



Bradley IEEE Student Branch

General Meeting - 2/16/17 - Git

Announcements

- Working on fixing manufacturer's defect on drone project
- IEEE Executive Board Nominations begin Tuesday, March 28
- IEEE Executive Board Elections take place April 11 - April 13
- Join the [IEEE Facebook Group](#) for news and event notifications
- Soft Skills Symposium March 29 and March 30

Introduction to Git



What is Git?

- Distributed Version Control System (DVCS)
 - “Records changes to a file or set of files over time”
- Created by Linus Torvalds, father of the Linux kernel, in 2005

What we will cover today...

- Installing/Configuring Git
- Git Fundamentals
 - Staging
 - Committing
 - Pushing
 - Pulling
 - Branching
 - Merging (hopefully!)

Installing Git

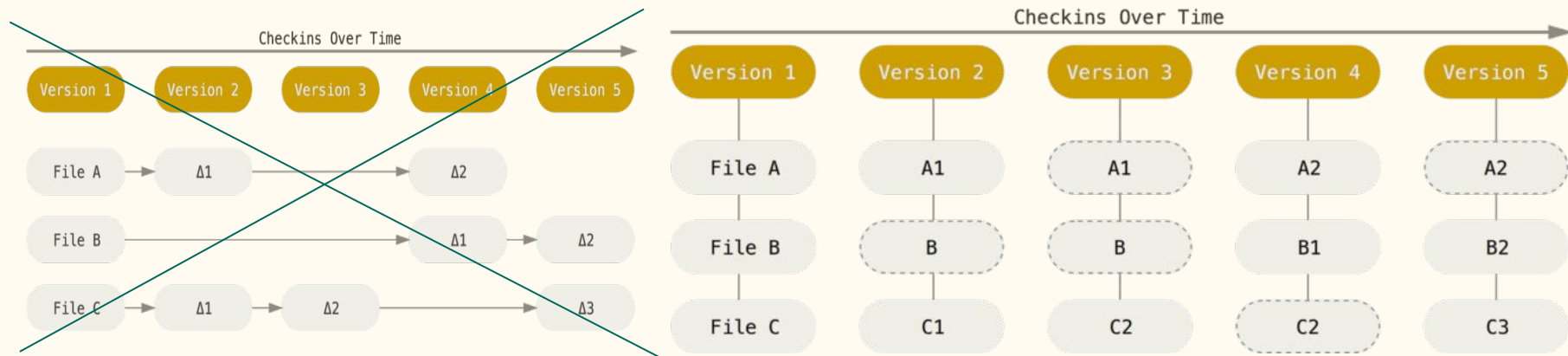
- Download installer from: <https://git-scm.com/>
- Uncheck “Windows Explorer integration”
 - Make sure .git* and .sh boxes are checked
 - Click “Next”
- We will be choosing “Use Git from the Windows Command Prompt”
 - Click “Next”
- We will be using the OpenSSH executable with Git
- Easiest option - “Checkout as-is, commit as-is”
- MinTTY as terminal editor
- Enable both “file system caching” and “Git Credential Manager”

Configuring Git

- Open Git CMD
- Set identity
 - `git config --global user.name "Your Name"`
 - `git config --global user.email your.email@gmail.com`
- Check settings
 - `git config --list`

```
C:\Users\Nick>git config user.name  
Nick P  
  
C:\Users\Nick>git config user.email  
nicholasgpratt@gmail.com
```

