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Use of AI for Programming & Programming Learning

by

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Founder & Master Trainer Image Nation 隨想國度

26-Year IT & New Media Experience

AI, Cloud, Blockchain, Web, Mobile, Database & IoT Applications Development

19-Year University Teaching & Tech Training

HKU / HKUSPACE / EdUHK / CityUHK

Certifications & Professional Qualifications

Microsoft Certified Azure Developer, AI Engineer & Github Copilot

AWS Certified Solution Architect, Developer, Data Engineer, Machine Learning Engineer & AI Practitioner

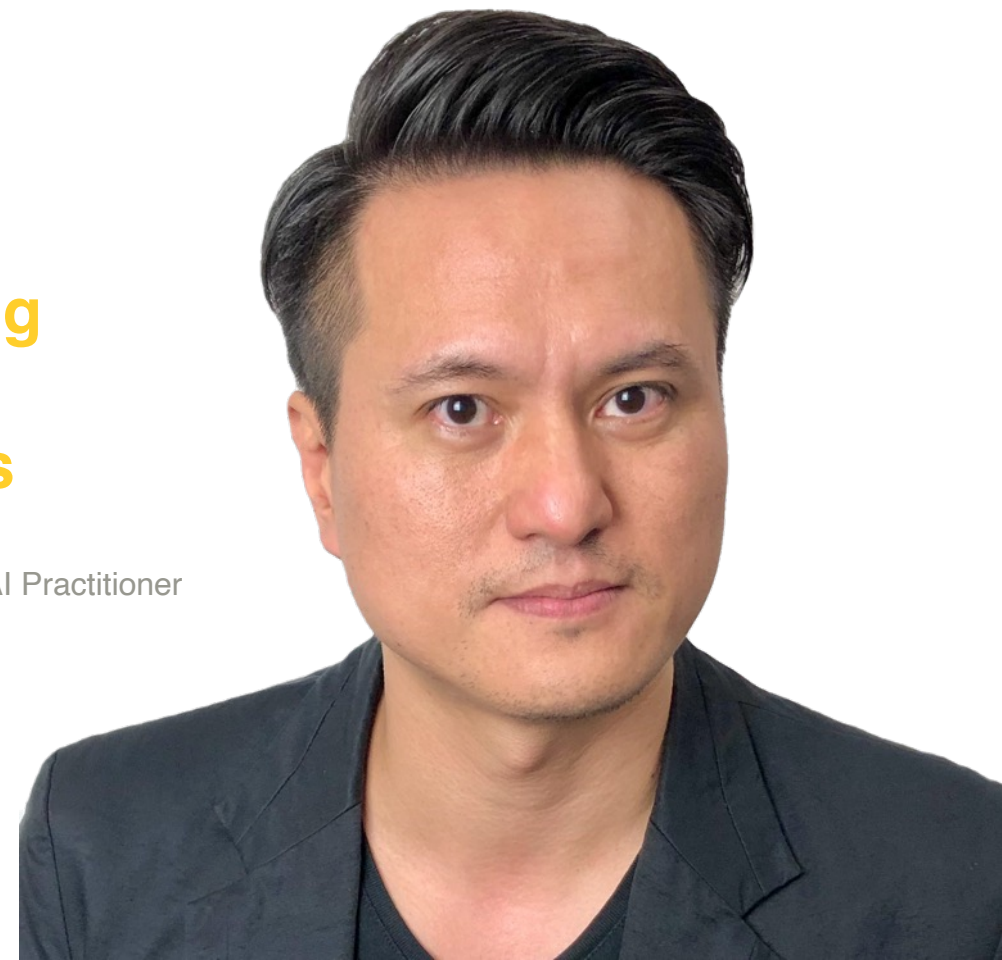
Alibaba Cloud Certified Professional in Cloud Computing

Accredited Educator for AWS Academy

Accredited Educator for Microsoft Learn for Educator (MSLE)

Accredited Educator for Oracle Academy

Accredited Educator for Cisco Networking Academy



Setup Check List

- Create Github Account & Activate Github Copilot
 - <https://github.com/signup>
- Apply **FREE** Github Pro for Student
 - <https://github.com/education/students>
- Visual Studio Code
 - <https://code.visualstudio.com/download>
- Install Github Copilot CLI
 - <https://docs.github.com/en/copilot/get-started/cli-quickstart#installation>

In this workshop (3 hours)

- Understand AI Pair Programming
- AI Dev Tools Ecosystem / Landscape
- Introduction to Github & Github Copilot
- Configuring Github Copilot in Visual Studio Code (VS Code)
- Getting Familiar with Github Copilot Interface
- Getting Familiar with AI Coding Features
- Try Yourself Projects: Practicing AI Pair Programming
- Introduction to Github Copilot CLI (**C**ommand **L**ine **I**nterface)

