



Making Better
Hacks, Faster
with GitHub Copilot



GitHub Copilot

Welcome @MLH, I'm your Copilot and I'm here to help you get things done faster.

I'm powered by AI, so surprises and mistakes are possible. Make sure to verify any generated code or suggestions.



MLH

What should we talk about in a presentation about getting started with GitHub Copilot at hackathons?



GitHub Copilot

As an AI programming assistant, I can provide an outline for a presentation about GitHub Copilot:

1. What is GitHub Copilot?

Why would you use it?

2. Setting up GitHub Copilot.

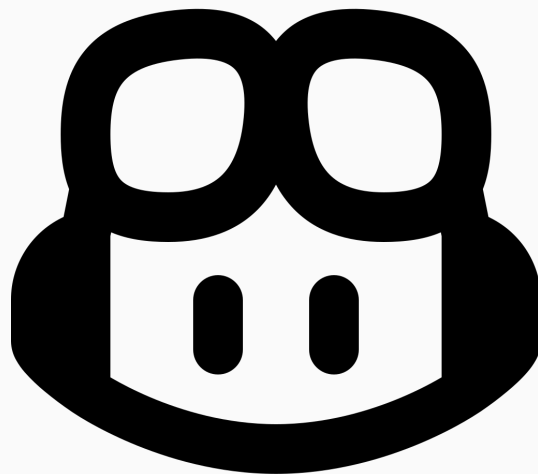
Getting started using Visual Studio Code & the GitHub Copilot extension.

3. Using GitHub Copilot.

An interactive tutorial using some of the features of GitHub Copilot.

What is GitHub Copilot?

GitHub Copilot is an AI pair programmer, that can help you write, debug, and understand code.



Create a new button component



Accept

Discard

/fix myVar is undefined



Accept

Discard

/explain



Accept

Discard

Why use GitHub Copilot?

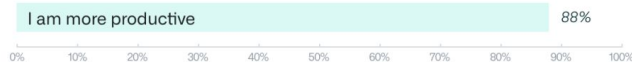


55%

Faster coding

When using GitHub Copilot...

Perceived Productivity



Satisfaction and Well-being*



Efficiency and Flow*

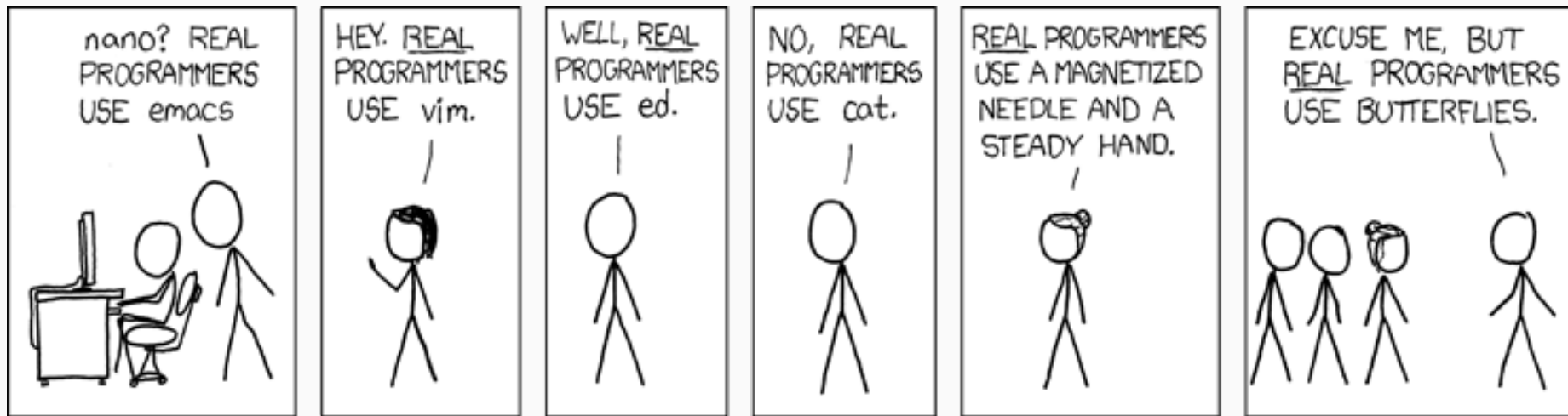


24 frustrating hours just turned into **37 hours** in flow.

Setting up GitHub Copilot

GitHub Copilot lives where you write code.

What text editor is best?

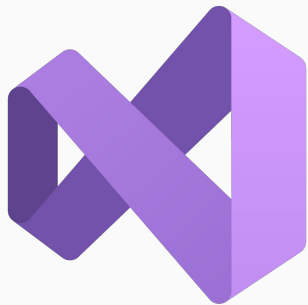


Put the knives away.

GitHub Copilot lives where you write code.



Visual Studio Code



Visual Studio



Vim



Neovim



JetBrains IDEs

Also on your command line through **gh** cli...

Let's get started with **Visual Studio Code**



Free Download
for your system



`code.visualstudio.com`



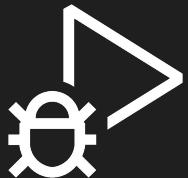
Intellisense

Smart completions from
your code.



Built-in Git

Pull, commit, and push all
without leaving your editor.



Run & Debug

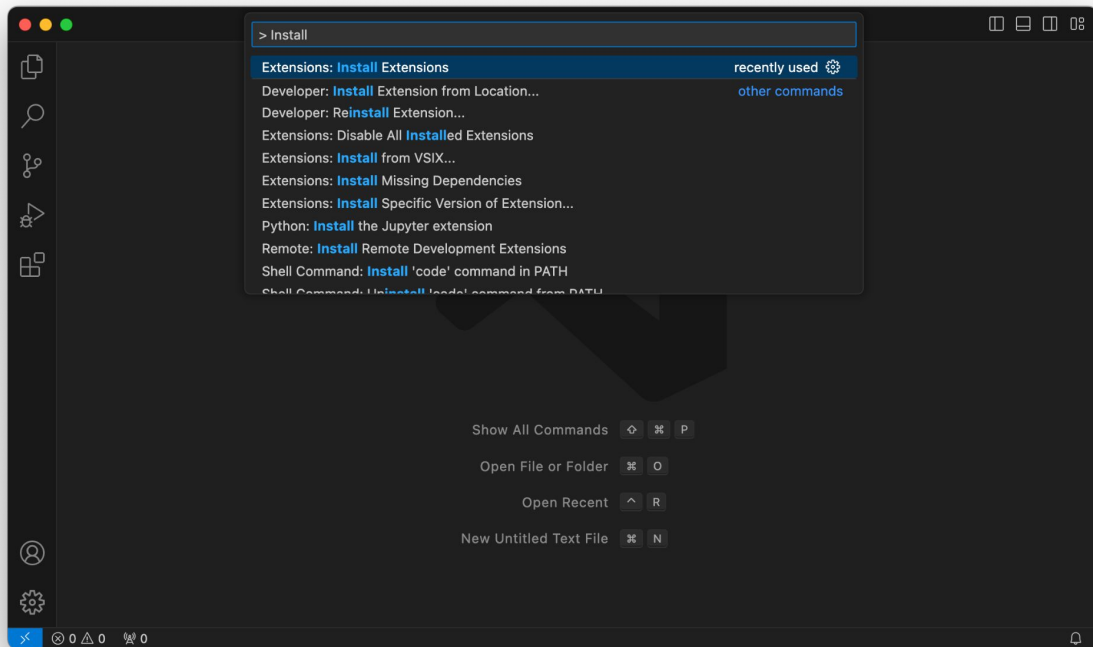
Run your code right from the
IDE.



Extensions

Add features to make the
editor match your needs.

