Batch: A-4 **Roll No.:** 16010122151	
Experiment No. 07	
Signature of the Staff In-charge with date	

Objective: To understand and implement application containerization using Docker and to gain practical exposure in building, running, and managing containers for simplified application deployment.

Expected Outcome of Experiment:

CO	Outcome
1	Successfully create Dockerfiles for containerizing applications
2	Build and run Docker containers
3	Understand how containerized applications work independently of the host environment
4	Push a custom Docker image to Docker Hub

Books/ Journals/ Websites referred:

- Docker Documentation
- https://github.com/Aahil13/Zeus
- https://hub.docker.com/

Abstract:-

This hands-on lab experience focuses on the foundational concepts and practical skills needed to work with Docker, a leading containerization platform. Participants will begin by setting up Docker on Windows systems, guided by a step-by-step installation tutorial. The lab then progresses to the containerization of a Python application, offering insights into creating Dockerfiles, managing dependencies, and building container images. Using additional resources, learners will deepen their understanding of how to containerize applications effectively, ensuring portability and consistency across environments. Finally, the experience is enriched by interactive practice using the Virtual Docker Lab from CourseLabs, allowing users to experiment with Docker commands and workflows in a safe, simulated environment. This comprehensive exercise equips participants with essential Docker knowledge, preparing them for modern DevOps and cloud-native application development.

Related Theory: -

Introduction to Virtualization and Containerization

In the realm of software development and deployment, ensuring that applications run consistently across different environments has always been a challenge. Traditionally, this issue was addressed through virtualization, wherein hypervisors enabled multiple operating systems to run on a single physical machine. However, virtualization is often resource-heavy and slower to initialize.

Containerization, a lighter alternative to traditional virtualization, has revolutionized the way applications are developed, tested, and deployed. Unlike virtual machines that emulate entire hardware stacks, containers virtualize the operating system, allowing multiple applications to share the same OS kernel while running in isolated environments. This reduces overhead, improves performance, and enables greater flexibility and scalability in application deployment.

What is Docker?

Docker is an open-source platform that automates the deployment of applications inside lightweight, portable containers. Developed by Docker Inc., it enables developers to package an application along with all its dependencies, libraries, and configuration files into a single image. This image can then be run as a container on any system that has Docker installed, ensuring consistent behavior across various stages of development and deployment.

Key Features of Docker:

- **Portability:** Docker containers can run on any system that supports Docker, irrespective of underlying hardware or operating system differences.
- **Efficiency:** Containers share the host OS kernel, leading to reduced memory and CPU usage compared to virtual machines.
- **Isolation:** Each container runs in a sandboxed environment, reducing the risk of conflicts between applications.

- **Version Control:** Docker images are versioned, making it easy to roll back to previous states or manage updates efficiently.
- **Scalability:** Containers can be deployed in clusters using tools like Docker Swarm or Kubernetes for orchestration.

Docker Components

- **Docker Engine:** The core client-server technology that includes a server (Docker daemon), REST API, and a command-line interface.
- **Docker Image:** A read-only template with instructions for creating a Docker container. It includes the application code, runtime, libraries, environment variables, and configuration files.
- **Docker Container:** A running instance of a Docker image. Containers are isolated and include everything needed to run the application.
- **Dockerfile:** A text document containing all the commands a user could call on the command line to assemble an image.
- **Docker Hub:** A public registry that stores Docker images, making them accessible for download and reuse.

Dockerizing a Python Application

Python, being a versatile and widely used language, is often deployed using Docker for building scalable microservices and web applications. The process of containerizing a Python application involves:

1. **Writing the Application:** A simple script or a complex web app (like using Flask or Django).
2. **Creating a Dockerfile:** This defines the base image (e.g., `python:3.9`), sets up the working directory, installs dependencies (using `requirements.txt`), and runs the application.
3. **Building the Docker Image:** Using `docker build` to convert the Dockerfile into a runnable image.
4. **Running the Container:** With `docker run`, the container is instantiated and the application is executed in an isolated environment.

This encapsulation ensures that the application behaves the same, whether it's running on a developer's local machine, a staging server, or in production.

Containerization vs. Virtual Machines

Aspect	**Containers**	**Virtual Machines**
Boot Time	Seconds	Minutes
Resource Usage	Low (shares host OS kernel)	High (requires guest OS per VM)
Portability	High	Moderate
Isolation	Process-level	OS-level
Management Tools	Docker, Kubernetes	VMware, VirtualBox, Hyper-V

Virtual Docker Labs

Virtual Docker labs, such as the one provided by CourseLabs, simulate real-world environments for learners to practice Docker concepts without installing anything locally. These cloud-based labs offer hands-on experience with Docker CLI, creating containers, writing Dockerfiles, and managing Docker networks and volumes. Such labs are essential for building practical skills and understanding container orchestration in distributed systems.

Implementation Details:

Francesco Ciulla
Posted on Apr 14, 2023

Dockerize a Python application

#beginners #programming #python #docker

Dockerize a Python application - Intro

In this article, we will see how to dockerize a simple Python application.

Francesco Ciulla

Check YouTube:
https://www.youtube.com/@francescociulla

LOCATION
Rome, Italy

EDUCATION
Computer Scientist

WORK
Developer Advocate at daily.dev

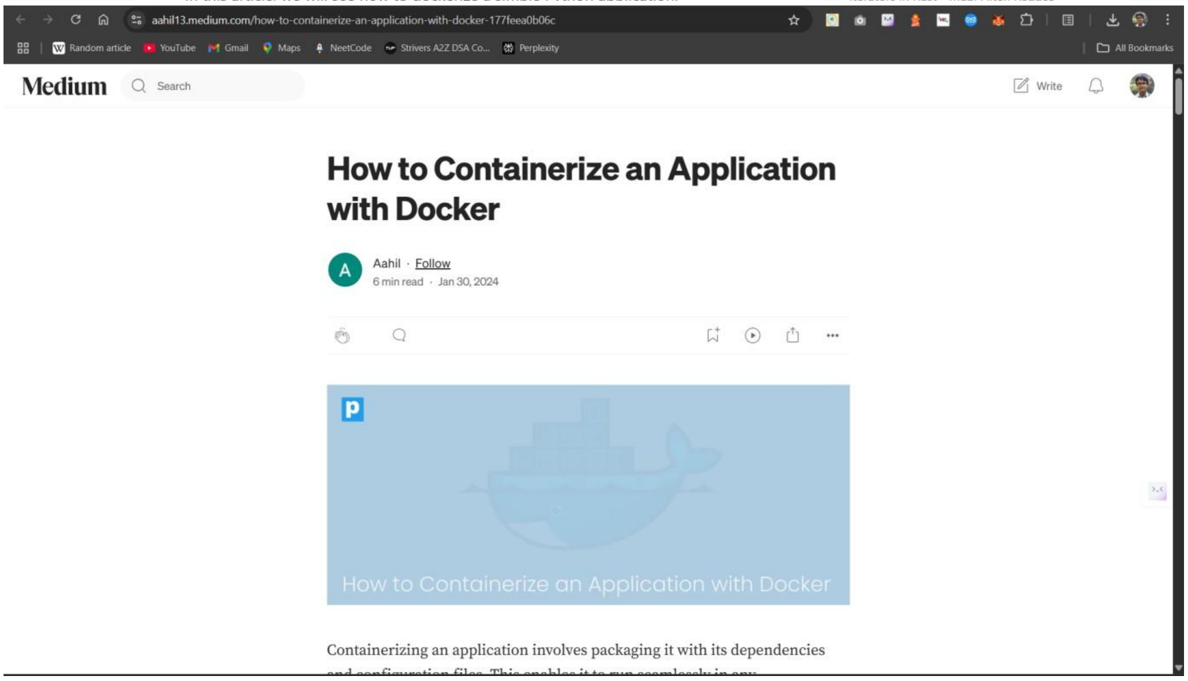
JOINED
Mar 3, 2020

More from Francesco Ciulla

Actix Web - The Rust Framework for Web Development - Hello World
#programming #opensource #rust #beginners

All the Rust Features
#programming #opensource #rust #beginners

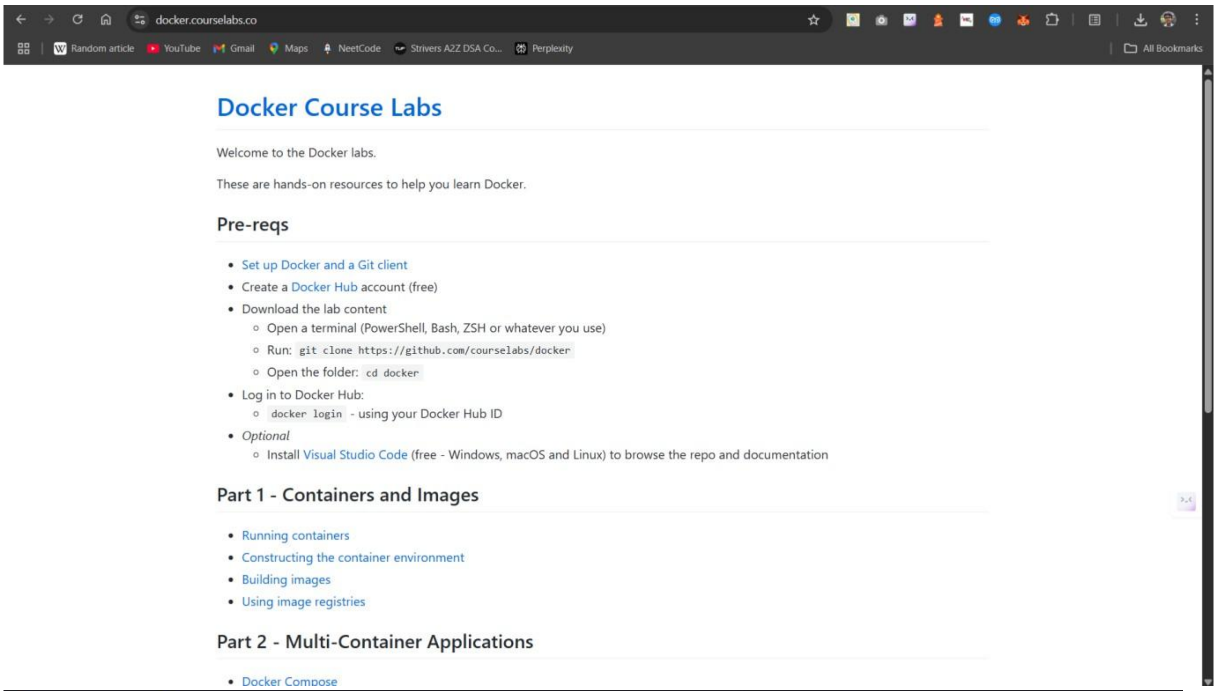
Iterators in Rust - Map, Filter, Reduce


aahil13.medium.com/how-to-containerize-an-application-with-docker-177feea0b06c
Random article
YouTube
Gmail
Maps
NeetCode
Strivers A2Z DSA Co...
Perplexity
All Bookmarks
Medium
Search
Write
How to Containerize an Application with Docker

How to Containerize an Application with Docker

Aahil · Follow
6 min read · Jan 30, 2024

Containerizing an application involves packaging it with its dependencies and configuration files. This enables it to run seamlessly in any



docker.courselabs.co

Docker Course Labs

Welcome to the Docker labs.

These are hands-on resources to help you learn Docker.

Pre-reqs

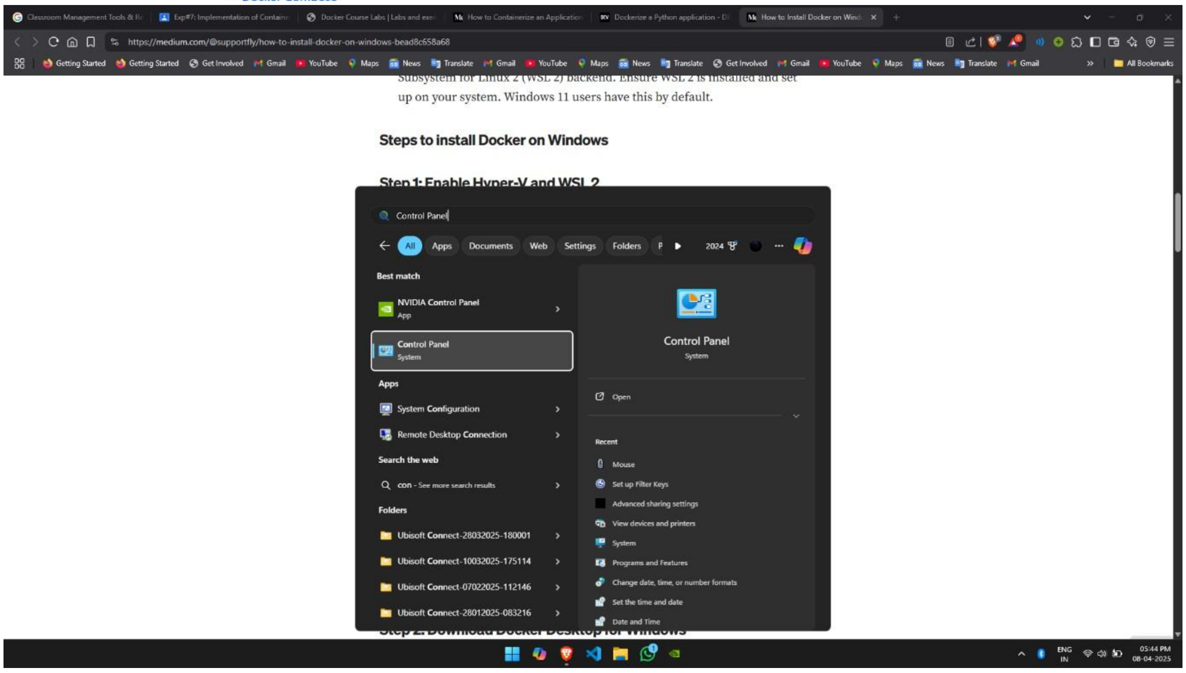
- Set up Docker and a Git client
- Create a Docker Hub account (free)
- Download the lab content
  - Open a terminal (PowerShell, Bash, ZSH or whatever you use)
  - Run: `git clone https://github.com/courselabs/docker`
  - Open the folder: `cd docker`
- Log in to Docker Hub:
  - `docker login` - using your Docker Hub ID
- *Optional*
  - Install Visual Studio Code (free - Windows, macOS and Linux) to browse the repo and documentation

Part 1 - Containers and Images

- Running containers
- Constructing the container environment
- Building images
- Using image registries

Part 2 - Multi-Container Applications

- Docker Compose



https://medium.com/@supportfly/how-to-install-docker-on-windows-bead8c658a68

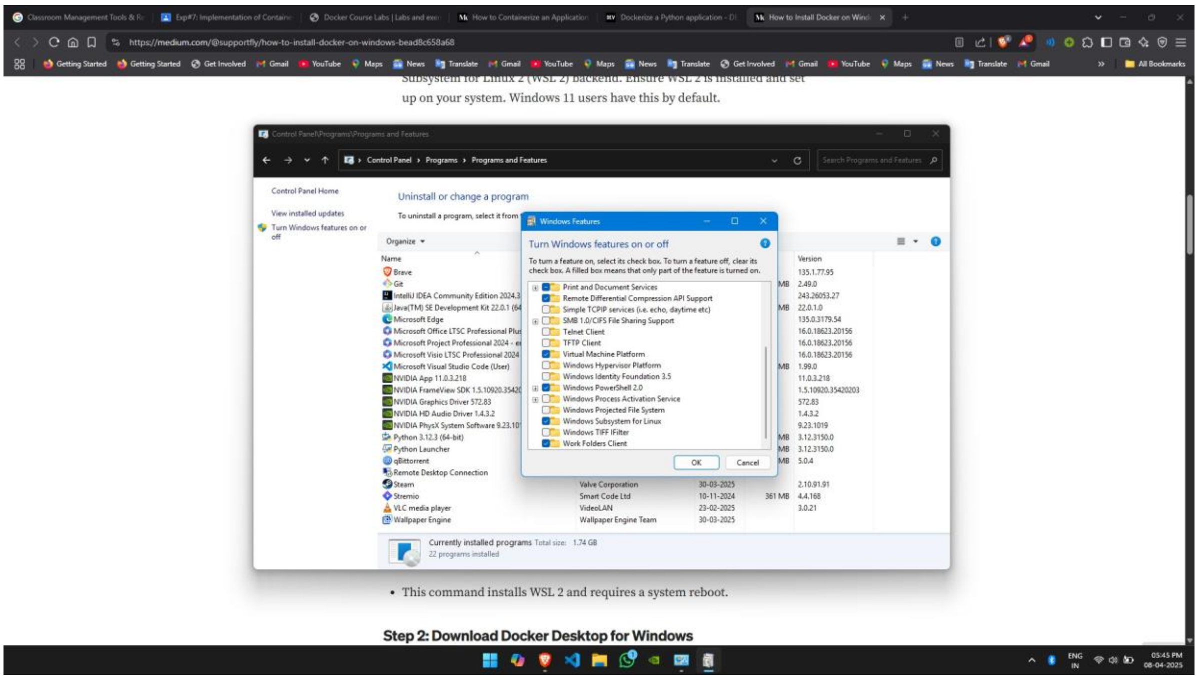
Subsystem for Linux 2 (WSL 2) backend. Ensure WSL 2 is installed and set up on your system. Windows 11 users have this by default.

Steps to install Docker on Windows

Step 1: Enable Hyper-V and WSL 2

Control Panel
All
Apps
Documents
Web
Settings
Folders
Best match
NVIDIA Control Panel
App
Control Panel
System
Apps
System Configuration
Remote Desktop Connection
Search the web
con - See more search results
Folders
Ubisoft Connect-28032025-180001
Ubisoft Connect-10032025-175114
Ubisoft Connect-07022025-112146
Ubisoft Connect-28012025-083216
Control Panel
System
Open
Recent
Mouse
Set up Filter Keys
Advanced sharing settings
View devices and printers
System
Programs and Features
Change date, time, or number formats
Set the time and date
Date and Time

Step 2: Download Docker Desktop for Windows



Subsystem for Linux 2 (WSL 2) backend. Ensure WSL 2 is installed and set up on your system. Windows 11 users have this by default.

Control Panel\Programs\Programs and Features

Control Panel > Programs > Programs and Features

Uninstall or change a program

To uninstall a program, select it from

Windows Features

Turn Windows features on or off

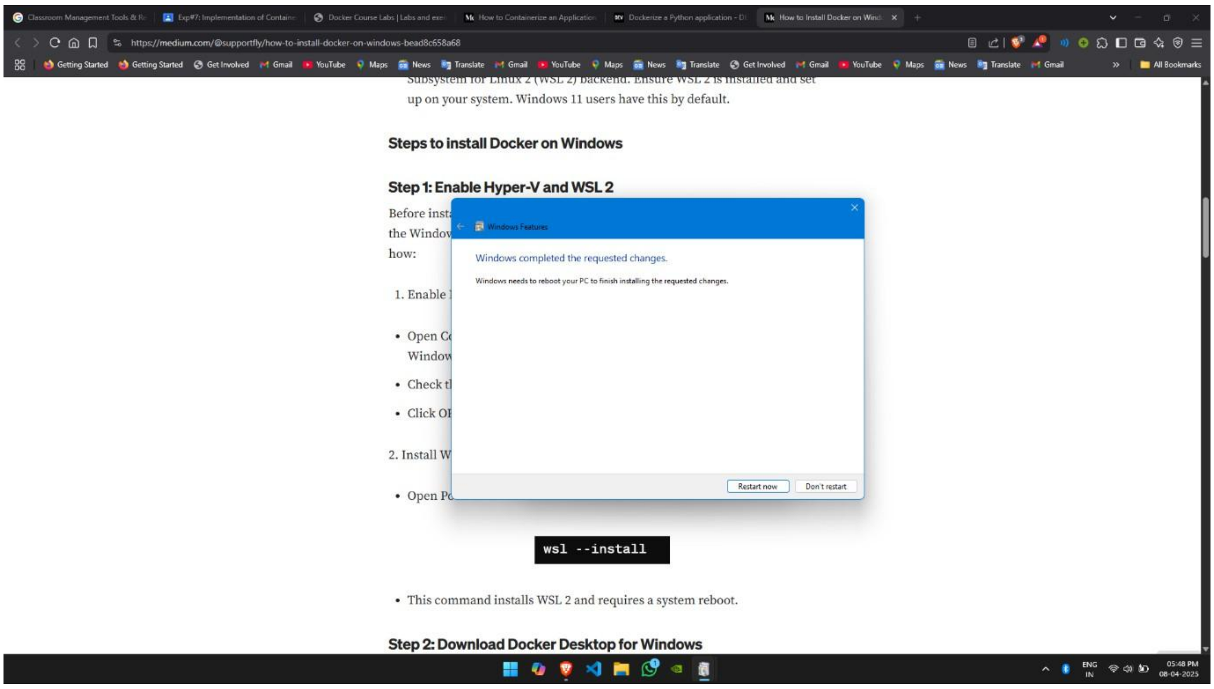
To turn a feature on, select its check box. To turn a feature off, clear its check box. A filled box means that only part of the feature is turned on.

- [■] Print and Document Services
- [✓] Remote Differential Compression API Support
- [ ] Simple TCPIP services (i.e. echo, daytime etc)
- [ ] SMB 1.0/CIFS File Sharing Support
- [ ] Telnet Client
- [ ] TFTP Client
- [✓] Virtual Machine Platform
- [ ] Windows Hypervisor Platform
- [ ] Windows Identity Foundation 3.5
- [✓] Windows PowerShell 2.0
- [ ] Windows Process Activation Service
- [ ] Windows Projected File System
- [✓] Windows Subsystem for Linux
- [ ] Windows TIFF IFilter
- [✓] Work Folders Client

Currently installed programs Total size: 1.74 GB
22 programs installed

- This command installs WSL 2 and requires a system reboot.

