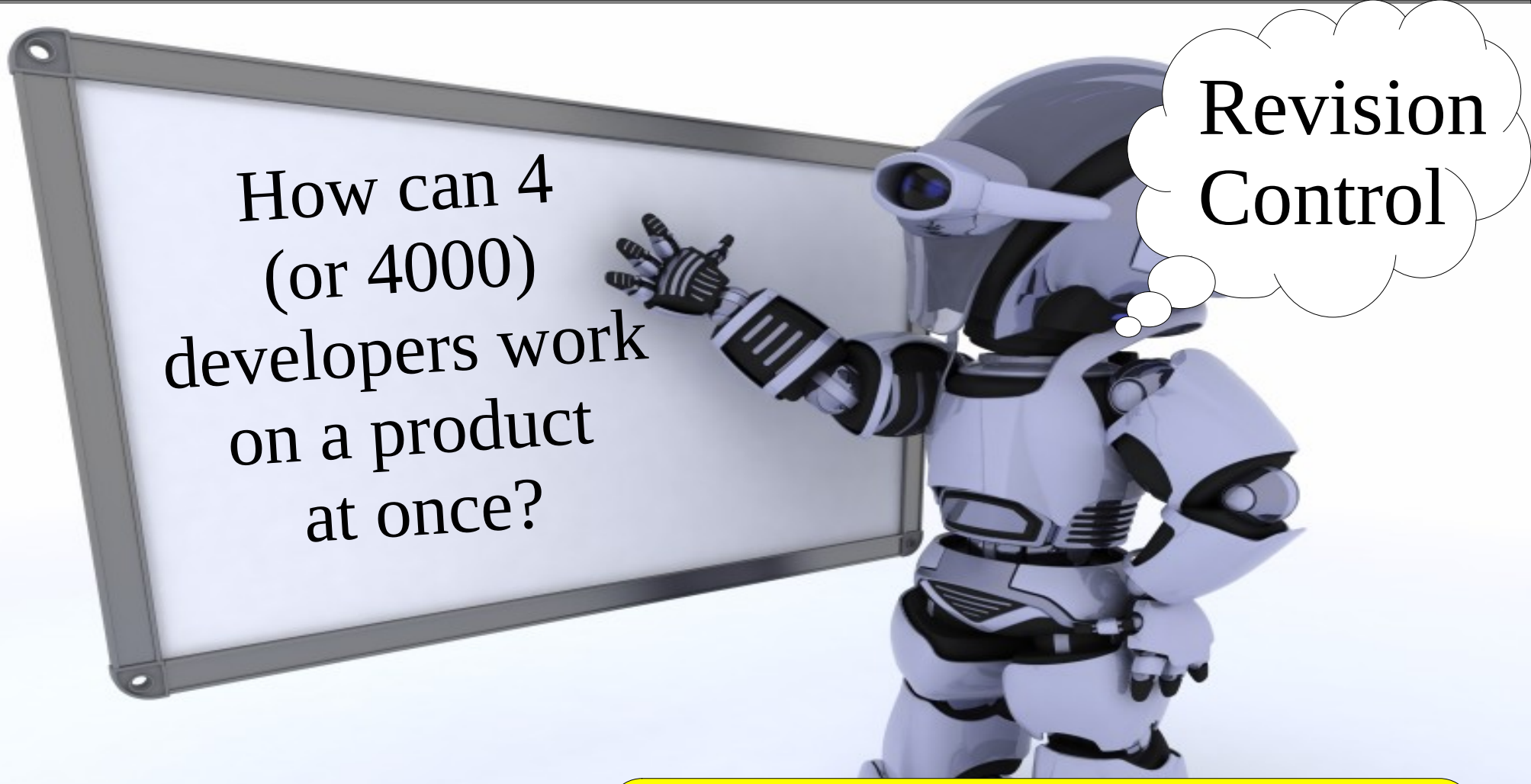


For Notes and Videos
tinyurl.com/ssssGitWorkshop

More Info: https://git-scm.com/book/en/v2/Getting-Started-About-Version-Control

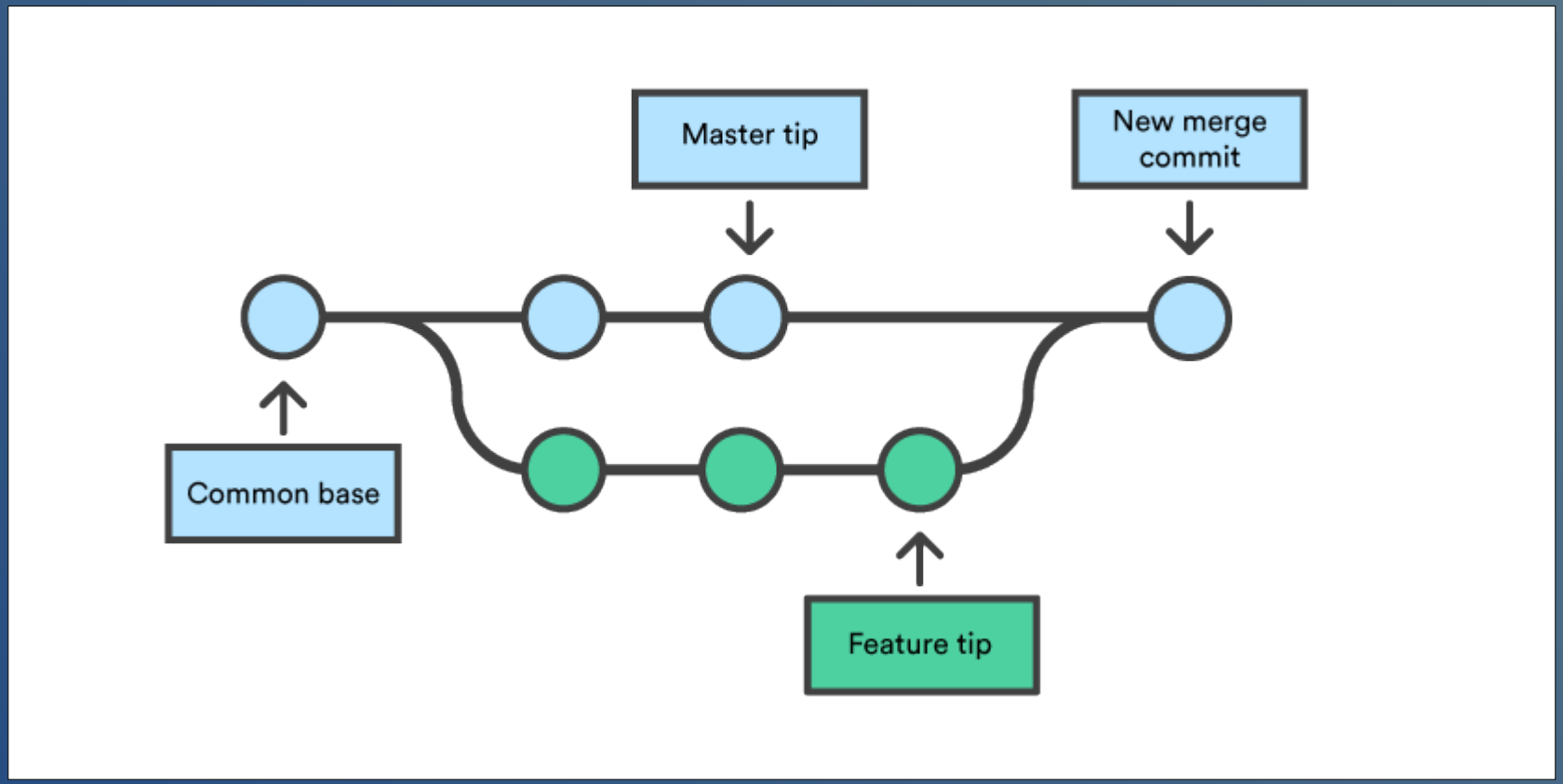
Software!

