Week 5: CI/CD Automation with Azure DevOps – Execution Steps

Objective:

1.To automate the weekly energy monitoring workflow using Azure DevOps, which:

2.Loads smart home energy usage data.

3.Transforms and checks for overuse.

4.Triggers alerts for devices consuming more than a set threshold.

5.Automates execution via Azure DevOps pipelines.

Pre-requisites:

Before you begin, make sure you have:

-Authentication: SSH Key or Personal Access Token (PAT) configured.

-Tools Installed:

- Git
- Python 3.x
- VS Code or any preferred IDE

-Local Project Folder contains:

-Python script: alert_threshold.py

-Azure DevOps pipeline config file: azure-pipelines.yml

Step-by-Step Execution

Step 1: Create Python Script & YAML in Local Folder

- alert_threshold.py

```
import pandas as pd
def load_data():
    # Simulated smart home energy usage
    data = {
        'device_id': ['AC01', 'WM02', 'FR03'],
        'date': ['2025-07-01'] * 3,
        'kwh_used': [8.5, 12.4, 9.3]
    }
    return pd.DataFrame(data)

def transform_data(df):
    return df[df['kwh_used'] > 10]

def alert_high_usage(df):
    for _, row in df.iterrows():
        print(f"ALERT: {row['device_id']} used {row['kwh_used']} kWh on
{row['date']}!")

def run_elt():
    df = load_data()
    high_usage = transform_data(df)
    alert_high_usage(high_usage)

if __name__ == "__main__":
```

```
    run_elt()
```

- **azure-pipelines.yml**

```
trigger:
  - main

pool:
  vmImage: 'ubuntu-latest'

steps:
  - task: UsePythonVersion@0
    inputs:
      versionSpec: '3.x'

  - script: |
      pip install pandas
      python Smart_Home_Energy_Usage_Tracker/
    displayName: 'Successfully Run'

  - script: |
      pip install pandas
     python alert_threshold.py
    displayName: 'Run ELT + Alert Script'
```

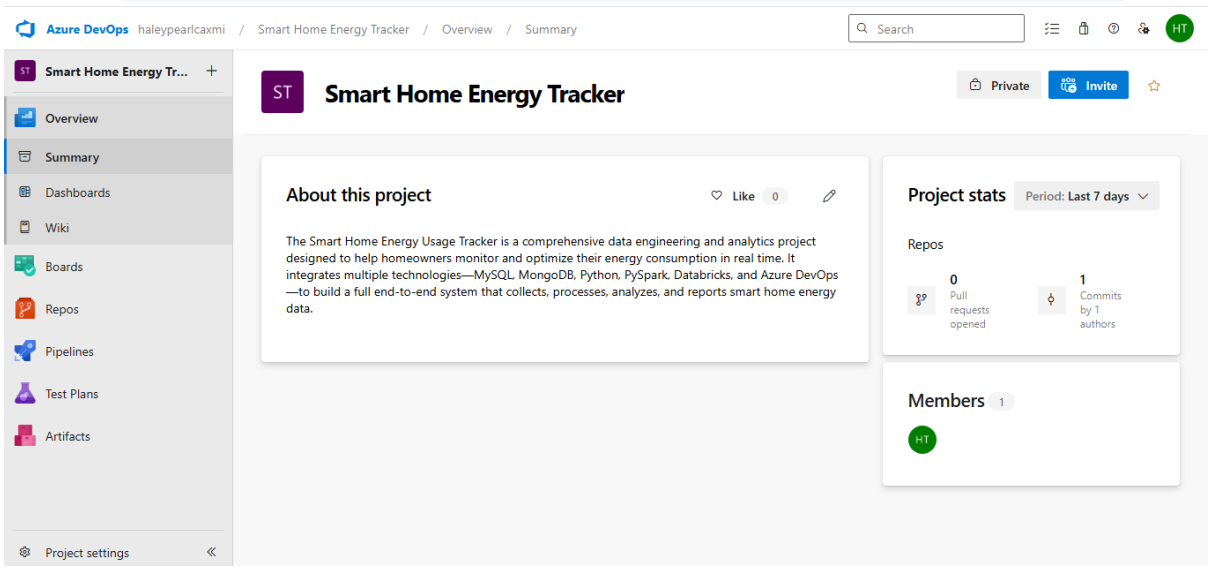
Step 2: Create Azure DevOps Project

1.Go to Azure DevOps Portal.

