

UNIVERSITY OF  
PORTSMOUTH

# Welcome!

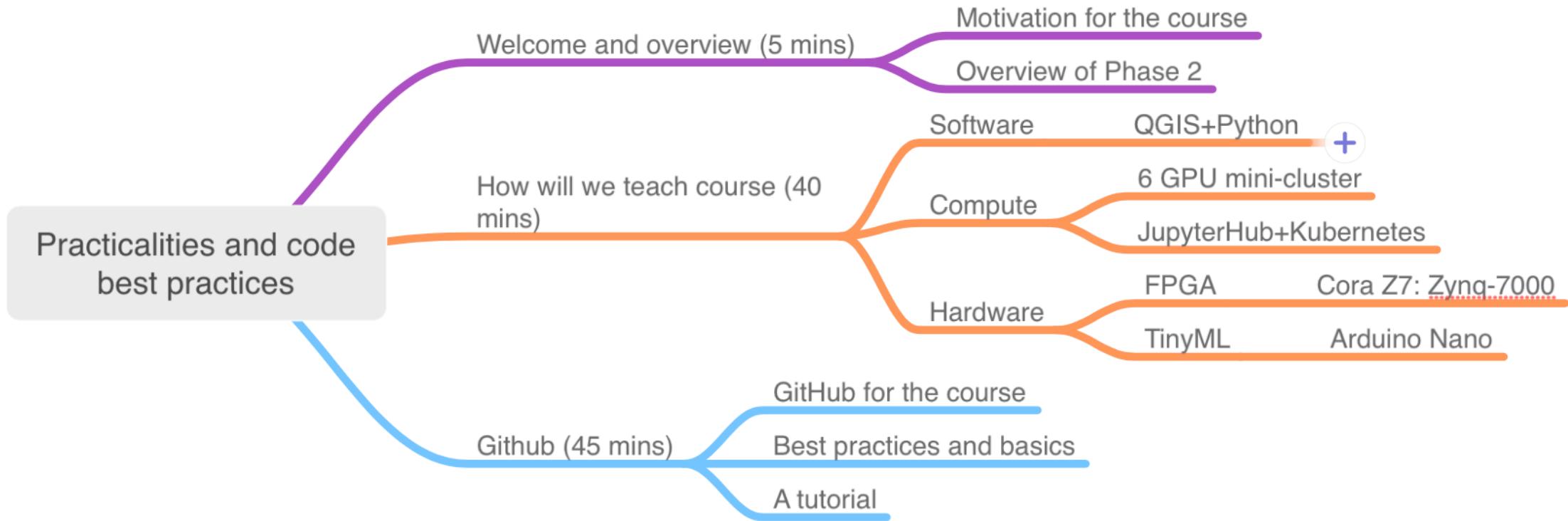
Becky Canning

Institute of Cosmology and Gravitation



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# Thanks for joining us!