Install the Copilot Extension

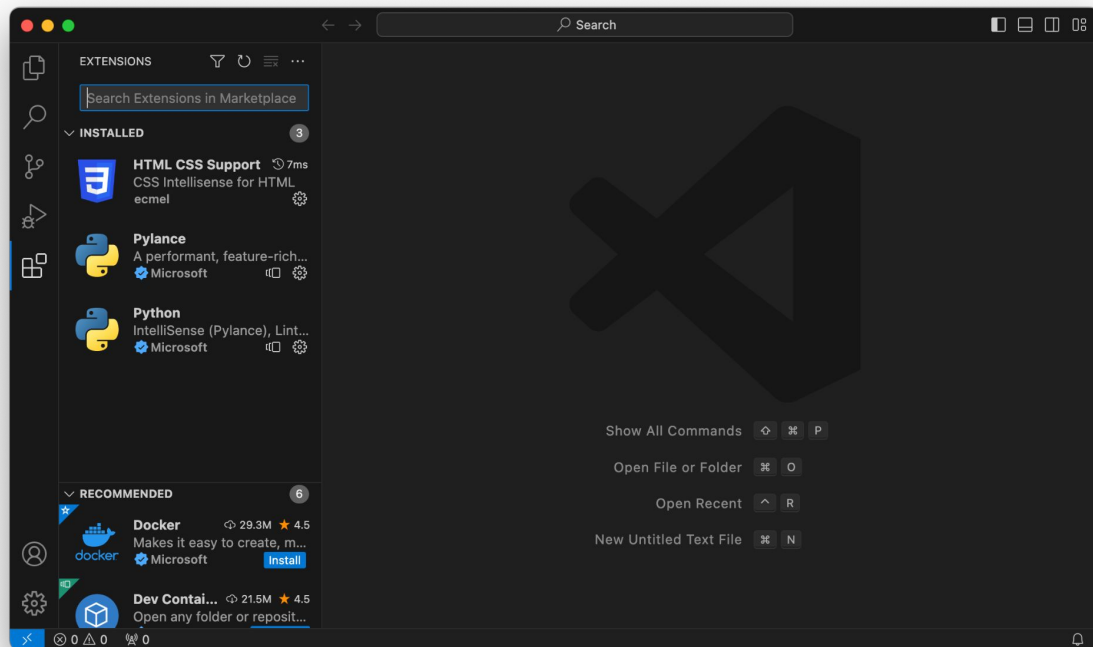


Ctrl-⇧-P / ⌘-⇧-P

Opens the Command Palette.

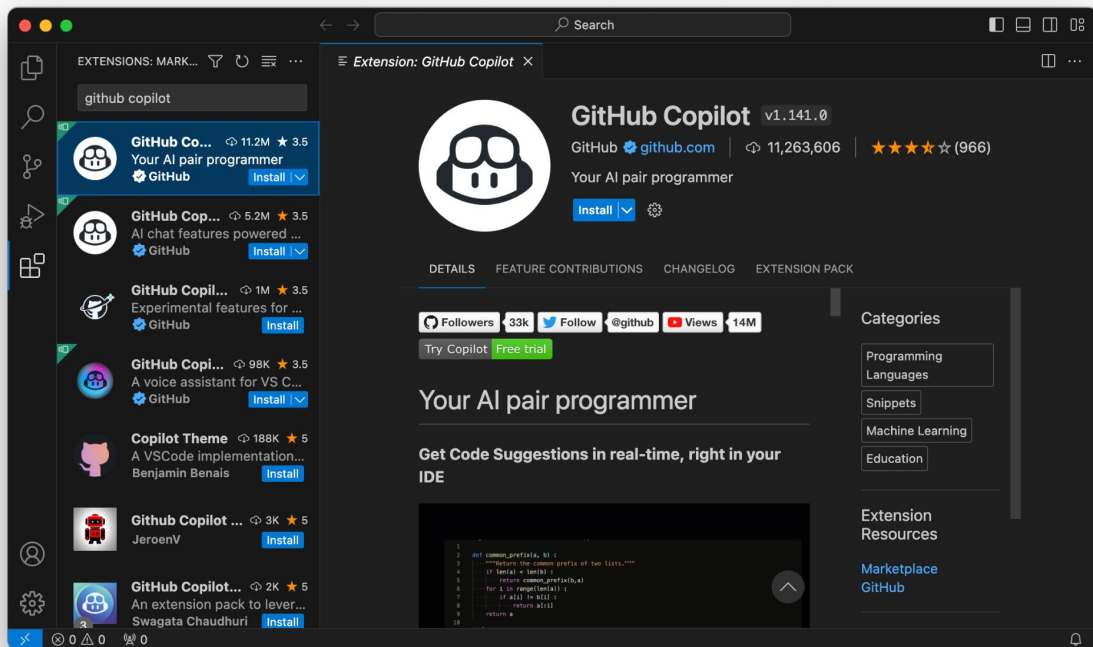
Type **Install Extension**

Install the Copilot Extension



**Search for
GitHub Copilot**

Install the Copilot Extension



Select Install

Activate Copilot

Copilot Individual

Code completions, Chat, and more for indie developers and freelancers

Free for Students

Free for verified students, teachers, and maintainers of popular open source projects.



GitHub

Student Developer Pack

Claim the GitHub Student Developer Pack

Access dozens of professional tools for free, while you're a student.