- Install both:
  - Git Command Line
    - Linux:
      $sudo apt-get install git
    - Windows: install Git for Windows
  - IDE: VS Code (or IntelliJ, or ....)

Revision Control

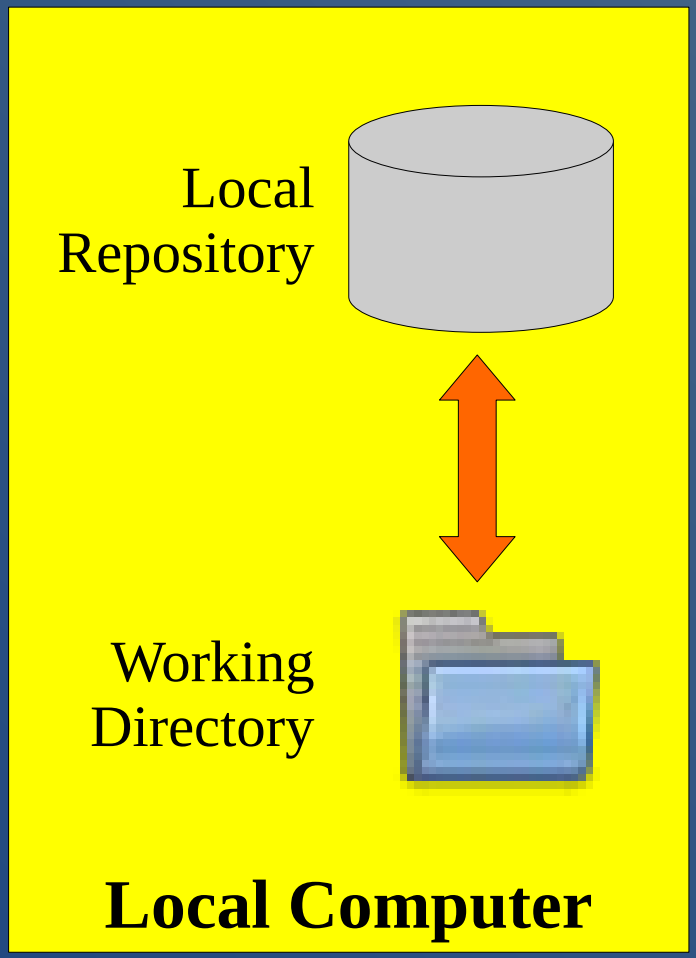
- Revision Control
  - a system to manage changes to electronic documents.
  - Also called version control, source control, software configuration management.
- Motivation
  - Need to coordinate changes made by multiple developers.

