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Using IBM Dependency Based Build (DBB) with Scripted Deployments

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Abstract

This primer outlines a basic z/OS configuration with DBB/Git and a customer-built Continuous Deployment process using IBM's sample starter scripts.

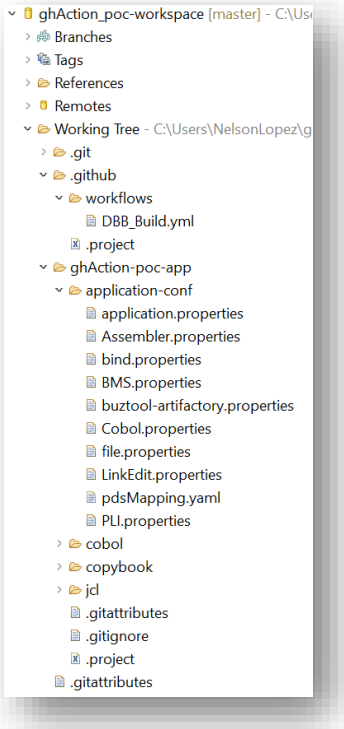
1 Introduction

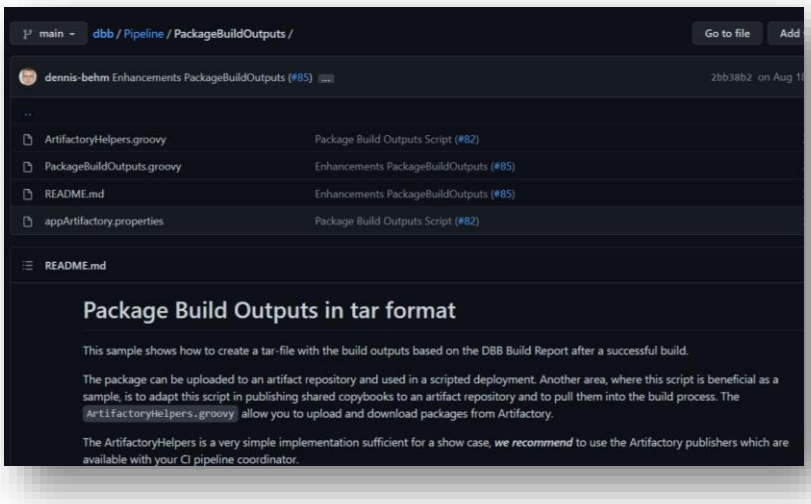
The purpose of this document is to outline the basic steps to install, configure and test a simple CI/CD pipeline using any Git server and any Orchestrator that runs Dependency Based Build (DBB) builds for z/OS-based applications. The focus will be on how to design and implement a customer-built "scripted" deployment process (CD) using sample starter scripts provided by IBM.

In the example provided below, GitLab will be used as the Repo and CI-Pipeline orchestrator.

1.1 Prerequisites

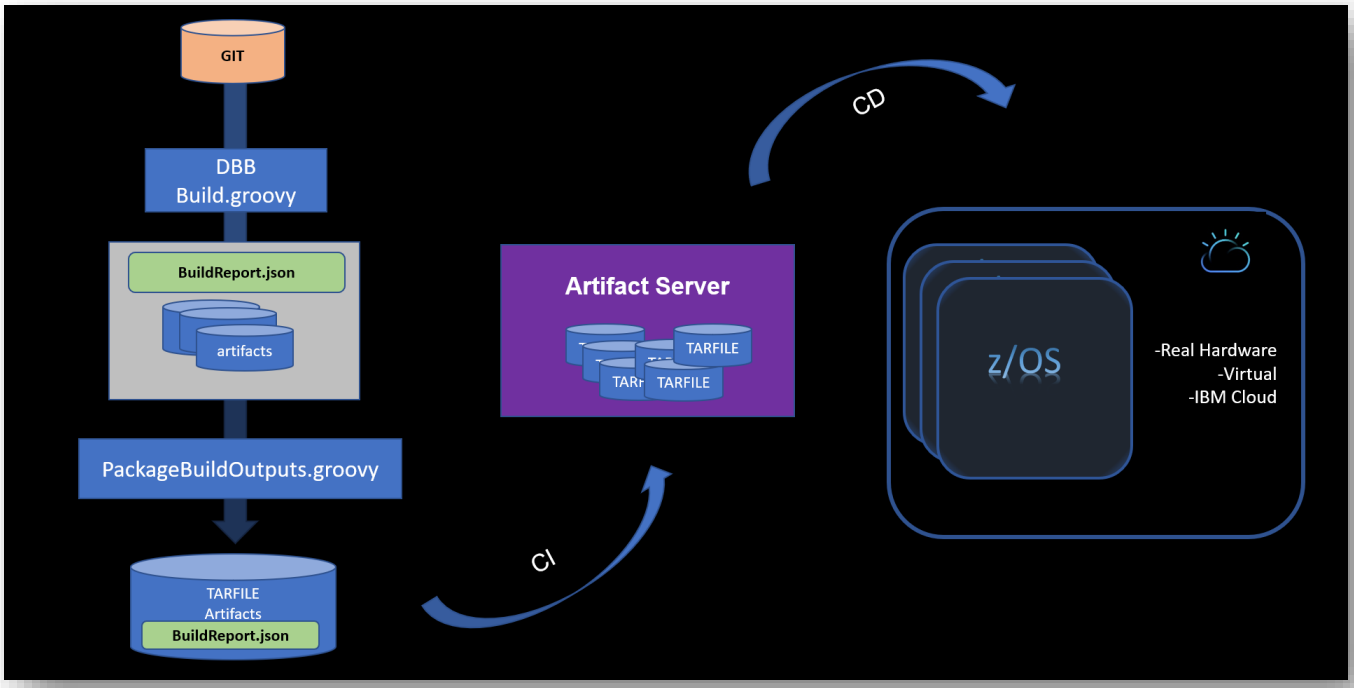
- A pipeline Orchestrator like GitLab CI-Pipelines
- A source Repo Server like GitLab Repos structured for DBB-based builds (see diagram on the right). It must have a z/OS ".gitattributes" file, a subfolder for your source code and DBB's "application-conf" files. And any other objects you may need.
- An Artifact Repo Server like Artifactory
- DBB Toolkit, DBB Server and dbb-zappbuild
- Rockets port of Git for z/OS
- An IDE like IBM Developer for z/OS (IDz)
- Access to z/OS with an account that has a standard Unix System Services profile (OMVS). Contact your z/OS Admin for assistance.
- Download/clone, review readme, install and configure the sample 'scripted' Package and Publish scripts from https://github.com/IBM/dbb/tree/main/Pipeline/PackageBuildOutputs





