UT Southwestern Medical Center
Lyda Hill Department of Bioinformatics
BioHPC

An Introduction to VS Code

Peng Lian

2023-06-28

Table of contents

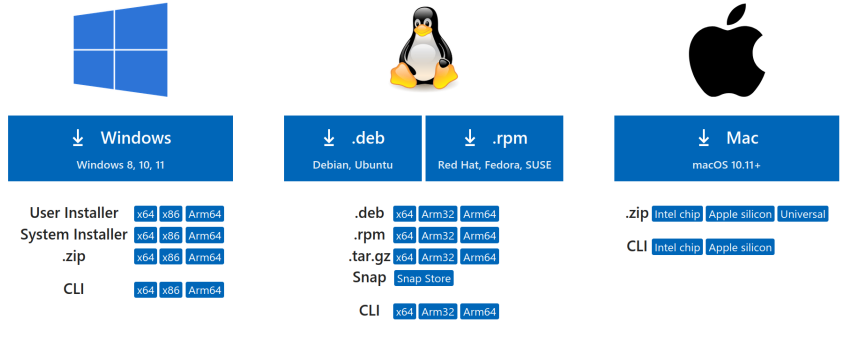
Overview

What is VS Code

Visual Studio Code (VS Code) is a free and open-source code editor developed by Microsoft. It is available for Windows, macOS, and Linux. VS Code is a powerful code editor that can be used for a variety of tasks, including:

- Programming
- Editing text
- Debugging
- Building and running applications
- Extending with extensions

VS Code is a great choice for both beginners and experienced developers. In the Stack Overflow 2022 Developer Survey, VS Code was ranked **the most popular** developer environment tool among 71,010 respondents, with 74.48% reporting that they use it.



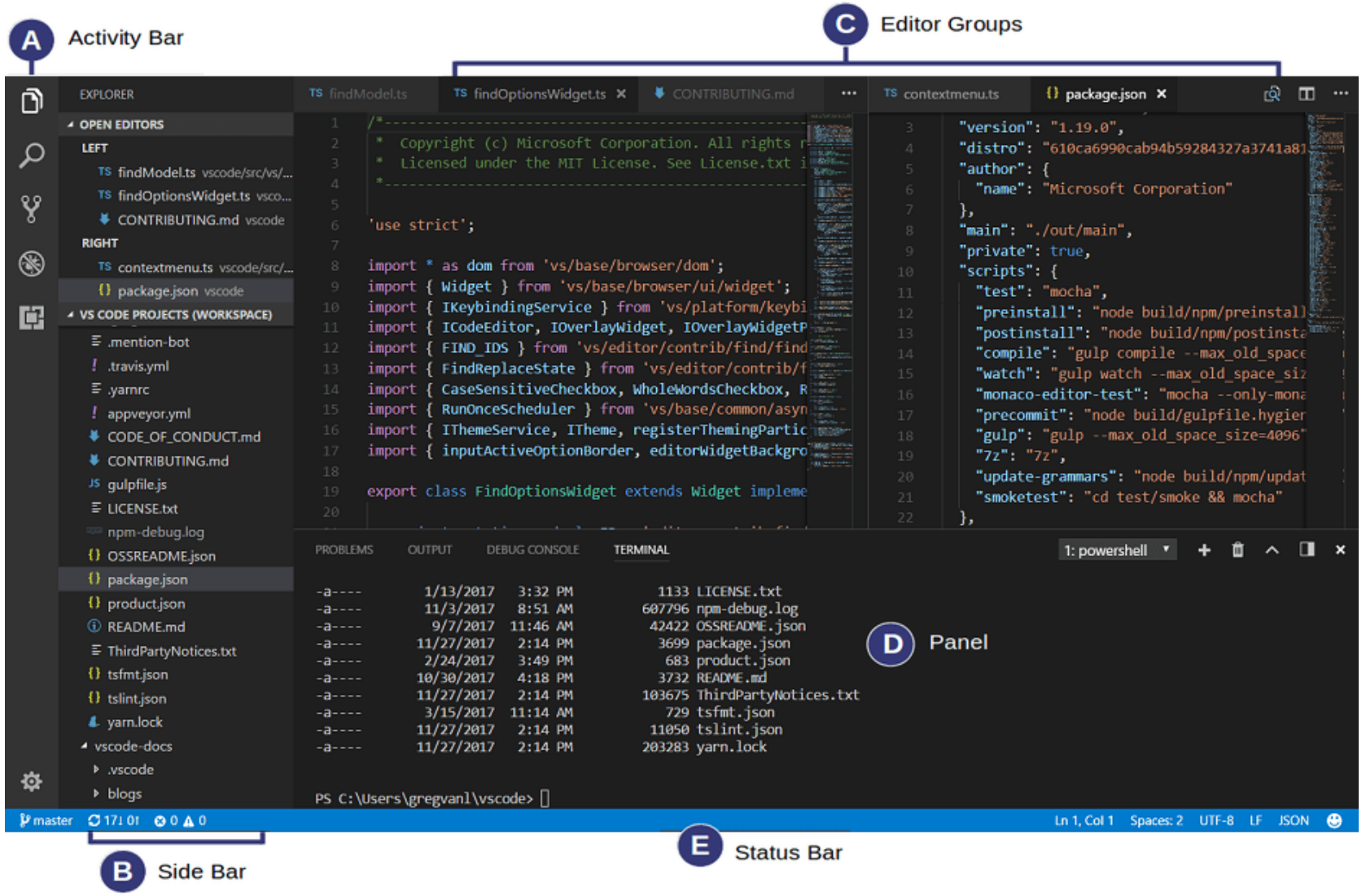
> **Note**: Visual Studio Code is a totally separate product from Visual Studio the IDE.
> **Source code**: https://github.com/Microsoft/vscode/
> **Documentations**: https://code.visualstudio.com/docs

VS Code on BioHPC

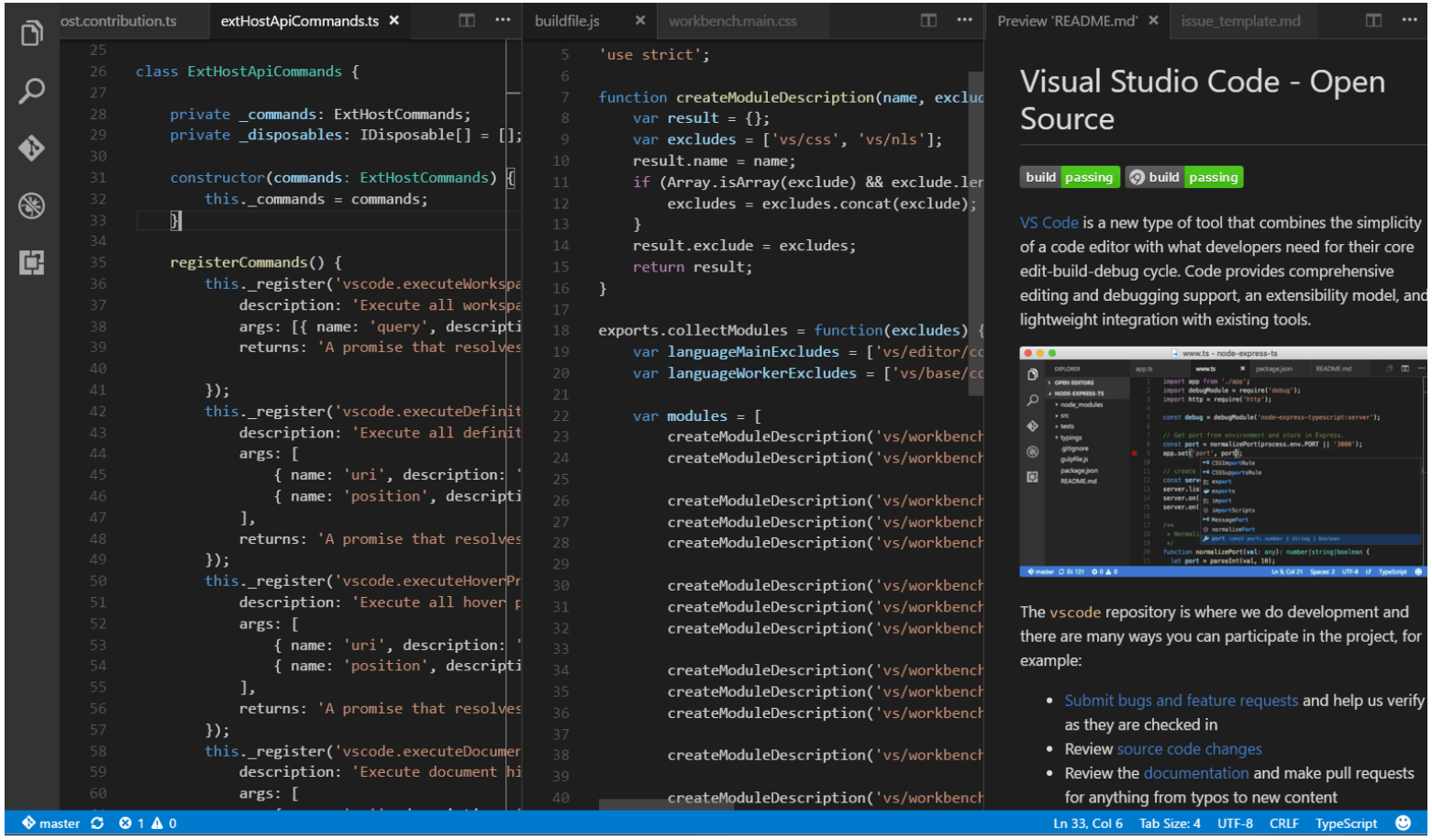
1. Go to portal.biohpc.swmed.edu –> Cloud Services –> Web Visualization
2. Open a terminal
3. module load vscode 1.66.1
4. code

