Spotted Python

Week 1 Tutorial

- Course Reminders
- GitHub Setup
- Markdown
- Coding Foundations

Welcome Spotted Pythons

- Coding is an important skill for astrophysics
- This stream is designed to learn coding at a slower pace
- All examples and materials are the same across the 2 streams, but approached in different ways
- Finn will be the tutor for Morelia

I am a small friendly snake!
If you have any questions, ask in tutorials, on the forum or via email (michelle.ding@unsw.edu.au)

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Welcome Spotted Pythons

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Michelle (she/her)

- 2nd year PhD student
- Wanted to be a singer before I was 11
- Decided to be an astronomer after I watched a documentary about Black Holes

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Michelle (she/her)

- Started university and jumped around multiple research groups
  - Prof Dennis Stello – Pipeline to distinguish between good and bad data
  - A. Prof Kim-Vy Tran – Strong lensing in group environments
  - Dr Jesse van de Sande – Chemical structures in edge-on galaxies
- I love teaching, singing, dancing, travelling, going to markets, and seeking out good vegetarian food (ask me for any restaurant suggestions)

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I want to hear from you

- What is your name
- What part of astronomy are you most excited about to learn/most interested in?
- Please give me feedback. I want you to govern what these tutorials are about!

Reminders

- The computational assignment involves collaboration
  - Weekly meetings with <50% attendance (I will allocate time for these during the tutorial)
  - Meeting minutes uploaded to GitHub as a Markdown
  - Minimum 3 lines of code committed to GitHub by each member
  - Every week until submission in Week 7
  - We may ask you to explain your code to us
- Responsible AI use
  - AI references can be wrong
  - Everything you write can be examinable
  - All materials covered in the tutorials can be examinable
  - We can tell AI-generated code apart from originally written code

Why use GitHub

- Backup of code to reduce the chances of you losing your work
- Version control
- Automation tools for building and testing your work
- Store and present documentation
- Recognition for your work
- If you are confused by my GitHub tutorial, refer to the following links (there are different ways to setup GitHub):
  - https://adacs-australia.github.io/2023-03-20-Coding-Best-Practices-Workshop/GitHub/index.html
  - https://code.visualstudio.com/docs/sourcecontrol/github

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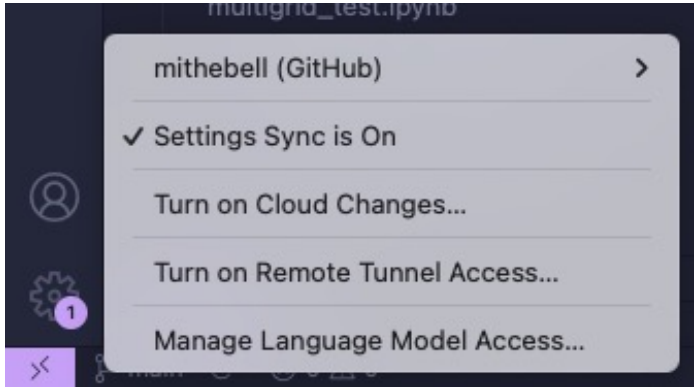
Setting up GitHub

- Sign up for a free account: https://github.com/
- Install VS Code: https://code.visualstudio.com/
- Check you have git installed on your machine
  - Mac and Linux should have Git installed by default
  - Open Terminal or Windows command prompt
  - Type **git version**
  - If Git is not installed, it will alert you that git is an unknown command

- Install Git and GitHub integration in VS Code
  - https://git-scm.com/downloads
  - Install the GitHub Pull Requests and Issues extension (Please check you have Git)
  - Sign in with your GitHub account



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Setting up GitHub

- Set up git for the first time on your computer:
  - Return to the terminal and type the following (with your email)

```
git config --global user.name "Michelle Ding"
git config --global user.email "michelle.ding@unsw.edu.au"
```

