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DevOps Foundations: Version Control and CI/CD with Jenkins

Course-End Project 1: Insured Assurance

Objective

To create a GitHub Actions CI/CD pipeline workflow for invoking the deployment of a Java application as a Jenkins job using Tomcat Apache

Real-time scenario:

Insured Assurance, a leading global insurance provider based in the US, offers a range of products including home, health, car, and life insurance. The company is transitioning to a DevOps architecture and aims to automate code builds and deployments across various environments. To meet this need, it has adopted GitHub Actions for code checkout, building, and testing automation and Jenkins for continuous deployment. As a DevOps engineer at Insured Assurance, you are tasked with implementing a CI/CD pipeline using GitHub Actions and Jenkins.

Tasks

The following tasks outline the process of implementing CI/CD using GitHub Actions and Jenkins:

1. *Create a code repository on GitHub*
2. *Create a GitHub Actions pipeline to perform continuous integration*
3. *Configure Tomcat Apache for automated code deployment*
4. *Integrate the GitHub Actions pipeline to invoke the Jenkins pipeline*
5. *Invoke pipeline to validate automated deployment*

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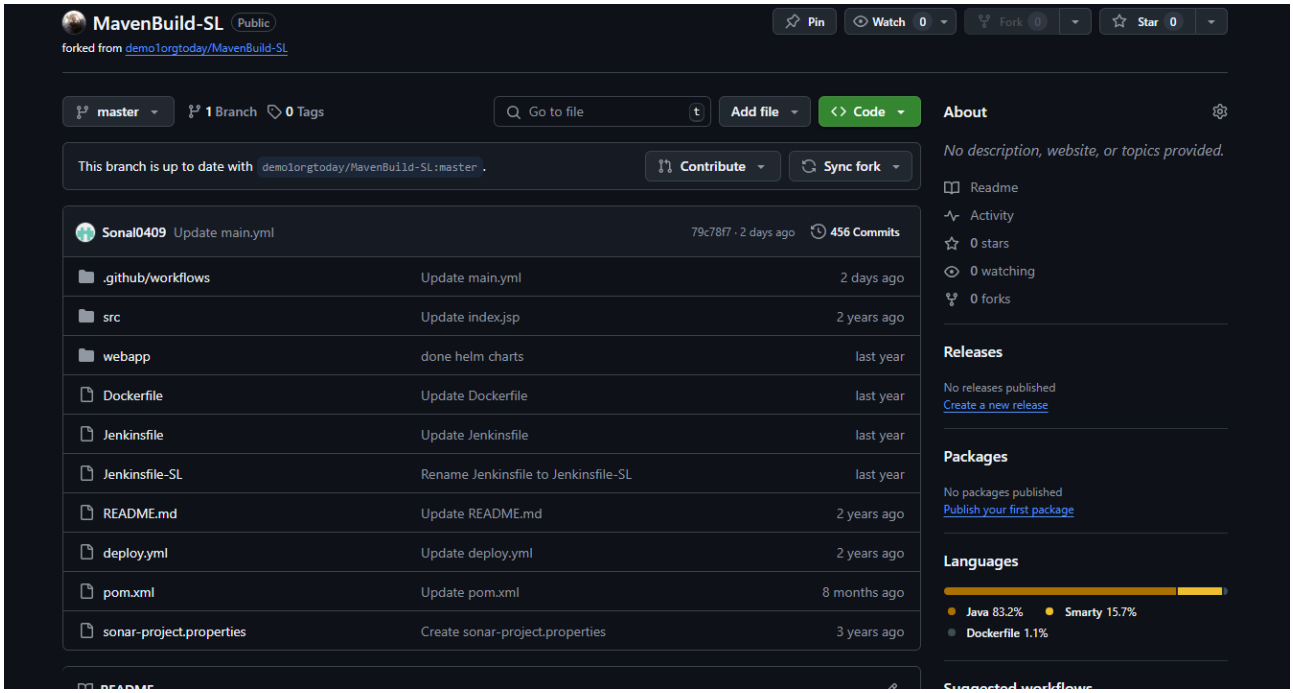
Solution:

Task 1: Create a code repository on GitHub

Forking repository from https://github.com/demo1orgtoday/MavenBuild-SL.git



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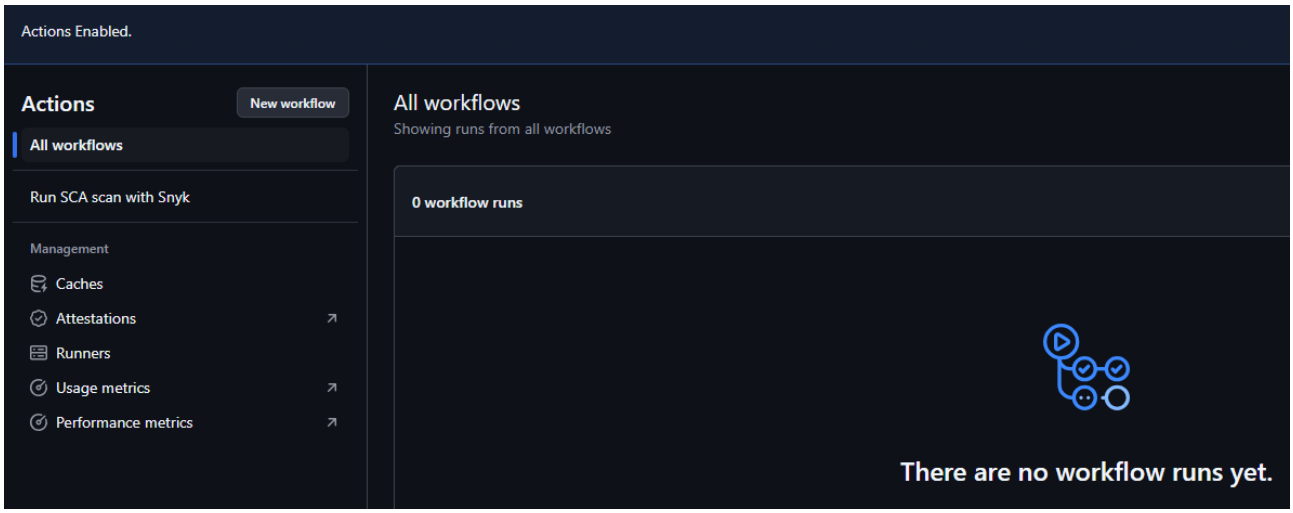
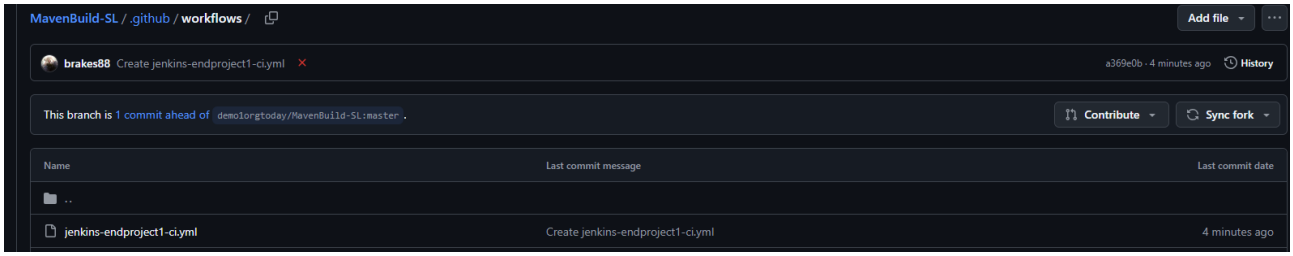
Task 2: Create a GitHub Actions pipeline to perform continuous integration

Created new empty workflow





Initial GitHub Action Code:

```yaml
name: Jenkins-EndProject1-CI
on:
  push: # run when there is commit to repo
  workflow_dispatch: # run manually
jobs:
  CICDjob:
    runs-on: ubuntu-latest
    steps:
    - name: Clone the repo on ubuntu server
      uses: actions/checkout@v4
    - name: Install Java and maven on ubuntu server
      uses: actions/setup-java@v4
      with:
        distribution: 'temurin'
        java-version: '11'
        cache: 'maven'
    - name: Build the code
      run: mvn package
```