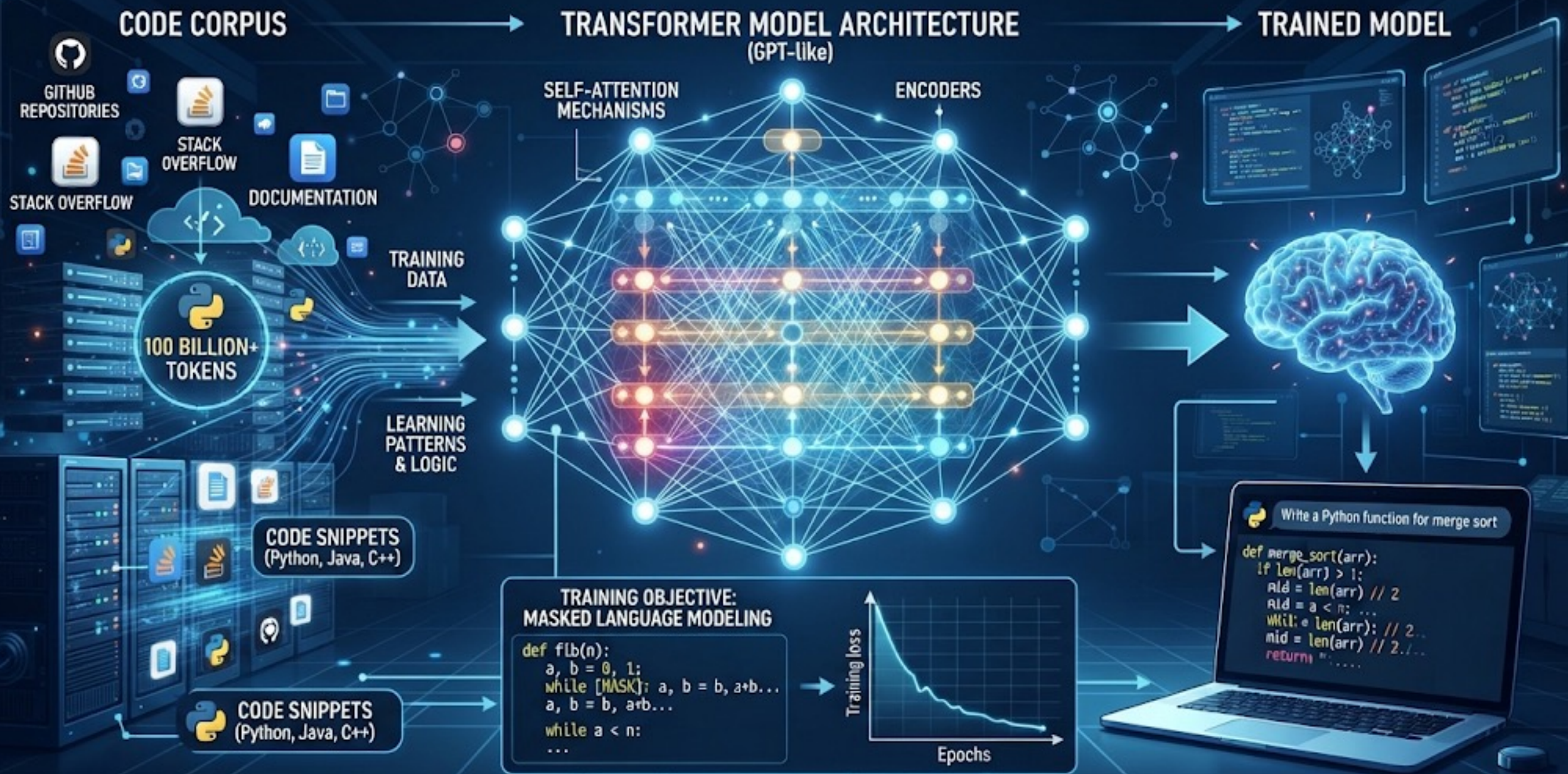
To download the slides

tinyurl.com/hkin-dl



How Models are Trained

HOW AI MODELS LEARN TO WRITE PROGRAMMING CODE



Understanding AI Pair Programming

Traditional Pair Programmer

collaborative software development technique

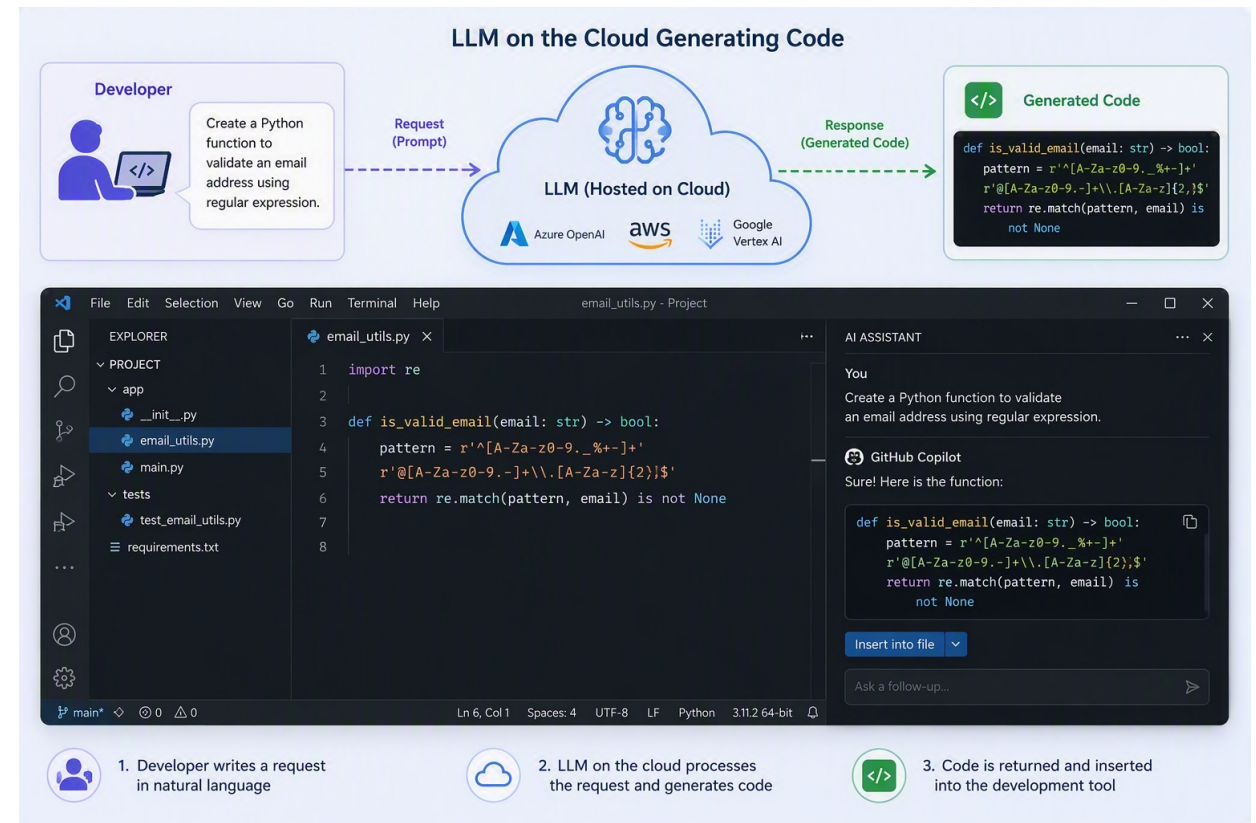


Understanding AI Pair Programming

- **An Interactive Tutor:** Explaining unfamiliar code, clarifying mathematical/statistical algorithms, and providing on-demand guidance.
- **AI Drafting Boilerplate Scripts:** Generating data manipulation pipelines, and creating visualizations in Python and R.
- **AI as Debugger & Code Reviewer:** Diagnosing error tracebacks, optimizing logic, and writing unit validation tests.

The Brain Behind: LLM

- The AI coding assistant in development tools are **agents** that constantly talk to a cloud-based LLM.
- The LLM, based on the chat message from programmer, generated new codes and send back to the programmer



AI-augmented Programmer Mindset #1

Decomposition & Prompting: Deconstruct complex business and data problems into structured, context-rich prompts for AI code generation.

AI-augmented Programmer Mindset #2

AI-Assisted Learning & Comprehension: Use AI to annotate, explain line-by-line, and translate scripts between different languages.

AI-augmented Programmer Mindset #3

Accelerated Data Analytics Workflow: Direct AI to perform end-to-end data cleaning, exploratory data analysis (EDA), and data visualization on typical business datasets.

AI-augmented Programmer Mindset #4

Verification, Debugging & Ethics: Identify AI hallucinations in computations, implement human-in-the-loop verification, and adhere to data privacy guidelines in enterprise environments.

Some Use Cases

Personal Tutor

- Asking AI for step-by-step annotations of complex functions (`groupby`, `pivot_table`, nested loops, or `tidyverse` pipes `%>%`).
- Cross-language translation: Translating R scripts into idiomatic Python and vice versa.
- Requesting conceptual analogies
 - e.g.: Explain vectorization in numpy versus looping in Python using an Excel analogy

Interactive Learning Drills

- Paste an unfamiliar script snippet into the AI and generate a structured "Cheat Sheet" explaining every method used.
- Request the AI to generate 3 progressive practice exercises on data filtering with hints and automated solution checkers.

Let's Practice

Let's use Google Gemini to generate a few code snippets and learn syntax and algorithm

AI Dev Tools Landscape

AI Dev Tools Landscape



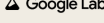
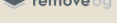
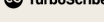
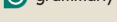
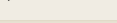
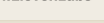
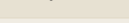
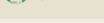
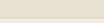
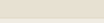
你好，我是 豆包 ●



Category	Tools	Best For
New App Builds	Bolt.new, Lovable	Rapidly building and deploying full-stack MVPs from text prompts.
Code-First Development	Github Copilot, Claude Code, Gemini Code Assist, Cursor	Developers who want AI assistance while maintaining full control over their code and repository.
UI/Frontend Prototypes	Vercel v0, Figma AI	Generating React components, UI layouts, and design system-integrated prototypes.
Collaborative Platforms	Builder.io, Github & Github Copilot	Teams needing a shared source of truth between design and production code.

