CA - Experiment X - Creating Build Pipelines in Azure DevOps

🏗️ Building a Maven/Gradle Project with Azure Pipelines, Integrating Code Repositories (e.g., GitHub, Azure Repos), Running Unit Tests and Generating Reports.

Objective

- Create a **CI/CD pipeline** in **Azure DevOps**.
- Build a **Maven/Gradle project** using **Azure Pipelines**.
- Integrate **code repositories** (GitHub, Azure Repos).
- Run **unit tests** and generate reports.

Introduction to Azure Pipelines

Azure Pipelines is a CI/CD service that automates:
✅ **Code building** (Maven, Gradle, .NET, etc.).
✅ **Testing** (JUnit, Selenium, etc.).
✅ **Deployment** (Azure App Services, Kubernetes, VMs).

Why Use Azure Pipelines?

✔ **Cloud-based & Scalable** – No need for local build agents.
✔ **Multi-Platform Support** – Works with Linux, macOS, and Windows.
✔ **Integration with GitHub, Azure Repos** – Fetches code from repositories.
✔ **Automation** – Continuous Integration (CI) and Continuous Deployment (CD).

Prerequisites:

✅ **A Maven Project - Dynamic Web Project** should be ready in **Eclipse**.

✅ **The war file(Web Application Archive)** should be exported and placed in the **target** folder of the same project.

✅ If you want to view the Web Application, make sure you have Apache Tomcat (**10.1 or above**) installed in you system.

✅ Also, **Tomcat Server** should be configured in **Eclipse** to view the Web Application.

✅ The same project should be pushed to **GitHub** and a valid **url** shhould be available. This will be connected to **Azure Pipelines.**

✅ If you don't have a **Maven Project - Dynamic Web Project**, here is the link to my GitHub repository →

GitHub - SauravSarkar-CodersArcade/MyWebApp-AzureDevOps: MyWebApp-AzureDevOps Practice

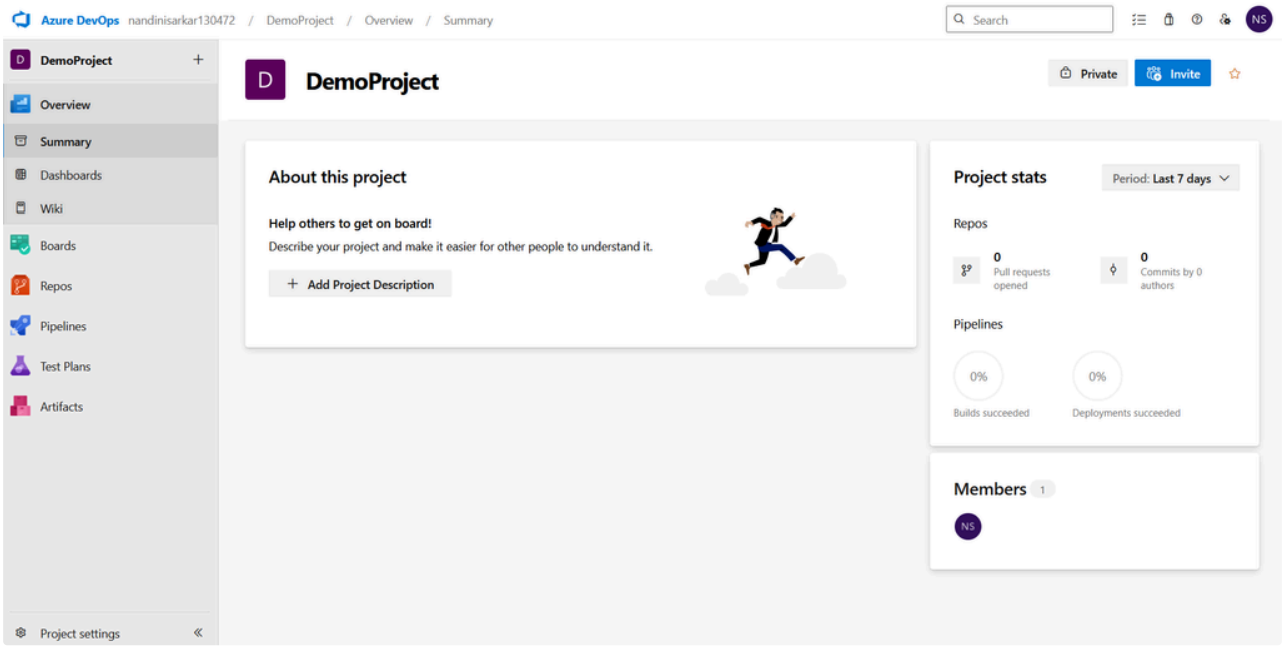
Just Fork it in your GitHub Account and you will be ready to go. Here are the steps for forking:

1. Open the **GitHub** repository: GitHub - SauravSarkar-CodersArcade/MyWebApp-AzureDevOps: MyWebApp-AzureDevOps Practice
2. Click the **Fork** button on the top right corner of the page.
3. Select your **GitHub** account as the destination where the forked repository should be created.
4. **GitHub** will create a copy of the repository in your own account.
5. Open your newly forked repository and copy the URL (either **HTTPS** or **SSH**).
6. Use this forked repository **URL** when connecting your **Azure DevOps Pipeline to GitHub**.

✅ With all these steps completed, you will be ready to start with **DevOPs VTU Lab → Experiment 10**.

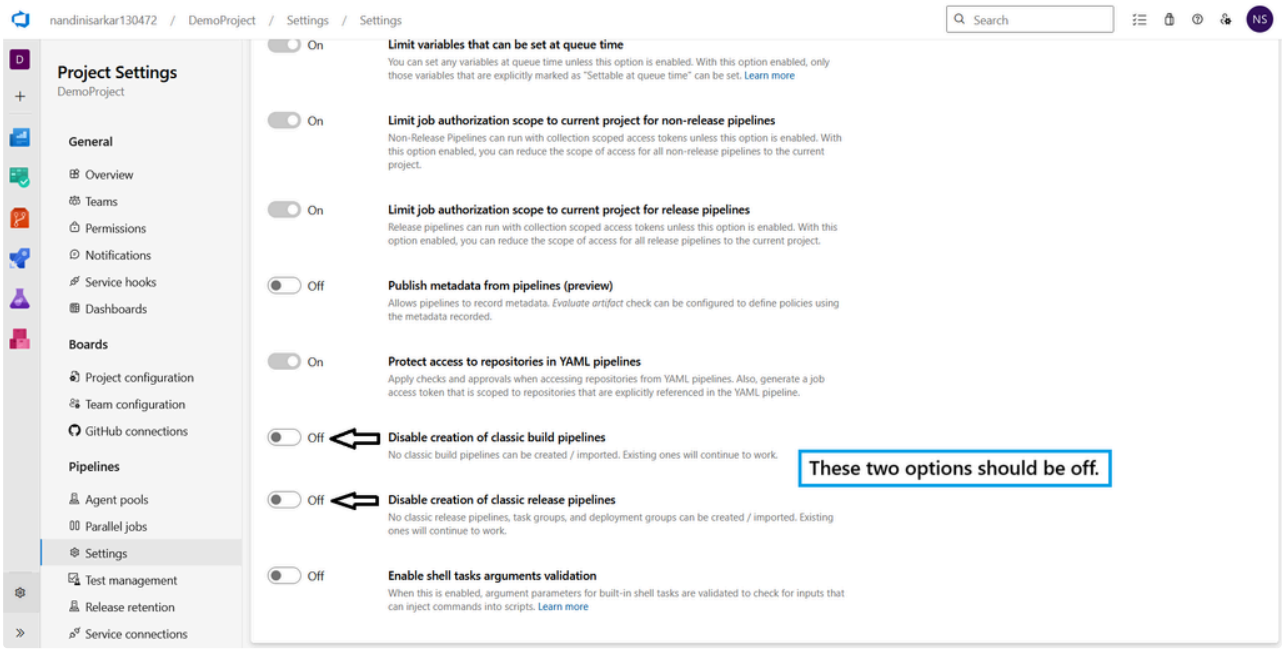
Here is a complete step by step guide from scratch to execute **DevOPS VTU Lab Experiment 10:**

1. The Azure Project created from **Experiment 9** should be ready. For example **Demo Project or Test Project.**

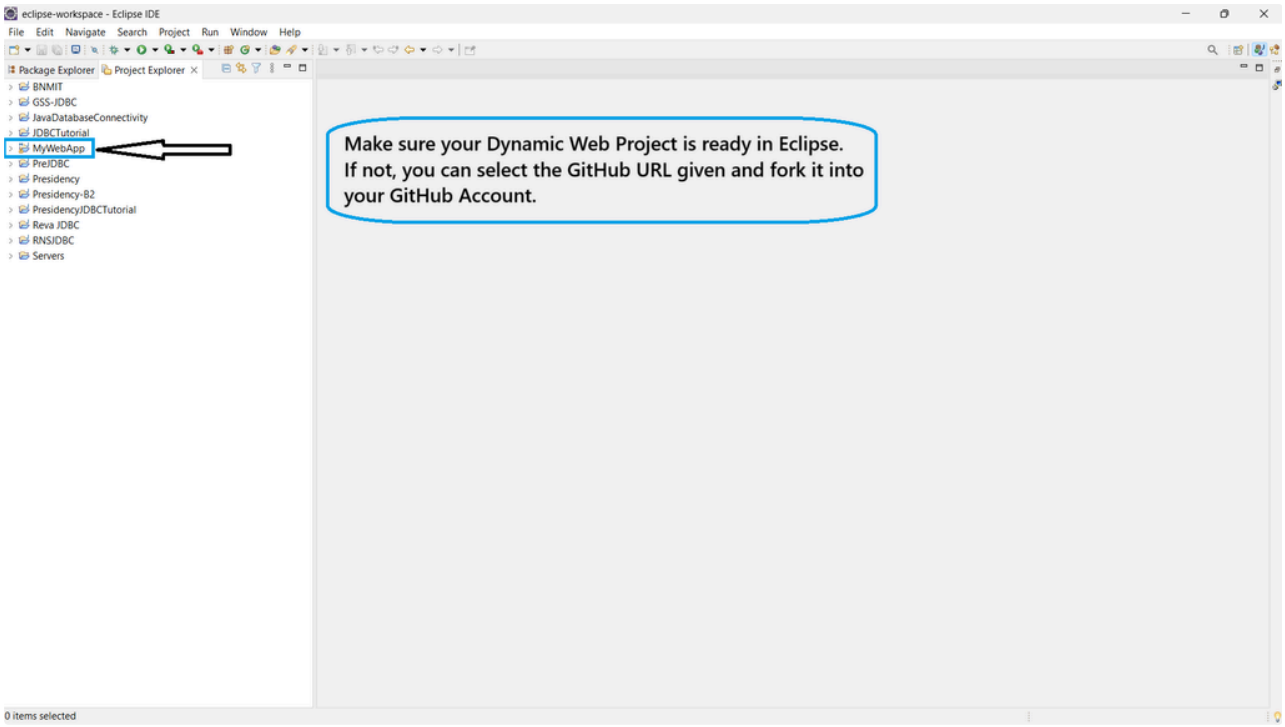


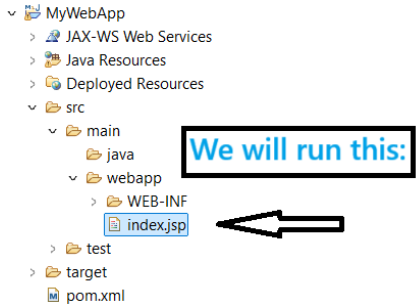
2. Go to organization settings and make sure these settings are off as shown:

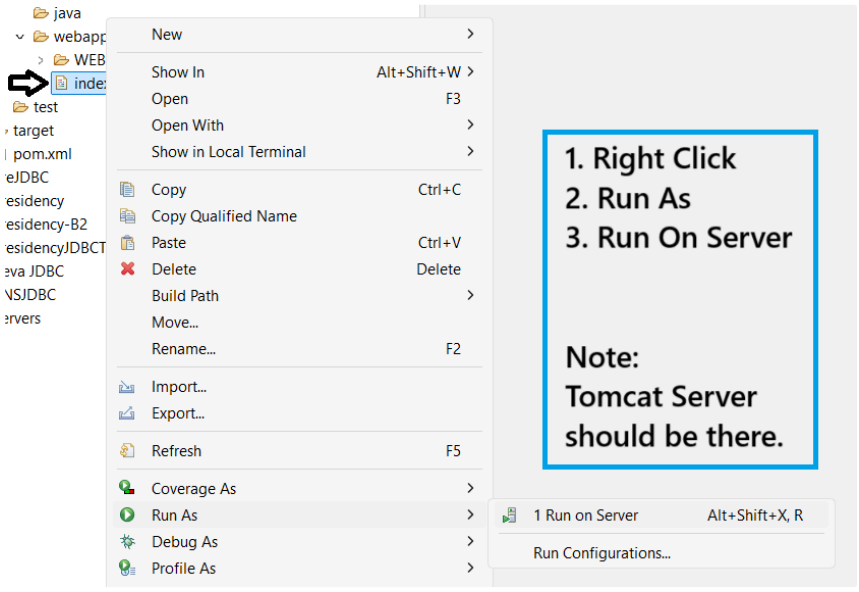
Your Organization → Organization Settings → Settings → They are **On** by default.

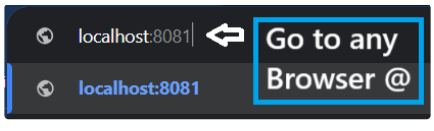


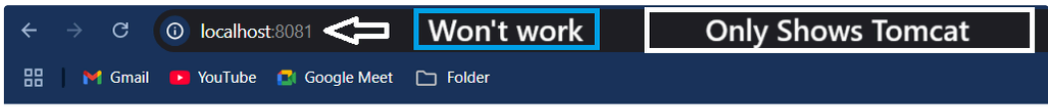
3. Go to your **Eclipse Maven Dynamic Web Project** & follow these steps:


eclipse-workspace - Eclipse IDE
File Edit Navigate Search Project Run Window Help
Package Explorer
Project Explorer
BNMIT
GSS-JDBC
JavaDatabaseConnectivity
JDBCTutorial
MyWebApp
PreJDBC
Presidency
Presidency-B2
PresidencyJDBCTutorial
Reva JDBC
RNSJDBC
Servers
Make sure your Dynamic Web Project is ready in Eclipse.
If not, you can select the GitHub URL given and fork it into your GitHub Account.
0 items selected


MyWebApp
JAX-WS Web Services
Java Resources
Deployed Resources
src
main
java
webapp
WEB-INF
index.jsp
test
target
pom.xml
We will run this:


New
Show In Alt+Shift+W
Open F3
Open With
Show in Local Terminal
Copy Ctrl+C
Copy Qualified Name
Paste Ctrl+V
Delete Delete
Build Path
Move...
Rename... F2
Import...
Export...
Refresh F5
Coverage As
Run As
Debug As
Profile As
1 Run on Server Alt+Shift+X, R
Run Configurations...
1. Right Click
2. Run As
3. Run On Server
Note:
Tomcat Server
should be there.


localhost:8081
localhost:8081
Go to any Browser @



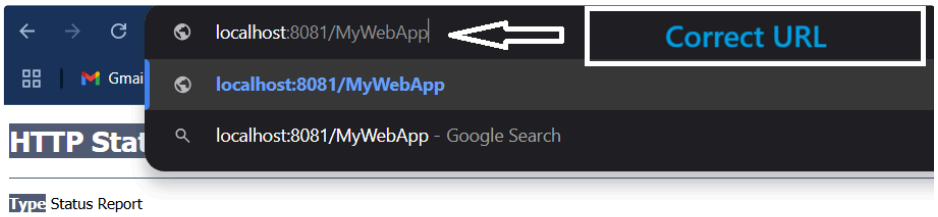
HTTP Status 404 – Not Found

Type Status Report

Message The requested resource [/] is not available

Description The origin server did not find a current representation for the target resource or is not willing to disclose that one exists.

Apache Tomcat/10.0.23



HTTP Sta

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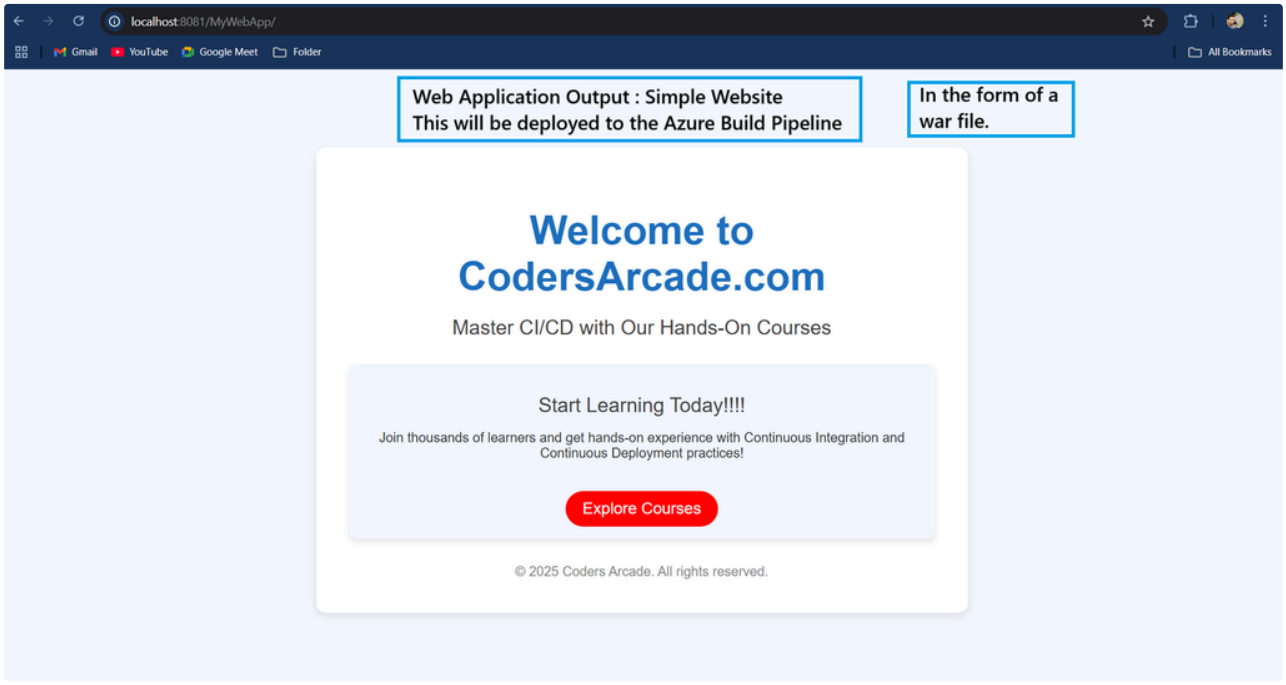
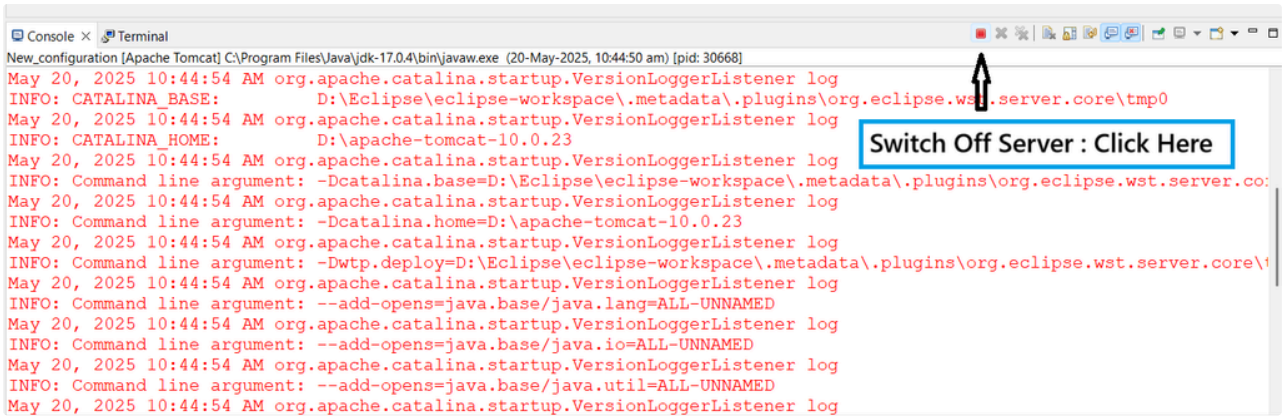
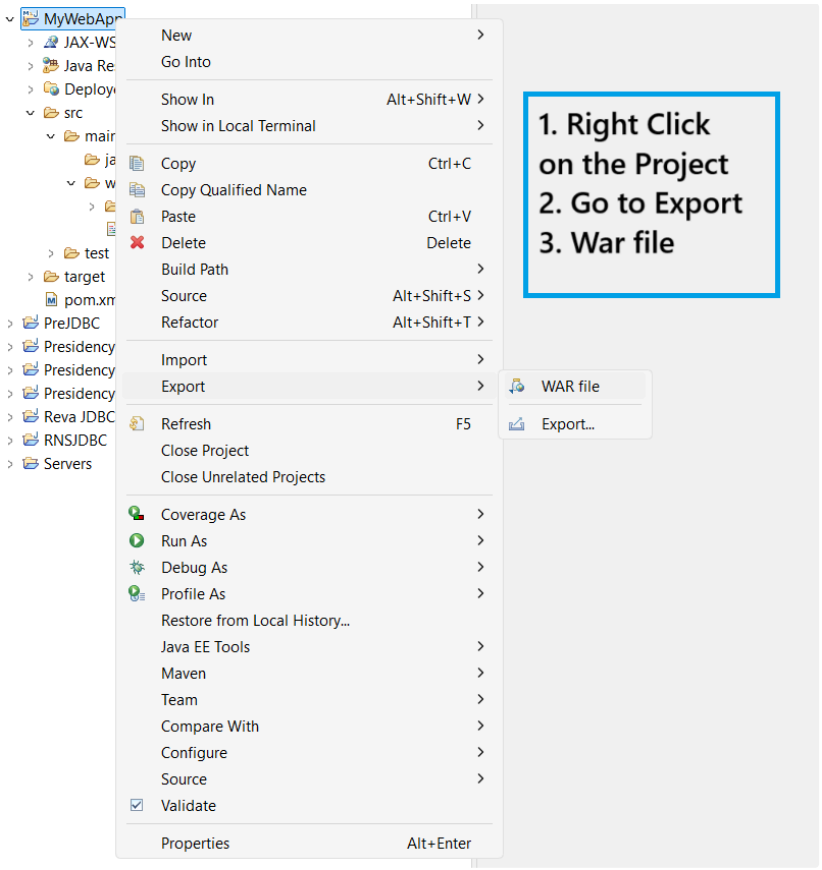
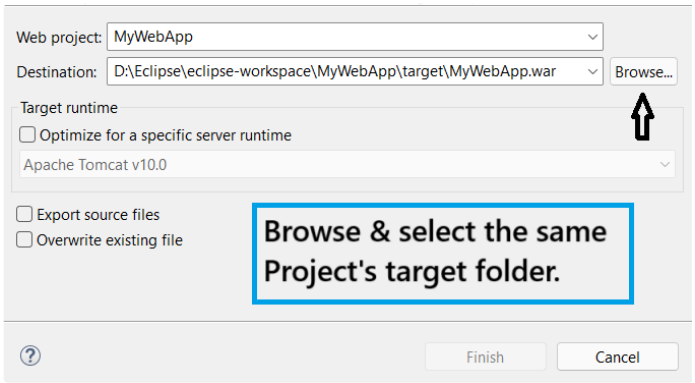
Apache Tomcat/10.0.23

