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London

GIT Tricks

GET OUT OF JAIL FREE - WITH GIT!

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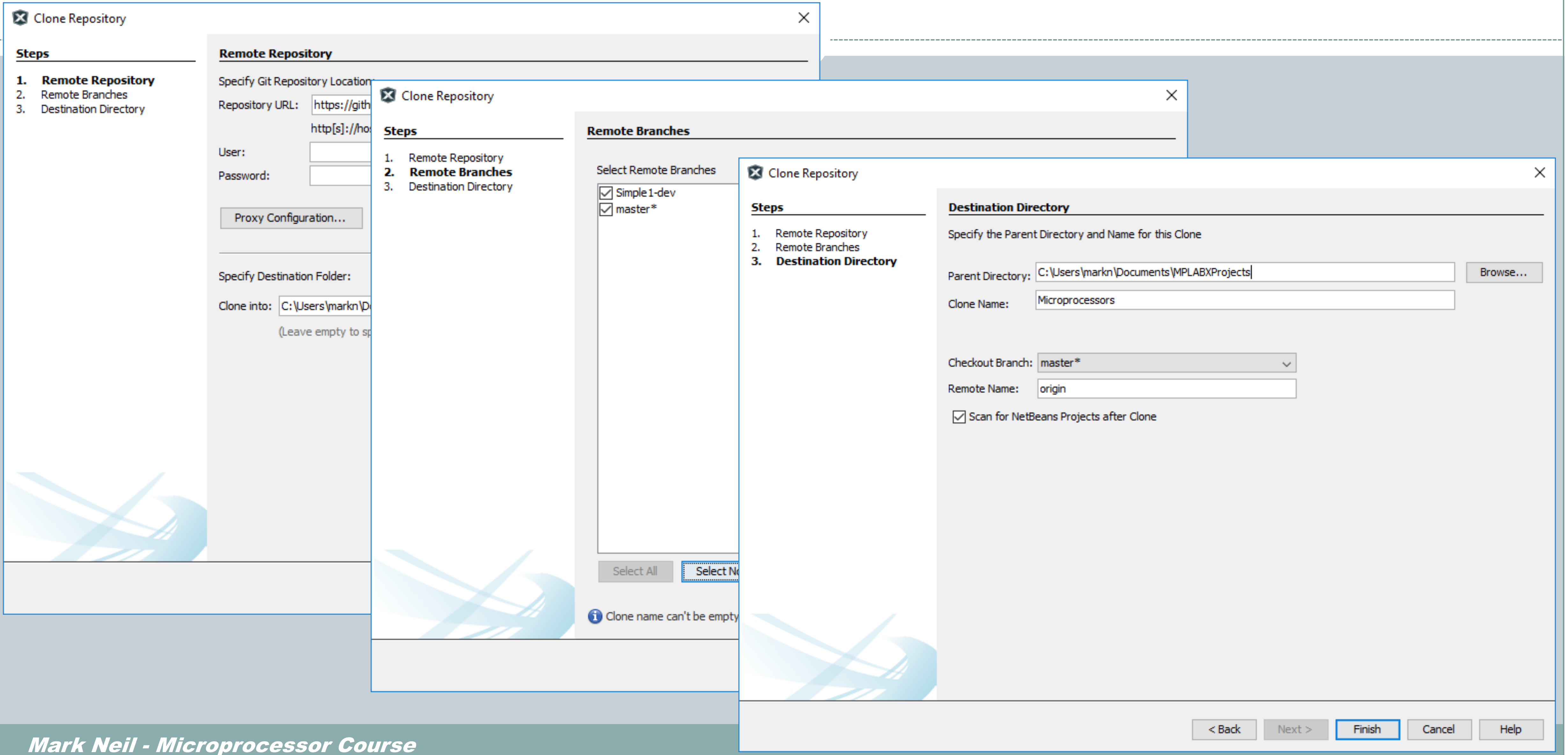
Cloning a repository with MPLAB and GIT



Parent Directory: C:\Users\markn\Documents\MPLABXProjects

Clone Name: Microprocessors

Checkout Branch: master*

Remote Name: origin

✓ Scan for NetBeans Projects after Clone

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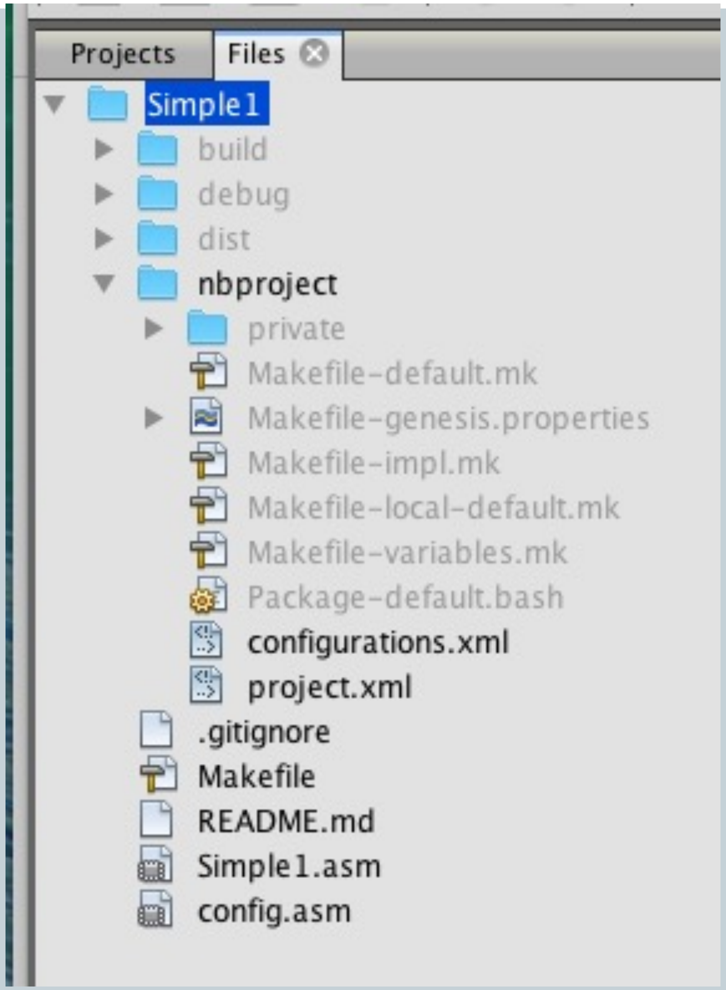
What files are in your GIT repository and in MPLAB

- Open the files tab in MPLAB to see what's there
- Only the files not greyed out are essential and stored by GIT
  - .gitignore tells GIT which files not to store
    - this is a very useful file and you should copy it to any MPLAB repository you make from scratch
  - README.md is a text file describing the project
  - Simple.asm and config.asm are your source files
    - Config.asm is another useful file that you should copy to your own projects
  - Makefile, configurations.xml and project.xml are all used internally by MPLAB
- All other files and directories in this directory are temporary and can be regenerated by MPLAB as and when they are needed
- On disk there is a hidden directory called .git where your local repository is actually stored
  - It is a database of all changes that have been made to the files in the repository over time at each "commit"



```
Simple1
  build
  debug
  dist
  nbproject
    private
    Makefile-default.mk
    Makefile-genesis.properties
    Makefile-impl.mk
    Makefile-local-default.mk
    Makefile-variables.mk
    Package-default.bash
    configurations.xml
    project.xml
  .gitignore
  Makefile
  README.md
  Simple1.asm
  config.asm
```

