Jenkins Pipeline

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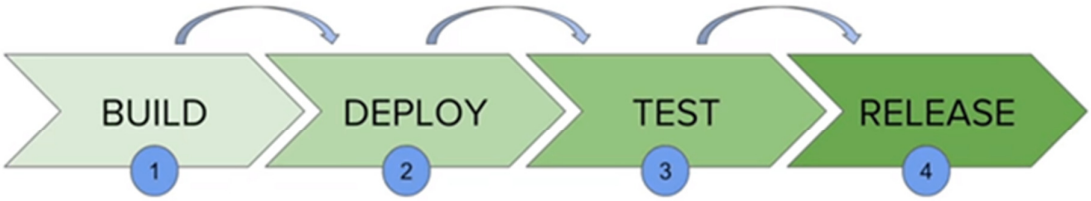
Chapter 1: **Introduction**

In Jenkins, a pipeline is a group of events or jobs which are interlinked with one another in a sequence. In simple words, Jenkins Pipeline is a combination of plugins that support the integration and implementation of **continuous delivery pipelines** using Jenkins. A pipeline has an extensible automation server for creating simple or complex delivery pipelines "as code," via pipeline DSL (Domain-specific Language).

Section 1.1: **What is Jenkins Pipeline?**

In a Jenkins Pipeline, every job has some sort of dependency on at least one or more jobs or events.



The above diagram represents a continuous delivery pipeline in Jenkins. It contains a collection of states such as build, deploy, test and release. These jobs or events are interlinked with each other. Every state has its jobs, which work in a sequence called a continuous delivery pipeline. By modelling a series of related tasks, users can take advantage of the many features of Pipeline:

- **Code**: Pipelines are implemented in code and typically checked into source control, giving teams the ability to edit, review, and iterate upon their delivery pipeline.
- **Durable**: Pipelines can survive both planned and unplanned restarts of the Jenkins master.
- **Pausable**: Pipelines can optionally stop and wait for human input or approval before continuing the Pipeline run.
- **Versatile**: Pipelines support complex real-world CD requirements, including the ability to fork/join, loop, and perform work in parallel.
- **Extensible**: The Pipeline plugin supports custom extensions to its DSL [1] and multiple options for integration with other plugins.

Section 1.2: **Why Use Jenkins Pipeline?**

Jenkins is a continuous integration server which has the ability to support the automation of software development processes. You can create several automation jobs with the help of use cases, and run them as a Jenkins pipeline.

Here are the reasons why you should use Jenkins pipeline:

- Jenkins pipeline is implemented as a code which allows several users to edit and execute the pipeline process.
- Pipelines are robust. So, if your server undergoes an unpredicted restart, the pipeline will be automatically resumed.
- You can pause the pipeline process and make it wait to continue until there is an input from the user.
- Jenkins Pipelines support big projects. You can run many jobs, and even use pipelines in a loop.

Chapter 2: **Types of Pipelines**

Two types of syntax are used for defining your JenkinsFile.

- Declarative
- Scripted

Section 2.1: **Scripted**

Scripted Jenkins pipeline runs on the Jenkins master with the help of a lightweight executor. It uses very few resources to translate the pipeline into atomic commands. Both declarative and scripted syntax are different from each other and are defined totally differently.

Section 2.1.1: **Scripted Pipeline Concepts**

Node: The node is a machine on which Jenkins runs is called a node. A node block is used in scripted pipeline syntax.

```
Eg: node {

}
```

Section 2.2: **Declarative**

Declarative pipeline syntax offers an easy way to create pipelines. It contains a predefined hierarchy to create Jenkins pipelines. It gives you the ability to control all aspects of a pipeline execution in a simple, straight-forward manner. This code is written in a Jenkinsfile which can be checked into a source control management system such as Git.

Section 2.2.1: Declarative Pipeline Concepts

Pipeline: This is the user-defined block, which contains all the processes such as build, test, deploy, etc. it is a group of all the stages in a JenkinsFile. All the stages and steps are defined in this block. It is used in declarative pipeline syntax.

