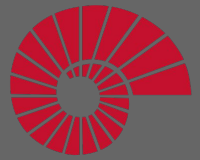
Bootcamp

Intro to C and Git

COMP201 - Spring 2021



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Contents - Part A

- Version Control System (VCS) and Git
- Github Classroom
- LinuxPool and REPL.it
- Bash - create and write to a file

Version Control System

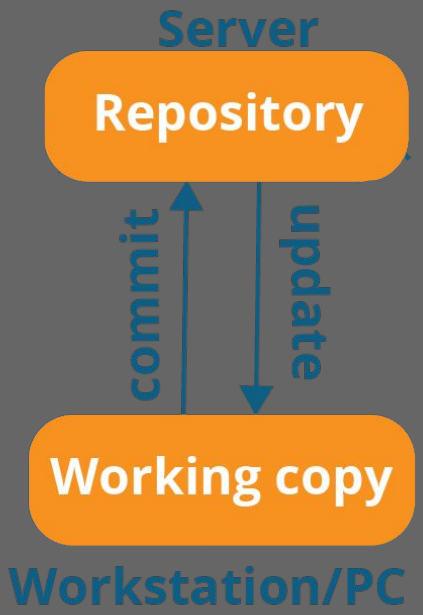
Version controls systems are a class of software tools that keep track of every modifications to source code over time.

Using VCS developers can recover earlier versions in case they needed it.

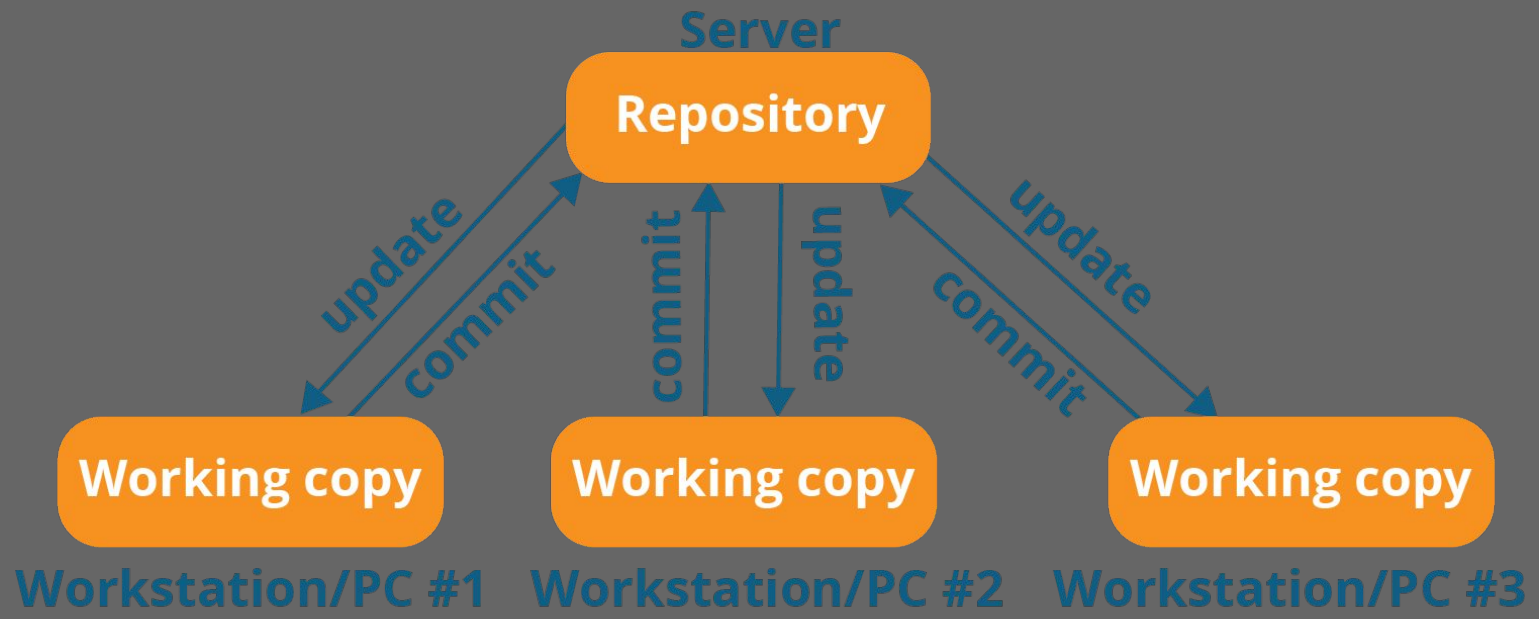
VCSs support multiple team members working on the same project while minimizing conflict.