User Interface

Basic layout



Side by side editing



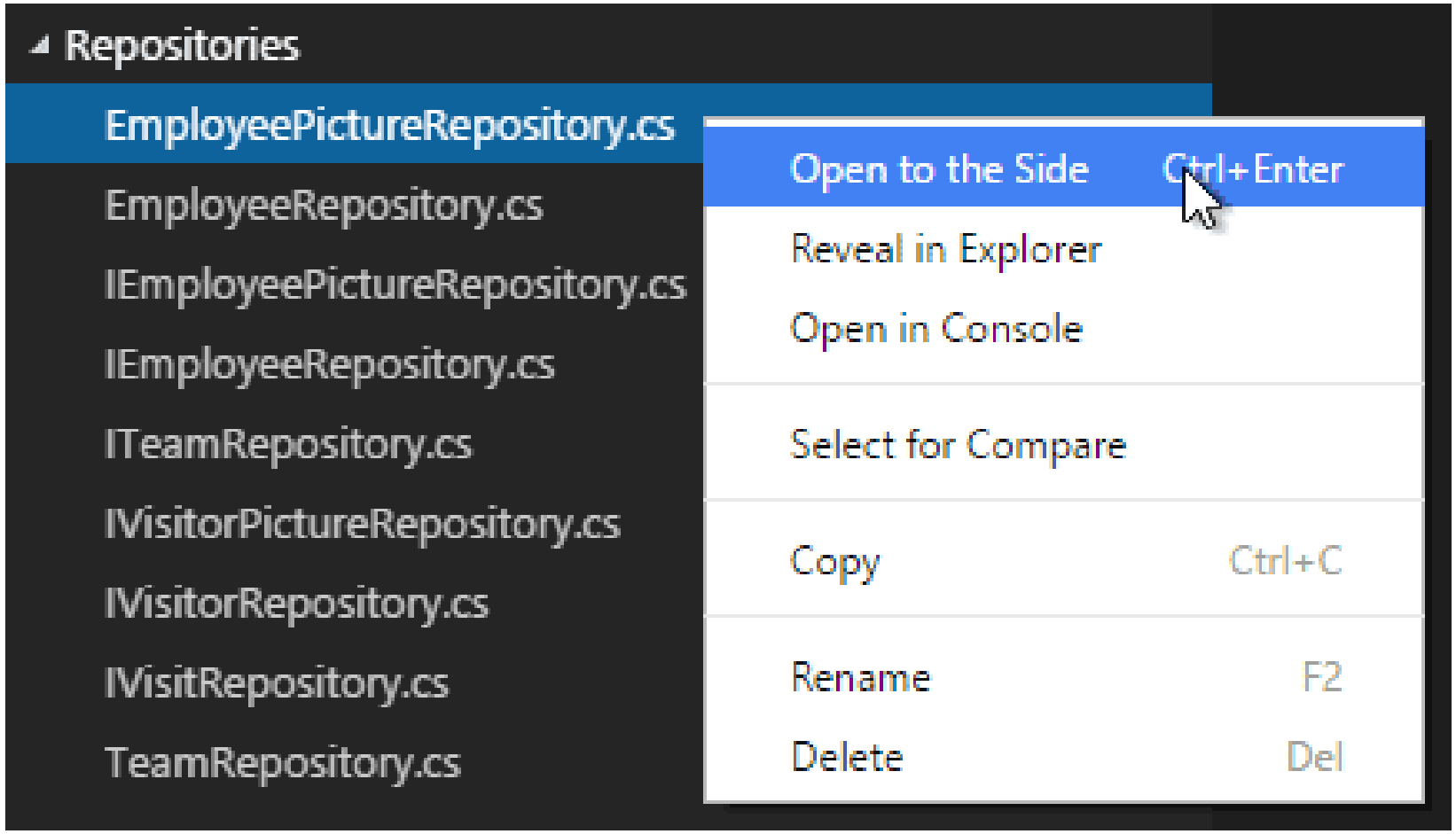
- Click the **Split Editor** button
- Or `Alt+Click` on a file in the Explorer
- Or drag and drop a tab

Minimap

gulpfile.js

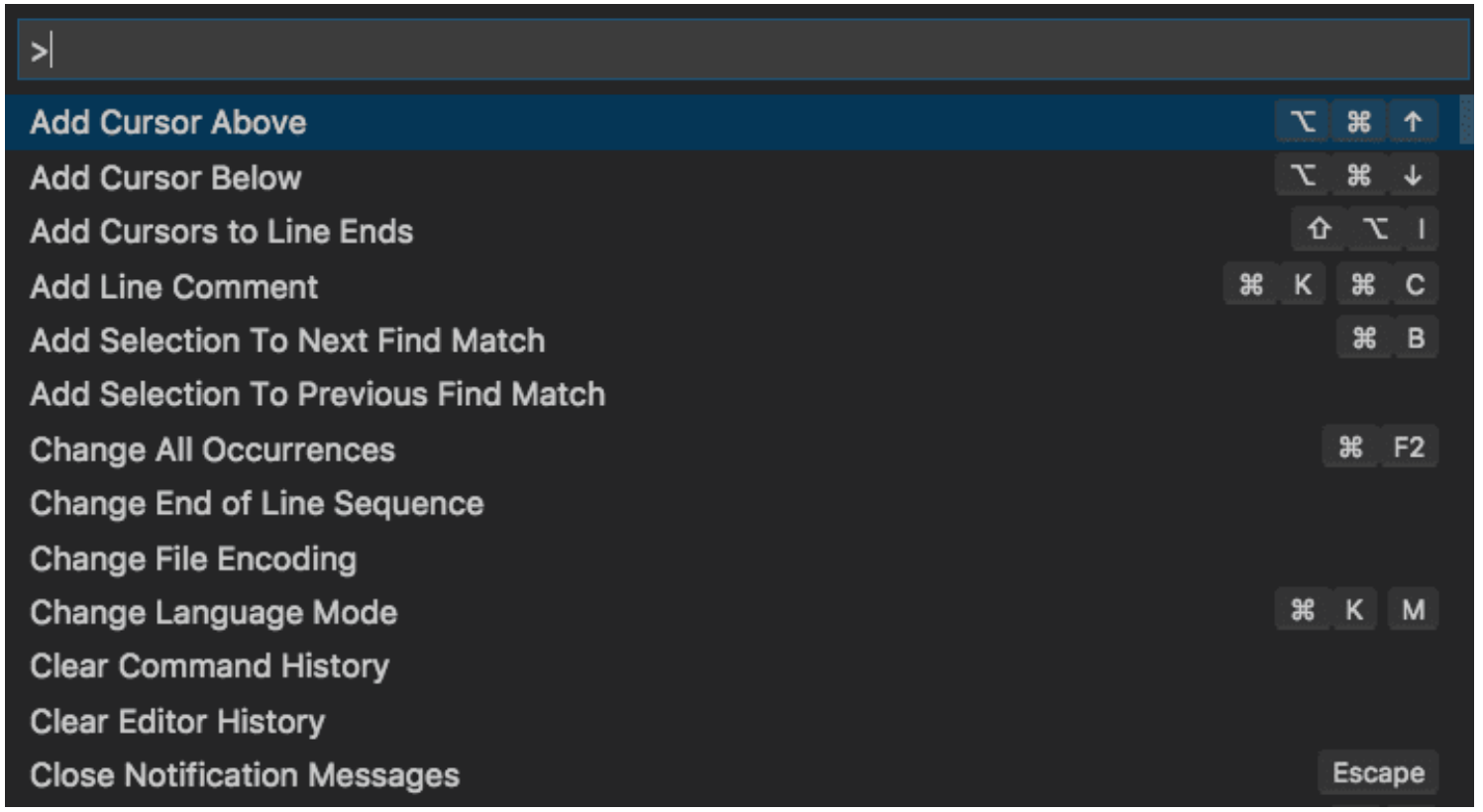
```
gulp.task('clean-out-folder', common.rimraf('out'));

gulp.task('clone-vscode-website', ['clean-out-folder'], function (cb) {
    fs.mkdir('out');
    process.chdir('./out');
    git.clone(URL, function (err) {
        if (err) {
            console.log('could not clone vscode-website')
            console.log(err);
            cb(err);
        } else {
            process.chdir('./vscode-website');
            git.checkout(BRANCH, function (error) {
                console.log('checked out branch:', BRANCH);
                process.chdir('../../');
                cb(error);
            });
        }
    });
});

gulp.task('commit', function () {
    process.chdir('./out/vscode-website');
```

Explorer



A high-level overview of the source code, which is useful for quick navigation and code understanding.

Command Palette



The Command Palette provides access to many commands. You can execute editor commands, open files, search for symbols, and see a quick outline of a file.