Step 2: Download Docker Desktop for Windows



Subsystem for Linux 2 (WSL 2) backend. Ensure WSL 2 is installed and set up on your system. Windows 11 users have this by default.

Steps to install Docker on Windows

Step 1: Enable Hyper-V and WSL 2

Before inst
the Windov
how:

1. Enable

- Open C
  Windov
- Check t
- Click O

2. Install W

- Open P

Windows Features

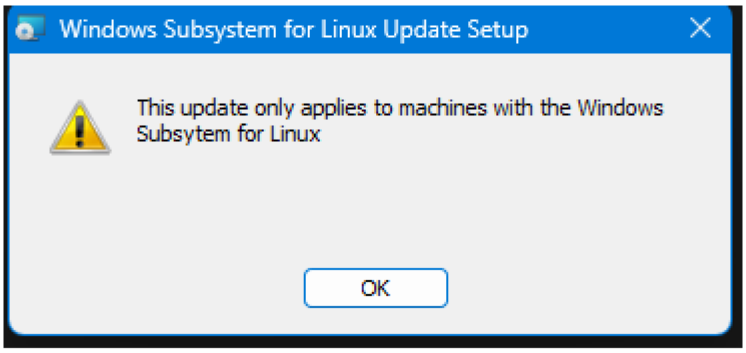
Windows completed the requested changes.

Windows needs to reboot your PC to finish installing the requested changes.

```
wsl --install
```

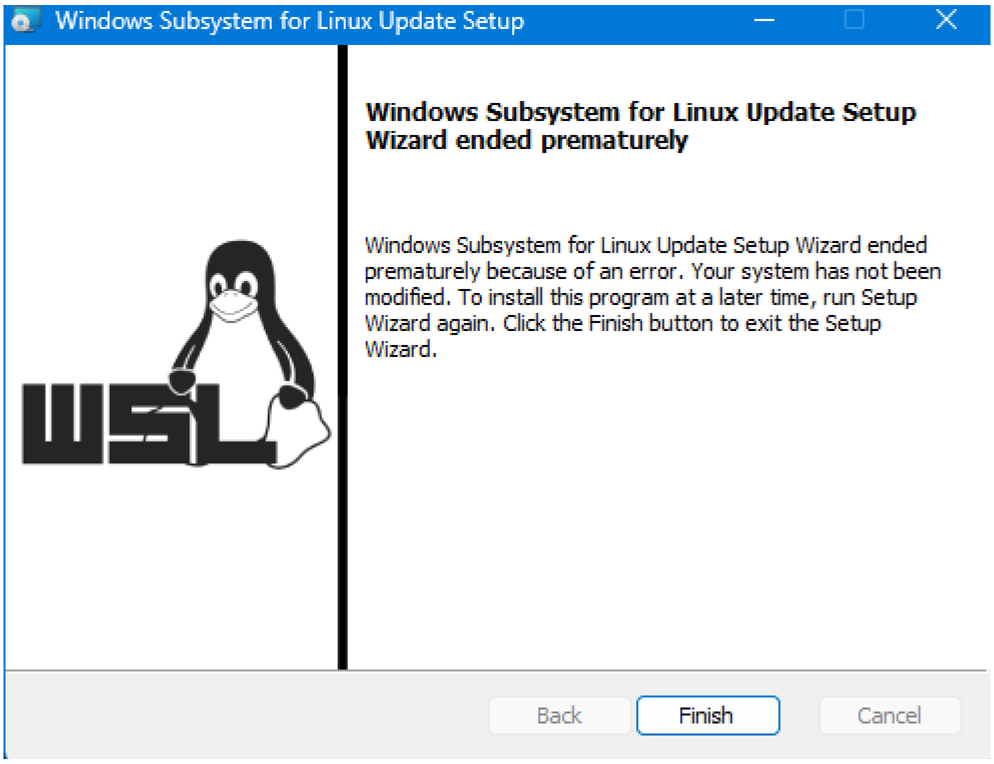
- This command installs WSL 2 and requires a system reboot.

Step 2: Download Docker Desktop for Windows



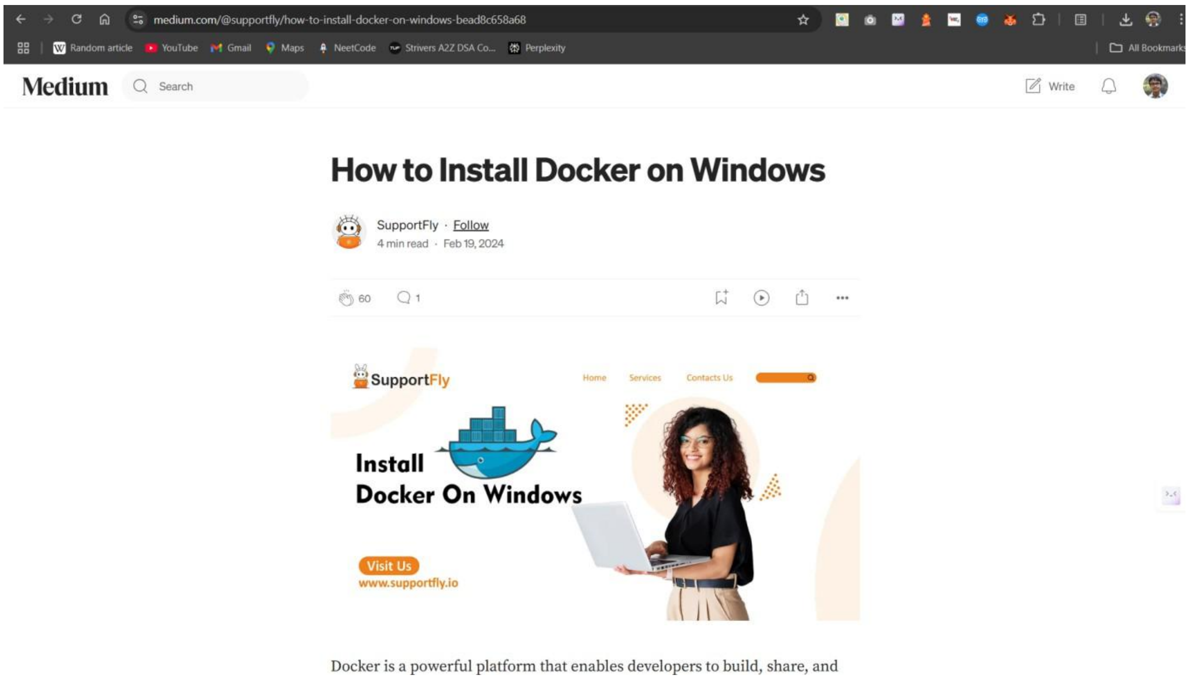
Windows Subsystem for Linux Update Setup

This update only applies to machines with the Windows Subsystem for Linux



Windows Subsystem for Linux Update Setup Wizard ended prematurely

Windows Subsystem for Linux Update Setup Wizard ended prematurely because of an error. Your system has not been modified. To install this program at a later time, run Setup Wizard again. Click the Finish button to exit the Setup Wizard.



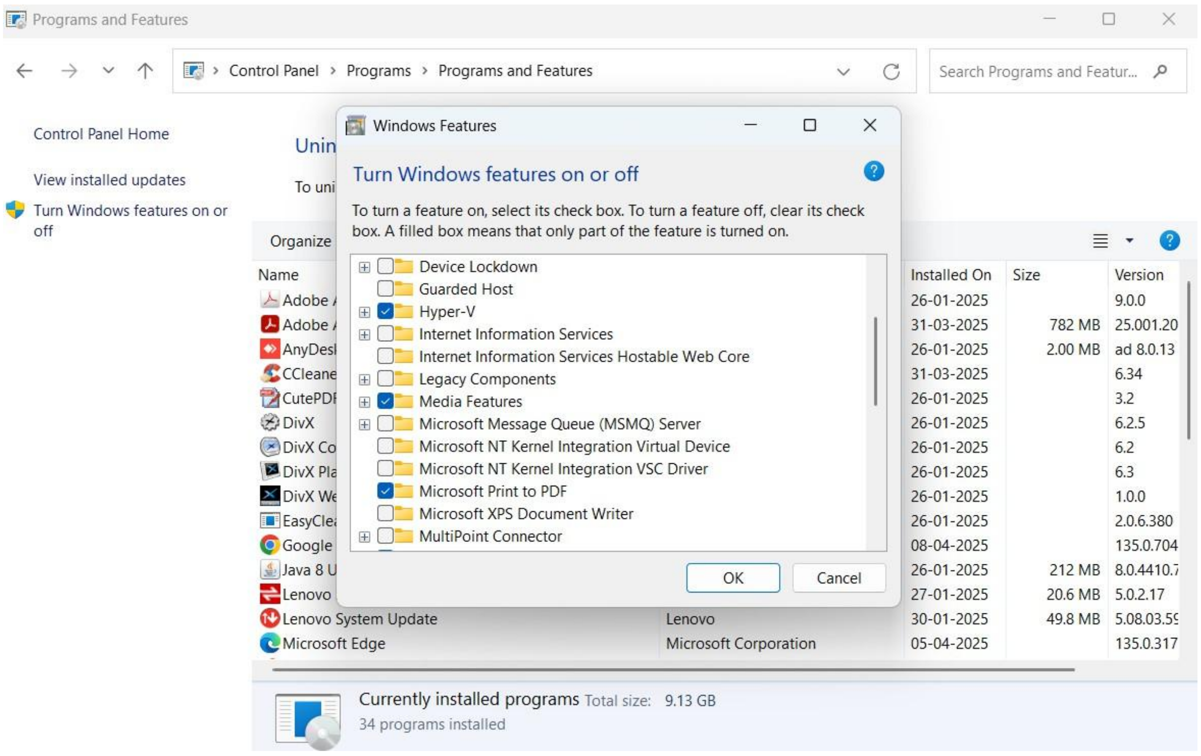
How to Install Docker on Windows

SupportFly · Follow
4 min read · Feb 19, 2024

Docker is a powerful platform that enables developers to build, share, and

SOMAIYA VIDYAVIHAR UNIVERSITY
K J Somaiya School of Engineering

Somaiya TRUST



Programs and Features

Control Panel › Programs › Programs and Features

Search Programs and Featur...

Control Panel Home

View installed updates

Turn Windows features on or off

Windows Features

Turn Windows features on or off

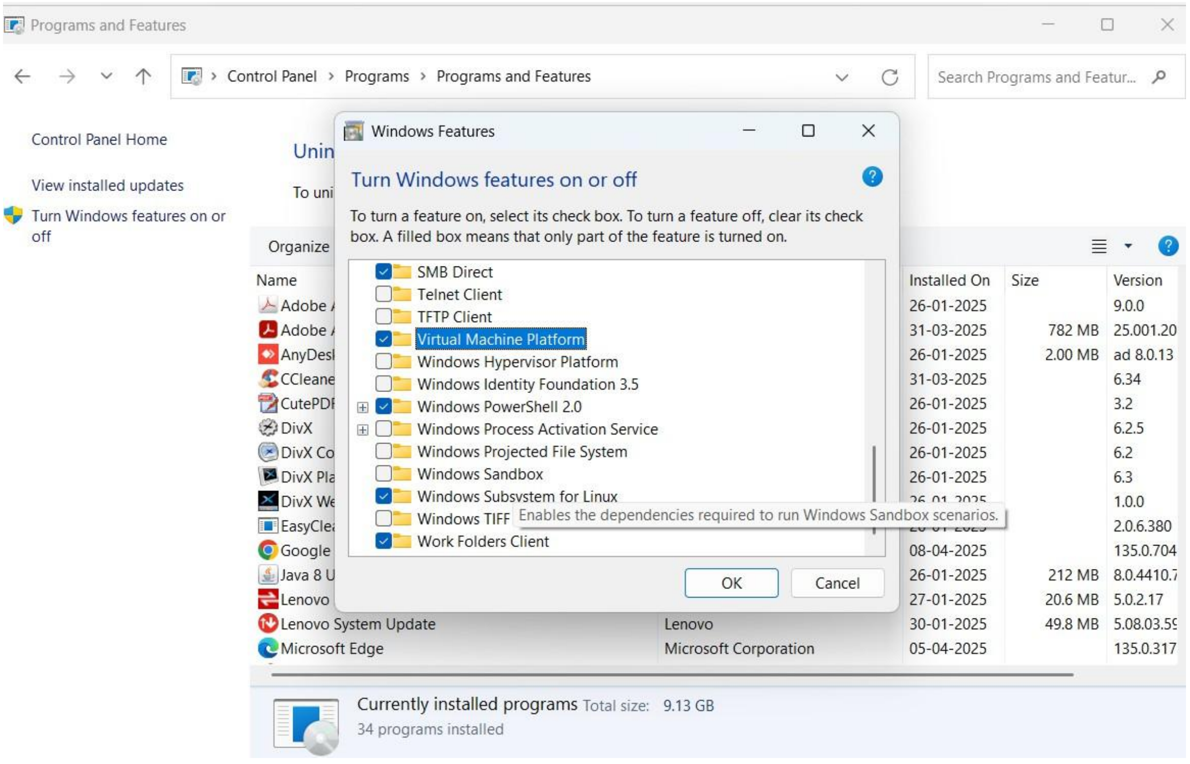
To turn a feature on, select its check box. To turn a feature off, clear its check box. A filled box means that only part of the feature is turned on.

- ☐ Device Lockdown
- ☐ Guarded Host
- ☑ Hyper-V
- ☐ Internet Information Services
- ☐ Internet Information Services Hostable Web Core
- ☐ Legacy Components
- ☑ Media Features
- ☐ Microsoft Message Queue (MSMQ) Server
- ☐ Microsoft NT Kernel Integration Virtual Device
- ☐ Microsoft NT Kernel Integration VSC Driver
- ☑ Microsoft Print to PDF
- ☐ Microsoft XPS Document Writer
- ☐ MultiPoint Connector

OK Cancel

Name	Publisher	Installed On	Size	Version
Adobe		26-01-2025		9.0.0
Adobe		31-03-2025	782 MB	25.001.20
AnyDesl		26-01-2025	2.00 MB	ad 8.0.13
CCleane		31-03-2025		6.34
CutePDF		26-01-2025		3.2
DivX		26-01-2025		6.2.5
DivX Co		26-01-2025		6.2
DivX Pla		26-01-2025		6.3
DivX We		26-01-2025		1.0.0
EasyClea		26-01-2025		2.0.6.380
Google		08-04-2025		135.0.704
Java 8 U		26-01-2025	212 MB	8.0.4410.7
Lenovo		27-01-2025	20.6 MB	5.0.2.17
Lenovo System Update	Lenovo	30-01-2025	49.8 MB	5.08.03.59
Microsoft Edge	Microsoft Corporation	05-04-2025		135.0.317

Currently installed programs Total size: 9.13 GB
34 programs installed



Programs and Features

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Search Programs and Featur...

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View installed updates

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- ☑ SMB Direct
- ☐ Telnet Client
- ☐ TFTP Client
- ☑ Virtual Machine Platform
- ☐ Windows Hypervisor Platform
- ☐ Windows Identity Foundation 3.5
- ☑ Windows PowerShell 2.0
- ☐ Windows Process Activation Service
- ☐ Windows Projected File System
- ☐ Windows Sandbox
- ☑ Windows Subsystem for Linux
- ☐ Windows TIFF
- ☑ Work Folders Client

Enables the dependencies required to run Windows Sandbox scenarios.

OK Cancel

Name	Publisher	Installed On	Size	Version
Adobe		26-01-2025		9.0.0
Adobe		31-03-2025	782 MB	25.001.20
AnyDesl		26-01-2025	2.00 MB	ad 8.0.13
CCleane		31-03-2025		6.34
CutePDF		26-01-2025		3.2
DivX		26-01-2025		6.2.5
DivX Co		26-01-2025		6.2
DivX Pla		26-01-2025		6.3
DivX We		26-01-2025		1.0.0
EasyClea				2.0.6.380
Google		08-04-2025		135.0.704
Java 8 U		26-01-2025	212 MB	8.0.4410.7
Lenovo		27-01-2025	20.6 MB	5.0.2.17
Lenovo System Update	Lenovo	30-01-2025	49.8 MB	5.08.03.59
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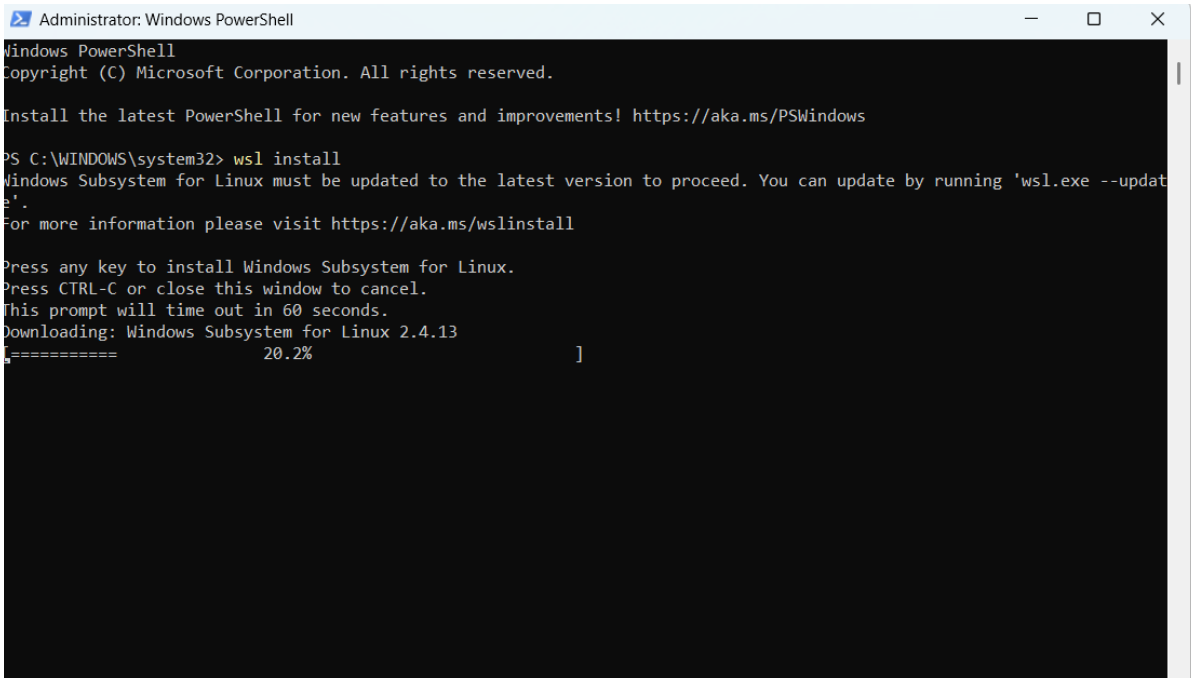
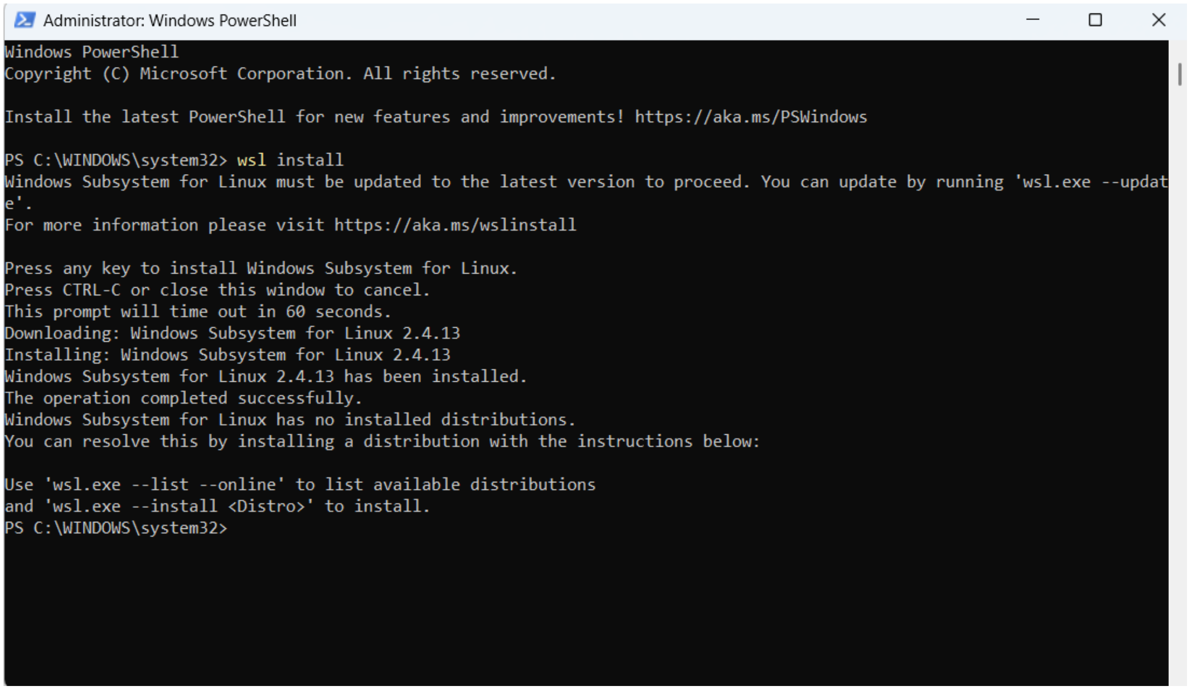
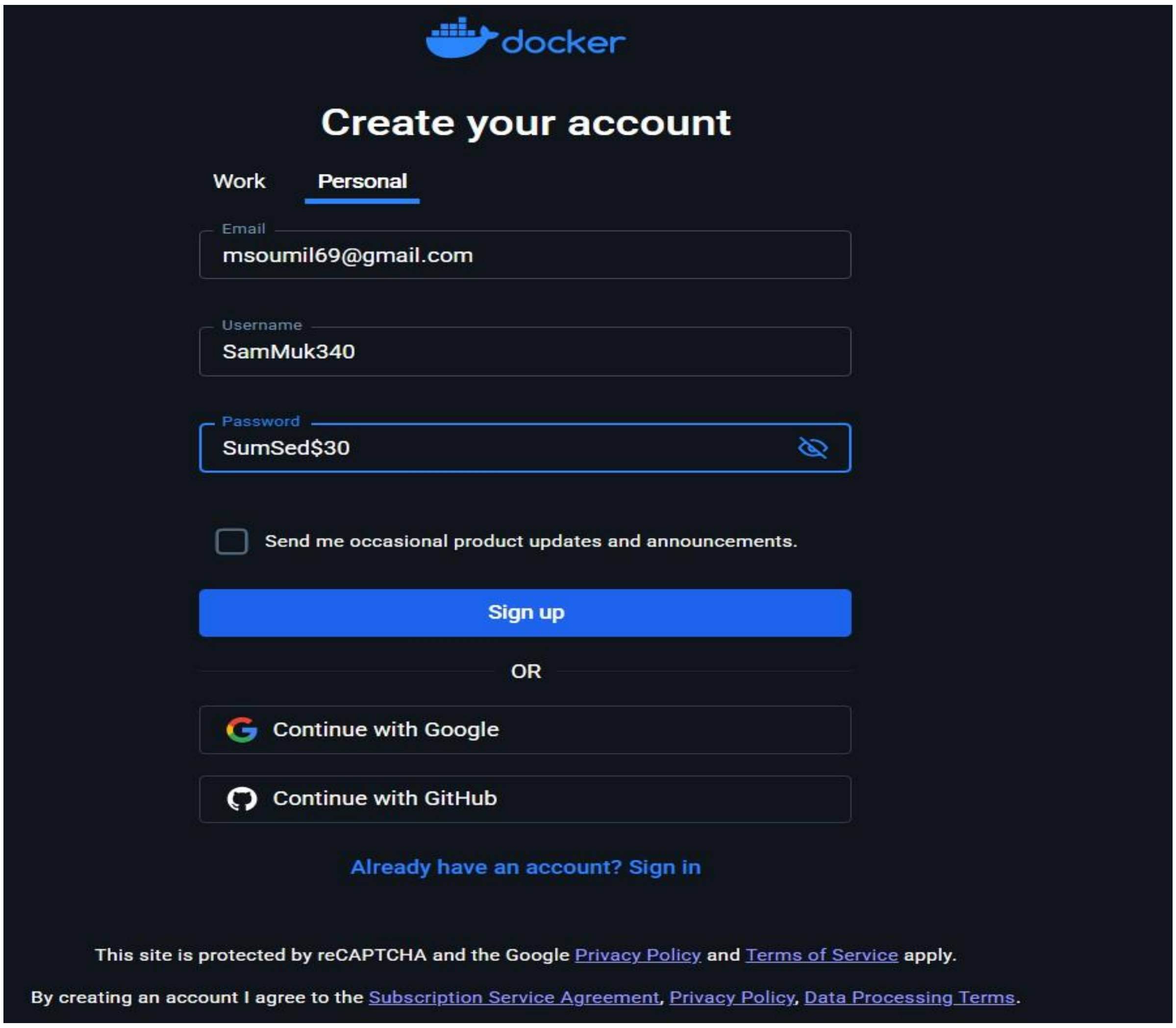
34 programs installed