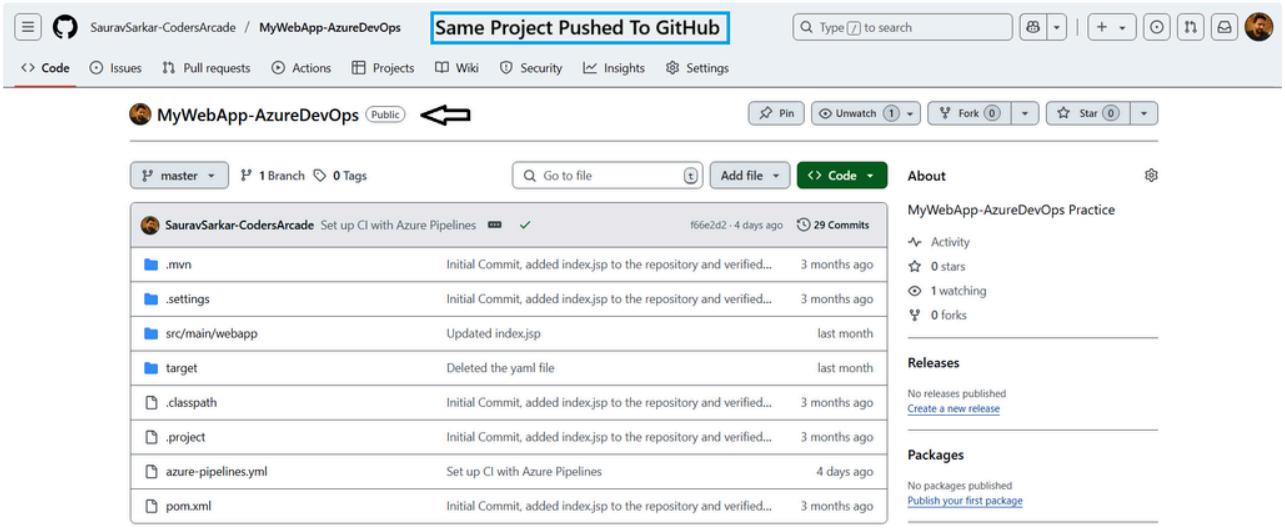



Console
Terminal
New_configuration [Apache Tomcat] C:\Program Files\Java\jdk-17.0.4\bin\javaw.exe (20-May-2025, 10:44:50 am) [pid: 30668]
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
INFO: CATALINA_BASE: D:\Eclipse\eclipse-workspace\.metadata\.plugins\org.eclipse.wst.server.core\tmp0
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
INFO: CATALINA_HOME: D:\apache-tomcat-10.0.23
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
INFO: Command line argument: -Dcatalina.base=D:\Eclipse\eclipse-workspace\.metadata\.plugins\org.eclipse.wst.server.co
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
INFO: Command line argument: -Dcatalina.home=D:\apache-tomcat-10.0.23
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
INFO: Command line argument: -Dwtp.deploy=D:\Eclipse\eclipse-workspace\.metadata\.plugins\org.eclipse.wst.server.core\
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
INFO: Command line argument: --add-opens=java.base/java.lang=ALL-UNNAMED
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
INFO: Command line argument: --add-opens=java.base/java.io=ALL-UNNAMED
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
INFO: Command line argument: --add-opens=java.base/java.util=ALL-UNNAMED
May 20, 2025 10:44:54 AM org.apache.catalina.startup.VersionLoggerListener log
Switch Off Server : Click Here

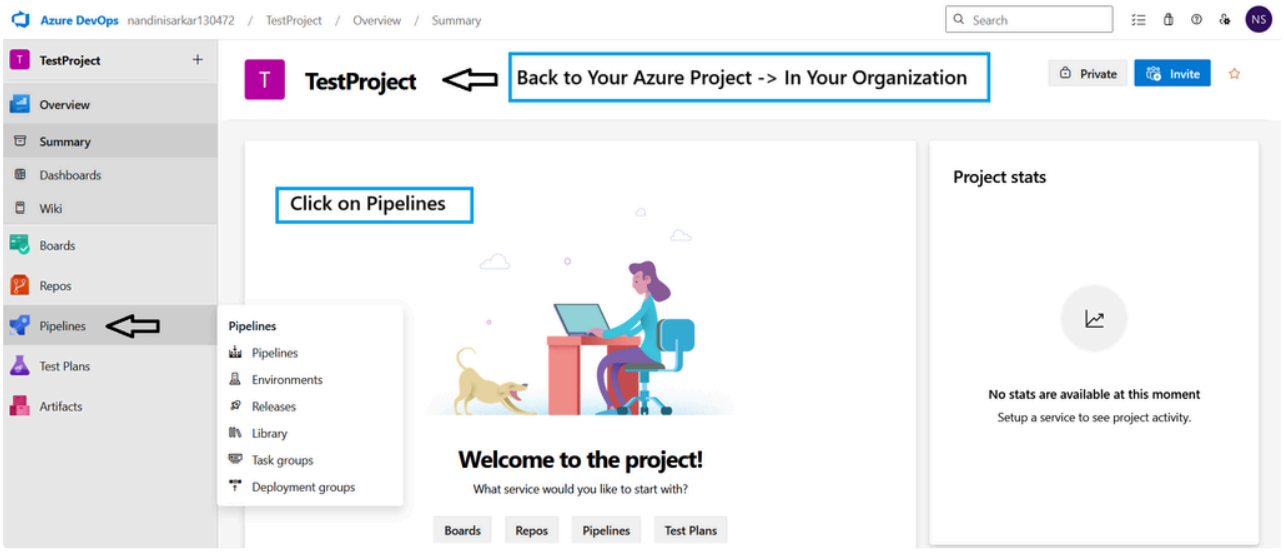

MyWebApp
JAX-WS
Java Re
Deploy
src
mair
ja
w
test
target
pom.xm
PreJDBC
Presidency
Presidency
Presidency
Reva JDBC
RNSJDBC
Servers
New
Go Into
Show In Alt+Shift+W
Show in Local Terminal
Copy Ctrl+C
Copy Qualified Name
Paste Ctrl+V
Delete Delete
Build Path
Source Alt+Shift+S
Refactor Alt+Shift+T
Import
Export
Refresh F5
Close Project
Close Unrelated Projects
Coverage As
Run As
Debug As
Profile As
Restore from Local History...
Java EE Tools
Maven
Team
Compare With
Configure
Source
Validate
Properties Alt+Enter
WAR file
Export...
1. Right Click on the Project
2. Go to Export
3. War file


Web project: MyWebApp
Destination: D:\Eclipse\eclipse-workspace\MyWebApp\target\MyWebApp.war
Browse...
Target runtime
Optimize for a specific server runtime
Apache Tomcat v10.0
Export source files
Overwrite existing file
Browse & select the same Project's target folder.
Finish
Cancel

4. Make sure the same project is pushed to **GitHub.** If not, use this **URL** ⬇️ & **Fork** it using the steps as given in the beginning:
5. GitHub URl : GitHub - SauravSarkar-CodersArcade/MyWebApp-AzureDevOps: MyWebApp-AzureDevOps Practice



6. Go back to your **Azure Project** & follow the given steps:



It will have no pipelines in the beginning, click on the button ■ "Create Pipeline" to create your 1st Pipeline.

Create your first Pipeline

Automate your build and release processes using our wizard, and go from code to cloud-hosted within minutes.

