

CIS 415 OPERATING SYSTEMS

LAB 0

ASSIGNMENT_0 COMPLETE

- ▶ Assignment_0 should be completed before this lab.
- ▶ If you have not finished Assignment_0, please do it quickly and quietly.

GENE OSBORNE

- ▶ Ph.D. Student
- ▶ I am a canine and every subject is a squirrel.
- ▶ I like to play volleyball.

LAB 0

- ▶ Office Hours
 - ▶ Wednesday
 - ▶ 3:30pm - 5:00pm
 - ▶ Thursday
 - ▶ 10:00am - 11:00am
 - ▶ Friday
 - ▶ 11:00am - 12:00pm
 - ▶ 2:00pm - 3:00pm
- ▶ Other times by appointment, but I am a student too.

TODAYS TOPICS

- ▶ GIT
- ▶ GNU Debugger (GDB)
- ▶ Valgrind

GETTING STARTED

- ▶ `git config --global user.name "YourNameInsideQuotes"`
- ▶ `git config --global user.email myemail@uoregon.edu`

I DON'T HAVE A PROJECT YET

- ▶ `git clone https://username@bitbucket.org/username/myrepo.git`
- ▶ - OR -
 - ▶ `cd <path to project>`
 - ▶ `git init`
 - ▶ Follow directions to configure remote on next slide...

I HAVE AN EXISTING LOCAL GIT PROJECT

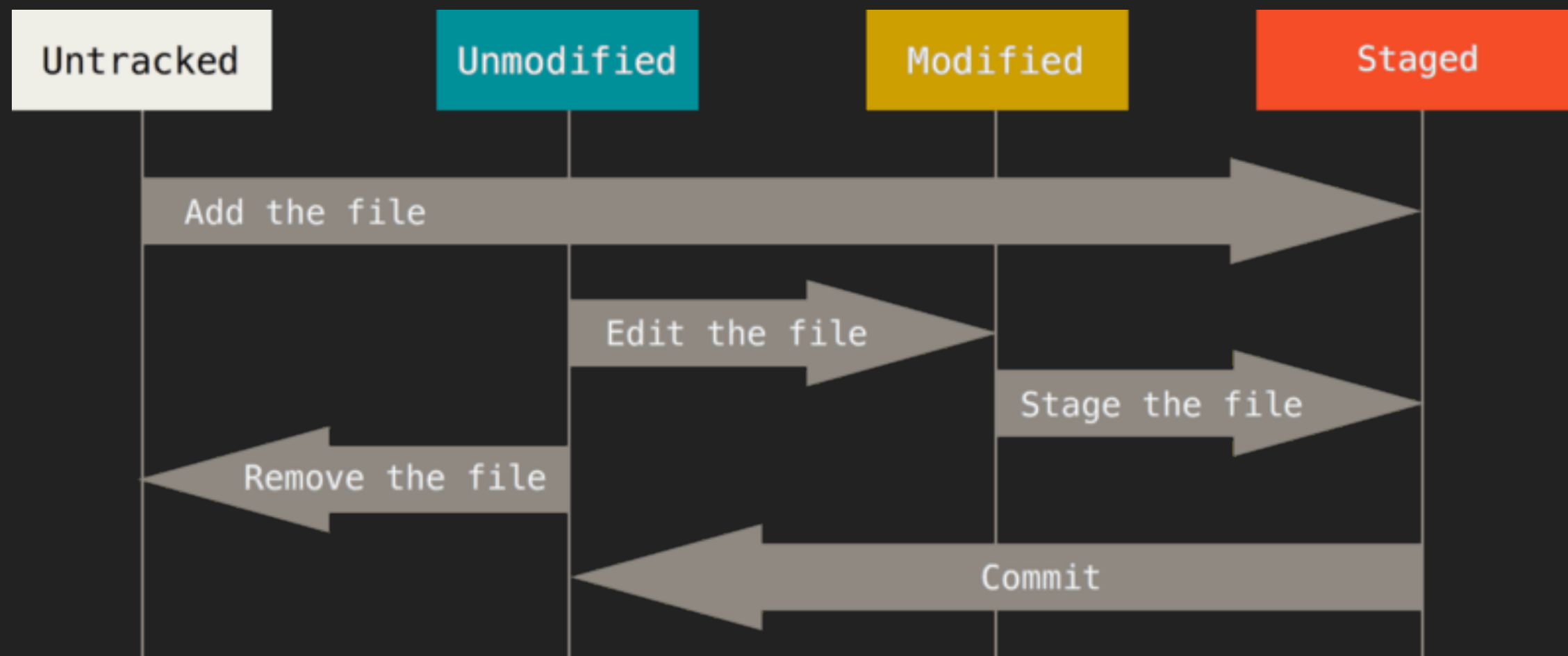
- ▶ `cd <my existing local project>`
- ▶ `git remote add origin https://username@bitbucket.org/username/myrepo.git`
- ▶ `git push --set-upstream origin master`