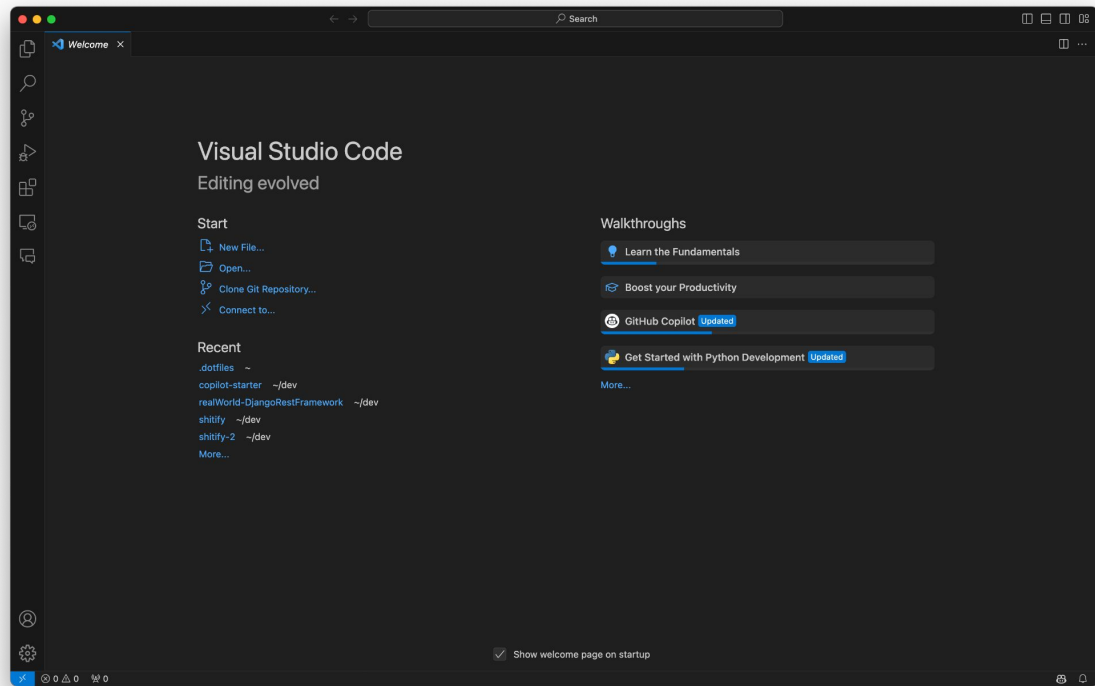
Signup for Student Developer Pack

<https://hackp.ac/pack>



Using GitHub Copilot

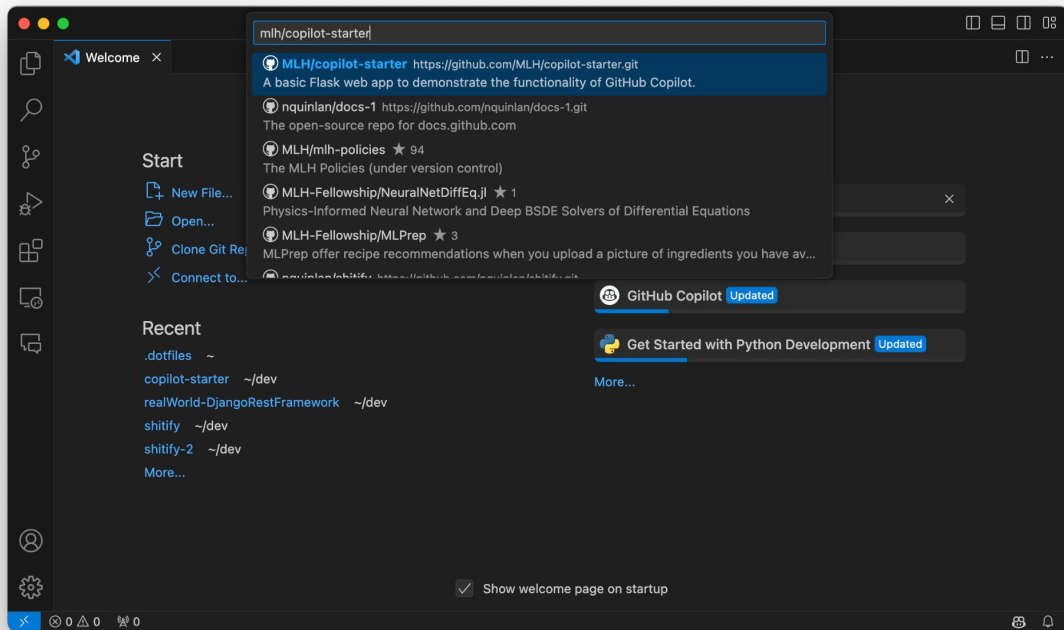
Starting a Project



Open a New Window

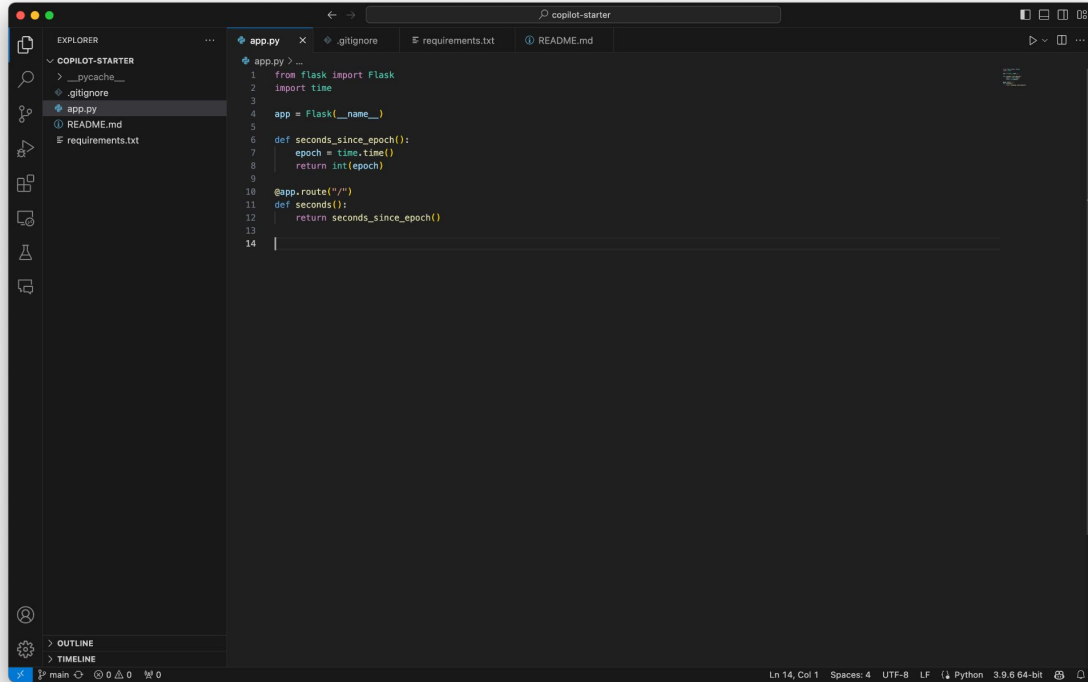
Select Clone Git Repo...