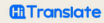
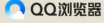
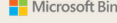
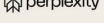
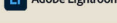
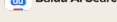
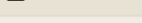
Top GenAI Tools

<https://a16z.com/100-gen-ai-apps-6/>

The Top 50 Gen AI Web Products, by Unique Monthly Visits				
1.  ChatGPT	11.  FREED!K	21.  Lovable	31.  Arena	41.  CURSOR
2.  Gemini	12.  Doubao	22.  PolyBuzz	32.  SEARAT.AI	42.  CIVITAI
3.  Canva	13.  JanitorAI	23.  ourdream.ai	33.  Hugging Face	43.  Midjourney
4.  deepseek	14.  Quark	24.  Kimi	34.  Crushon AI	44.  manus
5.  Grok	15.  SUNO	25.  Google Labs	35.  Meta AI	45.  KlingAI
6.  Claude	16.  remove.bg	26.  Qwen	36.  candy.ai	46.  VEED
7.  character.ai	17.  CapCut	27.  TurboScribe	37.  Photoroom	47.  Genspark
8.  perplexity	18.  grammarly	28.  GAMMA	38.  Pixelcut	48.  SIGA CHAT
9.  Notion	19.  SPICYCHAT.AI	29.  ElevenLabs	39.  Adot	49.  Poe
10.  Google AI Studio	20.  QuillBot	30.  NotebookLM	40.  Higgsfield	50.  cutout.pro

Source: Similarweb, January 2026
Charts are for informational purposes only. Past performance is not indicative of future results.
None of the above should be taken as investment advice; see a16z.com/disclosures.



The Top 50 Gen AI Mobile Apps, by Monthly Active Users				
1.  ChatGPT	11.  Remini	21.  Meta AI	31.  Facemoji	41.  Translate
2.  CapCut	12.  QQ浏览器	22.  meitu	32.  character.ai	42.  BeautyCam
3.  Gemini	13.  deepseek	23.  Copilot	33.  Microsoft Bing	43.  papago
4.  Canva	14.  Cici	24.  Hypic	34.  FaceApp	44.  BRAINLY
5.  AI Gallery	15.  perplexity	25.  Seekee	35.  NOVA	45.  PolyBuzz
6.  Picsart	16.  Adobe Lightroom	26.  Notion	36.  YouCut	46.  AI Mirror
7.  Doubao	17.  Baidu AI Search	27.  photomath	37.  Polish	47.  MIVI
8.  Microsoft Edge	18.  Grok	28.  Gauth	38.  B612	48.  SNOW
9.  Meituan	19.  VN	29.  Learna AI	39.  Photoroom	49.  VivaCut
10.  Yandex	20.  Edits, an instagram app	30.  Wink	40.  PixVerse	50.  BeautyPlus

Source: Sensor Tower, January 2026
Charts are for informational purposes only. Past performance is not indicative of future results.
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Let's try Gemini Canvas

Use the following prompts

Create a lucky draw app that generate random number between 100 and 200

Let's do it again in **Lovable**

Use the following prompts

Create a lucky draw app that generate random number between 100 and 200

Effective Prompting

Effective Prompting

- Applying structured prompt frameworks (Role, Context, Inputs, Constraints, Output Format).
- Specifying **packages, data schemas, UI elements** and **edge-case handling** in prompts. E.g.
 - Generating a Python pandas data pipeline from a simple plain-English business scenario vs. a structured prompt.

Sign-up Github & Github Copilot

Google for “Github”

Or visit <https://github.com/>

Create your free account

Explore GitHub's core features for individuals and organizations.

See what's included ^

- ✓ **Access to GitHub Copilot**
Increase your productivity and accelerate software development.
- ✓ **Unlimited repositories**
Collaborate securely on public and private projects.
- ✓ **Integrated code reviews**
Boost code quality with built-in review tools.
- ✓ **Automated workflows**
Save time with CI/CD integrations and GitHub Actions.
- ✓ **Community support**
Connect with developers worldwide for instant feedback and insights.

Display a menu

Sign up for GitHub

 Continue with Google

 Continue with Apple

or

Email*

Email

Password*

Password

Password should be at least 15 characters OR at least 8 characters including a number and a lowercase letter.

Username*

Username

Username may only contain alphanumeric characters or single hyphens, and cannot begin or end with a hyphen.

Your Country/Region*

Hong Kong

For compliance reasons, we're required to collect country information to send you occasional updates and announcements.

GitHub Copilot

- ☒ Sign up for Copilot Free for coding assistance on the web, in the IDE, and in the CLI. [See terms](#)

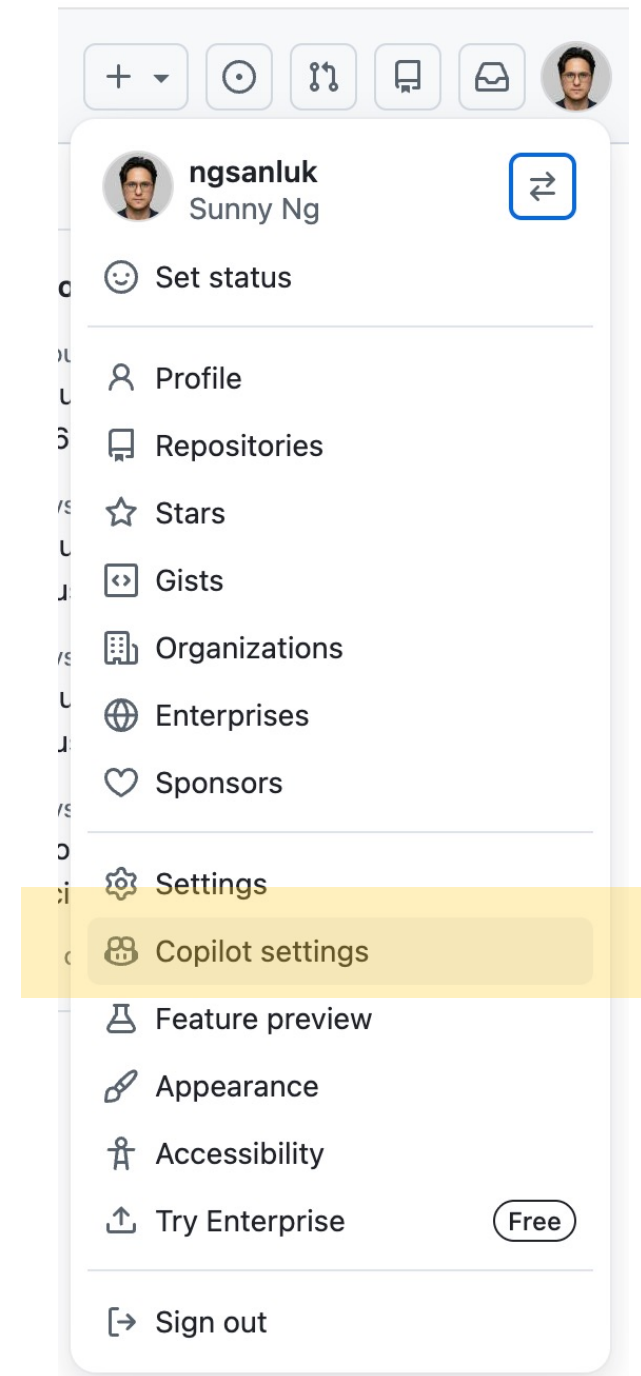
Email preferences

- ☐ Receive occasional product updates and announcements

Create account >

Github Copilot Setting

In Github website, click at your profile icon and reach to “**Copilot settings**”



Copilot Setting on Github Website

GitHub Copilot

Free

Getting started

0/3 complete

▼ Install Copilot in your editor

Ask about coding problems and get code completions while you work.

Visual Studio Code

▼

> Chat with Copilot anywhere

> Start building with Copilot

Usage

Inline suggestions

0% used

Included credits

0% used

Upgrade your Copilot plan for higher usage limits, premium models, AI reviews and more.