Eg: pipeline {

}

Stage: This block contains a series of steps in a pipeline. i.e., build, test, and deploy processes all come together in a stage. Generally, a stage block visualizes the Jenkins pipeline process.

Let's see an example for multiple stages, where each stage performs a specific task:

```
pipeline {
    agent any
    stages {
        stage ('Build') {
            ...
        }
        stage ('Test') {
            ...
        }
        stage ('QA') {
            ...
        }
        stage ('Deploy') {
            ...
        }
        stage ('Monitor') {
            ...
        }
    }
}
```

Step: A step is a single task that executes a specific process at a defined time. A pipeline involves a series of steps defined within a stage block.

```
pipeline {
    agent any
    stages {
        stage ('Build') {
            steps {
                echo 'Running build phase...'
            }
        }
    }
}
```

Section 2.3: **Declarative versus Scripted Pipeline syntax**

Though both these pipelines are based on the groovy DSL, the scripted pipeline uses stricter groovy based syntaxes because it was the first pipeline to be built on the groovy foundation. Since this Groovy script was not typically desirable to all the users, the declarative pipeline was introduced to offer a simpler and more optioned Groovy syntax. The declarative pipeline is defined within a block labelled '**pipeline**' whereas the scripted pipeline is defined within a '**node**'.

Jenkinsfile (Scripted Pipeline)

```
node {
    stage('Build') {
        //
    }
    stage('Test') {
        //
    }
    stage('Deploy') {
        //
    }
}
```

Jenkinsfile (Declarative Pipeline)

```
pipeline {
    agent any
    stages {
        stage('Build') {
            steps {
                //
            }
        }
        stage('Test') {
            steps {
                //
            }
        }
        stage('Deploy') {
            steps {
                //
            }
        }
    }
}
```

Chapter 3: ENHO Pipeline

Here is a sample of a Jenkinsfile using Declarative Pipeline syntax

```
pipeline {
    agent {
        label 'Mobile'
    }
    stages {
        stage ('build_generate') {
            steps {
            build job: 'HomeOwner_Android_ProdBuild'
        }
        stage('clone_repo') {
            steps {
                script{
                    env.FAILURE_STAGE = 'clone_repo'
                }
            checkout([$class: 'GitSCM', branches: [[name: '*/Codecraft_Android']],
            doGenerateSubmoduleConfigurations: false, extensions: [[$class:
            'CleanBeforeCheckout']], submoduleCfg: [], userRemoteConfigs:
            [[credentialsId: 'rspecs-keys', url:
            'git@bitbucket.org:enphaseembedded/mobile_automation.git']]])
            }
        }
        stage('upload_apk') {
            steps {
                script{
                    env.FAILURE_STAGE = 'upload_apk'
                }
                browserstack('9fcaabab-26a6-46c4-86e1-b6bbde22bbef') {}
            browserstackAppUploader(appPath: '/Users/admin/Downloads/latest-
            debug.apk'){
```

```
    script {
        env.BROWSERSTACK_APP_ID=“${BROWSERSTACK_APP_ID}”
    }
  }
}
stage('test') {
  steps {
    sh 'export PATH="$PATH:/Users/jenkins/apache-maven-3.6.1/bin"'
    script{
      env.FAILURE_STAGE = 'test'
    }
    sh 'printenv'
    sh 'mvn clean test
  Dsurefire.suiteXmlFiles=src/test/java/com/enphase/${type}.xml'
  sh 'ruby "$WORKSPACE/HTMLReporter/main.rb" "$WORKSPACE/allure-
  results" $JOB_BASE_NAME "https://global-
  allure.herokuapp.com/$BUILD_NUMBER/allure/"'
  }
}
stage('reports') {
  steps {
    script {
      env.FAILURE_STAGE = 'reports'
      allure([
        includeProperties: false,
        jdk: '',
        properties: [],
        reportBuildPolicy: 'ALWAYS',
        results: [[path: 'target/allure-results']]
      ])
    }
  }
```

```
        }


stage ('global-allure') {
            when {
                expression {
                    return currentBuild.result == 'FAILURE'||currentBuild.result ==
                    'SUCCESS'||currentBuild.result == 'UNSTABLE';
                }
            }
            steps {
                script{
                    env.FAILURE_STAGE = 'global-allure'
                }
                build job: 'AllureReport', parameters: [
                string(name: 'Temp', value: "${BUILD_NUMBER}")
                ]
            }
        }
    }



    post{


        always{
            junit testDataPublishers: [[$class: 'AutomateTestDataPublisher']], testResults:
            'target/surefire-reports/TEST-*.xml'
        }
```

```
        success{
            echo "Success Pipeline: ${currentBuild.fullDisplayName}"
            script {
                def mailRecipients = 'ostan@codecraft.co.in
                def jobName = currentBuild.fullDisplayName
                emailext body: '"${FILE,path="HTMLReporter/index.html"}"',
                mimeType: 'text/html',
                subject: "[Jenkins][${currentBuild.result}] Test Automation Report",
                to: "${mailRecipients}",
                replyTo: "${mailRecipients}",
                recipientProviders: [[$class: 'CulpritsRecipientProvider']]
            }
        }
        failure {
            echo "Failure Pipeline: ${currentBuild.result}"
             echo "Attention @here ${env.JOB_NAME} #${env.BUILD_NUMBER} has
            failed."
            script {
                def mailRecipients = 'ostan@codecraft.co.in
                def jobName = currentBuild.fullDisplayName
                emailext body: '"${FILE,path="HTMLReporter/index.html"}"',
                mimeType: 'text/html',
                   subject: "[Jenkins][${currentBuild.result}] Build is failing in
                   ${env.FAILURE_STAGE} stage",
                to: "${mailRecipients}",
                replyTo: "${mailRecipients}",
                recipientProviders: [[$class: 'CulpritsRecipientProvider']]
            }
        }
}
```