Git Graph / Log / History



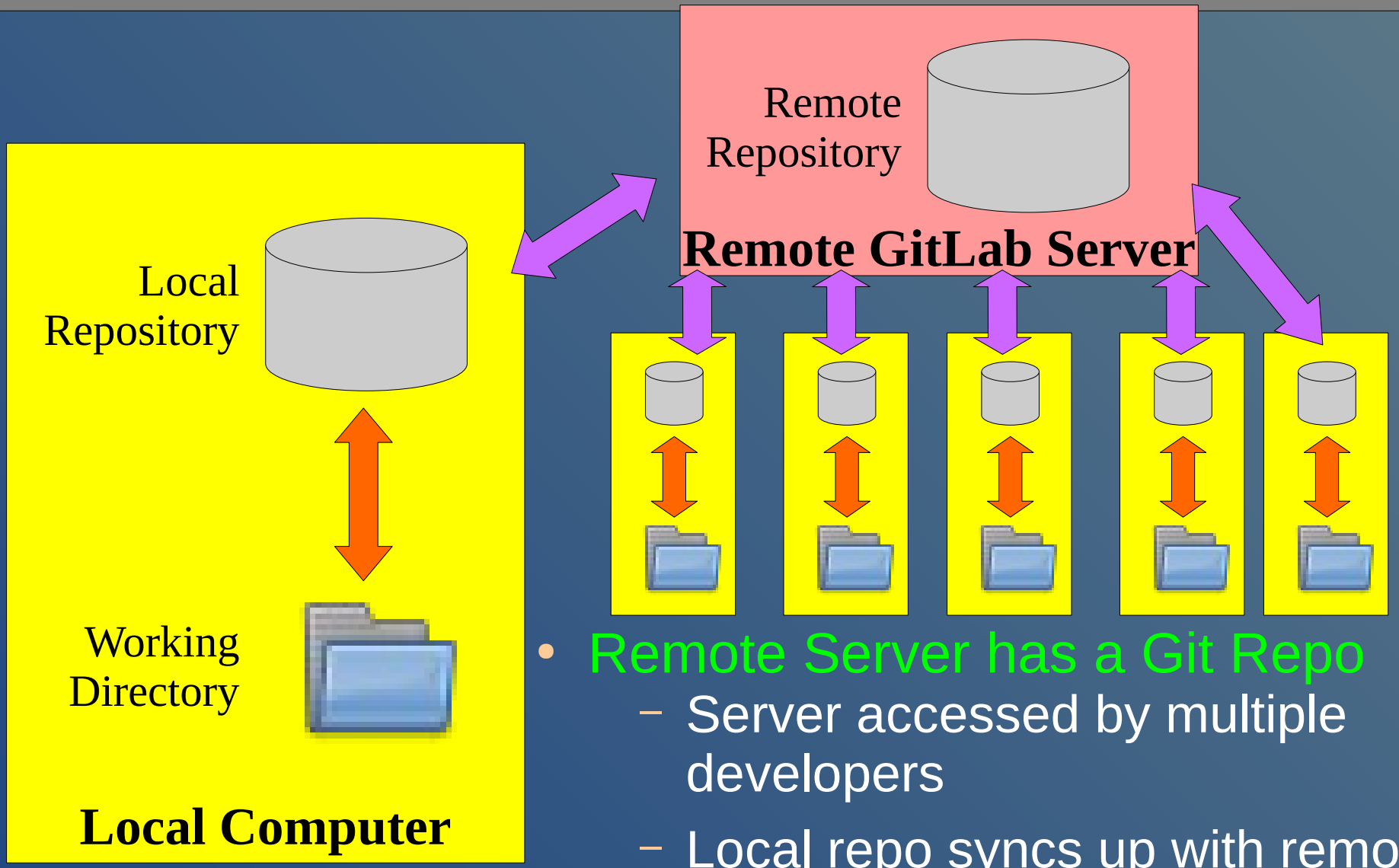
Git Basics

Local Topology Simplified



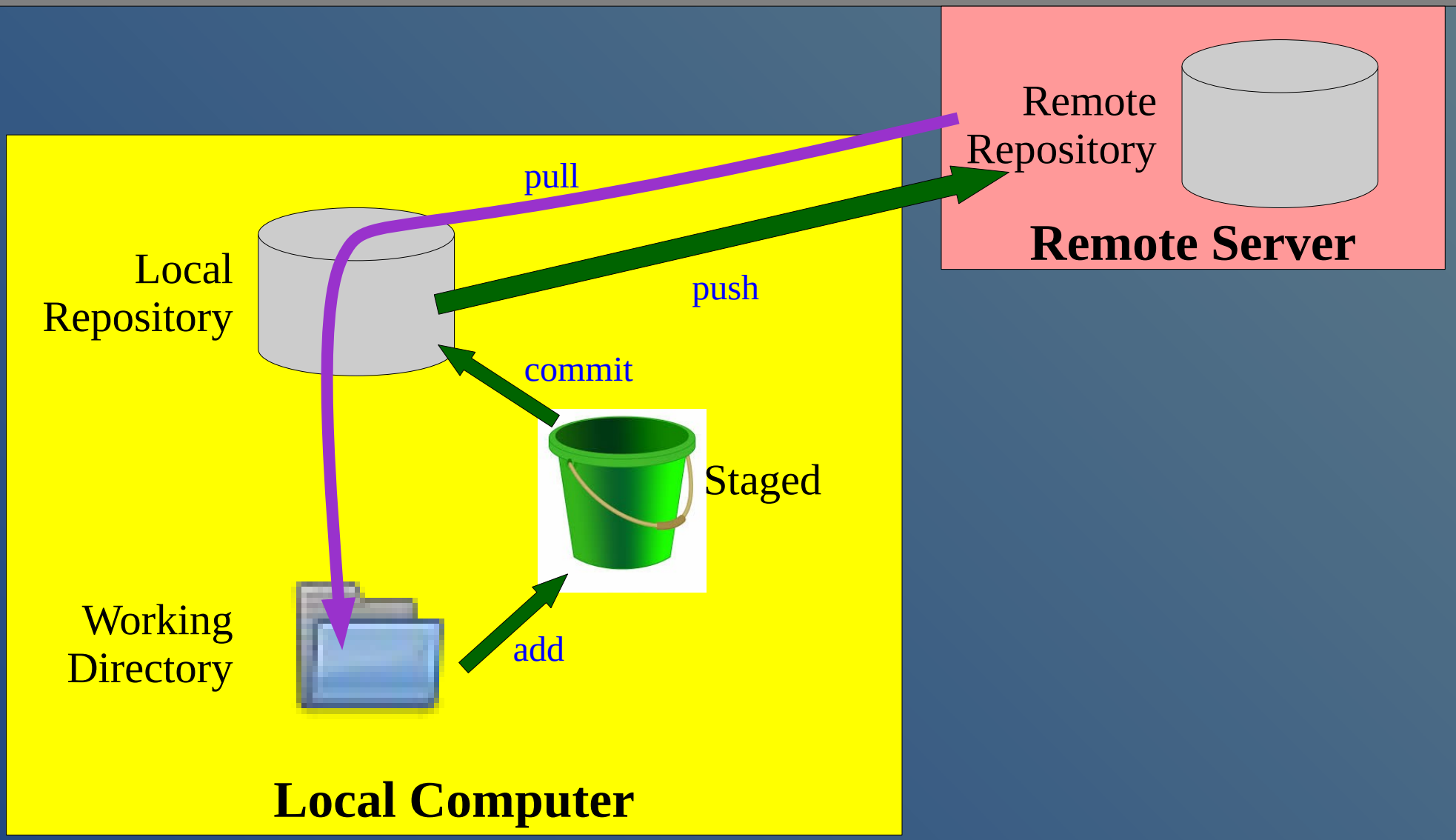
- Local Machine has a Git repository (Repo)
  - Usually in .git/ directory
  - Checkout code from repo to working directory.

Remote Topology Simplified



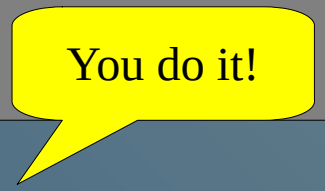
- Remote Server has a Git Repo
  - Server accessed by multiple developers
  - Local repo syncs up with remote