Upgrade plan

Copilot Setting on Github Website

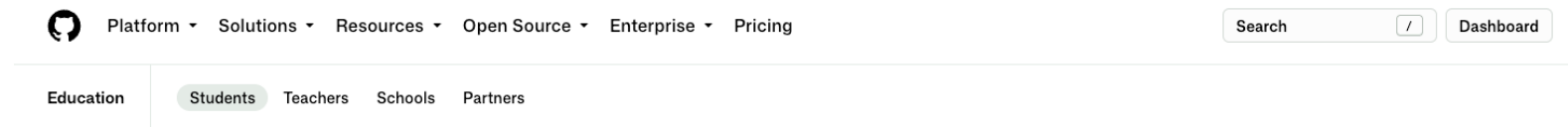
Features	
Copilot cloud agent Coming soon Enables access to Copilot in the cloud, including GitHub.com and GitHub Mobile. This policy replaces previous Copilot Chat and Copilot cloud agent policies. Learn more.	Enabled ▾
Semantic indexing for Non-GitHub Repositories If enabled you can use Semantic indexing for Non-GitHub Repositories to index your non-GitHub repositories in VSCode.	Enabled ▾
Copilot Chat in GitHub.com You can use Copilot Chat in GitHub.com. Preview features are only available for paid licenses. Learn more about Copilot in GitHub.com.	🔒 Enabled
Copilot CLI You can use GitHub Copilot for assistance in terminal.	🔒 Enabled
Copilot in GitHub Desktop You can use GitHub Copilot for assistance in GitHub Desktop.	Enabled ▾
GitHub Copilot app You can use the GitHub Copilot app . Enforcement begins July 27th, 2026 in version 1.1 of the GitHub Copilot app. The Copilot CLI policy continues to govern the GitHub Copilot App until version 1.1	🔒 Enabled
Copilot can search the web Copilot can answer questions about new trends and give improved answers, via Bing. See Microsoft Privacy Statement	Enabled ▾

Github Copilot Pricing

			BEST VALUE
Free For lightweight chats \$0 USD Start for free Open in VS Code	Pro For medium agent tasks \$10 USD per user / month Choose Pro	Pro+ For complex tasks \$39 USD per user / month Choose Pro+	Max For sustained, high-volume tasks \$100 USD per user / month Choose Max
What's included: ▲ ✓ Access to entry level models ✓ 2,000 completions per month ✓ Community Support	Everything in Free and: ▲ ✓ Access to medium-complexity models ✓ Unlimited code completion and next edit suggestions ✓ Access to 3rd party agents (Claude Code and Codex) ✓ 1,500 monthly AI credits (\$15 value)	Everything in Pro and: ▲ ✓ Access to frontier models ✓ Audit logs ✓ Over 4.6x included monthly credits than Pro	Everything in Pro+ and: ▲ ✓ Early access to frontier models ✓ Over 13.3x included monthly credits than Pro

Github Education

<https://github.com/education/students>



GITHUB EDUCATION ■

Hey students, your tech career starts here

Open the doors to innovation and growth in the tech world

Join GitHub Education

Free GitHub Pro account for verified learners



Install & Configure Visual Studio Code

Installing VS Code

<https://code.visualstudio.com/download>

Download Visual Studio Code

Free and built on open source. AI agents, Git, debugging, and extensions included.



↓ Windows

Windows 10, 11

User Installer [x64](#) [Arm64](#)

System [x64](#) [Arm64](#)

Installer [x64](#) [Arm64](#)

.zip [x64](#) [Arm64](#)

CLI [x64](#) [Arm64](#)



↓ .deb

Debian, Ubuntu

↓ .rpm

Red Hat, Fedora, SUSE

.deb [x64](#) [Arm32](#) [Arm64](#)

.rpm [x64](#) [Arm32](#) [Arm64](#)

.tar.gz [x64](#) [Arm32](#) [Arm64](#)

Snap [Snap Store](#)

CLI [x64](#) [Arm32](#) [Arm64](#)



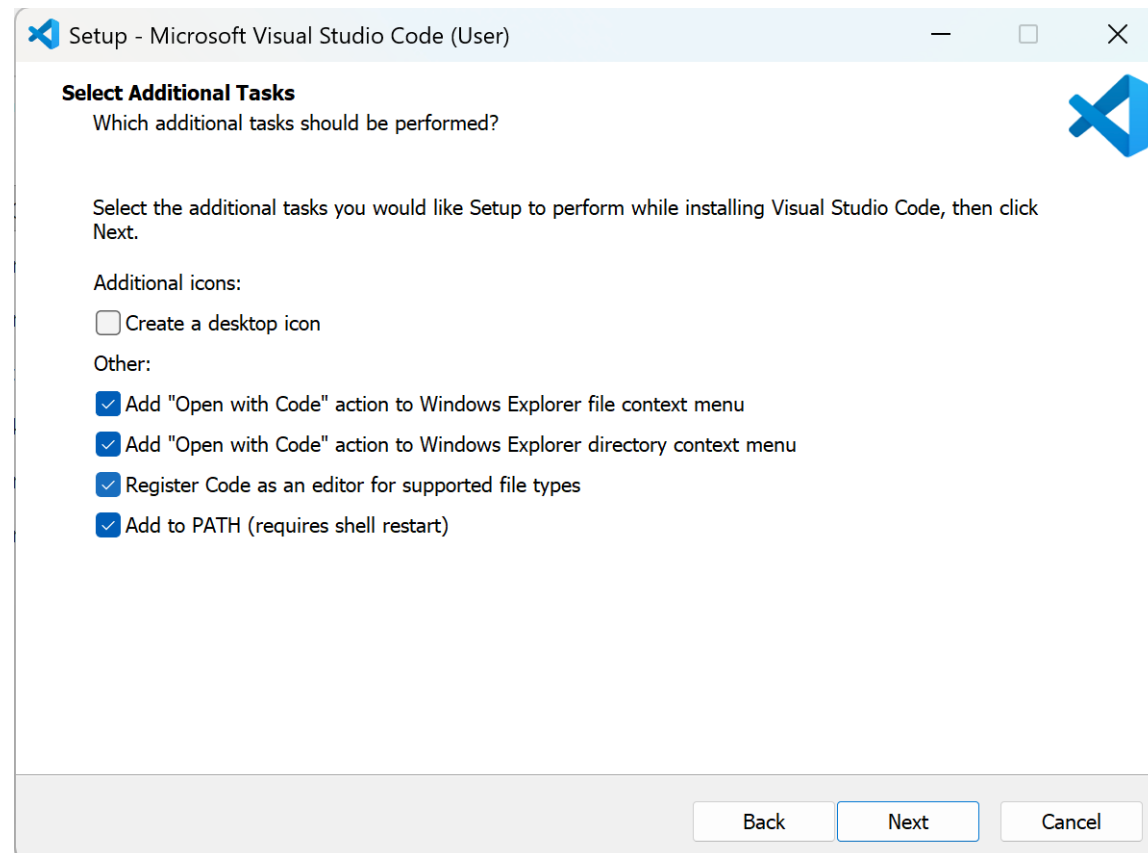
↓ Mac

macOS 12.0+

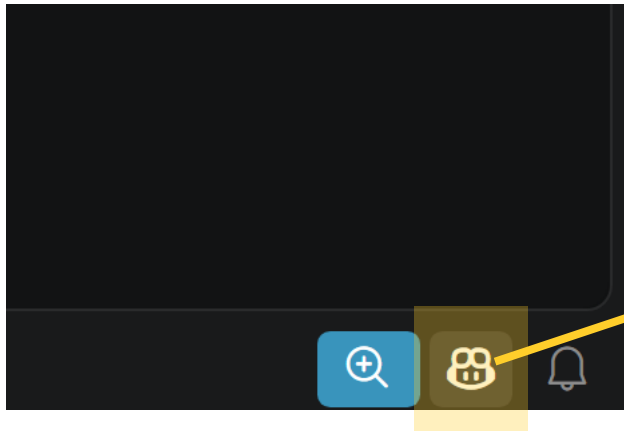
.dmg [Intel chip](#) [Apple silicon](#) [Universal](#)

CLI [Intel chip](#) [Apple silicon](#)