Create Pipeline ⋮ ⇦ Click Here

Connect | Select | Configure | Review

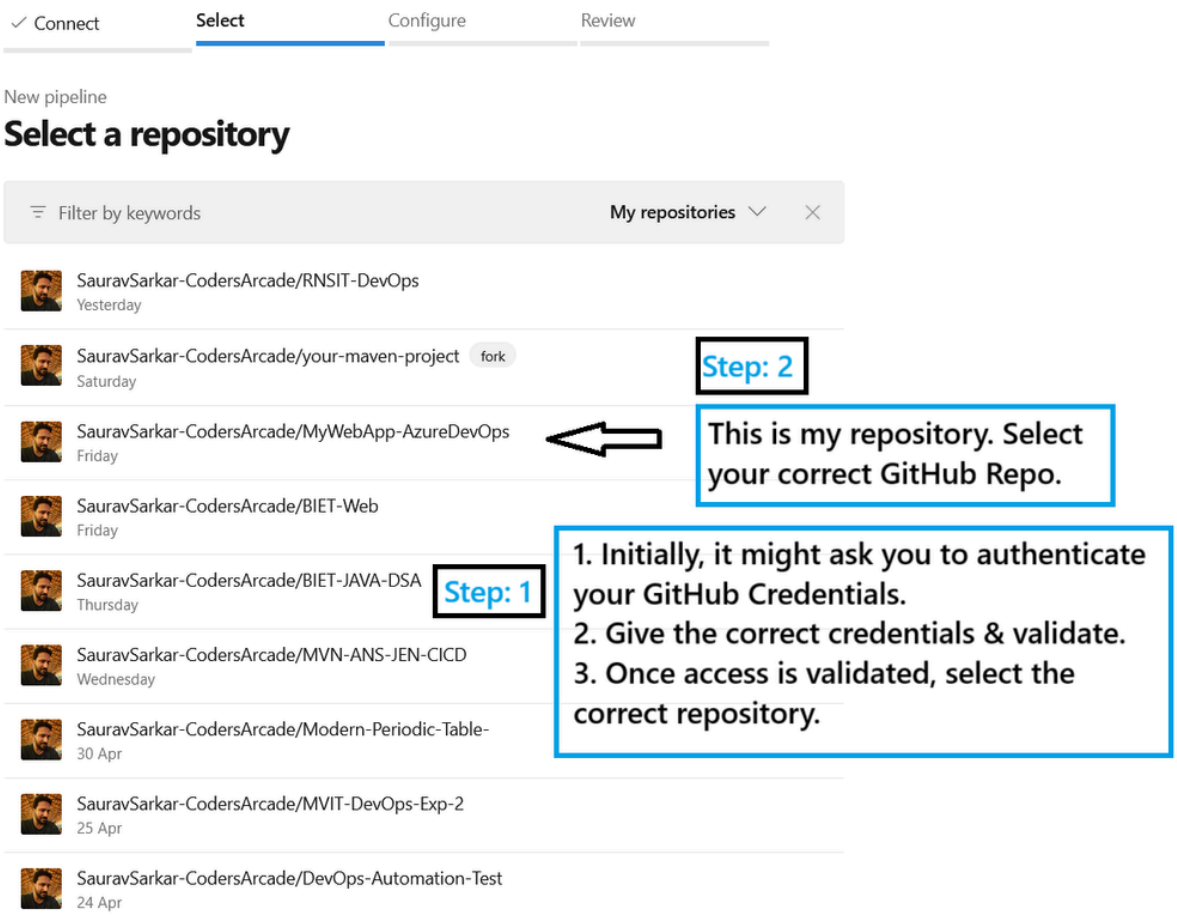
New pipeline

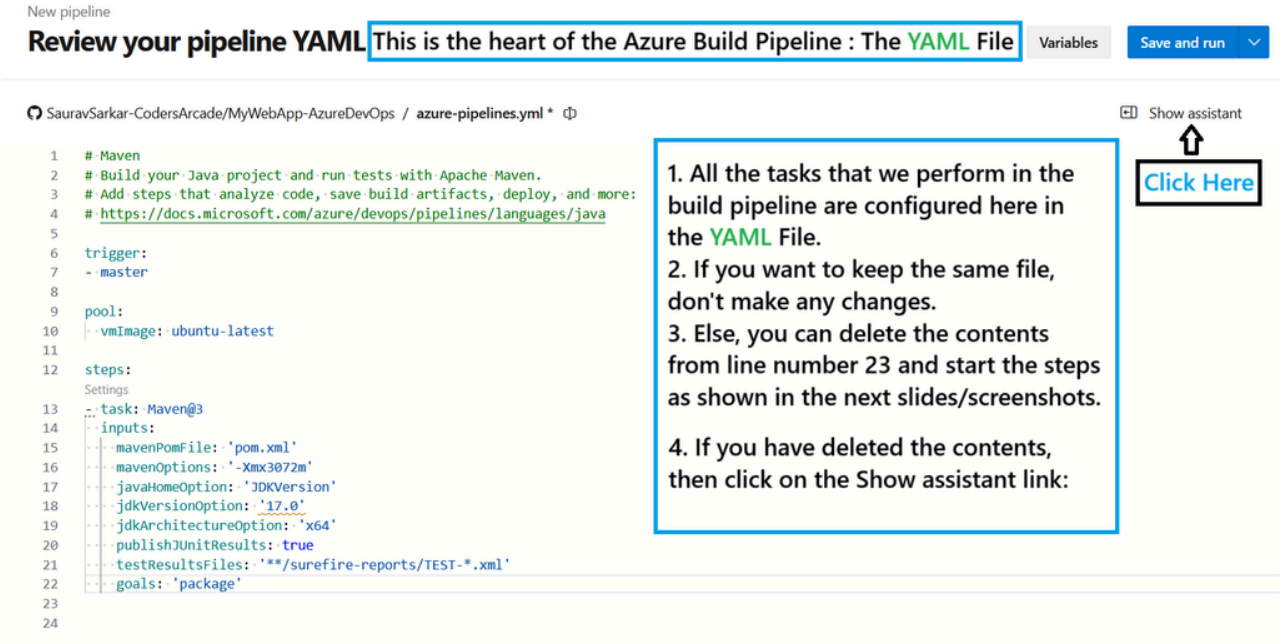
Where is your code?

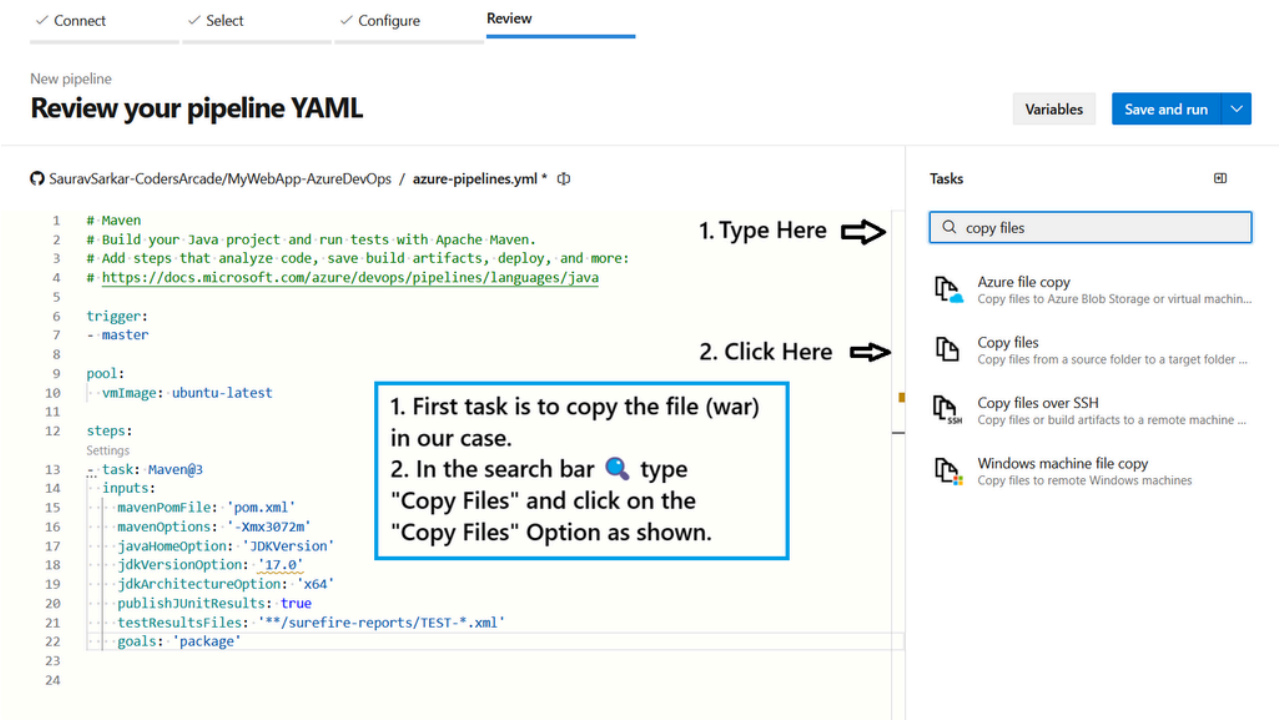
Azure will ask you Where your Source Code is : Select GitHub YAML "Third Option".

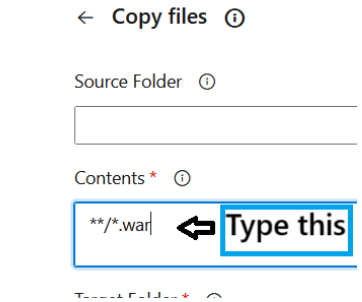
- Azure Repos Git YAML — Free private Git repositories, pull requests, and code search
- Bitbucket Cloud YAML — Hosted by Atlassian
- GitHub YAML — Home to the world's largest community of developers ⇦ Select this is our Source Code is on GitHub
- GitHub Enterprise Server YAML — The self-hosted version of GitHub Enterprise
- Other Git — Any generic Git repository
- Subversion — Centralized version control by Apache

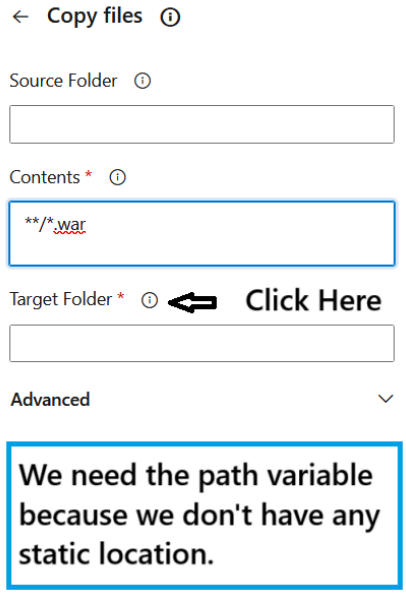
Use the classic editor to create a pipeline without YAML.


✓ Connect
Select
Configure
Review
New pipeline
Select a repository
Filter by keywords
My repositories
SauravSarkar-CodersArcade/RNSIT-DevOps
Yesterday
SauravSarkar-CodersArcade/your-maven-project
fork
Saturday
SauravSarkar-CodersArcade/MyWebApp-AzureDevOps
Friday
SauravSarkar-CodersArcade/BIET-Web
Friday
SauravSarkar-CodersArcade/BIET-JAVA-DSA
Thursday
SauravSarkar-CodersArcade/MVN-ANS-JEN-CICD
Wednesday
SauravSarkar-CodersArcade/Modern-Periodic-Table-
30 Apr
SauravSarkar-CodersArcade/MVIT-DevOps-Exp-2
25 Apr
SauravSarkar-CodersArcade/DevOps-Automation-Test
24 Apr
Step: 2
This is my repository. Select your correct GitHub Repo.
Step: 1
1. Initially, it might ask you to authenticate your GitHub Credentials.
2. Give the correct credentials & validate.
3. Once access is validated, select the correct repository.

