z/OS 3.2 IBM Education Assistant

Solution Name: zOSMF Workflow Dynamic File Template

Solution Element(s): zOSMF

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Agenda

- Trademarks

- Objectives

- Overview

- Usage & Invocation

- Interactions & Dependencies

- Upgrade & Coexistence Considerations

- Installation & Configuration

- Summary

- Appendix

Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.
- Additional Trademarks:
  - None

Overview

- ## Who (Audience)
  - As a system programmer, I want to create z/OSMF workflow definition without having file template content known at the workflow creation time.

- ## What (Solution)
  - Dynamic file template substitution

- ## Wow (Benefit / Value, Need Addressed)
  - System programmer can create z/OSMF workflow definitions when file templates contents are not available.
  - z/OSMF workflow engine dynamically retrieves content of file template during step execution time.

What is a z/OSMF workflow?

The z/OSMF Workflow is a framework that supports **z/OS System Programmers** (Workflow provider) to define a guided flow (workflow) through steps **to accomplish a system management or configuration task.**

The z/OSMF Workflow is useful to:
- Assist people unfamiliar with how to perform a given task, or a task that they perform rarely
- Ensure that all tasks are performed in the right order and only when their dependencies have been met
- Ensure that all steps are completed
  - Even if many of the tasks have been delegated to a number of different colleagues
- Monitor and track progress toward the completion of the task
- Provide a history (audit trail) of the steps performed for a task
- Perform the same tasks on multiple systems
  - Enabling a function (e.g. zEDC)
  - Upgrading a new release of software (e.g., z/OS)

The z/OSMF Workflow also provides RESTful APIs that allow user to run workflows programmatically

z/OSMF Workflow Terminology

- Terminology

  - **Workflow definition file :** An XML file that defines
    - Workflow metadata
    - Variables
    - Steps
  - **Workflow properties file**
    An optional text file used to define variable values when creating workflow instances.
  - **Workflow instance**
    A single entity generated from a workflow definition file inside of the Workflows Task.
  - **Workflow Editor task**
    z/OSMF plug-in that provides a UI to create workflow definition files.
  - **Workflow task**
    A z/OSMF plugin that creates and manages workflow instances from workflow definitions.

6

z/OSMF Workflow Step

Workflow Step

– Contains executable code or instructions that consumes workflow variables

– Steps can be assigned to different users when there is a separation of responsibility

– Conditional logic can decide if step should be executed or skipped

– Steps execution can be dependent on completion of previous steps

– Steps can be automated (when all steps can run under single user) or performed manually

– Automated steps can run in parallel when there is no dependency

Workflow step types

- The z/OSMF Workflow can execute variety of step types
  - Instruction – Provides instructions to user about how to perform specific task
  - Template
    - Invoke JCL via submitting job
    - Invoke Shell script
    - Invoke REXX Exec
  - Invoke REST APIs (both internal to z/OSMF and external APIs)
  - Invoke other workflows

- JCL, shell scripts or REXX exec can be coded inline or can be in z/OS dataset or files

- Output from jobs (JCL, shell scripts, REXX exec) are recorded in workflow instance and can be saved to user specified location

Workflow File Template : Background

The file which contains script to be executed in a z/OSMF workflow step is called "File Template".

How users use "File Template" currently:

File Template1   File Template2

Workflow Instance

Step1 → File Template1(copied)

Step2 → File Template2(copied)
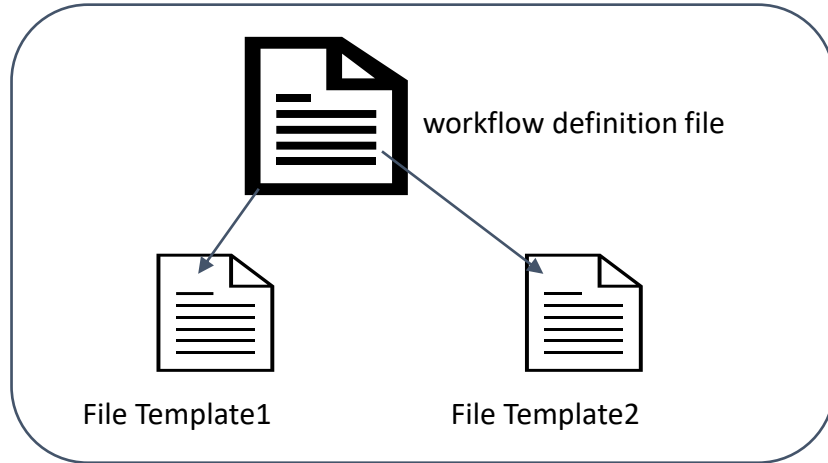
When creating the workflow:
1. The user needs to provide the "File Template".
2. When the "File Template" path contains variable substitution, the user should provide the variable value, so that Workflows task can find the "File Template".

