

# Modern CI/CD for Static Websites: Automating Deployment with Docker, Nginx, and Shell Scripts

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For more information, visit the repository at: <https://github.com/mmmohajer/ci-cd-static-sites>

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## Purpose

This project is a step-by-step tutorial designed to simulate how CI/CD pipelines are built and scaled for real-world applications. Starting from the basics, you'll learn how to set up a robust CI/CD pipeline for static websites using Docker, Nginx, and Shell scripts. By following each step, you'll understand how to scale from a simple setup to a fully functional CI/CD pipeline ready for production.

This setup is reusable for any static website, whether it's:

- A personal portfolio website.
- A website to represent your services.
- A business website needing regular updates.

By the end of this tutorial, you'll have a foundational CI/CD pipeline that shifts your focus from deployment headaches to content creation and design updates. You'll no longer worry about how to:

- Serve your website.
- Set up a custom domain.
- Integrate SSL certificates.

Instead, your focus will shift entirely to creating and updating the content and beautifying your website with HTML, CSS, and JavaScript.

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## How to Use This Repository and Study

This tutorial is designed as a **step-by-step guide**, with each step building upon the previous one. To get the most out of this project, follow these instructions:

### 1. Follow Each Step Sequentially

- Each step is carefully structured to simulate the process of building and scaling a CI/CD pipeline in real-world applications.
- **Do not skip steps**, as every new step builds on the work from the previous one.

### 2. Instructions for Each Step

- In each step, the **README.md** will provide:
  - **Tasks to Complete:** Specific actions you need to perform (e.g., creating files, writing code).
  - **Tests:** A way to verify that you have completed the step correctly.

### 3. Encourage Self-Learning

- If you encounter challenges during a step:
  - **Google it:** Use search engines to find solutions.
  - **Use ChatGPT:** Ask for guidance or clarification.
  - **Visit Stack Overflow:** Research common issues and solutions.
- Spending time troubleshooting on your own is an invaluable part of the learning process.

### 4. Get Support When Needed

If you're still unable to resolve an issue after self-search:

- **Contact Us:** Send a support request through our app for assistance.
- **Book a Mentorship Session:** For more in-depth help, you can schedule a mentorship session with us via the app.
- For more information about these services, feel free to reach us at **info@iswad.tech**.

### 5. Use the Branches for Guidance

- Each step has a corresponding branch named **step-{STEP\_NUMBER}** (e.g., **step-01**, **step-02**):
  - Switch to the relevant branch to see how the step should be structured:

```
git checkout step-{STEP_NUMBER}
```

- Review the comments in the code, where every line or important section is explained.
- If you want to compare your solution with mine, you can pull the code from the branch:

```
git pull origin step-{STEP_NUMBER}
```

## 6. Compare Changes Between Steps

- To fully understand what changed and why, use Git to compare files and folders updated in the current step:
  - **Using Pull Requests:** If you're using a repository with pull requests for each step, review the diff to analyze updates.
  - **Using Command Line:**
    - Compare changes between steps:

```
git diff step-{PREVIOUS_STEP_NUMBER} step-  
{CURRENT_STEP_NUMBER}
```

- This will show the differences between the two steps, helping you understand the updates made.

## 7. Track Your Progress

After completing each step:

- **Mark the Step as Completed:** Update the status of that step in the app to indicate that it has been successfully completed.
- **Share Optional Feedback:**
  - Include what you learned during the step or what challenges you faced and how you solved them.
  - This information will help:
    - Keep track of your progress and make you more committed to your work.
    - Assess whether you have successfully completed the step.
    - Enable future AI-powered features (currently under development) that will:
      - Help you generate a better resume.
      - Suggest relevant topics and personalized roadmaps to achieve your goal of becoming a professional or senior developer.

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By following this structured process, you'll gain both practical knowledge and confidence in building CI/CD pipelines for static websites. Additionally, our tools and features will help you stay motivated, track progress, and work towards your long-term career goals.

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## Who Is This For?

This project is for anyone who wants to learn how to automate and scale website deployments, including:

- **DevOps Engineers:** Build expertise in automating pipelines for static websites.
- **Full-Stack Engineers:** Level up by learning the basics of DevOps.

- **Front-End Developers:** Learn how to publish your designs professionally.
  - **UI/UX Designers:** If you can export HTML, CSS, and JavaScript or have basic knowledge of it, this guide will show you how to publish your app.
  - **Professionals and Service Providers:** Build and scale your website for your services or business.
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## What You'll Learn

By completing this tutorial, you'll gain:

- The ability to create and manage **Dockerfiles** for static websites.
  - Hands-on experience configuring **Nginx** for efficient static file serving.
  - Skills to write **Shell scripts** for automating CI/CD pipelines.
  - An understanding of CI/CD concepts and how to apply them to real-world projects.
  - A reusable deployment pipeline that works for any static website.
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## Prerequisites

Before you begin, ensure you have the following installed:

- **Git:** [Install Git](#).
  - **GitHub account:** For managing the repository and hosting code.
  - **Docker:** [Install Docker](#).
  - **Shell:** A Unix-based shell (bash/zsh) for running scripts.
  - **Basic Knowledge:** Familiarity with HTML, CSS, and JavaScript.
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## Step 01: Preparing the Development Configuration

### Goal of This Step

In this step, you will:

1. Set up the development environment for your static website.
2. Learn the basics of **Nginx**, **Docker**, and **Docker Compose** to containerize and serve the app.
3. Run the app locally using **docker-compose** and verify that everything is working as expected.