2.Click "New Project".

3.Enter project name and visibility.

4.Click "Create".



Step 3: Push Local Code to Azure Repo via SSH

cd "C:\Users\User\Desktop\Hexaware\Phase-2 Role Based Training [Data Engineering]\Capstone Project\Smart Home Energy Usage Tracker"

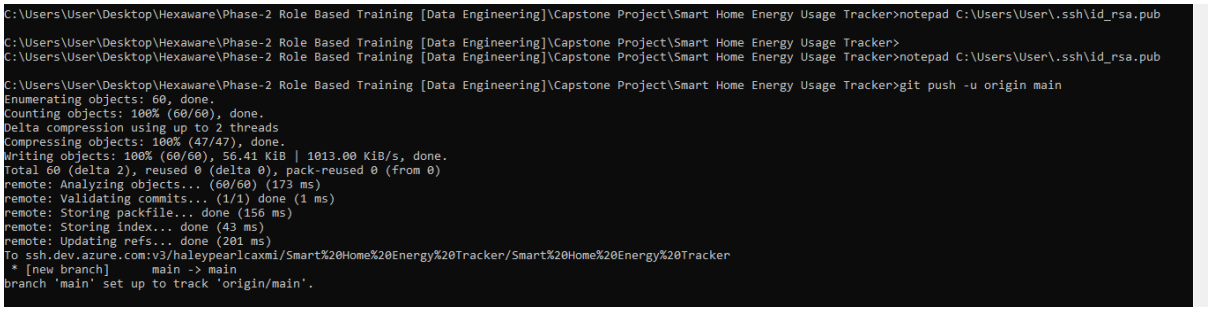
git init

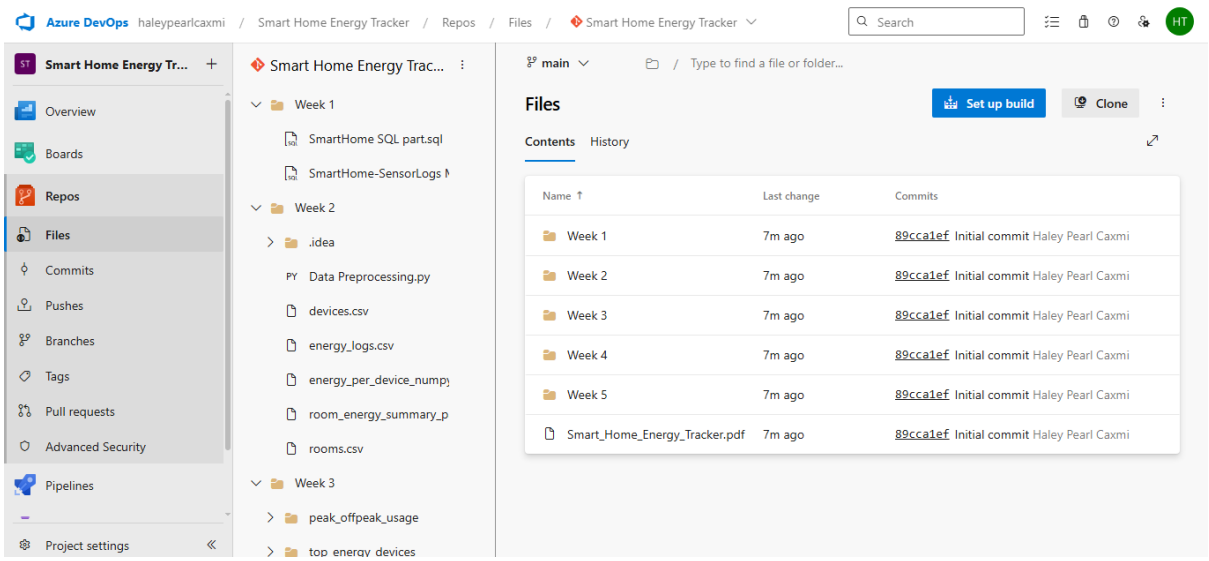
git add .