Preview mode

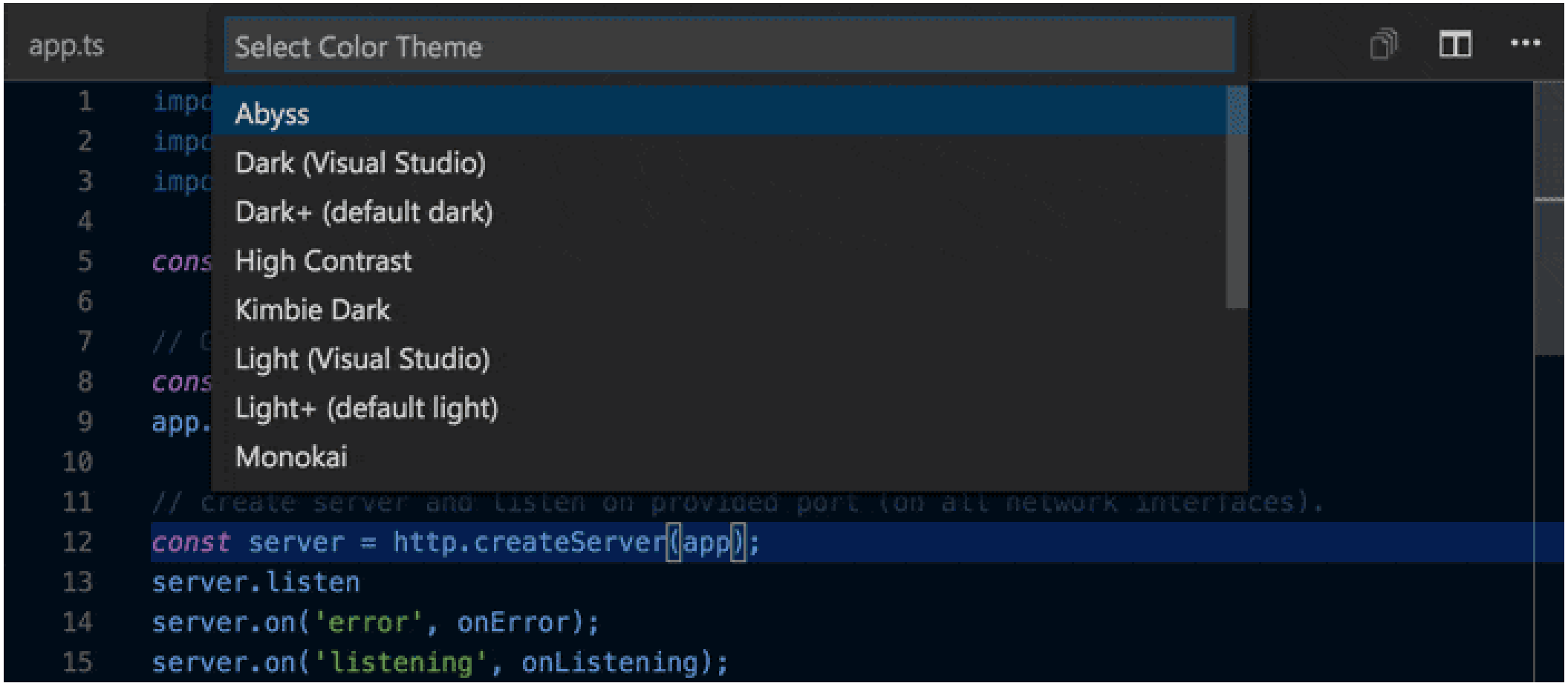
keyboardHandler.ts | *pointerHandler.ts* × | mouseTarget.ts | mouseHandler.ts

```
5   'use strict';
6
7   import {IDisposable} from 'vs/base/common/lifecycle';
```

When you single-click or select a file in the Explorer, it is shown in a preview mode and reuses an existing Tab. This is useful if you are quickly browsing files and don't want every visited file to have its own Tab. When you start editing the file or use double-click to open the file from the Explorer, a new Tab is dedicated to that file.

Preview mode is indicated by *italics* in the Tab heading.

Selecting the Color Theme



Open the Color Theme picker:

- File –> Preferences –> Theme –> Color Theme
- Or `Ctrl+K Ctrl+T`

The Editor

Settings

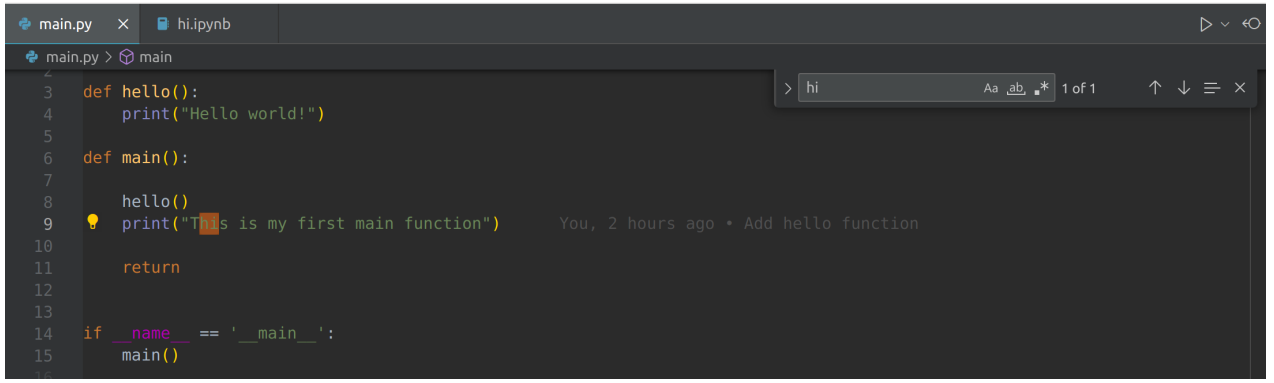
- Settings
  - File –> Preferences –> Settings
  - Or `Ctrl+,`
  - Global settings: `~/.config/Code/User/settings.json`
  - Project settings: `.vscode/settings.json`
- Settings Sync
  - File –> Preferences –> Settings Sync
- Zen mode Zen Mode lets you focus on your code by hiding all UI except the editor, going to full screen and centering the editor layout.
  - View –> Appearance –> Zen mode
  - `Ctrl+K Z`
  - **Double `Esc`** exits Zen Mode

Multiple selections

```
31 .global-message-list.transition {
32 →    -webkit-transition: top 200ms linear;
33 →    -ms-transition:     top 200ms linear;
34 →    -moz-transition:    top 200ms linear;
35 →    -khtml-transition:  top 200ms linear;
36 →    -o-transition:      top 200ms linear;
37 →    transition:         top 200ms linear;
38 }
```

Find and replace

- `Ctrl+F` ~ Find string in editor or find file in explorer
- `Enter` or `Shift+Enter` to navigate



- `Ctrl+Shift+F` ~ Find string across files

Folding and unfolding

```
364 ⊟     private onCursorSelectionChanged(): void {
365 ⊟         if (this.state === State.Hidden) {
366             return;
367         }
368
369         this.editor.layoutContentWidget(this);
370     }
371
372 ⊞     private onEditorBlur(): void {···
378     }
379
380 ⊟     private onListSelection(e: ISelectionChangeEvent<CompletionItem>): void {
381 ⊟         if (!e.elements.length) {
382             return;
383         }
```

Indentation & file encoding

VS Code analyzes your open file and determines the indentation used in the document. The auto-detected indentation overrides your default indentation settings. The detected setting is displayed on the right side of the Status Bar.

IntelliSense

IntelliSense is a general term for various code editing features including: code completion, parameter info, quick info, and member lists. IntelliSense features are sometimes called by other names such as “code completion”, “content assist”, and “code hinting.”

```
1  const express = require('express')
2  const app = express()
3
4  app.
       _router          (property) Application._router: any
       all
       apply
       arguments
       bind
       call
       caller
       checkout
       configure
       copy
```

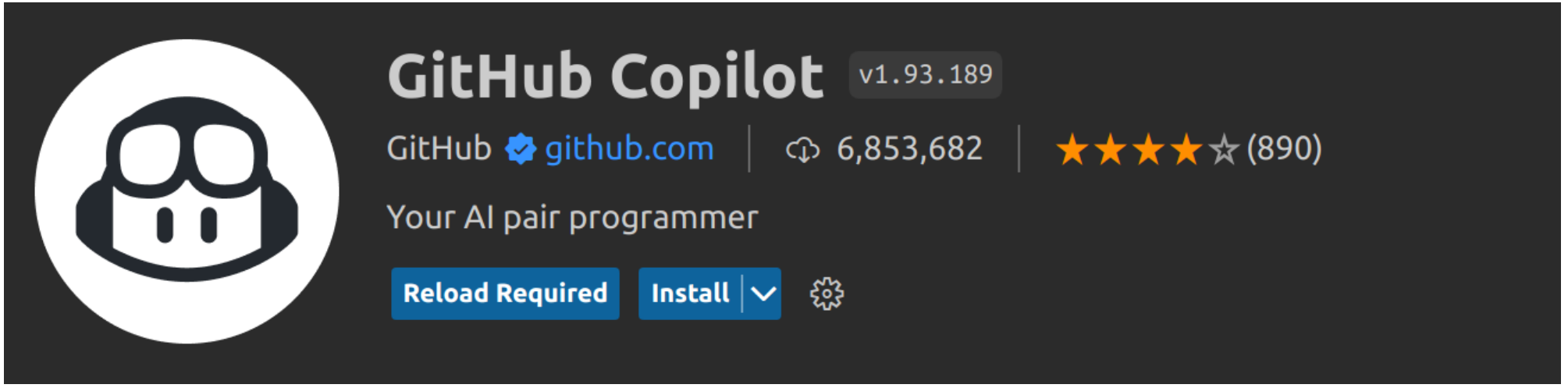
Snippets

Code snippets are templates that make it easier to enter repeating code patterns, such as loops or conditional-statements.

In Visual Studio Code, snippets appear in IntelliSense `Ctrl+Space` mixed with other suggestions, as well as in a dedicated snippet picker (Insert Snippet in the Command Palette).

AI tools in VS Code

The GitHub Copilot extension is an AI pair programmer tool that helps you write code faster and smarter. You can use the Copilot extension in VS Code to generate code, learn from the code it generates, and even configure your editor.



Source control

Using Git in VS Code

Visual Studio Code has integrated source control management (SCM) and includes Git support out-of-the-box. Many other source control providers are available through extensions.

