



WHAT IS DOCKER?

Docker packages software into lightweight, isolated containers. Each container holds everything the app needs — code, runtime, libraries, config — and runs identically on any machine.

Released: **2013** Language: **Go** License: **Apache 2.0**

CONTAINERS EXPLAINED

- Share host OS kernel — far lighter than VMs
- Start in milliseconds, not minutes
- Fully isolated: own filesystem, network, processes
- Identical on dev, staging, and production
- Defined in code — anyone can reproduce

IMAGES VS CONTAINERS

Concept	Analogy	Mutable?
Docker Image	Blueprint / Recipe	No — read-only
Container	Running instance	Yes — ephemeral
Volume	Persistent storage	Yes — survives

DOCKER VS TRADITIONAL INSTALLS

Traditional

- Dependency conflicts
- Version collisions
- Works on MY machine
- Manual setup docs

Docker

- Isolated environments
- One command setup
- Runs same everywhere
- Defined in code

ESSENTIAL COMMANDS

```
$ docker pull nginx
# Download image from Docker Hub
```

```
$ docker run -d nginx
# Run container in background
```

```
$ docker run -p 8080:80 nginx
# Map host port → container port
```

```
$ docker ps
# List running containers
```

```
$ docker ps -a
# List ALL containers incl. stopped
```

```
$ docker stop <id>
# Stop a running container
```

```
$ docker rm <id>
# Remove a stopped container
```

```
$ docker images
# List local images
```

```
$ docker rmi <image>
# Remove a local image
```

```
$ docker logs <id>
# View container output / logs
```

THE DOCKER ECOSYSTEM

Docker Engine	Core runtime that builds & runs containers
Docker CLI	Commands: docker run, build, ps, logs
Docker Desktop	GUI app for Mac & Windows
Docker Hub	Public registry — like GitHub for images
Docker Compose	YAML multi-container orchestration
Docker Volumes	Persist data across container restarts

WHAT YOU CAN RUN WITH DOCKER

- Databases — PostgreSQL, MySQL, MongoDB, Redis
- Web servers — Nginx, Apache, Caddy
- AI tools — Ollama, Open WebUI, Flowise, LocalAI
- Vector DBs — Qdrant, Weaviate, ChromaDB
- Automation — n8n, Activepieces, Windmill
- Monitoring — Grafana, Prometheus, Uptime Kuma



What Is Docker?

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WHY DOCKER FOR AI INFRASTRUCTURE

- Run Ollama LLM server with one Docker command
- Stack vector DB + model + UI using Compose
- Identical AI env: laptop → staging → production
- Self-host Open WebUI, Flowise, LangFlow instantly
- Production AI runs on Kubernetes — built on containers
- Bundle exact CUDA/Python versions with your model

ANATOMY OF A DOCKERFILE

```
FROM python:3.11-slim
# Base image to build upon
WORKDIR /app
# Set the working directory
COPY requirements.txt .
# Copy dependency file
RUN pip install -r requirements.txt
# Install Python deps
COPY . .
# Copy all app source code
EXPOSE 8000
# Document the port used
CMD ["python", "app.py"]
# Default start command
```

DOCKER COMPOSE SNAPSHOT (AI STACK)

```
services:
  ollama:
    image: ollama/ollama
    ports:
      - "11434:11434"
    volumes:
      - ollama:/root/.ollama
  open-webui:
    image: ghcr.io/open-webui/open-webui
    ports:
      - "3000:8080"
volumes:
  ollama:
```

KEY CONCEPTS QUICK REFERENCE

Container	Isolated running instance of an image
Image	Read-only blueprint / template
Dockerfile	Script that builds a Docker image
Registry	Image storage: Docker Hub, GHCR
Compose	YAML-based multi-container orchestration
Volume	Persistent storage for containers
Network	Isolated comms layer between containers
Port Mapping	-p HOST:CONTAINER maps inbound traffic
Tag	image:version label (e.g. nginx:latest)
Layer	Cached filesystem diff in an image build

USEFUL DOCKER RUN FLAGS

-d	Detached mode — runs in background
-p HOST:CON	Publish / map a port
-v HOST:CON	Bind mount a volume
-e VAR=value	Set an environment variable
--name myapp	Give the container a custom name
--rm	Auto-remove container on exit
--network net	Attach to a Docker network

DOCKER ON WINDOWS & MAC

Windows	Docker + WSL2 (Windows Subsystem for Linux)
Mac	Docker Desktop uses Apple Virtualization Framework
Both	Install Docker Desktop — handles everything
Linux	Native — no VM layer, best performance

Ready to install Docker?

Next: How to Install Docker on Windows and Mac · aibx.ai/how-to-install-docker