Section 3.1 Pipeline Breakdown

pipeline is Declarative Pipeline-specific syntax that defines a "block" containing all content and instructions for executing the entire Pipeline.

```
pipeline {

}
```

agent is Declarative Pipeline-specific syntax that instructs Jenkins to allocate an executor (on a node) and workspace for the entire Pipeline. In below example execution will continue on slave ‘Mobile’.

```
agent {

        label: ‘Mobile’
}
```

stage is a syntax block that describes a stage of this Pipeline. Read more about stage blocks in Declarative Pipeline syntax on the Pipeline syntax page. As mentioned above, stage blocks are optional in Scripted Pipeline syntax.

```
stages {
      stage {
   }
}
```

steps is Declarative Pipeline-specific syntax that describes the steps to be run in this stage.

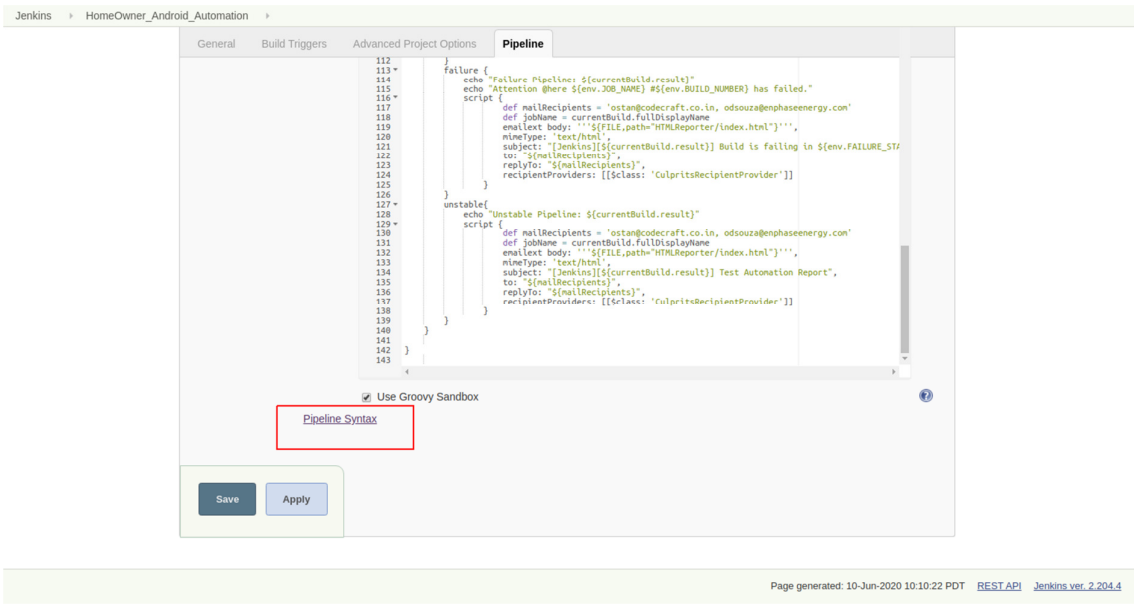
```
steps {

}
```

sh is a Pipeline step (provided by the Pipeline: Nodes and Processes plugin) that executes the given shell command.

Section 3.1.1 **Snippet Generator**

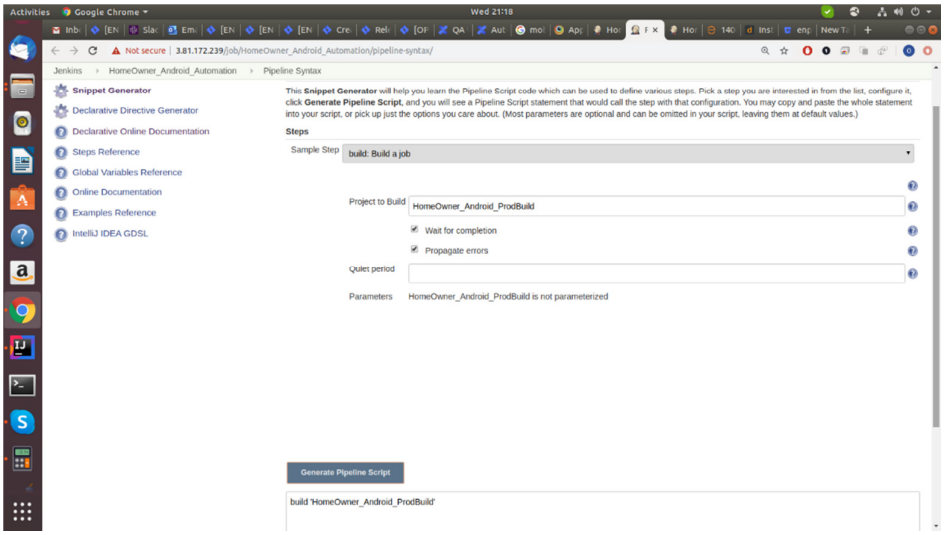
Jenkins provides it own snippet generator for declarative type pipelines



Build Job:

For build job stage we have to start dependant build job, we can use snippet generator to achieve this.

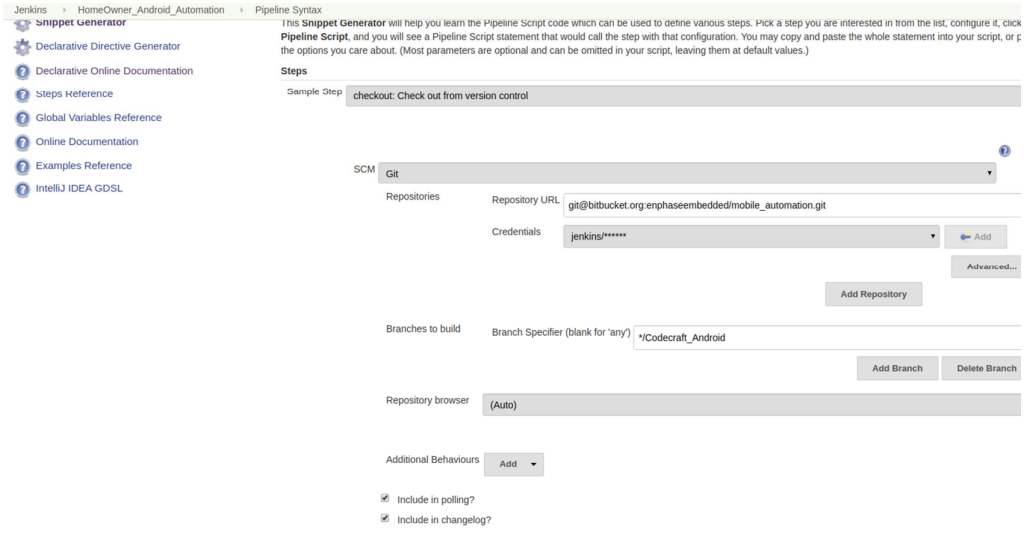
```
stage ('build_generate') {
    steps {
    build job: 'HomeOwner_Android_ProdBuild'
}
```