git commit -m "Initial commit"

git remote add origin "git@ssh.dev.azure.com:v3/haleypearlcaxmi/Smart%20Home%20Energy%20Tracker/Smart%20Home%20Energy%20Tracker"

git push -u origin main





Step 4: Configure and Run Azure Pipeline

1.In Azure DevOps, go to Pipelines → Create Pipeline.

2.*Select:*

Code source: Azure Repos Git

Your repository

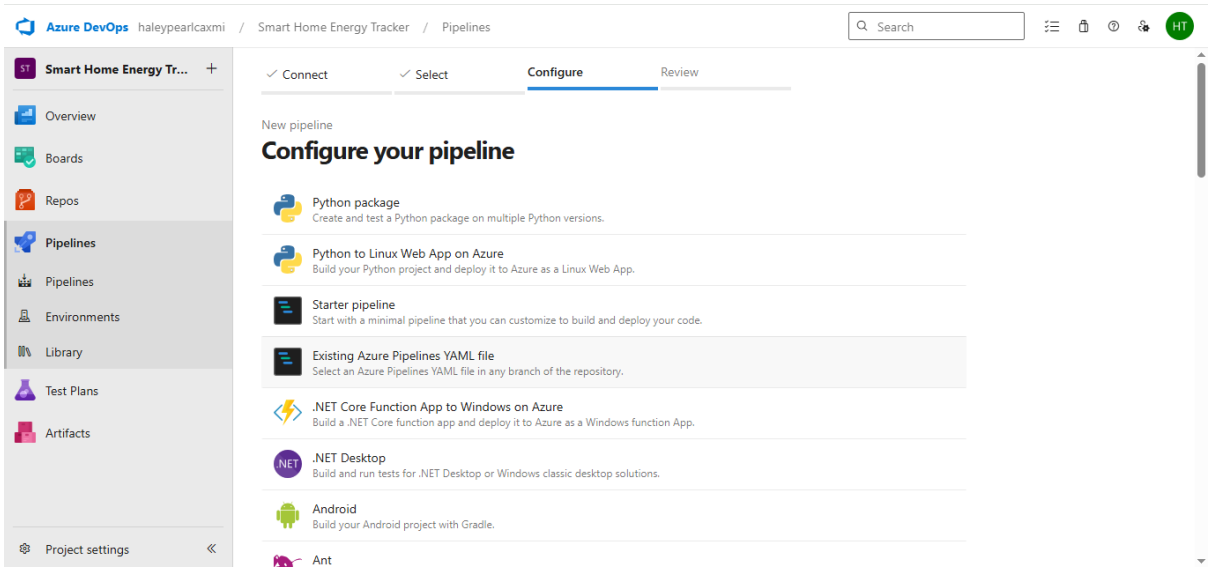
Choose: "Existing Azure Pipelines YAML file"