I cannot provide all the "File Templates" when creating the workflow definition. I cannot provide the variable values to do substitution at WF creation time. Can some of the "File Templates" and variable values be provided after that?
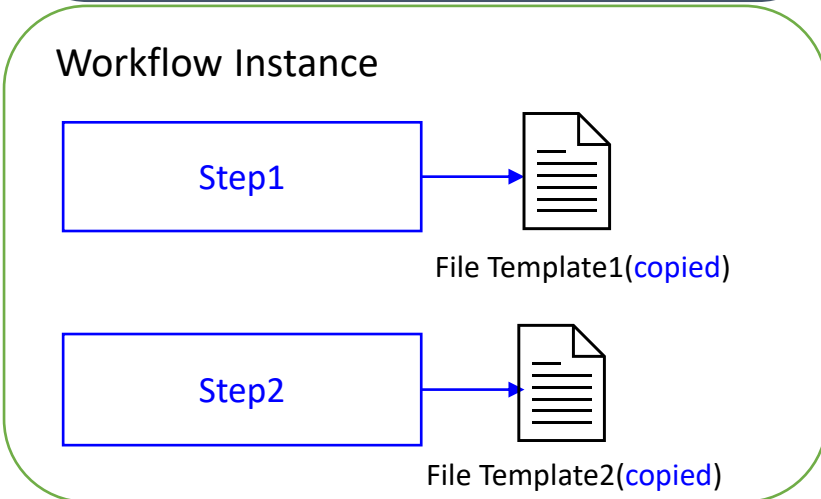
When running the workflow steps:
Because the "File Templates" have been copied into z/OSMF persistence when creating the workflow instance, any change in content change is not processed
1. The script to be executed in the workflow step will be fixed(reference to the copied "File Template") at step runtime

I do not want all "File Templates" to be fixed.
*Can some of the "File Templates" be dynamic at step runtime?*

Workflows Dynamic File Template (PH56619)

Workflows will provide a step level control attribute called "*dynamicResolution*" for file template:

1. If value of this attribute is "*true*", we call the "File Template" is dynamic. Workflows task will not read "File Template" at creation time. At step runtime, Workflows task will calculate the path of "File Template" if it needs to do file path variable substitution, then read "File Template" from the system which runs the step.

2. If value of this attribute is "*false*" which is the default value, Workflows task will be the same as before.

Below is a diagram shows the "Step1" has dynamic "File Template1" and "Step2" has "File Template2":

workflow creation time

workflow definition file

Dynamic File Template1   File Template2

Users do not need to provide "File Template1" at creation time

step runtime

Workflow Instance

Step1

Calculate the path if needed

Dynamic File Template1

Step2

File Template2(copied)

At step runtime, the Workflows task will calculate the path of dynamic "File Template1", then read it
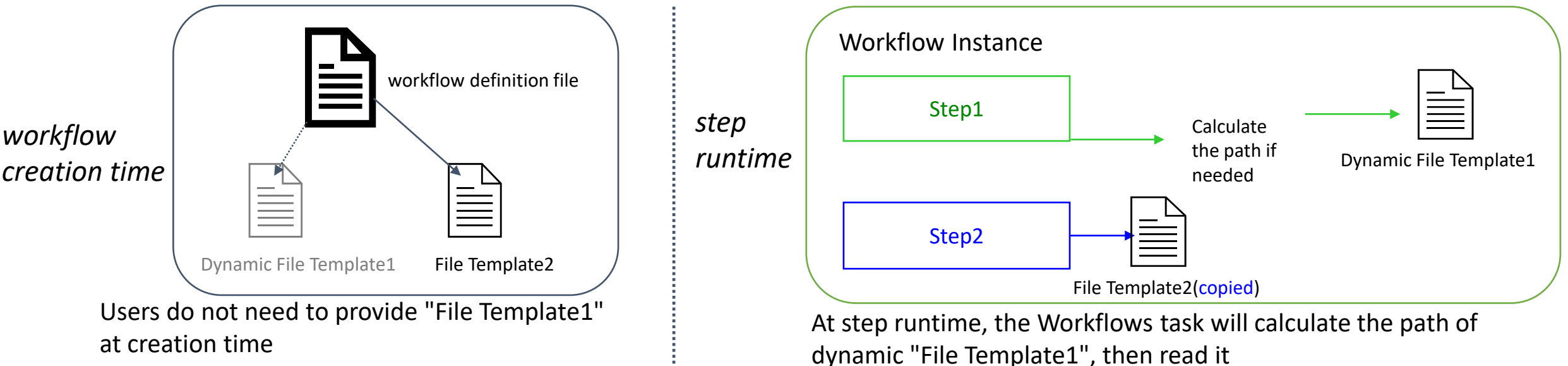
Workflows Dynamic File Template

- To use dynamic "File Template", the Workflows author needs to set the new attribute "*dynamicResolution*" to "*true*" in the <fileTemplate> of step. Omit this attribute or set it to "*false*" if you do not want to use this feature.