# What's all this about...

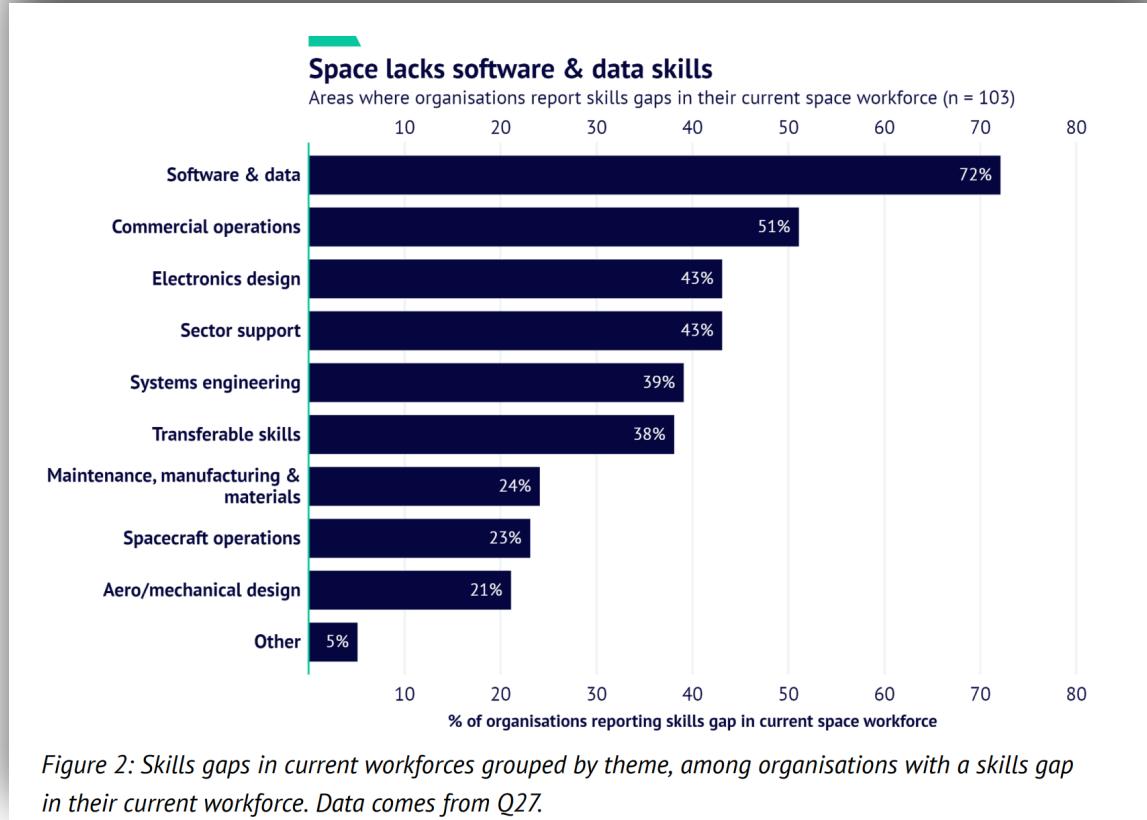


Figure 2: Skills gaps in current workforces grouped by theme, among organisations with a skills gap in their current workforce. Data comes from Q27.