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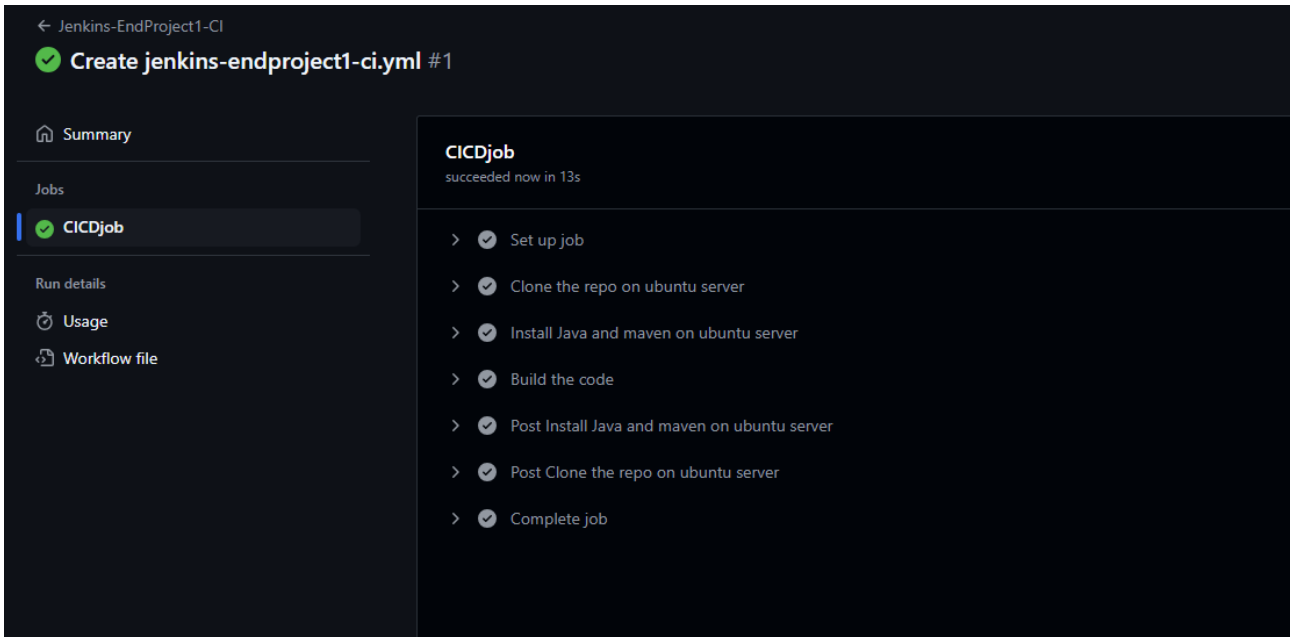

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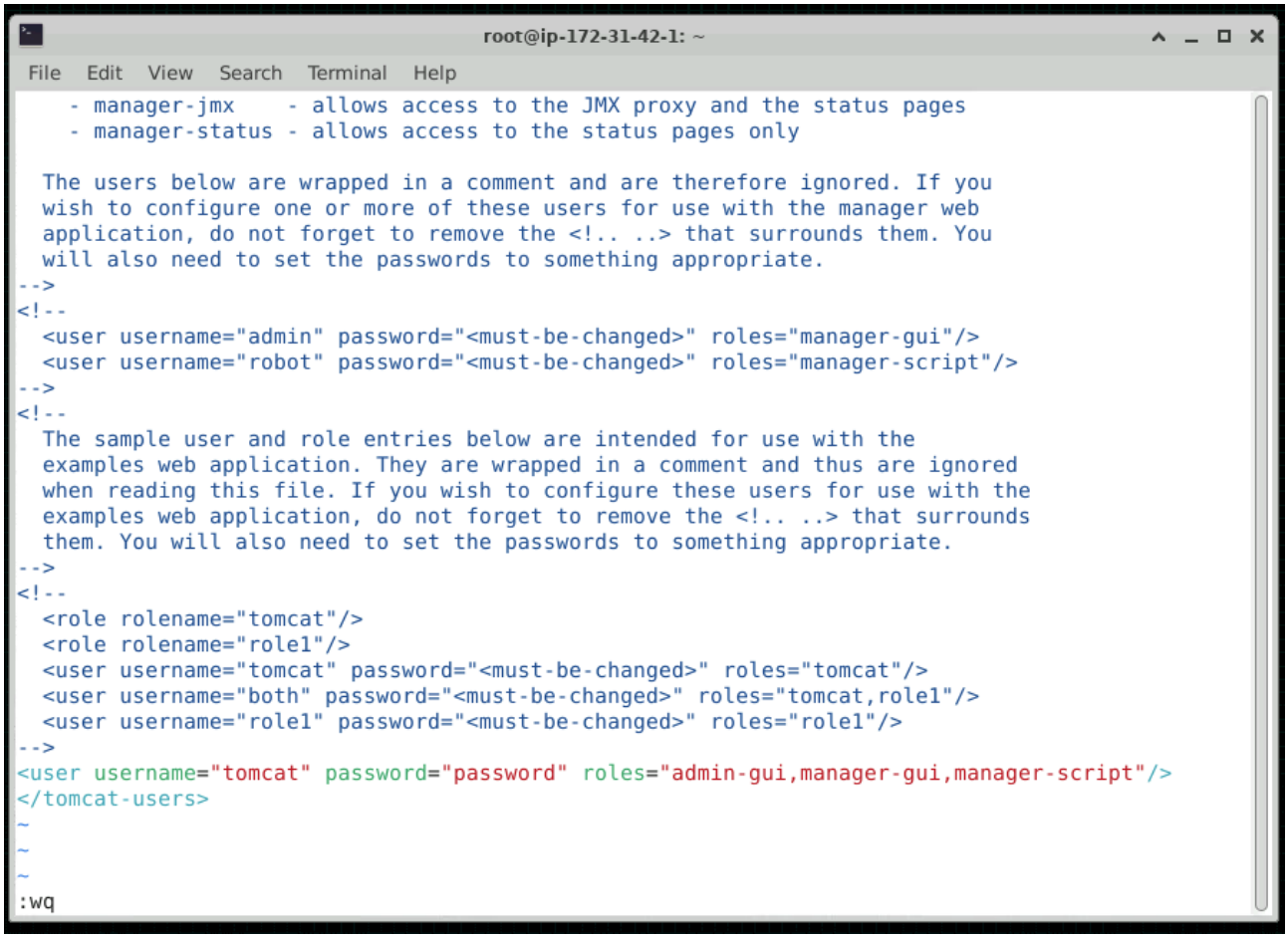
Task 3: Configure Tomcat Apache for automated code deployment