Git Command Diagram



Git Details

SSH Key



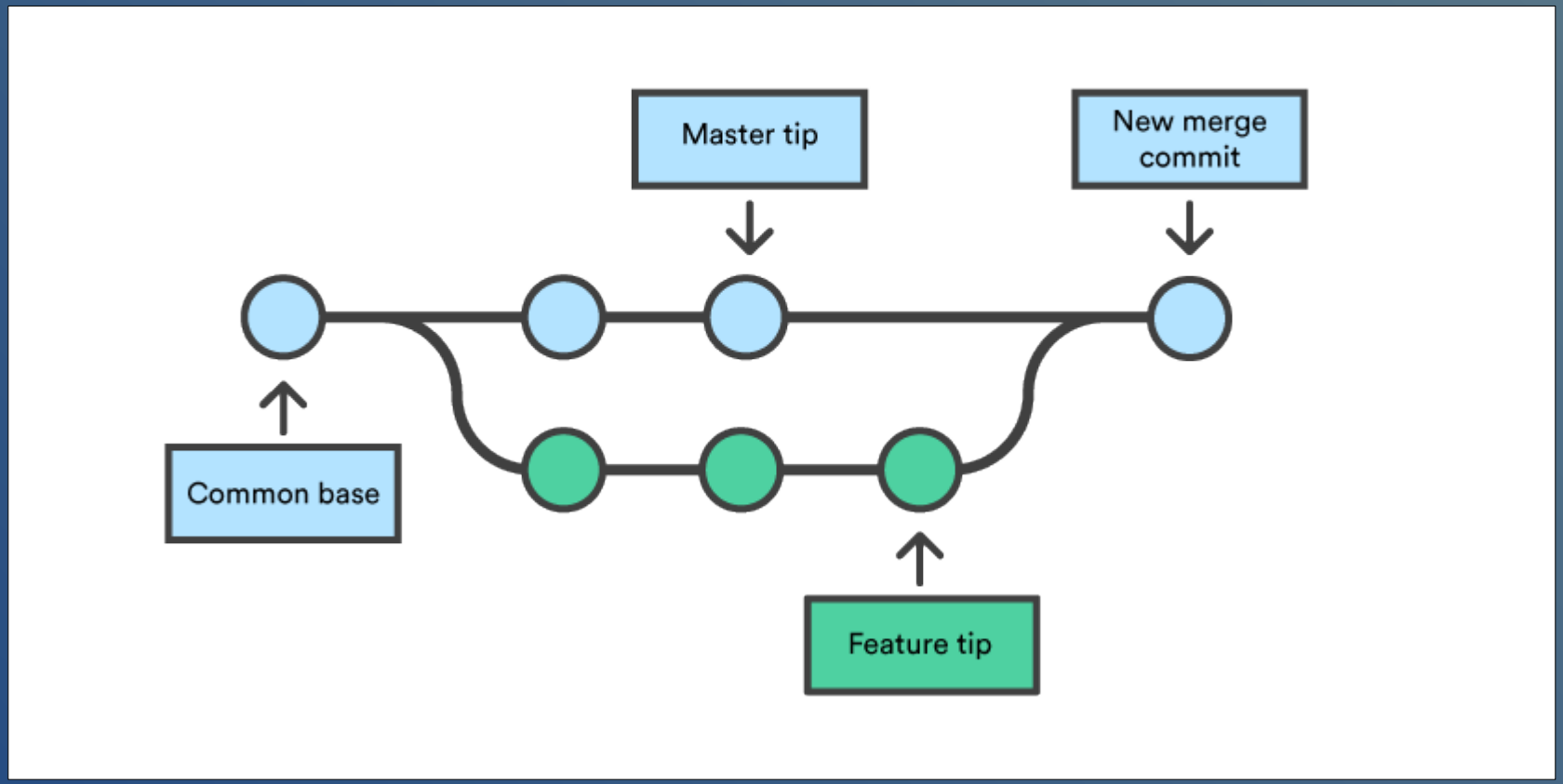
- GitLab verifies you via an SSH key (no passwords)
  - Generate the key on each machine you use
    (all CSIL machines will share your SSH key)
  - Open terminal and run:
    `$ ssh-keygen -t ed25519`
    (press enter until done)
  - View key; highlight and copy:
    `$ cat ~/.ssh/id_ed25519.pub`
- Or, view it from the Git GUI:
  - Run Git GUI
  - Go to: Help --> Show SSH Key

SSH Key (cont)

- On GitLab (gitlab.cs.sfu.ca)
  click avatar (top right) --> Settings --> SSH keys
  - paste SSH key;
  - give it title, such as “Laptop”, “CSIL”, or “Linux VM”
  - add it!
- Now GitLab will allow you access!

```
$ ssh -T git@csil-git1.cs.surrey.sfu.ca
```

Git Workflow



source: https://www.atlassian.com/git/tutorials/using-branches/git-merge

Work Flow 1: Setup

- Associate your local repo to a remote repo by either:
  - Create a repo in GitLab (gitlab.cs.sfu.ca) and push some existing code to it; or
  - Clone an existing repo to your local PC.