Clone mlh/copilot-starter

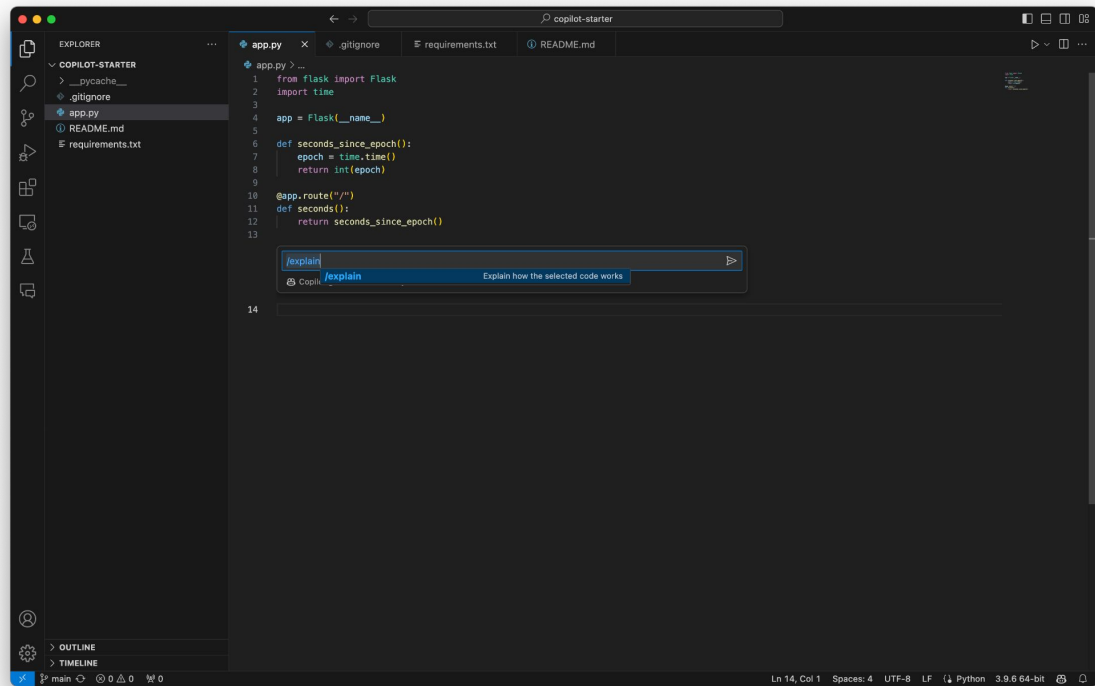


Clone:
mlh/copilot-starter

Open app.py



Using Copilot to Explain Code

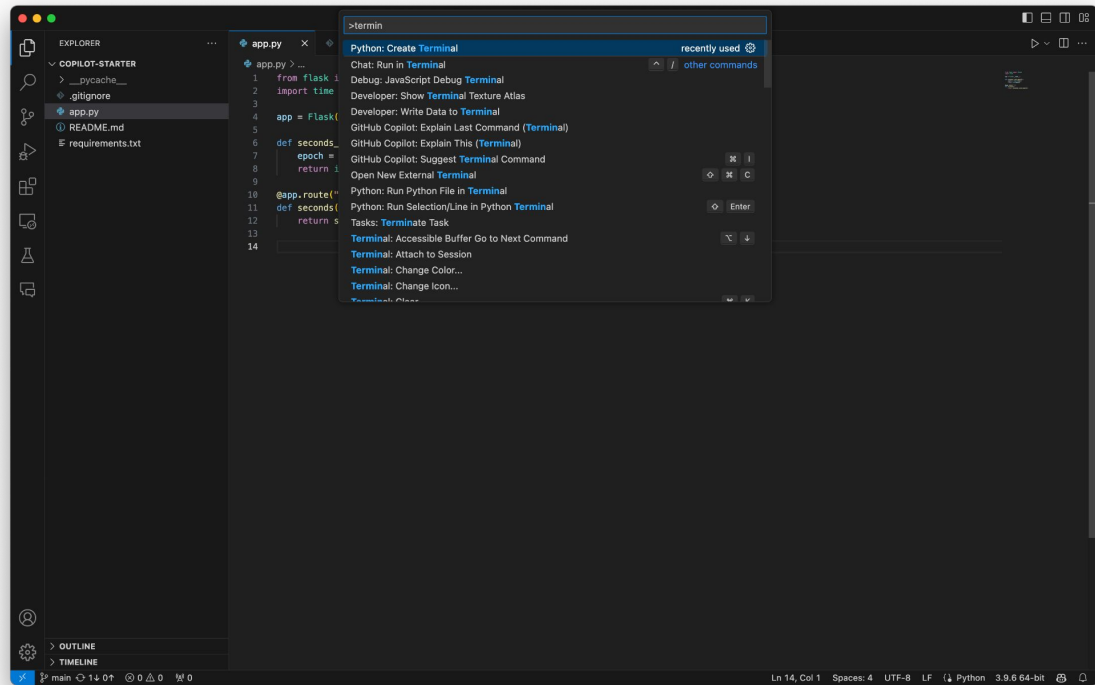


Ctrl-I / ⌘-I

Opens GitHub Copilot

Type **/explain**

Seeing the Code in Action

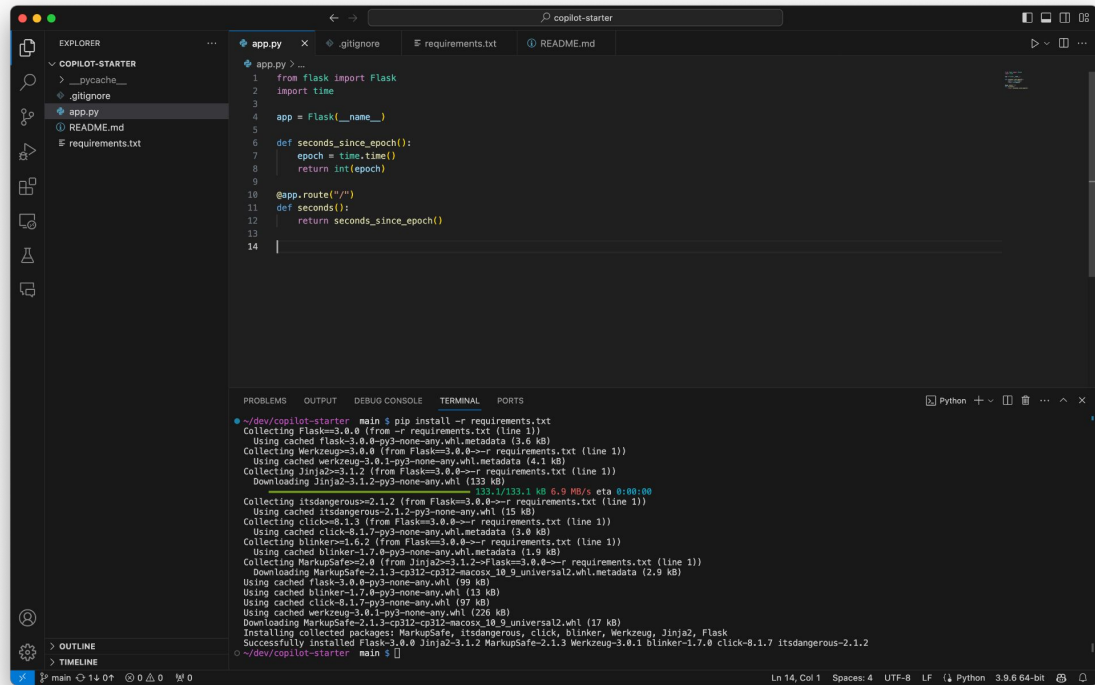


Ctrl-⇧-P / ⌘-⇧-P

Opens the Command Palette.

Type **Create Terminal**

Seeing the Code in Action



The screenshot shows a VS Code editor window titled 'copilot-starter'. The Explorer sidebar on the left shows the project structure: 'COPILOT-STARTER' containing '.__pycache__', '.gitignore', 'app.py', 'README.md', and 'requirements.txt'. The main editor area displays the contents of 'app.py', which is a simple Flask application. The code defines a Flask app, imports time, and has a route for '/'. The terminal at the bottom shows the command 'pip install -r requirements.txt' being executed, with detailed output showing the installation of various packages like Flask, Werkzeug, Jinja2, itsdangerous, click, blinker, and MarkupSafe.

```
app.py
1 from flask import Flask
2 import time
3
4 app = Flask(__name__)
5
6 def seconds_since_epoch():
7     epoch = time.time()
8     return int(epoch)
9
10 @app.route("/")
11 def seconds():
12     return seconds_since_epoch()
13
14
```

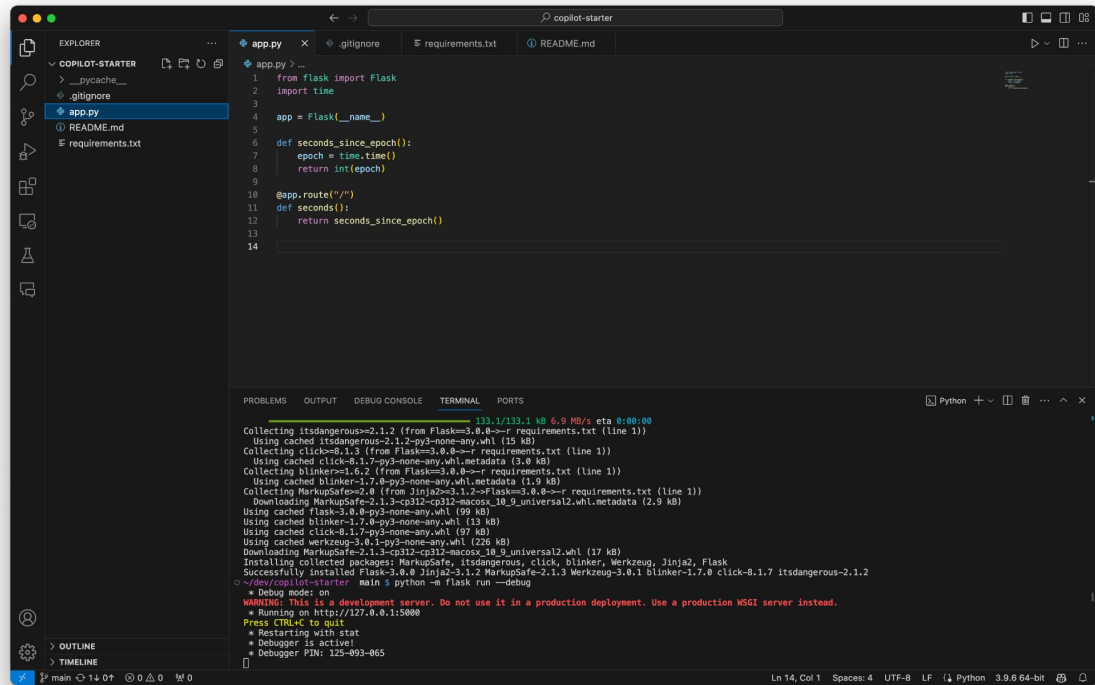
```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Python + Python 3.9.6 64-bit

~/dev/copilot-starter main $ pip install -r requirements.txt
Collecting Flask==3.0.0 (from -r requirements.txt (line 1))
  Using cached flask-3.0.0-py3-none-any.whl.metadata (3.6 kB)
Collecting Werkzeug==3.0.0 (from Flask==3.0.0->-r requirements.txt (line 1))
  Using cached werkzeug-3.0.1-py3-none-any.whl.metadata (4.1 kB)
Collecting Jinja2==3.1.2 (from Flask==3.0.0->-r requirements.txt (line 1))
  Downloading Jinja2-3.1.2-py3-none-any.whl (133 kB)
  133.1/133.1 kB 6.9 MB/s eta 0:00:00
Collecting itsdangerous==2.1.2 (from Flask==3.0.0->-r requirements.txt (line 1))
  Using cached itsdangerous-2.1.2-py3-none-any.whl (15 kB)
Collecting click==8.1.3 (from Flask==3.0.0->-r requirements.txt (line 1))
  Using cached click-8.1.7-py3-none-any.whl.metadata (3.8 kB)
Collecting blinker==1.6.2 (from Flask==3.0.0->-r requirements.txt (line 1))
  Using cached blinker-1.7.0-py3-none-any.whl.metadata (8.9 kB)
Collecting MarkupSafe==2.0 (from Jinja2==3.1.2->-r requirements.txt (line 1))
  Downloading MarkupSafe-2.1.3-cp12-cp312-macosx_10_9_universal2.whl.metadata (2.9 kB)
  Using cached flask-3.0.0-py3-none-any.whl (99 kB)
  Using cached blinker-1.7.0-py3-none-any.whl (13 kB)
  Using cached click-8.1.7-py3-none-any.whl (97 kB)
  Using cached werkzeug-3.0.1-py3-none-any.whl (226 kB)
  Downloading MarkupSafe-2.1.3-cp312-cp312-macosx_10_9_universal2.whl (17 kB)
Installing collected packages: MarkupSafe, itsdangerous, click, blinker, Werkzeug, Jinja2, Flask
Successfully installed Flask-3.0.0 Jinja2-3.1.2 MarkupSafe-2.1.3 Werkzeug-3.0.1 blinker-1.7.0 click-8.1.7 itsdangerous-2.1.2
~/dev/copilot-starter main $
```