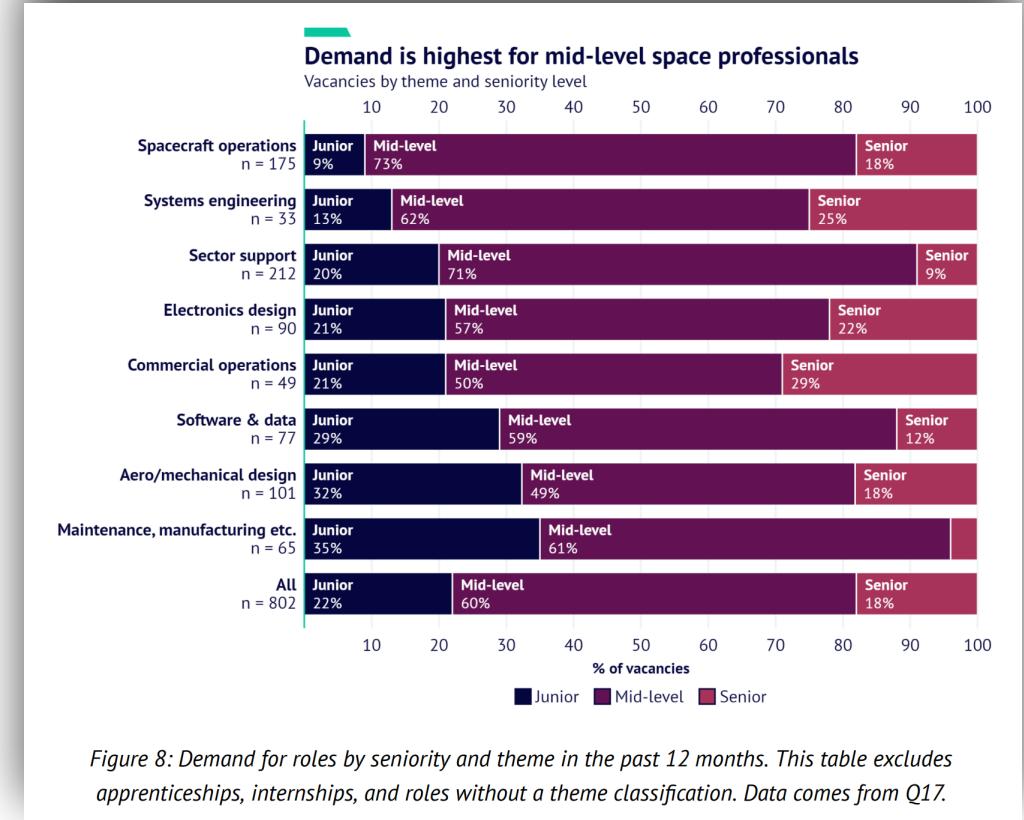


Figure 8: Demand for roles by seniority and theme in the past 12 months. This table excludes apprenticeships, internships, and roles without a theme classification. Data comes from Q17.

# With huge thanks to:

- **Lecturers, demonstrators, supervisors:** Ben, Chris Br, Chris P, Coleman, Basel, Becky, Ehsan, Gbenga, Hanna, Hugh, Ioana, John, Keith, Lorenza, Mojtaba, Obinna, Pete, Richard, Scott, Victoria, Vincent, Xan
- **Technical team:** Alexandra, Barrie, Becky, Chris Be, John, Michael, Toby, **Xan**
- **Project management, administration and comms:** **Dan and Pam**, Amanda, Ben, Chris B, Emma, Finnoula, Glenn, Hugh, Louise B, Louise P, Phil, Priya, Scott, Sharon, Vicky, Victoria
- **All of you and many of your colleagues**

# The next few days...

- Broad course - many lecturers (sometimes a couple or few at once)
- Some involved in the course but not teaching this part, but you may still see them around these few days - pleased do chat and ask them any stored up questions!
- **FTC 4th floor (here!)** is our base - **all food and caffeine will be here** during the day
- Breakfast is at hotel and there are dinner events
- Some lectures will make use of facilities in other locations specifically:
  - Mission Incubator - Dennis Sciama Building rm 1.12 (up main stairs and go to glass box in the corner)
  - Anglesea A0.07 - Lab - for FPGA development

# The next few days...

Phase	Duration	Delivery	Schedule									
1	4-week	Online (16 hrs)	Introduction lecture course to software and data usage in the space sector									
	3-day		9-10.30	10.30-11.00	11-12.30	12.30-13.30	13.30-15.00	15.00-15.30	15.30-17.00	18.30-21.00		
		Tuesday 1st Oct									Welcome reception (Portland atrium)	
		Wednesday 2nd Oct	Welcome (BC) Getting started with Git (Future Technology Center, FTC)	Coffee/Tea (FTC)	EO data & processing (RT + EK) (MIssion Incubator, MI)	Lunch (FTC)	EO data analysis (RT + EK) (MI)		Coffee/Tea (FTC)	AI 101: syntax, data prep and training (BC) (MI)	Mary Rose event	
		Thursday 3rd Oct	AI 101 continued: ML v's deep learning (BC) (MI)	Coffee/Tea (FTC)	Embedded software - FPGA 101 (MG) (Anglesea 0.07, A0.07)		Embedded software FPGA 101 (MG) (A0.07)			Embedded software FPGA 101 (MG) (A0.07)		
2	Friday Oct	4th	Trust and ethics: AI/Automation in safety critical sectors (PL) (FTC)	Coffee / Tea (FTC)	Bid writing for the space sector (VC) (FTC)	Bus	Lunch and tour (Metaverse) Tour 13.00-14.30 (arrive 12.45)			3-5pm - Cyber security - Threat Modelling (BH + IB) (FTC)	Course Dinner - Queens	
3	8-week	Online (32 hrs)	1 hour mentorship per week, participant to spend total of 4-hours per week on project incl. mentorship									

# How will we teach the course

- EO data processing and analysis - QGIS
- AI/ML models - Python packages (SciKit-Learn, PyTorch)
- AI/ML models on device (Tensorflowlite/micro, C and Arduino Nano)
- FPGA programming (VHDL with Vivado on Xilinx Cora Z7: Zynq-7000)
- Web based activities

# How will we teach the course

Mission incubator  
computers  
(windows)

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6 GPU mini-  
cluster (linux,  
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Laptops  
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# How will we teach the course

Mission incubator  
computers  
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- All accessed via your 'staff' account - who will have this from now throughout Phase 3

6 GPU mini-  
cluster (linux,  
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through  
JupyterHub +  
Kubernetes)

- VPN is required to access the cluster
- Data for AI examples is already on the cluster, unless 'getting the data' is the part being taught!