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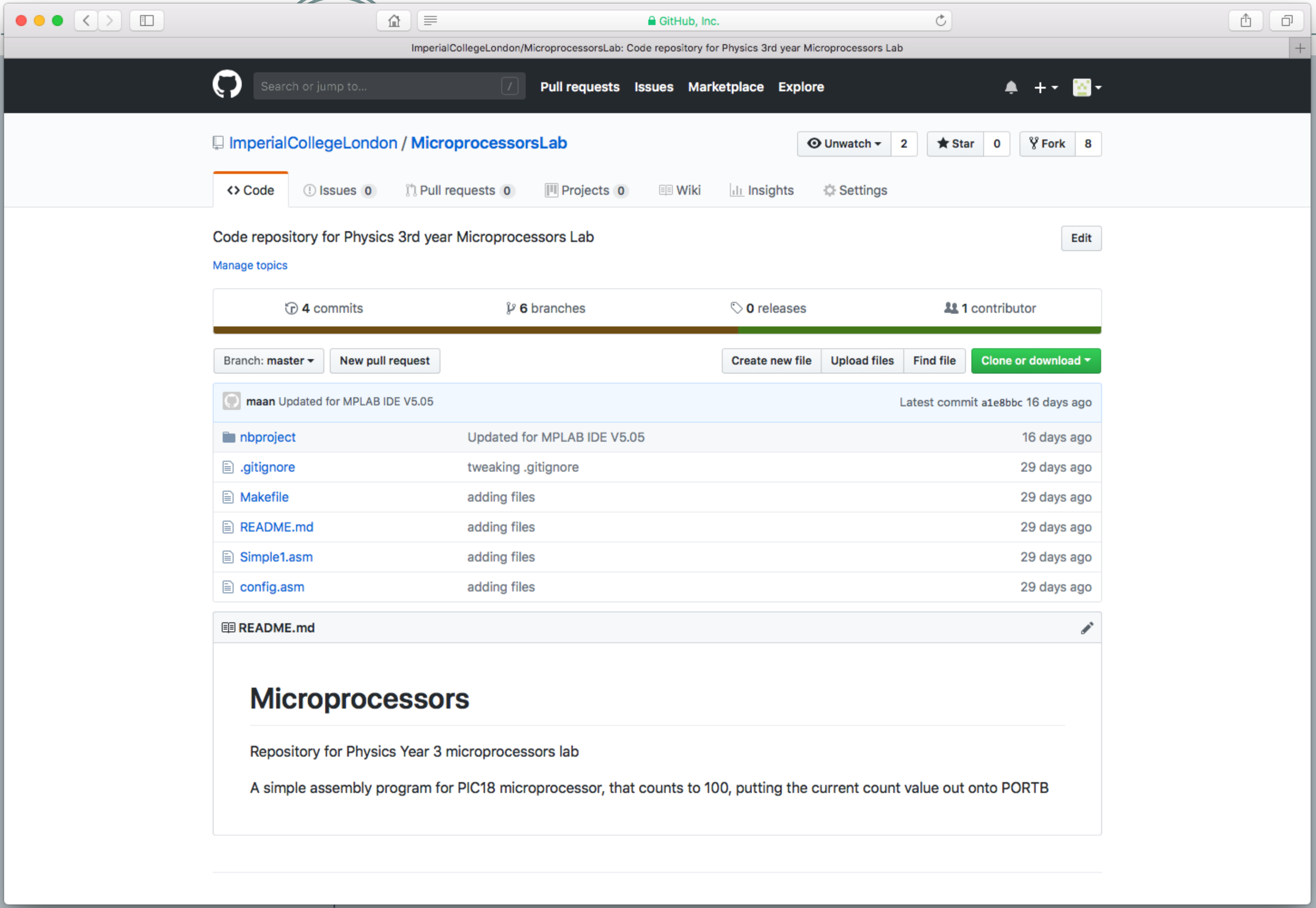
Viewing your repository in GITHUB

- You can view the repository on-line (the origin)
- The stored files are visible and you can see what is in the separate branches
- You can do a few other things here too…



ImperialCollegeLondon/MicroprocessorsLab: Code repository for Physics 3rd year Microprocessors Lab

ImperialCollegeLondon / MicroprocessorsLab

Code repository for Physics 3rd year Microprocessors Lab

maan Updated for MPLAB IDE V5.05 — Latest commit a1e8bbc 16 days ago

nbproject	Updated for MPLAB IDE V5.05	16 days ago
.gitignore	tweaking .gitignore	29 days ago
Makefile	adding files	29 days ago
README.md	adding files	29 days ago
Simple1.asm	adding files	29 days ago
config.asm	adding files	29 days ago

README.md

Microprocessors

Repository for Physics Year 3 microprocessors lab

A simple assembly program for PIC18 microprocessor, that counts to 100, putting the current count value out onto PORTB

https://github.com/ImperialCollegeLondon/MicroprocessorsLab

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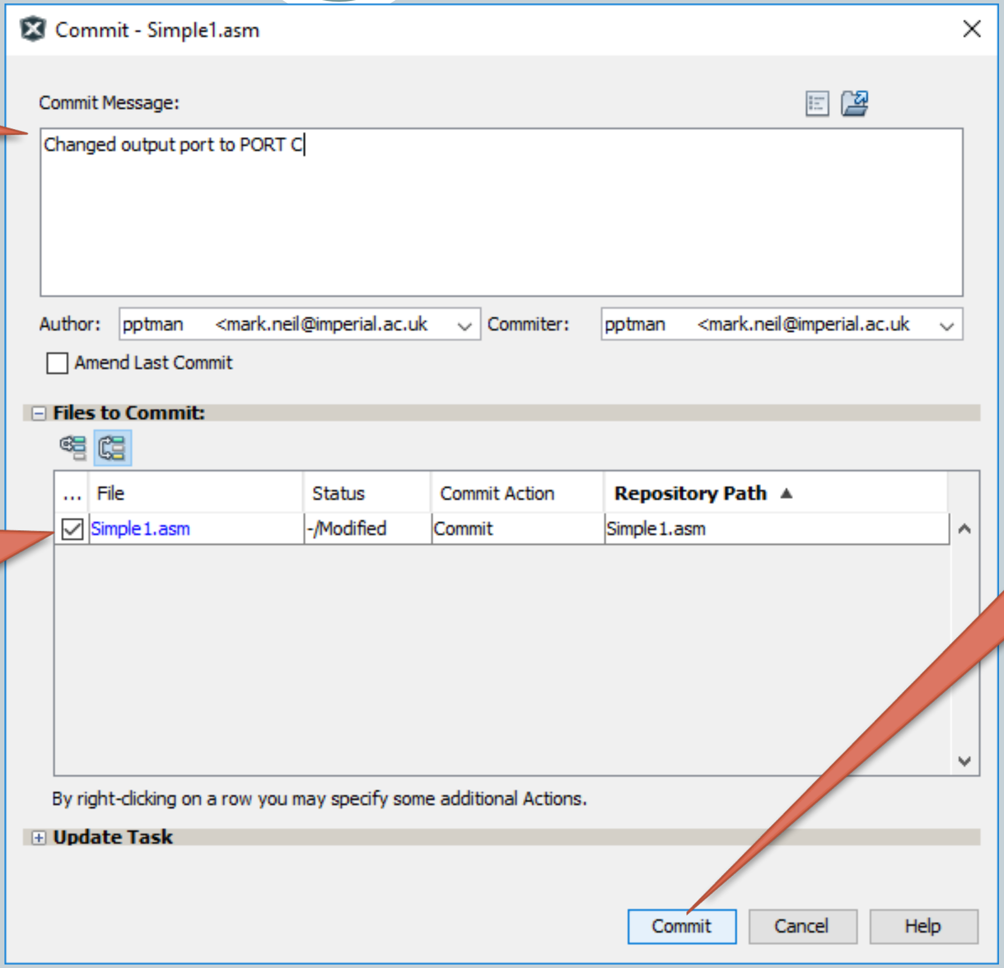
Commit changes from MPLAB

Add a useful message to say what the changes have been made

Files with changes are listed here, choose the ones you want to include in this commit



Commit - Simple1.asm

Commit Message:

Changed output port to PORT C

Author: pptman <mark.neil@imperial.ac.uk Commiter: pptman <mark.neil@imperial.ac.uk

☐ Amend Last Commit

Files to Commit:

...	File	Status	Commit Action	Repository Path ▲
☑	Simple1.asm	-/Modified	Commit	Simple1.asm

By right-clicking on a row you may specify some additional Actions.

Update Task

Hit commit

Do a commit whenever you want to save things in your history for later, or before switching to a different branch.
Note in your lab book what you have done!