- Creating a GitHub repository from a local folder

1. Log in to GitHub, then click on the icon in the top right corner

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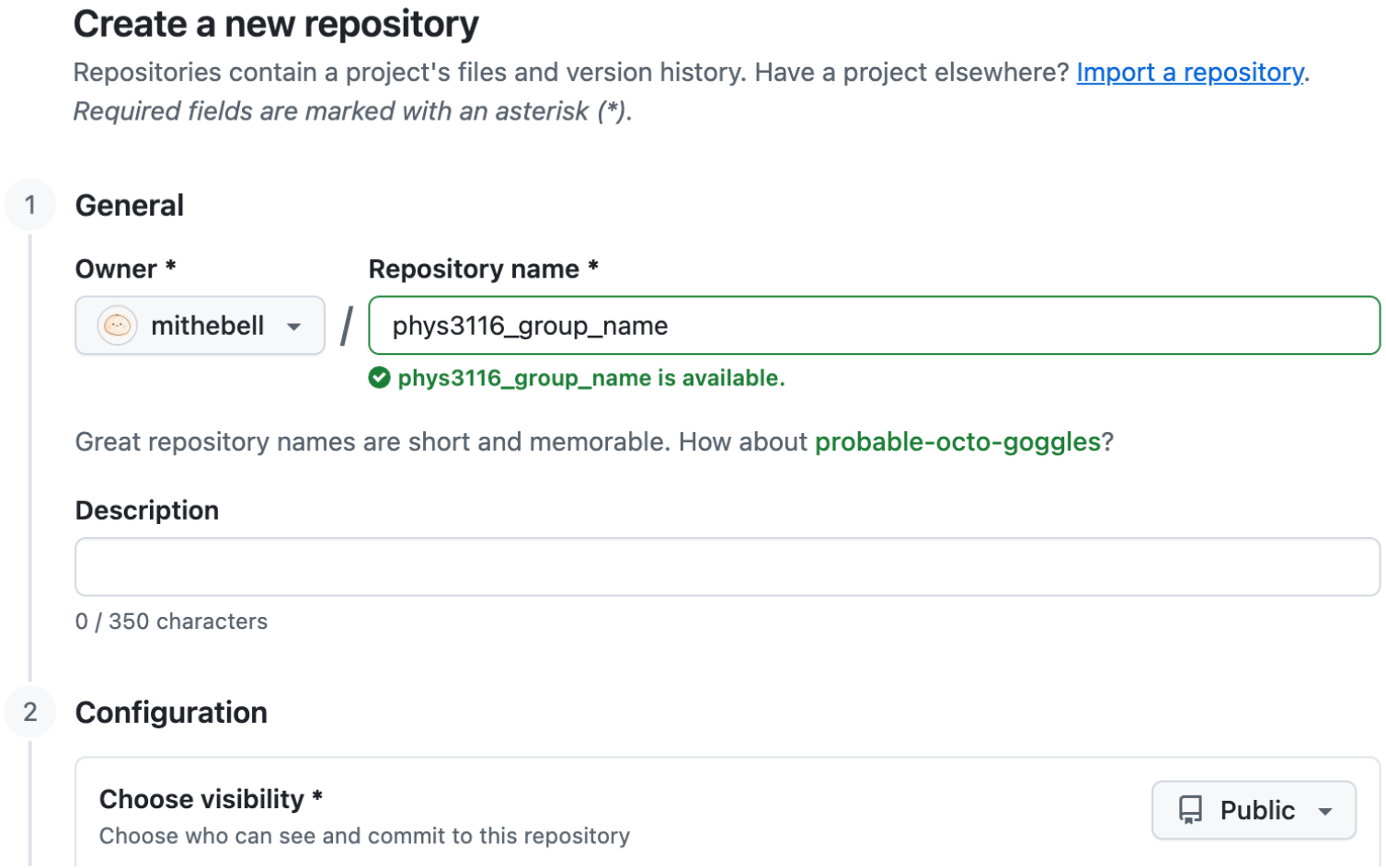
Setting up GitHub

2. Make your repository name as a group, make it public, and add a README



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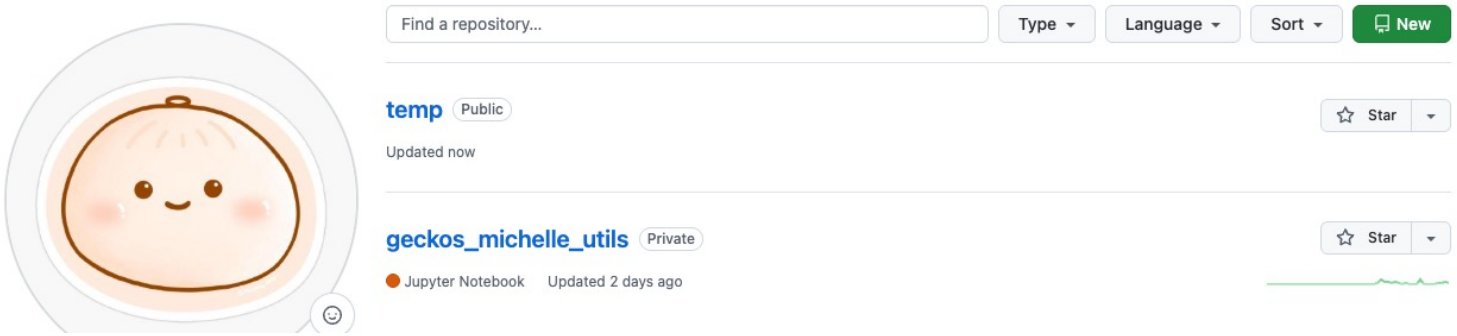
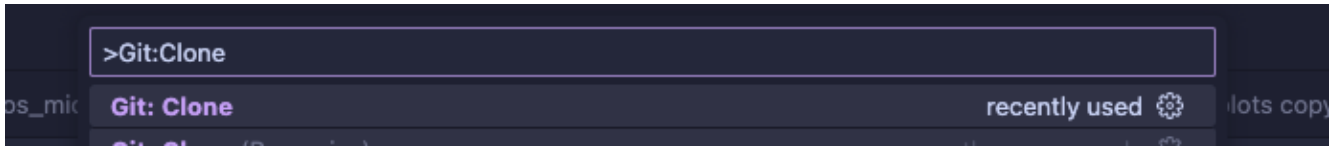
Setting up GitHub