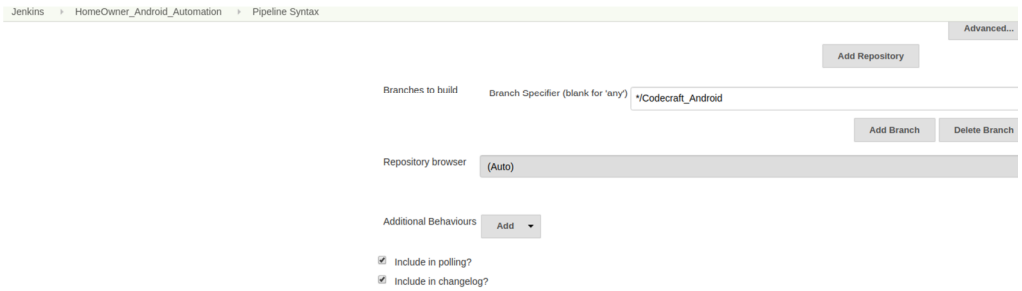


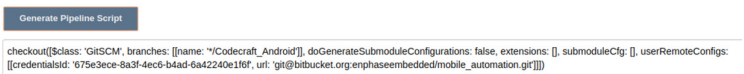
Clone repo:

For clone repo stage we have to use git plugin, we can use snippet generator to achieve this.

```
stage('clone_repo') {
    steps {
        checkout([$class: 'GitSCM', branches: [[name: '*/Codecraft_Android']],
        doGenerateSubmoduleConfigurations: false, extensions: [[$class:
        'CleanBeforeCheckout']], submoduleCfg: [], userRemoteConfigs:
        [[credentialsId: 'rspecs-keys', url:
        'git@bitbucket.org:enphaseembedded/mobile_automation.git']]])
    }
}
```





