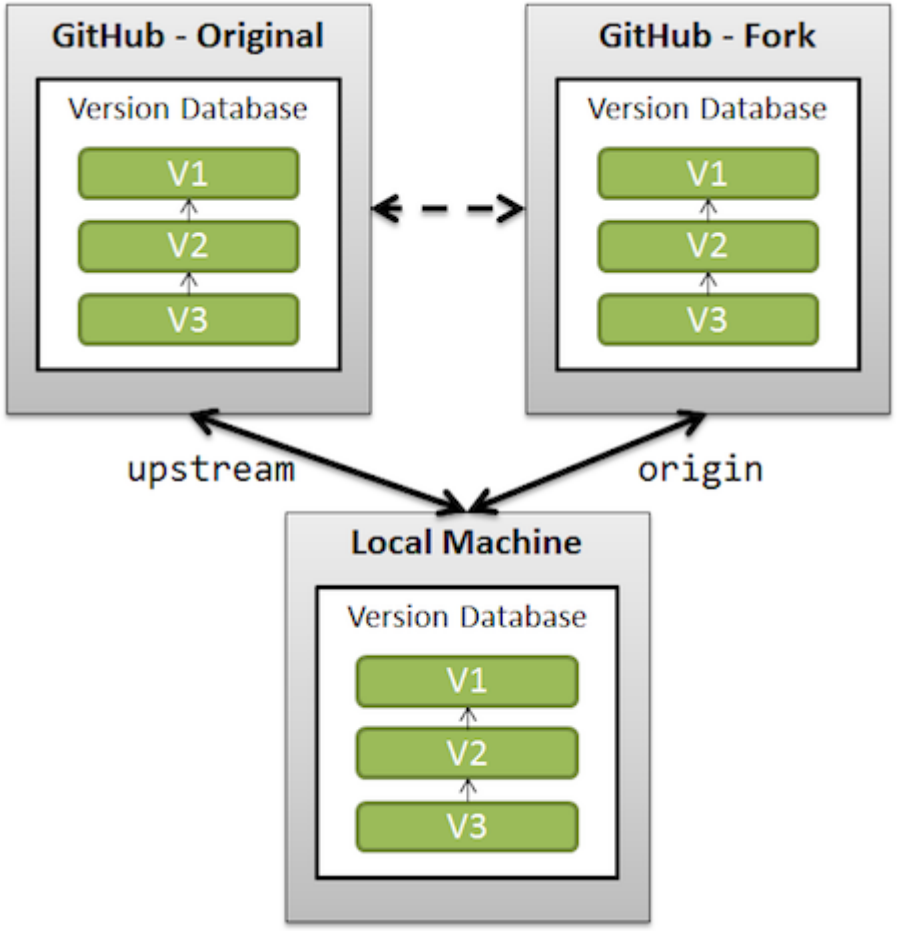
- All commits in a repository live in some branch
- The main branch in a repository is called the master branch
- A project can have many branches
  - For example, in a project that follows GitFlow, will have a master branch, a develop branch, feature branches, hotfix branches, release branches
- Branches allow maintaining parallel and separate development tracks in a single project
- Development tracks can be
  - branched off
  - merged

What is GitHub?

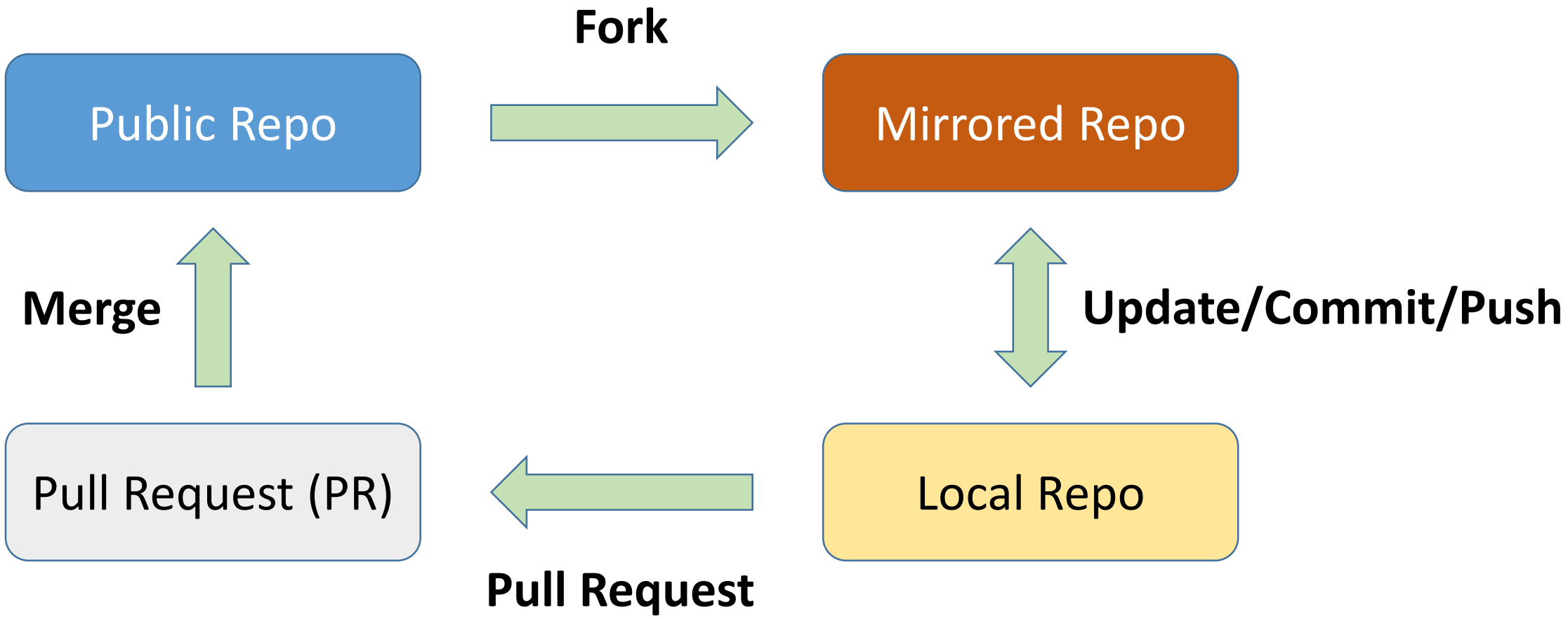
- Largest web-based git repository hosting service https://github.com/
- Founded in 2008
- Promotes open source, but also has an Enterprise Edition for businesses