Administrator: Windows PowerShell

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> wsl install
Windows Subsystem for Linux must be updated to the latest version to proceed. You can update by running 'wsl.exe --updat
e'.
For more information please visit https://aka.ms/wslinstall

Press any key to install Windows Subsystem for Linux.
Press CTRL-C or close this window to cancel.
This prompt will time out in 60 seconds.
Downloading: Windows Subsystem for Linux 2.4.13
[===========              20.2%                           ]
```


Administrator: Windows PowerShell

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> wsl install
Windows Subsystem for Linux must be updated to the latest version to proceed. You can update by running 'wsl.exe --updat
e'.
For more information please visit https://aka.ms/wslinstall

Press any key to install Windows Subsystem for Linux.
Press CTRL-C or close this window to cancel.
This prompt will time out in 60 seconds.
Downloading: Windows Subsystem for Linux 2.4.13
Installing: Windows Subsystem for Linux 2.4.13
Windows Subsystem for Linux 2.4.13 has been installed.
The operation completed successfully.
Windows Subsystem for Linux has no installed distributions.
You can resolve this by installing a distribution with the instructions below:

Use 'wsl.exe --list --online' to list available distributions
and 'wsl.exe --install <Distro>' to install.
PS C:\WINDOWS\system32>
```



Create your account

Email: msoumil69@gmail.com

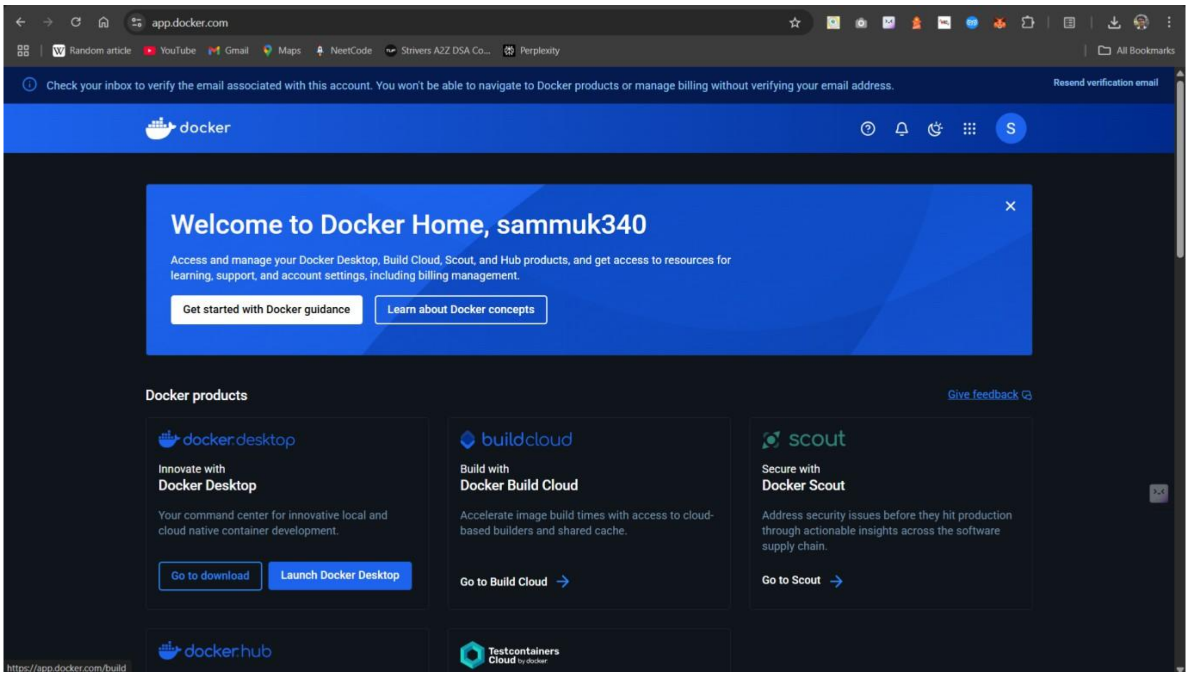
Username: SamMuk340

Password: SumSed$30

☐ Send me occasional product updates and announcements.

This site is protected by reCAPTCHA and the Google Privacy Policy and Terms of Service apply.

By creating an account I agree to the Subscription Service Agreement, Privacy Policy, Data Processing Terms.



Check your inbox to verify the email associated with this account. You won't be able to navigate to Docker products or manage billing without verifying your email address.

Welcome to Docker Home, sammuk340

Access and manage your Docker Desktop, Build Cloud, Scout, and Hub products, and get access to resources for learning, support, and account settings, including billing management.

Docker products

Innovate with
Docker Desktop

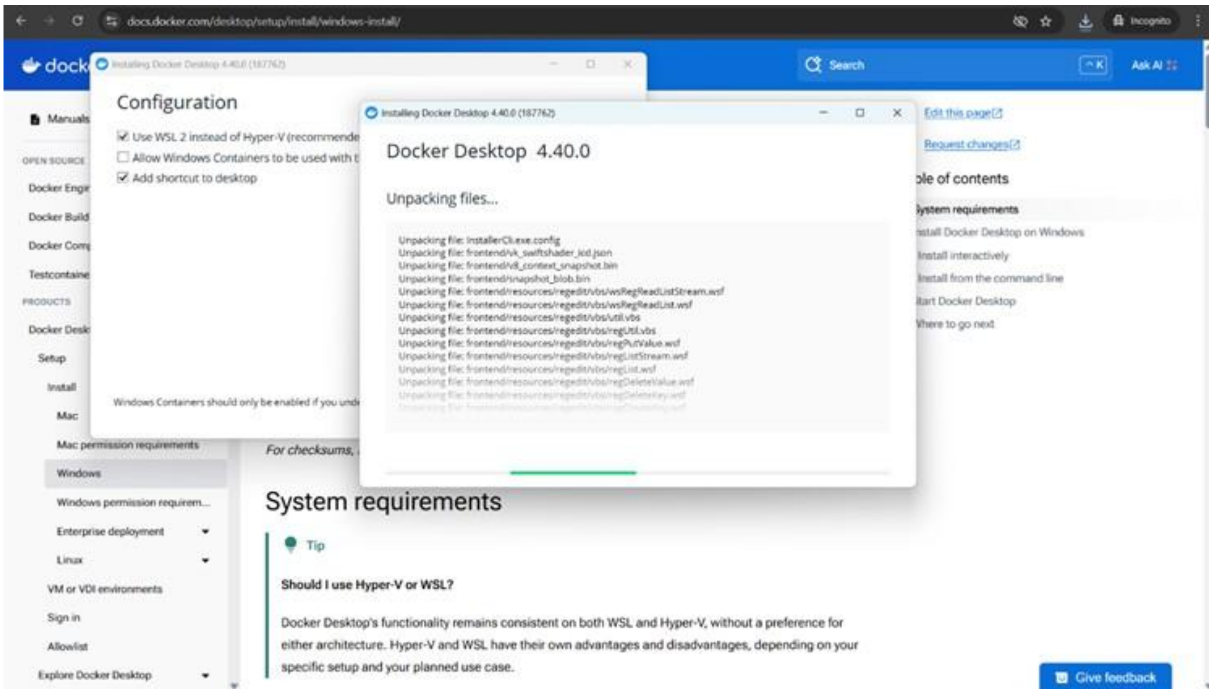
Your command center for innovative local and cloud native container development.

Build with
Docker Build Cloud

Accelerate image build times with access to cloud-based builders and shared cache.

Secure with
Docker Scout

Address security issues before they hit production through actionable insights across the software supply chain.



Configuration

☑ Use WSL 2 instead of Hyper-V (recommende
☐ Allow Windows Containers to be used with t
☑ Add shortcut to desktop

Windows Containers should only be enabled if you unde

Installing Docker Desktop 4.40.0 (187762)

Docker Desktop 4.40.0

Unpacking files...

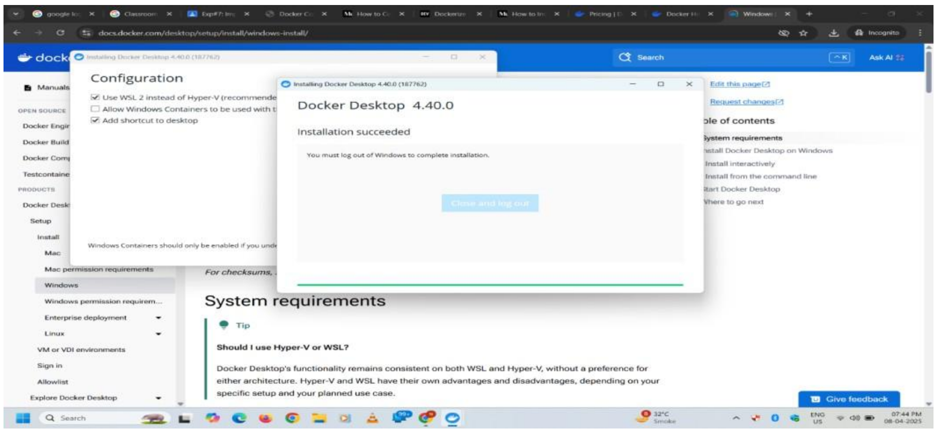
```
Unpacking file: InstallerCli.exe.config
Unpacking file: frontend/vk_swiftshader_icd.json
Unpacking file: frontend/v8_context_snapshot.bin
Unpacking file: frontend/snapshot_blob.bin
Unpacking file: frontend/resources/regedit/vbs/wsRegReadListStream.wsf
Unpacking file: frontend/resources/regedit/vbs/wsRegReadList.wsf
Unpacking file: frontend/resources/regedit/vbs/util.vbs
Unpacking file: frontend/resources/regedit/vbs/regUtil.vbs
Unpacking file: frontend/resources/regedit/vbs/regPutValue.wsf
Unpacking file: frontend/resources/regedit/vbs/regListStream.wsf
Unpacking file: frontend/resources/regedit/vbs/regList.wsf
Unpacking file: frontend/resources/regedit/vbs/regDeleteValue.wsf
```

System requirements

Tip

Should I use Hyper-V or WSL?

Docker Desktop's functionality remains consistent on both WSL and Hyper-V, without a preference for either architecture. Hyper-V and WSL have their own advantages and disadvantages, depending on your specific setup and your planned use case.



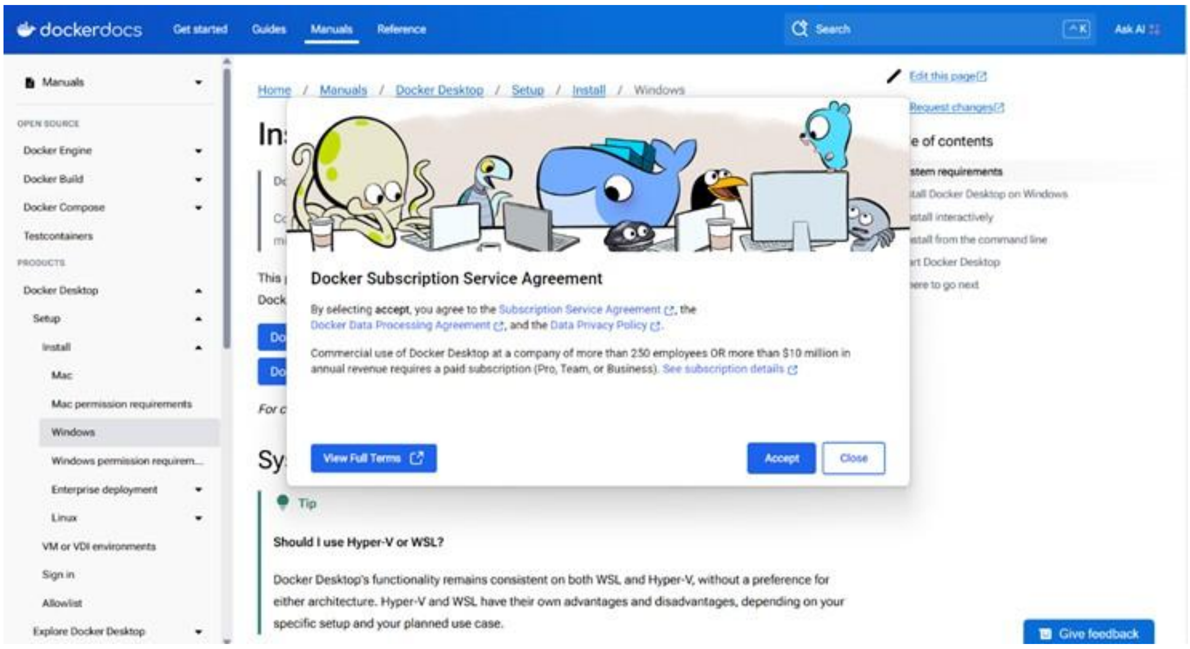
Installing Docker Desktop 4.40.0 (187762)

Docker Desktop 4.40.0

Installation succeeded

You must log out of Windows to complete installation.

Close and log out



Docker Subscription Service Agreement

By selecting accept, you agree to the Subscription Service Agreement, the Docker Data Processing Agreement, and the Data Privacy Policy.

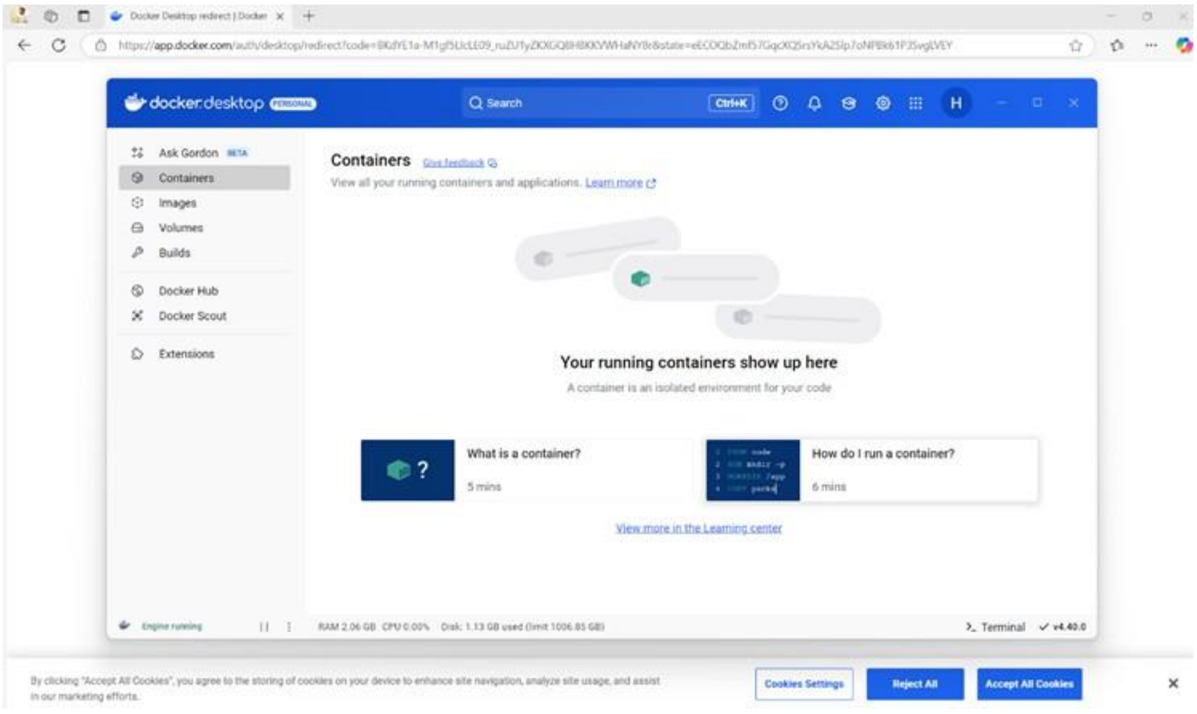
Commercial use of Docker Desktop at a company of more than 250 employees OR more than $10 million in annual revenue requires a paid subscription (Pro, Team, or Business). See subscription details

View Full Terms   Accept   Close

Tip

Should I use Hyper-V or WSL?

Docker Desktop's functionality remains consistent on both WSL and Hyper-V, without a preference for either architecture. Hyper-V and WSL have their own advantages and disadvantages, depending on your specific setup and your planned use case.


Docker Desktop redirect | Docker
https://app.docker.com/auth/desktop/redirect?code=BKdYE1a-M1gf5UcLE09_ruZU1yZKXGQ8H8KKVWHaNY8r&state=eECOQbZmf57GqcKQ5rsYkA2Slp7oNPBk61P3vgLVEY
docker desktop PERSONAL
Search
Ctrl+K
H
Ask Gordon BETA
Containers
Images
Volumes
Builds
Docker Hub
Docker Scout
Extensions
Give feedback
Learn more
What is a container?
5 mins
How do I run a container?
6 mins
View more in the Learning center
Engine running
RAM 2.06 GB CPU 0.00% Disk: 1.13 GB used (limit 1006.85 GB)
Terminal
v4.40.0
Cookies Settings
Reject All
Accept All Cookies

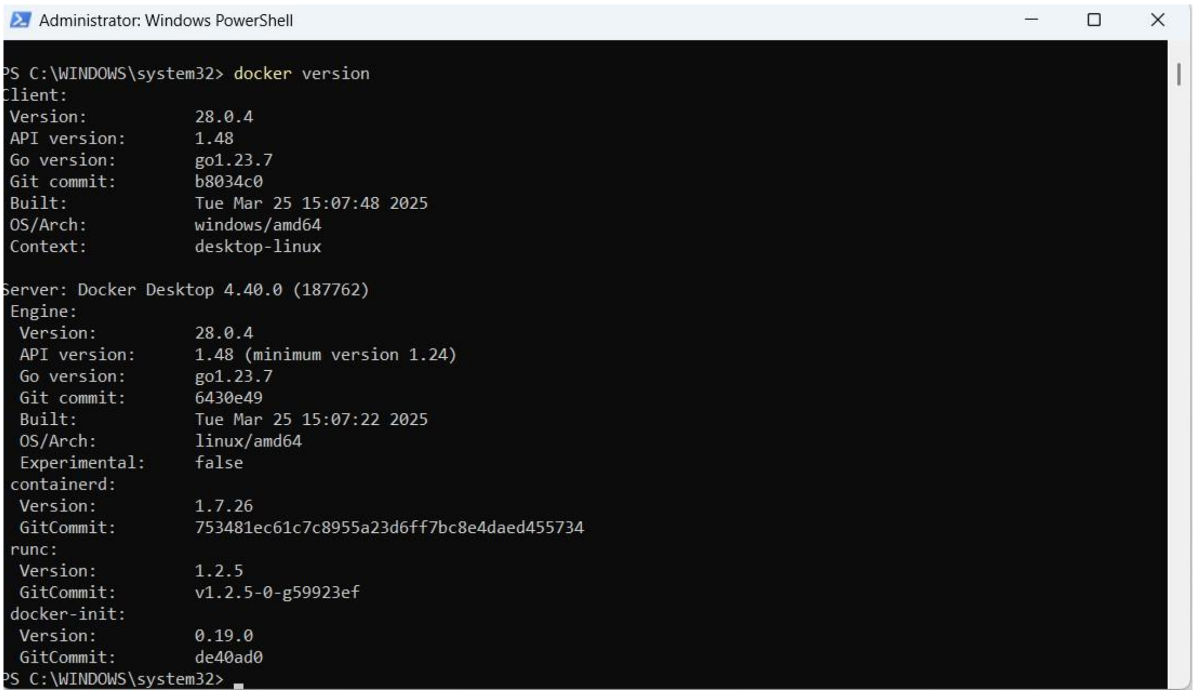
Containers

View all your running containers and applications.