By the end of this step, you'll have a minimal CI/CD setup running locally, serving your static website.

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### Concepts to Learn

#### 1. Nginx: The Backbone of Modern Web Servers

**Theoretical Overview:** Nginx is a web server used to efficiently serve files (like HTML, CSS, and JavaScript) or act as a reverse proxy. It's widely used in real-world scenarios for its performance and ability to handle thousands of simultaneous requests.

**Practical Analogy:** Think of Nginx as a **waiter** in a restaurant:

- When a user (customer) makes a request, like "Show me the homepage," Nginx fetches the `index.html` file (menu) and delivers it to the user.
- If the customer requests additional resources (like CSS or images), Nginx fetches and serves them quickly.

#### Real-World Example:

- Websites like **Netflix**, **YouTube**, and **Amazon** use Nginx to serve static files like videos, images, and stylesheets.

#### How Nginx Works in This Project:

- It will:
    1. Serve your `index.html` file to users visiting the site.
    2. Look for additional static files (like CSS and JavaScript) and deliver them to the browser.
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## 2. Docker: Ensuring Consistency

**Theoretical Overview:** Docker packages your app and its environment into a container, ensuring it runs the same way across all machines, from your laptop to a production server.

**Practical Analogy:** Think of Docker as a **portable kitchen** that includes:

- The ingredients (your app files).
- The tools (dependencies like Nginx).
- The oven (a runtime environment).

#### Real-World Example:

- Companies like **Spotify** and **Google** use Docker to make sure their apps run identically across development and production environments.

#### How Docker Works in This Project:

- It will:
    1. Package your app files and Nginx into a container.
    2. Serve your app consistently, no matter where it's running.
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## 3. Docker Compose: Managing Multiple Services

**Theoretical Overview:** Docker Compose lets you define and manage multiple services in one file (`docker-compose.yml`) and run them together with a single command.

**Practical Analogy:** Think of Docker Compose as a **kitchen manager** that coordinates multiple stations:

- One station serves files (Nginx).
- Another could handle data storage (a database).

#### Real-World Example:

- An e-commerce platform might use Docker Compose to manage:
  - A front-end service (React or Angular).
  - A back-end API (Node.js or Django).
  - A database (PostgreSQL or MongoDB).

### How Docker Compose Works in This Project:

- It will:
  1. Define the Nginx service.
  2. Map your local files to the container for live updates.
  3. Expose port **80** so you can access the app in your browser.

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## Practical Steps

### 1. Create the Folder Structure

- At the root of your repository:
  - Create a folder named **site** to store all your website files (HTML, CSS, JavaScript, images).
    - Add a file named **index.html** with minimal content (e.g., "Hello, world!").
    - Add a file named **404.html** to serve as a custom 404 error page.
  - Create a folder named **nginx** to store Nginx configuration files.
    - Add a file named **default-dev.conf** for your Nginx configuration.
    - Add a file named **Dockerfile.dev** for building the Nginx Docker image.
  - Create a file named **docker-compose-dev.yml** in the root directory for your Docker Compose setup.

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### 2. Write the Nginx Configuration

- Inside the **nginx/default-dev.conf** file, write a basic configuration to:
  - Serve files from **/var/www/app**.
  - Look for **index.html** as the default file when users visit the root of your site.
  - Include a fallback to a **404.html** file for missing resources.

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### 3. Write the Docker Compose File

- In the root directory, define the **docker-compose-dev.yml** file to:
  - Set up Nginx as a service.
  - Map your local **site** folder to **/var/www/app** inside the container.
  - Map the **nginx** folder for custom configurations.
  - Expose port **80** for local access.

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### 4. Folder Structure

At the end of this step, your folder structure should look like this:

```
.
├── nginx/
│   ├── default-dev.conf # Write your Nginx configuration in this file
│   └── Dockerfile.dev   # Dockerfile to build the Nginx image
├── site/
│   ├── index.html      # Write your minimal HTML file here (e.g.,
│   │                   "Hello, world!" app)
│   └── 404.html        # Custom 404 error page for missing resources
└── docker-compose-dev.yml # Define your Docker Compose setup for
    development
```

## 5. Run the App

- Open a terminal or Bash at the root directory where `docker-compose-dev.yml` is located.
- Run the following command to start the app:

```
docker-compose -f docker-compose-dev.yml up --build -d
```

## 6. Verify Everything is Working

1. Visit <http://localhost> in your browser. You should see the content of your `index.html` file.
2. Modify the `index.html` file to display a "Hello, world!" message.
3. Refresh the browser to ensure the changes are reflected.

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## 6. Test Your Setup

After completing this step, verify the following:

- Does visiting <http://localhost> display the content of your `index.html` file?
- Are changes to the `index.html` file reflected in the browser after refreshing?