2 Overview of a DBB-Based CI/CD Flow

A standard DBB build produces output artifacts like load modules and DBRM's. It also creates a BuildReport.json that lists all the artifacts. This report provides attributes that are used to package the artifacts into a tar file and publish it to an Artifact repo. This document provides details on the continuous Integration (CI) phase. A topic on Continuously Deployment (CD) will be added soon.



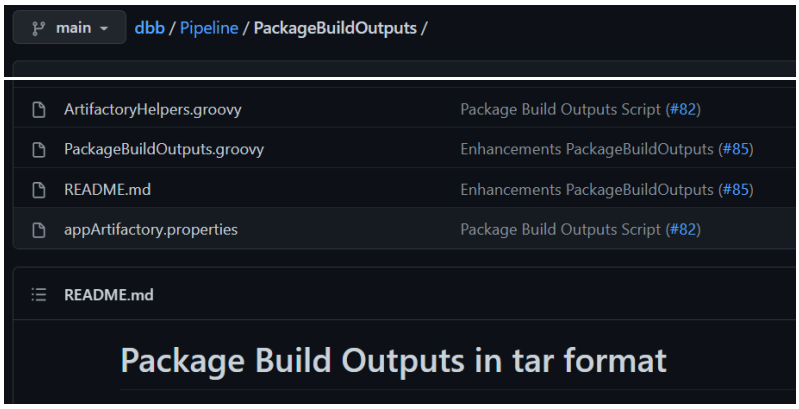
3 Package and Publish – Setup and a Sample Run

Summary of setup steps:

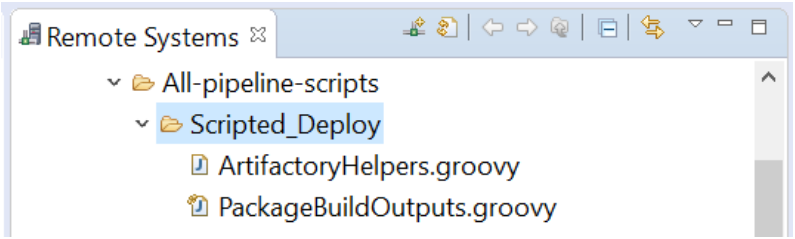
1. Add the scripts to USS (see the Prerequisites section).
2. Add artifactory properties to your configuration
3. Add a property in the application's dbb configuration file ("createBuildOutputSubfolder=false")
4. Add the script step to the CI-pipeline
5. Test to validate your pipeline

1 – Download and Install the scripts

Clone the samples repo[1]. The repo has many folders. The PackageBuildOuptuts folder has the scripts needed for this configuration.



Add the 2 groovy scripts to a z/OS Unix home folder as shown.