Installed tomcat9 in lab

Updated user information in /etc/tomcat9/tomcat-users.xml



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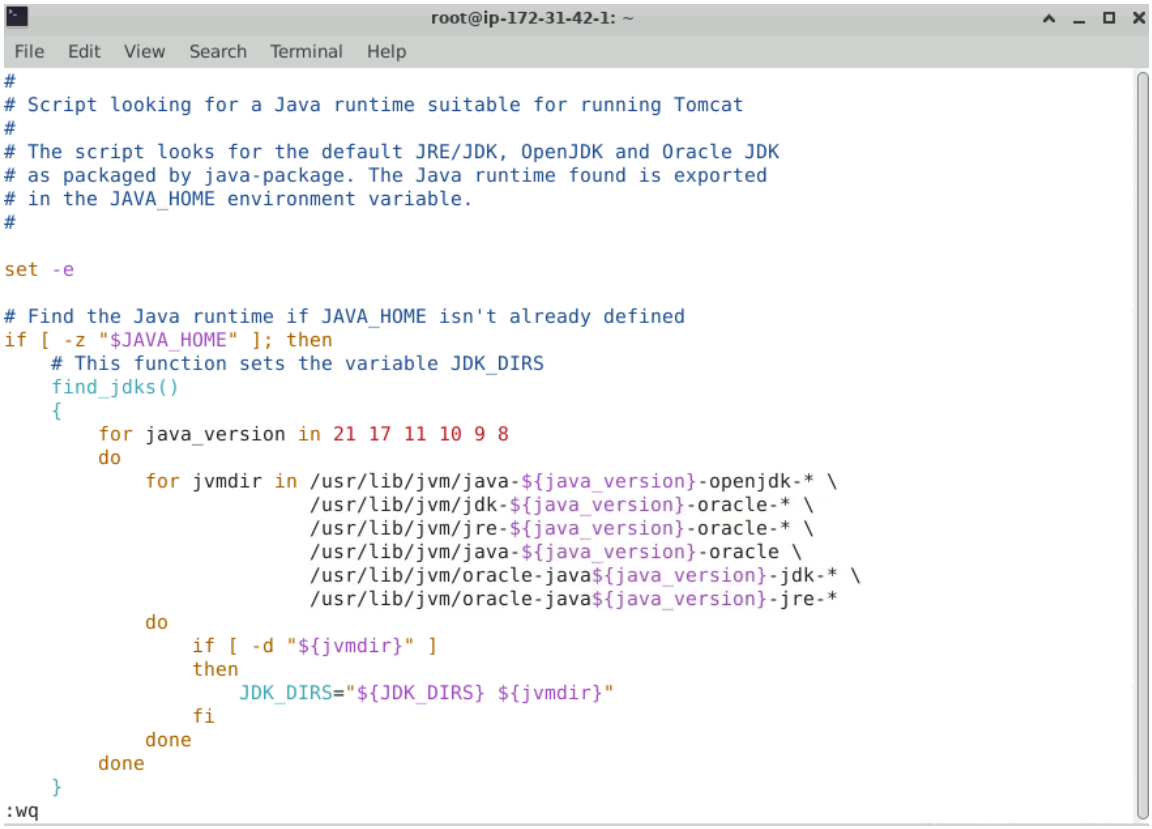
Changed tomcat port in /etc/tomcat9/server.xml