3. Check that you have your repository on your profile



4. Return to VS Code, and type **>Git: Clone** in the Command Palette



5. Choose Clone from GitHub, and select the repository you want to clone
6. Make a new folder where you want to keep your code and select it as the repository destination
7. Go back to the Command Palette and type **>Git: Initialize Repository**
8. You can now start committing to GitHub

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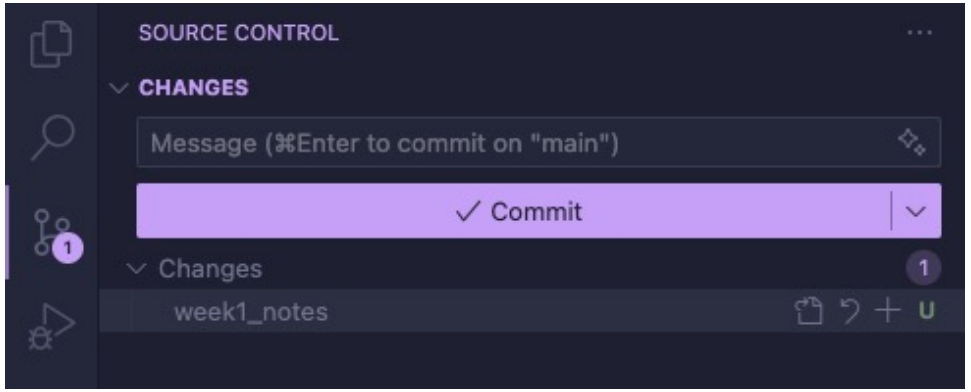
Setting up GitHub

- Staging and committing code
  - Go to Source Control
  - Add the changes you want to commit, and press commit



  - Write a short description of what you are committing and press the tick in the upper right corner

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Setting up GitHub

- Staging and committing code
  - Sync your changes and check you have your new code/files on GitHub
- Adding collaborators
  - Go to the settings of your repository, and select Collaborators
  - Invite your group mates
- Clone the repository for the other collaborators
- Be careful about changing the code at the same time
  - I recommend communicating when code has been changed
  - If you are advanced, use branches

Markdown

- Text-to-HTML conversion tool
- Can be used in Jupyter Notebooks for annotation of code

Element	Markdown Syntax
Heading	# Heading 1
Bold	**Bold text** or __Bold text__
Italic	*Italic text* or _Italic text_
Highlight	==Highlighted text==
Unordered List	- First item
Link	[title](https://www.example.com)

- Allows mathematical expressions in LaTeX-style syntax
- Cheat sheet: https://www.markdownguide.org/cheat-sheet/
- **Exercise 1:** Find your group and write your meeting notes in a Markdown file. Then upload it to GitHub

BODMAS with Python

- Operators in Python are applied much like the rules we learnt in primary school. Specifically:
  1. () Brackets
  2. ** (not ^) Exponentiation
  3. *, /, //, % Multiplication, Division, Floor Division, Modulus
  4. +, - Addition, Subtraction
- We will start exercises next week when the streams are split

Note:
Using comments and easily interpreted variable names makes code easier to read. But make sure your variable name starts with a letter and is not a reserved word within Python.

Modules

- A file containing Python definitions and statements that can be imported into another script
- Common modules and how they are imported:
  - import numpy as np
    - Manipulation of arrays
  - import matplotlib.pyplot as plt
    - Create static, animated and interactive visualisations
  - from astropy.io import fits
    - Contains range of tools for astronomical computations
    - FITS (Flexible Image Transport System) is a digital file format containing multi-dimensional arrays

Data Types

- A file of different data types:

Data Type	Meaning
Integer	No decimal point
Floating point	With decimal
Complex number	
String	Text

- Cannot add or subtract strings with an integer
- To work with the data types, you can convert them into the same type