COMMANDS

- ▶ Git Cheat Sheet

- ▶ <https://services.github.com/kit/downloads/github-git-cheat-sheet.pdf>

FILE LIFECYCLE



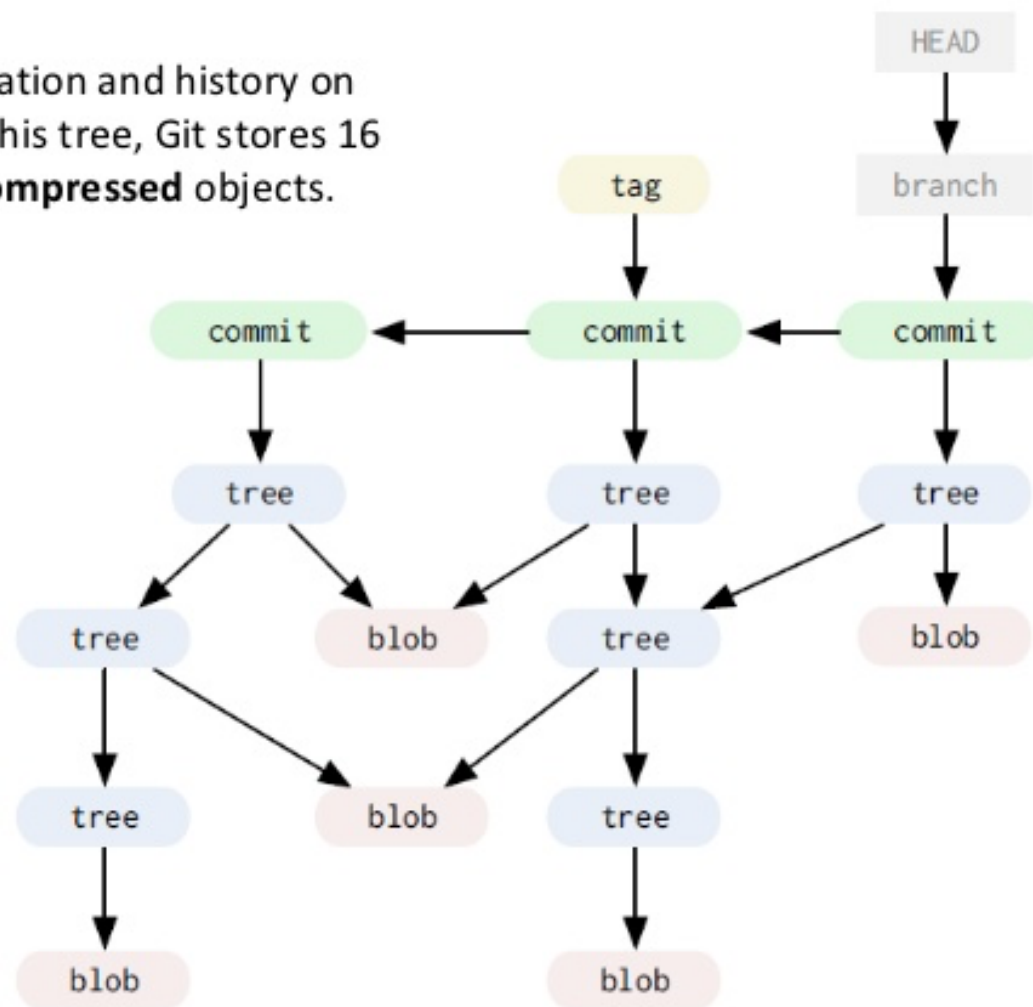
What about ".gitignore"?