Added java versions in /usr/libexec/tomcat9/tomcat-locate-java.sh



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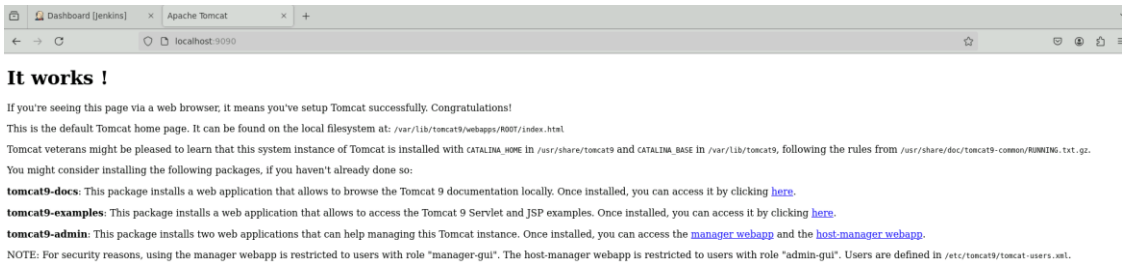
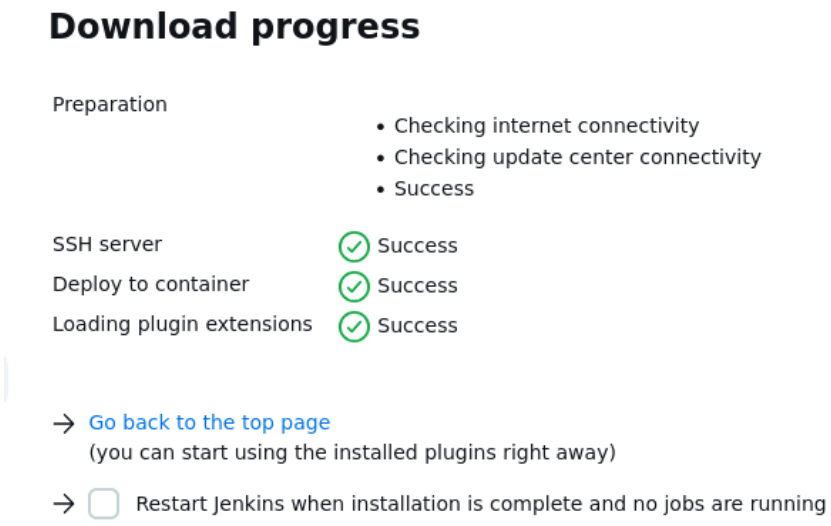
Restarted tomcat service

```
root@ip-172-31-42-1:~# systemctl restart tomcat9.service
root@ip-172-31-42-1:~# systemctl status tomcat9.service
● tomcat9.service - Apache Tomcat 9 Web Application Server
     Loaded: loaded (/lib/systemd/system/tomcat9.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2025-05-13 14:21:42 UTC; 7s ago
       Docs: https://tomcat.apache.org/tomcat-9.0-doc/index.html
    Process: 21839 ExecStartPre=/usr/libexec/tomcat9/tomcat-update-policy.sh (code=exited, stat>
   Main PID: 21843 (java)
      Tasks: 38 (limit: 18910)
     Memory: 239.7M
        CPU: 7.851s
     CGroup: /system.slice/tomcat9.service
             └─21843 /usr/lib/jvm/java-21-openjdk-arm64/bin/java -Djava.util.logging.config.fil>

May 13 14:21:45 ip-172-31-42-1 tomcat9[21843]: Deployment of deployment descriptor [/etc/tomcat>
May 13 14:21:45 ip-172-31-42-1 tomcat9[21843]: Deploying deployment descriptor [/etc/tomcat9/Ca>
May 13 14:21:45 ip-172-31-42-1 tomcat9[21843]: The path attribute with value [/manager] in depl>
May 13 14:21:46 ip-172-31-42-1 tomcat9[21843]: At least one JAR was scanned for TLDs yet contai>
May 13 14:21:46 ip-172-31-42-1 tomcat9[21843]: Deployment of deployment descriptor [/etc/tomcat>
May 13 14:21:46 ip-172-31-42-1 tomcat9[21843]: Deploying web application directory [/var/lib/to>
May 13 14:21:46 ip-172-31-42-1 tomcat9[21843]: At least one JAR was scanned for TLDs yet contai>
May 13 14:21:46 ip-172-31-42-1 tomcat9[21843]: Deployment of web application directory [/var/li>
May 13 14:21:46 ip-172-31-42-1 tomcat9[21843]: Starting ProtocolHandler ["http-nio-9090"]
May 13 14:21:46 ip-172-31-42-1 tomcat9[21843]: Server startup in [3152] milliseconds
lines 1-22/22 (END)...skipping...
● tomcat9.service - Apache Tomcat 9 Web Application Server
     Loaded: loaded (/lib/systemd/system/tomcat9.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2025-05-13 14:21:42 UTC; 7s ago
       Docs: https://tomcat.apache.org/tomcat-9.0-doc/index.html
    Process: 21839 ExecStartPre=/usr/libexec/tomcat9/tomcat-update-policy.sh (code=exited, status>
   Main PID: 21843 (java)
      Tasks: 38 (limit: 18910)
     Memory: 239.7M
        CPU: 7.851s
```