Laptops  
(windows)

- Data for projects can be stored on the cluster.

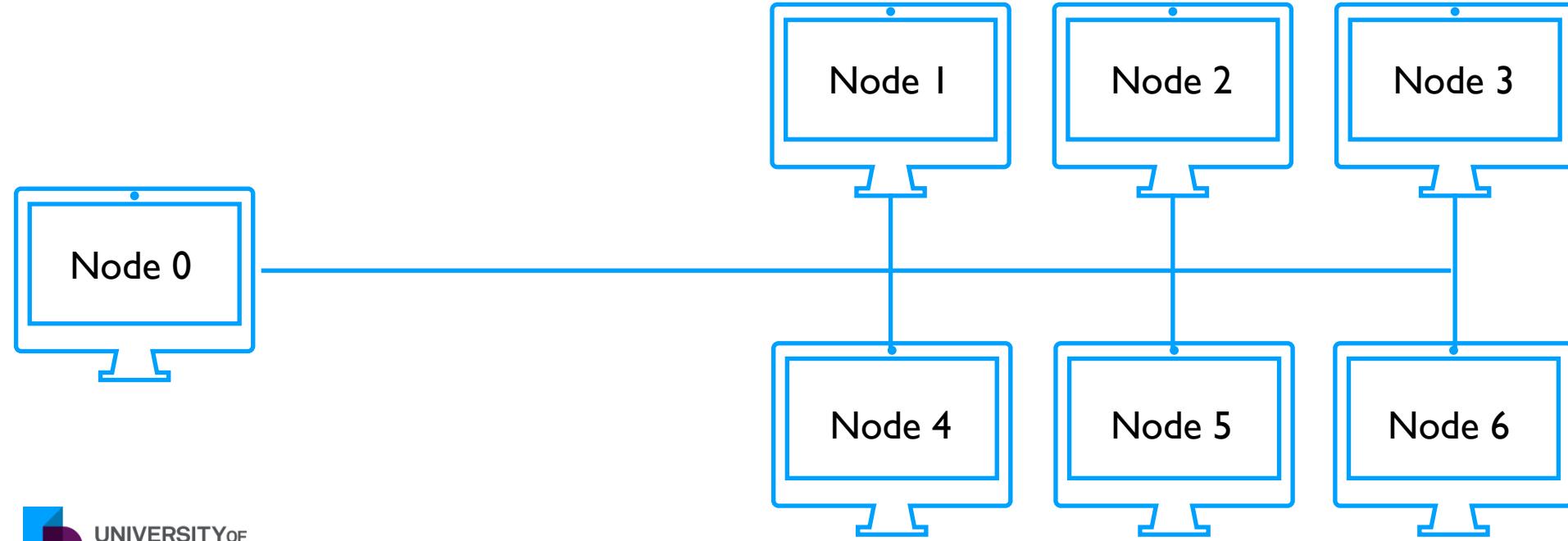
# Pause to test staff account details and VPN access

- To set up staff account please see your e-mails
- For VPN install see this site: <https://myport.port.ac.uk/guidance-and-support/staff-it-support/staff-vpn-global-protect>

# Introducing the mini-cluster

A huge thanks to:  
**Xan Morice-Atkinson, Toby Maule,  
Chris Beakes, John Randell, Alexandra  
Packer, Barrie Miles, Michael Reid**