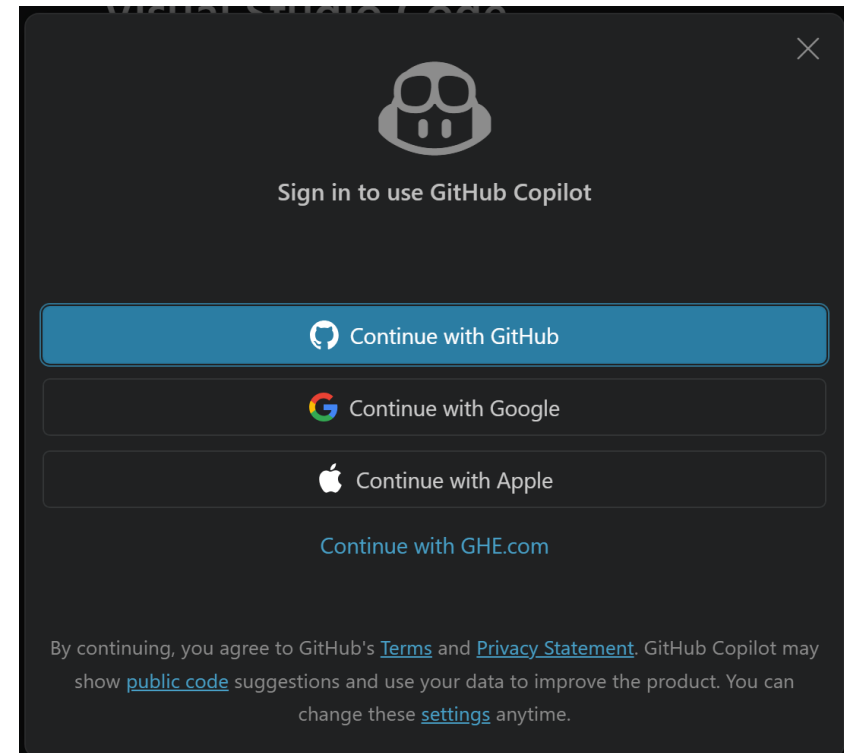
Configure VS Code



Sign in your Github account



At lower-right corner





Authorize Visual Studio Code

From the options below, choose which account you would like to use to authorize this app.