Added Deploy to container Jenkins plugin



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Added tomcat user

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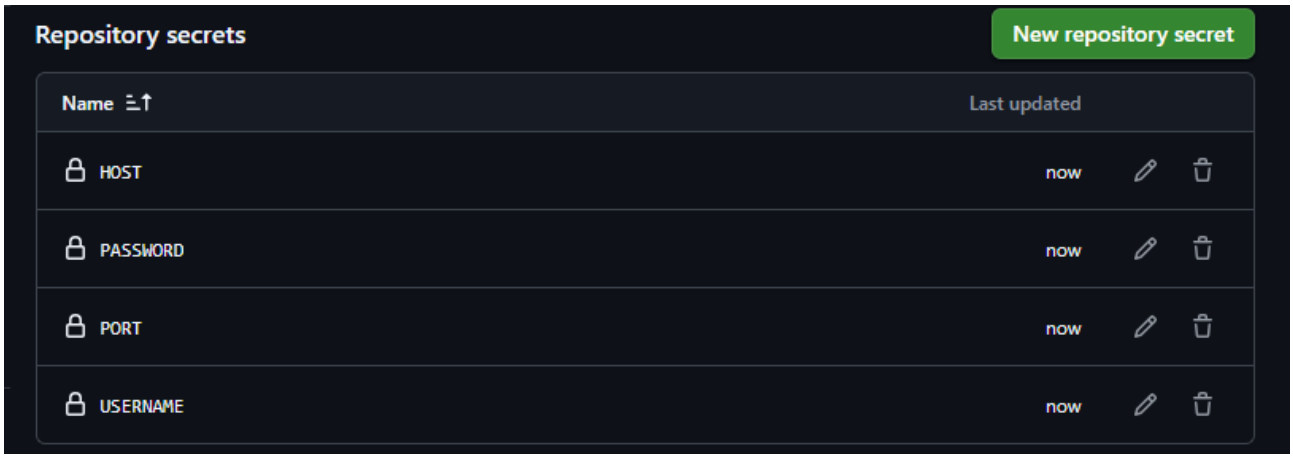
Task 4: Integrate the GitHub Actions pipeline to invoke the Jenkins pipeline

Added secrets for lab connection



Updated action with .war copy and trigger for Jenkins job

```yaml
name: Jenkins-EndProject1-CICD
on:
  push: # run when there is commit to repo
  workflow_dispatch: # run manually
jobs:
  CICDjob:
    runs-on: ubuntu-latest
    steps:
    - name: Clone the repo on ubuntu server
      uses: actions/checkout@v4
    - name: Install Java and maven on ubuntu server
      uses: actions/setup-java@v4
      with:
        distribution: 'temurin'
        java-version: '11'
        cache: 'maven'
    - name: Build the code
      run: mvn package
    - name: connect to LAb and deploy code on tomcat9
      uses: cross-the-world/ssh-scp-ssh-pipelines@latest
      with:
        host: ${{secrets.HOST}}
        user: ${{secrets.USERNAME}}
        pass: ${{secrets.PASSWORD}}
        port: ${{secrets.PORT}}
        connect_timeout: 10s
        first_ssh: |
          sudo chmod 777 /var/lib/tomcat9/webapps
        scp: |
          './target/*war' => /var/lib/tomcat9/webapps
        last_ssh: |
          sudo systemctl restart tomcat9
    - name: Connect to Lab machine and trigger a Jenkins job
      uses: cross-the-world/ssh-scp-ssh-pipelines@latest
      with:
        host: ${{secrets.HOST}}
        user: ${{secrets.USERNAME}}
        pass: ${{secrets.PASSWORD}}
        port: ${{secrets.PORT}}
        connect_timeout: 10s
        first_ssh: |
```