3.*Specify:*

Branch: main

YAML Path: /Week 5/azure-pipelines.yml

4.Click Continue → Run.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Configure
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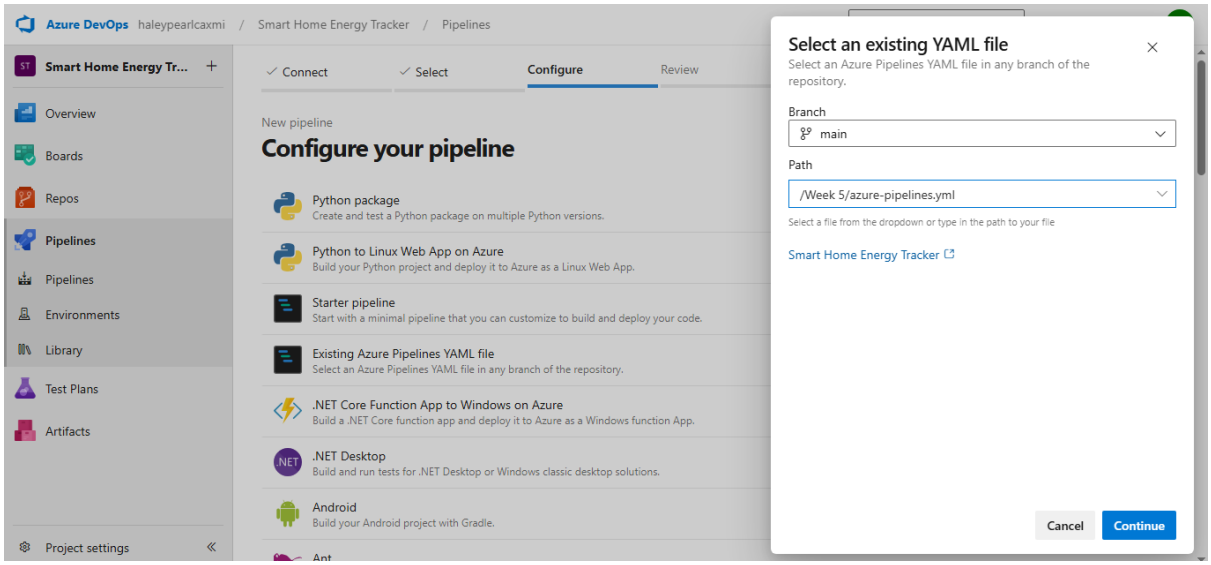
New pipeline
Configure your pipeline
Python package
Create and test a Python package on multiple Python versions.
Python to Linux Web App on Azure
Build your Python project and deploy it to Azure as a Linux Web App.
Starter pipeline
Start with a minimal pipeline that you can customize to build and deploy your code.
Existing Azure Pipelines YAML file
Select an Azure Pipelines YAML file in any branch of the repository.
.NET Core Function App to Windows on Azure
Build a .NET Core function app and deploy it to Azure as a Windows function App.
.NET Desktop
Build and run tests for .NET Desktop or Windows classic desktop solutions.
Android
Build your Android project with Gradle.
Ant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Build and run tests for .NET Desktop or Windows classic desktop solutions.
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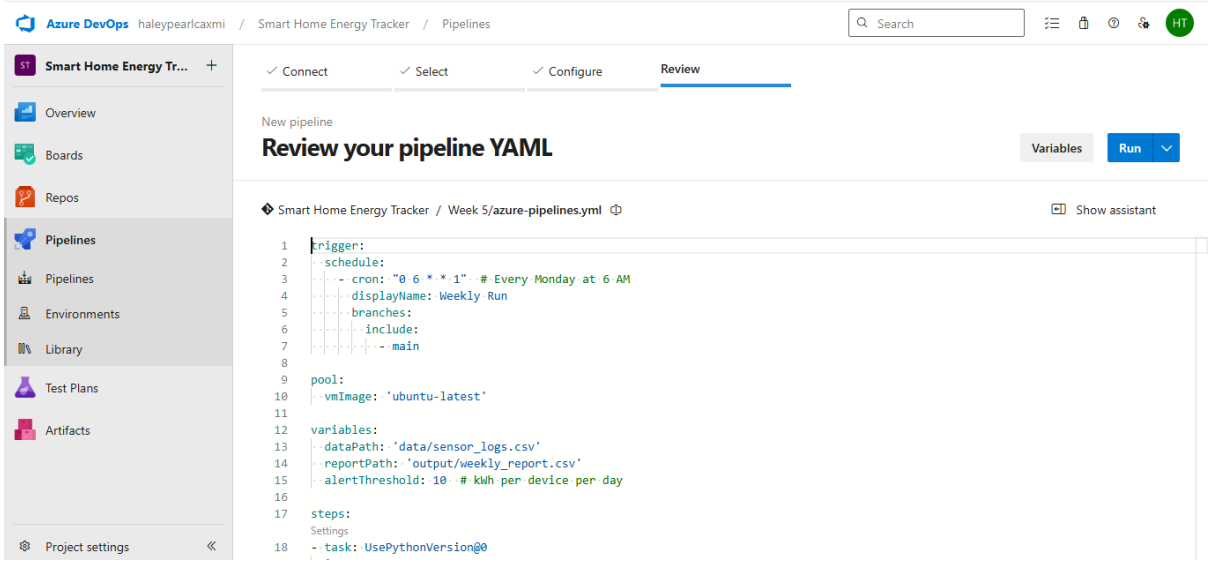