- Offers all Git distributed version control functionality
- Additional functionality:
  - User interface (web-based)
  - Documentation
  - Bug tracking
  - Feature requests
  - Pull requests

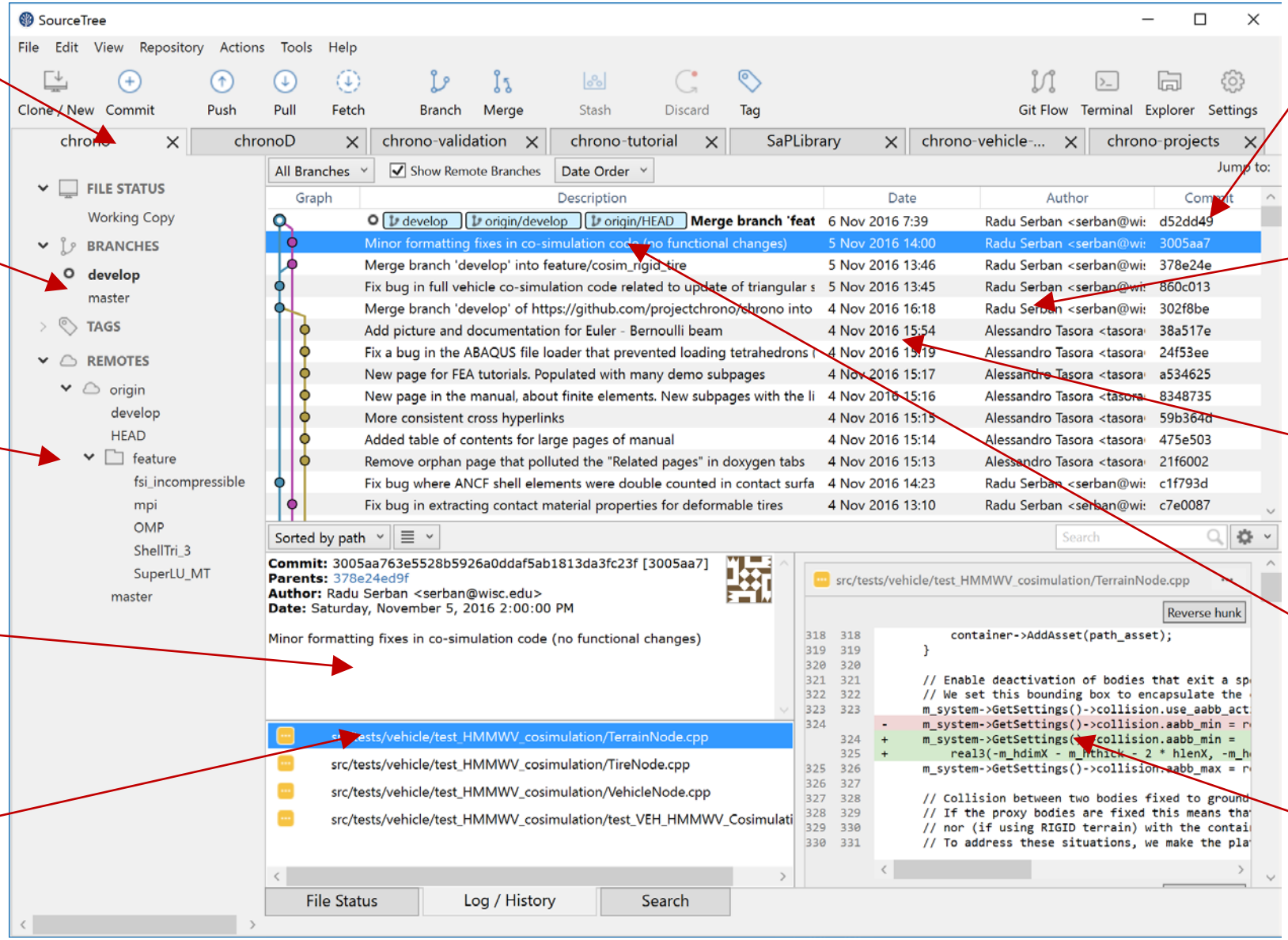
GitHub basics – forking



GitHub basics – pull requests

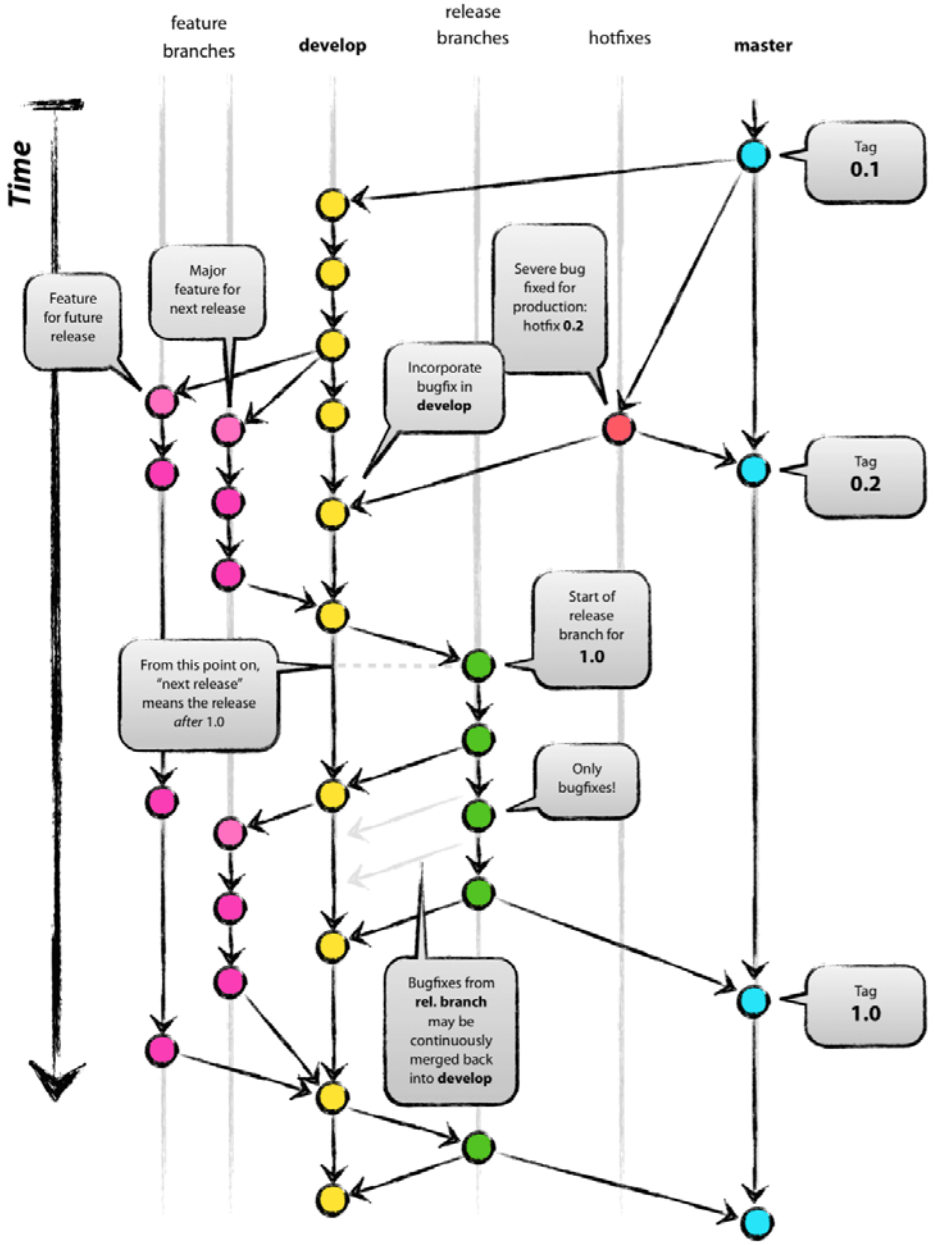


Sourcetree GUI client



GitFlow

- Proposed by Vicent Driessen
  http://nvie.com/posts/a-successful-git-branching-model/
- A development model based on Git
- Adopted in ProjectChrono



Git/GitHub resources

- Git official website: https://git-scm.com
- GitHub guides: https://guides.github.com
- Git tutorials and training: https://www.atlassian.com/git/tutorials/
- Git cheat-sheet: https://services.github.com/kit/downloads/github-git-cheat-sheet.pdf
- GetFlow cheat-sheet: http://danielkummer.github.io/git-flow-cheatsheet/

- Git GUI clients: many options (see https://git-scm.com/download/gui/linux)
  - Windows/Mac: Sourcetree (by Atlassian)
  - Linux/Windows/Mac: SmartGit, git-cola