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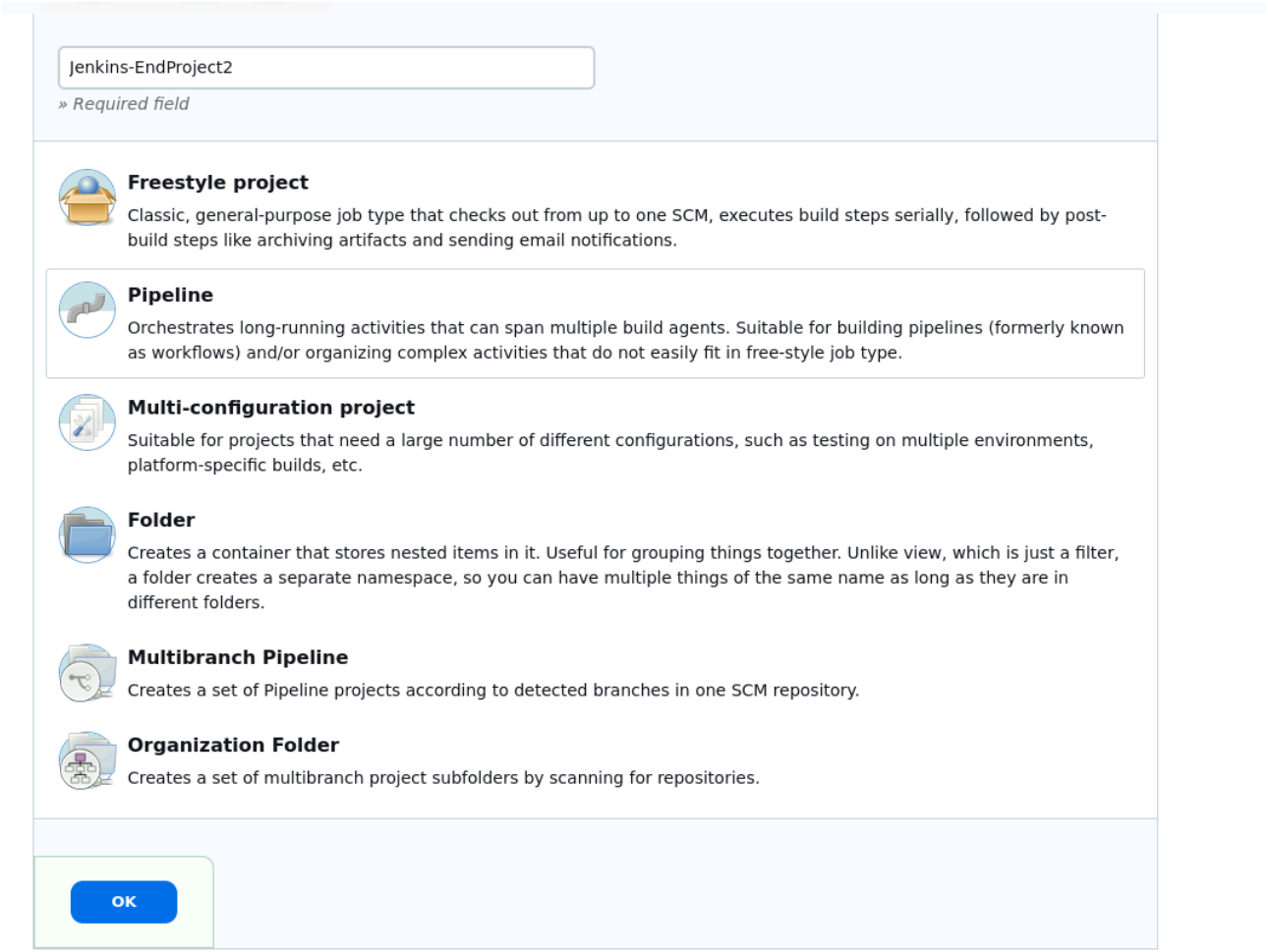
```
        curl -l -u admin:Root123$ http://localhost:8080/job/Jenkins-
EndProject2/build?token=tomcatDeploy
```

Added Maven Tool

Create Jenkins pipeline



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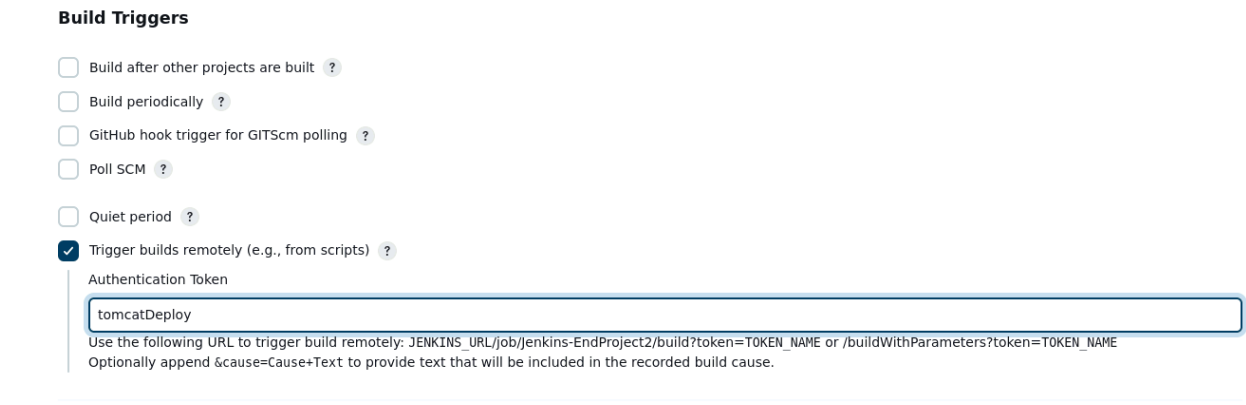

Jenkins Pipeline

```
pipeline{

    agent any

    tools{
        maven 'mymaven'
    }

    stages{
        stage('checkout code')
        {
            steps{
                git  'https://github.com/Sonal0409/DevOpsCodeDemo.git'
            }
        }

        stage('Build and Deploy the Code')
        {
            steps{
                sh 'mvn package'
            }

            post{
                 success{
                    deploy adapters: [tomcat9(credentialsId: 'tomcat-user', path: '', url:
'http://localhost:9090')], contextPath: null, war: '**/*.war'
                }
            }
```

```
        }
    }
}
```