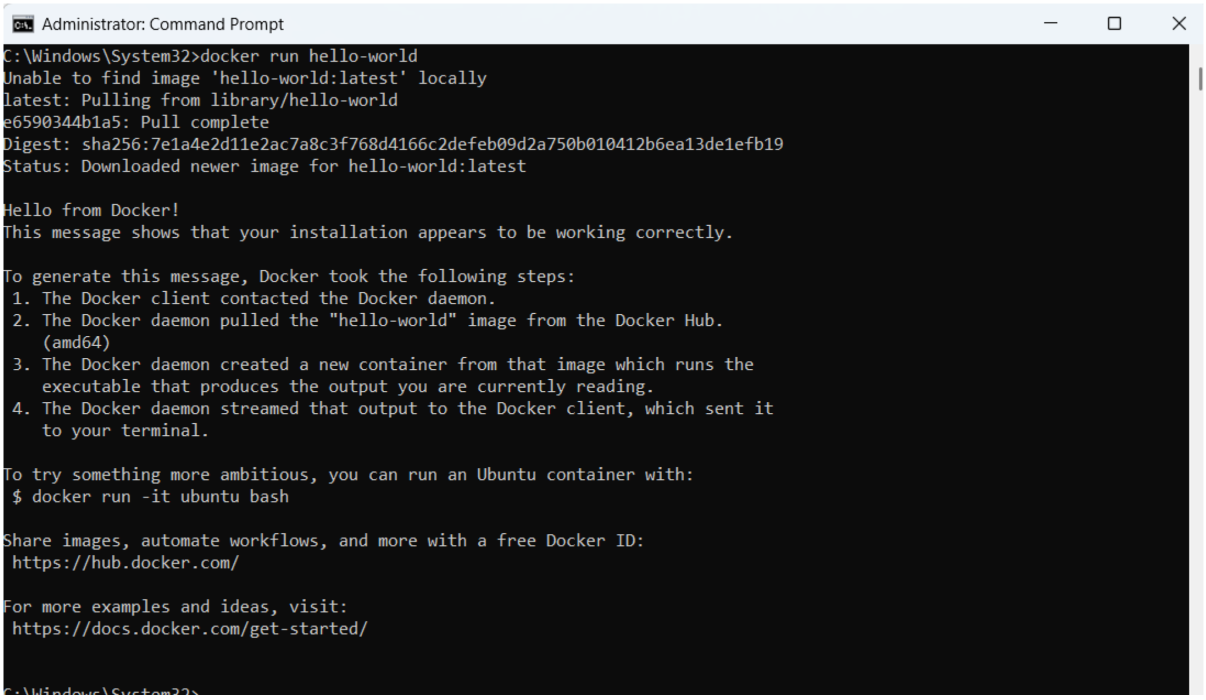
Your running containers show up here

A container is an isolated environment for your code

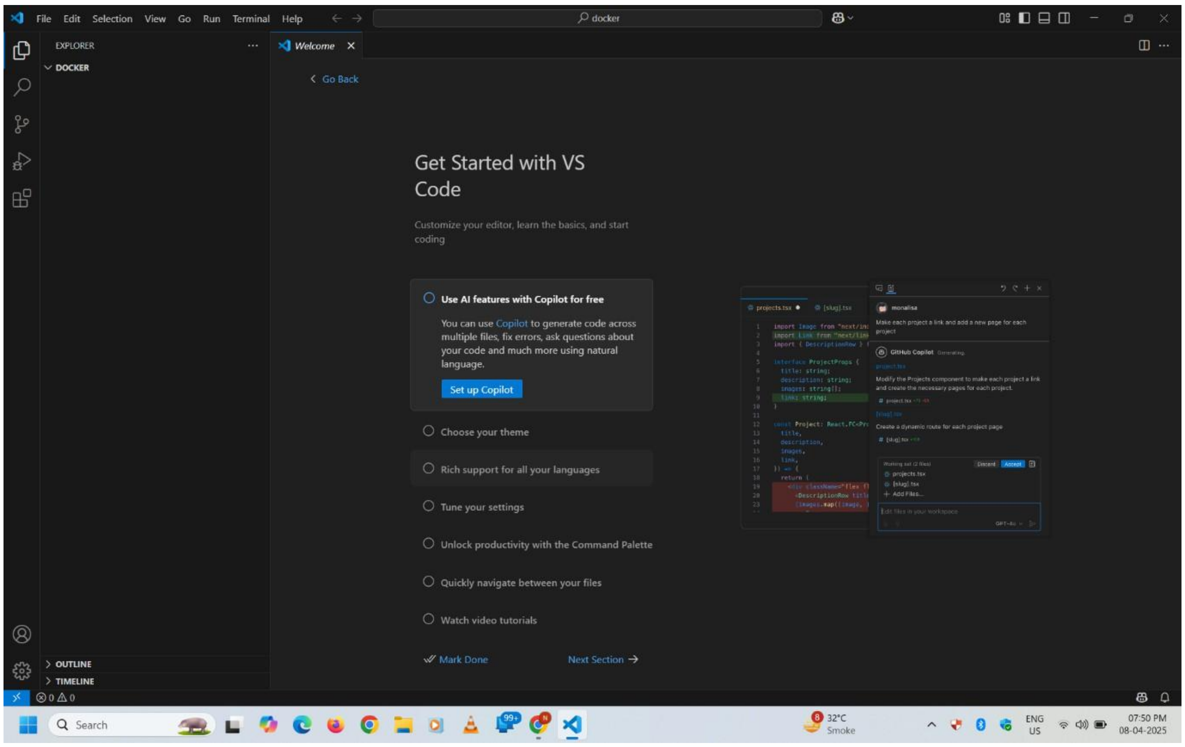
By clicking "Accept All Cookies", you agree to the storing of cookies on your device to enhance site navigation, analyze site usage, and assist in our marketing efforts.

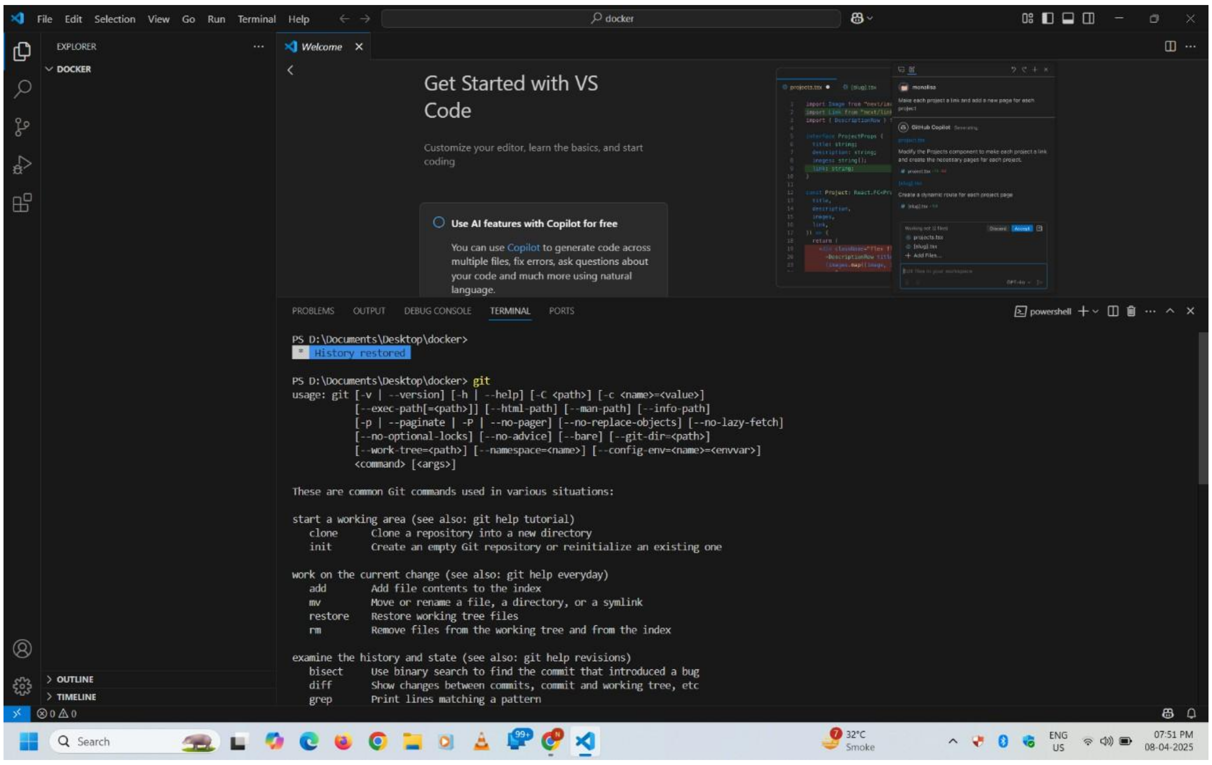


```
PS C:\WINDOWS\system32> docker version
Client:
 Version:           28.0.4
 API version:       1.48
 Go version:        go1.23.7
 Git commit:        b8034c0
 Built:             Tue Mar 25 15:07:48 2025
 OS/Arch:           windows/amd64
 Context:           desktop-linux

Server: Docker Desktop 4.40.0 (187762)
 Engine:
  Version:          28.0.4
  API version:      1.48 (minimum version 1.24)
  Go version:       go1.23.7
  Git commit:       6430e49
  Built:            Tue Mar 25 15:07:22 2025
  OS/Arch:          linux/amd64
  Experimental:     false
 containerd:
  Version:          1.7.26
  GitCommit:        753481ec61c7c8955a23d6ff7bc8e4daed455734
 runc:
  Version:          1.2.5
  GitCommit:        v1.2.5-0-g59923ef
 docker-init:
  Version:          0.19.0
  GitCommit:        de40ad0
PS C:\WINDOWS\system32>
```


Administrator: Command Prompt

```
C:\Windows\System32>docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
e6590344b1a5: Pull complete
Digest: sha256:7e1a4e2d11e2ac7a8c3f768d4166c2defeb09d2a750b010412b6ea13de1efb19
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://hub.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/get-started/


C:\Windows\System32>
```


File Edit Selection View Go Run Terminal Help
docker
EXPLORER
DOCKER
Welcome
Go Back
Get Started with VS Code
Customize your editor, learn the basics, and start coding
Use AI features with Copilot for free
You can use Copilot to generate code across multiple files, fix errors, ask questions about your code and much more using natural language.
Set up Copilot
Choose your theme
Rich support for all your languages
Tune your settings
Unlock productivity with the Command Palette
Quickly navigate between your files
Watch video tutorials
Mark Done
Next Section
OUTLINE
TIMELINE
Search
32°C Smoke
ENG US
07:50 PM 08-04-2025



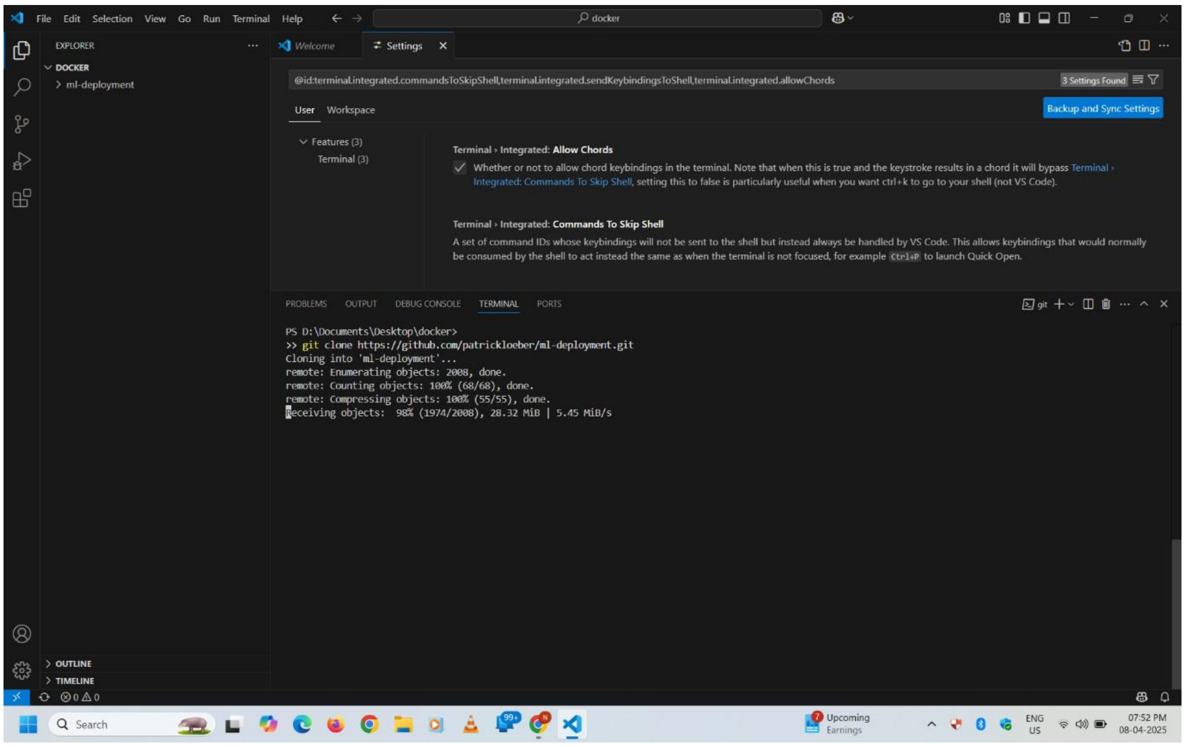
Get Started with VS Code

Customize your editor, learn the basics, and start coding

Use AI features with Copilot for free

You can use Copilot to generate code across multiple files, fix errors, ask questions about your code and much more using natural language.

```
PS D:\Documents\Desktop\docker>
 * History restored

PS D:\Documents\Desktop\docker> git
usage: git [-v | --version] [-h | --help] [-C <path>] [-c <name>=<value>]
           [--exec-path[=<path>]] [--html-path] [--man-path] [--info-path]
           [-p | --paginate | -P | --no-pager] [--no-replace-objects] [--no-lazy-fetch]
           [--no-optional-locks] [--no-advice] [--bare] [--git-dir=<path>]
           [--work-tree=<path>] [--namespace=<name>] [--config-env=<name>=<envvar>]
           <command> [<args>]

These are common Git commands used in various situations:

start a working area (see also: git help tutorial)
   clone     Clone a repository into a new directory
   init      Create an empty Git repository or reinitialize an existing one

work on the current change (see also: git help everyday)
   add       Add file contents to the index
   mv        Move or rename a file, a directory, or a symlink
   restore   Restore working tree files
   rm        Remove files from the working tree and from the index

examine the history and state (see also: git help revisions)
   bisect    Use binary search to find the commit that introduced a bug
   diff      Show changes between commits, commit and working tree, etc
   grep      Print lines matching a pattern
```



@id:terminal.integrated.commandsToSkipShell,terminal.integrated.sendKeybindingsToShell,terminal.integrated.allowChords

3 Settings Found

User Workspace

Features (3)
Terminal (3)

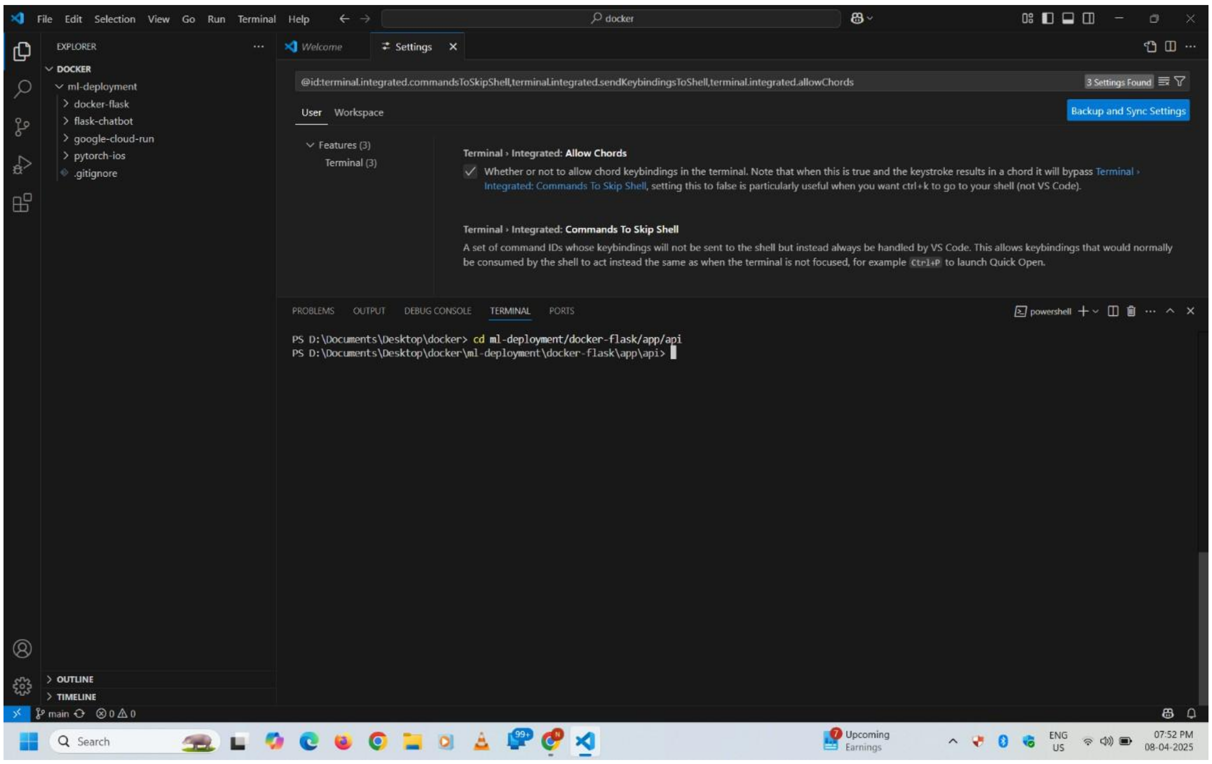
Terminal › Integrated: Allow Chords

✓ Whether or not to allow chord keybindings in the terminal. Note that when this is true and the keystroke results in a chord it will bypass Terminal › Integrated: Commands To Skip Shell, setting this to false is particularly useful when you want ctrl+k to go to your shell (not VS Code).

Terminal › Integrated: Commands To Skip Shell

A set of command IDs whose keybindings will not be sent to the shell but instead always be handled by VS Code. This allows keybindings that would normally be consumed by the shell to act instead the same as when the terminal is not focused, for example `Ctrl+P` to launch Quick Open.

```
PS D:\Documents\Desktop\docker>
>> git clone https://github.com/patrickloeber/ml-deployment.git
Cloning into 'ml-deployment'...
remote: Enumerating objects: 2008, done.
remote: Counting objects: 100% (68/68), done.
remote: Compressing objects: 100% (55/55), done.
Receiving objects:  98% (1974/2008), 28.32 MiB | 5.45 MiB/s
```



@id:terminal.integrated.commandsToSkipShell,terminal.integrated.sendKeybindingsToShell,terminal.integrated.allowChords

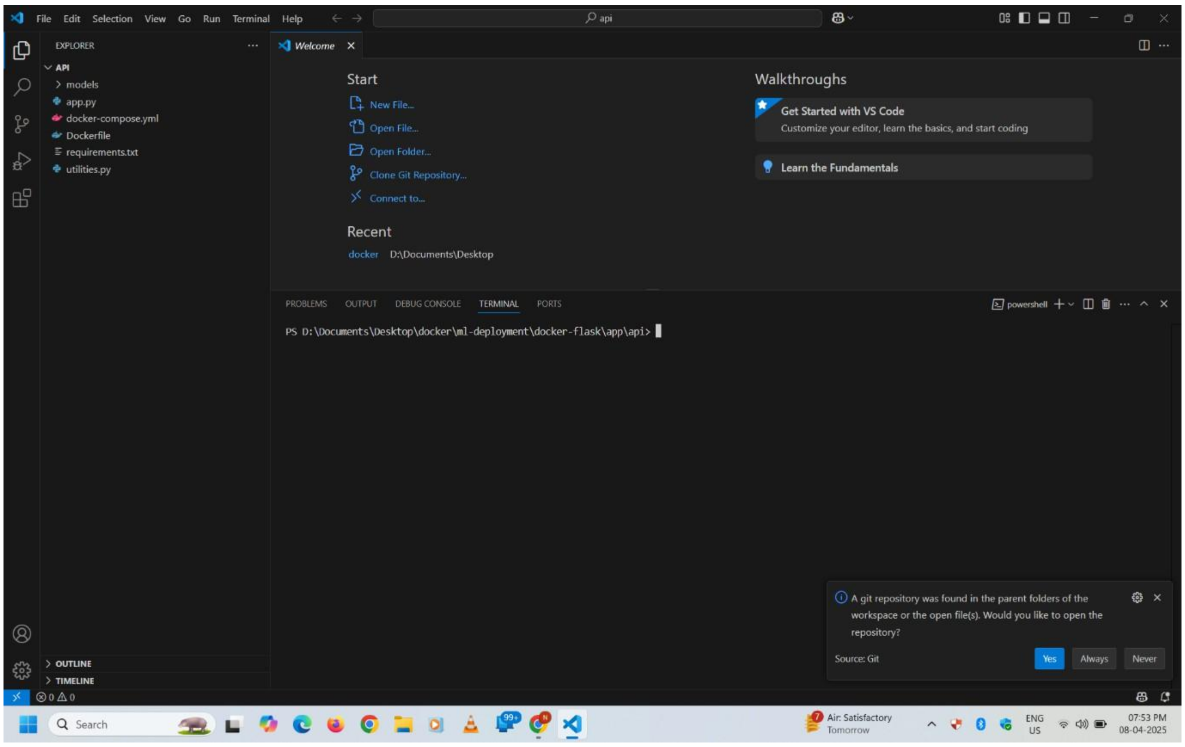
Terminal › Integrated: Allow Chords

✓ Whether or not to allow chord keybindings in the terminal. Note that when this is true and the keystroke results in a chord it will bypass Terminal › Integrated: Commands To Skip Shell, setting this to false is particularly useful when you want ctrl+k to go to your shell (not VS Code).