Type

```
pip install -r requirements.txt
```

Seeing the Code in Action



The screenshot shows a VS Code editor window titled 'copilot-starter'. The Explorer sidebar on the left shows the project structure with files like 'app.py', 'requirements.txt', and 'README.md'. The main editor area displays the code in 'app.py':

```
1 from flask import Flask
2 import time
3
4 app = Flask(__name__)
5
6 def seconds_since_epoch():
7     epoch = time.time()
8     return int(epoch)
9
10 @app.route("/")
11 def seconds():
12     return seconds_since_epoch()
13
14
```

The bottom panel shows the TERMINAL output, which includes the command 'python -m flask run --debug' and the resulting output from the Flask development server:

```
133.1/133.1 kB 6.9 MB/s eta 0:00:00
Collecting itsdangerous>2.1.2 (from Flask==3.0.0->r requirements.txt (line 1))
Using cached itsdangerous-2.1.2-py3-none-any.whl (15 kB)
Collecting click>8.1.3 (from Flask==3.0.0->r requirements.txt (line 1))
Using cached click-8.1.7-py3-none-any.whl.metadata (3.0 kB)
Collecting blinker>1.6.2 (from Flask==3.0.0->r requirements.txt (line 1))
Using cached blinker-1.7.0-py3-none-any.whl.metadata (1.9 kB)
Collecting MarkupSafe>2.0 (from Jinja2>3.1.2->Flask==3.0.0->r requirements.txt (line 1))
Downloading MarkupSafe-2.1.3-cp12-cp12-macosx_10_9_universal2.whl.metadata (2.9 kB)
Using cached flask-3.0.0-py3-none-any.whl (99 kB)
Using cached blinker-1.7.0-py3-none-any.whl (13 kB)
Using cached click-8.1.7-py3-none-any.whl (97 kB)
Using cached werkzeug-3.0.1-py3-none-any.whl (226 kB)
Downloading MarkupSafe-2.1.3-cp12-cp12-macosx_10_9_universal2.whl (17 kB)
Installing collected packages: MarkupSafe, itsdangerous, click, blinker, Werkzeug, Jinja2, Flask
Successfully installed Flask-3.0.0 Jinja2-3.1.2 MarkupSafe-2.1.3 Werkzeug-3.0.1 blinker-1.7.0 click-8.1.7 itsdangerous-2.1.2
~/dev/copilot-starter: main $ python -m flask run --debug
 * Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on https://127.0.0.1:5000
Press CTRL+C to quit
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 125-893-865
```

Type

```
python -m flask run --debug
```

Seeing the Code in Action

TypeError

TypeError: The view function did not return a valid response. The return type must be a string, dict, list, tuple with headers or status, Response instance, or WSGI callable, but it was a int.

Traceback (most recent call last)

```
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1478, in __call__
    return self.wsgi_app(environ, start_response)
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1458, in wsgi_app
    response = self.handle_exception(e)
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1455, in wsgi_app
    response = self.full_dispatch_request()
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 870, in full_dispatch_request
    return self.finalize_request(rv)
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 889, in finalize_request
    response = self.make_response(rv)
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1197, in make_response
    raise TypeError(
    ^
TypeError: The view function did not return a valid response. The return type must be a string, dict, list, tuple with headers or status, Response instance, or WSGI callable, but it was a int.

The debugger caught an exception in your WSGI application. You can now look at the traceback which led to the error.



To switch between the interactive traceback and the plaintext one, you can click on the "Traceback" headline. From the text traceback you can also create a paste of it. For code execution mouse-over the frame you want to debug and click on the console icon on the right side.



You can execute arbitrary Python code in the stack frames and there are some extra helpers available for introspection:



- dump() shows all variables in the frame
- dump(obj) dumps all that's known about the object

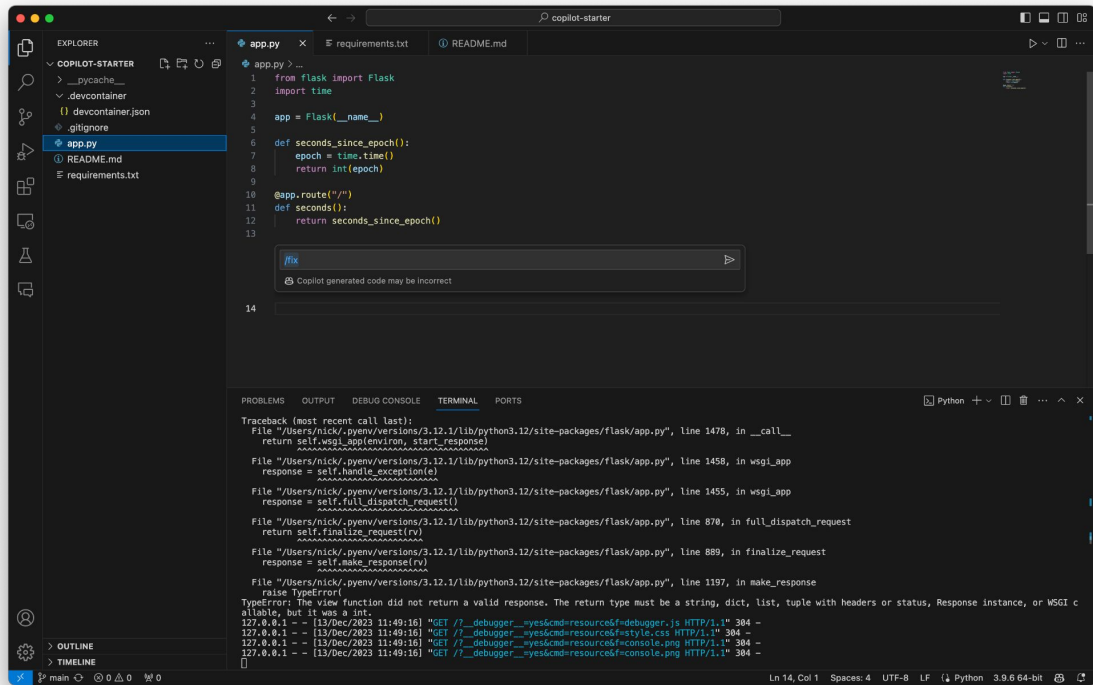


Brought to you by DON'T PANIC, your friendly Werkzeug powered traceback interpreter.