Basic Git Sequence for Editing Code

0. Have a working directory with no changes
1. .. “Pull”
   - will "fast-forward" without any conflicting changes
2. .. Do your work
   - cannot pull with some uncommitted changes
3. .. “Add” & “Commit” changed files
4. ..“Pull”
   - automatically merges files without conflicting changes
   - manually merge conflicts when required
5. ..“Push”
   - cannot push if others have pushed code:
     “current branch is behind master”, “unable to fast-forward”

Your Turn!

1) Create *__empty__* repo on gitlab.cs.sfu.ca
2) Create Java project in IntelliJ; add a Readme.txt
3) Commit to local repo (this adds and commits)
4) Push to remote repo
   Set origin to git@csil-git1.cs.surrey.sfu.ca.____.git
   (get ____ from GitLab repo's "clone" button)

   If you mistakenly created a non-empty repo, it's easiest to create a new empty repo (no readme even!) and push to it.

5) Make another change, commit, push

Working in a Team

Let’s try it with a partner

Person A

1. Add ‘B’ to your repo
3. Add hello.java, push it (loop to print 10 ‘hellos’)

Person B

2. Clone repo
4. VCS --> Update
   Edit hello.java & push

---

1. Pull
2. Change hello.java at top
3. Push

4. Change hello.java at bottom
5. Push (fails)
6. VCS --> Update
7. Push (succeeds!)

Merging with Partner

Person A

1. Pull
2. Change hello.java's loop (for/while/do-while)
4. Push (fails)
5. VCS --> Update
6. Resolve merges
7. Push

Person B

1. Pull
2. Change hello.java's loop (for/while/do-while)
3. Push
8. Pull

.gitignore / delete / add / rename

- .gitignore File
  - Lists file types to exclude from Git:
  - Example:
    Exclude .bak, build products, some IDE files
- Delete / Add / Rename Files
  - Just delete / create the files in working directory
  - Then execute Git commands:
    - “add” changed files
    - “commit”
    - “push”

Commit Messages

- A good commit message is required!
  - Line 1: Short summary (<70 characters)
  - Line 2: Blank
  - Line 3+: Details.. ; wrap your text ~70 characters

Example:

Make game state persist between launches and rotation.

Use SharedPreferences to store Game's state. Serialize using Gson library and Bundle for rotation.

Reverting Changes

- ‘git checkout’ to revert files
  - discards any uncommited changes to a file.
  - Overwrite file in working directory with one from local repo.
- Revert with Caution
  - Will lose all uncommitted changes in the file.
  - If in doubt, grab a backup copy (ZIP your folder) then revert.
    - Just make sure you don’t commit the backup!

Team Work

- Minimum requirement to committing code:

Don't break the build!

  - When you check in, the full system must compile and run (and pass all unit tests).
  - Only under exceptional circumstances should you ever check in something which breaks the build.