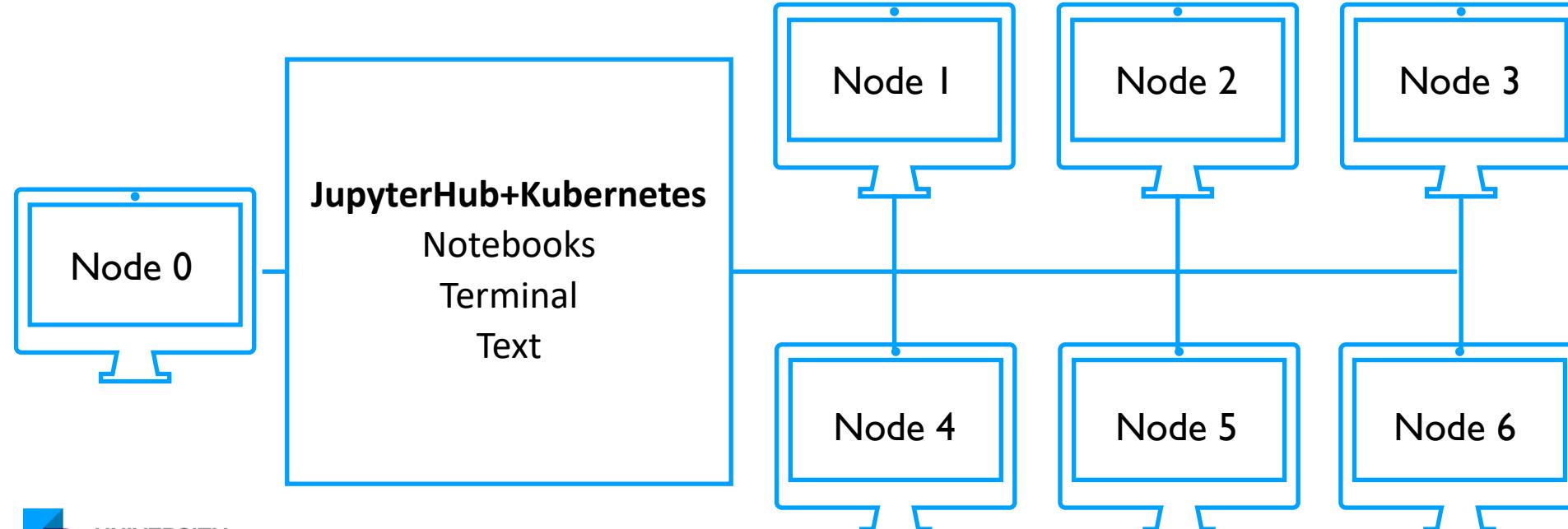
- Not a full scale HPC but plenty good enough for moderate deep learning (not going to retrain ChatGPT but it will be pretty good for object detection in imaging)
- 1-6: Nvidia RTX 4000, 20GB, 16 core Threadripper, 64GB, 512GB SSD, 8TB HD
- 0: Intel Integrated Graphics, 10 core Intel, 16GB, 2TB - **Keep for login**