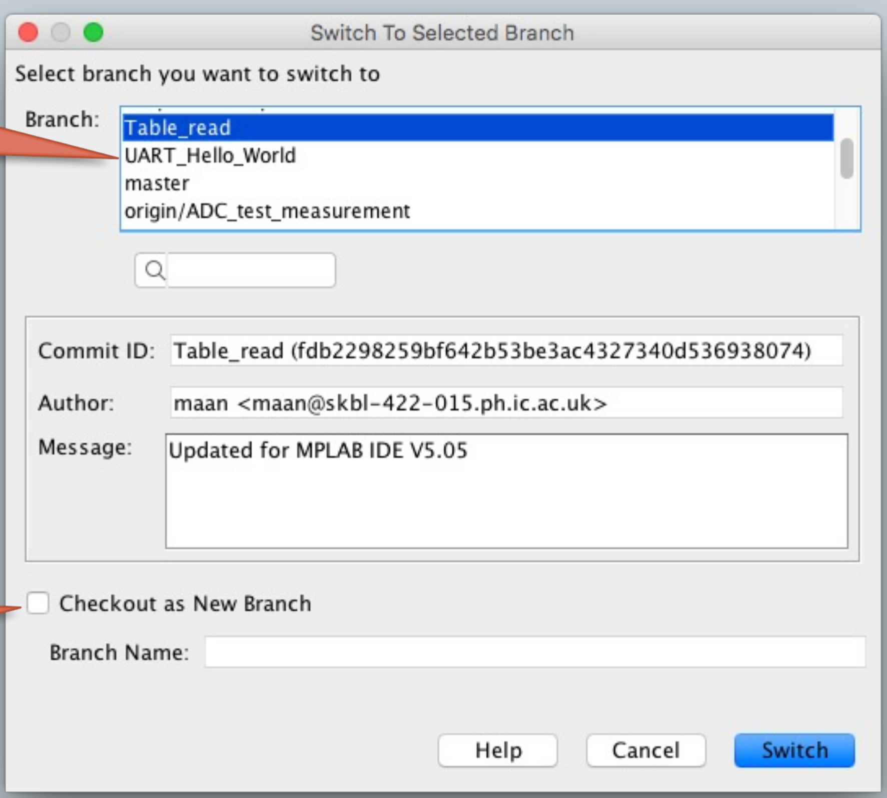
Push, Pull and Fetch

- A Push will send any commits in your local repository up to the origin on GitHub
  - Only if you have write privileges to the origin
- A Fetch will download any commits on the origin that anyone else might have made, to your local repository, but you won't see them yet if you have local modifications
- A Pull, does the same as a fetch but then also merges the changes (if it can) with any changes you have made to your local copy

Switching branches from MPLAB

Choose the branch you want to switch to
If it is not local then select the one on origin

Make sure that you tick this box if you are switching to a branch that is only on origin


Switch To Selected Branch

Select branch you want to switch to

Branch:
Table_read
UART_Hello_World
master
origin/ADC_test_measurement

Commit ID: Table_read (fdb2298259bf642b53be3ac4327340d536938074)

Author: maan <maan@skbl-422-015.ph.ic.ac.uk>

Message: Updated for MPLAB IDE V5.05

☐ Checkout as New Branch

Branch Name:

This is what it looks like on a mac, by the way!

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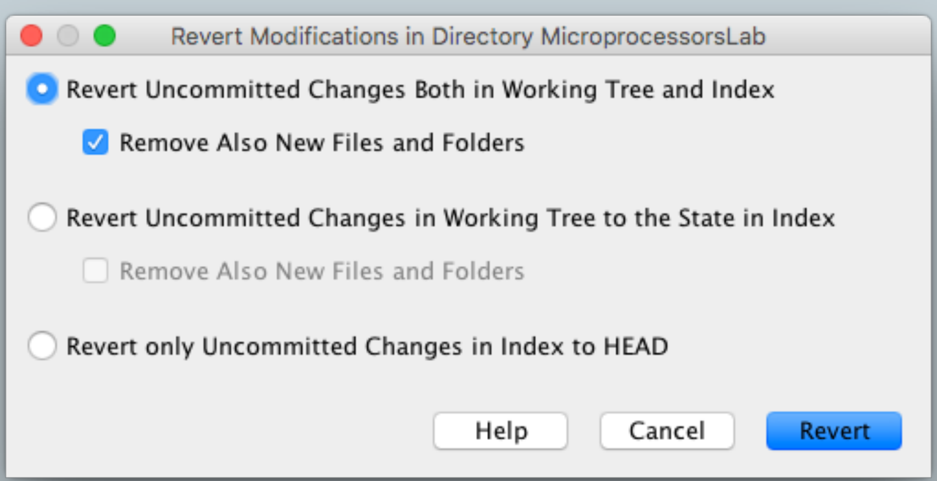
Fixing things with a revert

- Sometimes things can go wrong with a switch (usually because MPLAB can have configurations.xml open when you switch)
- Or you may just want to bin what you have been doing and revert to your last commited state
- Choose Git->Revert Modifications to undo everything
- Close your project and reopen it to make sure things are all correct



Revert Modifications in Directory MicroprocessorsLab

[✓ Revert Uncommitted Changes Both in Working Tree and Index]

[✓ Remove Also New Files and Folders]

Revert Uncommitted Changes in Working Tree to the State in Index

Remove Also New Files and Folders

Revert only Uncommitted Changes in Index to HEAD

What's a Fork?

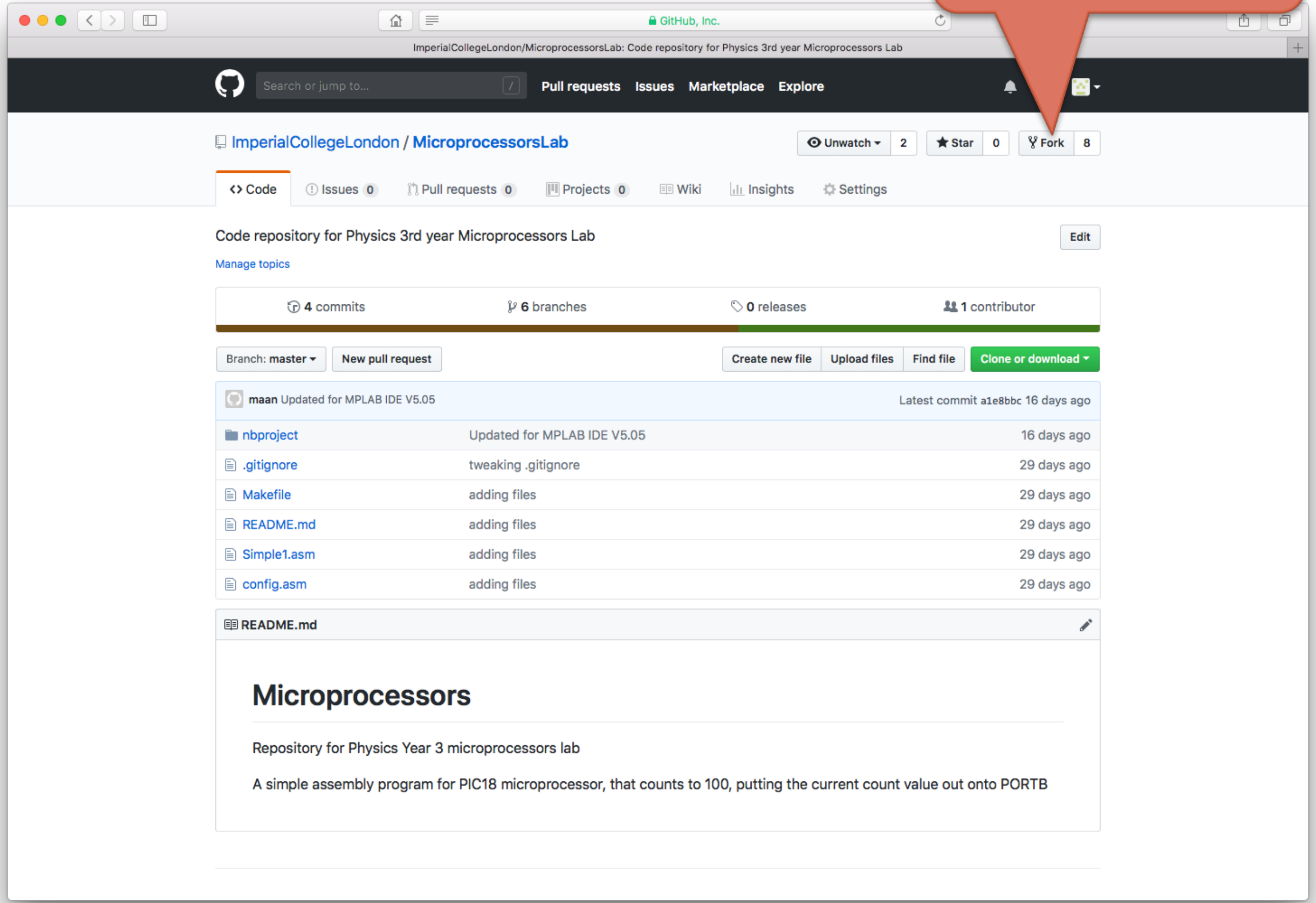
A Fork is your own copy of a repository that is linked back to the original

You can store your own modifications to the code in a fork

You can also let the owner of the original code about any changes that you have made that they might find useful (eg bug fixes)

- To do this you create a "Pull request"

If the original is public then your copy will be public too



Code repository for Physics 3rd year Microprocessors Lab

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Microprocessors

Repository for Physics Year 3 microprocessors lab

A simple assembly program for PIC18 microprocessor, that counts to 100, putting the current count value out onto PORTB