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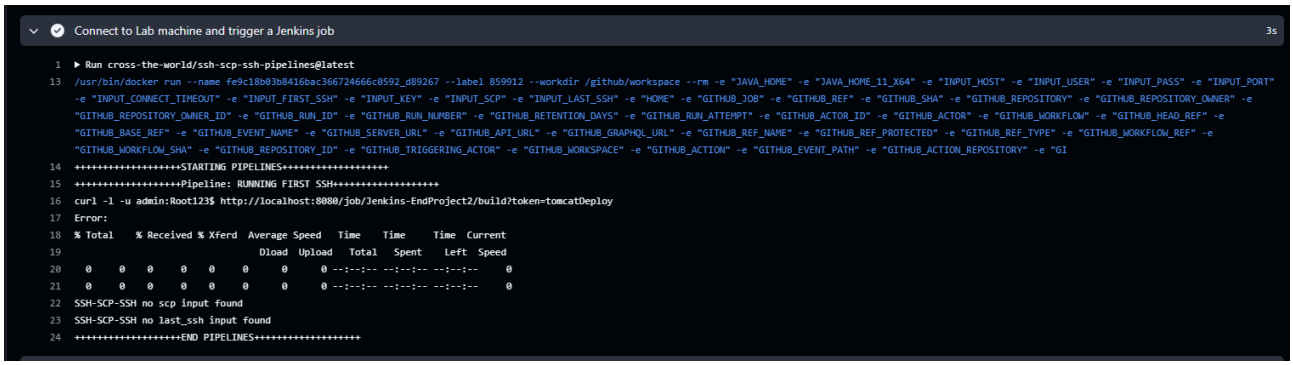
Task 5: Invoke pipeline to validate automated deployment



Permalinks

- Last build (#4), 20 sec ago
- Last stable build (#4), 20 sec ago
- Last successful build (#4), 20 sec ago
- Last failed build (#3), 3 min 15 sec ago
- Last unsuccessful build (#3), 3 min 15 sec ago
- Last completed build (#4), 20 sec ago

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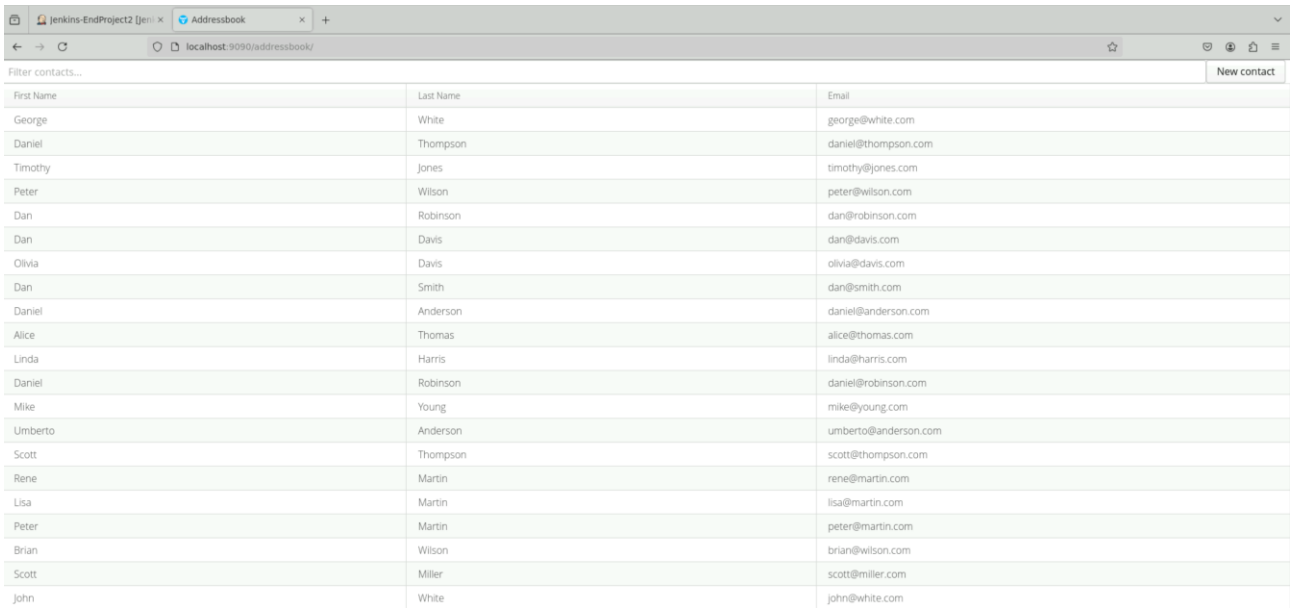

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