Snapshots

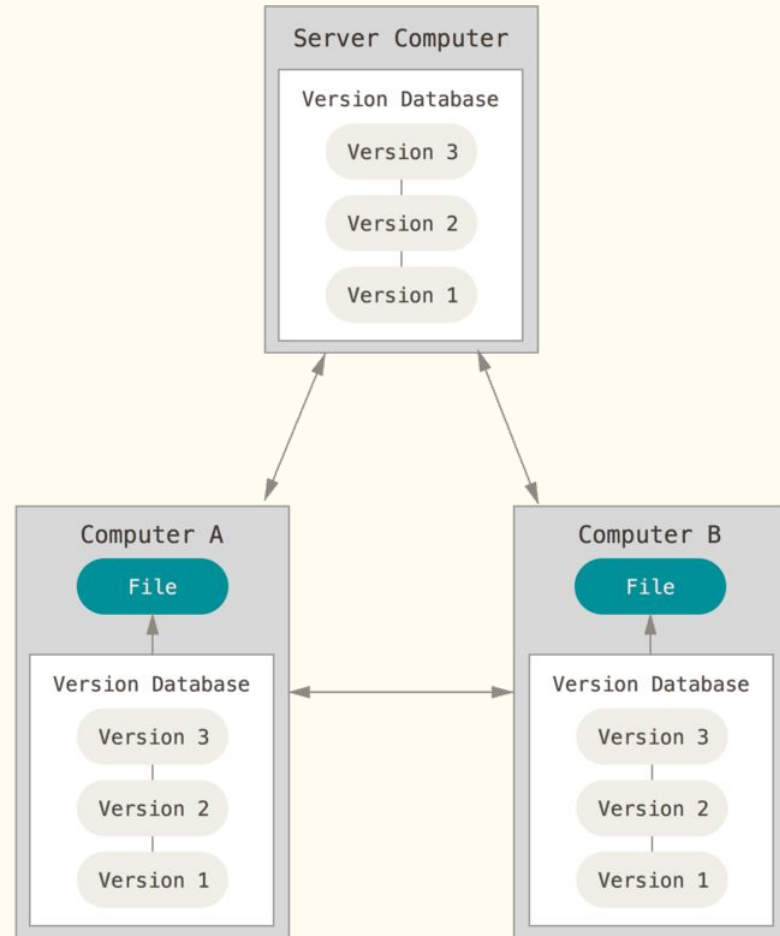


Integrous

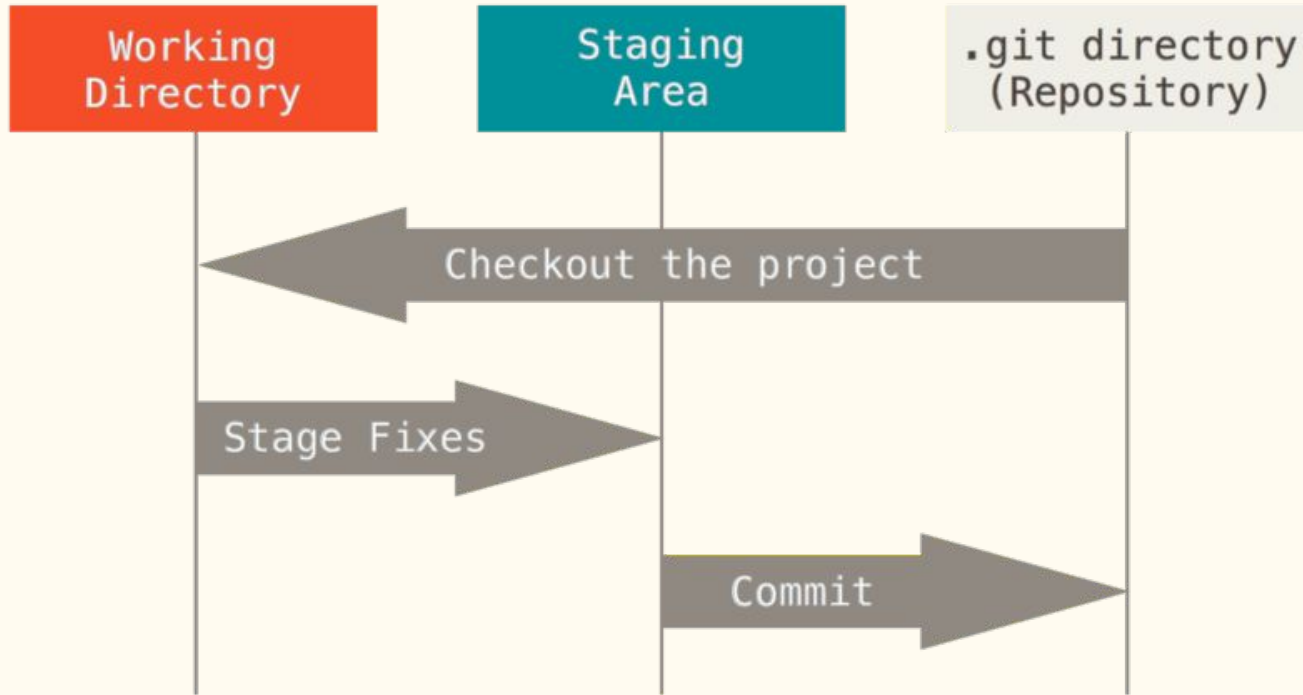
- SHA-1 checksum
- Checksums used all over the place