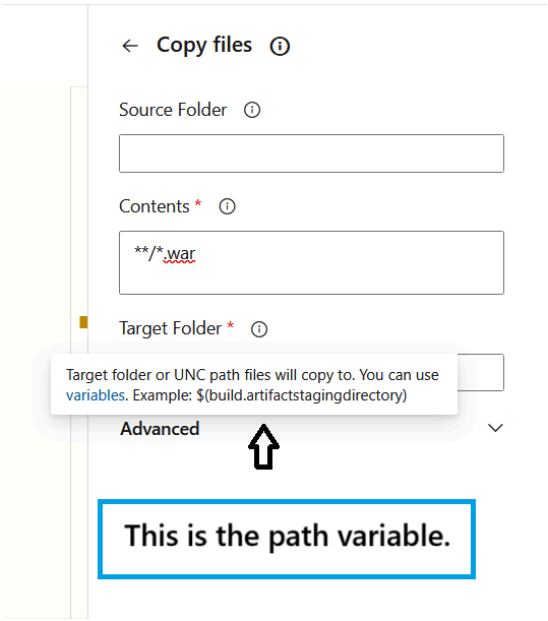

New pipeline
Review your pipeline YAML
This is the heart of the Azure Build Pipeline : The YAML File
Variables
Save and run
SauravSarkar-CodersArcade/MyWebApp-AzureDevOps / azure-pipelines.yml *
Show assistant
Click Here
Maven
Build your Java project and run tests with Apache Maven.
Add steps that analyze code, save build artifacts, deploy, and more:
https://docs.microsoft.com/azure/devops/pipelines/languages/java
trigger:
- master
pool:
vmImage: ubuntu-latest
steps:
Settings
- task: Maven@3
inputs:
mavenPomFile: 'pom.xml'
mavenOptions: '-Xmx3072m'
javaHomeOption: 'JDKVersion'
jdkVersionOption: '17.0'
jdkArchitectureOption: 'x64'
publishJUnitResults: true
testResultsFiles: '**/surefire-reports/TEST-*.xml'
goals: 'package'
1. All the tasks that we perform in the build pipeline are configured here in the YAML File.
2. If you want to keep the same file, don't make any changes.
3. Else, you can delete the contents from line number 23 and start the steps as shown in the next slides/screenshots.
4. If you have deleted the contents, then click on the Show assistant link:

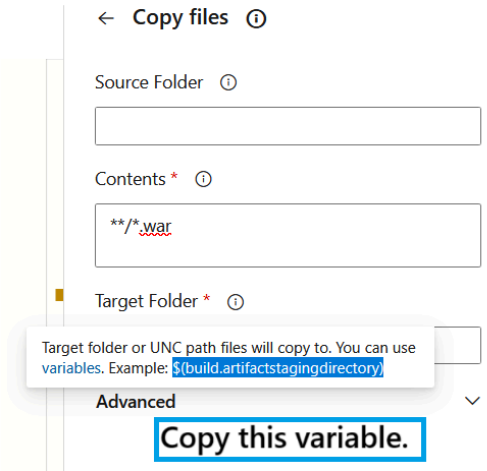


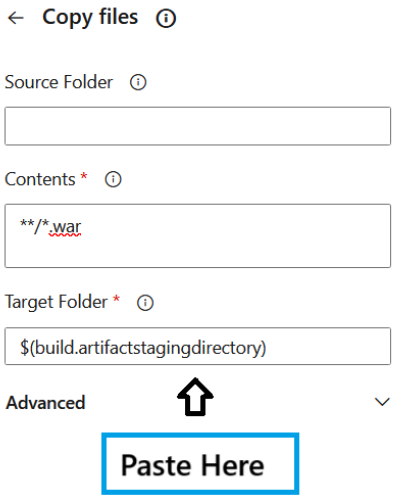


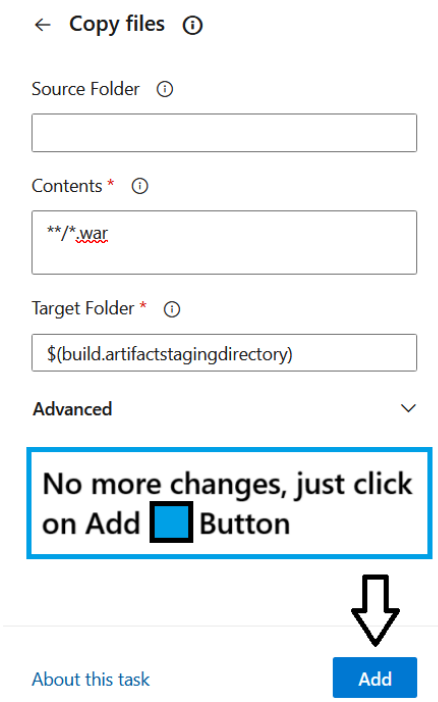


We need the path variable because we don't have any static location.


Copy files
Source Folder
Contents *
**/*.war
Target Folder *
Target folder or UNC path files will copy to. You can use variables. Example: $(build.artifactstagingdirectory)
Advanced
This is the path variable.


Copy files
Source Folder
Contents *
**/*.war
Target Folder *
Target folder or UNC path files will copy to. You can use variables. Example: $(build.artifactstagingdirectory)
Advanced
Copy this variable.


Copy files
Source Folder
Contents *
**/*.war
Target Folder *
$(build.artifactstagingdirectory)
Advanced
Paste Here



New pipeline

Review your pipeline YAML

SauravSarkar-CodersArcade/MyWebApp-AzureDevOps / **azure-pipelines.yml** *

Settings

```yaml
- task: Maven@3
  inputs:
    mavenPomFile: 'pom.xml'
    mavenOptions: '-Xmx3072m'
    javaHomeOption: 'JDKVersion'
    jdkVersionOption: '17.0'
    jdkArchitectureOption: 'x64'
    publishJUnitResults: true
    testResultsFiles: '**/surefire-reports/TEST-*.xml'
    goals: 'package'
```

Settings

```yaml
- task: CopyFiles@2
  inputs:
    Contents: '**/*.war'
    TargetFolder: '$(build.artifactstagingdirectory)'
```

This task gets added.

New pipeline

Review your pipeline YAML

Variables | Save and run

SauravSarkar-CodersArcade/MyWebApp-AzureDevOps / azure-pipelines.yml *

```yaml
Settings
- task: Maven@3
  inputs:
    mavenPomFile: 'pom.xml'
    mavenOptions: '-Xmx3072m'
    javaHomeOption: 'JDKVersion'
    jdkVersionOption: '17.0'
    jdkArchitectureOption: 'x64'
    publishJUnitResults: true
    testResultsFiles: '**/surefire-reports/TEST-*.xml'
    goals: 'package'
Settings
- task: CopyFiles@2
  inputs:
    Contents: '**/*.war'
    TargetFolder: '$(build.artifactstagingdirectory)'
```

1. Now we need to Publish our Build Artifact (war) file.
2. Go to the Assistant again.

Tasks

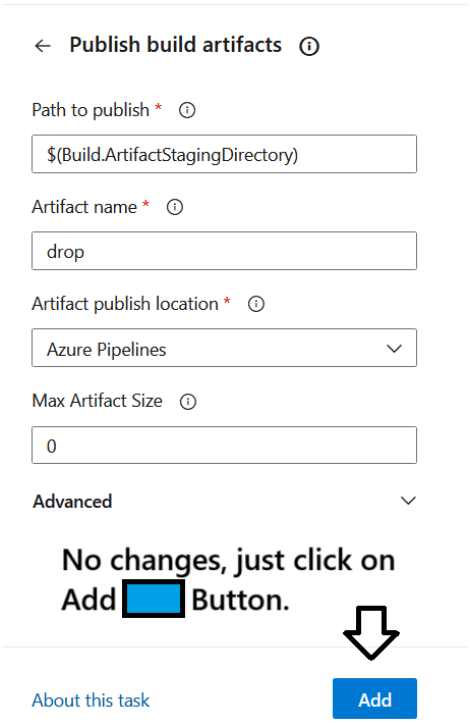
Search tasks

- .NET Core — Build, test, package, or publish a dotnet applicatio...
- Android signing — Sign and align Android APK files
- Ant — Build with Apache Ant
- App Center distribute — Distribute app builds to testers and users via Visu...
- App Center test — Test app packages with Visual Studio App Center
- Archive files — Compress files into .7z, .tar.gz, or .zip
- ARM template deployment — Deploy an Azure Resource Manager (ARM) templ...
- Azure App Configuration Export

Tasks — Type : "publish"

publish

- .NET Core — Build, test, package, or publish a dotnet applicatio...
- Index sources and publish symbols — Index your source code and publish symbols to a ...
- npm — Install and publish npm packages, or run an npm ...
- Publish build artifacts — Publish build artifacts to Azure Pipelines or a Win... — Click
- Publish code coverage results v2 — Publish any of the code coverage results from a b...
- Publish Pipeline Artifacts — Publish (upload) a file or directory as a named arti...
- Publish Pipeline Metadata — Publish Pipeline Metadata to Evidence store