Create one by clicking here

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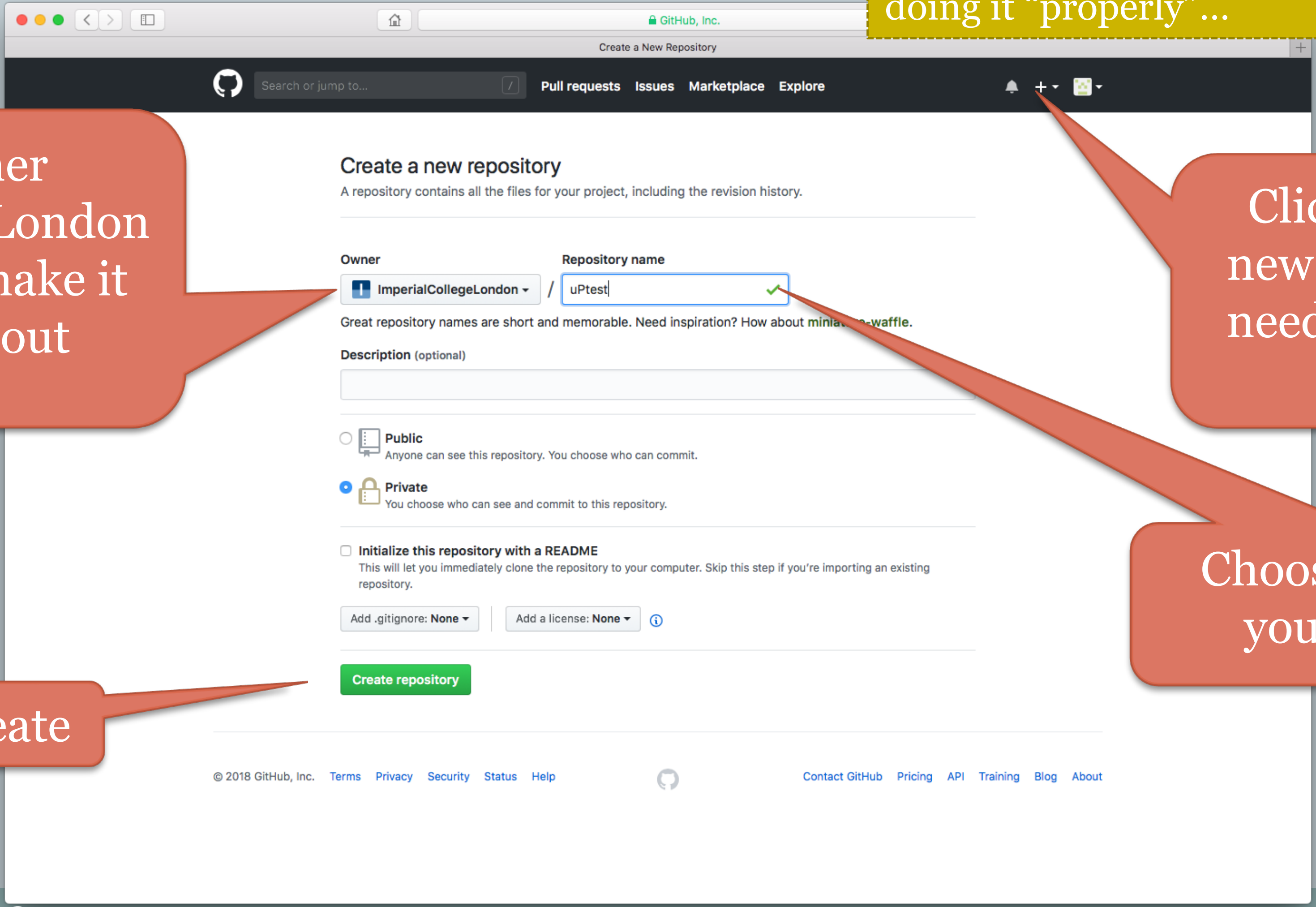
Make your own Private copy of a repository

This works and can all be done via the web, but there are probably many other ways of doing it "properly"…



GitHub, Inc.

Create a New Repository

Search or jump to… Pull requests Issues Marketplace Explore

Create a new repository

A repository contains all the files for your project, including the revision history.

Owner ImperialCollegeLondon / **Repository name** uPtest

Great repository names are short and memorable. Need inspiration? How about miniat…-waffle.

Description (optional)

- ( ) **Public** Anyone can see this repository. You choose who can commit.
- (●) **Private** You choose who can see and commit to this repository.

[ ] **Initialize this repository with a README**
This will let you immediately clone the repository to your computer. Skip this step if you're importing an existing repository.

Add .gitignore: None | Add a license: None

Create repository

© 2018 GitHub, Inc. Terms Privacy Security Status Help Contact GitHub Pricing API Training Blog About

Choose owner ImperialCollegeLondon if you want to make it private (without paying!)

Click + to create a new repository (you need to be signed in to GitHub)

Choose a name for your new copy

Finally, hit create

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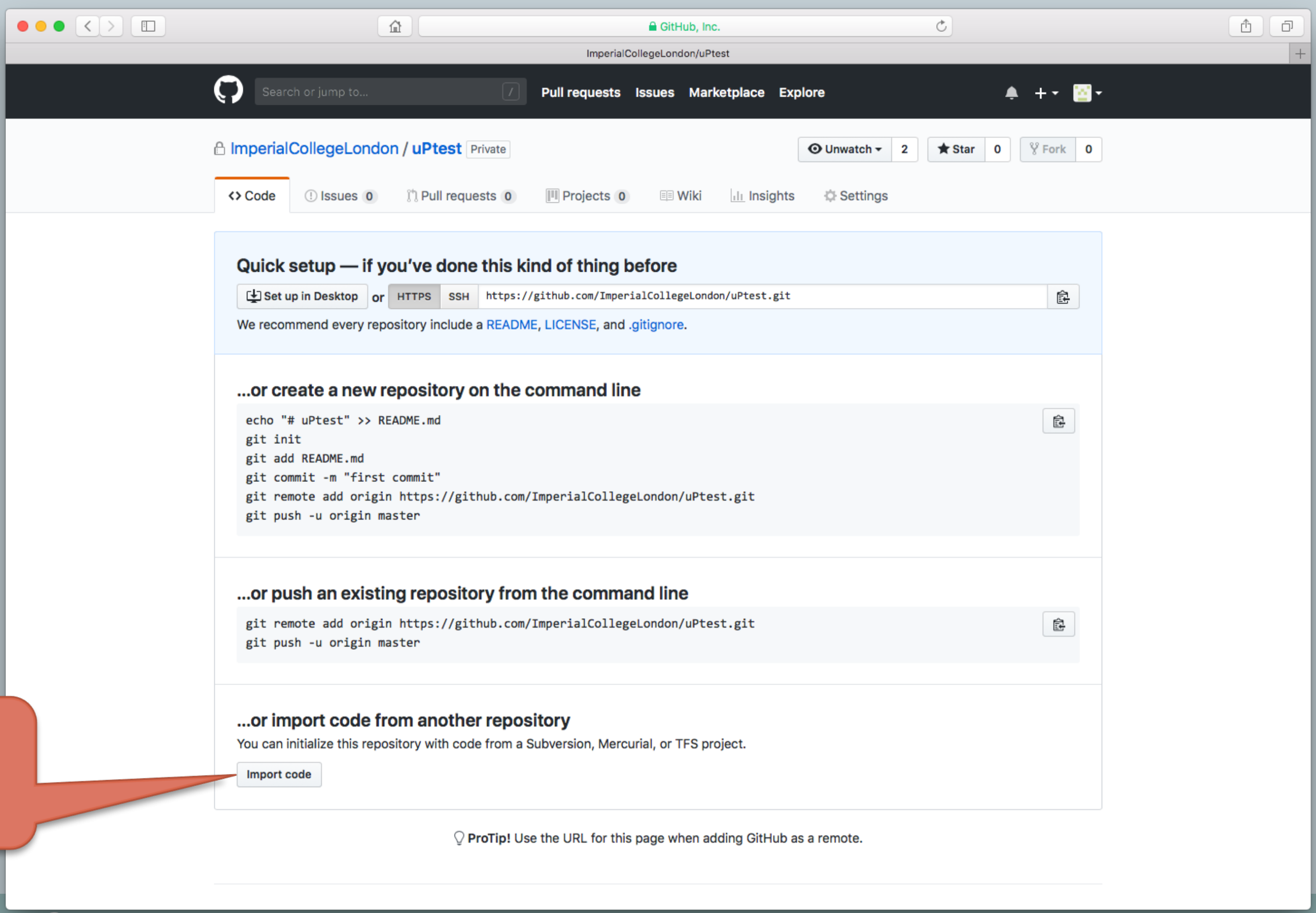
Next page...



Quick setup — if you've done this kind of thing before

Set up in Desktop or HTTPS SSH `https://github.com/ImperialCollegeLondon/uPtest.git`

We recommend every repository include a README, LICENSE, and .gitignore.