```



Fixing the Error

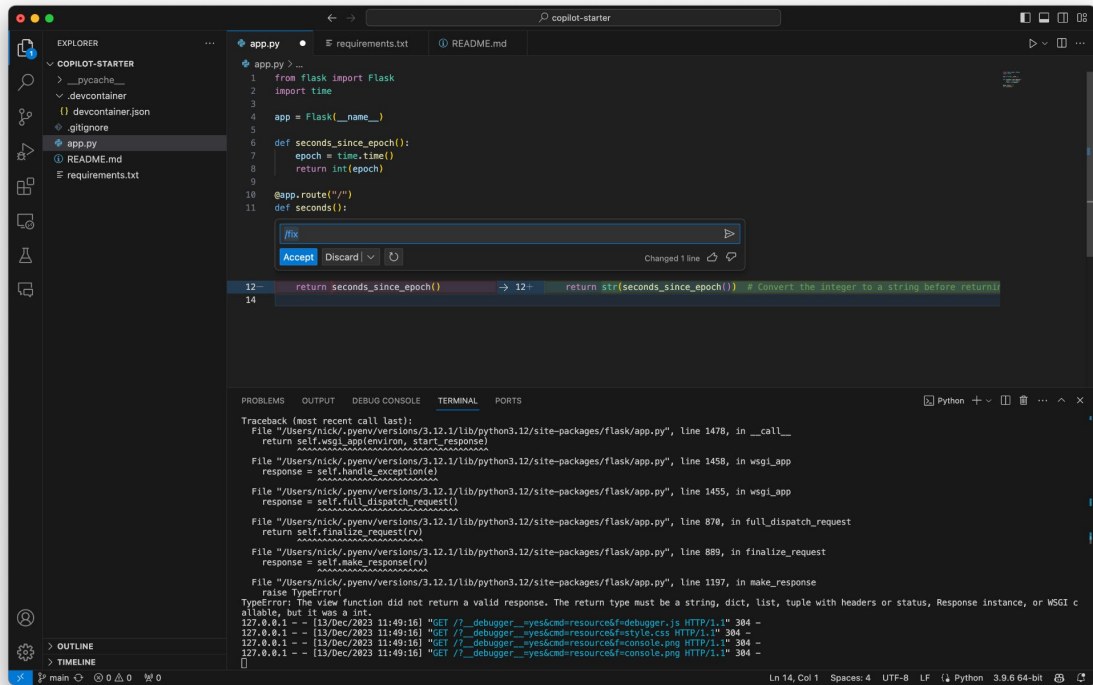


Ctrl-I / ⌘-I

Opens GitHub Copilot

Type **/fix**

Fixing the Error



The screenshot shows a VS Code editor window titled 'copilot-starter'. The Explorer sidebar on the left shows a project structure with files like 'app.py', 'requirements.txt', and 'README.md'. The main editor area displays the 'app.py' file, which contains a Flask application. A GitHub Copilot suggestion is shown as a blue box with a 'fix' button, suggesting to change the return type of the 'seconds_since_epoch' function from 'int' to 'str'. The suggestion is accepted, and the code is updated to 'return str(seconds_since_epoch())'. Below the code, the Terminal panel shows a traceback of a 'TypeError: The view function did not return a valid response. The return type must be a string, dict, list, tuple with headers or status, Response instance, or WSGI callable, but it was a int.' The traceback includes file paths and line numbers for the Flask application and the Copilot suggestion.

```
1 from flask import Flask
2 import time
3
4 app = Flask(__name__)
5
6 def seconds_since_epoch():
7     epoch = time.time()
8     return int(epoch)
9
10 @app.route("/")
11 def seconds():
12     return seconds_since_epoch()
13
14
```

fix

Accept Discard

Changed 1 line

```
12- return seconds_since_epoch() → 12+ return str(seconds_since_epoch()) # Convert the integer to a string before returning
14
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

Python

Traceback (most recent call last):
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1478, in __call__
return self.wsgi_app(environ, start_response)
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1458, in wsgi_app
response = self.handle_exception(e)
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1455, in wsgi_app
response = self.full_dispatch_request()
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 878, in full_dispatch_request
return self.finalize_request(rv)
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 889, in finalize_request
response = self.make_response(rv)
File "Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1197, in make_response
raise TypeError
TypeError: The view function did not return a valid response. The return type must be a string, dict, list, tuple with headers or status, Response instance, or WSGI callable, but it was a int.
127.0.0.1 -- [13/Dec/2023 11:49:16] "GET /?__debugger__=yes&cmd=resource&f=debugger.js HTTP/1.1" 304 -
127.0.0.1 -- [13/Dec/2023 11:49:16] "GET /?__debugger__=yes&cmd=resource&f=style.css HTTP/1.1" 304 -
127.0.0.1 -- [13/Dec/2023 11:49:16] "GET /?__debugger__=yes&cmd=resource&f=console.png HTTP/1.1" 304 -
127.0.0.1 -- [13/Dec/2023 11:49:16] "GET /?__debugger__=yes&cmd=resource&f=console.png HTTP/1.1" 304 -

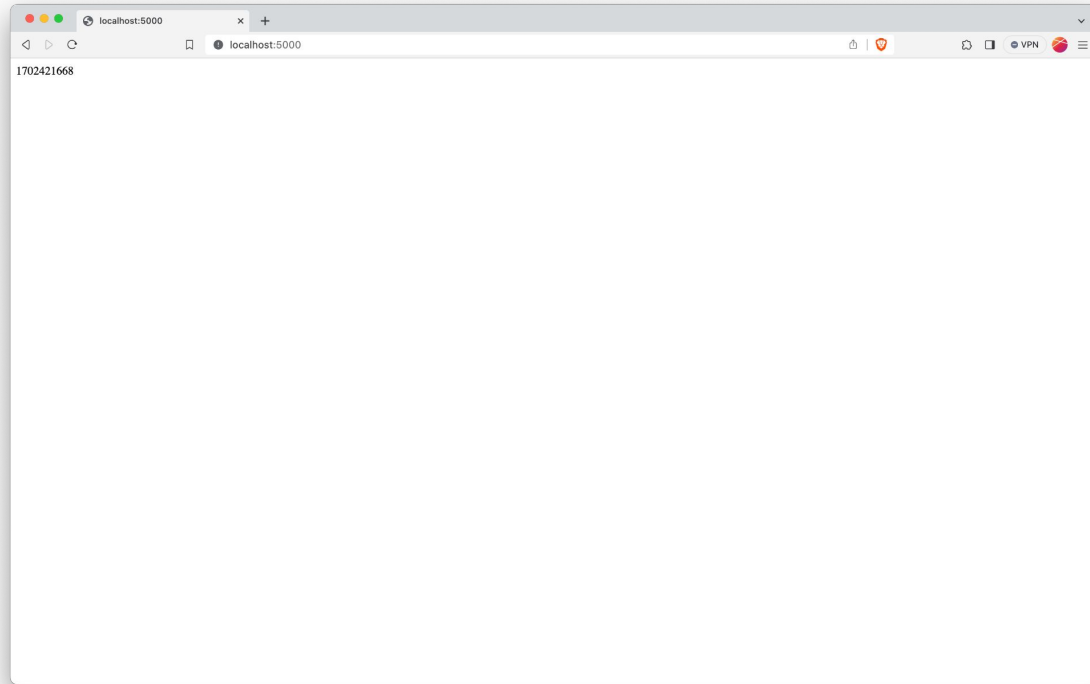
Ln 14, Col 1 Spaces: 4 UTF-8 LF Python 3.9.6 64-bit

Ctrl-I / ⌘-I

Opens GitHub Copilot

Type **/fix**

Fixing the Error



Adding to the Program

The screenshot shows a VS Code editor window titled 'copilot-starter'. The Explorer sidebar on the left shows a project structure with files like 'app.py', 'requirements.txt', and 'README.md'. The main editor area displays the 'app.py' file with the following code:

```
1 from flask import Flask
2 import time
3
4 app = Flask(__name__)
5
6 def seconds_since_epoch():
7     epoch = time.time()
8     return int(epoch)
9
10 @app.route("/")
11 def seconds():
12     return str(seconds_since_epoch()) # Convert the integer to a string before returning it
```

A GitHub Copilot suggestion is shown as a blue box with a right-pointing arrow, containing the text: 'add a route that shows hours since the epoch'. Below the suggestion, a small note says 'Copilot generated code may be incorrect'.

The bottom panel of the editor shows the 'TERMINAL' tab with the following output:

```
File "/Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 878, in full_dispatch_request
    return self.finalize_request(rv)
File "/Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 889, in finalize_request
    response = self.make_response(rv)
File "/Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1197, in make_response
    raise TypeError(
TypeError: The view function did not return a valid response. The return type must be a string, dict, list, tuple with headers or status, Response instance, or WSGI callable, but it was a int.
127.0.0.1 - - [13/Dec/2023 11:54:25] "GET /?_debugger__yes&cmd=resource&f=style.css HTTP/1.1" 304 -
127.0.0.1 - - [13/Dec/2023 11:54:25] "GET /?_debugger__yes&cmd=resource&f=debugger.js HTTP/1.1" 304 -
127.0.0.1 - - [13/Dec/2023 11:54:25] "GET /?_debugger__yes&cmd=resource&f=console.png HTTP/1.1" 304 -
127.0.0.1 - - [13/Dec/2023 11:54:25] "GET /?_debugger__yes&cmd=resource&f=console.png HTTP/1.1" 304 -
* Detected change in "/Users/nick/dev/copilot-starter/app.py", reloading
* Restarting with stat
* Debugger is active!
* Debugger PIN: 125-893-865
127.0.0.1 - - [13/Dec/2023 11:54:28] "GET / HTTP/1.1" 200 -
* Detected change in "/Users/nick/dev/copilot-starter/app.py", reloading
* Restarting with stat
* Debugger is active!
* Debugger PIN: 125-893-865
```

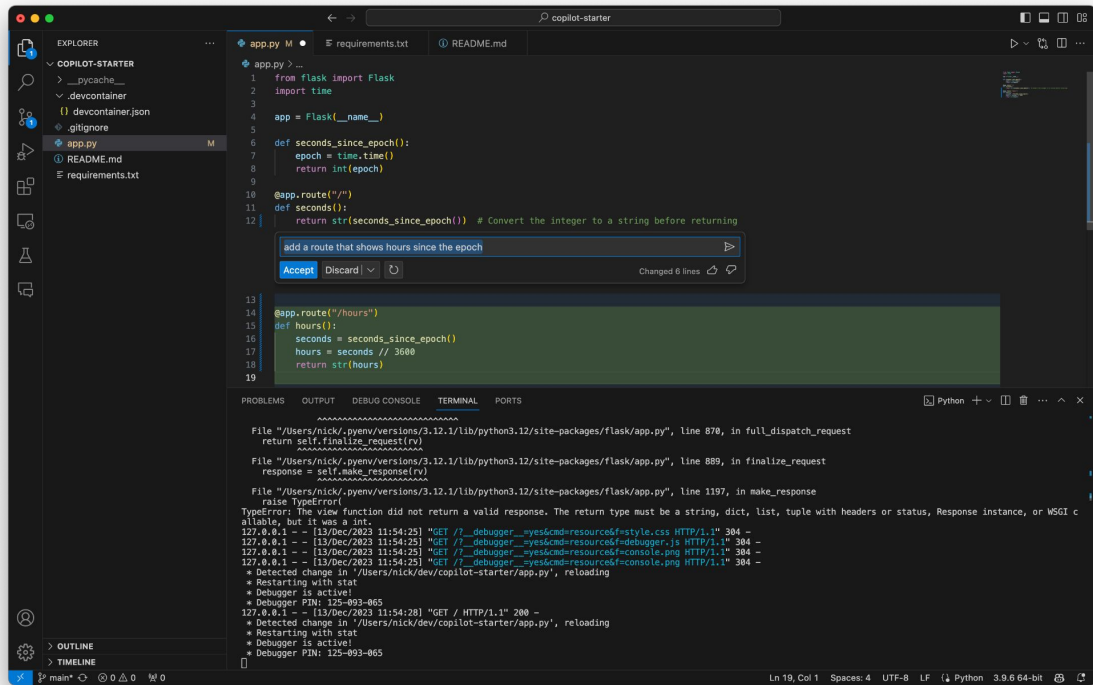
Ctrl-I / ⌘-I

Opens GitHub Copilot

Type

**add a route that shows
hours since the epoch**

Adding to the Program



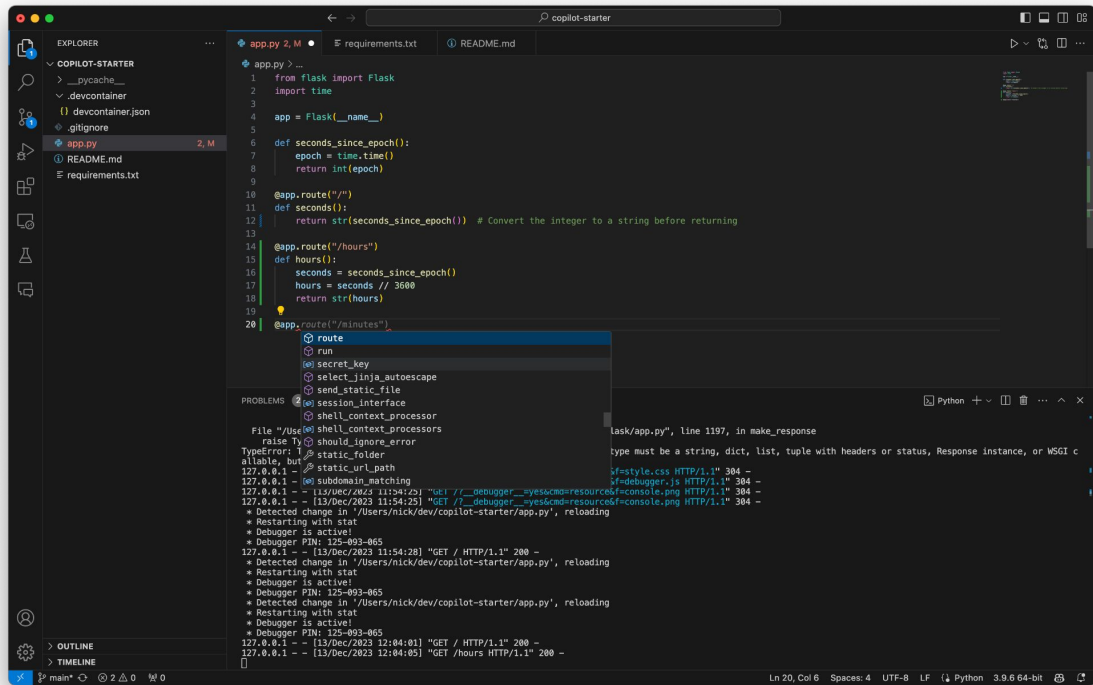
Ctrl-I / ⌘-I

Opens GitHub Copilot

Type

**add a route that shows
hours since the epoch**

Pairing with Copilot



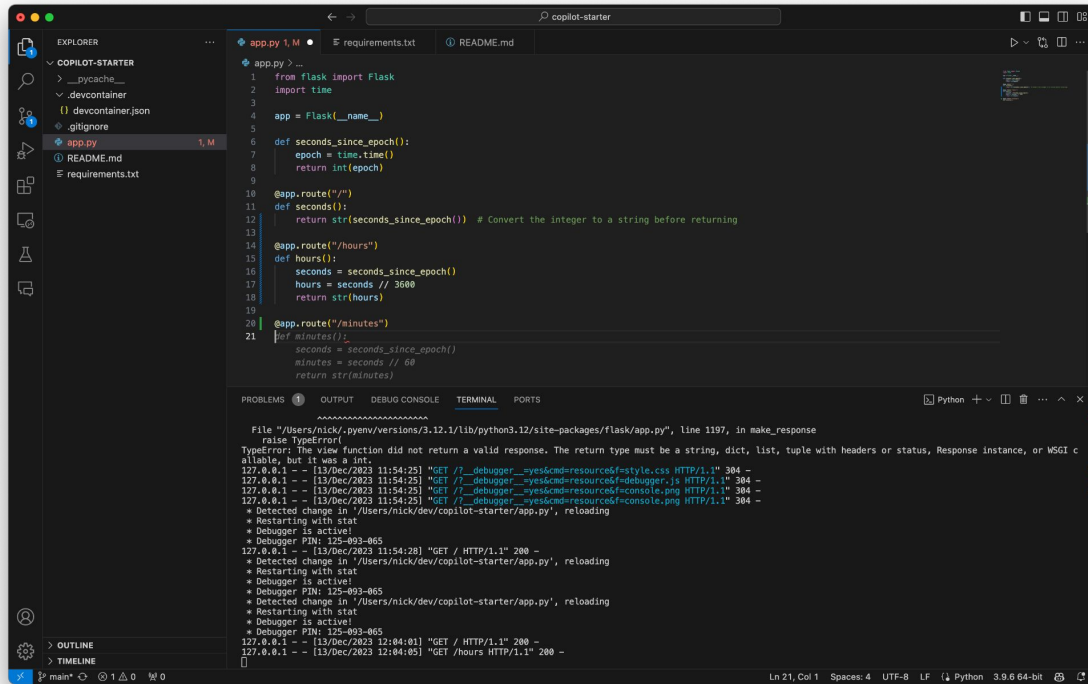
The screenshot shows a VS Code editor window titled 'copilot-starter'. The Explorer sidebar on the left shows a project structure with files like 'app.py', 'requirements.txt', and 'README.md'. The main editor area displays the code for 'app.py', which is a Flask application. The code includes imports for 'Flask' and 'time', a Flask app instance, and several routes. The routes are: a root route ('/') that returns the current time, an '/hours' route that returns the current time in hours, and a '/minutes' route that is currently being edited. A Copilot suggestion menu is open over the '/minutes' route, showing options like 'route', 'run', 'secret_key', 'select Jinja2 autoescape', 'send_static_file', 'session_interface', and 'shell_context_processor'. The bottom of the editor shows a terminal window with a debug console output, including messages like 'Detected change in "/Users/nick/dev/copilot-starter/app.py"', 'Restarting with stat', and 'Debugger is active!'. The status bar at the bottom indicates the file is at line 20, column 6, with 4 spaces, UTF-8 encoding, LF line endings, and is a Python 3.9.6 64-bit file.