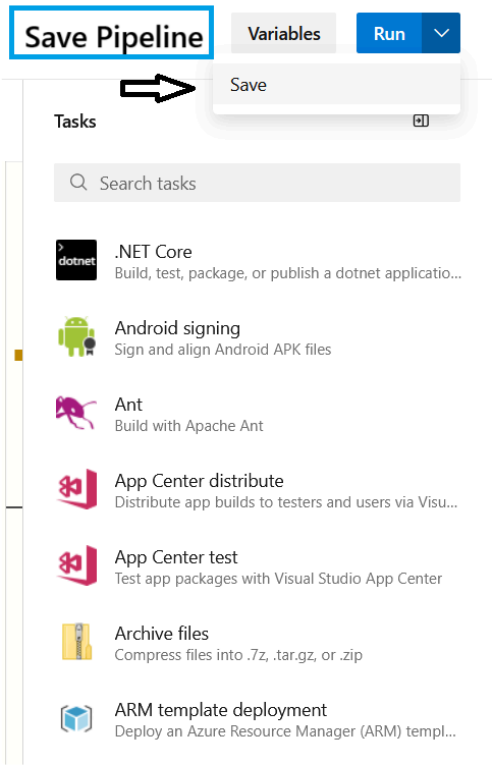
New pipeline

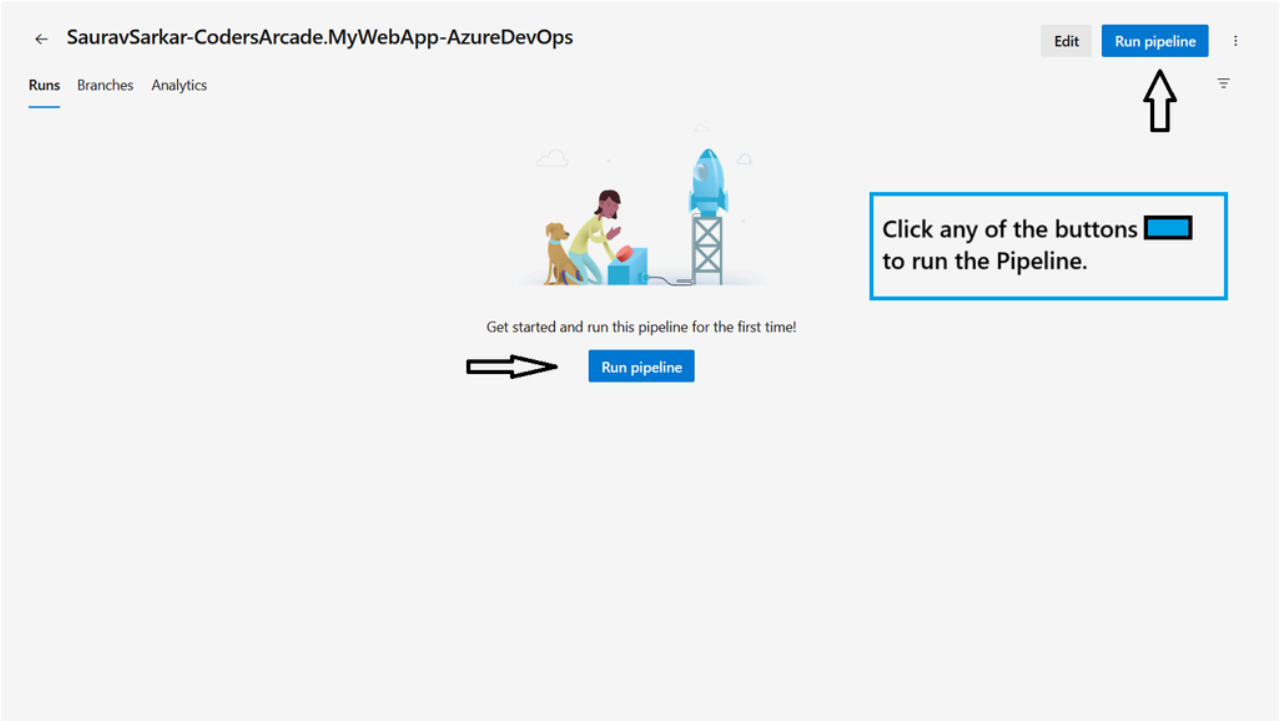
Review your pipeline YAML

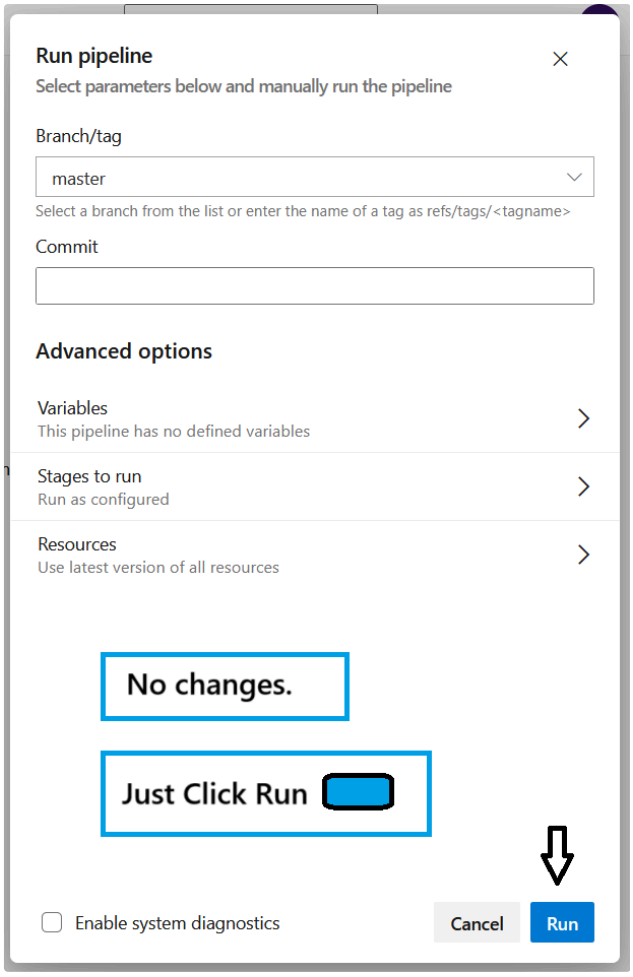
SauravSarkar-CodersArcade/MyWebApp-AzureDevOps / **azure-pipelines.yml**

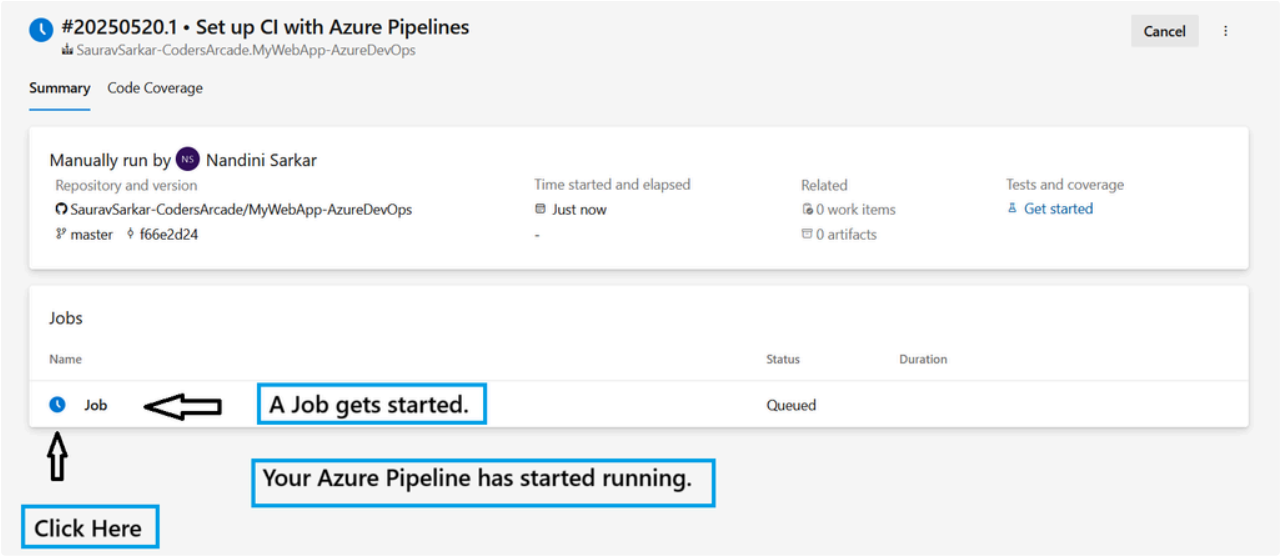
```
Settings
- task: Maven@3
  inputs:
    mavenPomFile: 'pom.xml'
    mavenOptions: '-Xmx3072m'
    javaHomeOption: 'JDKVersion'
    jdkVersionOption: '17.0'
    jdkArchitectureOption: 'x64'
    publishJUnitResults: true
    testResultsFiles: '**/surefire-reports/TEST-*.xml'
    goals: 'package'
Settings
- task: CopyFiles@2
  inputs:
    Contents: '**/*.war'
    TargetFolder: '$(build.artifactstagingdirectory)'
Settings
- task: PublishBuildArtifacts@1
  inputs:
    PathtoPublish: '$(Build.ArtifactStagingDirectory)'
    ArtifactName: 'drop'
    publishLocation: 'Container'
```

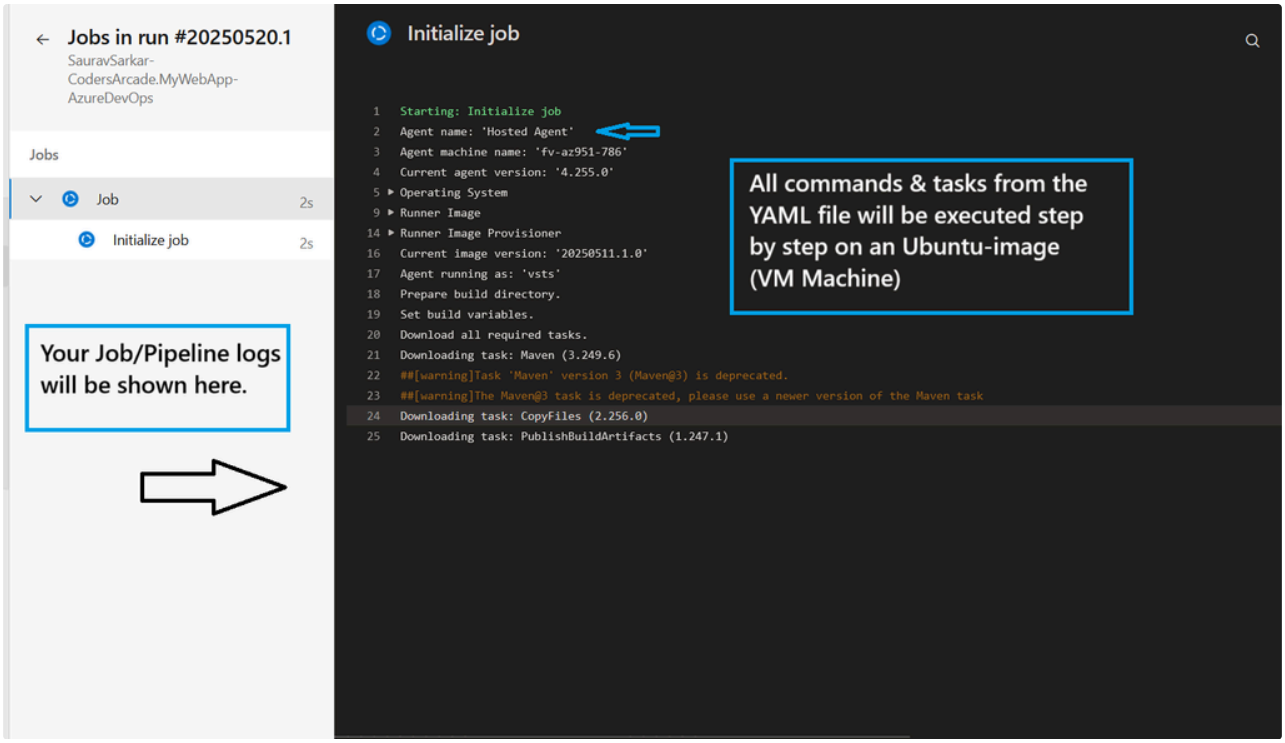
This gets added.

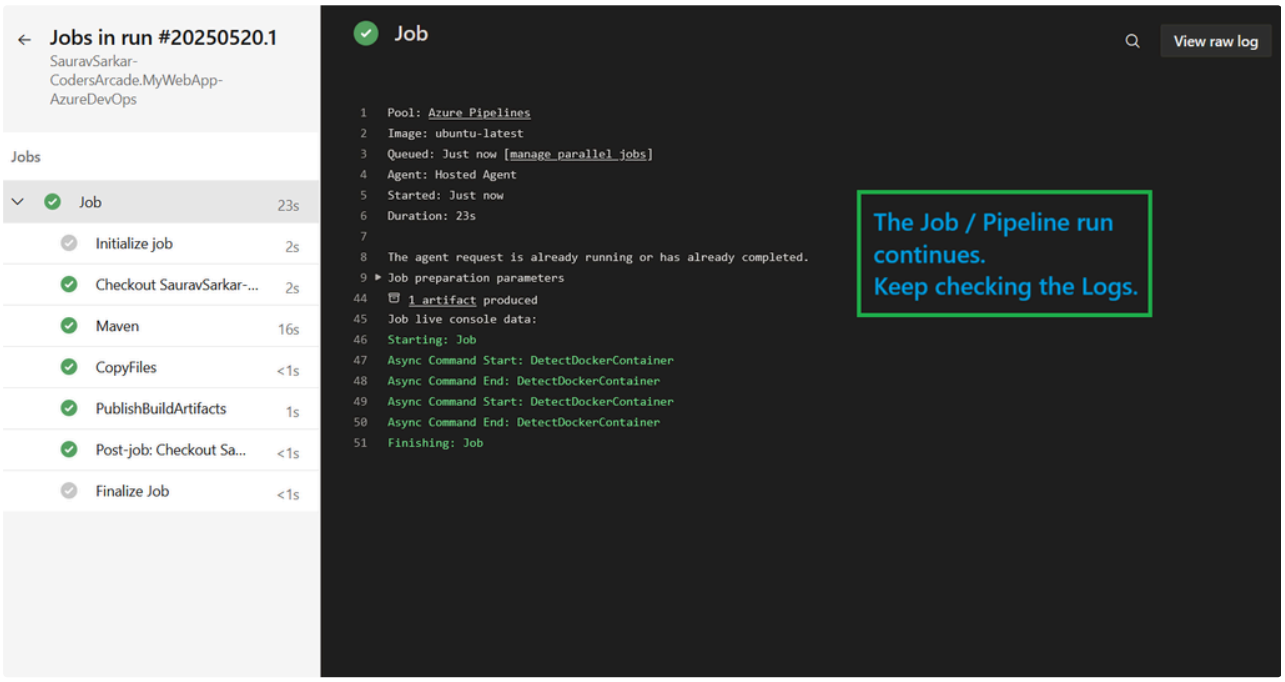

Save Pipeline
Variables
Run
Save
Tasks
Search tasks
.NET Core
Build, test, package, or publish a dotnet applicatio...
Android signing
Sign and align Android APK files
Ant
Build with Apache Ant
App Center distribute
Distribute app builds to testers and users via Visu...
App Center test
Test app packages with Visual Studio App Center
Archive files
Compress files into .7z, .tar.gz, or .zip
ARM template deployment
Deploy an Azure Resource Manager (ARM) templ...