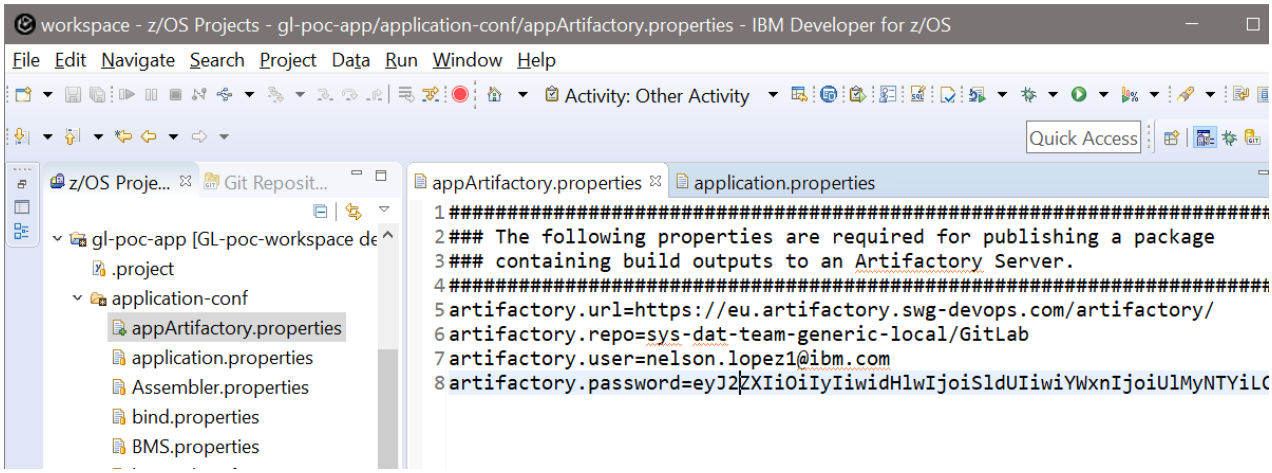


[1] https://github.com/IBM/dbb

2 – Add Artifactory Properties file to application-conf

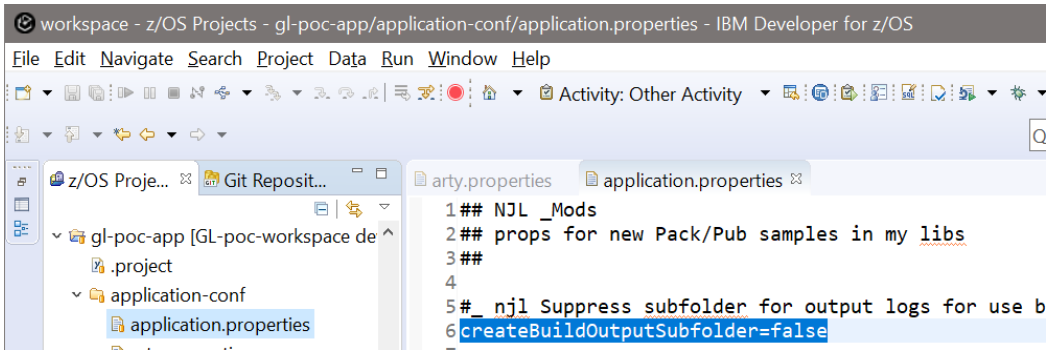
The sample property file is added to the application's application-conf folder as shown.

Fill in the details to reflect your configuration. Note, for POCs and trials, adding the password in a repo may be acceptable. However, in a production environment, consider using your Orchestrator's vault or other secret store to protect the password.



3 - Add a new property in the application's dbb configuration

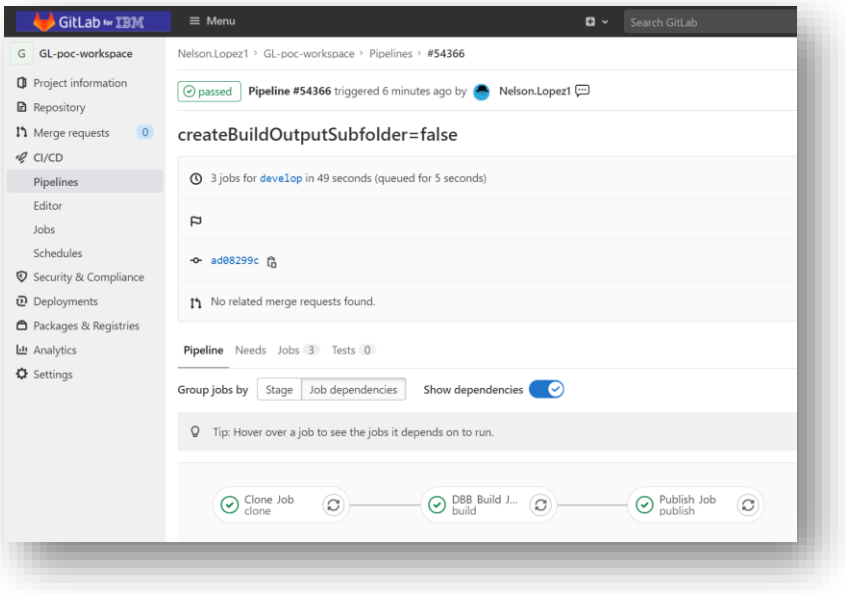
By default, DBB creates a subfolder to store artifacts. Add the property below (createBuildOutputSubfolder=false) to your 'application.properties' file. This causes DBB to place the BuildReport.json file at the workDir root level and not a subfolder.