...or create a new repository on the command line

```
echo "# uPtest" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin https://github.com/ImperialCollegeLondon/uPtest.git
git push -u origin master
```

...or push an existing repository from the command line

```
git remote add origin https://github.com/ImperialCollegeLondon/uPtest.git
git push -u origin master
```

...or import code from another repository

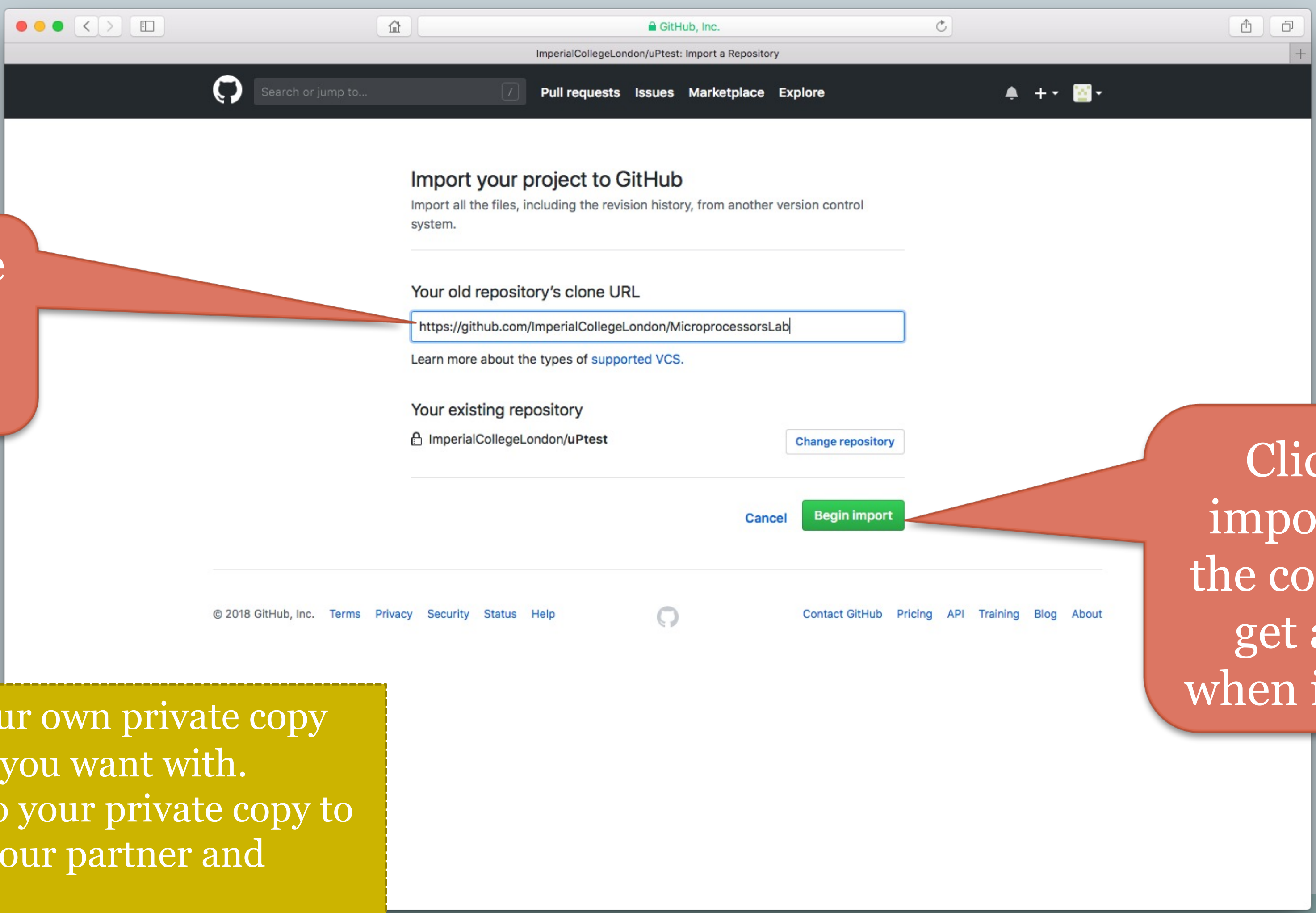
You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

Import code

ProTip! Use the URL for this page when adding GitHub as a remote.

Hit the "Import Code" button

Doing the copy


ImperialCollegeLondon/uPtest: Import a Repository

Import your project to GitHub

Import all the files, including the revision history, from another version control system.

Your old repository's clone URL

https://github.com/ImperialCollegeLondon/MicroprocessorsLab

Learn more about the types of supported VCS.

Your existing repository

ImperialCollegeLondon/uPtest

Add the url of the repository you are copying

Click begin import to start the copy – you'll get an email when its all done

- You will now have your own private copy that you can do what you want with.
- You can give access to your private copy to other users, such as your partner and demonstrator

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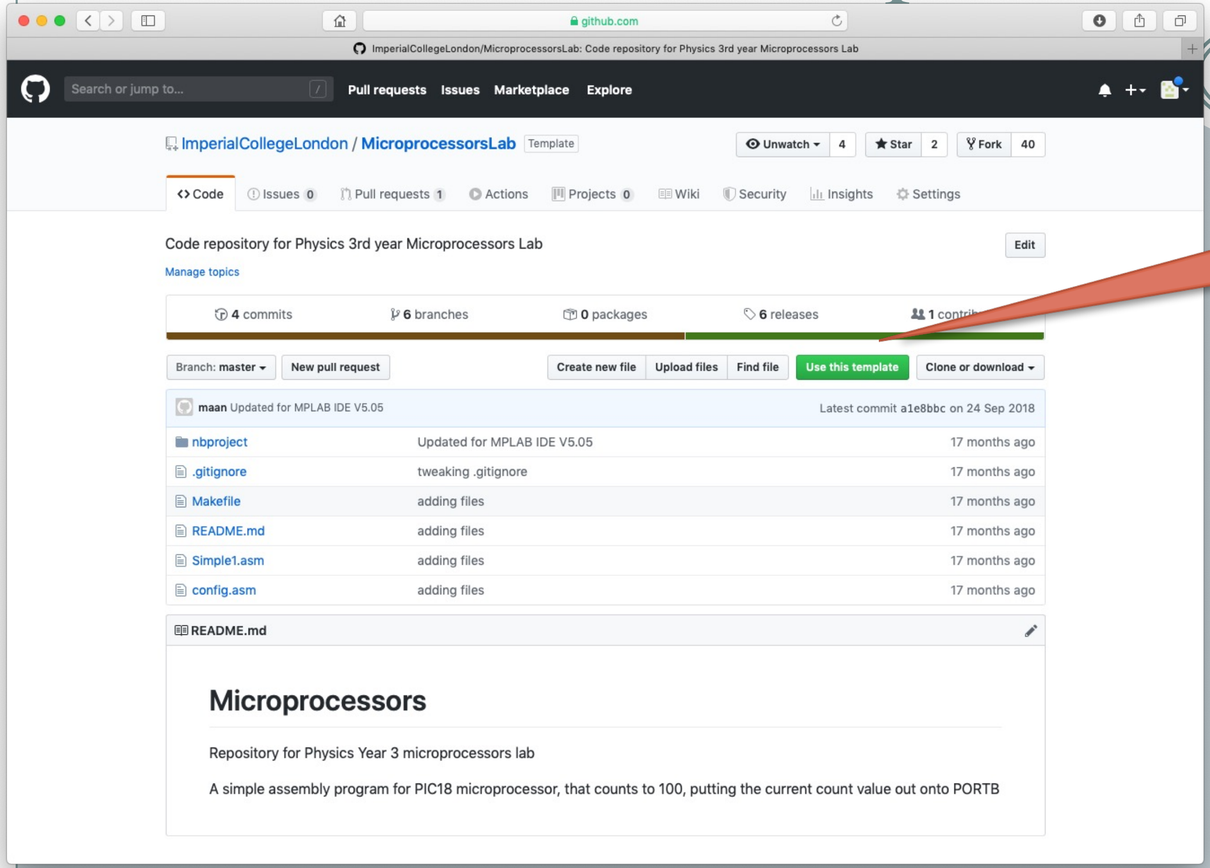
Or use the Microprocessors repository as a Template



github.com

ImperialCollegeLondon/MicroprocessorsLab: Code repository for Physics 3rd year Microprocessors Lab

ImperialCollegeLondon / MicroprocessorsLab Template

Code repository for Physics 3rd year Microprocessors Lab

4 commits · 6 branches · 0 packages · 6 releases · 1 contrib

maan Updated for MPLAB IDE V5.05 — Latest commit a1e8bbc on 24 Sep 2018

nbproject	Updated for MPLAB IDE V5.05	17 months ago
.gitignore	tweaking .gitignore	17 months ago
Makefile	adding files	17 months ago
README.md	adding files	17 months ago
Simple1.asm	adding files	17 months ago
config.asm	adding files	17 months ago