Select an existing YAML file
Select an Azure Pipelines YAML file in any branch of the repository.
Branch
main
Path
/Week 5/azure-pipelines.yml
Select a file from the dropdown or type in the path to your file
Smart Home Energy Tracker
Cancel
Continue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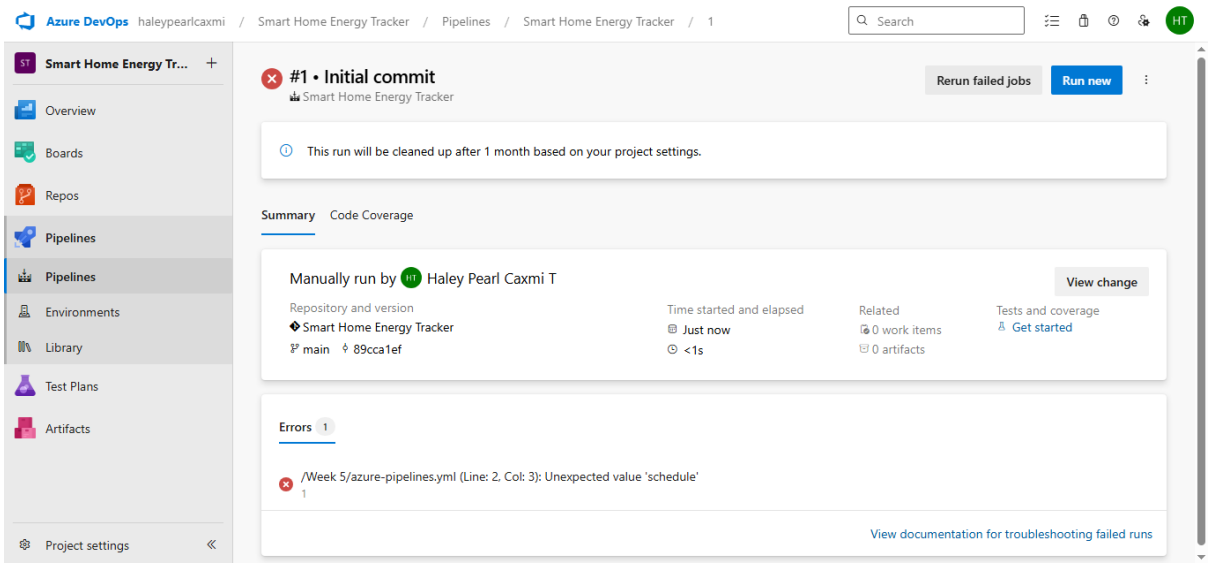
Select
Configure
Review
New pipeline
Review your pipeline YAML
Variables
Run
Smart Home Energy Tracker / Week 5/azure-pipelines.yml
Show assistant
1 trigger:
2 schedule:
3 - cron: "0 6 * * 1" # Every Monday at 6 AM
4 displayName: Weekly Run
5 branches:
6 include:
7 - main
8
9 pool:
10 vmImage: 'ubuntu-latest'
11
12 variables:
13 dataPath: 'data/sensor_logs.csv'
14 reportPath: 'output/weekly_report.csv'
15 alertThreshold: 10 # kWh per device per day
16
17 steps:
Settings
18 - task: UsePythonVersion@0



Final Output

1.Azure DevOps pipeline automatically runs:

-Sets up Python environment.

-Installs dependencies (pandas).

-Executes elt_energy_alert.py.

2.Log displays:

-"Successfully Run"

-"Run ELT + Alert Script"

If energy consumption > 10 kWh for any device, alert message appears:

-ALERT: WM02 used 12.4 kWh on 2025-07-01!