Commit: 1b3a3e4c38b6ef3b9824fe005c5d26f89b0f4a65 [1b3a3e4]

Distributed

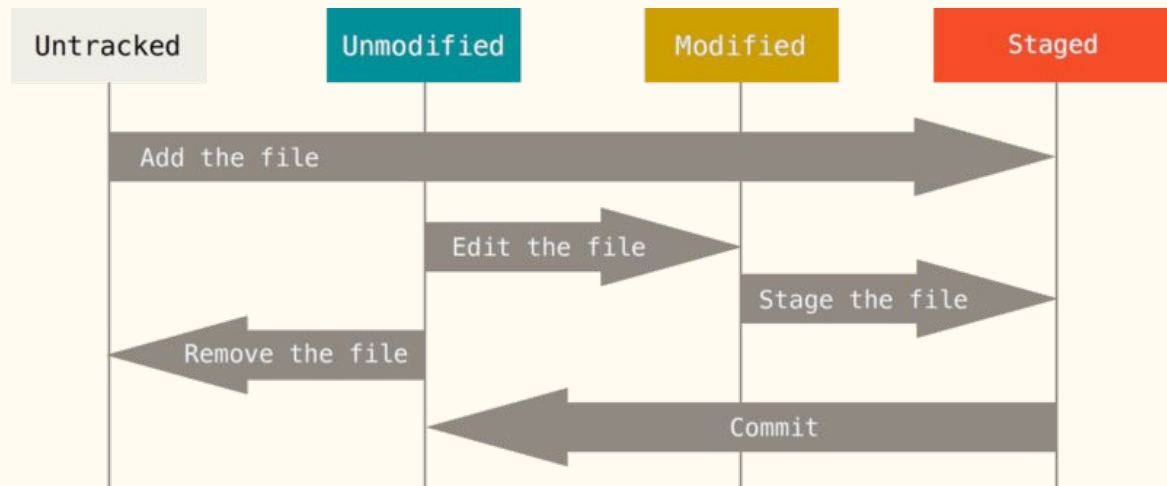


Three States



Basic Workflow

1. Modify files in directory
2. Stage files
3. Commit files
4. Push changes

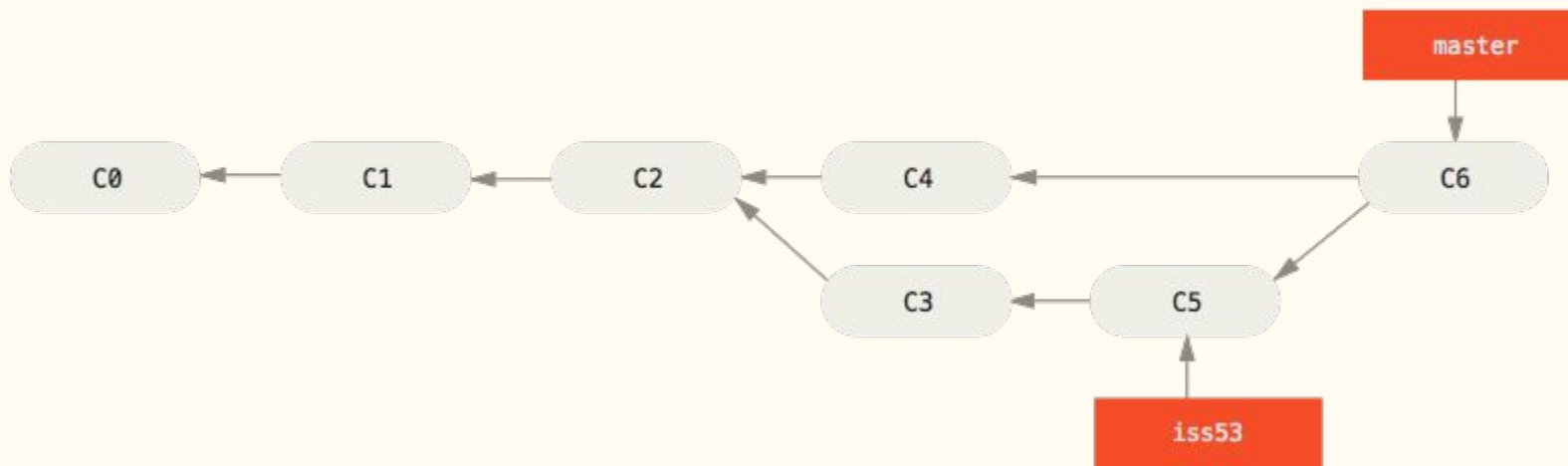


Gitignore

- .gitignore file used to exclude unnecessary files
- Typically ignored files include:
 - Object files
 - Executables
 - Text editor config files
 - OS-generated files

Branching

- Used to better organize your project
- Easy to create, easy to destroy
- Perfect for adding new features and keeping master branch clean



Demo

- Creating a git repository
 - Travel to requisite directory
 - *git init*

```
C:\Users\Nick\Documents\School\Senior Year>cd IEEE
```

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git init  
Initialized empty Git repository in C:/Users/Nick/Documents/School/Senior Year/IEEE/.git/
```

Status of Files

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git status
On branch master

Initial commit

nothing to commit (create/copy files and use "git add" to track)
```


Modifying a File

hello - Notepad

File Edit Format View Help

```
#include <stdio.h>

int main(void)
{
    printf("Hello, World!\n");
    return 0;
}
```