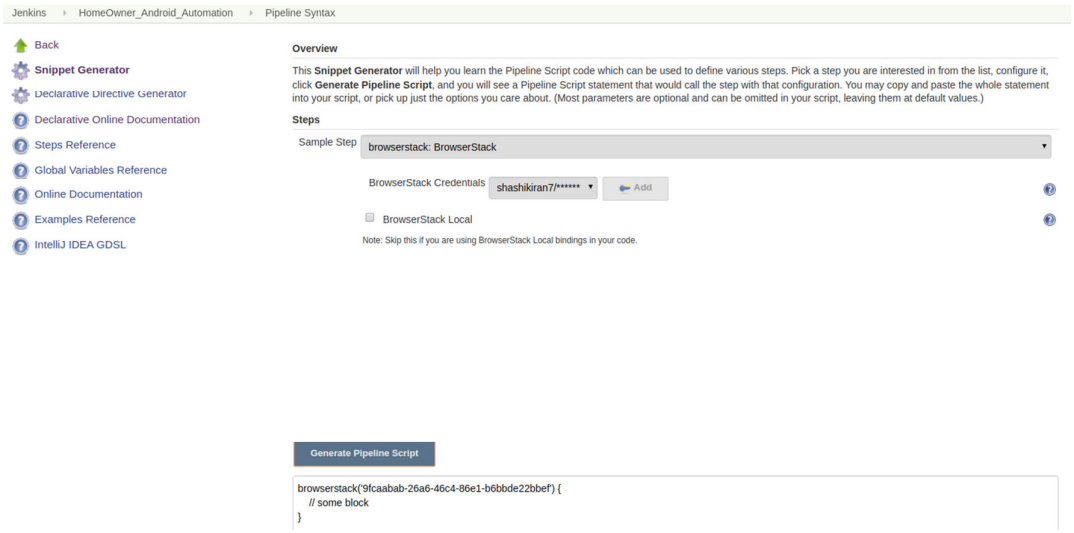


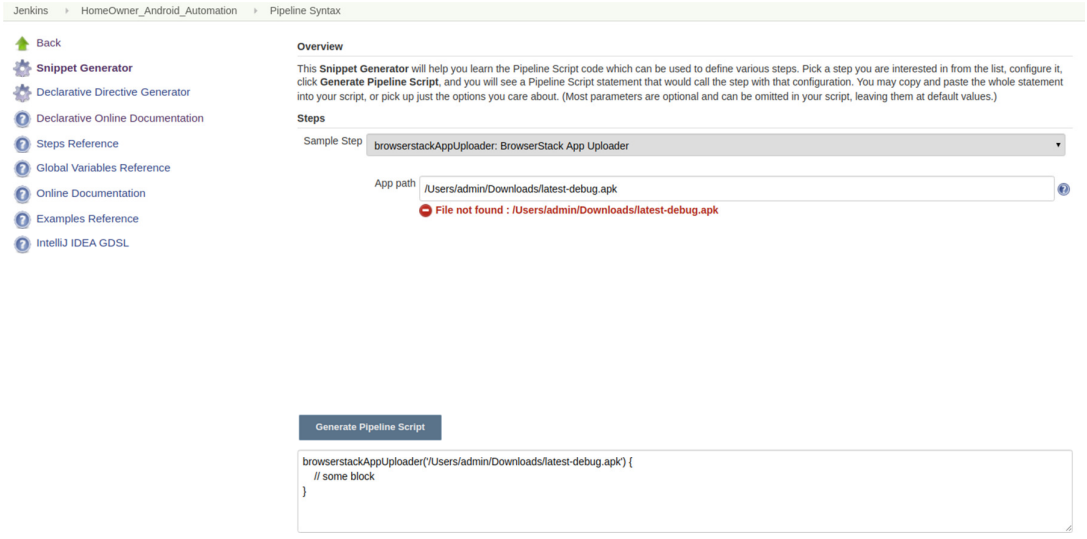
Browserstack upload:

For upload apk stage we have to use browserstack plugin, we can use snippet generator to achieve this.

```
steps {
        browserstack('9fcaabab-26a6-46c4-86e1-b6bbde22bbef') { }
      browserstackAppUploader(appPath: '/Users/admin/Downloads/latest-debug.apk'){

      script {
            env.BROWSERSTACK_APP_ID="${BROWSERSTACK_APP_ID}"
      }
}
```