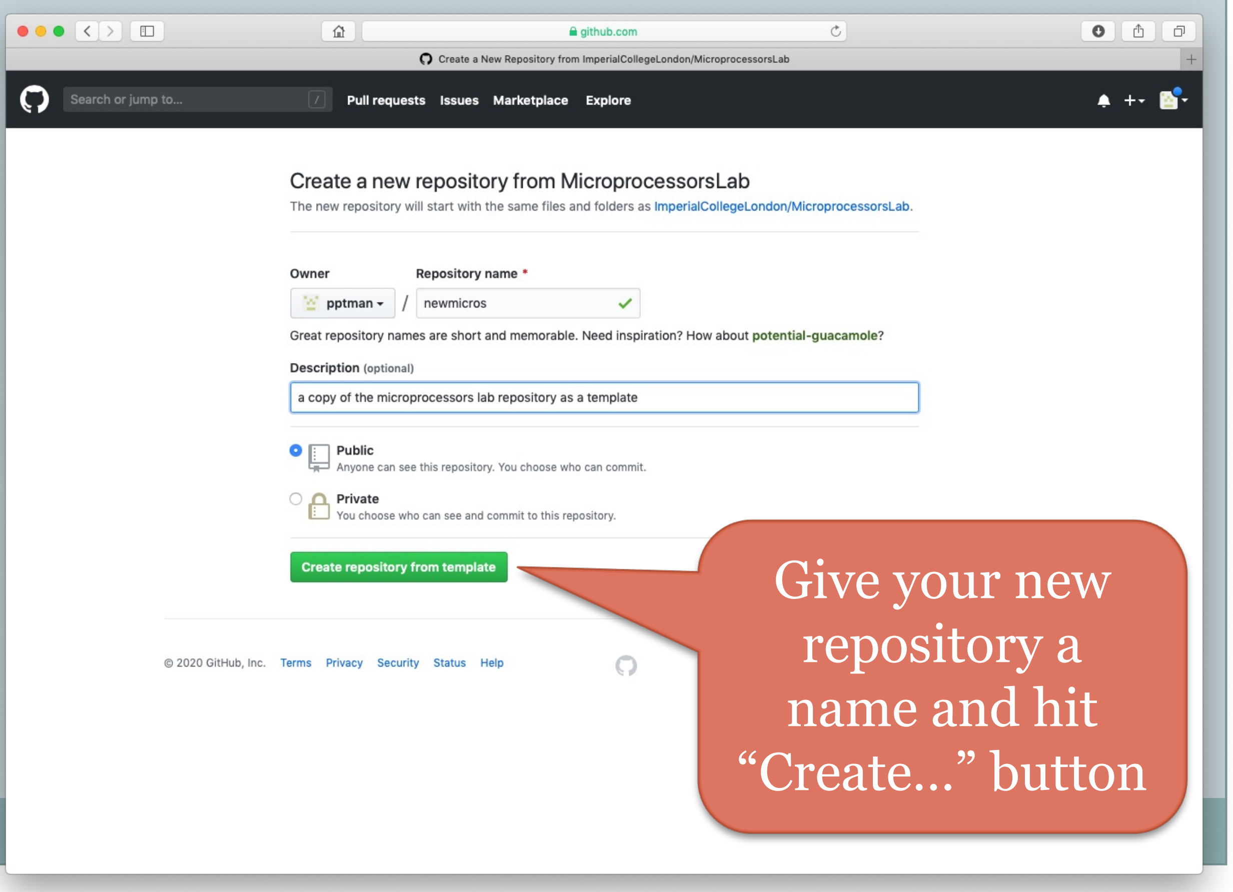
README.md

Microprocessors

Repository for Physics Year 3 microprocessors lab

A simple assembly program for PIC18 microprocessor, that counts to 100, putting the current count value out onto PORTB

Choose "Use as template" button



github.com

Create a New Repository from ImperialCollegeLondon/MicroprocessorsLab

Create a new repository from MicroprocessorsLab

The new repository will start with the same files and folders as ImperialCollegeLondon/MicroprocessorsLab.

Owner: pptman / Repository name *: newmicros

Great repository names are short and memorable. Need inspiration? How about potential-guacamole?

Description (optional): a copy of the microprocessors lab repository as a template

[✓ Public] Anyone can see this repository. You choose who can commit.

Private You choose who can see and commit to this repository.

© 2020 GitHub, Inc. Terms Privacy Security Status Help

Give your new repository a name and hit "Create..." button

- Creates a completely new and separate repository from the Master branch
- Contains "boiler-plate" code and files that sets your project up (eg config.asm etc)

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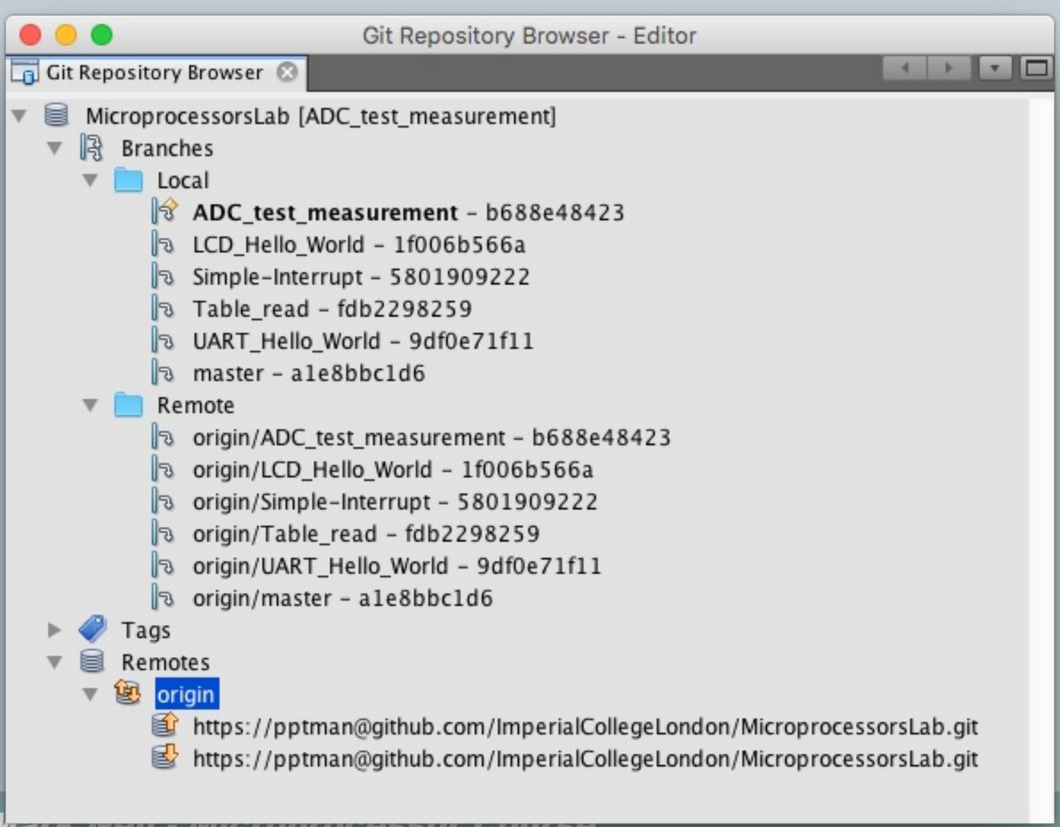
Changing your origin to a new remote (eg fork or copy)

- In the repository browser window
  - Select origin
  - Right click and select "Remove"