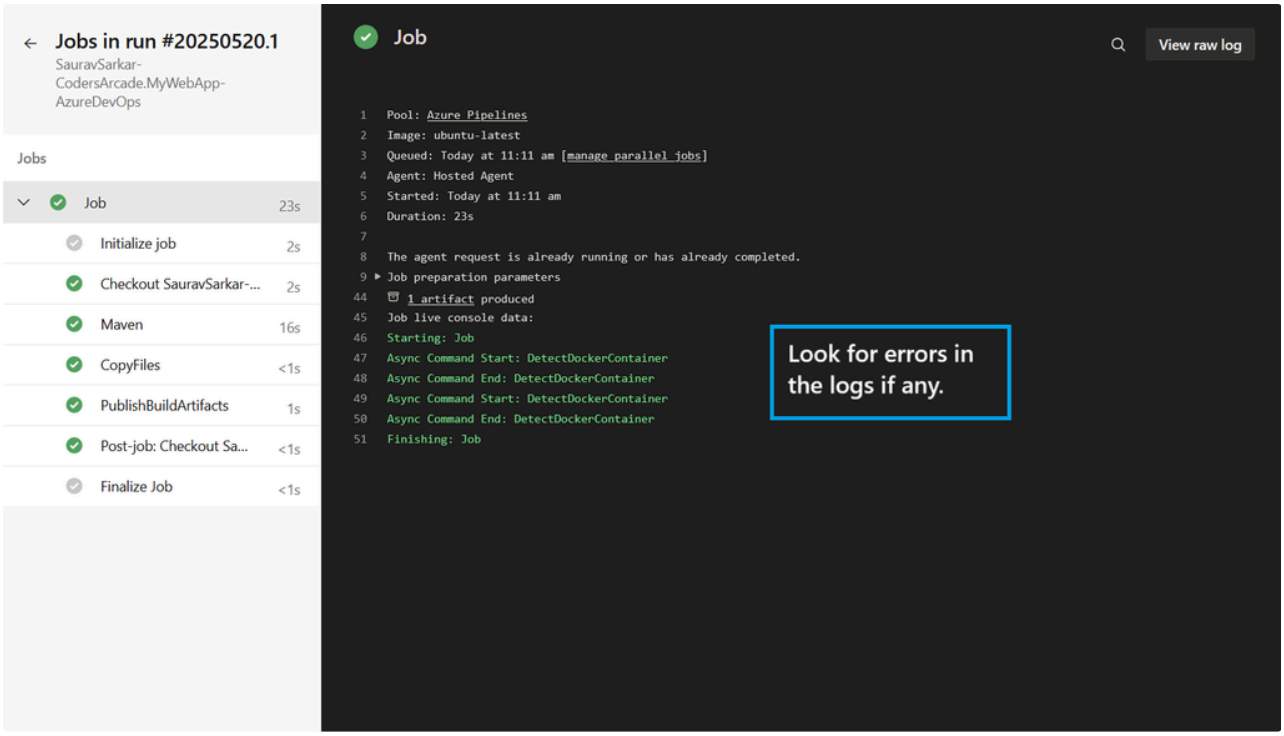

SauravSarkar-CodersArcade.MyWebApp-AzureDevOps
Edit
Run pipeline
Runs
Branches
Analytics
Click any of the buttons to run the Pipeline.
Get started and run this pipeline for the first time!
Run pipeline

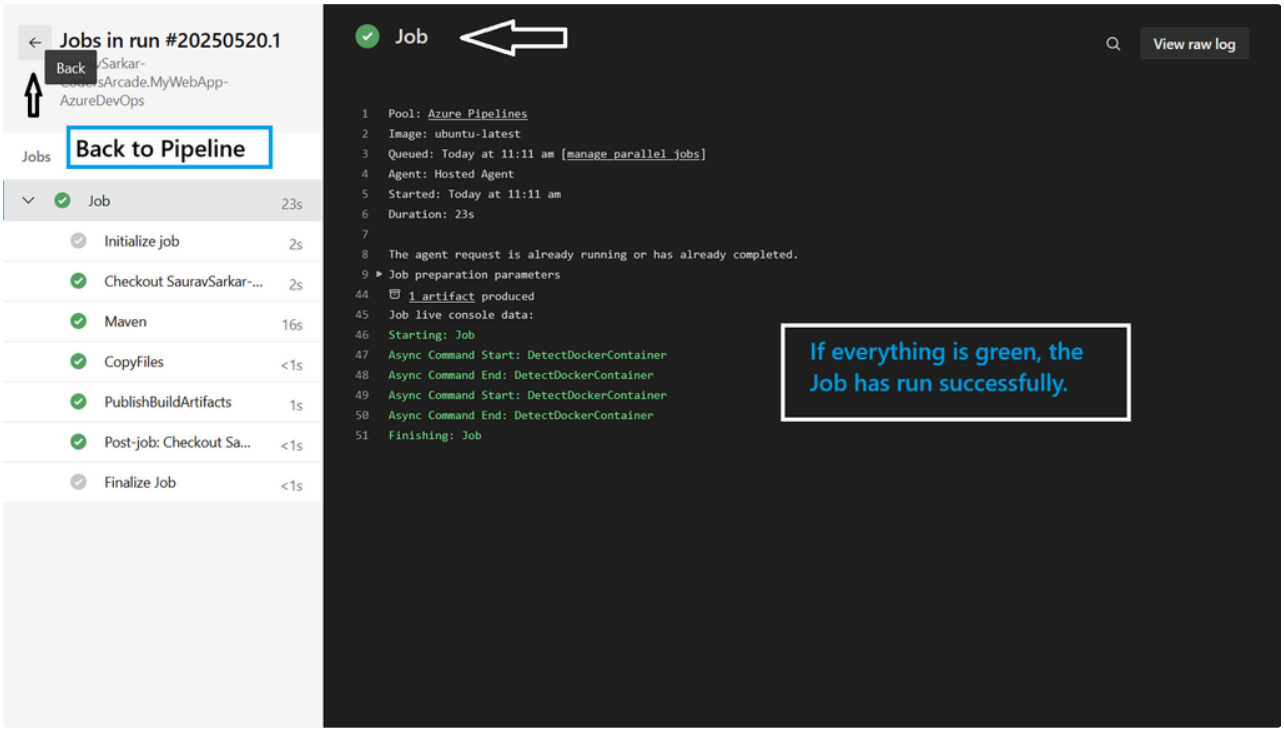

Run pipeline
Select parameters below and manually run the pipeline
Branch/tag
master
Select a branch from the list or enter the name of a tag as refs/tags/<tagname>
Commit
Advanced options
Variables
This pipeline has no defined variables
Stages to run
Run as configured
Resources
Use latest version of all resources
No changes.
Just Click Run
Enable system diagnostics
Cancel
Run

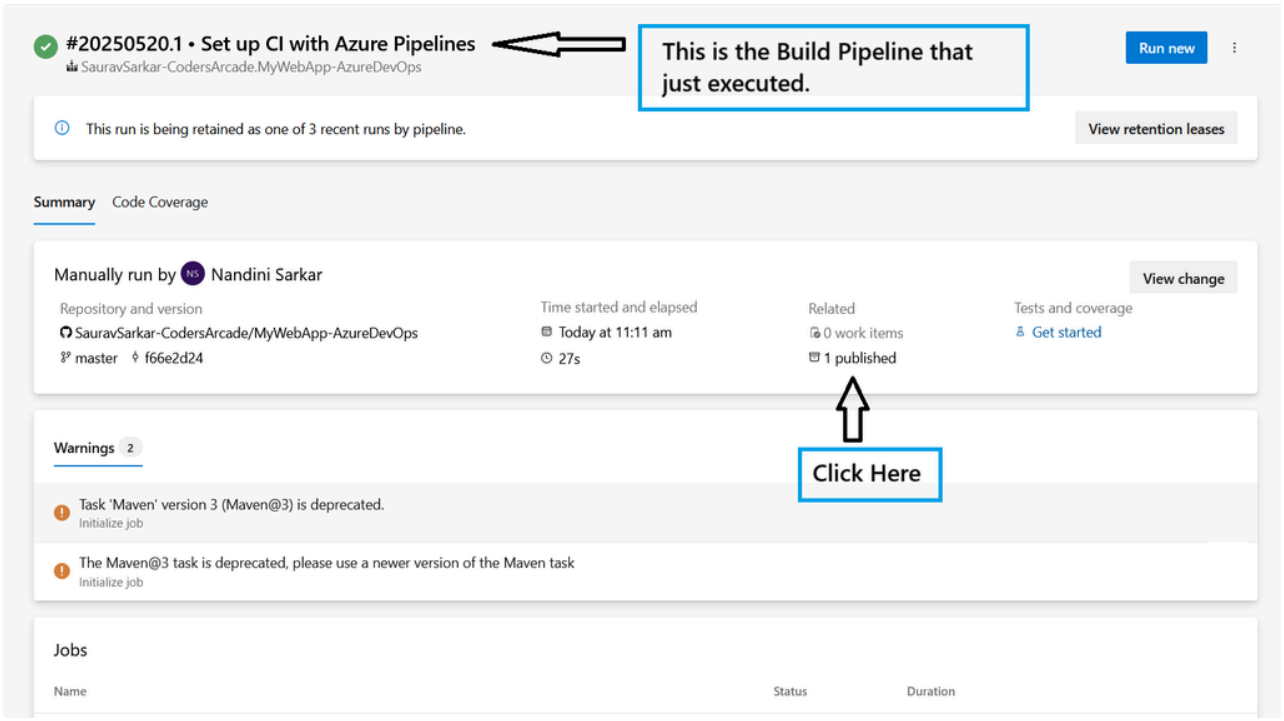

#20250520.1 • Set up CI with Azure Pipelines
SauravSarkar-CodersArcade.MyWebApp-AzureDevOps
Cancel
Summary
Code Coverage
Manually run by Nandini Sarkar
Repository and version
SauravSarkar-CodersArcade/MyWebApp-AzureDevOps
master
f66e2d24
Time started and elapsed
Just now
Related
0 work items
0 artifacts
Tests and coverage
Get started
Jobs
Name
Status
Duration
Job
A Job gets started.
Queued
Your Azure Pipeline has started running.
Click Here