Terminal › Integrated: Commands To Skip Shell

A set of command IDs whose keybindings will not be sent to the shell but instead always be handled by VS Code. This allows keybindings that would normally be consumed by the shell to act instead the same as when the terminal is not focused, for example `Ctrl+P` to launch Quick Open.

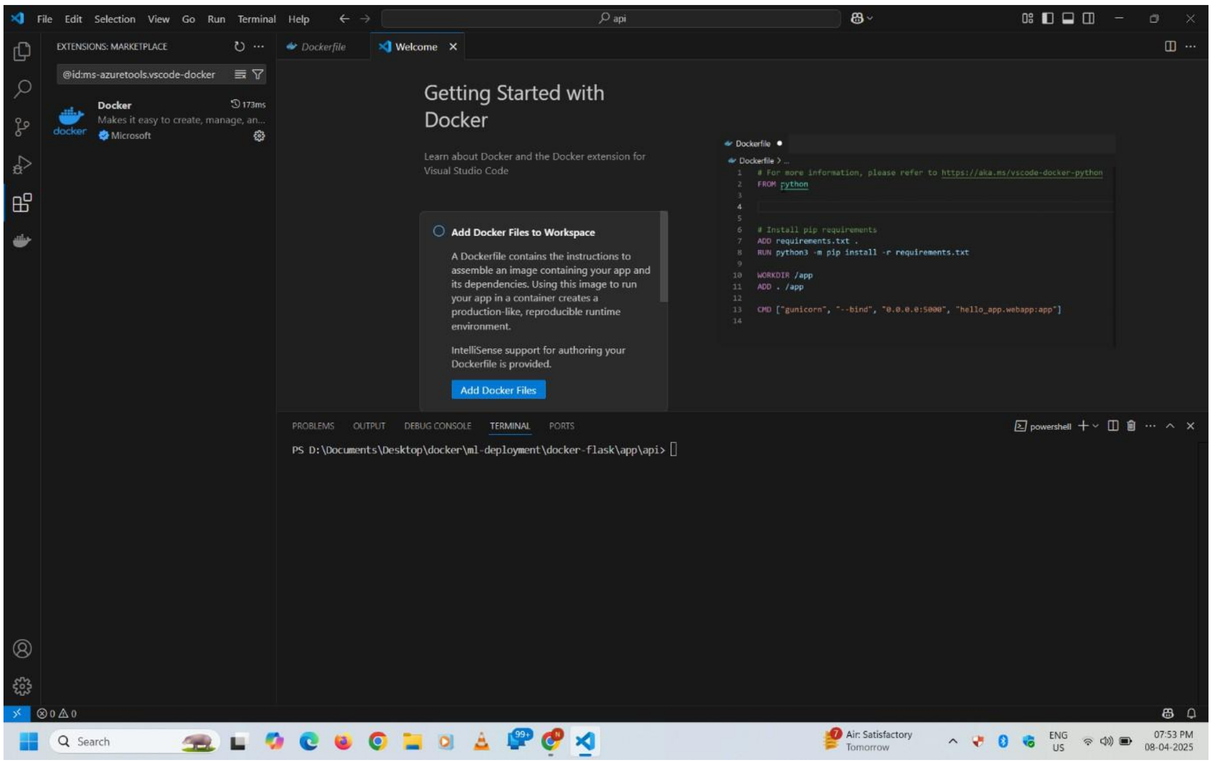
```
PS D:\Documents\Desktop\docker> cd ml-deployment/docker-flask/app/api
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api>
```



```
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api>
```

A git repository was found in the parent folders of the workspace or the open file(s). Would you like to open the repository?

Source: Git — Yes | Always | Never


EXTENSIONS: MARKETPLACE
@id:ms-azuretools.vscode-docker
Docker
Makes it easy to create, manage, an...
Microsoft

Getting Started with Docker

Learn about Docker and the Docker extension for Visual Studio Code

Add Docker Files to Workspace

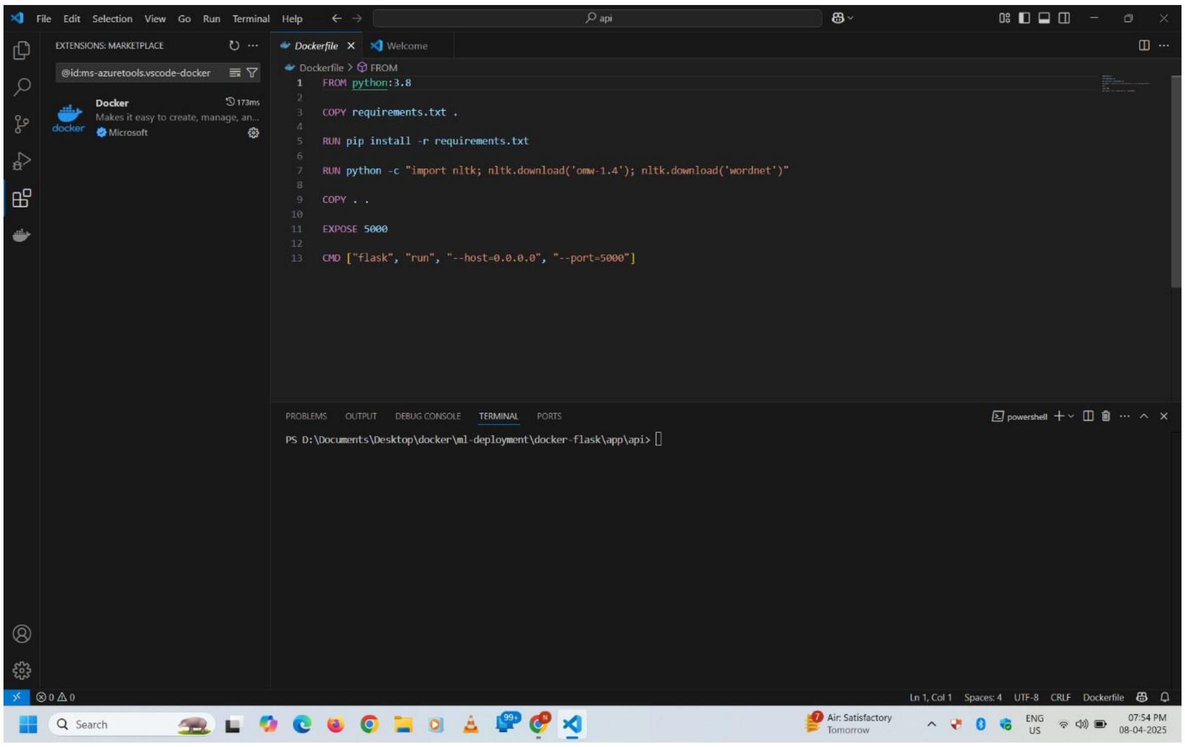
A Dockerfile contains the instructions to assemble an image containing your app and its dependencies. Using this image to run your app in a container creates a production-like, reproducible runtime environment.

IntelliSense support for authoring your Dockerfile is provided.

Add Docker Files

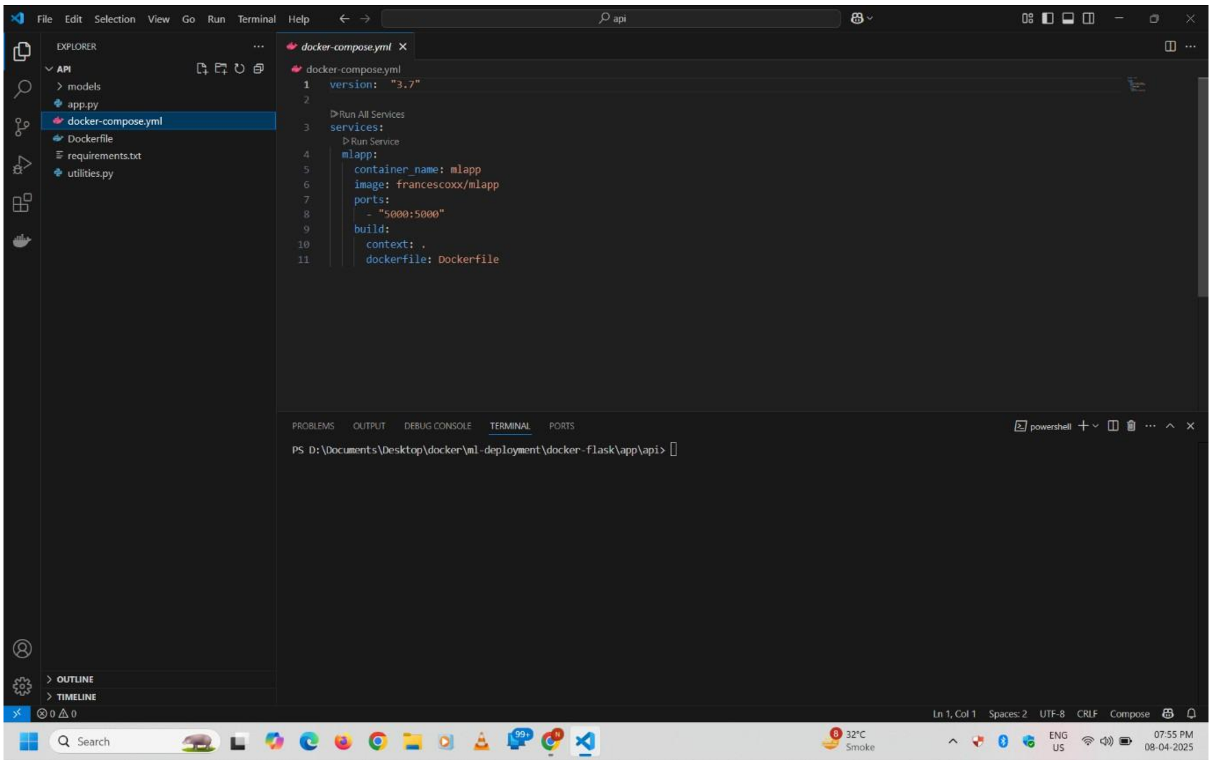
```
# For more information, please refer to https://aka.ms/vscode-docker-python
FROM python



# Install pip requirements
ADD requirements.txt .
RUN python3 -m pip install -r requirements.txt

WORKDIR /app
ADD . /app

CMD ["gunicorn", "--bind", "0.0.0.0:5000", "hello_app.webapp:app"]
```

```
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api>
```


EXTENSIONS: MARKETPLACE
@id:ms-azuretools.vscode-docker
Docker
Makes it easy to create, manage, an...
Microsoft
Dockerfile
Welcome

```
FROM python:3.8

COPY requirements.txt .

RUN pip install -r requirements.txt

RUN python -c "import nltk; nltk.download('omw-1.4'); nltk.download('wordnet')"

COPY . .

EXPOSE 5000

CMD ["flask", "run", "--host=0.0.0.0", "--port=5000"]
```

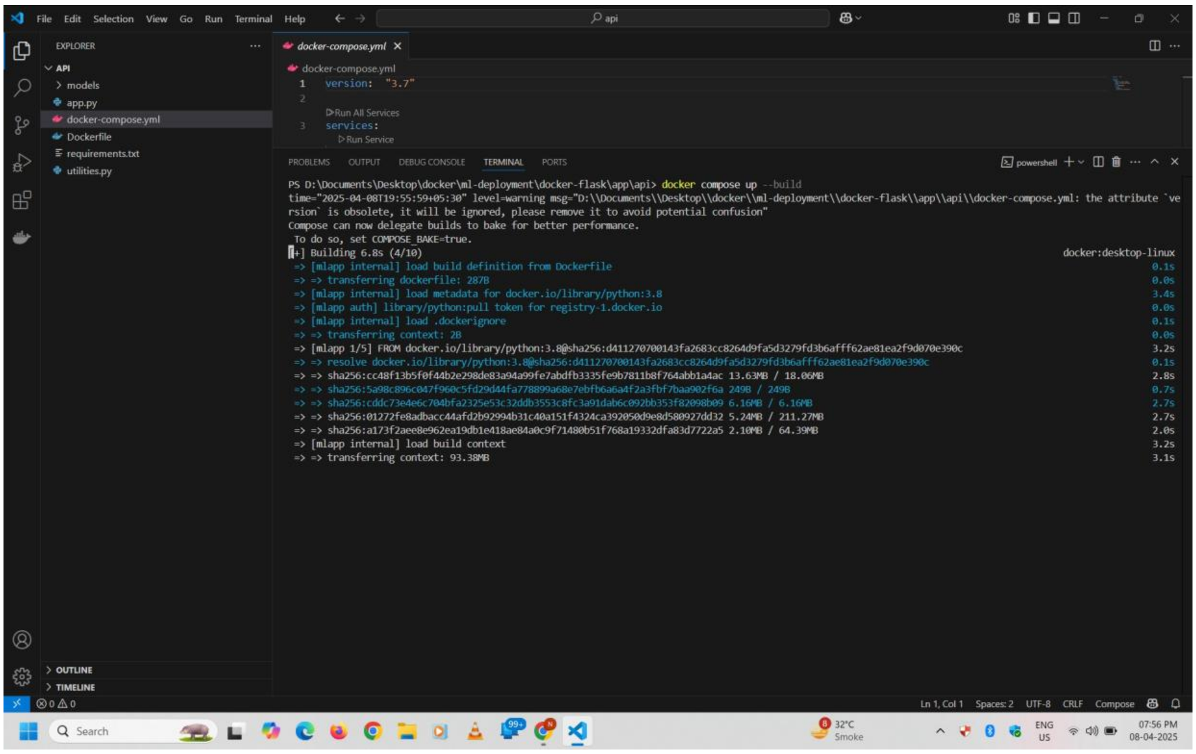
```
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api>
```



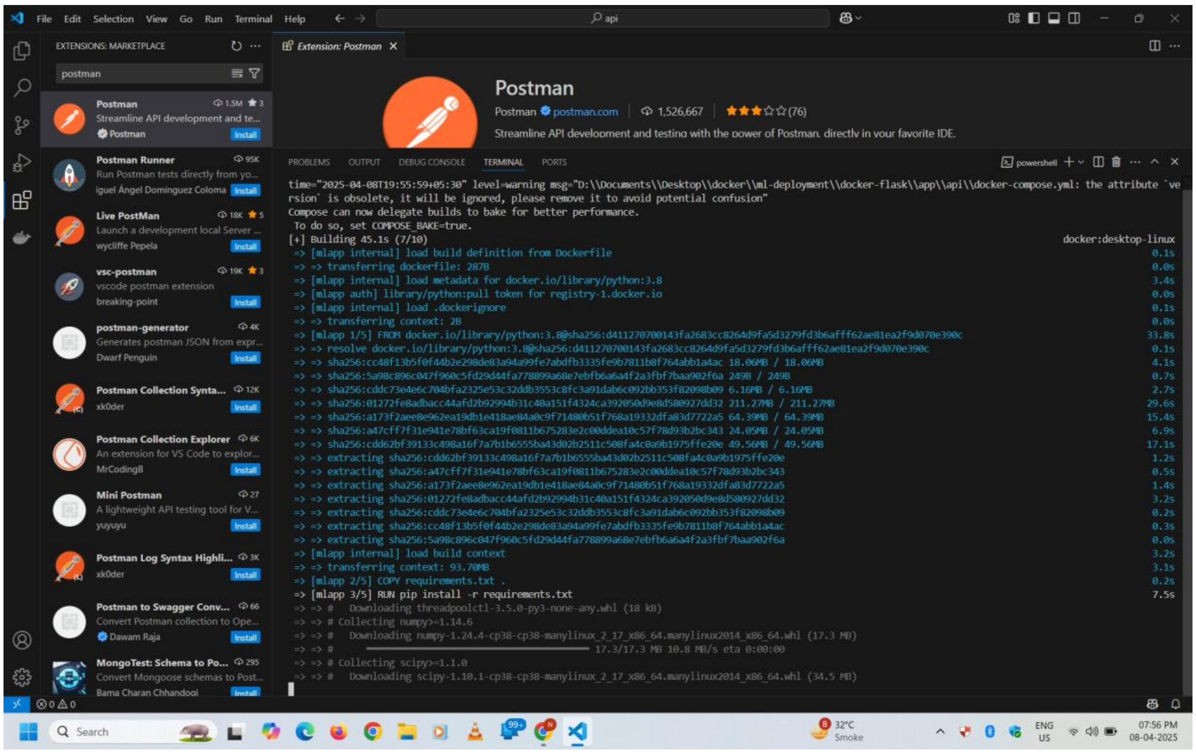
docker-compose.yml

```yaml
version:  "3.7"

services:
  mlapp:
    container_name: mlapp
    image: francescoxx/mlapp
    ports:
      - "5000:5000"
    build:
      context: .
      dockerfile: Dockerfile
```

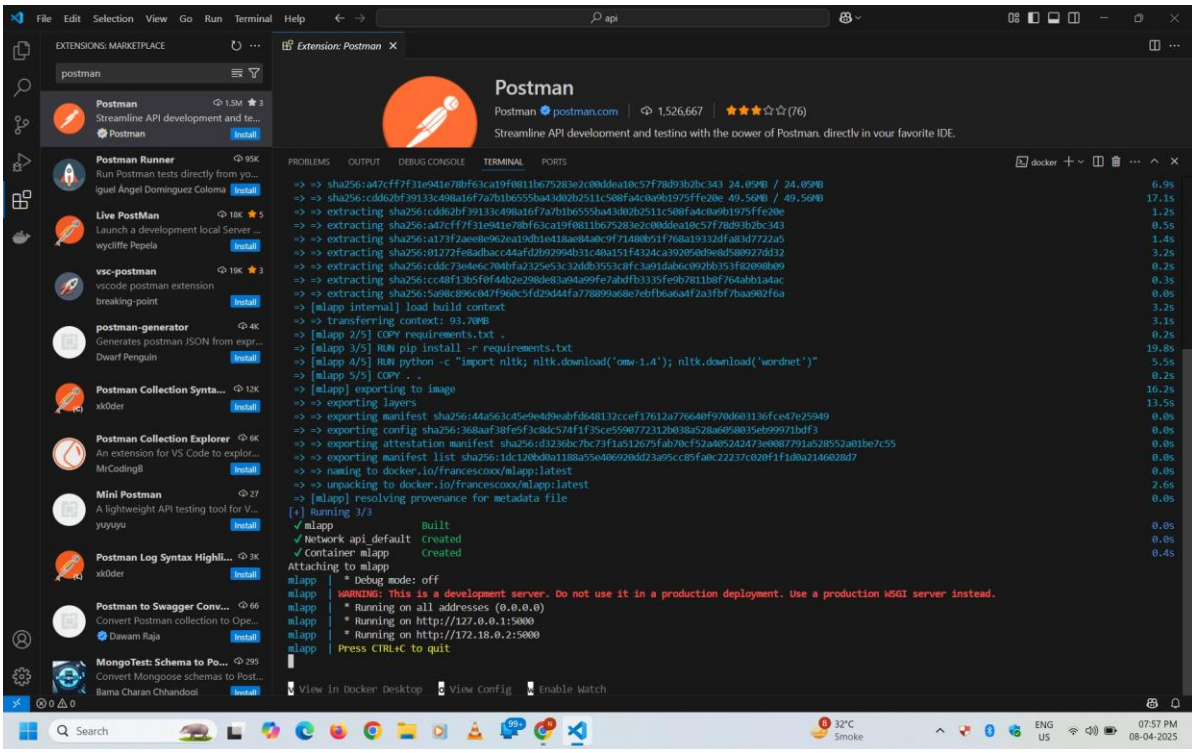
```
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api>
```