Git CMD

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git status
On branch master

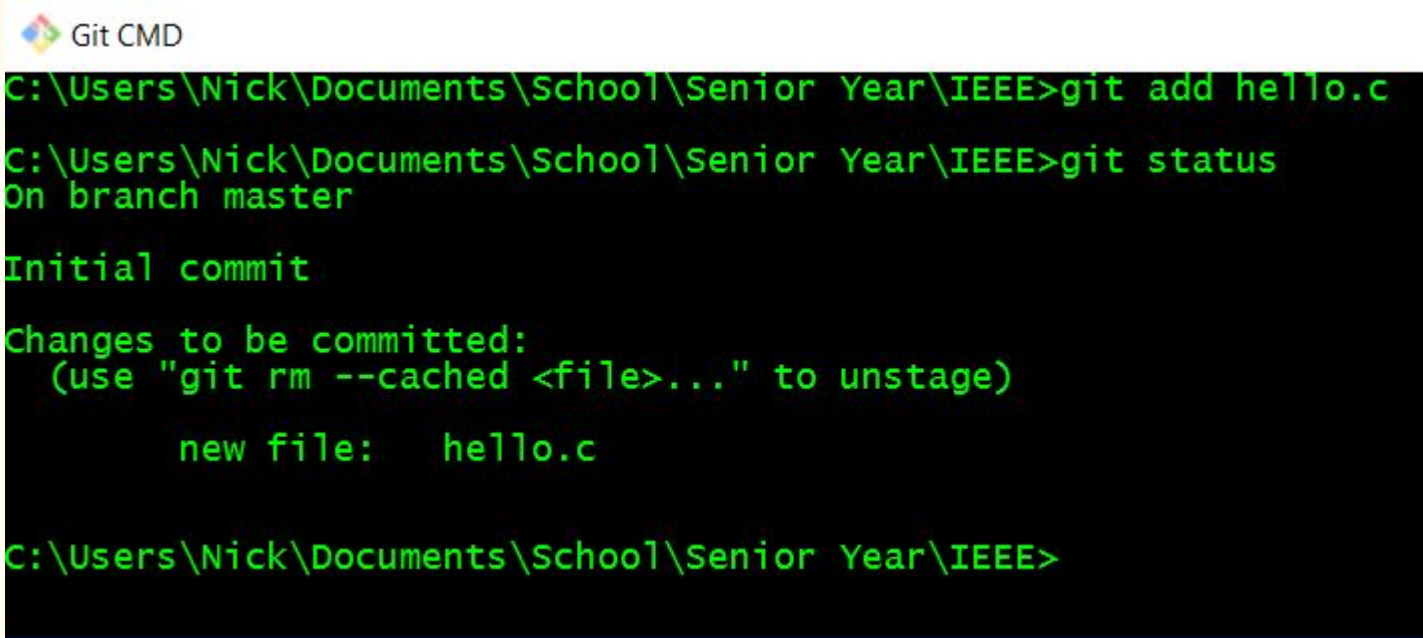
Initial commit

Untracked files:
  (use "git add <file>..." to include in what will be committed)

        hello.c

nothing added to commit but untracked files present (use "git add" to track)
C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

Tracking a New File



```
Git CMD
C:\Users\Nick\Documents\School\Senior Year\IEEE>git add hello.c

C:\Users\Nick\Documents\School\Senior Year\IEEE>git status
On branch master

Initial commit

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)

    new file:   hello.c

C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

Committing Changes

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git commit -m "Initial Commit - Hello World"
[master (root-commit) 6bf3b1c] Initial Commit - Hello World
1 file changed, 7 insertions(+)
create mode 100644 hello.c
```

Continuing...

- Make another change, stage, commit...

hello - Notepad

File Edit Format View Help

```
#include <stdio.h>
```

```
int main(void)
```

```
{
```

```
    int a = 5;
```

```
    int b = 10;
```

```
    int c = a+b;
```

```
    printf("Hello, World!\n");
```

```
    printf("a+b=%d\n",c);
```

```
    return 0;
```

```
}
```

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git add hello.c
```

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git commit -m "Added simple addition"
[master 9e24dd6] Added simple addition
1 file changed, 6 insertions(+)
```

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

Git CMD

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git status
```

```
On branch master
```

```
Changes not staged for commit:
```

```
  (use "git add <file>..." to update what will be committed)
```

```
  (use "git checkout -- <file>..." to discard changes in working directory)
```

```
    modified:   hello.c
```

```
no changes added to commit (use "git add" and/or "git commit -a")
```

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

Viewing Commit History

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git log
commit 9e24dd63190e5d07eb7dccd39ffddd2041bef8c6
Author: Nick P <nicholasgpratt@gmail.com>
Date:   Wed Feb 15 11:57:48 2017 -0600

    Added simple addition

commit 6bf3b1c36ffead3136097e2781d505441000d1a4
Author: Nick P <nicholasgpratt@gmail.com>
Date:   Wed Feb 15 11:53:11 2017 -0600

    Initial Commit - Hello World

C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

Checking Out an Old Commit

- `git checkout <revision> .`

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git checkout 6bf3b1c36ffead3136097e2781d505441000d1a4 .
```