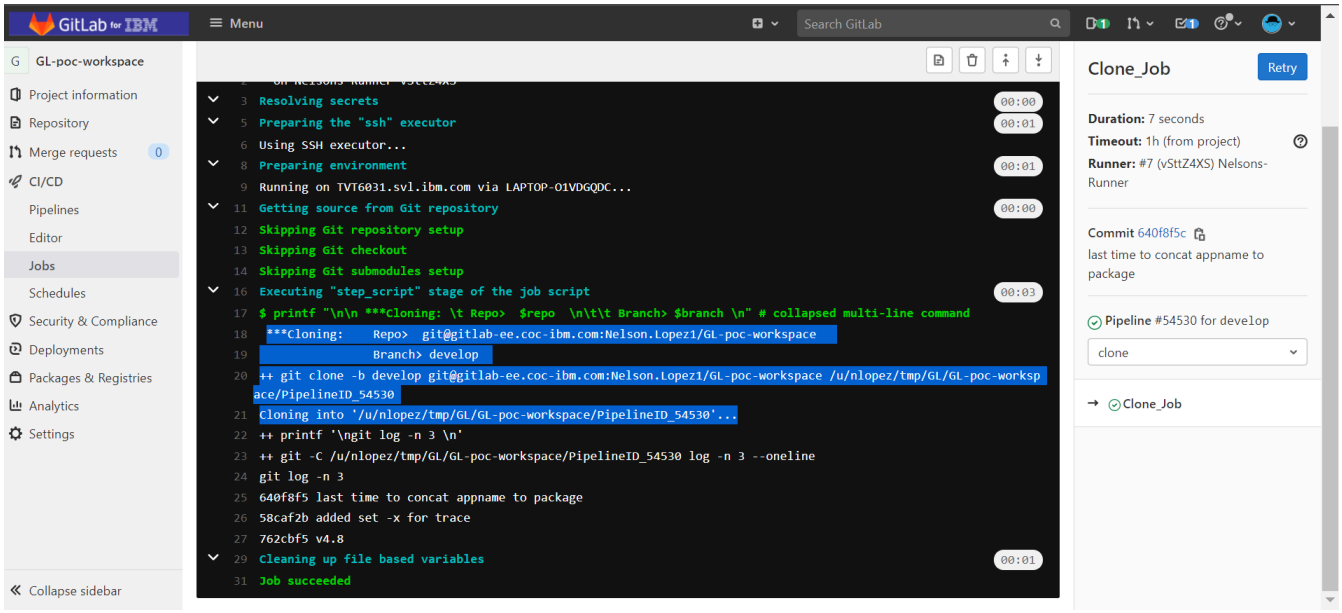
4 - Add the script to the CI-pipeline

Below is a sample Gitlab pipeline. There are 3 basic steps:

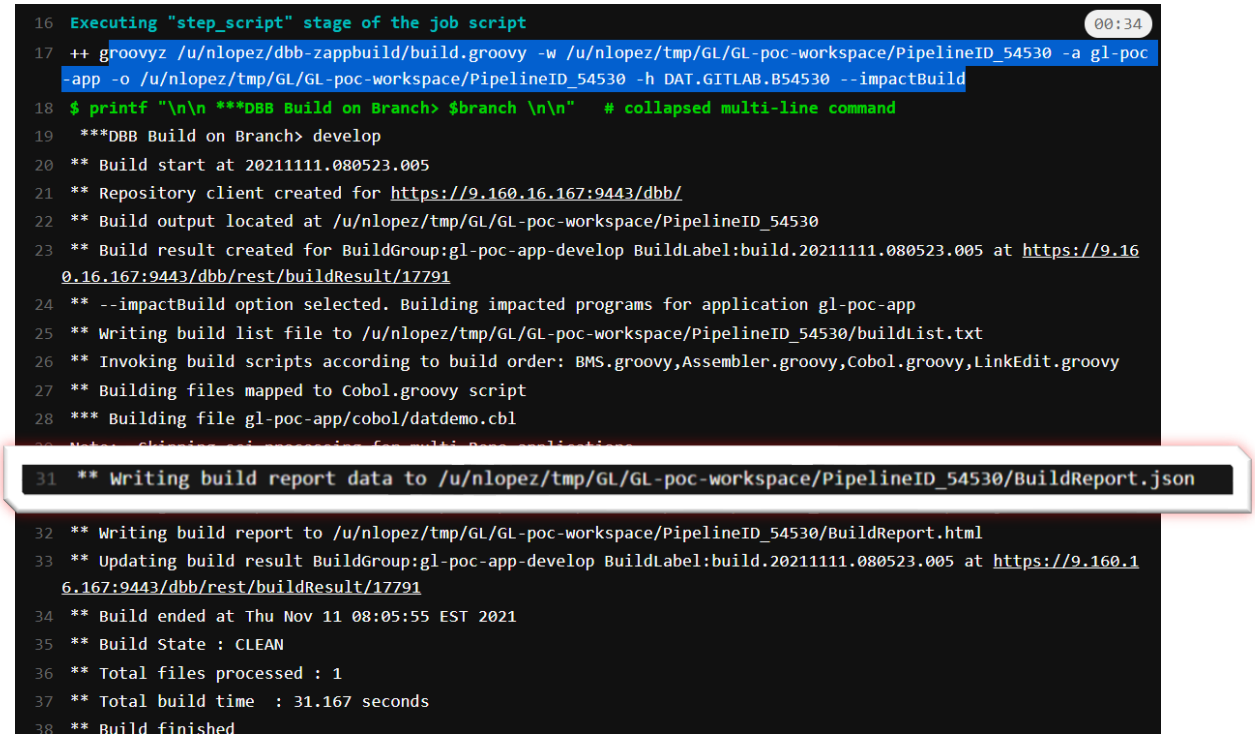
1. Clone the application repo
2. DBB build
3. Package and publish



1 - The **clone** creates a workDir folder that is used by all steps. In this case the workDir ends with "PipelineID_5430". 5430 is the jobID provided by the system to help create a unique working folder for each run. Note that the clone script in this step can be replaced by Gitlab's internal Git Clone plugin.