Be a professional programmer

Single User Version Control



Multi User Version Control



GitHub Classroom

Assignments are based on a template repository

Instructor can see your work and progress

Github Classroom can be utilized to automatically tests and grades your work

Repl.it

Repl.it is a cloud IDE

Lets you work on your repository on your browser

No need to have git or compiler installed

Since May 2020 Github Classroom and RELP.it are integrated

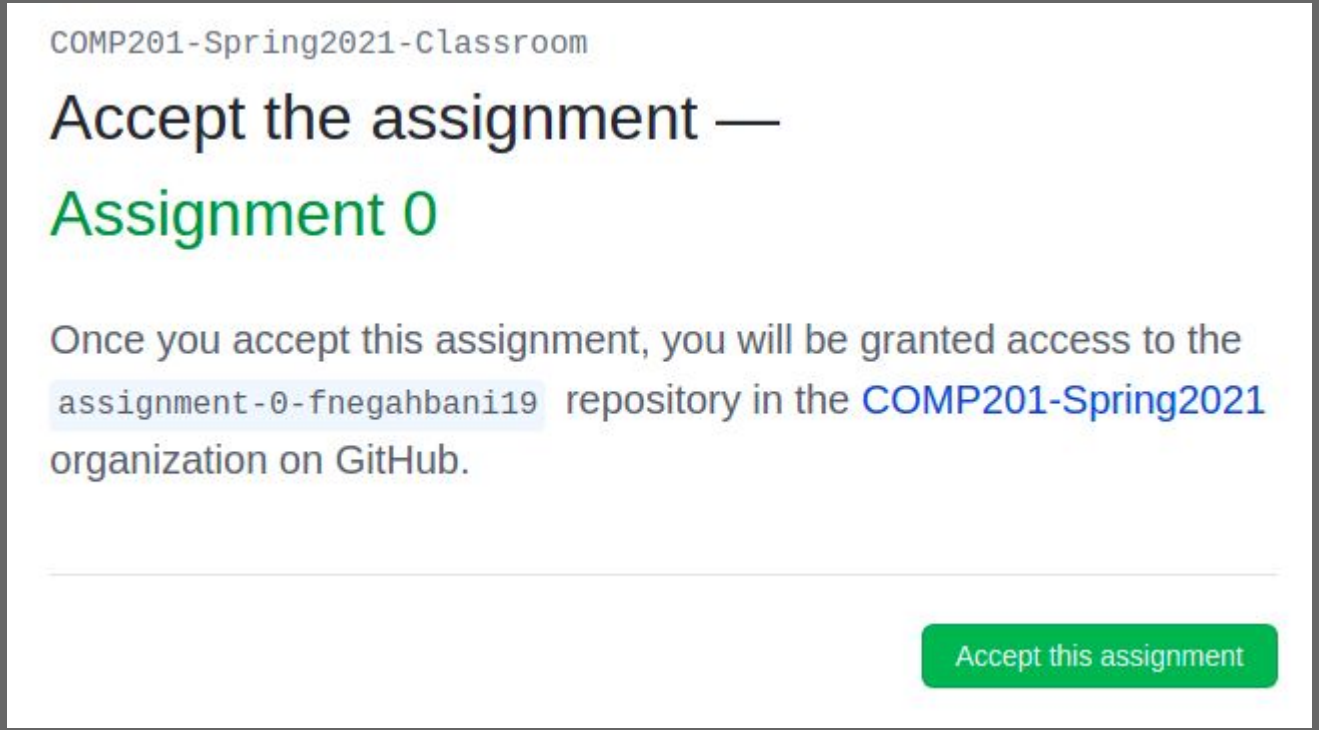
Accept and work on assignments

During this semester, you will get an invitation link to accept assignments.