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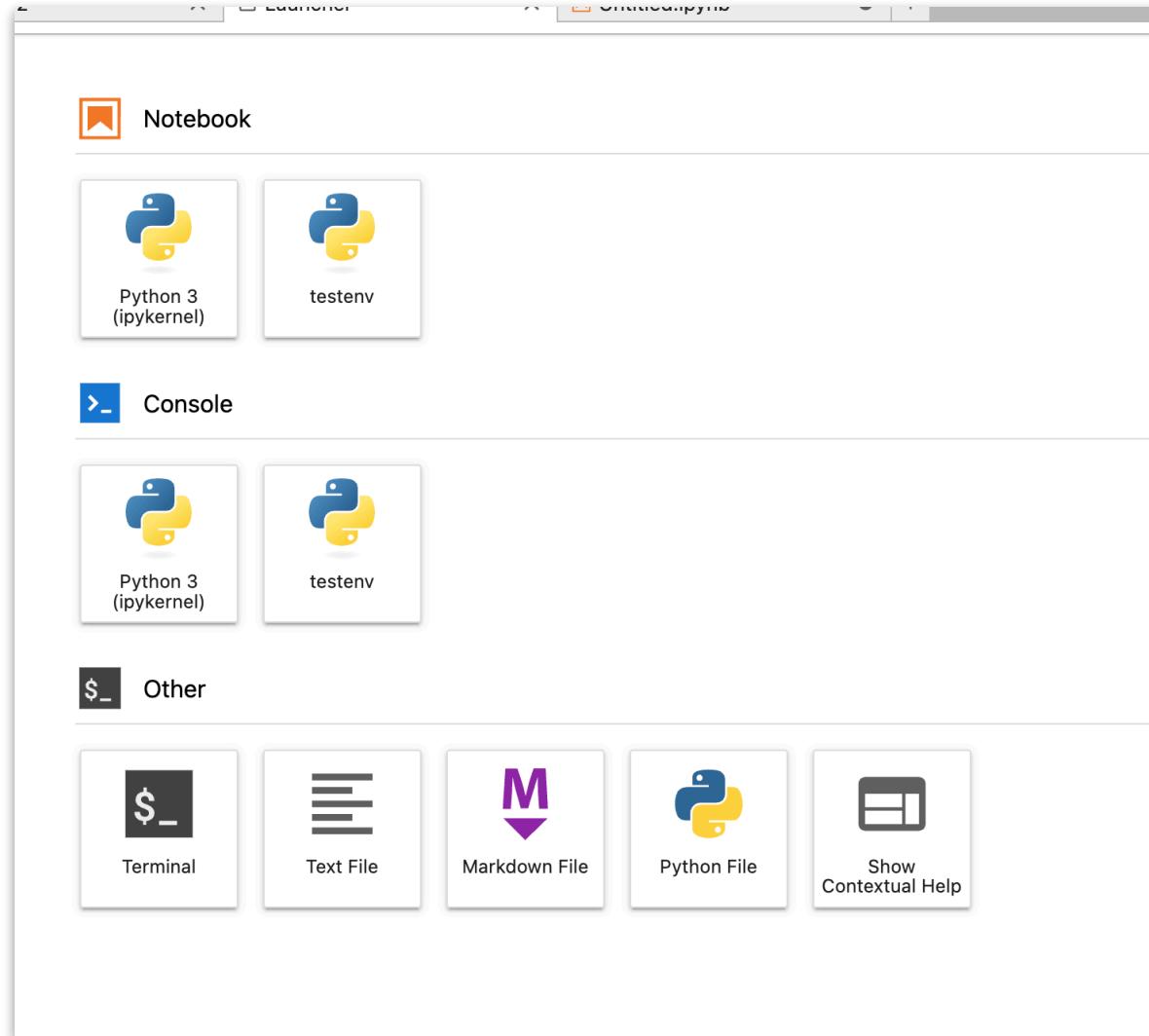
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# Pause to test cluster access through vpn