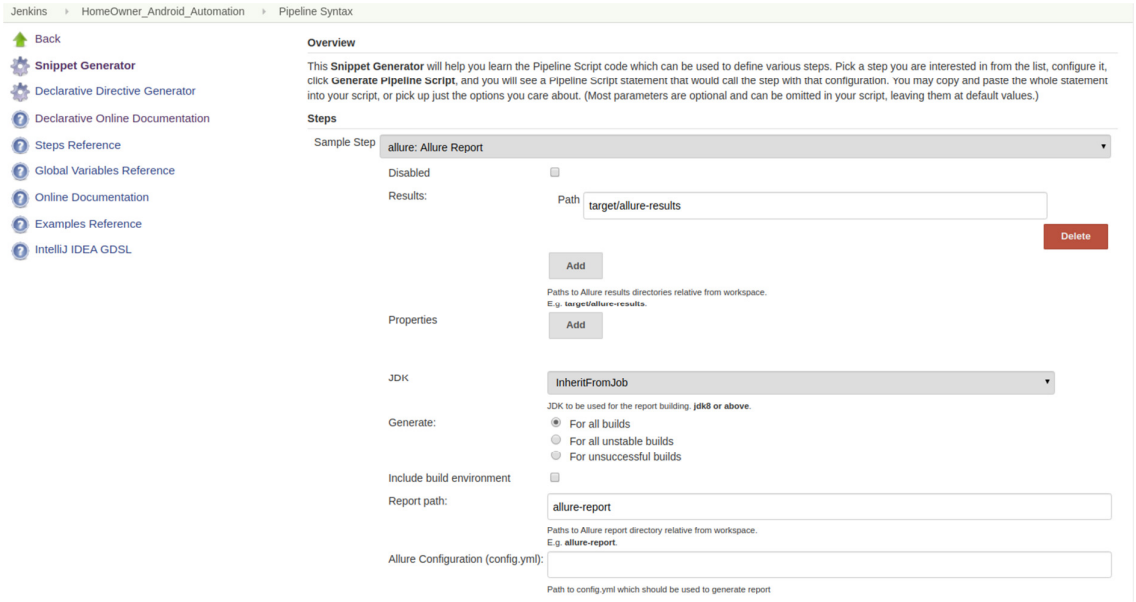


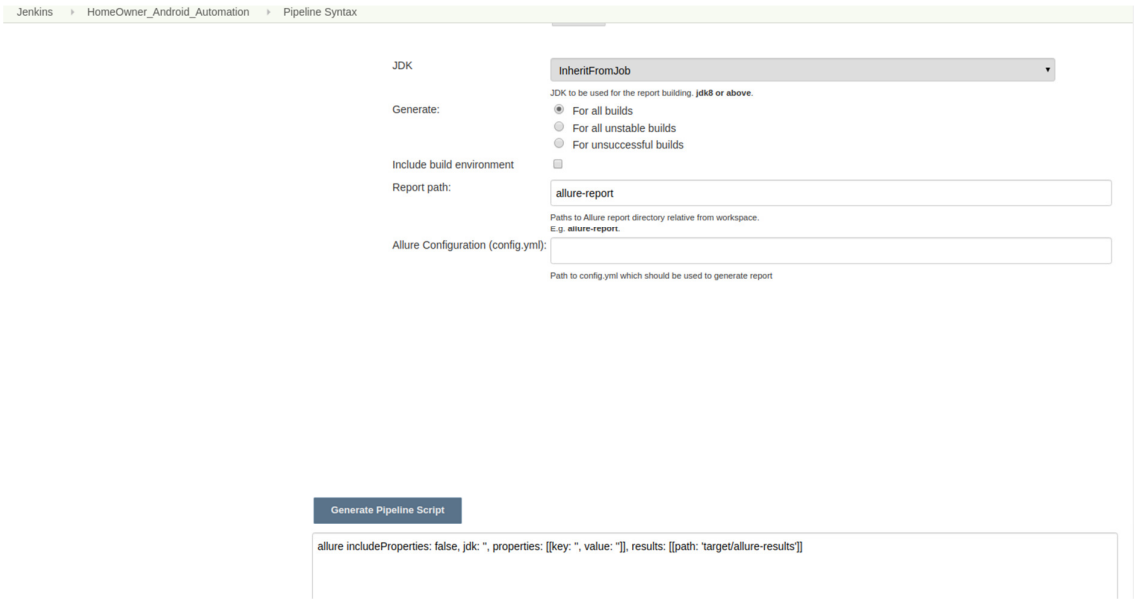


Publish Reports:

For reports stage we have to use allure plugin, we can use snippet generator to achieve this.

```
allure([
        includeProperties: false,
        jdk: '',
        properties: [],
        reportBuildPolicy: 'ALWAYS',
        results: [[path: 'target/allure-results']]
  ])
```

