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SYSTEMS MANAGER'S PARAMETER STORE

Systems Manager's Parameter Store

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Systems Manager's Parameter Store

Glossary

Term	Description
AWS	Amazon Web Services
SSM	Systems Manager
CFN	CloudFormation
AWS CLI	AWS Command Line Interface
ENI	Elastic Network Interface
AMI	AWS Machine Image
PS	Systems Manager's parameter store

Introduction

Systems Manager is an EC2 instances management tool. Associated with an instance are a good number of so called parameters such as ENI (Elastic Network Interface), private IP, public IP when applicable, AMI from which the instance was launched, and Key Pair name for SSH access to the instance, just name a few. Such information can be obtained from the instance itself, often the instance login is required, or the information can be stored in Systems Manager's Parameter Store (PS). When it is stored in PS, it can be consumed by other services like CloudFormation and be queried by AWS CLI scripts thus a great degree of automation can be achieved by dynamic referencing

This article demonstrates how to create parameters in PS and how to retrieve the values from PS when needed.

Enabling Systems Manager

You need to enable SSM if you have not done so.

Go to SSM Console, click on Get Started with Systems Manager. See figure 1 below

Figure 1 – Get started



When Quick Setup page shows up as Figure 2 shows below, change from defaults

Systems Manager's Parameter Store

Figure 2 – Quick Setup

AWS Systems Manager X

Quick Setup ^{New}

▼ Operations Management

- CloudWatch Dashboard
- OpsCenter
- Resource Groups
- Trusted Advisor & PHD

▼ Actions & Change

- Automation
- Maintenance Windows

▼ Instances & Nodes

- Compliance
- Inventory
- Managed Instances
- Hybrid Activations
- Session Manager
- Run Command
- State Manager
- Patch Manager
- Distributor

▼ Shared Resources

AWS Systems Manager > Quick Setup

Systems Manager Quick Setup

Configure required security roles and commonly used Systems Manager capabilities.

Permissions (Required)

Use the following options to configure two roles that give Systems Manager permission to access your instances and run commands on them.

Instance profile role

Use the default role ☒

Quick Setup creates a new instance profile that uses a secure IAM permissions policy. Quick Setup assigns the profile to the instances that you specify.

Choose an existing role ☐

Uses an existing instance profile. The instance profile must contain the required permissions policy. Choose the instance profile from the following list.

Assume role for Systems Manager

Use the default role ☒

Quick Setup creates a new assume role that enables Systems Manager to securely run commands on your instances.

Choose an existing role ☐

Uses an existing service role. The role must contain the required permissions policy. Choose the role from the following list.

Quick Setup options

In Instance profile role section, choose an existing role.

In Assume role for Systems Manager, choose an existing role

See Figure 3 below.

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Figure 3 – Choosing existing roles

AWS Systems Manager X

Quick Setup ^{New}

▼ Operations Management

CloudWatch Dashboard

OpsCenter

Resource Groups

Trusted Advisor & PHD

▼ Actions & Change

Automation

Maintenance Windows

▼ Instances & Nodes

Compliance

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AWS Systems Manager > Quick Setup

Systems Manager Quick Setup

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Quick Setup creates a new instance profile that uses a secure IAM permissions policy. Quick Setup assigns the profile to the instances that you specify.

☒ Choose an existing role

Uses an existing instance profile. The instance profile must contain the required permissions policy. Choose the instance profile from the following list.

IAM Roles

dcllc-ec2-role-ssm ▼

Assume role for Systems Manager

☐ Use the default role

Quick Setup creates a new assume role that enables Systems Manager to securely run commands on your instances.

☒ Choose an existing role

Uses an existing service role. The role must contain the required permissions policy. Choose the role from the following list.

IAM Roles

AmazonSSMRoleForAutomationAssumeQuickSetup ▼

Scroll down. Keep the defaults in the remaining sections. In Target section, select your running instances. Click Create at the bottom of the page

See Figure 4 and 5 below

Systems Manager's Parameter Store

Figure 4 – Quick Setup Options (keeping defaults)

AWS Systems Manager X

Quick Setup New

▼ Operations Management

CloudWatch Dashboard

OpsCenter

Resource Groups

Trusted Advisor & PHD

▼ Actions & Change

Automation

Maintenance Windows

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Quick Setup options

Quick Setup configures the following Systems Manager components based on best practices. Select the check boxes for actions you want to schedule. [Learn more](#)

☒ Update Systems Manager (SSM) Agent every two weeks

☒ Collect inventory from your instances every 30 minutes

☒ Scan instances for missing patches daily

☐ Install and configure the CloudWatch agent

☐ Update the CloudWatch agent once every 30 days

Learn more about the metrics included in [the CloudWatch agent's basic configuration](#) and Amazon CloudWatch [pricing](#).

Targets

Targets are the Amazon EC2 instances to manage with Systems Manager.