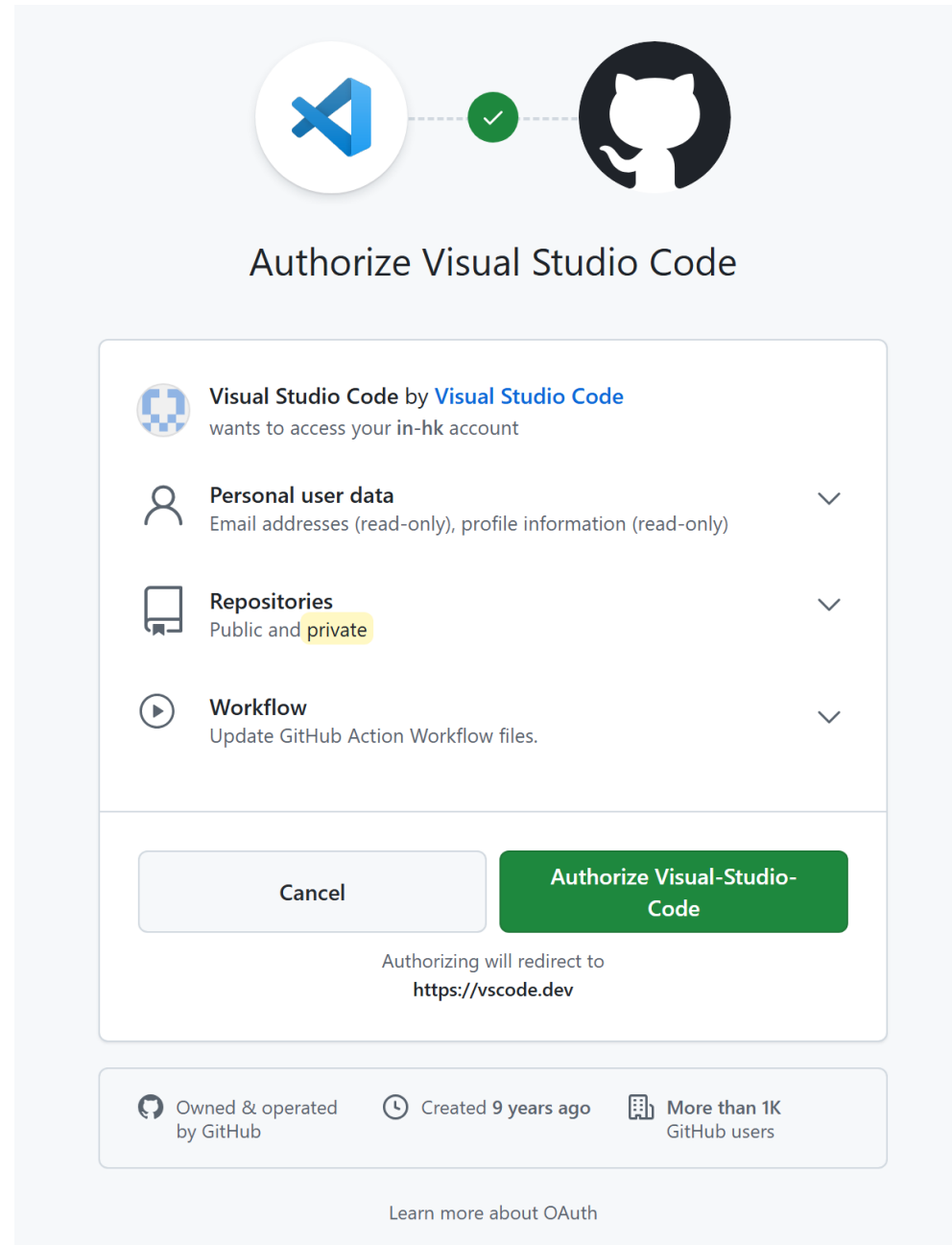


Signed in as
in-hk

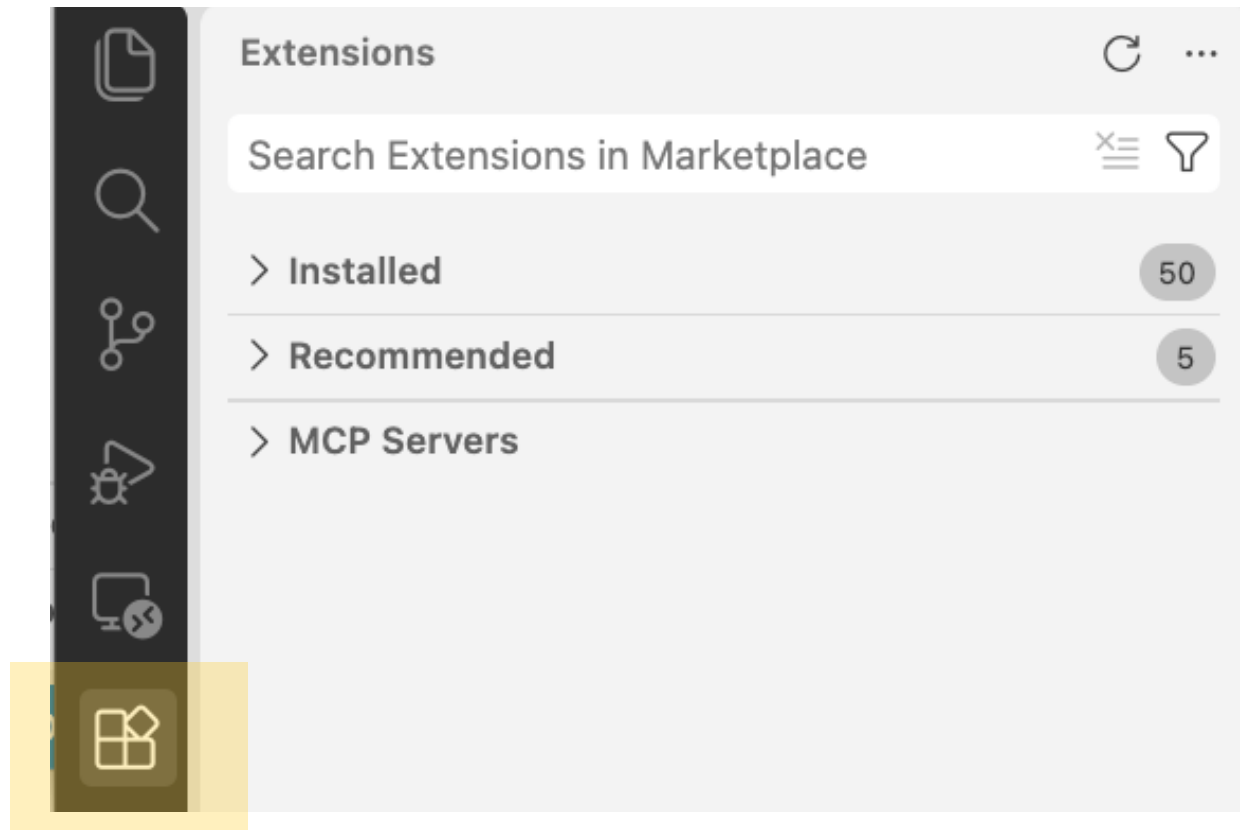
Continue

or

Use a different account

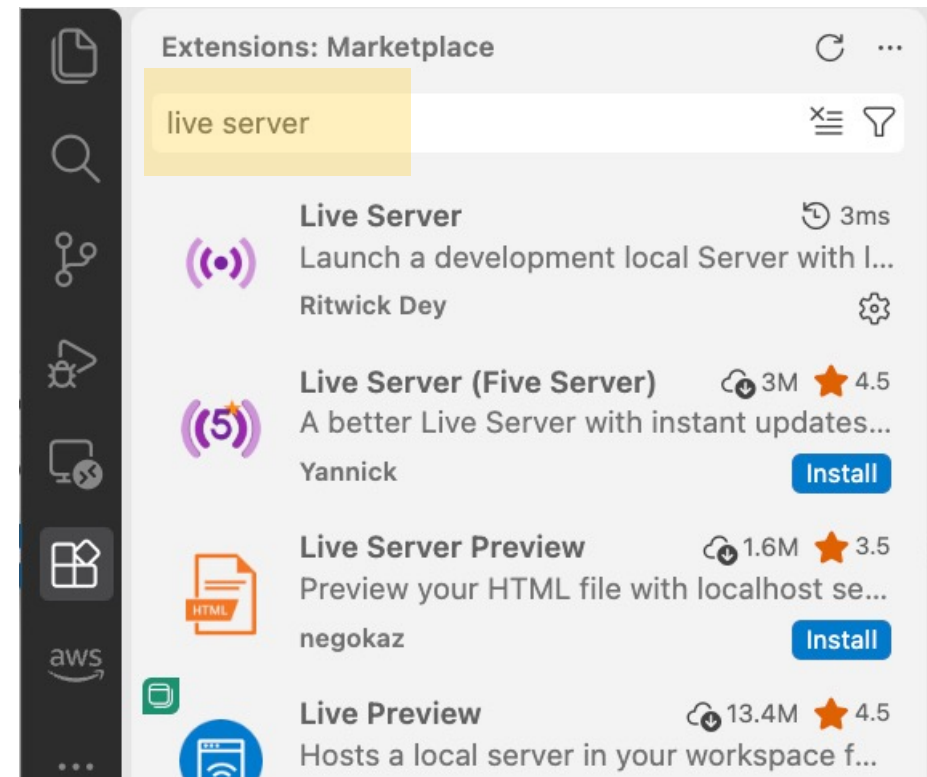


VS Code Extensions



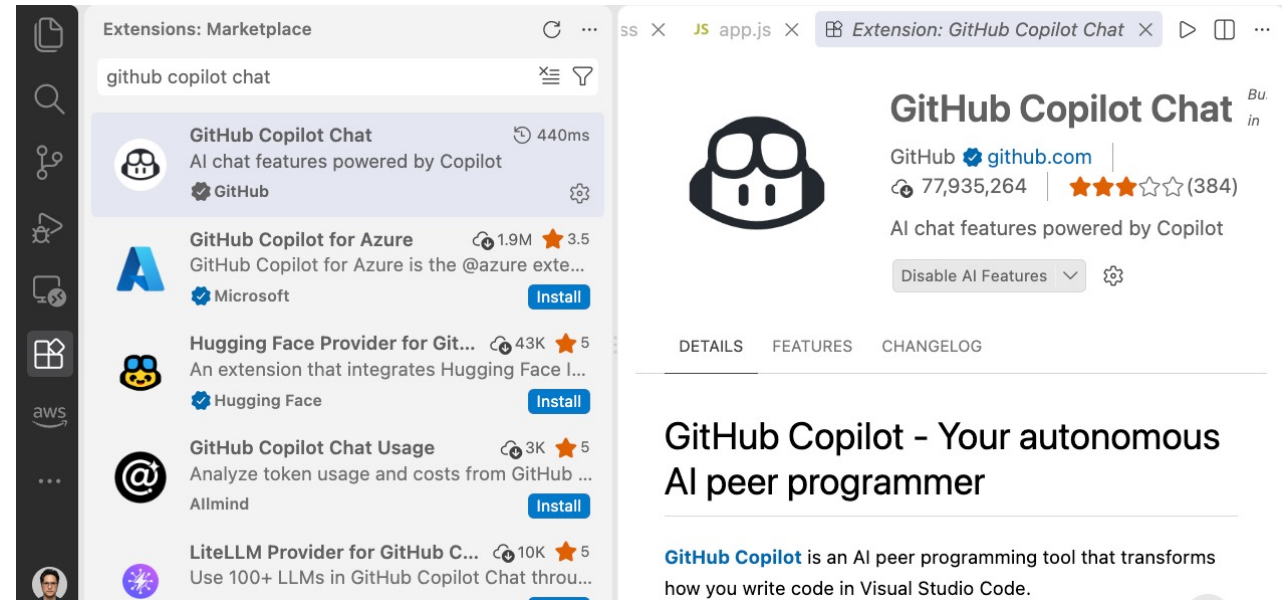
Installing “Live Server” Extension

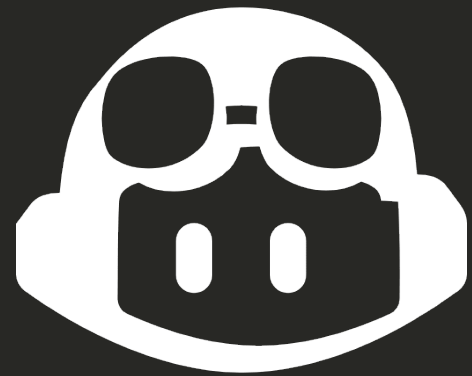
- In the search box, type “**Live Server**” to search and install the extension for web development



Check “Github Copilot Chat” Extension

- In the latest VS Code, this feature is pre-installed and therefore no need to install. You are suggested to install the latest version
- In case you are using older version of VS Code, please search and install it.