Git documentations:

- Cheat Sheet
- Git-SCM website
- Manual
- Book
- Videos

Note: make sure you have Git installed on your computer.

Open folder or clone repo locally

Welcome - Visual Studio Code

File Edit Selection View Go Run Terminal Help

SOURCE CONTROL

In order to use git features, you can open a folder containing a git repository or clone from a URL.

Open Folder

Clone Repository

To learn more about how to use git and source control in VS Code read our docs.

Welcome

Visual Studio Code

Editing evolved

Start

New File...

Open File...

Open Folder...

Clone Git Repository...

Recent

vscode-demo ~/workplace

astrocyte_cli ~/workplace/project/astrocyte [SSH: ws029]

astrocyte_ansible ~/workplace/project/astrocyte [SSH: ws029]

utsw-slides ~/Documents/UTSW/BioHPC

astrocyte ~/workplace/project/astrocyte [SSH: ws029]

More...

Walkthroughs

Get Started with VS Code

Discover the best customizations to make VS Code yours.

Learn the Fundamentals

Boost your Productivity

Get Started with GitLens Updated

Get Started with Python Development Updated

More...

Show welcome page on startup

Initialize the local repo

Welcome - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

SOURCE CONTROL

The folder currently open doesn't have a git repository. You can initialize a repository which will enable source control features powered by git.

Initialize Repository

To learn more about how to use git and source control in VS Code read our docs.

You can directly publish this folder to a GitHub repository. Once published, you'll have access to source control features powered by git and GitHub.

Publish to GitHub

Welcome

Visual Studio Code

Editing evolved

Start

New File...

Open File...

Open Folder...

Clone Git Repository...

Recent

workplace ~

astrocyte_cli ~/workplace/project/astrocyte [SSH: ws029]

astrocyte_ansible ~/workplace/project/astrocyte [SSH: ws029]

utsw-slides ~/Documents/UTSW/BioHPC

astrocyte ~/workplace/project/astrocyte [SSH: ws029]

More...

Walkthroughs

Get Started with VS Code

Discover the best customizations to make VS Code yours.

Learn the Fundamentals

Boost your Productivity

Get Started with GitLens Updated

Get Started with Python Development Updated

More...

Show welcome page on startup

Create new files

main.py - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

SOURCE CONTROL

vscode-demo Git main*

Message (Ctrl+Enter to commit on "main")

Commit

Changes 2

.gitignore U

main.py U

BRANCHES (1)

REMOTES

main.py U

main.py > main

```python
import os

def main():

    print("This is the main function")
    return


if __name__ == '__main__':
    main()
```

.gitignore U

.gitignore

```
.history
```

main* 0 0 Git Graph Ln 6, Col 11 Spaces: 4 UTF-8 LF MagicPython 3.10.6 64-bit Spell

Stage changes & commit

main.py - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

SOURCE CONTROL

vscode-demo Git main*+

Message (Ctrl+Enter to commit on "main")

✓ Commit

Staged Changes 1

main.py A

Changes 1

.gitignore U

BRANCHES (1)

REMOTES

main.py A

```python
import os

def main():

    print("This is the main function")
    return


if __name__ == '__main__':
    main()
```

.gitignore U

```
.history
```

main*+ 0 0 Git Graph Ln 11, Col 1 Spaces: 4 UTF-8 LF MagicPython 3.10.6 64-bit Spell

Stage changes & commit

main.py - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

SOURCE CONTROL

vscode-demo Git main*+

Message (Ctrl+Enter to commit on "main")

✓ Commit

Staged Changes 1

main.py A

Changes 1

.gitignore U

BRANCHES (1)

REMOTES

main.py A

```python
import os

def main():

    print("This is the main function")
    return


if __name__ == '__main__':
    main()
```

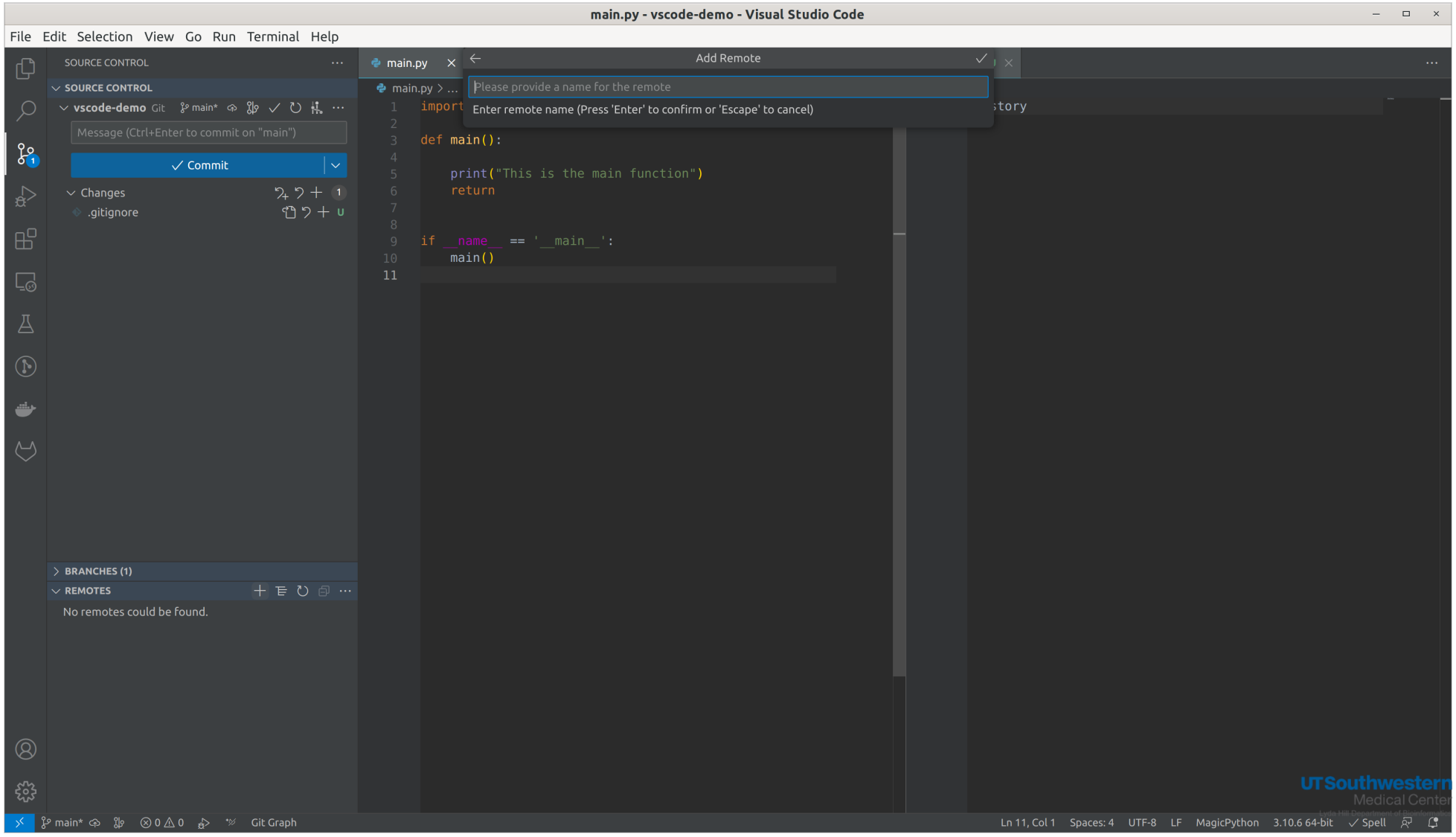
.gitignore U

```
.history
```

main*+ 0 0 Git Graph Ln 11, Col 1 Spaces: 4 UTF-8 LF MagicPython 3.10.6 64-bit Spell