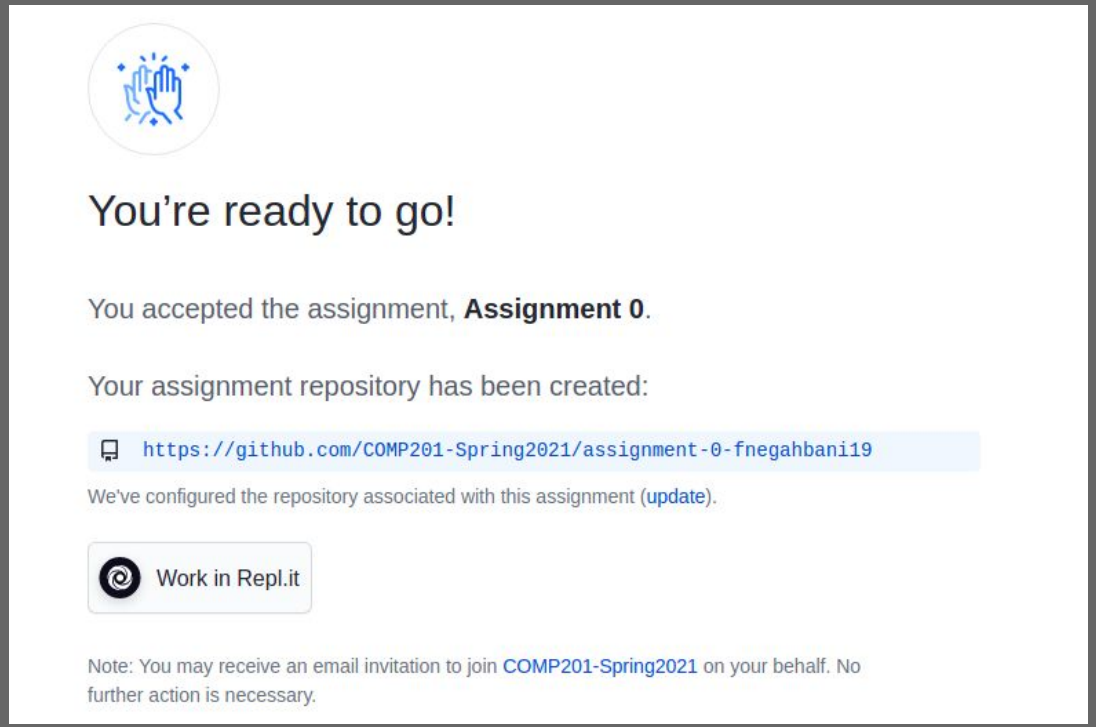
To work on the assignment, you have two options:

1. Clone it on your local machine and push changes to your Github Classroom repository.
2. Work on it in your browser using REPL.it
    a. Which automatically clones but you still need to push your work when done

Accept and work on assignments



Accept and work on assignments



Demo

1. Git basic commands
   a. Clone, commit, push, pull
2. Connect to LinuxPool
3. Create and edit file using bash
   a. Nano command
4. Git Branch management
   a. Demo

Useful Git links

1. Tutorial
2. Git Branching
3. Cheatsheet

Contents - Part B

- C language Introduction
- How to compile and run a C program
- What is a makefile

C Programming

- C is the most widely used programming language
- Almost all new hardware come with C compilers
- Is very tightly coupled with the platform (OS+HW)
- Provides direct access to the memory
  - Which is the source of it being hard and prone to errors if attention is not paid
- Is otherwise very similar to other languages

Sample C Program

- All C programs start with main() function
- All variables have types
- Library definitions are added via #include
- Address of variables are sent to many functions via & operator
- Pointers are a big deal!

```c
#include <stdio.h> // standard IO functions

int main() // main is the program entry function
{
    int a, b; // two int variables
    scanf("%d %d", &a, &b); // address of a, b
    printf("Hello world %d\n", a + b);
    return 0;
}
```

How to compile and run a C program

- C programs are compiled
- There are generally two means of compiling C programs:
  - Partially (turns into object files and libraries)
  - Fully (all the source code into one binary)
- Partially is still needed if the project is too large, or if uses external libraries that are not source code

How to compile and run a C program (cont.)

- C programs are compiled with C compilers
- The most common compilers are GCC (GNU Compiler Collection) and Clang (Apple's LLVM compiler)
- gcc -o target_binary -W all -g -O3 file1.c file2.c file3.c
  - -o defines output file
  - -W all means emit all warnings
  - -g includes debug symbols (more info on errors)
  - -O means optimization (0 to 3)
  - The rest are C source code files

What is a Makefile

- Compiling large C programs is very slow
- Instead of compiling all of the program at any change, we compile files separately into object files
- That way only the changed files are re-compiled
- Then we link all the object files into the binary
- But how can we tell which file is changed to compile easily?

What is a Makefile (cont.)

- Make is a UNIX utility that given a list of source code files
  - Can detect which ones have changed
  - Can run commands on those files
  - Can clear out extra files
  - Can determine simple dependencies
- Make reads the list and configurations from a file called Makefile

Demo

1. Simple C language program
    a. “Hello World”

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Thank You!

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