Getting Familiar with Github Copilot



Sarah's
Intent

Context
(Codebase, File Tree, Comments)

GitHub Copilot:
Intelligent Assistant

Sarah's Intent

Codium Assistant

Real-time Code
Suggestions

Contextual
Understanding

Security Scan

Optimized Code Snippets

Autocomplete

Refactoring Suggestions
Documentation

Global Cloud LLM

(Large Language Model)

OpenAI GPT-4, GitHub
Data Lake

Global Cloud LLM
(Large Language Model)

OpenAI GPT-4, GitHub Infrastructure,
Data Lake

Models in Github Copilot

<https://docs.github.com/en/copilot/reference/ai-models/supported-models>

 GitHub Docs

Version: Free, Pro, & Team

Search or ask Copilot



GitHub Copilot

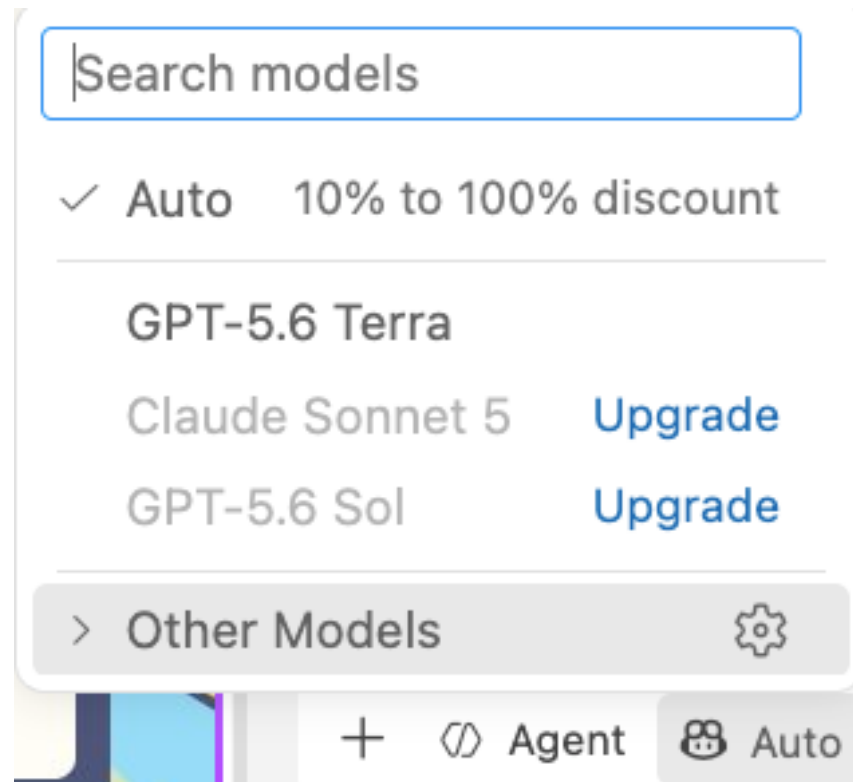
- Concepts
- How-tos
- Reference
 - Chat cheat sheet
 - Customization cheat sheet
 - AI models
 - Supported models**
 - Model comparison
 - Model hosting
 - Copilot feature matrix
 - Keyboard shortcuts
 - Copilot CLI reference
 - GitHub Copilot app reference
 - Custom agents configuration

Supported AI models in Copilot

This table lists the AI models available in Copilot, along with their release status.

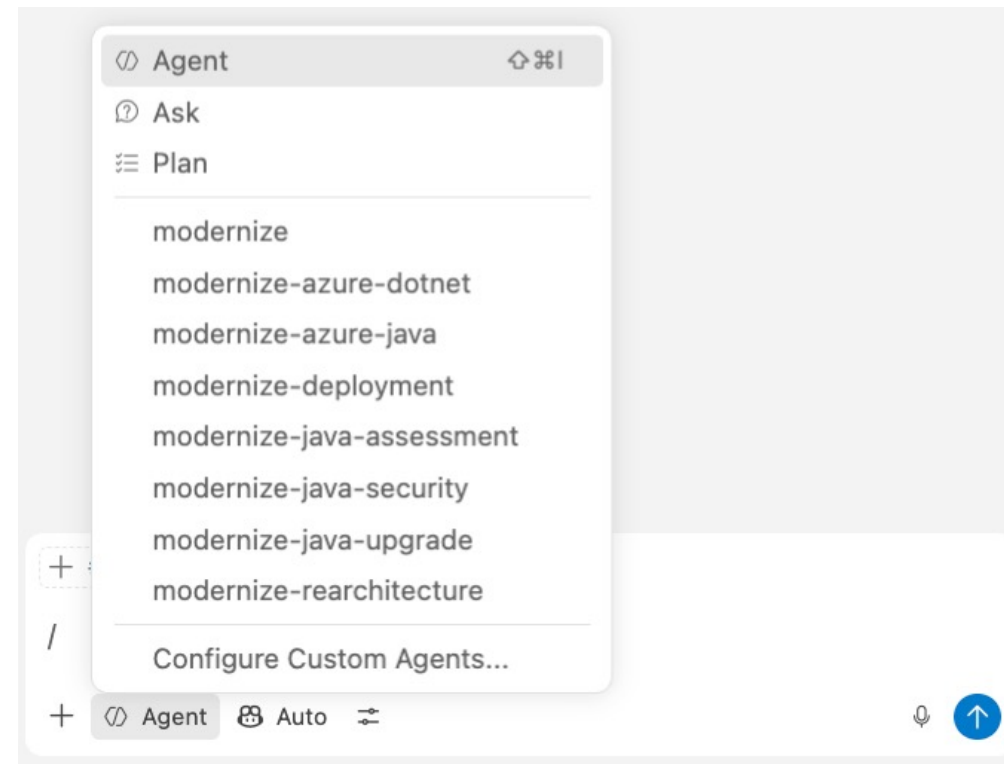
Model name	Provider	Release status
GPT-5 mini	OpenAI	GA
GPT-5.3-Codex	OpenAI	GA
GPT-5.4	OpenAI	GA
GPT-5.4 mini	OpenAI	GA
GPT-5.4 nano ^[1]	OpenAI	GA
GPT-5.5	OpenAI	GA
GPT-5.6 Luna	OpenAI	GA
GPT-5.6 Sol	OpenAI	GA
GPT-5.6 Terra	OpenAI	GA
Claude Fable 5 ^[2]	Anthropic	GA

Pick your favorite model



Interaction Modes

- **Agent Mode:** Autonomously executes multi-step tasks, edits files across your project, and runs commands to achieve a high-level goal.
- **Ask Mode:** Answers questions and explains code without modifying your workspace.
- **Plan Mode:** Explores your codebase to create a detailed, step-by-step implementation plan before any code is written.



Building a Plain JavaScript App

No JS libraries will be used.

Easier for beginner to learn.

It's NOT common in actual software development.

Lucky Draw app

- Create a new project folder name **lucky-draw**
- Open the the folder in VS Code
- Create a new file and name it “index.html”
- Choose **Agent** mode

Use the following prompts

Create a lucky draw app that generate random number between 100 and 200. Use plain JavaScript