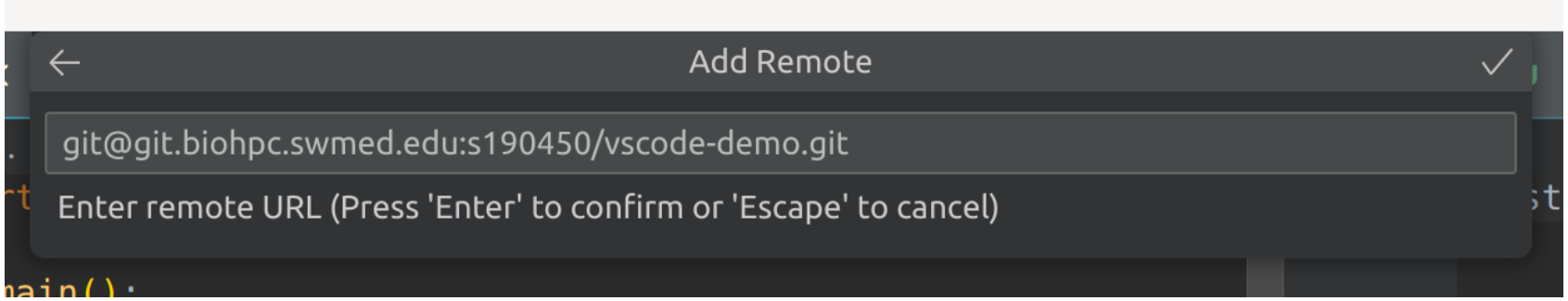
Add remote

- Add remote name



Add remote URL and confirm

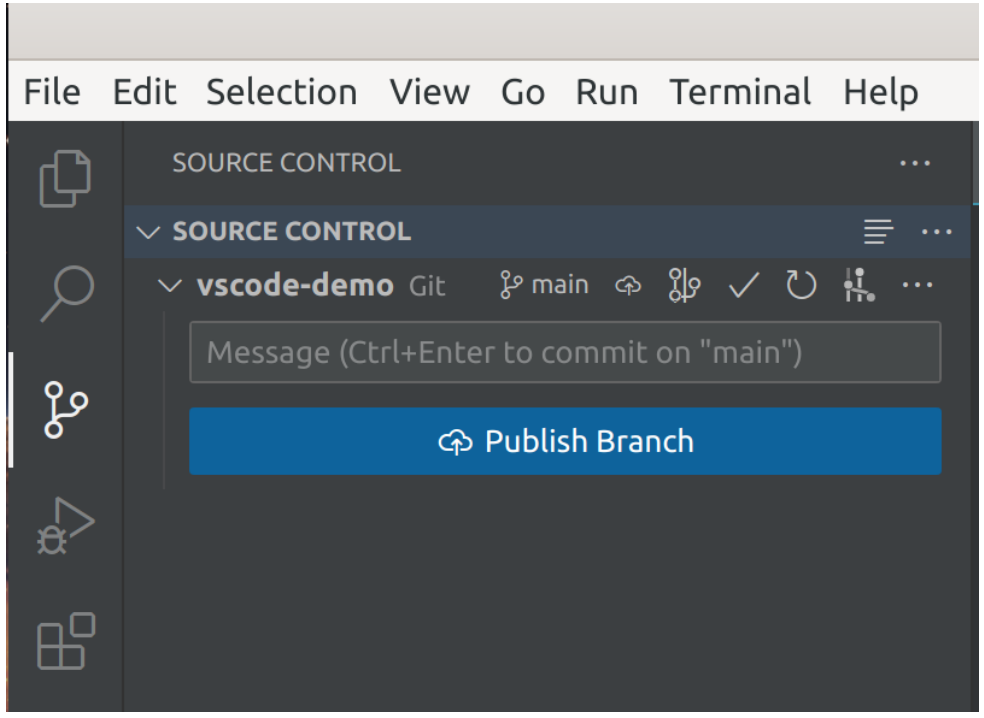
- Add remote URL



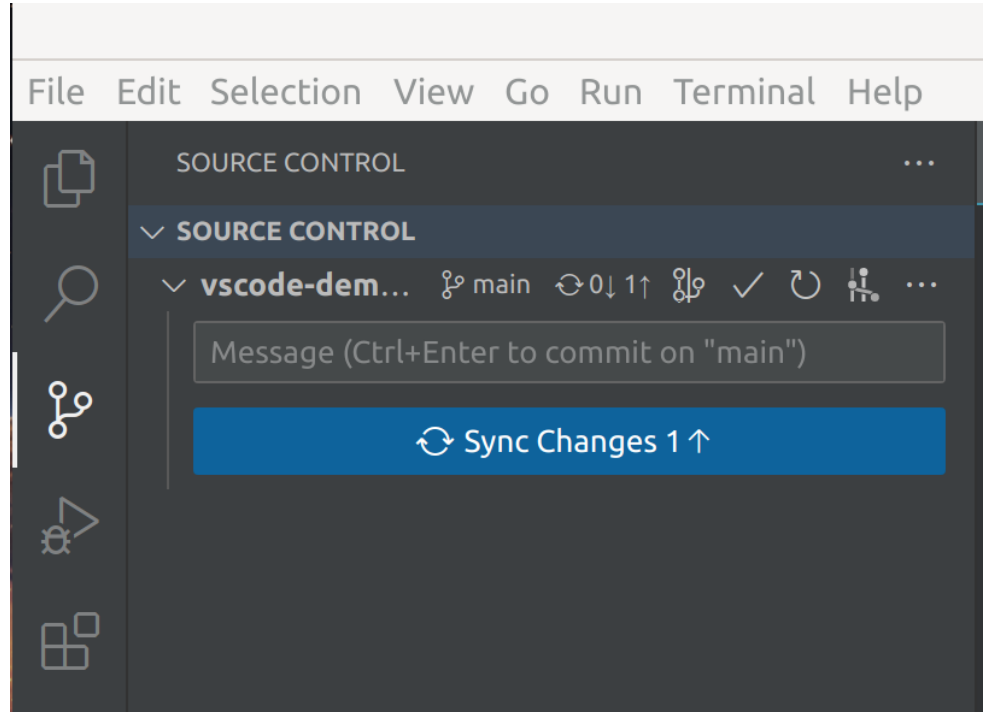
- Confirm add remote

Push/Sync chnages

- Push branch to remote

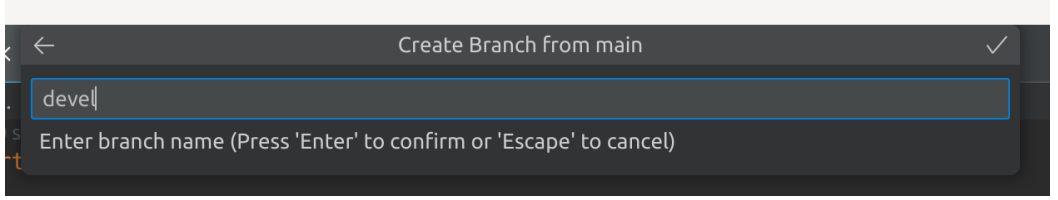


- Sync changes

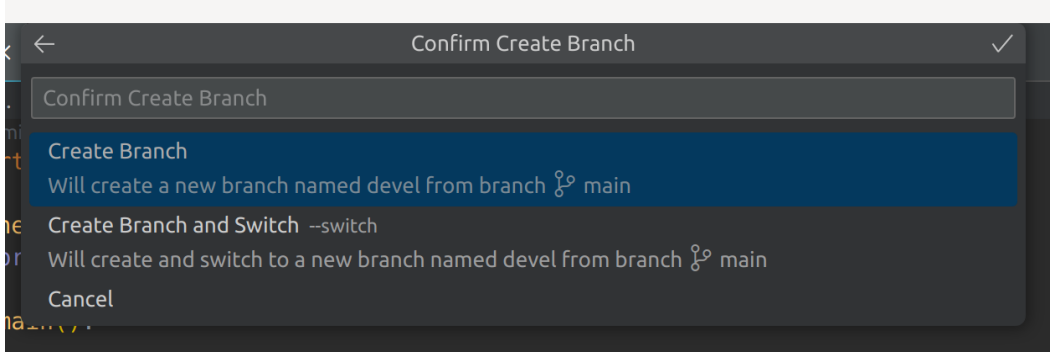


Working with branch

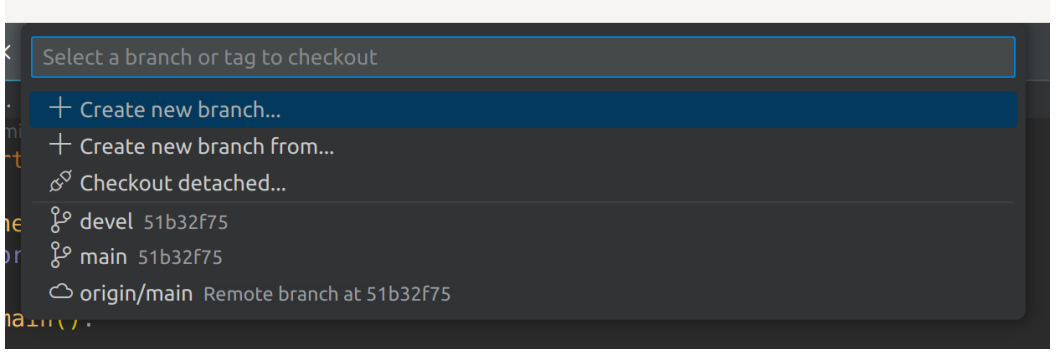
- Add a branch name



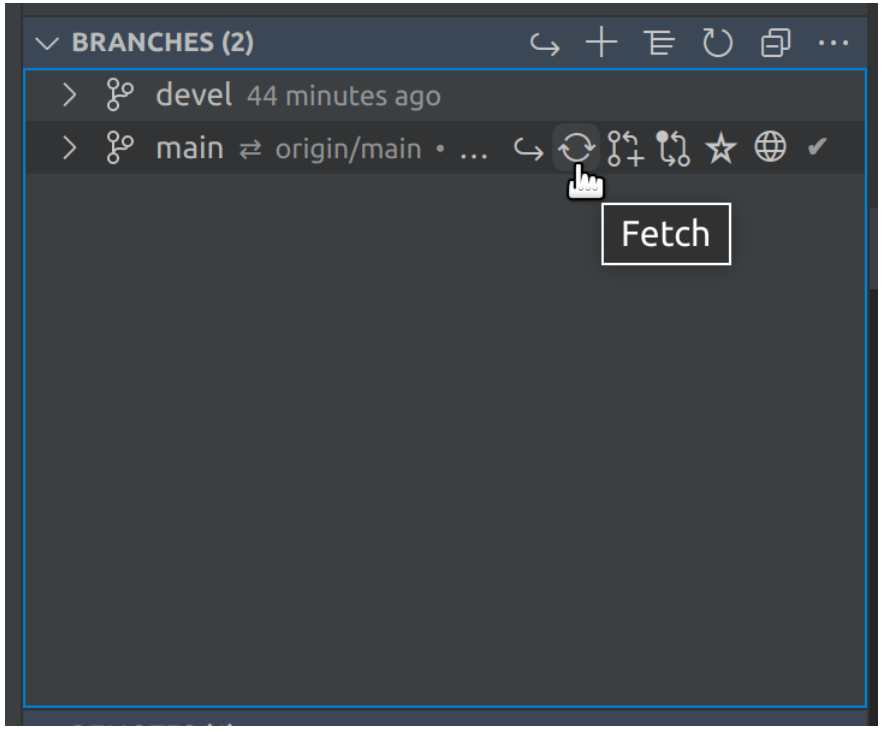
- Create branch



- Switch branch



- Fetch branch



Add changes and commit to devel

main.py - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

SOURCE CONTROL

vscode-demo Git main*

Message (Ctrl+Enter to commit on "main")

✓ Commit

Changes 1

main.py M

main.py M

main.py > ...