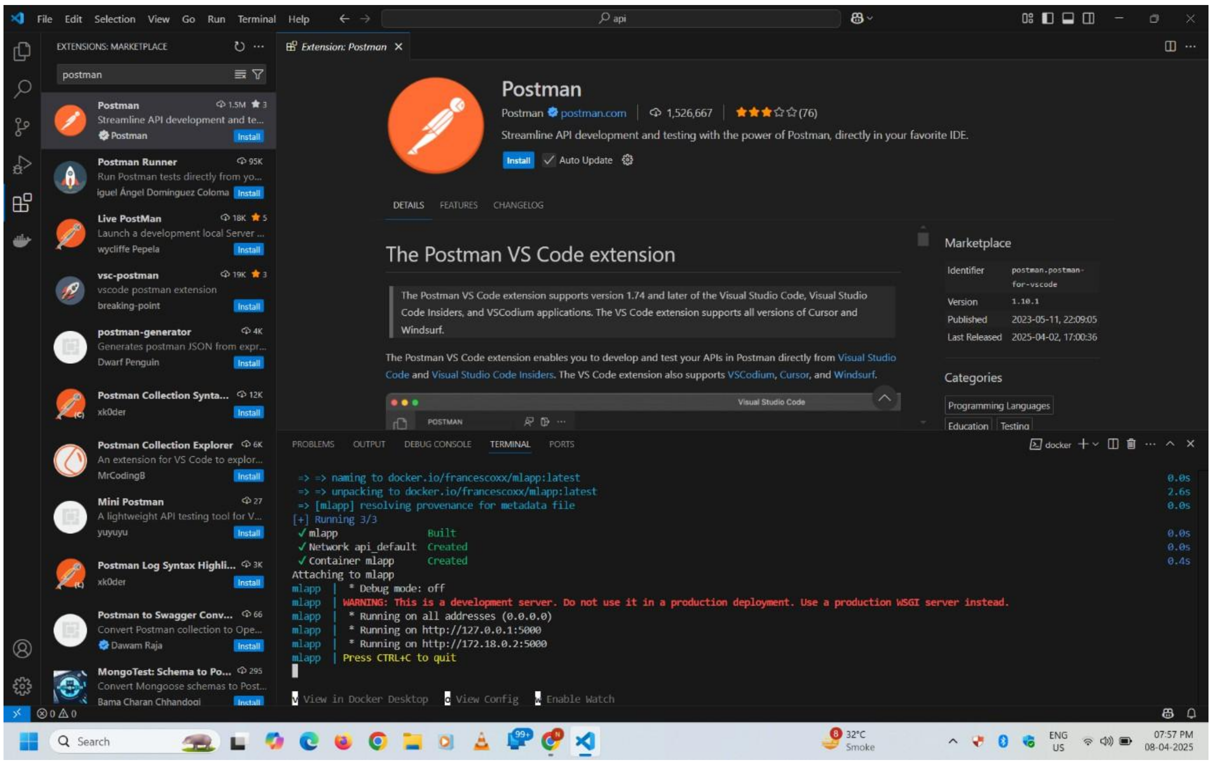
```
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker compose up --build
time="2025-04-08T19:55:59+05:30" level=warning msg="D:\\Documents\\Desktop\\docker\\ml-deployment\\docker-flask\\app\\api\\docker-compose.yml: the attribute `ve
rsion` is obsolete, it will be ignored, please remove it to avoid potential confusion"
Compose can now delegate builds to bake for better performance.
 To do so, set COMPOSE_BAKE=true.
[+] Building 6.8s (4/10)                                                                                                      docker:desktop-linux
 => [mlapp internal] load build definition from Dockerfile                                                                                   0.1s
 => => transferring dockerfile: 287B                                                                                                         0.0s
 => [mlapp internal] load metadata for docker.io/library/python:3.8                                                                          3.4s
 => [mlapp auth] library/python:pull token for registry-1.docker.io                                                                          0.0s
 => [mlapp internal] load .dockerignore                                                                                                      0.1s
 => => transferring context: 2B                                                                                                              0.0s
 => [mlapp 1/5] FROM docker.io/library/python:3.8@sha256:d411270700143fa2683cc8264d9fa5d3279fd3b6afff62ae81ea2f9d070e390c                    3.2s
 => => resolve docker.io/library/python:3.8@sha256:d411270700143fa2683cc8264d9fa5d3279fd3b6afff62ae81ea2f9d070e390c                          0.1s
 => => sha256:cc48f13b5f0f44b2e298de83a94a99fe7abdfb3335fe9b7811b8f764abb1a4ac 13.63MB / 18.06MB                                             2.8s
 => => sha256:5a98c896c047f960c5fd29d44fa778899a68e7ebfb6a6a4f2a3fbf7baa902f6a 249B / 249B                                                   0.7s
 => => sha256:cddc73e4e6c704bfa2325e53c32ddb3553c8fc3a91dab6c092bb353f82098b09 6.16MB / 6.16MB                                               2.7s
 => => sha256:01272fe8adbacc44afd2b92994b31c40a151f4324ca392050d9e8d580927dd32 5.24MB / 211.27MB                                             2.7s
 => => sha256:a173f2aee8e962ea19db1e418ae84a0c9f71480b51f768a19332dfa83d7722a5 2.10MB / 64.39MB                                              2.0s
 => [mlapp internal] load build context                                                                                                      3.2s
 => => transferring context: 93.38MB                                                                                                         3.1s
```


Extension: Postman
Postman
Postman postman.com 1,526,667 (76)
Streamline API development and testing with the power of Postman, directly in your favorite IDE.
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
powershell

```
time="2025-04-08T19:55:59+05:30" level=warning msg="D:\\Documents\\Desktop\\docker\\ml-deployment\\docker-flask\\app\\api\\docker-compose.yml: the attribute `ve
rsion` is obsolete, it will be ignored, please remove it to avoid potential confusion"
Compose can now delegate builds to bake for better performance.
 To do so, set COMPOSE_BAKE=true.
[+] Building 45.1s (7/10)                                                                                      docker:desktop-linux
 => [mlapp internal] load build definition from Dockerfile                                                                     0.1s
 => => transferring dockerfile: 287B                                                                                           0.0s
 => [mlapp internal] load metadata for docker.io/library/python:3.8                                                            3.4s
 => [mlapp auth] library/python:pull token for registry-1.docker.io                                                            0.0s
 => [mlapp internal] load .dockerignore                                                                                        0.1s
 => => transferring context: 2B                                                                                                0.0s
 => [mlapp 1/5] FROM docker.io/library/python:3.8@sha256:d411270700143fa2683cc8264d9fa5d3279fd3b6afff62ae81ea2f9d070e390c     33.8s
 => => resolve docker.io/library/python:3.8@sha256:d411270700143fa2683cc8264d9fa5d3279fd3b6afff62ae81ea2f9d070e390c            0.1s
 => => sha256:cc48f13b5f0f44b2e298de83a94a99fe7abdfb3335fe9b7811b8f764abb1a4ac 18.06MB / 18.06MB                               4.1s
 => => sha256:5a98c896c047f960c5fd29d44fa778899a68e7ebfb6a6a4f2a3fbf7baa902f6a 249B / 249B                                     0.7s
 => => sha256:cddc73e4e6c704bfa2325e53c32ddb3553c8fc3a91dab6c092bb353f82098b09 6.16MB / 6.16MB                                 2.7s
 => => sha256:01272fe8adbacc44afd2b92994b31c40a151f4324ca392050d9e8d580927dd32 211.27MB / 211.27MB                            29.6s
 => => sha256:a173f2aee8e962ea19db1e418ae84a0c9f71480b51f768a19332dfa83d7722a5 64.39MB / 64.39MB                              15.4s
 => => sha256:a47cff7f31e941e78bf63ca19f0811b675283e2c00ddea10c57f78d93b2bc343 24.05MB / 24.05MB                               6.9s
 => => sha256:cdd62bf39133c498a16f7a7b1b6555ba43d02b2511c508fa4c0a9b1975ffe20e 49.56MB / 49.56MB                              17.1s
 => => extracting sha256:cdd62bf39133c498a16f7a7b1b6555ba43d02b2511c508fa4c0a9b1975ffe20e                                      1.2s
 => => extracting sha256:a47cff7f31e941e78bf63ca19f0811b675283e2c00ddea10c57f78d93b2bc343                                      0.5s
 => => extracting sha256:a173f2aee8e962ea19db1e418ae84a0c9f71480b51f768a19332dfa83d7722a5                                      1.4s
 => => extracting sha256:01272fe8adbacc44afd2b92994b31c40a151f4324ca392050d9e8d580927dd32                                      3.2s
 => => extracting sha256:cddc73e4e6c704bfa2325e53c32ddb3553c8fc3a91dab6c092bb353f82098b09                                      0.2s
 => => extracting sha256:cc48f13b5f0f44b2e298de83a94a99fe7abdfb3335fe9b7811b8f764abb1a4ac                                      0.3s
 => => extracting sha256:5a98c896c047f960c5fd29d44fa778899a68e7ebfb6a6a4f2a3fbf7baa902f6a                                      0.0s
 => [mlapp internal] load build context                                                                                        3.2s
 => => transferring context: 93.70MB                                                                                           3.1s
 => [mlapp 2/5] COPY requirements.txt .                                                                                        0.2s
 => [mlapp 3/5] RUN pip install -r requirements.txt                                                                            7.5s
 => => #   Downloading threadpoolctl-3.5.0-py3-none-any.whl (18 kB)
 => => # Collecting numpy>=1.14.6
 => => #   Downloading numpy-1.24.4-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (17.3 MB)
 => => #      ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 17.3/17.3 MB 10.8 MB/s eta 0:00:00
 => => # Collecting scipy>=1.1.0
 => => #   Downloading scipy-1.10.1-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (34.5 MB)
```


Extension: Postman
Postman
Postman postman.com 1,526,667 (76)
Streamline API development and testing with the power of Postman, directly in your favorite IDE.
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
docker

```
 => => sha256:a47cff7f31e941e78bf63ca19f0811b675283e2c00ddea10c57f78d93b2bc343 24.05MB / 24.05MB                               6.9s
 => => sha256:cdd62bf39133c498a16f7a7b1b6555ba43d02b2511c508fa4c0a9b1975ffe20e 49.56MB / 49.56MB                              17.1s
 => => extracting sha256:cdd62bf39133c498a16f7a7b1b6555ba43d02b2511c508fa4c0a9b1975ffe20e                                      1.2s
 => => extracting sha256:a47cff7f31e941e78bf63ca19f0811b675283e2c00ddea10c57f78d93b2bc343                                      0.5s
 => => extracting sha256:a173f2aee8e962ea19db1e418ae84a0c9f71480b51f768a19332dfa83d7722a5                                      1.4s
 => => extracting sha256:01272fe8adbacc44afd2b92994b31c40a151f4324ca392050d9e8d580927dd32                                      3.2s
 => => extracting sha256:cddc73e4e6c704bfa2325e53c32ddb3553c8fc3a91dab6c092bb353f82098b09                                      0.2s
 => => extracting sha256:cc48f13b5f0f44b2e298de83a94a99fe7abdfb3335fe9b7811b8f764abb1a4ac                                      0.3s
 => => extracting sha256:5a98c896c047f960c5fd29d44fa778899a68e7ebfb6a6a4f2a3fbf7baa902f6a                                      0.0s
 => [mlapp internal] load build context                                                                                        3.2s
 => => transferring context: 93.70MB                                                                                           3.1s
 => [mlapp 2/5] COPY requirements.txt .                                                                                        0.2s
 => [mlapp 3/5] RUN pip install -r requirements.txt                                                                           19.8s
 => [mlapp 4/5] RUN python -c "import nltk; nltk.download('omw-1.4'); nltk.download('wordnet')"                                5.5s
 => [mlapp 5/5] COPY . .                                                                                                       0.2s
 => [mlapp] exporting to image                                                                                                16.2s
 => => exporting layers                                                                                                       13.5s
 => => exporting manifest sha256:44a563c45e9e4d9eabfd648132ccef17612a776640f970d603136fce47e25949                              0.0s
 => => exporting config sha256:368aaf38fe5f3c8dc574f1f35ce5590772312b038a528a6058035eb99971bdf3                                0.0s
 => => exporting attestation manifest sha256:d3236bc7bc73f1a512675fab70cf52a405242473e0087791a528552a01be7c55                  0.0s
 => => exporting manifest list sha256:1dc120bd0a1188a55e406920dd23a95cc85fa0c22237c020f1f1d0a2146028d7                         0.0s
 => => naming to docker.io/francescoxx/mlapp:latest                                                                            0.0s
 => => unpacking to docker.io/francescoxx/mlapp:latest                                                                         2.6s
 => [mlapp] resolving provenance for metadata file                                                                             0.0s
[+] Running 3/3
 ✓ mlapp                Built                                                                                                  0.0s
 ✓ Network api_default  Created                                                                                                0.0s
 ✓ Container mlapp      Created                                                                                                0.4s
Attaching to mlapp
mlapp  |  * Debug mode: off
mlapp  | WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
mlapp  |  * Running on all addresses (0.0.0.0)
mlapp  |  * Running on http://127.0.0.1:5000
mlapp  |  * Running on http://172.18.0.2:5000
mlapp  | Press CTRL+C to quit


v View in Docker Desktop   o View Config   w Enable Watch
```



Postman

Postman postman.com | 1,526,667 | ★★★☆☆ (76)

Streamline API development and testing with the power of Postman, directly in your favorite IDE.

Install ✓ Auto Update

The Postman VS Code extension

> The Postman VS Code extension supports version 1.74 and later of the Visual Studio Code, Visual Studio Code Insiders, and VSCodium applications. The VS Code extension supports all versions of Cursor and Windsurf.

The Postman VS Code extension enables you to develop and test your APIs in Postman directly from Visual Studio Code and Visual Studio Code Insiders. The VS Code extension also supports VSCodium, Cursor, and Windsurf.

Marketplace

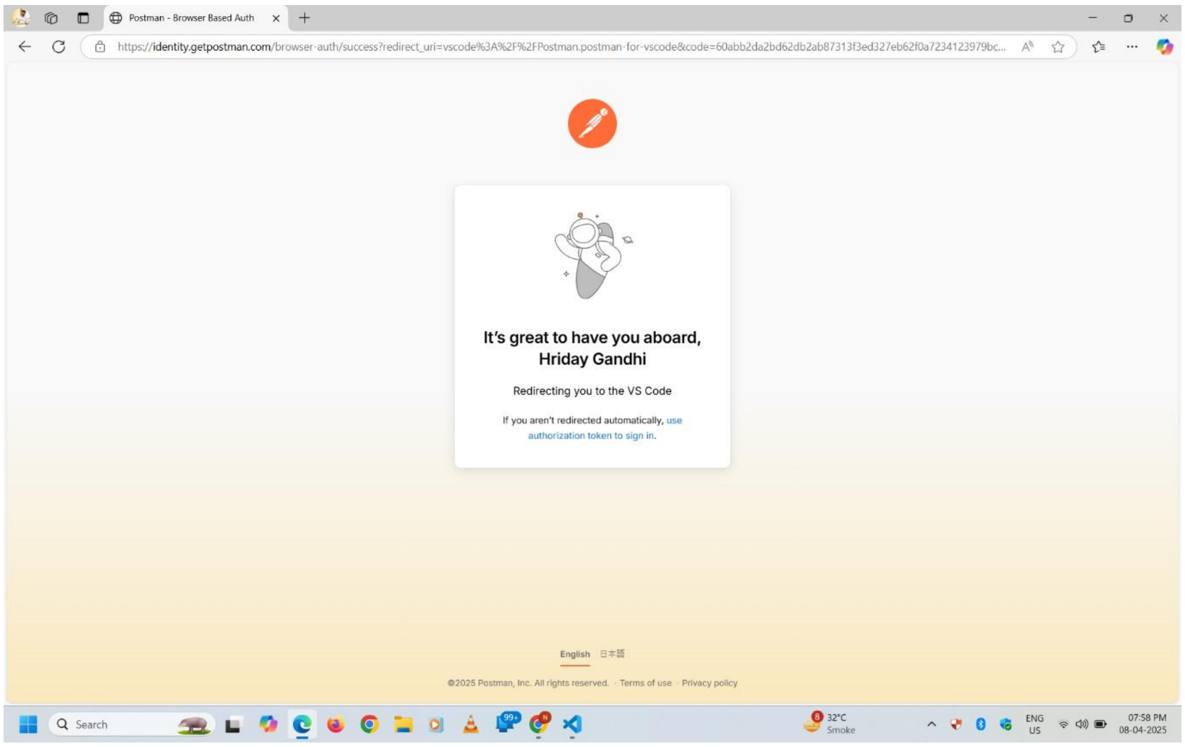
Identifier	postman.postman-for-vscode
Version	1.10.1
Published	2023-05-11, 22:09:05
Last Released	2025-04-02, 17:00:36

Categories

Programming Languages | Education | Testing

```
 => => naming to docker.io/francescoxx/mlapp:latest                                   0.0s
 => => unpacking to docker.io/francescoxx/mlapp:latest                                2.6s
 => [mlapp] resolving provenance for metadata file                                   0.0s
[+] Running 3/3
 ✓ mlapp                Built                                                        0.0s
 ✓ Network api_default  Created                                                      0.0s
 ✓ Container mlapp      Created                                                      0.4s
Attaching to mlapp
mlapp  |  * Debug mode: off
mlapp  | WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
mlapp  |  * Running on all addresses (0.0.0.0)
mlapp  |  * Running on http://127.0.0.1:5000
mlapp  |  * Running on http://172.18.0.2:5000
mlapp  | Press CTRL+C to quit

v View in Docker Desktop   o View Config   w Enable Watch
```

07:57 PM 08-04-2025



https://identity.getpostman.com/browser-auth/success?redirect_uri=vscode%3A%2F%2FPostman.postman-for-vscode&code=60abb2da2bd62db2ab87313f3ed327eb62f0a7234123979bc...

It's great to have you aboard, Hriday Gandhi

Redirecting you to the VS Code

If you aren't redirected automatically, use authorization token to sign in.