Enhancing the project structure

Split into separate file: HTML, CSS & JavaScript

Lucky Draw app - enhanced

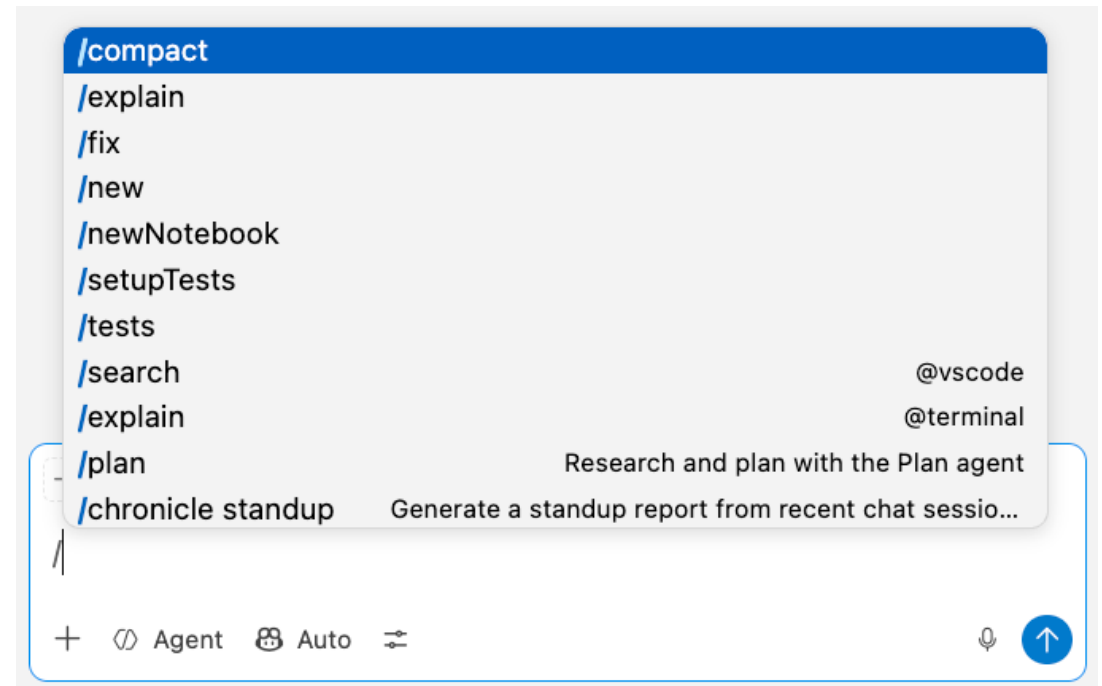
- Choose **Agent** mode

Use the following prompts

Instead of putting everything into one single file, create a better project structure for this app

Using Slash Commands

- In GitHub Copilot, the slash symbol (/) is formally referred to as a **slash command** prefix.
- When typed into the chat prompt box, it triggers a prefix for **slash commands** (such as /explain, /tests, or /fix) that act as shorthand shortcuts for specific developer tasks.



Creating an Vue.js App

Vue.js library is a very popular package for front-end development e.g. **mini-program (小程序)**

Creating Vue.js App

- Create a new project folder name lucky-draw-2
- Open the the folder in VS Code
- Choose **Agent** mode

Use the following prompts

Create a lucky draw app that generates random number between 1000 and 2000.
Make it in Vue.js app.

Enhancing the UI

Specify the UI Styling

Creating Vue.js App

- Choose **Agent** mode

Use the following prompts

Enhance the app UI. Make it more playful and more colorful.

Converting to React App

React is open-source project from Facebook.
It is widely used world-wide for front-end development.

Converting a Vue.js app in to a **React** app

- Make sure you've choose **Agent** mode
- What we are doing here involve up-side-down changing to the projects. In real life, this might be too aggressive.
- Today, we are just learning anyway. Let's find out how powerful AI can be.

Use the following prompts

Convert the app to React app.

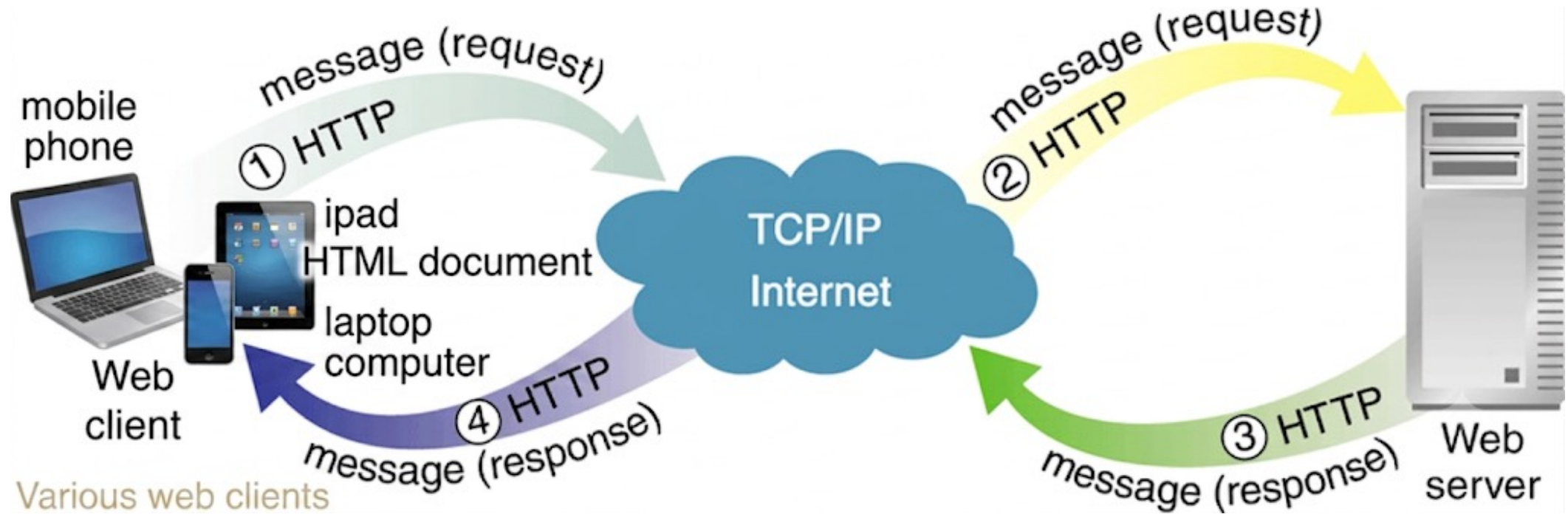
Software Stack

Modern Software Building Blocks

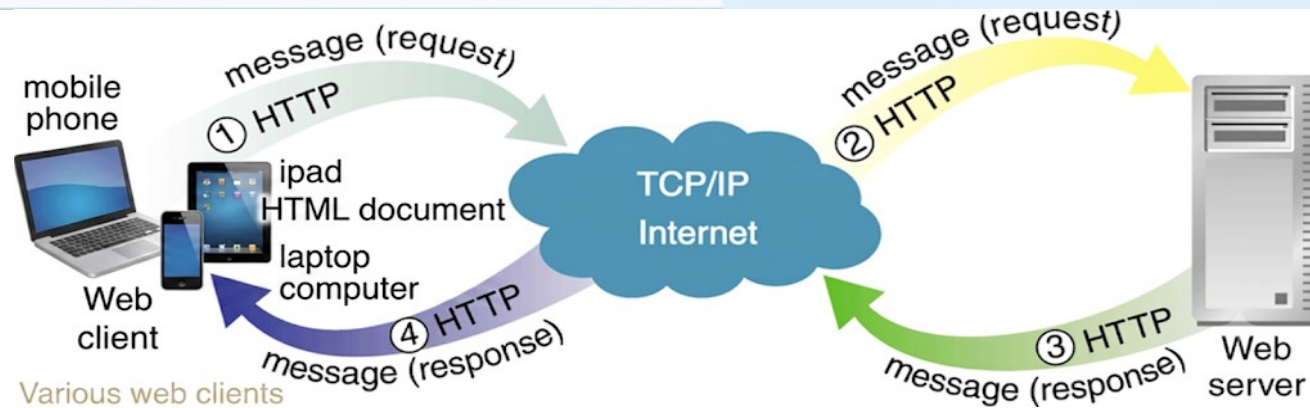
Software Stack

A software stack is a **set of integrated technology components** - ranging from operating systems and databases to programming languages and client-side tools - that work in tandem to support the execution of an application.

When you run an app, your device talk to server in **HTTP** protocol



Front-End vs. Back-End





Create a “To Do List”

Multi-category, web storage backed To Do App

Creating To Do List

- Create a new project folder name **to-do-list**
- Open the the folder in VS Code
- Choose **Agent** mode

Use the following prompts

Create a multi-category to do list in Vue.js. The data should be stored in the format of web storage.

Wrapping Up

Wrapping Up

- Vibe coding make programming a lot easier. But after all, a full stack application is still a complex project.
- It will often require cloud-computing knowledge to deploy the app so that internet users out there can access.
- What you've learnt today can assist you to further learning more on various programming language
- These skills can also apply to the domain of data analysis, data visualization, dashboarding and machine learning.

Thank You!