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git log
```

```
commit 9e24dd63190e5d07eb7dccc39ffddd2041bef8c6
```

```
Author: Nick P <nicholasgpratt@gmail.com>
```

```
Date:   Wed Feb 15 11:57:48 2017 -0600
```

```
    Added simple addition
```

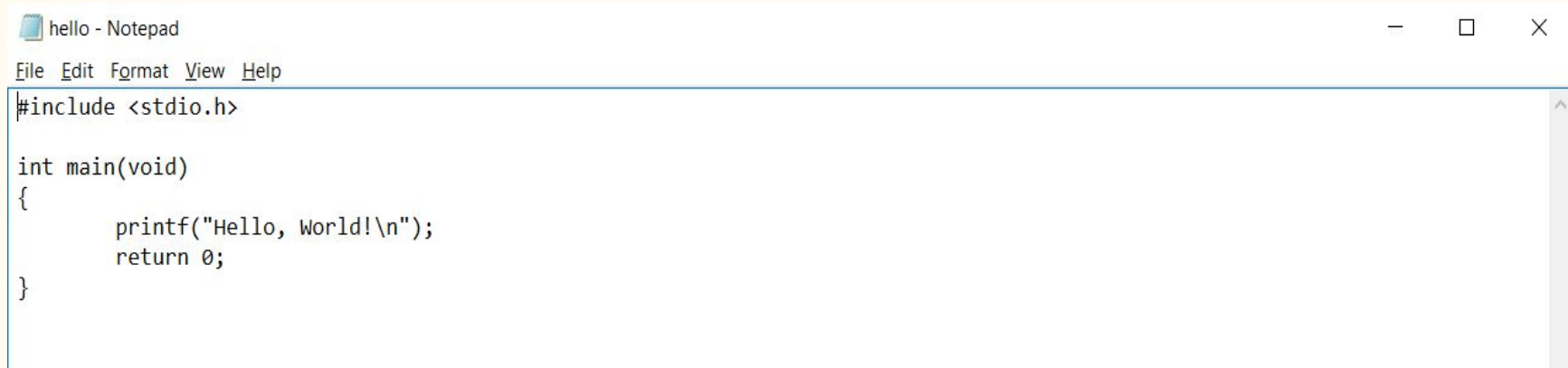
```
commit 6bf3b1c36ffead3136097e2781d505441000d1a4
```

```
Author: Nick P <nicholasgpratt@gmail.com>
```

```
Date:   Wed Feb 15 11:53:11 2017 -0600
```

```
    Initial Commit - Hello World
```

Checking out an Old Commit (continued)



```
hello - Notepad
File Edit Format View Help
#include <stdio.h>

int main(void)
{
    printf("Hello, World!\n");
    return 0;
}
```

Remote Repositories - Push

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git remote add iee https://ngpratt@bitbucket.org/ngpratt/ieee_presentation.git