  1. If the "*dynamicResolution*" and "*filePathSubstitution*" are both "*true*":
  At step runtime, Workflows task will do variable substitution for the path first, then read the "File Template". Here is an example of the definition:

```
<template>
  <fileTemplate filePathSubstitution="true" dynamicResolution="true" substitution="true">//${dsn}(${mem})</fileTemplate>
  <submitAs maxRc="0">JCL</submitAs>
</template>
```
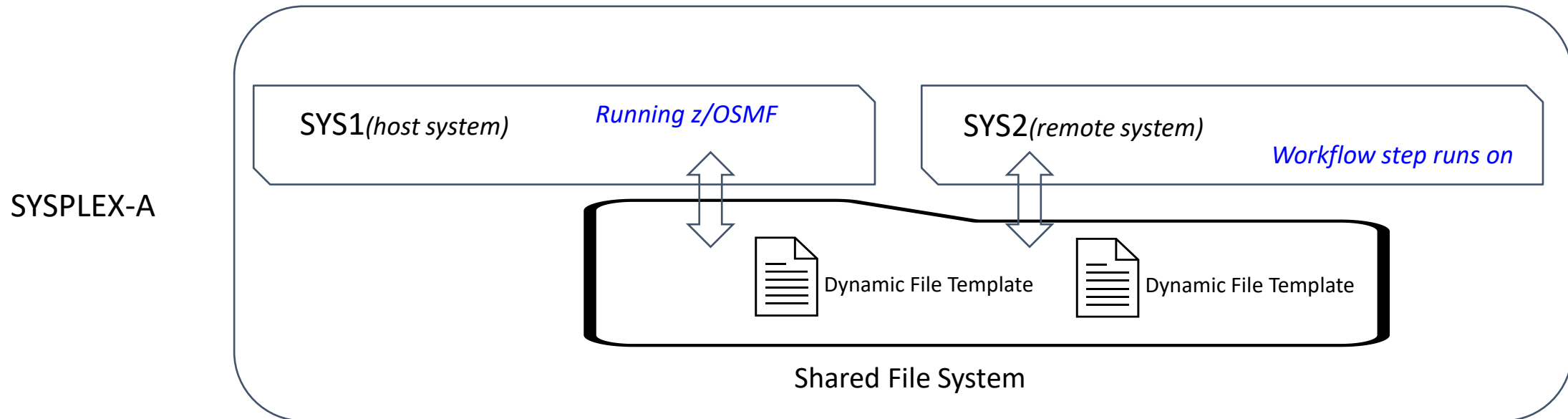
  2. If the "*dynamicResolution*" is "*true*" and "*filePathSubstitution*" is "*false*":
  Workflows task will use the path defined in the step and read the "File Template".

  3. For dynamic file template, at step run time, file template content will be obtained from local system where workflow instance is created

Workflows Dynamic File Template (1)

- The dynamic "File Template" should on a shared file system if it's a "remote system"

  In Workflow, the system which runs step can be a "host system"(a system which runs z/OSMF) or a "remote system"(a system which does not run z/OSMF).

  If the system which runs step is a remote system, the dynamic "File Template" should be on a shared file system with the host system under the same SYSPLEX, so that Workflows task can read the dynamic "File Template" from it.

SYSPLEX-A

SYS1*(host system)*   *Running z/OSMF*

SYS2*(remote system)*

Workflow step runs on

Dynamic File Template   Dynamic File Template

Shared File System

Workflows Dynamic File Template (2)

- The step owner must have read access to the dynamic "File Template": Previously, when the workflow creator creates a new workflow instance, the creator needs to have the read access to the "File Template", the step owner does not need to have read access to the "File Template". To use the new feature, the step owner who performs the step must have read access to the dynamic "File Template".

- The dynamic "File Template" cannot be used together with "runAsUser" step: The "runAsUser" step needs to be signed or approved before using it, the "File Template" in it should not change after the signing/approving process, so it cannot use dynamic "File Template".

Workflow Editor Task Enhancement

Workflow Editor enhancement to specify "Dynamic resolution for file template"

A new option in workflow editor to identify if file template Path and content should be resolved dynamically

Workflow Task Enhancement

After dynamic resolution,
workflow UI will show the file path or
dataset/member from which
file template content is retrieved

Interactions & Dependencies

- Software Dependencies
  - No dependencies.

- Hardware Dependencies
  - None

- Exploiters
  - None

Upgrade & Coexistence Considerations

- To exploit this solution, all systems in the Plex must be at the new z/OS level: **No**

- List any toleration/coexistence APARs/PTFs. **N/A**

- List anything that doesn't work the same anymore. N/A

Installation & Configuration

- zOSMF needs to be installed and configured

Summary

- Enhancements in Workflow Schema to add new element for dynamic resolution

- Enhancements in Workflow Editor to support setting dynamic resolution

- Enhancements in Workflow to support resolution of file template path and content dynamically

Appendix

- Publications
  - zOSMF Configuration Guide
  - zOSMF Programming Guide
  - Online help within zOSMF