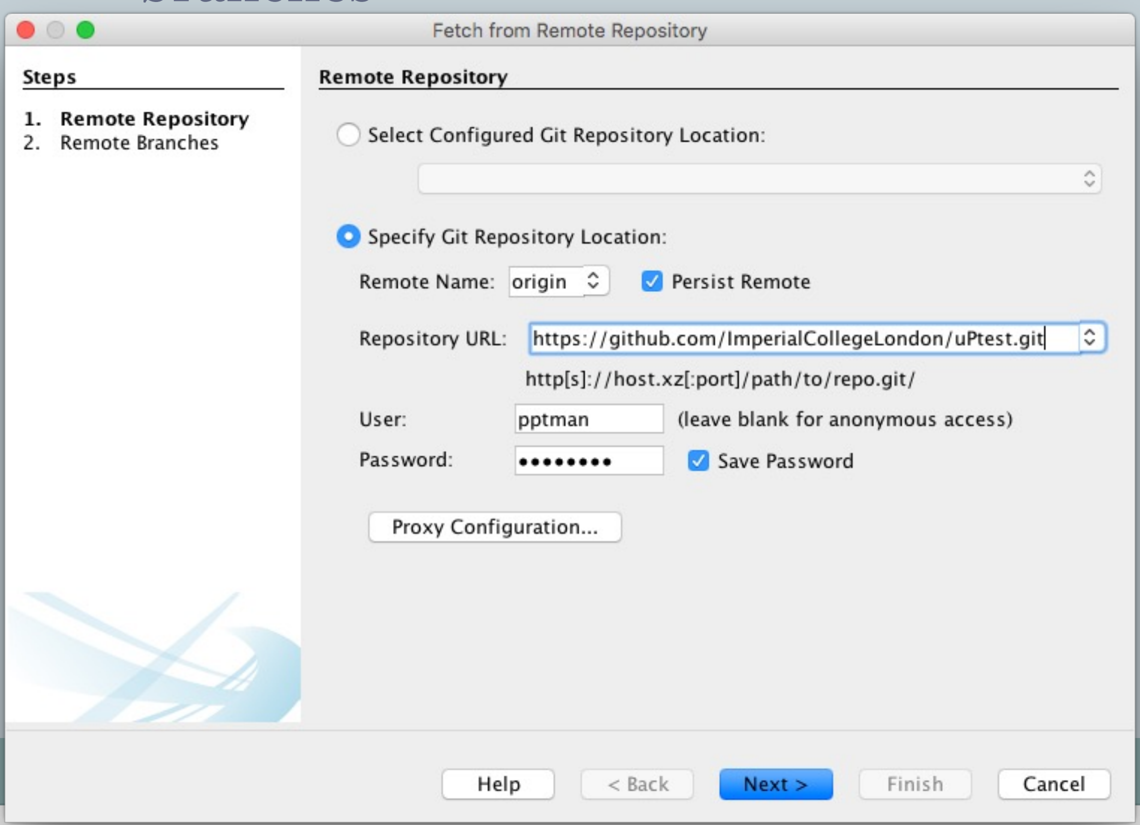


Git Repository Browser - Editor

Git Repository Browser

```
MicroprocessorsLab [ADC_test_measurement]
  Branches
    Local
      ADC_test_measurement - b688e48423
      LCD_Hello_World - 1f006b566a
      Simple-Interrupt - 5801909222
      Table_read - fdb2298259
      UART_Hello_World - 9df0e71f11
      master - a1e8bbc1d6
    Remote
      origin/ADC_test_measurement - b688e48423
      origin/LCD_Hello_World - 1f006b566a
      origin/Simple-Interrupt - 5801909222
      origin/Table_read - fdb2298259
      origin/UART_Hello_World - 9df0e71f11
      origin/master - a1e8bbc1d6
  Tags
  Remotes
    origin
      https://pptman@github.com/ImperialCollegeLondon/MicroprocessorsLab.git
      https://pptman@github.com/ImperialCollegeLondon/MicroprocessorsLab.git
```

- "Fetch" the new remote
  - Git>Remote>Fetch…
  - Specify new repository location and branches



Fetch from Remote Repository

Steps
1. Remote Repository
2. Remote Branches

Remote Repository

( ) Select Configured Git Repository Location:

(●) Specify Git Repository Location:

Remote Name: origin [✓] Persist Remote

Repository URL: https://github.com/ImperialCollegeLondon/uPtest.git

http[s]://host.xz[:port]/path/to/repo.git/

User: pptman (leave blank for anonymous access)

Password: •••••••• [✓] Save Password

Github Authentication

- Github like many other systems has introduced more robust authentication mechanisms including 2-factor authentication
- Simple password authentication is now deprecated and may not work

- See https://microchipsupport.force.com/s/article/Github-2-factor-authentification-in-MPLAB-X for further details on how to use the updated authentication methods

Other GIT tools

GIT is originally a command line tool written for linux

Is installed in MacOSX by default

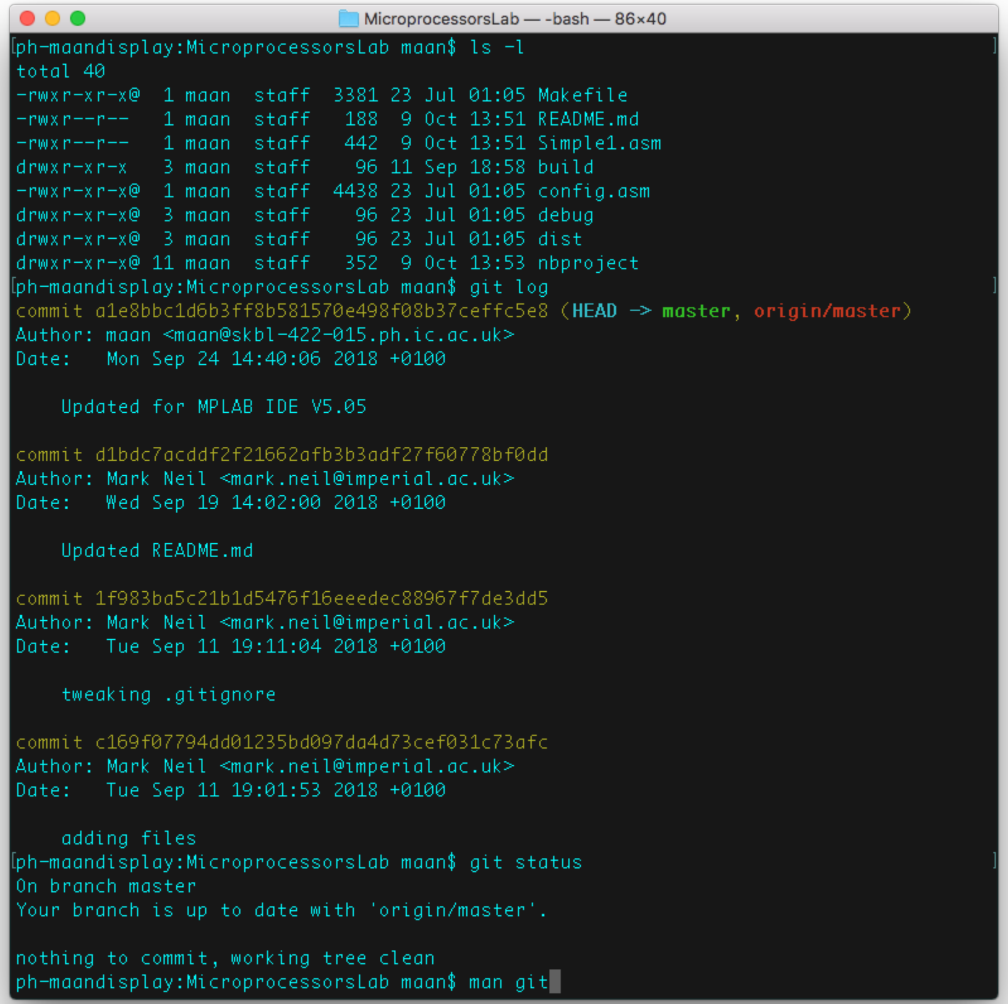
You can install on your college windows 10 account using the new “magic” cloud software system

Ultimately the command line version lets you do the most with GIT

But it gets complicated…

Check out https://git-scm.com/docs for details

Real programmers only use command-line GIT!



```
ph-maandisplay:MicroprocessorsLab maan$ ls -l
total 40
-rwxr-xr-x@  1 maan  staff  3381 23 Jul 01:05 Makefile
-rwxr--r--   1 maan  staff   188  9 Oct 13:51 README.md
-rwxr--r--   1 maan  staff   442  9 Oct 13:51 Simple1.asm
drwxr-xr-x   3 maan  staff    96 11 Sep 18:58 build
-rwxr-xr-x@  1 maan  staff  4438 23 Jul 01:05 config.asm
drwxr-xr-x@  3 maan  staff    96 23 Jul 01:05 debug
drwxr-xr-x@  3 maan  staff    96 23 Jul 01:05 dist
drwxr-xr-x@ 11 maan  staff   352  9 Oct 13:53 nbproject
ph-maandisplay:MicroprocessorsLab maan$ git log
commit a1e8bbc1d6b3ff8b581570e498f08b37ceffc5e8 (HEAD -> master, origin/master)
Author: maan <maan@skbl-422-015.ph.ic.ac.uk>
Date:   Mon Sep 24 14:40:06 2018 +0100

    Updated for MPLAB IDE V5.05

commit d1bdc7acddf2f21662afb3b3adf27f60778bf0dd
Author: Mark Neil <mark.neil@imperial.ac.uk>
Date:   Wed Sep 19 14:02:00 2018 +0100

    Updated README.md

commit 1f983ba5c21b1d5476f16eeedec88967f7de3dd5
Author: Mark Neil <mark.neil@imperial.ac.uk>
Date:   Tue Sep 11 19:11:04 2018 +0100

    tweaking .gitignore

commit c169f07794dd01235bd097da4d73cef031c73afc
Author: Mark Neil <mark.neil@imperial.ac.uk>
Date:   Tue Sep 11 19:01:53 2018 +0100

    adding files
ph-maandisplay:MicroprocessorsLab maan$ git status
On branch master
Your branch is up to date with 'origin/master'.

nothing to commit, working tree clean
ph-maandisplay:MicroprocessorsLab maan$ man git
```

A Mac again, but would look the same on Linux and similar on a windows machine!