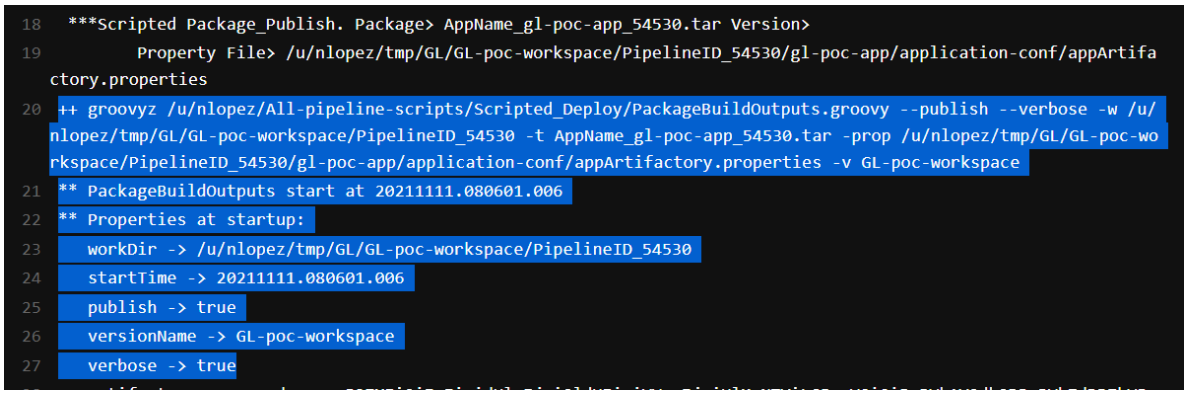


2 – A clean DBB build places artifacts in the workDir root.

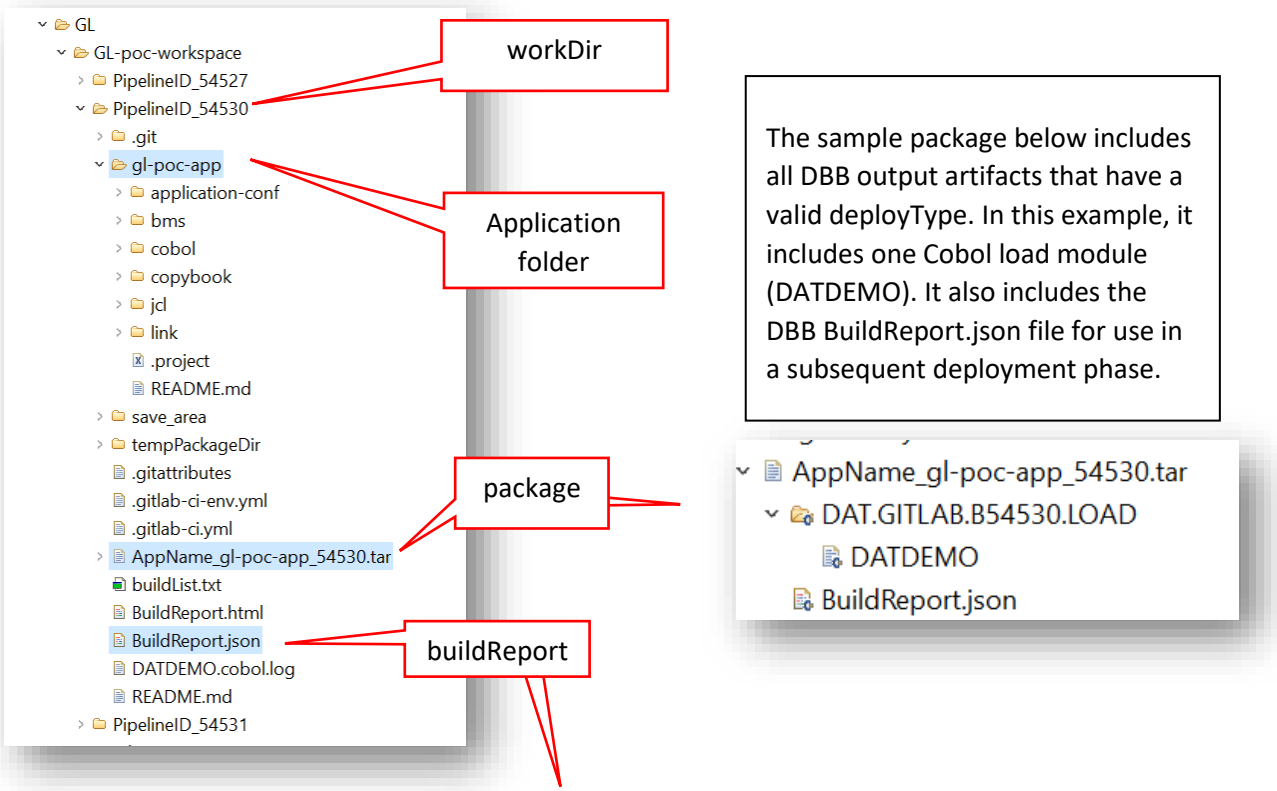


3 - The PackageBuildOutput script reads the DBB json file, tars the DBB artifacts that have a supported deployType and publishes them to Artifactory using the properties in application-conf. In addition, the DBB BuildReport.json file is included to support the CD phase.

Supported deployTypes are any default or user supplied attributes assigned to an output artifact by a dbb-zappbuild groovy language script.