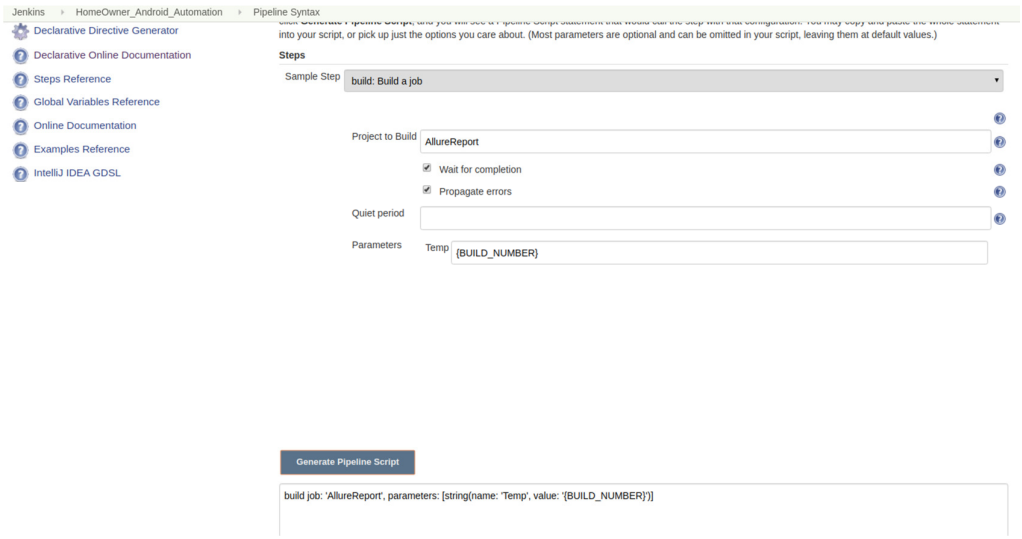




Global allure:

For global-allure stage we have to start dependant parameterized allure job, we can use snippet generator to achieve this.

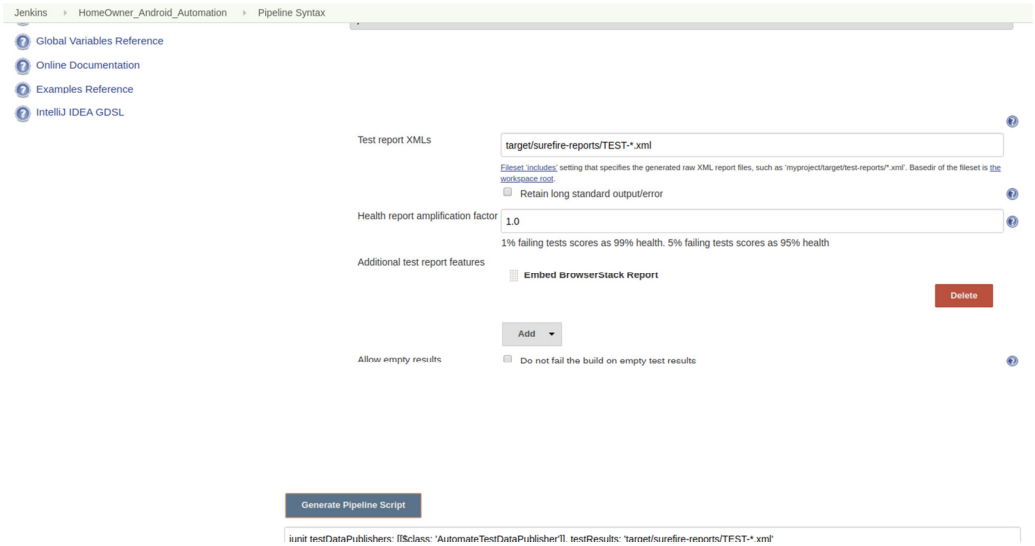
```
build job: 'AllureReport', parameters: [
 string(name: 'Temp', value: "${BUILD_NUMBER}")
```



HTML Reports:

For post build always stage we have to use Publish JUnit HTML report plugin, we can use snippet generator to achieve this.

junit testDataPublishers: [[$class: 'AutomateTestDataPublisher']], testResults: 'target/surefire-reports/TEST-*.xml'



Mail Notification:

For post build success/failure stage we have to use extended email plugin, we can use snippet generator to achieve this.

```
emailext body: '"${FILE,path="HTMLReporter/index.html"}"',
mimeType: 'text/html',
subject: "[Jenkins][${currentBuild.result}] Build is failing in ${env.FAILURE_STAGE} stage",
to: "${mailRecipients}",
replyTo: "${mailRecipients}",
recipientProviders: [[$class: 'CulpritsRecipientProvider']]
```