You, 3 minutes ago | 1 author (You)

```python
import os

def hello():
    print("Hello world!")

def main():

    hello()
    print("This is my first main function")

    return


if __name__ == '__main__':
    main()
```

OUTPUT TERMINAL GITLENS DEBUG CONSOLE PROBLEMS

```
(base) s190450@peng-ubuntu:~/workplace/vscode-demo$
```

bash

Python De...

Python

BRANCHES (1)

main 10 minutes ago

REMOTES (1)

origin git.biohpc.swmed.edu • s190450/vscod...

main* 0 0 Git Graph Ln 16, Col 1 Spaces: 4 UTF-8 LF MagicPython 3.10.6 64-bit Spell

Compare branches

main.py - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

SOURCE CONTROL

vscode-demo Git devel

Message (Ctrl+Enter to commit on "devel")

Publish Branch

BRANCHES (2)

devel 4 minutes ago

Compare devel with <branch, tag, or ref>

Publish devel to a remote

Add hello function You, 4 minutes ago

main, ... Add .gitigore You, 20 minutes ...

Add main.py You, 37 minutes ago

main 20 minutes ago

REMOTES (1)

origin git.biohpc.swmed.edu • s190450/vscod...

main.py

Compare devel with

Choose a reference to compare with (or enter a reference using #)

devel 5c850ee • 14 minutes ago

main 51b32f7 • 30 minutes ago Branches

origin/main remote branch 51b32f7 • 30 minutes ago Remote Branches

```
import
def he
    print("Hello world!")

def main():

    hello()
    print("This is my first main function")

    return


if __name__ == '__main__':
    main()
```

Click to compare devel with a branch, tag, or ref

OUTPUT TERMINAL GITLENS DEBUG CONSOLE PROBLEMS

```
(base) s190450@peng-ubuntu:~/workplace/vscode-demo$
```

bash

Python De...

Python

GitLens

devel 0 0 Git Graph Ln 16, Col 1 Spaces: 4 UTF-8 LF MagicPython 3.10.6 64-bit Spell

File differences

main.py (c4bc725) ↔ main.py (5c850ee) - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

SOURCE CONTROL

vscode-demo Git devel

Message (Ctrl+Enter to commit on "devel")

Publish Branch

BRANCHES (2)

devel 4 minutes ago

Compare devel with main

Behind 0 commits

Ahead 1 commit

1 file changed 6 additions (+), 1 deletion (-)

main.py

Publish devel to a remote

Add hello function You, 4 minutes ago

main, ... Add .gitigore You, 20 minutes ...

Add main.py You, 37 minutes ago

main 20 minutes ago

REMOTES (1)

origin git.biohpc.swmed.edu • s190450/vscod...

main.py | main.py (c4bc725) ⟷ main.py (5c850ee)

home > s190450 > workplace > vscode-demo > main.py

```
1   import os
2
    ////////////////////////////////////////////////////////////
3   def main():
4
5-      print("This is the main function")
    ////////////////////////////////////////////////////////////
6       return
7
8
9   if __name__ == '__main__':
10      main()
11
```

```
1   import os
2
3+  def hello():        You, 15 minutes ago • Add hello function ...
4+      print("Hello world!")
5+
6   def main():
7
8+      hello()
9+      print("This is my first main function")
10+
11      return
12
13
14  if __name__ == '__main__':
15      main()
16
```

OUTPUT TERMINAL GITLENS DEBUG CONSOLE PROBLEMS

```
(base) s190450@peng-ubuntu:~/workplace/vscode-demo$
```

bash

Python De...

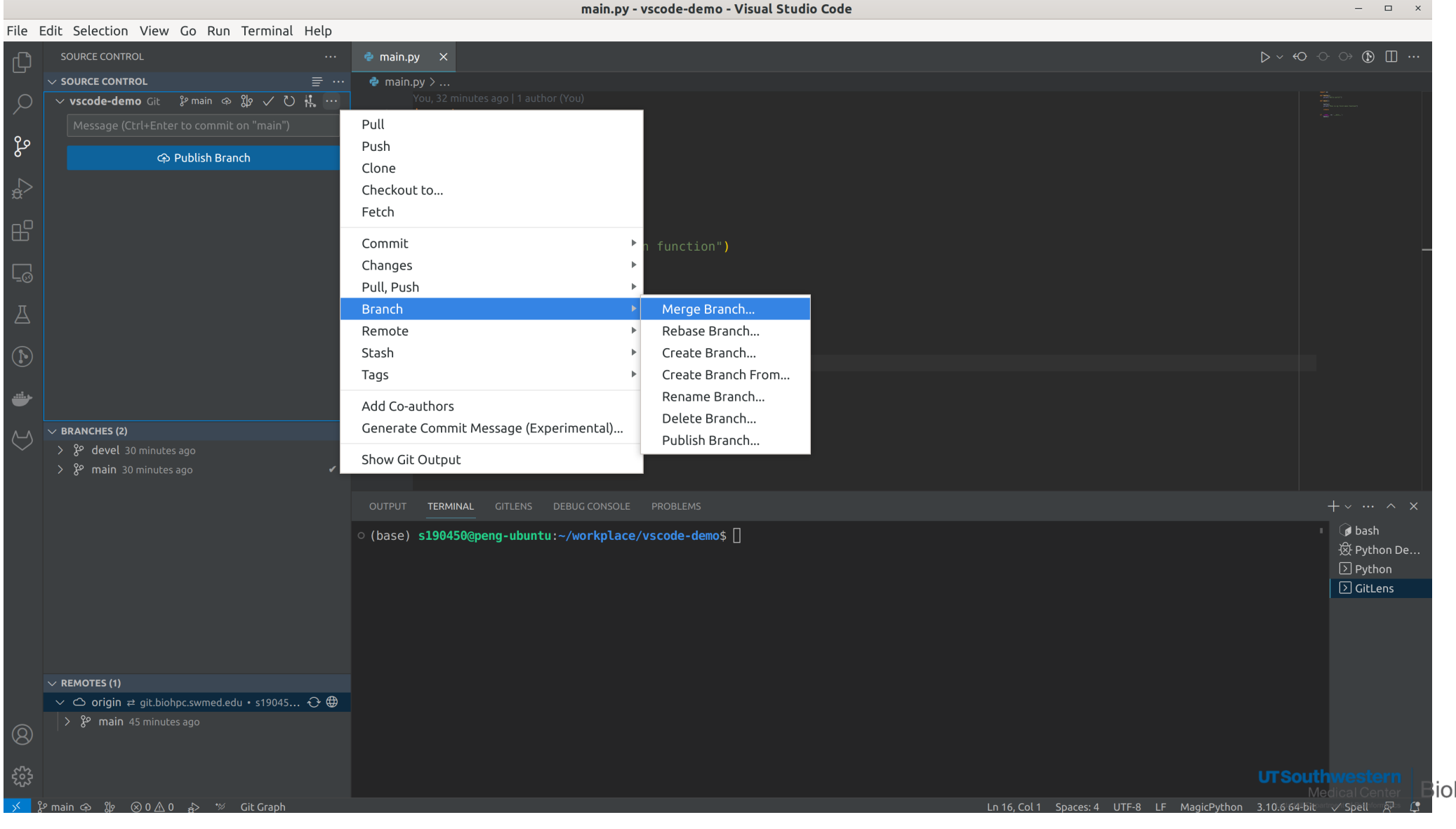
Python

GitLens

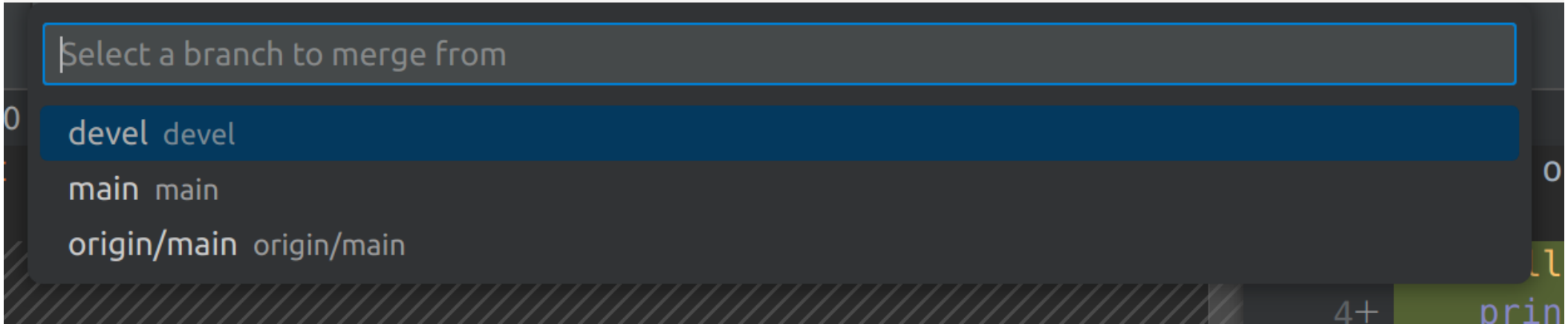
devel 0 0 Git Graph You, 15 minutes ago Ln 3, Col 1 Spaces: 4 UTF-8 MagicPython 3.10.6 64-bit Spell