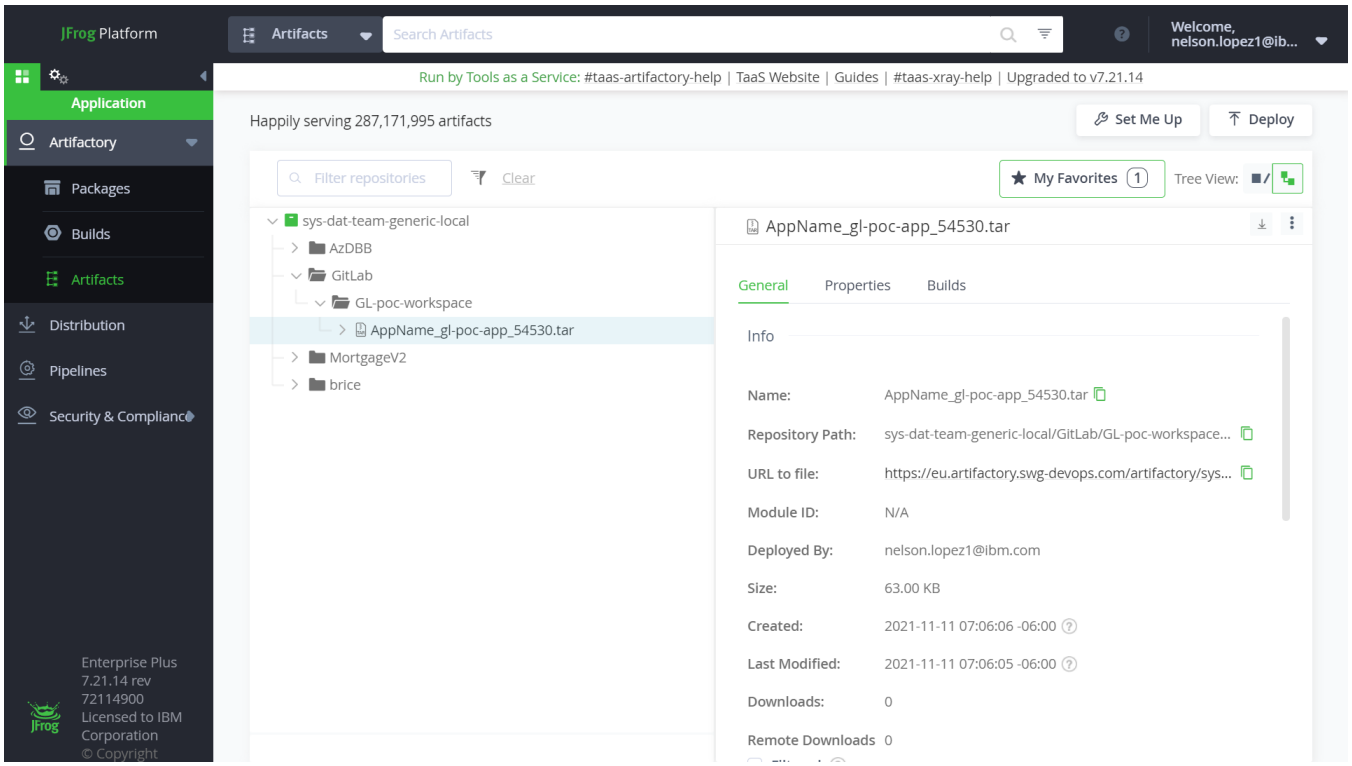


At the end of the job, the workDir will have the cloned repo, the DBB BuildReport.json and the tar file created by the package script.




```
88      {
89          "mode": "TEXT",
90          "destination": "\/u\/nlopez\/tmp\/GL\/GL-poc-workspace\/PipelineID_54530\/DATDEMO.cobol.log",
91          "id": "COPY_TO_HFS_1",
92          "source": "SYSPRINT",
93          "type": "COPY_TO_HFS"
94      },
95      {
96          "outputs": [{
97              "dataset": "DAT.GITLAB.B54530.LOAD(DATDEMO)",
98              "deployType": "LOAD"
99          }],
100         "rc": 0,
101         "file": "gl-poc-app\/cobol\/datdemo.cbl",
102         "options": "MAP,RENT,COMPAT(PM5)",
103         "id": "EXECUTE_2",
104         "type": "EXECUTE",
105         "logs": ["\/u\/nlopez\/tmp\/GL\/GL-poc-workspace\/PipelineID_54530\/DATDEMO.cobol.log"],
106         "command": "IEWBLINK"
107     },
```

The package is published and ready for deployment to any z/OS environment. In this sample, the repo's project name "GL-poc-workspace" is used as the upper folder. The package tar file has the application name 'gl-poc-app' and the pipeline's buildID for traceability.