[HTTPS://GIT-SCM.COM/BOOK/EN/V2/BOOK/02-GIT-BASICS/IMAGES/LIFECYCLE.PNG](https://git-scm.com/book/en/v2/book/02-git-basics/images/lifecycle.png)

BRANCHING

History is a DAG

To keep all the information and history on the three versions of this tree, Git stores 16 **immutable, signed, compressed** objects.



NOTES ON BRANCHING

- ▶ HEAD points to the current branch
- ▶ A branch is just a pointer to a commit.
- ▶ A commit contains parent pointers to other commits, so when you commit to a branch, the new commit is made to point to the commit pointed to by the branch pointer. The branch pointer is then pointed toward the new commit.
- ▶ When you merge branches, you are adding a pointer to the absorbed branch's pointer's commit to the current branch's pointer's commit's list of parent pointers. Ugh!

NOTE ON BRANCHING

- ▶ A Blob represent the current state of a file.
- ▶ Note that a commit has a pointer to a Tree and each Tree has pointers to other Trees and Blobs. This allows files that have not been changed in a given commit to have a chain of reference to tracked files without copying the Blobs each time a commit is made.

WHAT DO YOU NEED TO REMEMBER

- ▶ Hopefully everything, but...
- ▶ Know how to get started.
- ▶ Know how to add/remove changes to/from the staging area. Know how to commit those changes.
- ▶ Know how to push your changes to a remote repository.
- ▶ Know how to update your local repository from changes from a remote repository.
- ▶ Know the basics of branching.
- ▶ Know how to use .gitignore

TYPES OF ERRORS

- ▶ Syntax and Compile Time Errors
- ▶ Runtime Errors
 - ▶ Logical Errors
 - ▶ Use a Debugger (GDB)
 - ▶ Use Valgrind
 - ▶ Memory Leaks
 - ▶ Use Valgrind

GNU DEBUGGER (GDB)

- ▶ GDB can be used to find runtime errors (usually logical), but in order to do this, it needs to create a Debugging Symbol Table.
 - ▶ This is used by the debugger to map instructions in the compiled binary to their corresponding variable, function, line number, et cetera in the source code.
- ▶ `gcc -g {the rest}`
- ▶ `gdb a.out (or whatever)`

GDB COMMANDS

- ▶ https://www.tutorialspoint.com/gnu_debugger/gdb_quick_guide.htm

VALGRIND

- ▶ MemCheck

- ▶ `valgrind --leak-check=yes ./a.out arg1 arg2`

- ▶ "MemCheck Clean"

HANDS ON

- ▶ Lets test GDB and Valgrind on a simple program, which has some errors.
- ▶ Create new directory on your virtual machine and use:
 - ▶ `git clone https://GeneOsborne@bitbucket.org/GeneOsborne/cis-415-lab.git`
- ▶ The program has logical errors and memory leaks.
- ▶ The program is adding the values 0 - 9 to an AVL tree, after which an iterator is used to print the values contained within said tree.
- ▶ Goals:
 - ▶ Why is the program outputting the wrong values?
 - ▶ How can we make the program MemCheck Clean?