Merge branches

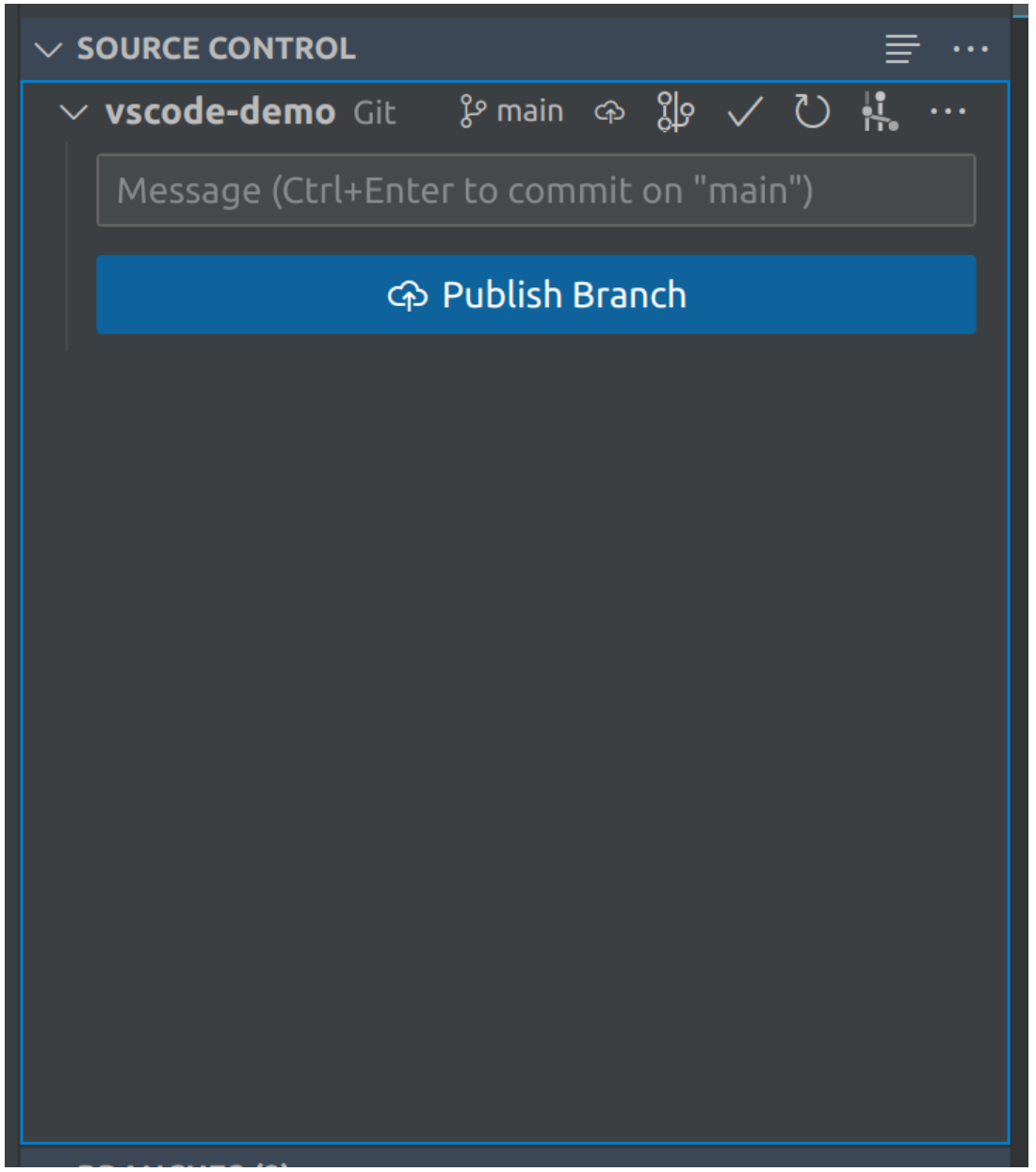
Note: Switch to the **targe branch** before starting to merge



Select a branch to merge from



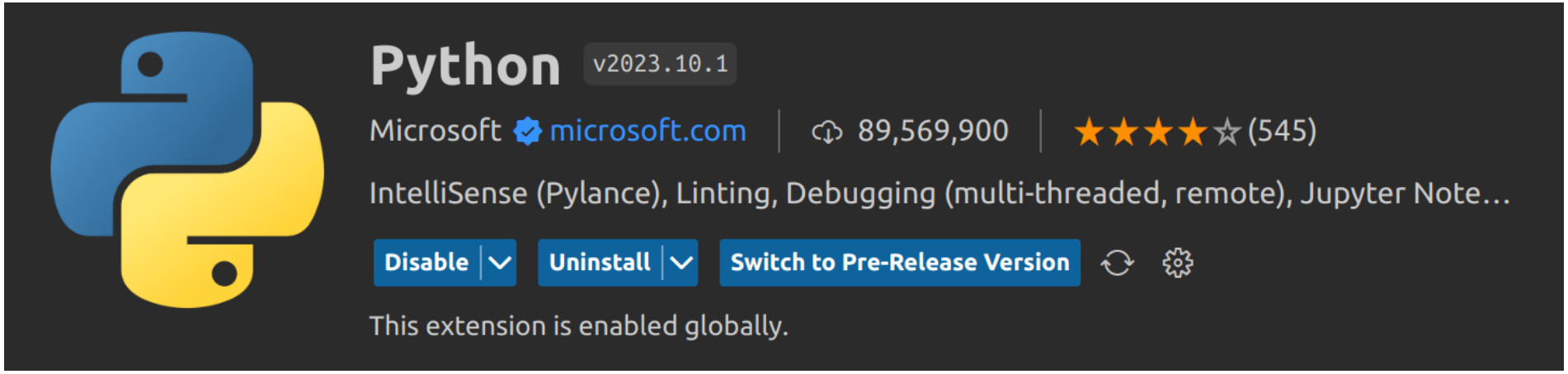
Publish merged branch



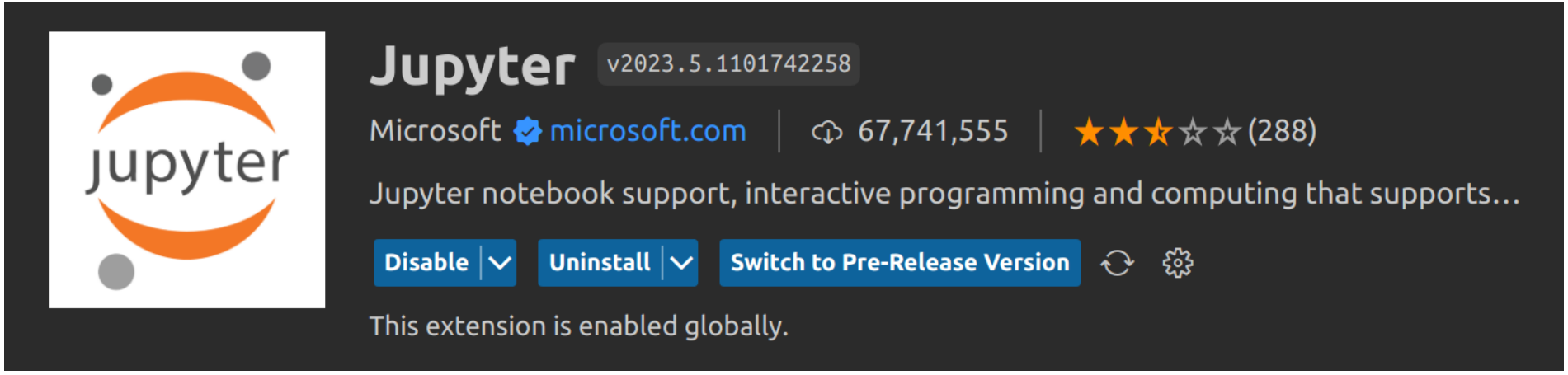
Work with Python

Prerequisites

- Python 3
- VS Code Python extension

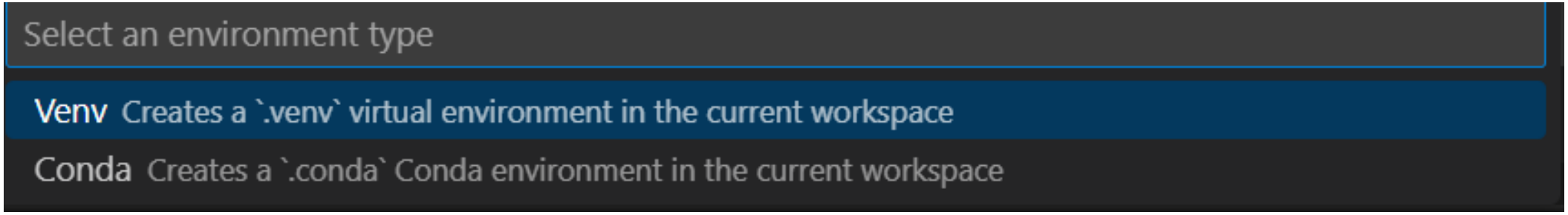


- Jupyter extension (optional)


Jupyter
v2023.5.1101742258
Microsoft
microsoft.com
67,741,555
(288)
Jupyter notebook support, interactive programming and computing that supports...
Disable
Uninstall
Switch to Pre-Release Version
This extension is enabled globally.