- Open a terminal
- Change nodes
- Create a notebook
- Create a text file



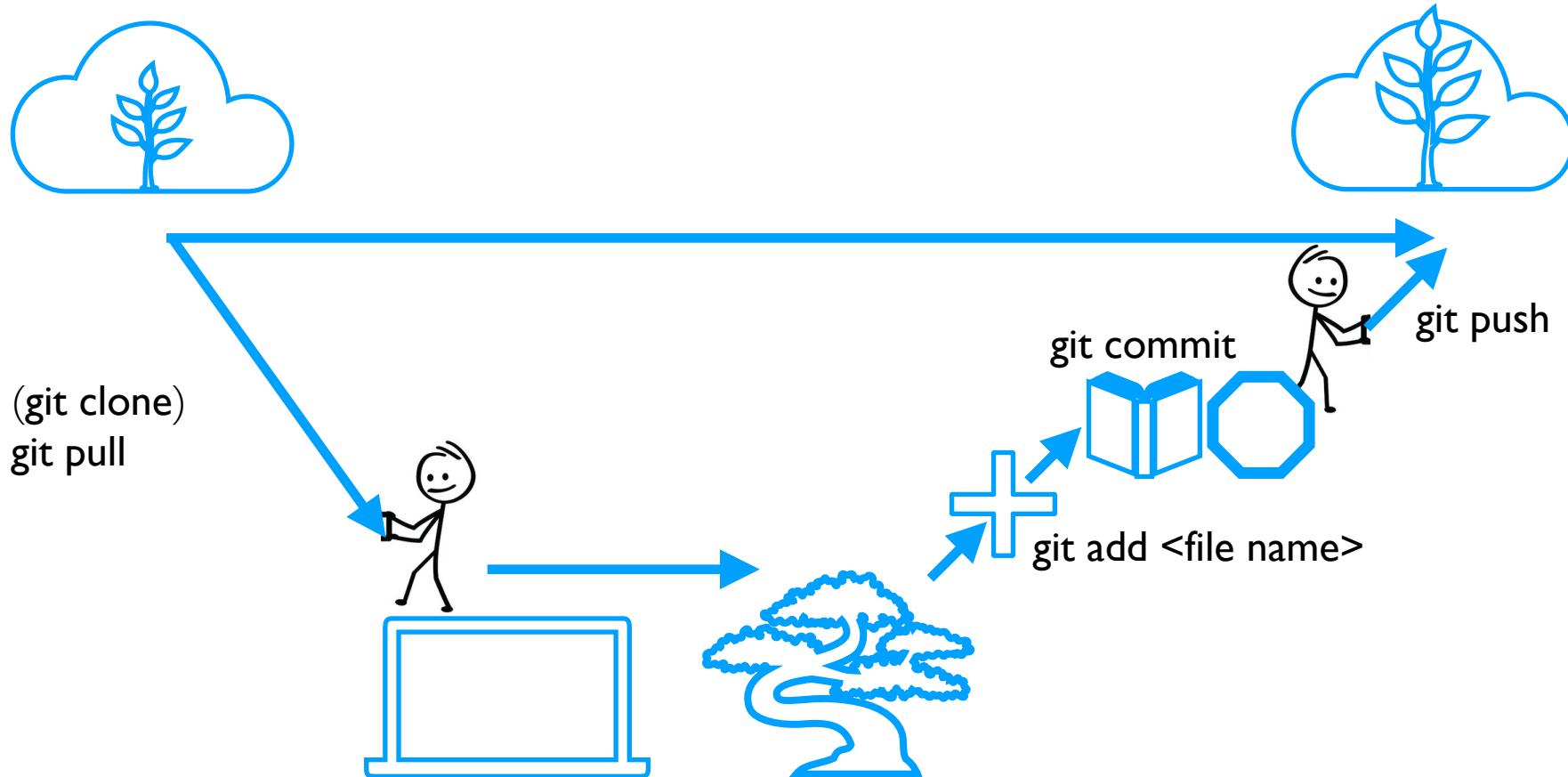
# Software versioning and best practice

- Unless you write perfect code every time then you will want some sort of version control system for your software.
- If you are working collaboratively or expecting others to use a product of your software this is a must.
- SVN and Git popular
  - Apache subversion - centralised enabling granular access control, single point failure
  - Git - distributed (work offline and redundancy), lacks granular access control