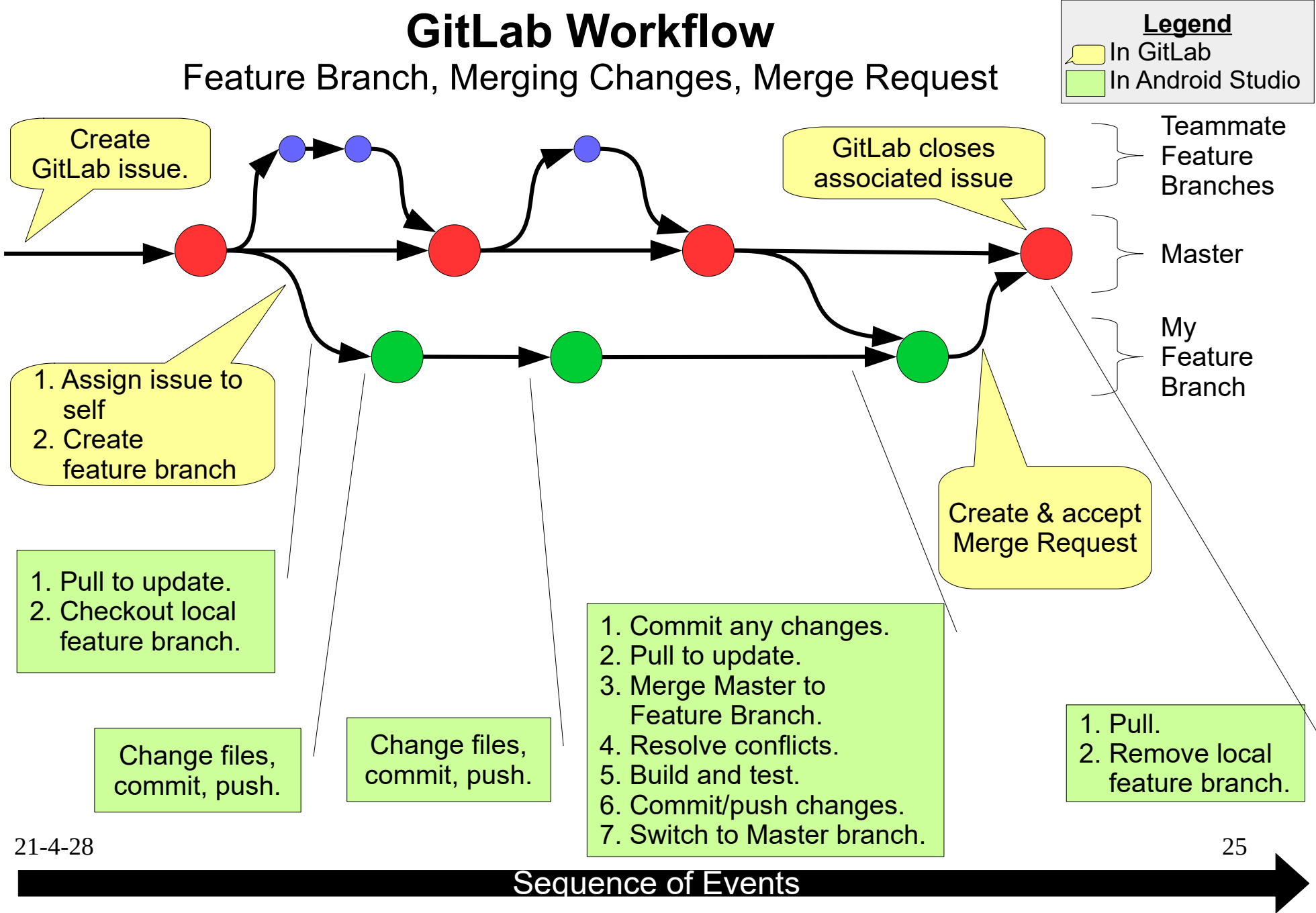
Feature Branches

Issues and Branches

- GitLab Issues
  - Used to track feature changes and bugs
- Feature Branch
  - Separate from master branch:
    allows you to develop and push your code without it going into master.
  - Used for most changes in bigger projects.
- Process
  - Create a GitLab Issue with a branch
  - Checkout branch on your PC.
  - Code, then push changes.
  - Do a GitLab Merge Request

GitLab Workflow

Feature Branch, Merging Changes, Merge Request



Feature Branch Workflow

- Do a Feature Branch
  - GitLab: Create issue
  - GitLab: Create branch
  - IntelliJ: Pull / switch to branch
  - IntelliJ: Code, add-commit-push (repeat!)
  - IntelliJ: Merge master to branch; push
  - GitLab: Merge Request

See videos on GitLab Workshop Page for more!