English 日本語

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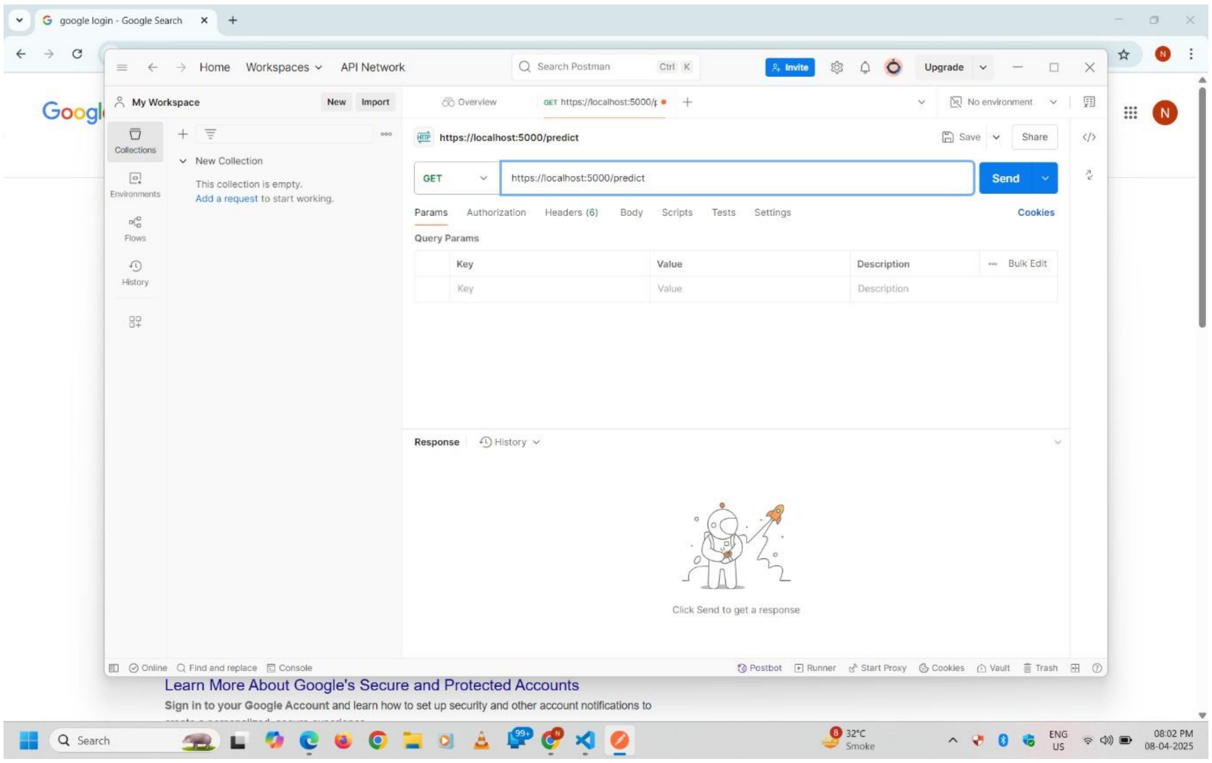
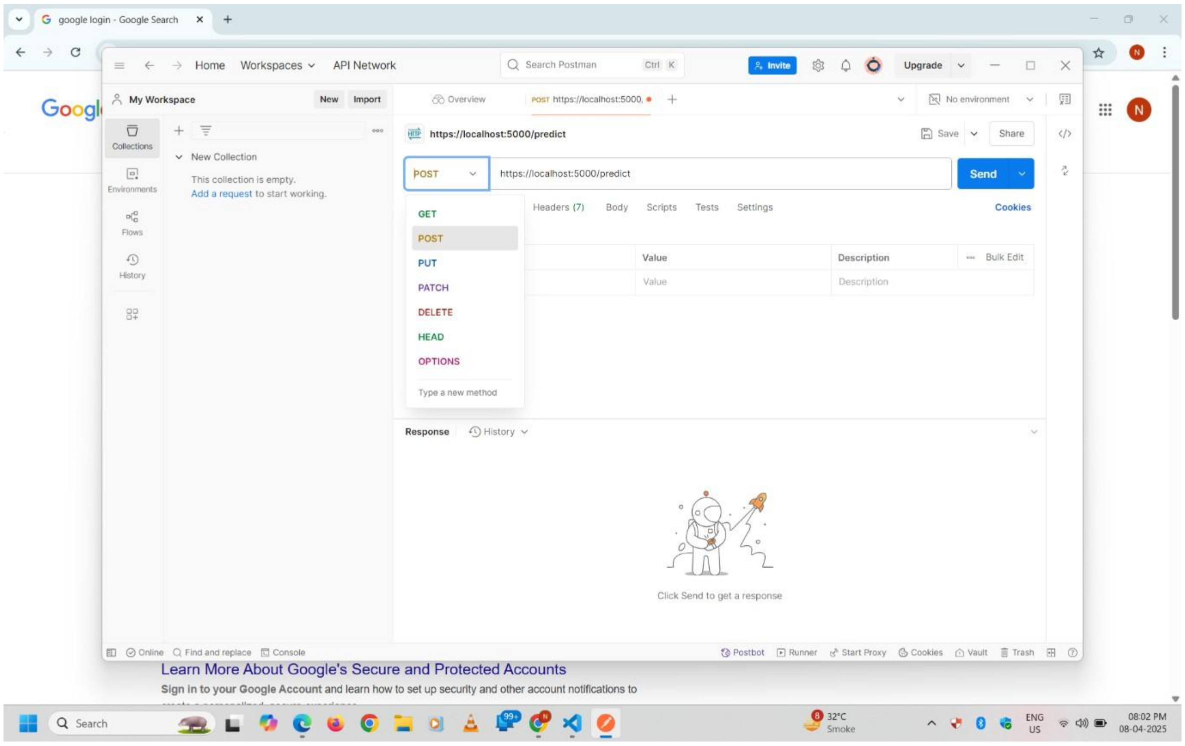
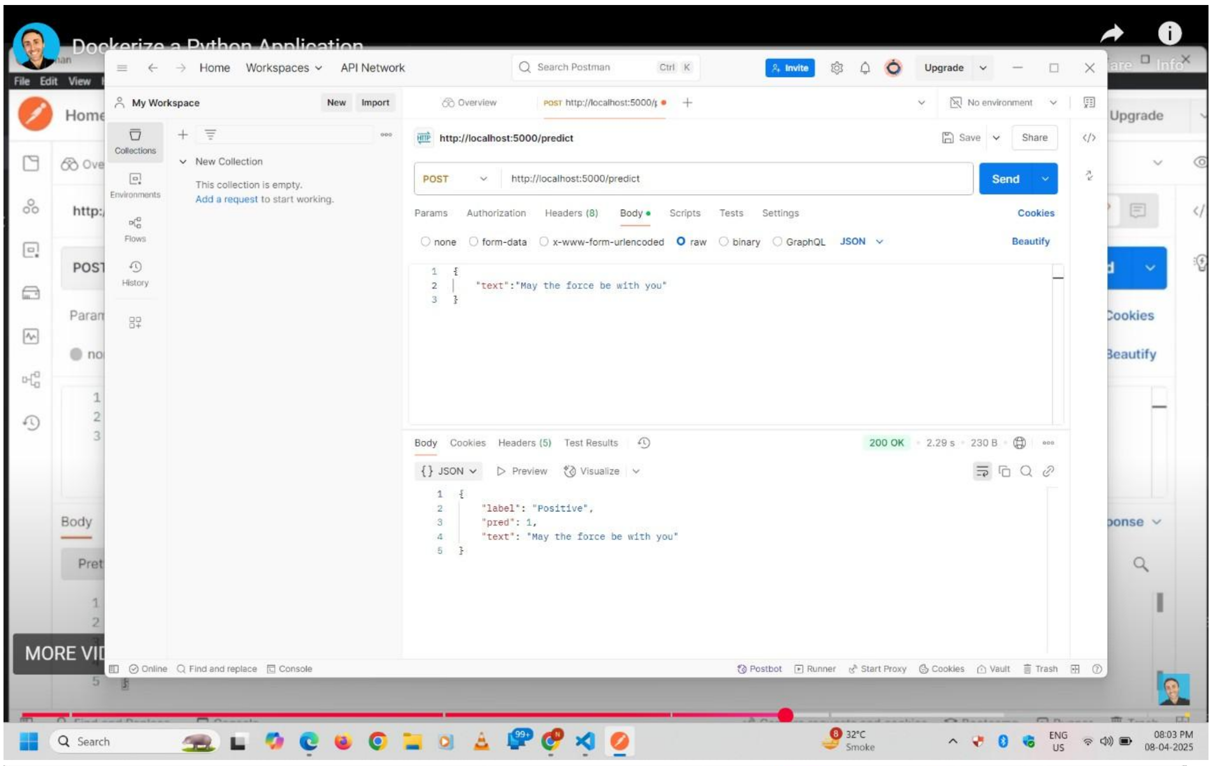
07:58 PM 08-04-2025


google login - Google Search
Home
Workspaces
API Network
Search Postman
Invite
Upgrade
My Workspace
New
Import
Overview
No environment
Collections
Environments
Flows
History
New Collection
This collection is empty.
Add a request to start working.
https://localhost:5000/predict
Save
Share
GET
https://localhost:5000/predict
Send
Params
Authorization
Headers (6)
Body
Scripts
Tests
Settings
Cookies
Query Params
Key
Value
Description
Bulk Edit
Response
History
Click Send to get a response
Online
Find and replace
Console
Postbot
Runner
Start Proxy
Cookies
Vault
Trash
Learn More About Google's Secure and Protected Accounts
Sign in to your Google Account and learn how to set up security and other account notifications to
32°C Smoke
08:02 PM
08-04-2025


google login - Google Search
Home
Workspaces
API Network
Search Postman
Invite
Upgrade
My Workspace
New
Import
Overview
POST https://localhost:5000,
No environment
New Collection
This collection is empty.
Add a request to start working.
https://localhost:5000/predict
Save
Share
POST
https://localhost:5000/predict
Send
GET
POST
PUT
PATCH
DELETE
HEAD
OPTIONS
Type a new method
Headers (7)
Body
Scripts
Tests
Settings
Cookies
Value
Description
Bulk Edit
Response
History
Click Send to get a response
Learn More About Google's Secure and Protected Accounts
Sign in to your Google Account and learn how to set up security and other account notifications to
32°C Smoke
08:02 PM
08-04-2025



http://localhost:5000/predict

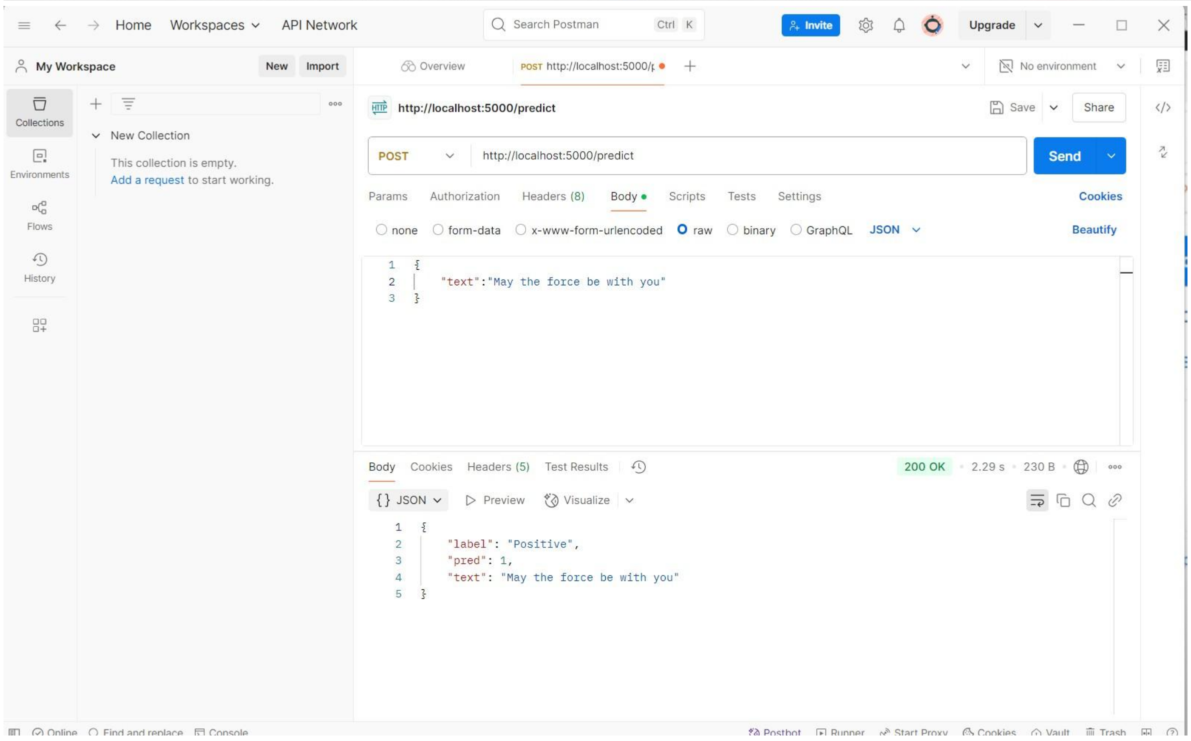
POST http://localhost:5000/predict

Body: raw JSON

```
{
  "text":"May the force be with you"
}
```

200 OK · 2.29 s · 230 B

```
{
    "label": "Positive",
    "pred": 1,
    "text": "May the force be with you"
}
```



http://localhost:5000/predict

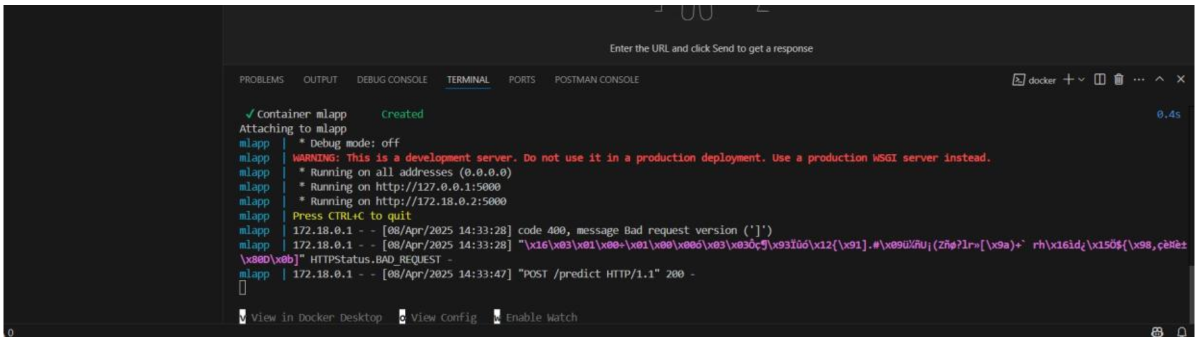
POST http://localhost:5000/predict

Body: raw JSON

```
{
  "text":"May the force be with you"
}
```

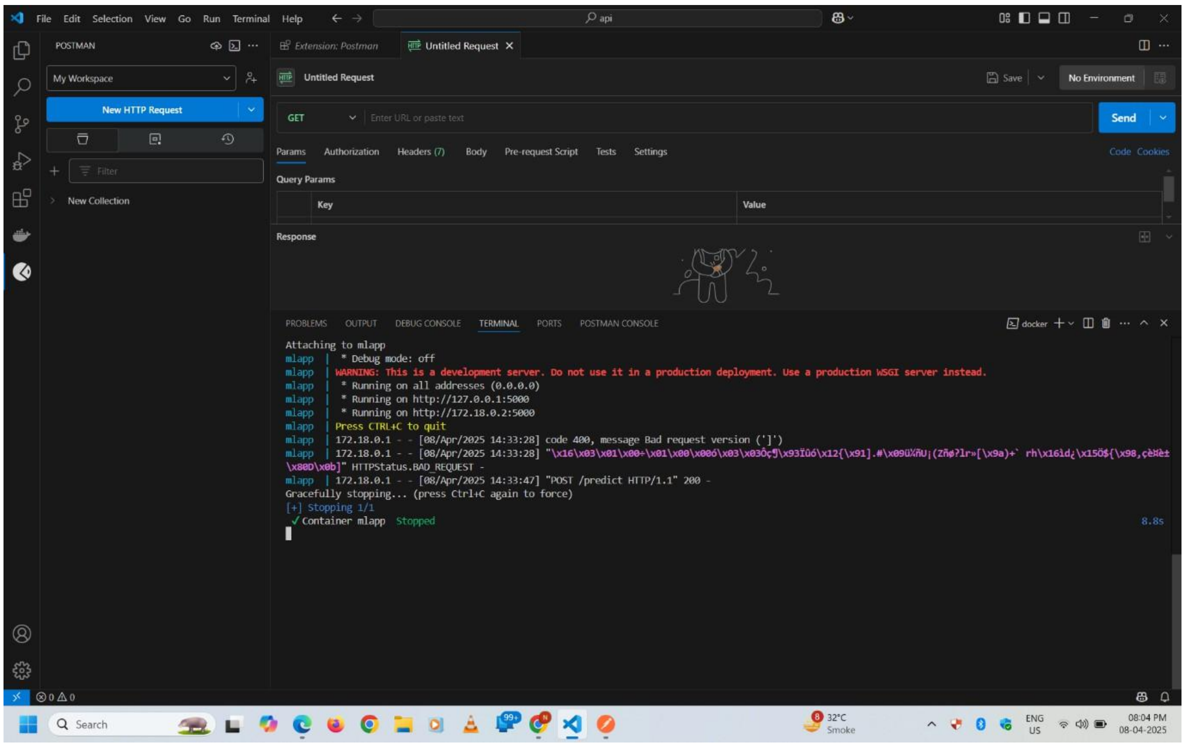
200 OK · 2.29 s · 230 B

```
{
    "label": "Positive",
    "pred": 1,
    "text": "May the force be with you"
}
```

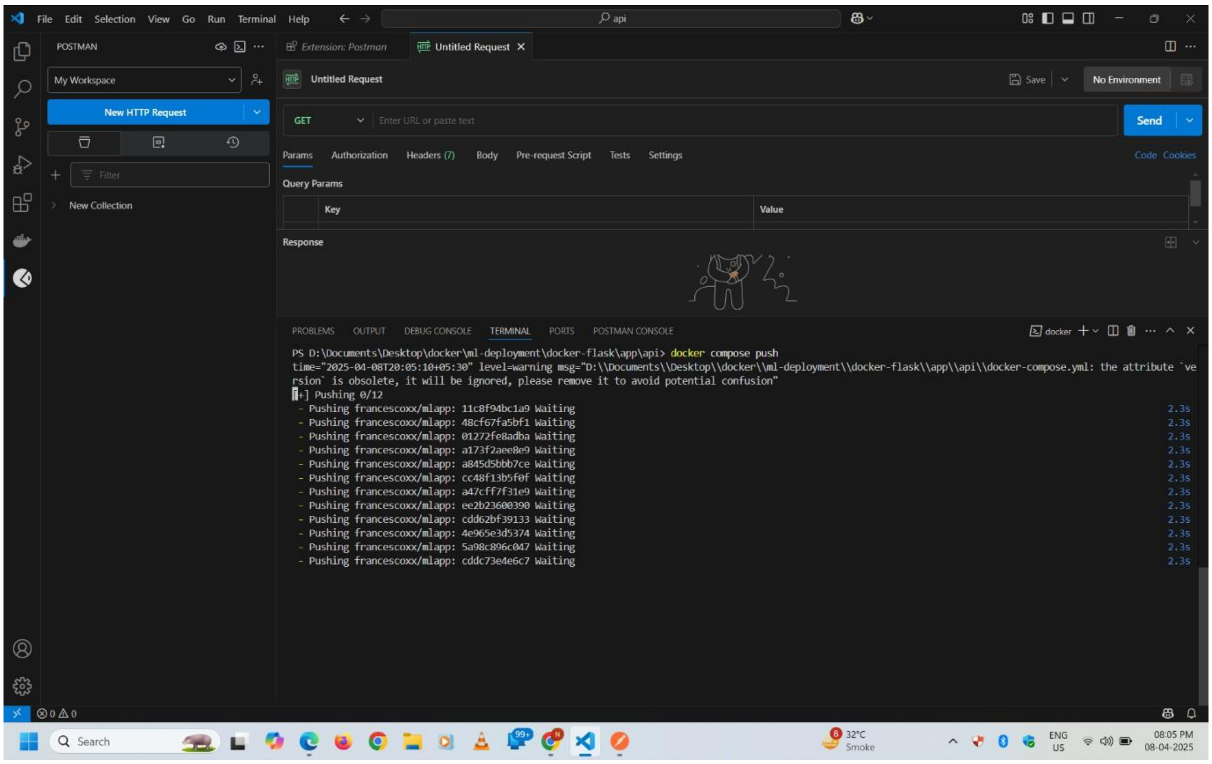


Enter the URL and click Send to get a response

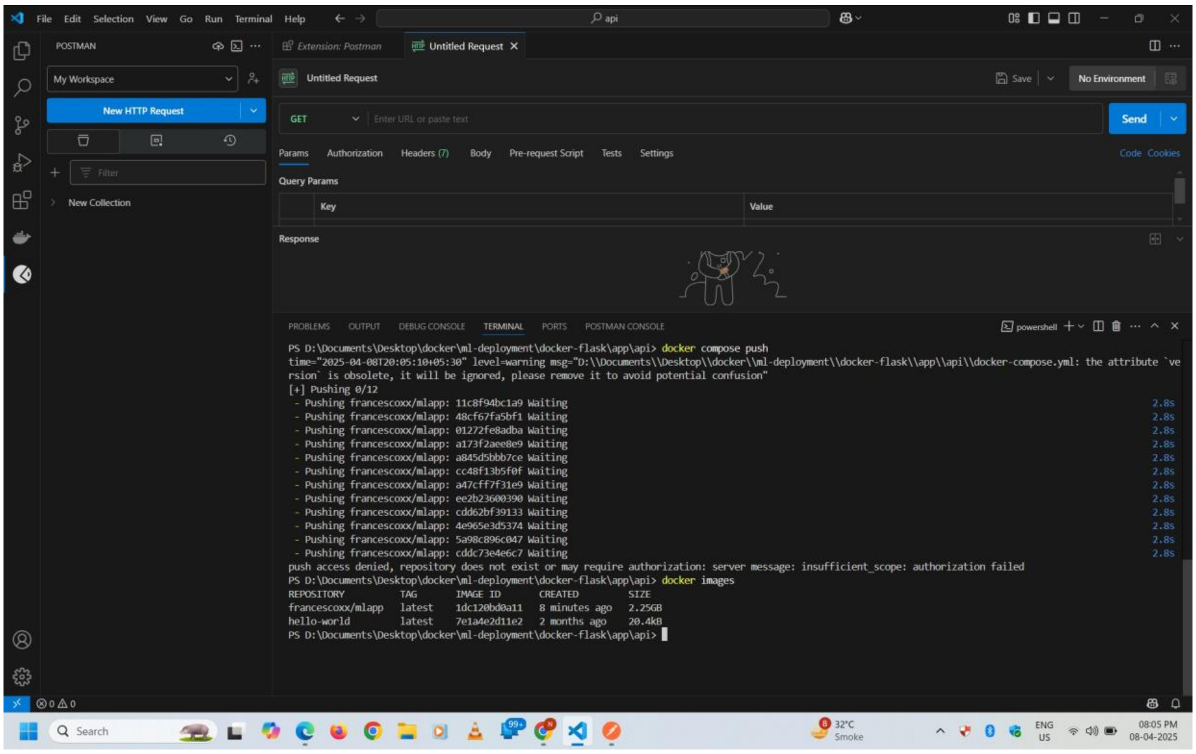
```
✓Container mlapp      Created                                                                                        0.4s
Attaching to mlapp
mlapp  |  * Debug mode: off
mlapp  | WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
mlapp  |  * Running on all addresses (0.0.0.0)
mlapp  |  * Running on http://127.0.0.1:5000
mlapp  |  * Running on http://172.18.0.2:5000
mlapp  | Press CTRL+C to quit
mlapp  | 172.18.0.1 - - [08/Apr/2025 14:33:28] code 400, message Bad request version (']')
mlapp  | 172.18.0.1 - - [08/Apr/2025 14:33:28] "\x16\x03\x01\x00÷\x01\x00\x00ó\x03\x03Ôç¶\x93Ïûó\x12{\x91].#\x09ü¼ñU¡(Zñø?lr»[\x9a)+` rh\x16ìd¿\x15Ö${\x98,çè¤è±
\x80D\x0b]" HTTPStatus.BAD_REQUEST -
mlapp  | 172.18.0.1 - - [08/Apr/2025 14:33:47] "POST /predict HTTP/1.1" 200 -

 View in Docker Desktop   View Config   Enable Watch
```