```
1 from flask import Flask
2 import time
3
4 app = Flask(__name__)
5
6 def seconds_since_epoch():
7     epoch = time.time()
8     return int(epoch)
9
10 @app.route("/")
11 def seconds():
12     return str(seconds_since_epoch()) # Convert the integer to a string before returning
13
14 @app.route("/hours")
15 def hours():
16     seconds = seconds_since_epoch()
17     hours = seconds // 3600
18     return str(hours)
19
20 @app.route("/minutes")
21 def minutes():
```

Start creating a new
route for /minutes

Tab ↹

Pairing with Copilot



```
1 from flask import Flask
2 import time
3
4 app = Flask(__name__)
5
6 def seconds_since_epoch():
7     epoch = time.time()
8     return int(epoch)
9
10 @app.route("/")
11 def seconds():
12     return str(seconds_since_epoch()) # Convert the integer to a string before returning
13
14 @app.route("/hours")
15 def hours():
16     seconds = seconds_since_epoch()
17     hours = seconds // 3600
18     return str(hours)
19
20 @app.route("/minutes")
21 def minutes():
22     seconds = seconds_since_epoch()
23     minutes = seconds // 60
24     return str(minutes)
```

File "/Users/nick/.pyenv/versions/3.12.1/lib/python3.12/site-packages/flask/app.py", line 1197, in make_response
raise TypeError
TypeError: The view function did not return a valid response. The return type must be a string, dict, list, tuple with headers or status, Response instance, or WSGI callable, but it was an int.
127.0.0.1 - - [13/Dec/2023 11:54:25] "GET /?_debugger__yes&cmd=resource&f=style.css HTTP/1.1" 304 -
127.0.0.1 - - [13/Dec/2023 11:54:25] "GET /?_debugger__yes&cmd=resource&f=debugger.js HTTP/1.1" 304 -
127.0.0.1 - - [13/Dec/2023 11:54:25] "GET /?_debugger__yes&cmd=resource&f=console.png HTTP/1.1" 304 -
127.0.0.1 - - [13/Dec/2023 11:54:25] "GET /?_debugger__yes&cmd=resource&f=console.png HTTP/1.1" 304 -
* Detected change in '/Users/nick/dev/copilot-starter/app.py', reloading
* Restarting with stat
* Debugger is active!
* Debugger PIN: 125-893-065
127.0.0.1 - - [13/Dec/2023 11:54:28] "GET / HTTP/1.1" 200 -
* Detected change in '/Users/nick/dev/copilot-starter/app.py', reloading
* Restarting with stat
* Debugger is active!
* Debugger PIN: 125-893-065
* Detected change in '/Users/nick/dev/copilot-starter/app.py', reloading
* Restarting with stat
* Debugger is active!
* Debugger PIN: 125-893-065
127.0.0.1 - - [13/Dec/2023 12:04:01] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [13/Dec/2023 12:04:05] "GET /hours HTTP/1.1" 200 -

Start creating a new
route for /minutes

Tab ↹

Next Steps



Remember: Copilot Makes Errors

Copilot is built on OpenAI's GPT-4 model.

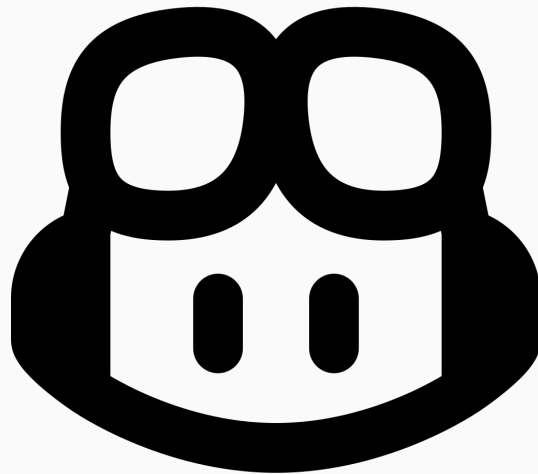
It will write bad code and it won't understand what you want every time.

It also only has code samples up to September 2021, so it won't know about new libraries, APIs, etc.

You'll need to read, understand, and edit the code it produces, but ***you're a hacker, you'll do great.***

Add Copilot to Your Team

GitHub Copilot is here for you the entire hackathon and can do even more with more complicated code. Keep Copilot pairing with you for the event.



It won't even ask for prizes if you win.

Create a new button component ▶

Accept Discard

/fix myVar is undefined ▶

Accept Discard

/explain ▶

Accept Discard

Additional Resources

hackp.ac/copilot-guides: Set up and navigate the various functions of GitHub Copilot across all of the supported environments.

hackp.ac/copilot-examples: See practical examples of how GitHub Copilot can help you work.

hackp.ac/copilot-config: Learn how to configure GitHub Copilot to your personal preferences.