C:\Users\Nick\Documents\School\Senior Year\IEEE>git remote
iee

C:\Users\Nick\Documents\School\Senior Year\IEEE>git push iee master
Counting objects: 6, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (4/4), done.
Writing objects: 100% (6/6), 634 bytes | 0 bytes/s, done.
Total 6 (delta 0), reused 0 (delta 0)
To https://bitbucket.org/ngpratt/ieee_presentation.git
 * [new branch]      master -> master

C:\Users\Nick\Documents\School\Senior Year\IEEE>
```


Remote Repositories - Pull

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git pull ieee master
From https://bitbucket.org/ngpratt/ieee_presentation
 * branch          master          -> FETCH_HEAD
Already up-to-date.

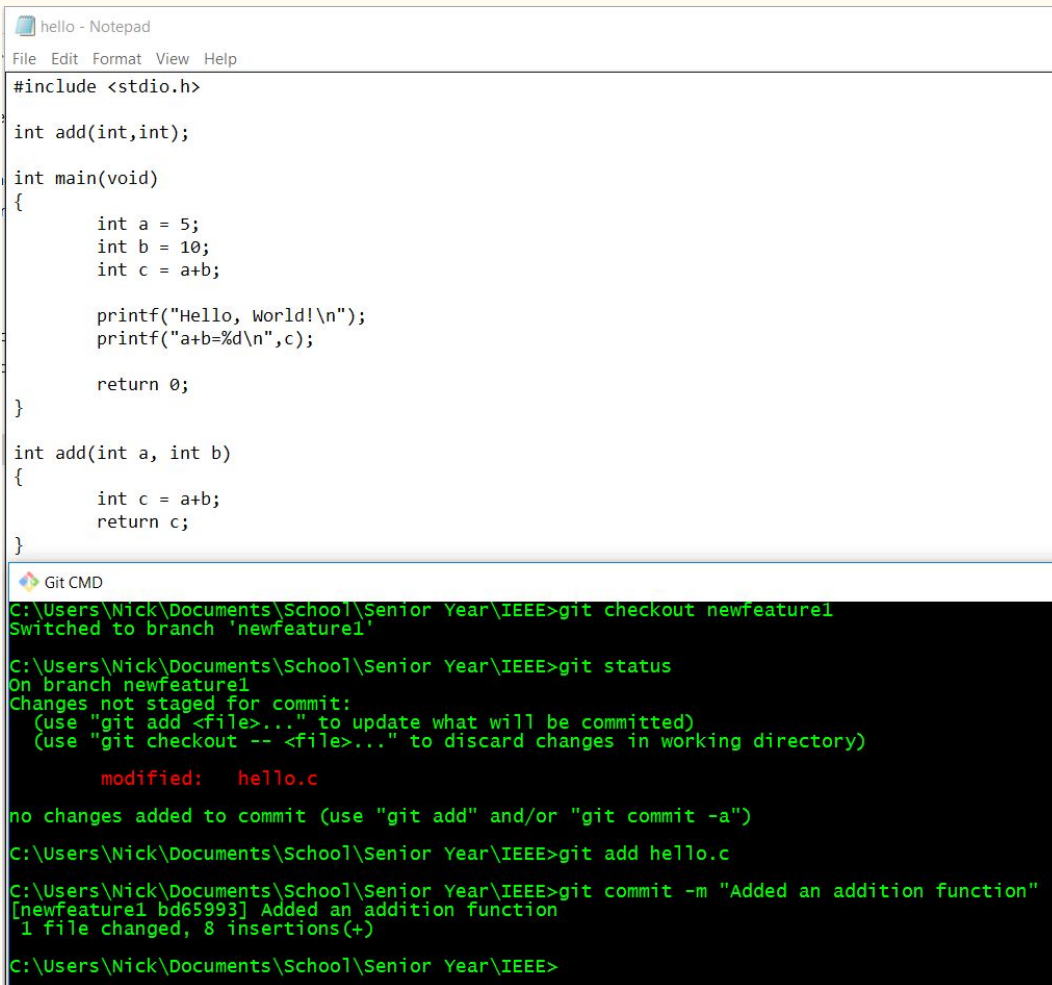
C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