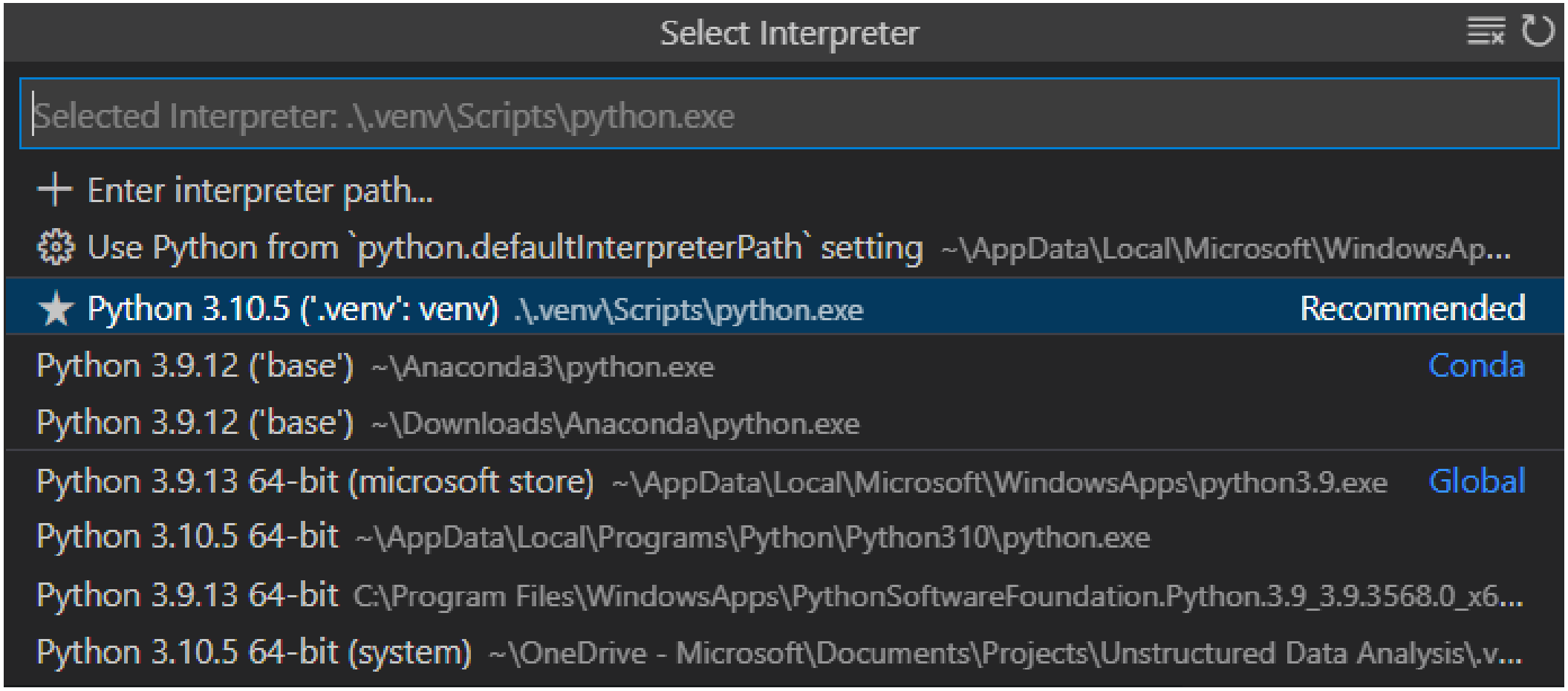
Create a virtual environment

- Command Palette (`Ctrl+Shift+P`) –> **Python: Create Environment**



Select a interpreter

- Command Palette (`Ctrl+Shift+P`) –> **Python: Select Interpreter**



Create debugging configuration

main.py - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

RUN AND DEBUG

RUN

Run and Debug

To customize Run and Debug create a launch.json file.

Show all automatic debug configurations.

main.py M

main.py > ...

```
def he
    pr

def ma

    he
    pr

    re


if __name__ == '__main__':      You, 28 seconds ago • Uncommitted changes
    main()
```

Select a debug configuration

Debug Configuration

- Python File Debug the currently active Python file
- Module Debug a Python module by invoking it with '-m'
- Remote Attach Attach to a remote debug server
- Attach using Process ID Attach to a local process
- Django Launch and debug a Django web application
- FastAPI Launch and debug a FastAPI web application
- Flask Launch and debug a Flask web application
- Pyramid Launch and debug a Pyramid web application

OUTPUT TERMINAL GITLENS JUPYTER DEBUG CONSOLE PROBLEMS 2

```
(base) s190450@peng-ubuntu:~/workplace/vscode-demo$
```

bash
Python De...
Python
GitLens

BREAKPOINTS

- [ ] Raised Exceptions
- [x] Uncaught Exceptions
- [ ] User Uncaught Exceptions

main* 0 0 2 Git Graph You, 28 seconds ago Ln 14, Col 1 Spaces: 4 UTF-8 LF MagicPython 3.10.6 64-bit Spell

Debugging

main.py - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

RUN AND DEBUG No Configurations

main.py M hi.ipynb U

main.py > ...

```
3   def hello():
4       print("Hello world!")
5
6   def main():
7
8       hello()
9       print("This is my first main function")
10
11      return
12
13
14  if __name____ == '__main__':
```

You, 28 seconds ago • Uncommitted changes

Exception has occurred: NameError

```
name '__name____' is not defined
  File "/home/s190450/workplace/vscode-demo/main.py", line 14, in <module>
    if __name____ == '__main__':
NameError: name '__name____' is not defined
```

```
15      main()
16
```

VARIABLES

Locals

special variables

function variables

os: <module 'os' from '/usr/lib/python3.10/os.p...

Globals

WATCH

CALL STACK name '__name____' is not defined

<module> main.py 14:1

BREAKPOINTS

- [ ] Raised Exceptions
- [x] Uncaught Exceptions
- [ ] User Uncaught Exceptions

OUTPUT TERMINAL GITLENS JUPYTER DEBUG CONSOLE PROBLEMS 2

```
./debugpy/../debugpy/server/cli.py", line 284, in run_file
    runpy.run_path(target, run_name="__main__")
  File "/home/s190450/.vscode/extensions/ms-python.python-2023.10.1/pythonFiles/lib/python/debugpy/_vendored/pydevd/_pydevd_bundle/pydevd_runpy.py", line 321, in run_path
    return _run_module_code(code, init_globals, run_name,
  File "/home/s190450/.vscode/extensions/ms-python.python-2023.10.1/pythonFiles/lib/python/debugpy/_vendored/pydevd/_pydevd_bundle/pydevd_runpy.py", line 135, in _run_module_code
    _run_code(code, mod_globals, init_globals,
  File "/home/s190450/.vscode/extensions/ms-python.python-2023.10.1/pythonFiles/lib/python/debugpy/_vendored/pydevd/_pydevd_bundle/pydevd_runpy.py", line 124, in _run_code
    exec(code, run_globals)
  File "/home/s190450/workplace/vscode-demo/main.py", line 14, in <module>
    if __name____ == '__main__':
NameError: name '__name____' is not defined. Did you mean: '__name__'?
(base) s190450@peng-ubuntu:~/workplace/vscode-demo$  cd /home/s190450/workplace/vscode-demo ; /usr/bin/env /bin/python3 /home/s190450/.vscode/extensions/ms-python.python-2023.10.1/pythonFiles/lib/python/debugpy/adapter/../../debugpy/launcher 52789 -- /home/s190450/workplace/vscode-demo/main.py
```

bash

Python De...

Python

GitLens

main* 0 0 2 Git Graph You, 28 seconds ago Ln 14, Col 1 Spaces: 4 UTF-8 LF MagicPython 3.10.6 64-bit Spell

Jupyter in VS Code

hi.ipynb - vscode-demo - Visual Studio Code

File Edit Selection View Go Run Terminal Help

RUN AND DEBUG

RUN

Run and Debug

To customize Run and Debug create a launch.json file.

Show all automatic debug configurations.

main.py M | hi.ipynb U

hi.ipynb > Jupyter Notebook Editor > x = np.linspace(0, 20, 100)

+ Code + Markdown | Run All | Clear All Outputs | Restart | Variables | Outline ··· base (Python 3.7.4)

```
import os
```

[1] ✓ 0.0s MagicPython

```
os.listdir('.')
```

[2] ✓ 0.0s MagicPython

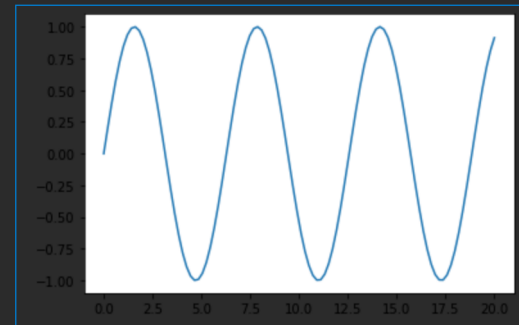
```
['hi.ipynb', '.gitignore', '.history', 'main.py', '.git']
```

```
import matplotlib.pylab as plt
import numpy as np
```

[3] ✓ 0.5s MagicPython

```
x = np.linspace(0, 20, 100)
plt.plot(x, np.sin(x))
plt.show()
```

[4] ✓ 0.3s MagicPython



[ ] MagicPython

BREAKPOINTS

- [ ] Raised Exceptions
- [x] Uncaught Exceptions
- [ ] User Uncaught Exceptions

main* ⊗0 ⚠0 ⓘ2 Git Graph Ln 3, Col 11 Spaces: 4 LF Cell 5 of 6 ✓ Spell

Acknowledgement

- Thank all BioHPC team members for their support.
- Please acknowledge our contribution by adding the following sentence to your paper:

> **This research was supported in part by the computational resources provided by the BioHPC supercomputing facility located in the Lyda Hill Department of Bioinformatics, UT Southwestern Medical Center.**

Questions?

Thanks for your attention!