# Git terminology

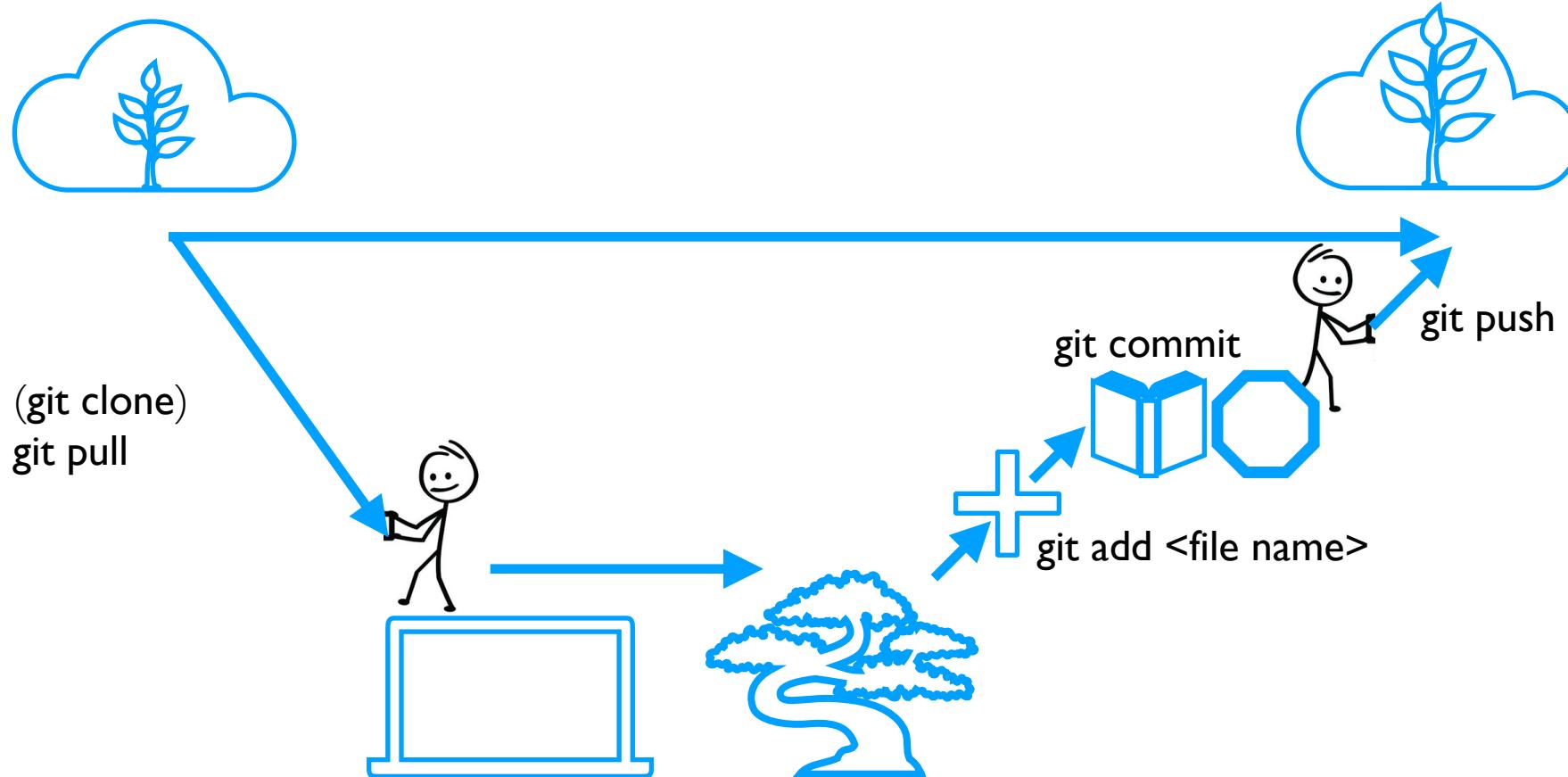
- Repository: A folder that has Git version control set up
  - Local repository: A Git repository that is on your development computer
  - Remote repository: A Git repository that is on the internet
- Pull from remote - "Pulling" the changes from the remote to you local repository
- Push to remote: - "Pushing" changes from the local to the remote repository
- Git add <file name>
- Commit: - Creating a checkpoint you can return back to
- Branch: - A working space that does not effect other branches
- Merge: - Merging two branches together
- Tag: - Naming a commit to make it easier to find in the future (typically new code release versions are tagged)

# Git cheat sheet



```
# make a new branch: git checkout -b <new branch name>
# move to an existing branch: git checkout <branch name>
# list all (local) branches: git branch
```

# Git cheat sheet



git checkout main  
git merge <branch name>

Also a minimal git workflow.

No reviewers, no feedback, ...  
No continuous integration or continuous delivery...

# make a new branch: **git checkout -b <new branch name>**  
# move to an existing branch: **git checkout <branch name>**  
# list all (local) branches: **git branch**

# Exercise Git.ipynb (written by Coleman)

- Install git (and desktop version if you want it)
- Create a GitHub account
- e-mail Dan your username (for Phase 3)
- Set up ssh key
- Set up two-factor authentication
- Practice Git basics
- If pretty happy with git.ipynb please go on to:
  - github\_with\_collaborators.md, good\_coding\_practices.md (written by Coleman)
- Coleman will provide a supervision lecture on versioning and best practices including CI / CD early in Phase 3 to start you off on the right foot!