Creation of Pipeline in Jenkins:

Step 1: Create Project Directory and Navigate Into It

- `mkdir my_python_project && cd my_python_project`
  - Creates a new directory named `my_python_project`.
  - Changes the working directory to `my_python_project`.

Step 2: Initialize a Git Repository

- `git init`
  - Initializes a new Git repository in the project directory.

Step 3: Create `pyproject.toml` for Project Configuration

- `cat << EOF > pyproject.toml ... EOF`
  - Creates a `pyproject.toml` file with project configurations.
  - Specifies the build system (`hatchling`) and the project's metadata.
  - Defines a CLI script (`myapp`) that points to `my_python_project.main:main`.

Step 4: Create Source Code Directory and Main Python File

- `mkdir -p src/my_python_project`
  - Creates a directory structure (`src/my_python_project`).
- `cat << EOF > src/my_python_project/main.py ... EOF`
  - Creates `main.py` with a simple function that prints a message.
  - **Mistake:** `_name_` should be corrected to `__name__`, and `_main_` to `__main__`.

Step 5: Create a Basic Test File

- `mkdir tests`
  - Creates a `tests` directory for unit tests.
- `cat << EOF > tests/test_main.py ... EOF`
  - Creates a test file using `unittest` framework.
  - Captures output from `main()` and compares it with expected output.
  - **Mistake:** `_name_` should be `__name__`, `_main_` should be `__main__`.
  - `sys._stdout_` should be corrected to `sys.stdout`.

Step 6: Create a Dockerfile

- `cat << EOF > Dockerfile ... EOF`
  - Defines a Docker image using `python:3.9-slim` as the base image.
  - Copies the built `.whl` file into the container.
  - Installs the wheel and sets `myapp` as the default command.

Step 7: Create a `.gitignore` File

- `cat << EOF > .gitignore ... EOF`
  - Specifies files and directories to ignore in Git.
  - Ignores `__pycache__`, compiled Python files, `dist/`, `build/`, `.egg-info/`, and `venv/`.

Step 8: Build the Initial Wheel File

- `pip install build`
  - Installs the `build` package to create Python wheels.
- `python -m build --wheel`
  - Builds a wheel (`.whl`) package of the project.

Step 9: Commit Everything to Git

- `git add .`
  - Stages all new and modified files for commit.
- `git commit -m "Initial project setup with Python code and Dockerfile"`
  - Commits the changes with a descriptive message.

Step 10: Create a Jenkinsfile for CI/CD Pipeline

- `cat << EOF > Jenkinsfile ... EOF`
  1. Defines a Jenkins pipeline for automated build, test, and deployment.
- **Stages in the Jenkinsfile:**
  1. **Checkout:** Clones the repository from a local Git URL.
  2. **Build Wheel:** Installs `build` package and generates a `.whl` file.
  3. **Test:** Installs `pytest` and runs tests.
  4. **Build Docker Image:** Builds a Docker image for the application.
  5. **Deploy:** Stops and removes any existing container, then runs the new container.
- Uses `post` block to handle success or failure messages.

Step 11: Add `Jenkinsfile` to Git and Commit

- `git add Jenkinsfile`
  - Stages the `Jenkinsfile`.
- `git commit -m "Add Jenkinsfile for CI/CD pipeline"`
  - Commits the `Jenkinsfile` with a message.

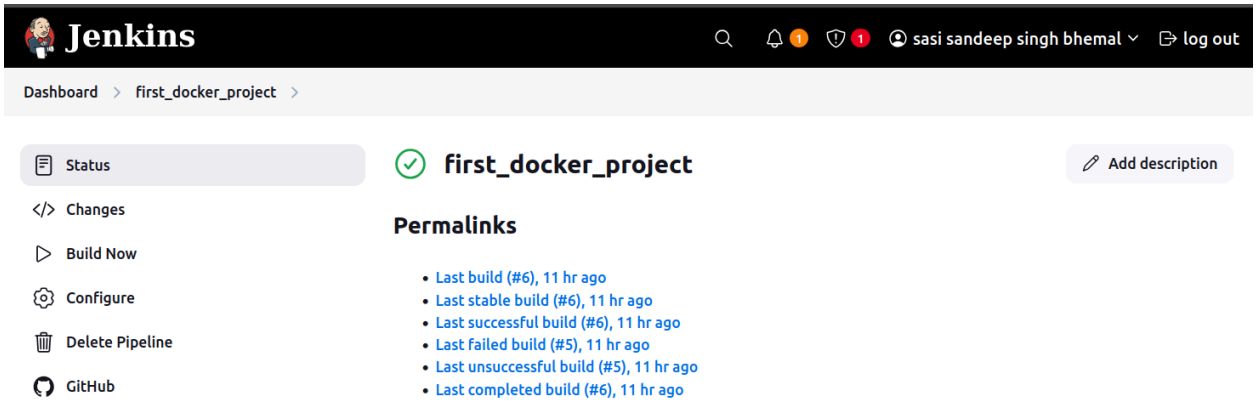
Step 12: Display Project Structure

- `echo "Project structure created:"`
  - Prints a message.
- `ls -R`
  - Lists all files and directories recursively.

Additional Jenkins Pipeline for Repository Cloning

- **Stage 1: Clone Repository**
  - `cleanWs()`
    - Cleans the Jenkins workspace before starting.
  - `sh 'echo "Current directory: $PWD"'`
    - Prints the current working directory.
  - `git clone https://github.com/jineshranawatcode/my_python_project.git`
    - Clones the repository from GitHub.
  - `ls -la my_python_project`
    - Lists all files inside the cloned directory.
- **Stage 2: Verify Clone**
  - `cd my_python_project`
    - Changes directory to the cloned repository.
  - `ls -la`
    - Lists files inside the repository.
  - `git status`
    - Checks the current Git status.
- **Post Actions:**
  - `success` → Prints **"Repository cloned successfully to workspace!"**.
  - `failure` → Prints **"Failed to clone repository."**.

OUTPUT:



Key Takeaways:

- **Project Initialization:** Set up Python project structure, `pyproject.toml`, and `Dockerfile`.
- **Testing:** Used `unittest` and `pytest` for test automation.
- **Git & GitHub:** Version control with `git init`, `add`, `commit`, and `clone`.
- **CI/CD with Jenkins:** Automated build, test, and deployment using `Jenkinsfile`.
- **Docker:** Containerized the application with a `Dockerfile`.
- **Jenkins Pipeline for Git Cloning:** Ensured correct workspace setup for CI/CD.