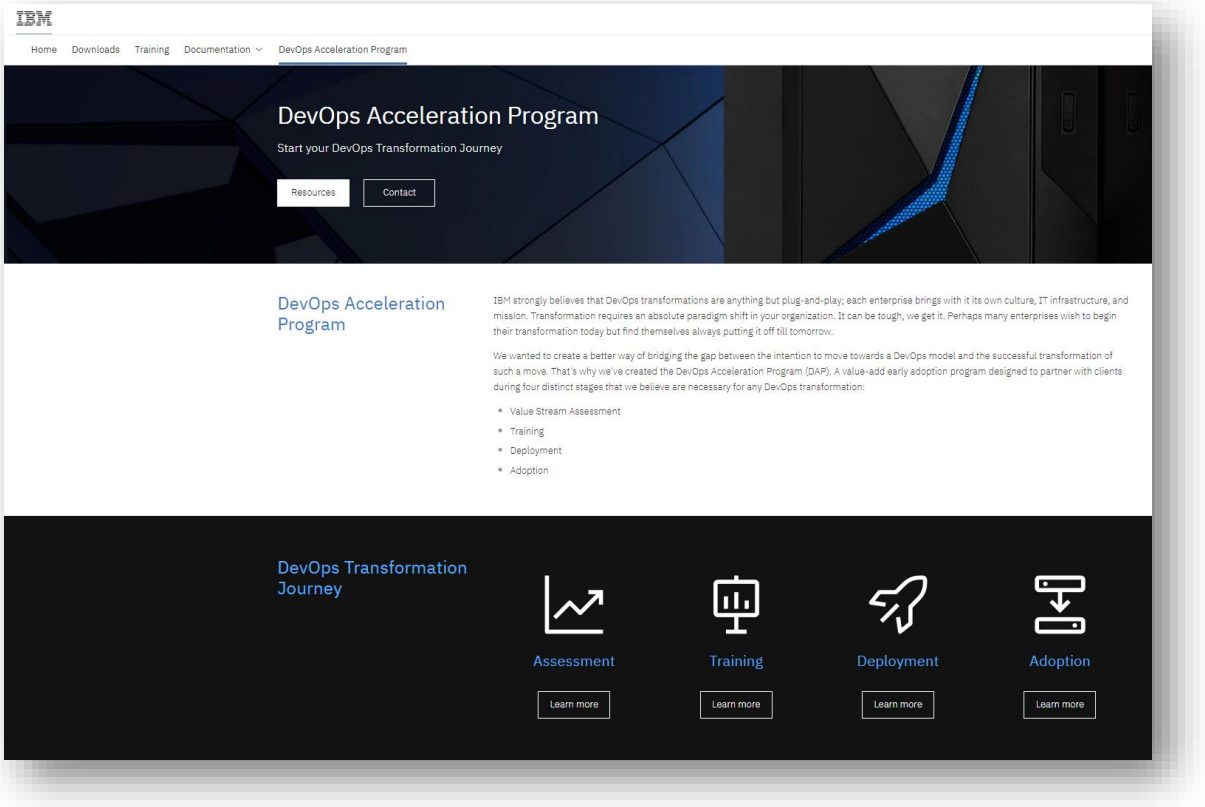
4 Summary

As shown in the sample run above, adding a scripted package and publish to your ci-pipeline is a one-step job. Additional steps should be considered like adding a CD step, automated tests and cleanup of logs. CD will be added in a future update of this document.

The examples provided are meant to get you started. Over time it can be extended to support production-like workloads, automated quality gates and more robust logging and audit trails.

For more reference material please visit IBM's "DevOps Acceleration Program" website
https://ibm.github.io/mainframe-downloads/DevOps_Acceleration_Program/devops-acceleration-program.html

Reach out to your account representative for support and services.



Appendix – Technical references

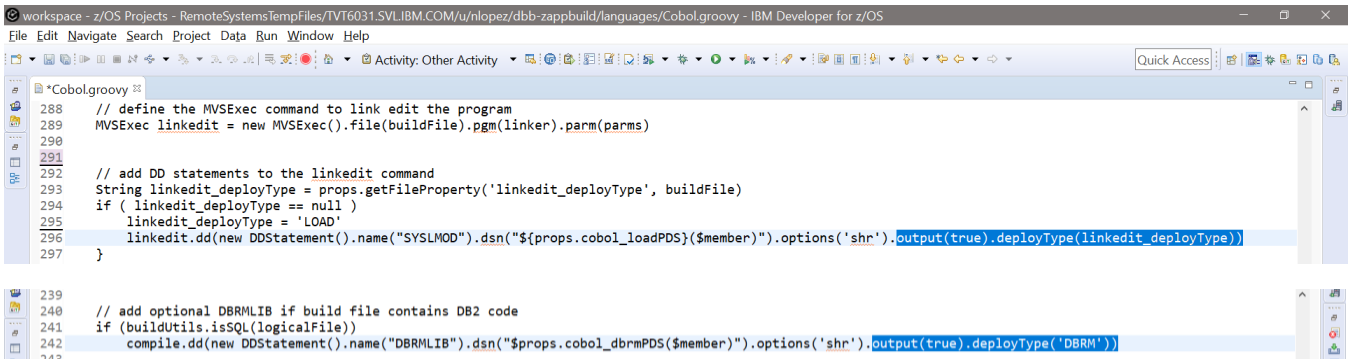
4.1 DBB BuildReport Groovy Implementation

The code snippets below are from IBM's sample dbb-zappbuild[2] framework. It shows how a Cobol program's output load module (artifact) is tagged with a **deployType** of "LOAD". Based on the nature of the source code, zAppBuild is capable of setting different deployTypes to allow different processing during the deployment of the outputs artifacts.[3] It also shows how the BMS.groovy script assigns the "MAPLOAD" deployType to the map load module. In addition to the deployType, output file DD allocations must set the "output" flag to "true" to include the artifact in the BuildReport.

DeployTypes and file names are used to drive the actual deployment logic during the CD phase.

You can add or change the deployType to fit your design.