Branching

- Can also use *git checkout -b newfeature1*

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git branch newfeature1  
C:\Users\Nick\Documents\School\Senior Year\IEEE>git checkout newfeature1  
Switched to branch 'newfeature1'  
C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

Making a Branch Commit



```
hello - Notepad
File Edit Format View Help

#include <stdio.h>

int add(int,int);

int main(void)
{
    int a = 5;
    int b = 10;
    int c = a+b;

    printf("Hello, World!\n");
    printf("a+b=%d\n",c);

    return 0;
}

int add(int a, int b)
{
    int c = a+b;
    return c;
}

Git CMD
C:\Users\Nick\Documents\School\Senior Year\IEEE>git checkout newfeature1
Switched to branch 'newfeature1'

C:\Users\Nick\Documents\School\Senior Year\IEEE>git status
On branch newfeature1
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

        modified:   hello.c

no changes added to commit (use "git add" and/or "git commit -a")
C:\Users\Nick\Documents\School\Senior Year\IEEE>git add hello.c
C:\Users\Nick\Documents\School\Senior Year\IEEE>git commit -m "Added an addition function"
[newfeature1 bd65993] Added an addition function
 1 file changed, 8 insertions(+)
C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

Merging

```
C:\Users\Nick\Documents\School\Senior Year\IEEE>git checkout master
Switched to branch 'master'

C:\Users\Nick\Documents\School\Senior Year\IEEE>git merge newfeature1
Updating 9e24dd6..4772813
Fast-forward
 hello.c | 10 ++++++++--
 1 file changed, 9 insertions(+), 1 deletion(-)

C:\Users\Nick\Documents\School\Senior Year\IEEE>
```

- Delete unneeded branch with `git branch -d newfeature1`

Merge Conflicts

```
<<<<<< HEAD:index.html
<div id="footer">contact : email.support@github.com</div>
=====
<div id="footer">
  please contact us at support@github.com
</div>
>>>>>> iss53:index.html
```

- Respective branch contents split by “=====” and labeled with “<<<<<<< [name]” and “>>>>>>> [name]”
- Fix conflicts and remove above lines

```
<div id="footer">
please contact us at email.support@github.com
</div>
```

Possibility of Git Workshop 2

- Resolving merge conflicts
- Forking
- Rebasing
- Tagging
- Fixing errors / undoing
- Aliases
- Customization
- Inspection and comparison

More Information

- <https://git-scm.com/book/en/v2>
- <https://guides.github.com/activities/hello-world/>

All images courtesy of <https://git-scm.com/book/en/v2>