A GUI for GIT?

Installing GIT may well install GitHub desktop for you too that can do some stuff in a GUI

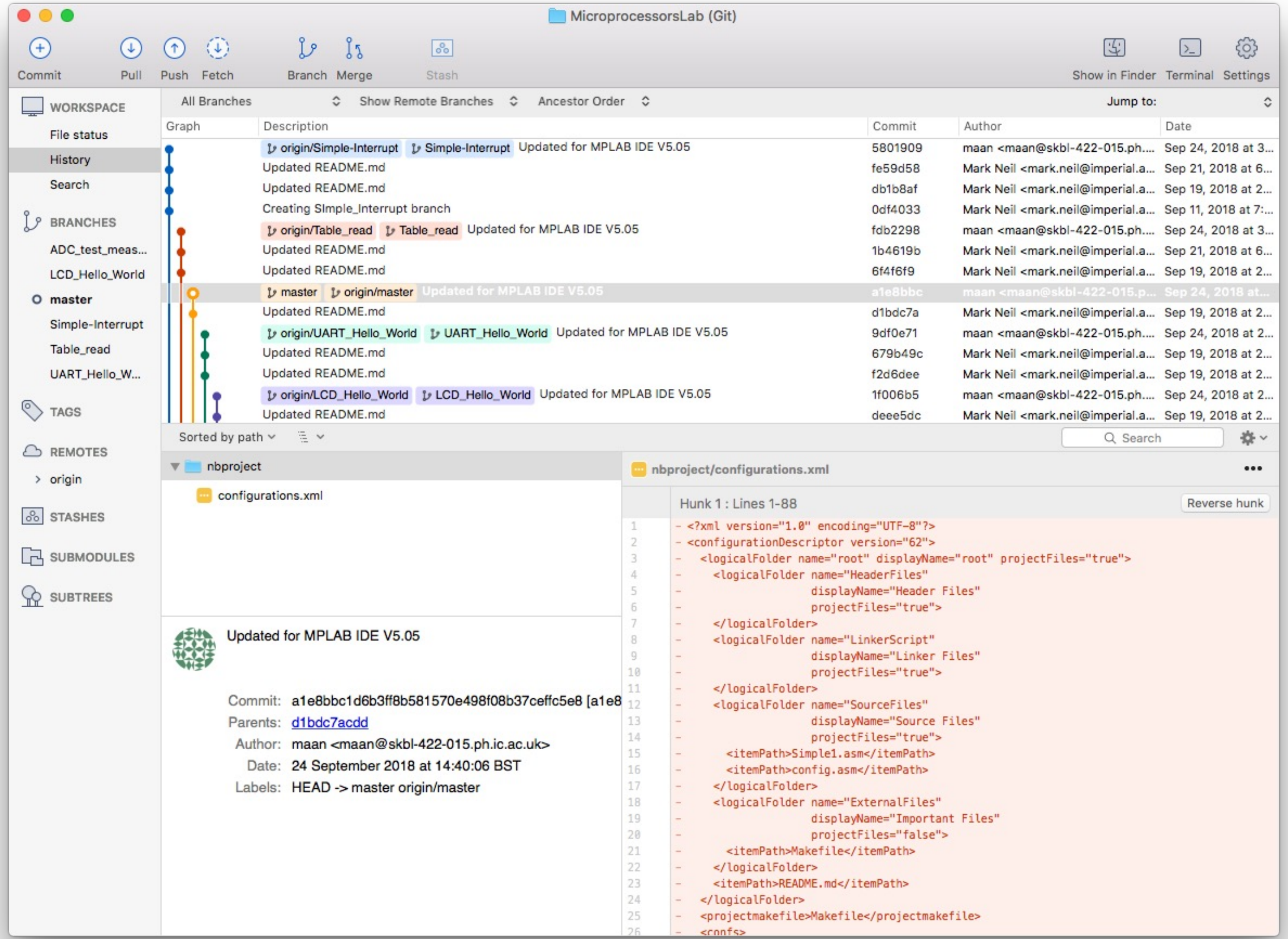
Other GUI programs are available

My favourite is “SourceTree”

Good because it gives you a nice graphical view of your repository structure

And what happened in each commit

Switching branches or to different commits is as simple as double-clicking with the mouse



Graph	Description	Commit	Author	Date
	origin/Simple-Interrupt Simple-Interrupt Updated for MPLAB IDE V5.05	5801909	maan <maan@skbl-422-015.ph....	Sep 24, 2018 at 3...
	Updated README.md	fe59d58	Mark Neil <mark.neil@imperial.a...	Sep 21, 2018 at 6...
	Updated README.md	db1b8af	Mark Neil <mark.neil@imperial.a...	Sep 19, 2018 at 2...
	Creating SImple_Interrupt branch	0df4033	Mark Neil <mark.neil@imperial.a...	Sep 11, 2018 at 7:...
	origin/Table_read Table_read Updated for MPLAB IDE V5.05	fdb2298	maan <maan@skbl-422-015.ph....	Sep 24, 2018 at 3...
	Updated README.md	1b4619b	Mark Neil <mark.neil@imperial.a...	Sep 21, 2018 at 6...
	Updated README.md	6f4f6f9	Mark Neil <mark.neil@imperial.a...	Sep 19, 2018 at 2...
	master origin/master Updated for MPLAB IDE V5.05	a1e8bbc	maan <maan@skbl-422-015.p...	Sep 24, 2018 at...
	Updated README.md	d1bdc7a	Mark Neil <mark.neil@imperial.a...	Sep 19, 2018 at 2...
	origin/UART_Hello_World UART_Hello_World Updated for MPLAB IDE V5.05	9df0e71	maan <maan@skbl-422-015.ph....	Sep 24, 2018 at 2...
	Updated README.md	679b49c	Mark Neil <mark.neil@imperial.a...	Sep 19, 2018 at 2...
	Updated README.md	f2d6dee	Mark Neil <mark.neil@imperial.a...	Sep 19, 2018 at 2...
	origin/LCD_Hello_World LCD_Hello_World Updated for MPLAB IDE V5.05	1f006b5	maan <maan@skbl-422-015.ph....	Sep 24, 2018 at 2...
	Updated README.md	deee5dc	Mark Neil <mark.neil@imperial.a...	Sep 19, 2018 at 2...

nbproject
configurations.xml

Updated for MPLAB IDE V5.05

Commit: a1e8bbc1d6b3ff8b581570e498f08b37ceffc5e8 [a1e8
Parents: d1bdc7acdd
Author: maan <maan@skbl-422-015.ph.ic.ac.uk>
Date: 24 September 2018 at 14:40:06 BST
Labels: HEAD -> master origin/master

nbproject/configurations.xml

Hunk 1 : Lines 1-88

```
- <?xml version="1.0" encoding="UTF-8"?>
- <configurationDescriptor version="62">
-   <logicalFolder name="root" displayName="root" projectFiles="true">
-     <logicalFolder name="HeaderFiles"
-                    displayName="Header Files"
-                    projectFiles="true">
-     </logicalFolder>
-     <logicalFolder name="LinkerScript"
-                    displayName="Linker Files"
-                    projectFiles="true">
-     </logicalFolder>
-     <logicalFolder name="SourceFiles"
-                    displayName="Source Files"
-                    projectFiles="true">
-       <itemPath>Simple1.asm</itemPath>
-       <itemPath>config.asm</itemPath>
-     </logicalFolder>
-     <logicalFolder name="ExternalFiles"
-                    displayName="Important Files"
-                    projectFiles="false">
-       <itemPath>Makefile</itemPath>
-     </logicalFolder>
-     <itemPath>README.md</itemPath>
-   </logicalFolder>
-   <projectmakefile>Makefile</projectmakefile>
-   <confs>
```

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Doing a merge

- This is where GIT gets really useful
- You (or different people) can work on different aspects of the code – usually in different branches
- A "merge" is when you combine changes from one branch into another
- Most of the time this just works as it is relatively easy for GIT to spot how the code has developed in the 2 branches as it tracks the changes between them
- Sometimes you have to help it along the way by telling it which modifications to keep and which to reject
  - But there are tools to help you do this
- You still need to test your code after the merge to make sure it all works!