Cobol.groovy Snippet – LOAD & DBRM DeployType



[2] See https://github.com/IBM/dbb-zappbuild

[3] See https://github.com/IBM/dbb-zappbuild/blob/main/samples/application-conf/Cobol.properties#L62-L72

BMS.groovy Snippet – MAPLOAD DeployType

uild_wazi06.md | Cobol.groovy | BMS.groovy

```groovy
/*
 * createLinkEditCommand - creates a MVSExec xommand for link editing the bms object module produced by the compile
 */
def createLinkEditCommand(String buildFile, String member, File logFile) {
    String parameters = props.getFileProperty('bms_linkEditParms', buildFile)

    // define the MVSExec command to link edit the program
    MVSExec linkedit = new MVSExec().file(buildFile).pgm(props.bms_linkEditor).parm(parameters)

    // add DD statements to the linkedit command
    linkedit.dd(new DDStatement().name("SYSLIN").dsn("&&TEMPOBJ").options("shr"))
    linkedit.dd(new DDStatement().name("SYSLMOD").dsn("${props.bms_loadPDS}($member)").options('shr').output(true).deployType('MAPLOAD'))
    linkedit.dd(new DDStatement().name("SYSPRINT").options(props.bms_tempOptions))
    linkedit.dd(new DDStatement().name("SYSUT1").options(props.bms_tempOptions))
```

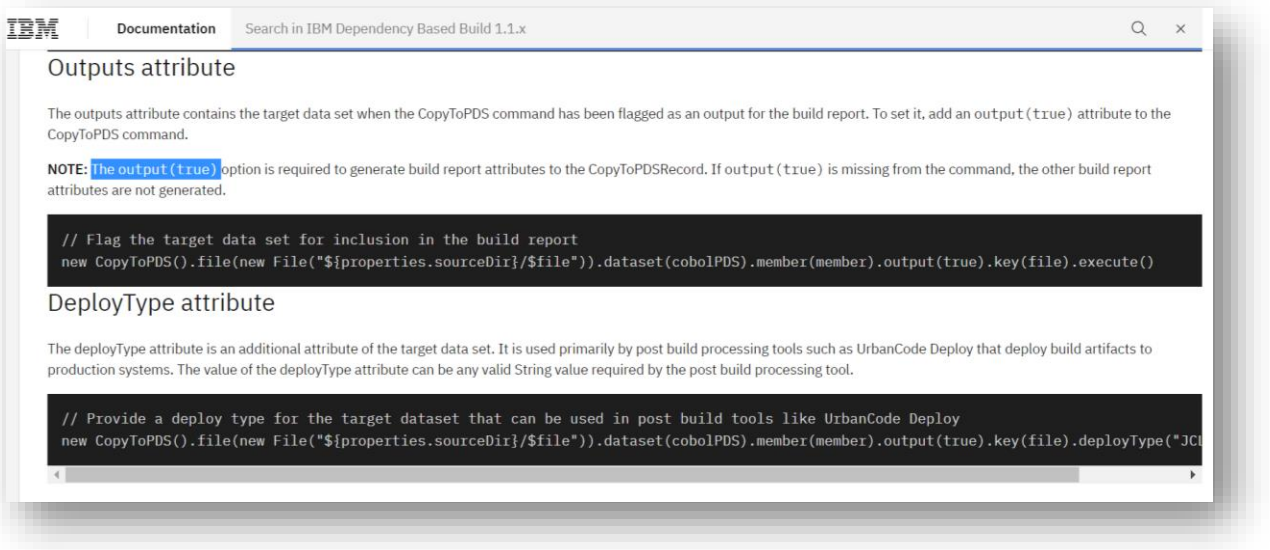
For IMS applications, the "IMSLOAD" deployType is assigned.

Below is a sample Build Report. Notice the Output element with the deployType attribute. In this case, it's a Cobol load module.


```
{
    "mode": "TEXT",
    "destination": "\/u\/nlopez\/GITLAB -WorkSpace\/AzDBB_1786\/.\/build.20211023.074424.044\/DATDEMO.c
    "id": "COPY_TO_HFS_3",
    "source": "SYSPRINT",
    "type": "COPY_TO_HFS"
},
{
    "outputs": [{
        "dataset": "NLOPEZ.GITLAB.LOAD(DATDEMO)",
        "deployType": "LOAD"
    }],
    "rc": 0,
    "file": "GITLAB -main-app\/cobol\/datdemo.cbl",
    "options": "MAP,RENT,COMPAT(PM5)",
    "id": "EXECUTE_4",
    "type": "EXECUTE",
    "logs": ["\/u\/nlopez\/GITLAB -WorkSpace\/AzDBB_1786\/.\/build.20211023.074424.044\/DATDEMO.cobol.l
    "command": "IEWBLINK"
},
{
    "mode": "TEXT",
    "destination": "\/u\/nlopez\/GITLAB -WorkSpace\/AzDBB_1786\/.\/build.20211023.074424.044\/DATDEMO.c
    "id": "COPY_TO_HFS_4",
    "source": "SYSPRINT",
    "type": "COPY_TO_HFS"
},
{
    "id": "DBB.BuildResultProperties",
    "type": "PROPERTIES",
    "properties": {
        "impactBuild": "true",
        "filesProcessed": "2",
        ":giturl:GITLAB -Mortgage-SA\/GITLAB -main-app": "git@ssh.dev.GITLAB .com:v3\/GITLAB -Repo-DBB\
```

For more information on the BuildReport, see:

https://www.ibm.com/docs/en/adfz/dbb/1.1.0?topic=scripts-how-create-access-dbb-build-report



For more detailed information, refer to the DBB JavaDoc's BuildReport Packages and classes.

Ref: https://www.ibm.com/docs/api/v1/content/SS6T76_1.1.0/javadoc/index.html