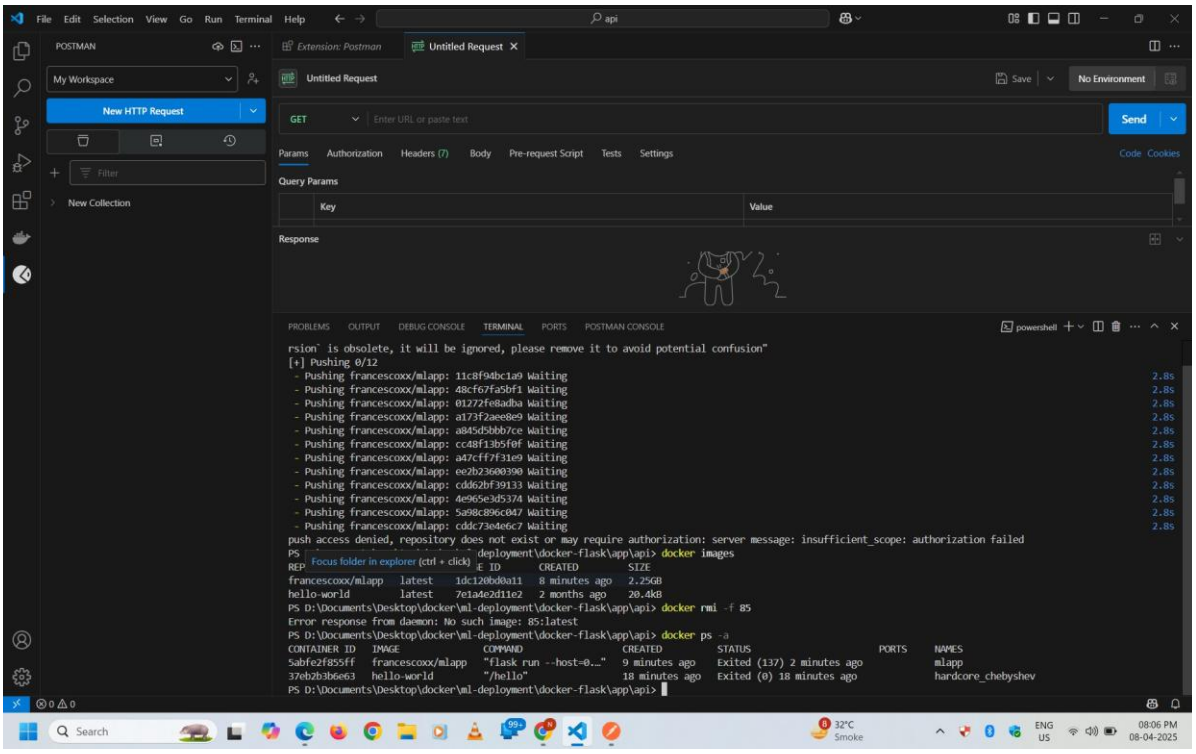
```
Attaching to mlapp
mlapp  |  * Debug mode: off
mlapp  | WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
mlapp  |  * Running on all addresses (0.0.0.0)
mlapp  |  * Running on http://127.0.0.1:5000
mlapp  |  * Running on http://172.18.0.2:5000
mlapp  | Press CTRL+C to quit
mlapp  | 172.18.0.1 - - [08/Apr/2025 14:33:28] code 400, message Bad request version (']')
mlapp  | 172.18.0.1 - - [08/Apr/2025 14:33:28] "\x16\x03\x01\x00÷\x01\x00\x00ó\x03\x03Ôç¶\x93Ïûó\x12{\x91].#\x09ü¼ñU¡(Zñø?lr»[\x9a)+` rh\x16ìd¿\x15Ö${\x98,çè¤è±
\x80D\x0b]" HTTPStatus.BAD_REQUEST -
mlapp  | 172.18.0.1 - - [08/Apr/2025 14:33:47] "POST /predict HTTP/1.1" 200 -
Gracefully stopping... (press Ctrl+C again to force)
[+] Stopping 1/1
 ✓Container mlapp  Stopped                                                                                       8.8s
```



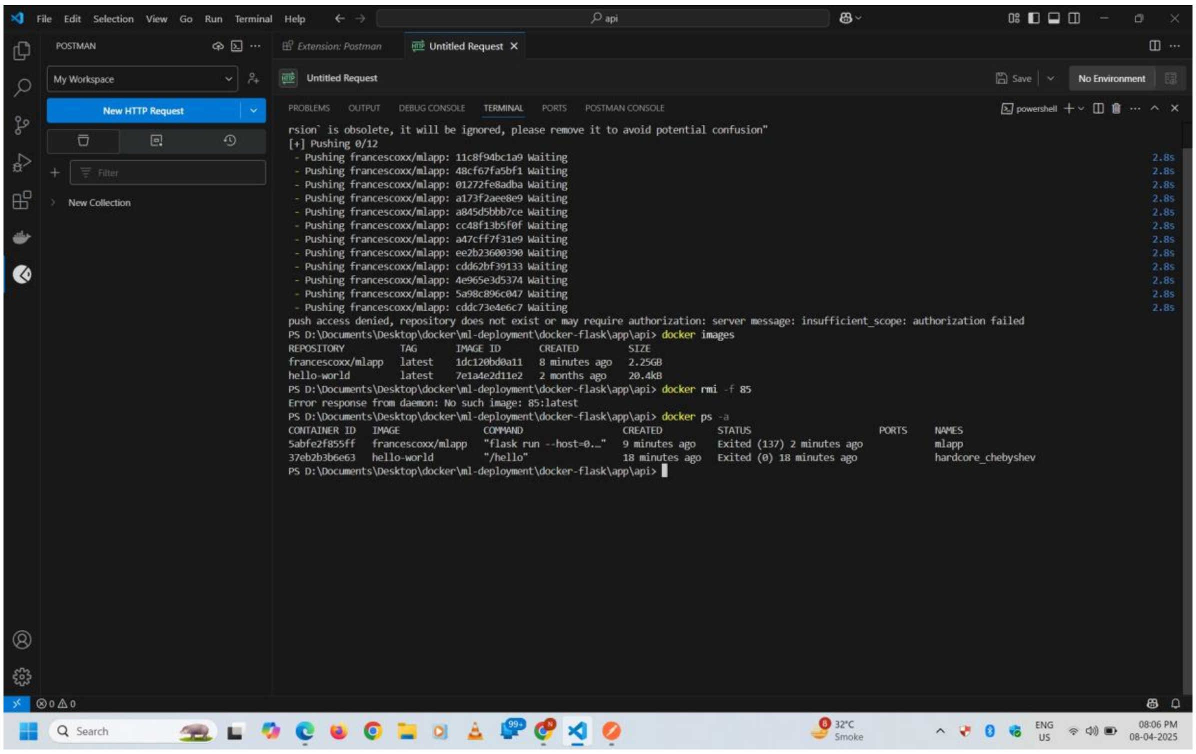
```
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker compose push
time="2025-04-08T20:05:10+05:30" level=warning msg="D:\\Documents\\Desktop\\docker\\ml-deployment\\docker-flask\\app\\api\\docker-compose.yml: the attribute `ve
rsion` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Pushing 0/12
 - Pushing francescoxx/mlapp: 11c8f94bc1a9 Waiting                                    2.3s
 - Pushing francescoxx/mlapp: 48cf67fa5bf1 Waiting                                    2.3s
 - Pushing francescoxx/mlapp: 01272fe8adba Waiting                                    2.3s
 - Pushing francescoxx/mlapp: a173f2aee8e9 Waiting                                    2.3s
 - Pushing francescoxx/mlapp: a845d5bbb7ce Waiting                                    2.3s
 - Pushing francescoxx/mlapp: cc48f13b5f0f Waiting                                    2.3s
 - Pushing francescoxx/mlapp: a47cff7f31e9 Waiting                                    2.3s
 - Pushing francescoxx/mlapp: ee2b23600390 Waiting                                    2.3s
 - Pushing francescoxx/mlapp: cdd62bf39133 Waiting                                    2.3s
 - Pushing francescoxx/mlapp: 4e965e3d5374 Waiting                                    2.3s
 - Pushing francescoxx/mlapp: 5a98c896c047 Waiting                                    2.3s
 - Pushing francescoxx/mlapp: cddc73e4e6c7 Waiting                                    2.3s
```



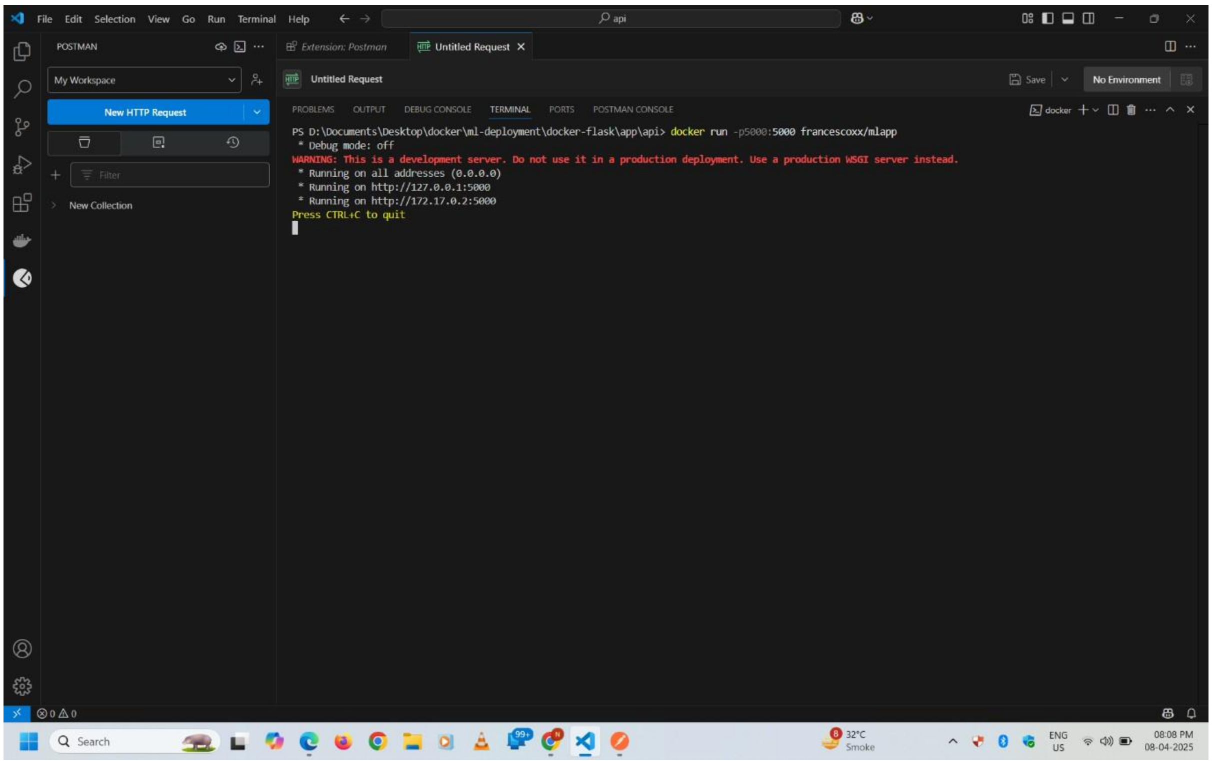
```
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker compose push
time="2025-04-08T20:05:10+05:30" level=warning msg="D:\\Documents\\Desktop\\docker\\ml-deployment\\docker-flask\\app\\api\\docker-compose.yml: the attribute `ve
rsion` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Pushing 0/12
 - Pushing francescoxx/mlapp: 11c8f94bc1a9 Waiting                                    2.8s
 - Pushing francescoxx/mlapp: 48cf67fa5bf1 Waiting                                    2.8s
 - Pushing francescoxx/mlapp: 01272fe8adba Waiting                                    2.8s
 - Pushing francescoxx/mlapp: a173f2aee8e9 Waiting                                    2.8s
 - Pushing francescoxx/mlapp: a845d5bbb7ce Waiting                                    2.8s
 - Pushing francescoxx/mlapp: cc48f13b5f0f Waiting                                    2.8s
 - Pushing francescoxx/mlapp: a47cff7f31e9 Waiting                                    2.8s
 - Pushing francescoxx/mlapp: ee2b23600390 Waiting                                    2.8s
 - Pushing francescoxx/mlapp: cdd62bf39133 Waiting                                    2.8s
 - Pushing francescoxx/mlapp: 4e965e3d5374 Waiting                                    2.8s
 - Pushing francescoxx/mlapp: 5a98c896c047 Waiting                                    2.8s
 - Pushing francescoxx/mlapp: cddc73e4e6c7 Waiting                                    2.8s
push access denied, repository does not exist or may require authorization: server message: insufficient_scope: authorization failed
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker images
REPOSITORY          TAG       IMAGE ID       CREATED         SIZE
francescoxx/mlapp   latest    1dc120bd0a11   8 minutes ago   2.25GB
hello-world         latest    7e1a4e2d11e2   2 months ago    20.4kB
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api>
```



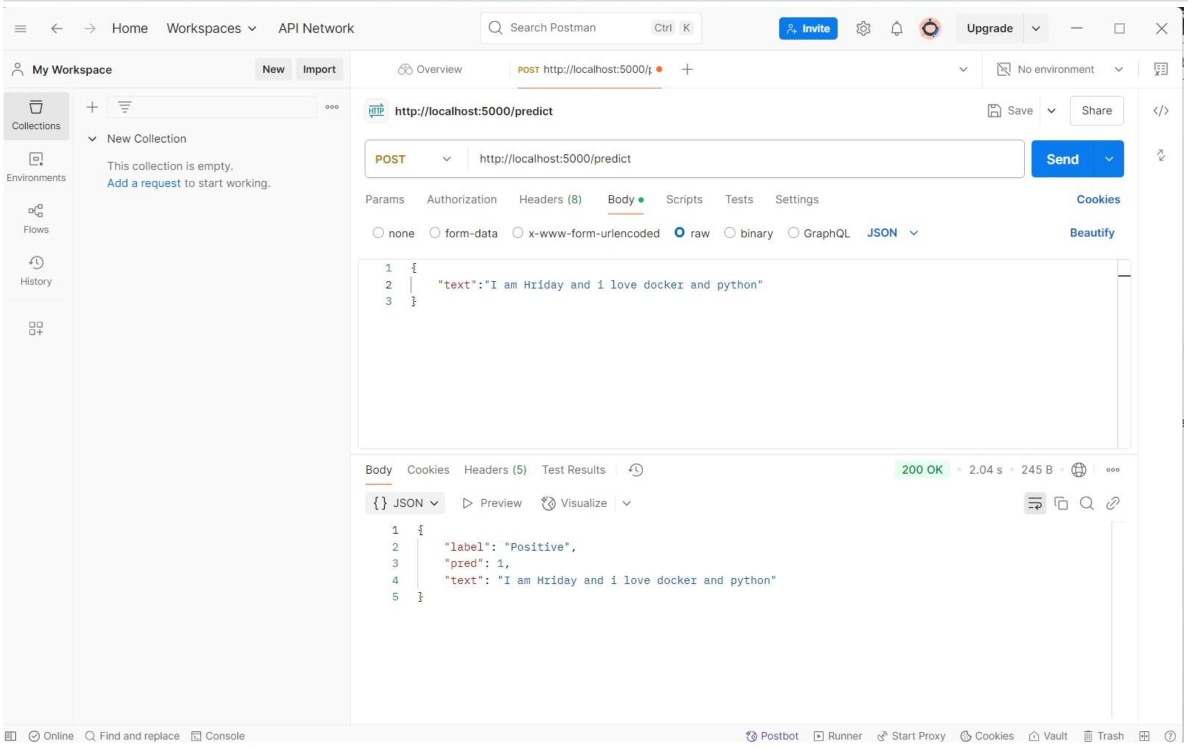
```
rsion` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Pushing 0/12
 - Pushing francescoxx/mlapp: 11c8f94bc1a9 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: 48cf67fa5bf1 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: 01272fe8adba Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: a173f2aee8e9 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: a845d5bbb7ce Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: cc48f13b5f0f Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: a47cff7f31e9 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: ee2b23600390 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: cdd62bf39133 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: 4e965e3d5374 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: 5a98c896c047 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: cddc73e4e6c7 Waiting                                                          2.8s
push access denied, repository does not exist or may require authorization: server message: insufficient_scope: authorization failed
PS Focus folder in explorer (ctrl + click) deployment\docker-flask\app\api> docker images
REP                                   E ID         CREATED          SIZE
francescoxx/mlapp   latest    1dc120bd0a11   8 minutes ago   2.25GB
hello-world         latest    7e1a4e2d11e2   2 months ago    20.4kB
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker rmi -f 85
Error response from daemon: No such image: 85:latest
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker ps -a
CONTAINER ID   IMAGE               COMMAND                  CREATED          STATUS                       PORTS     NAMES
5abfe2f855ff   francescoxx/mlapp   "flask run --host=0.…"   9 minutes ago    Exited (137) 2 minutes ago             mlapp
37eb2b3b6e63   hello-world         "/hello"                 18 minutes ago   Exited (0) 18 minutes ago              hardcore_chebyshev
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> 
```



```
rsion` is obsolete, it will be ignored, please remove it to avoid potential confusion"
[+] Pushing 0/12
 - Pushing francescoxx/mlapp: 11c8f94bc1a9 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: 48cf67fa5bf1 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: 01272fe8adba Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: a173f2aee8e9 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: a845d5bbb7ce Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: cc48f13b5f0f Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: a47cff7f31e9 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: ee2b23600390 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: cdd62bf39133 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: 4e965e3d5374 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: 5a98c896c047 Waiting                                                          2.8s
 - Pushing francescoxx/mlapp: cddc73e4e6c7 Waiting                                                          2.8s
push access denied, repository does not exist or may require authorization: server message: insufficient_scope: authorization failed
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker images
REPOSITORY          TAG       IMAGE ID       CREATED         SIZE
francescoxx/mlapp   latest    1dc120bd0a11   8 minutes ago   2.25GB
hello-world         latest    7e1a4e2d11e2   2 months ago    20.4kB
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker rmi -f 85
Error response from daemon: No such image: 85:latest
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker ps -a
CONTAINER ID   IMAGE               COMMAND                  CREATED          STATUS                       PORTS     NAMES
5abfe2f855ff   francescoxx/mlapp   "flask run --host=0.…"   9 minutes ago    Exited (137) 2 minutes ago             mlapp
37eb2b3b6e63   hello-world         "/hello"                 18 minutes ago   Exited (0) 18 minutes ago              hardcore_chebyshev
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> 
```



```
PS D:\Documents\Desktop\docker\ml-deployment\docker-flask\app\api> docker run -p5000:5000 francescoxx/mlapp
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://172.17.0.2:5000
Press CTRL+C to quit
```



POST http://localhost:5000/predict

Body: raw JSON

```
{
    "text":"I am Hriday and i love docker and python"
}
```

200 OK · 2.04 s · 245 B

```
{
    "label": "Positive",
    "pred": 1,
    "text": "I am Hriday and i love docker and python"
}
```

STEPS TAKEN :-

I. Docker Installation on Windows

1. Visit the official Docker website or follow a trusted tutorial (e.g., from Medium).
2. Download **Docker Desktop for Windows**.
3. Install Docker Desktop by running the installer.
4. Enable **WSL 2 (Windows Subsystem for Linux)** if prompted.
5. Restart your system (if required).
6. Launch Docker Desktop.
7. Ensure Docker is running properly (check the whale icon in the system tray).
8. Open Command Prompt or PowerShell.
9. Run `docker --version` to verify the installation.
10. Run `docker run hello-world` to test if Docker is working.

II. Creating a Python Application

1. Create a new project directory (e.g., `my-python-app`).
2. Inside the directory, create your Python script (e.g., `app.py`).
3. Write a simple Python application (e.g., Flask web app or a script that prints text).
4. Create a `requirements.txt` file listing all dependencies (e.g., `flask`).
5. Optionally, add additional files such as config files, static assets, or templates.

III. Writing a Dockerfile

1. Inside the project directory, create a file named `Dockerfile` (no extension).
2. Specify a base image (e.g., `FROM python:3.9`).
3. Set the working directory inside the container using `WORKDIR`.
4. Copy local project files into the container using `COPY`.
5. Install dependencies using `RUN pip install -r requirements.txt`.
6. Define the command to run the application using `CMD` or `ENTRYPOINT`.
7. Save and close the Dockerfile.

Sample Dockerfile:

```
dockerfile
CopyEdit
FROM python:3.9
WORKDIR /app
COPY . /app
RUN pip install --no-cache-dir -r requirements.txt
CMD ["python", "app.py"]
```

IV. Building and Running the Docker Image

1. Open the terminal in your project directory.
2. Build the Docker image using:

```
perl
CopyEdit
docker build -t my-python-app .
```

3. Check if the image was built:

```
nginx
CopyEdit
docker images
```

4. Run the container using:

```
arduino
CopyEdit
docker run -d -p 5000:5000 my-python-app
```

5. Open a browser and visit `http://localhost:5000` (if it's a web app).
6. Verify the application is running correctly.

V. Testing and Debugging

1. Use `docker ps` to list running containers.
2. Use `docker logs <container_id>` to check logs.
3. Use `docker exec -it <container_id> bash` to get an interactive shell inside the container.
4. Make changes to your code and rebuild the image if needed.
5. Stop containers using `docker stop <container_id>`.
6. Remove containers/images using `docker rm` and `docker rmi`.

VI. Using Docker Compose (Optional)

1. Create a `docker-compose.yml` file for managing multi-container apps.
2. Define services (e.g., web app + database).
3. Run `docker-compose up` to start all services.
4. Run `docker-compose down` to stop them.

VII. Working in a Virtual Docker Lab

1. Go to https://docker.courselabs.co/.
2. Register or log in to access the lab.
3. Launch a new Docker lab environment.
4. Use the web-based terminal provided to practice:
   - Running containers

- Building images
- Writing Dockerfiles
- Networking and volumes

5. Follow any pre-built tutorials or challenges in the lab.
6. Experiment freely without affecting your local machine.
7. Save your work (if supported) or export your files.

VIII. Cleaning Up

1. Remove unused containers: `docker container prune`
2. Remove unused images: `docker image prune`
3. Free up system resources by cleaning volumes/networks.
4. Backup Dockerfiles and application source code.
5. Optionally, push the image to **Docker Hub** using:

```
perl
CopyEdit
docker tag my-python-app username/my-python-app
docker push username/my-python-app
```

Conclusion:-

This experiment demonstrated Docker’s importance in creating reliable, portable Python applications. By containerizing code with all dependencies, we ensured consistent performance across environments. Practicing with virtual labs deepened our understanding of core Docker concepts, preparing us for modern software development trends like DevOps, microservices, and cloud-native architectures.