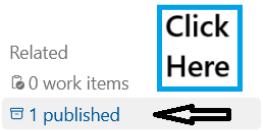

Jobs in run #20250520.1
SauravSarkar-CodersArcade.MyWebApp-AzureDevOps
Jobs
Job 2s
Initialize job 2s
Your Job/Pipeline logs will be shown here.
Initialize job
1 Starting: Initialize job
2 Agent name: 'Hosted Agent'
3 Agent machine name: 'fv-az951-786'
4 Current agent version: '4.255.0'
5 Operating System
9 Runner Image
14 Runner Image Provisioner
16 Current image version: '20250511.1.0'
17 Agent running as: 'vsts'
18 Prepare build directory.
19 Set build variables.
20 Download all required tasks.
21 Downloading task: Maven (3.249.6)
22 ##[warning]Task 'Maven' version 3 (Maven@3) is deprecated.
23 ##[warning]The Maven@3 task is deprecated, please use a newer version of the Maven task
24 Downloading task: CopyFiles (2.256.0)
25 Downloading task: PublishBuildArtifacts (1.247.1)
All commands & tasks from the YAML file will be executed step by step on an Ubuntu-image (VM Machine)

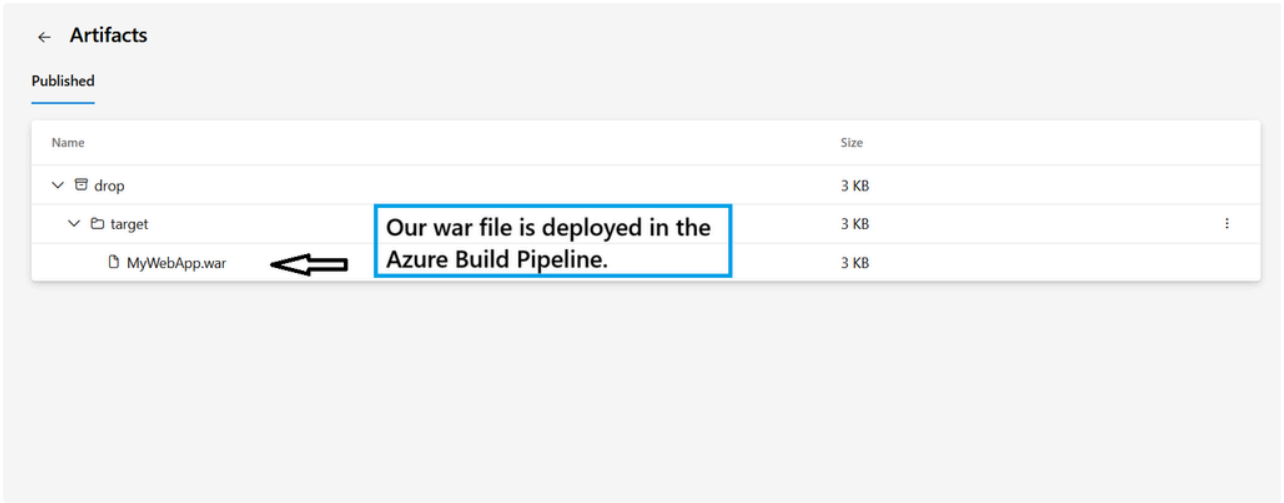

Jobs in run #20250520.1
SauravSarkar-CodersArcade.MyWebApp-AzureDevOps
Jobs
Job 23s
Initialize job 2s
Checkout SauravSarkar-... 2s
Maven 16s
CopyFiles <1s
PublishBuildArtifacts 1s
Post-job: Checkout Sa... <1s
Finalize Job <1s
Job
View raw log
1 Pool: Azure Pipelines
2 Image: ubuntu-latest
3 Queued: Just now [manage parallel jobs]
4 Agent: Hosted Agent
5 Started: Just now
6 Duration: 23s
8 The agent request is already running or has already completed.
9 Job preparation parameters
44 1 artifact produced
45 Job live console data:
46 Starting: Job
47 Async Command Start: DetectDockerContainer
48 Async Command End: DetectDockerContainer
49 Async Command Start: DetectDockerContainer
50 Async Command End: DetectDockerContainer
51 Finishing: Job
The Job / Pipeline run continues.
Keep checking the Logs.

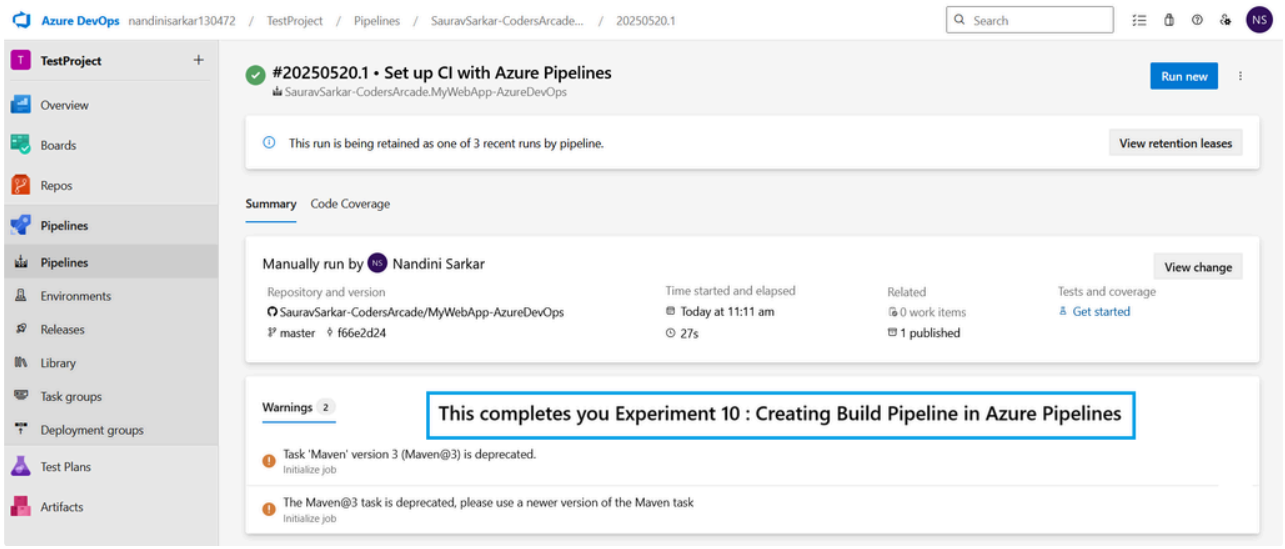

Jobs in run #20250520.1
SauravSarkar-CodersArcade.MyWebApp-AzureDevOps
Jobs
Job 23s
Initialize job 2s
Checkout SauravSarkar-... 2s
Maven 16s
CopyFiles <1s
PublishBuildArtifacts 1s
Post-job: Checkout Sa... <1s
Finalize Job <1s
Job
View raw log
1 Pool: Azure Pipelines
2 Image: ubuntu-latest
3 Queued: Today at 11:11 am [manage parallel jobs]
4 Agent: Hosted Agent
5 Started: Today at 11:11 am
6 Duration: 23s
7
8 The agent request is already running or has already completed.
9 Job preparation parameters
44 1 artifact produced
45 Job live console data:
46 Starting: Job
47 Async Command Start: DetectDockerContainer
48 Async Command End: DetectDockerContainer
49 Async Command Start: DetectDockerContainer
50 Async Command End: DetectDockerContainer
51 Finishing: Job
Look for errors in the logs if any.


Jobs in run #20250520.1
Back
AzureDevOps
Back to Pipeline
Jobs
Job 23s
Initialize job 2s
Checkout SauravSarkar-... 2s
Maven 16s
CopyFiles <1s
PublishBuildArtifacts 1s
Post-job: Checkout Sa... <1s
Finalize Job <1s
Job
View raw log
1 Pool: Azure Pipelines
2 Image: ubuntu-latest
3 Queued: Today at 11:11 am [manage parallel jobs]
4 Agent: Hosted Agent
5 Started: Today at 11:11 am
6 Duration: 23s
7
8 The agent request is already running or has already completed.
9 Job preparation parameters
44 1 artifact produced
45 Job live console data:
46 Starting: Job
47 Async Command Start: DetectDockerContainer
48 Async Command End: DetectDockerContainer
49 Async Command Start: DetectDockerContainer
50 Async Command End: DetectDockerContainer
51 Finishing: Job
If everything is green, the Job has run successfully.


#20250520.1 • Set up CI with Azure Pipelines
SauravSarkar-CodersArcade.MyWebApp-AzureDevOps
This is the Build Pipeline that just executed.
Run new
This run is being retained as one of 3 recent runs by pipeline.
View retention leases
Summary
Code Coverage
Manually run by Nandini Sarkar
View change
Repository and version
SauravSarkar-CodersArcade/MyWebApp-AzureDevOps
master
f66e2d24
Time started and elapsed
Today at 11:11 am
27s
Related
0 work items
1 published
Tests and coverage
Get started
Click Here
Warnings 2
Task 'Maven' version 3 (Maven@3) is deprecated.
Initialize job
The Maven@3 task is deprecated, please use a newer version of the Maven task
Initialize job
Jobs
Name
Status
Duration


Related
0 work items
1 published
Click Here


Artifacts
Published
Name
Size
drop
3 KB
target
3 KB
MyWebApp.war
3 KB
Our war file is deployed in the Azure Build Pipeline.


Azure DevOps nandinisarkar130472 / TestProject / Pipelines / SauravSarkar-CodersArcade... / 20250520.1
Search
NS
TestProject
Overview
Boards
Repos
Pipelines
Pipelines
Environments
Releases
Library
Task groups
Deployment groups
Test Plans
Artifacts
#20250520.1 • Set up CI with Azure Pipelines
SauravSarkar-CodersArcade.MyWebApp-AzureDevOps
Run new
This run is being retained as one of 3 recent runs by pipeline.
View retention leases
Summary
Code Coverage
Manually run by NS Nandini Sarkar
View change
Repository and version
SauravSarkar-CodersArcade/MyWebApp-AzureDevOps
master f66e2d24
Time started and elapsed
Today at 11:11 am
27s
Related
0 work items
1 published
Tests and coverage
Get started
Warnings 2
This completes you Experiment 10 : Creating Build Pipeline in Azure Pipelines
Task 'Maven' version 3 (Maven@3) is deprecated.
Initialize job
The Maven@3 task is deprecated, please use a newer version of the Maven task
Initialize job