Target selection method

☐ Specify instance tags

☒ Choose instances manually

You haven't selected any instances

☐

Name

Instance ID

Instance state

IAM instance profile name

Availability Zone

Figure 5 – Instances selected

AWS Systems Manager X

Quick Setup New

▼ Operations Management

CloudWatch Dashboard

OpsCenter

Resource Groups

Trusted Advisor & PHD

▼ Actions & Change

Automation

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Targets

Targets are the Amazon EC2 instances to manage with Systems Manager.

Target selection method

☐ Specify instance tags

☒ Choose instances manually

i-04ced2df5a97a0561 X

i-0535ad7b919778a37 X

i-0b7fdd3ff6c957ad9 X

i-0f7621f02471e7d22 X

i-037b88bf67f5dd1d6 X

i-0bf7bfbe035846c59 X

☒

Name

Instance ID

Instance state

IAM instance profile name

Availability Zone

☒

ret-vpc-use1-dev-01-f-sn000-ip-10-10-5-154

i-0bf7bfbe035846c59

☒ running

dclic-ec2-role-ssm

us-east-1f

☒

ret-vpc-use1-dev-01-a-

i-037b88bf67f5dd1d6

☒ running

dclic-ec2-

us-east-1a

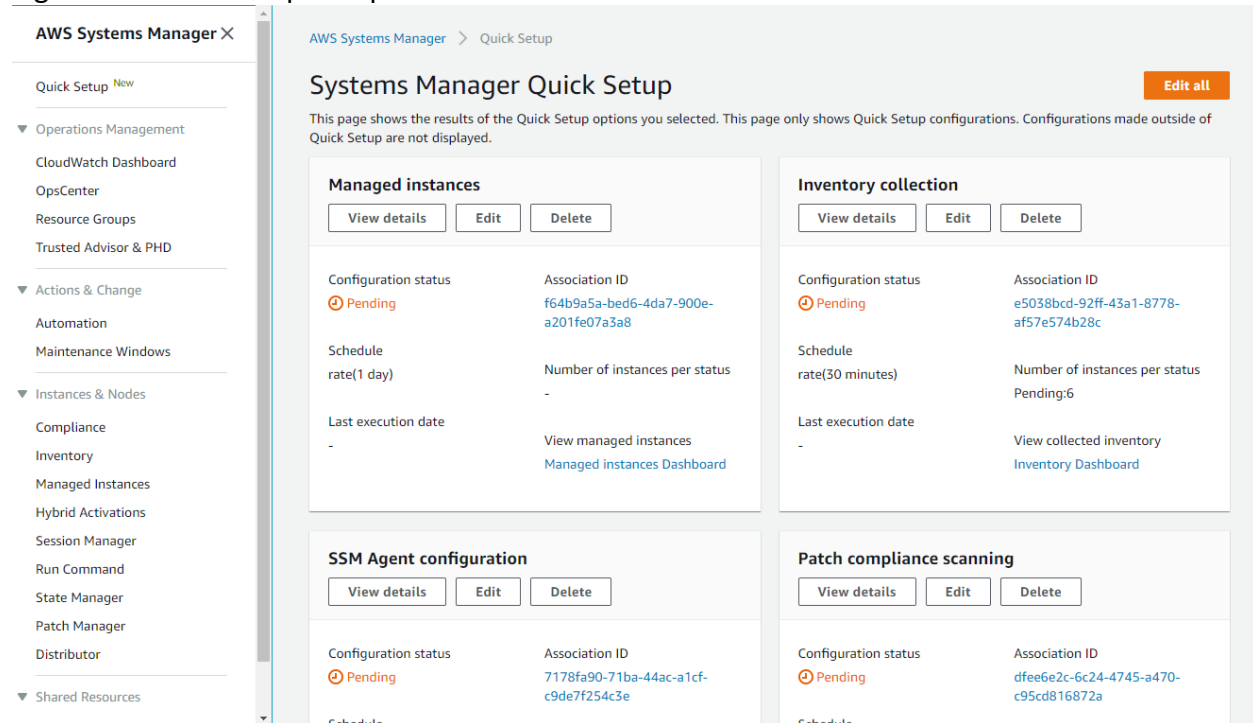
V0.1

Page 6

Systems Manager's Parameter Store

SSM is thus enabled. As a regionally scoped service, once you have enabled SSM in one region, SSM is enabled in other regions in your account. However, SSM managed instances and parameter store remain local to each region. See Figure 6 below.

Figure 6 – Quick Setup Completed



Creating Parameters

In the navigation pane, scroll down to find and click on **Parameter Store** under **Shared Resources** section

When prompted, select the region you are working on. Click Create parameter. Fill out the details in the page as Figure 7 shows below, substituting Name, Value, Tag with yours. When done, click **Create parameter**

First parameter details:

Name: o1-a03-use1-rssmprm-dev-999-KeyPair
Tier: Standard
Type: String
Value: ret-vpc-use1-dev-01-keypair
Tag: Name
Value: o1-a03-use1-rssmprm-dev-999-KeyPair

Systems Manager's Parameter Store

Figure 7 – Creating parameter

The screenshot shows the AWS Systems Manager console interface for creating a new parameter. The left sidebar contains navigation links for various AWS services. The main content area is titled 'Create parameter' and includes the following sections:

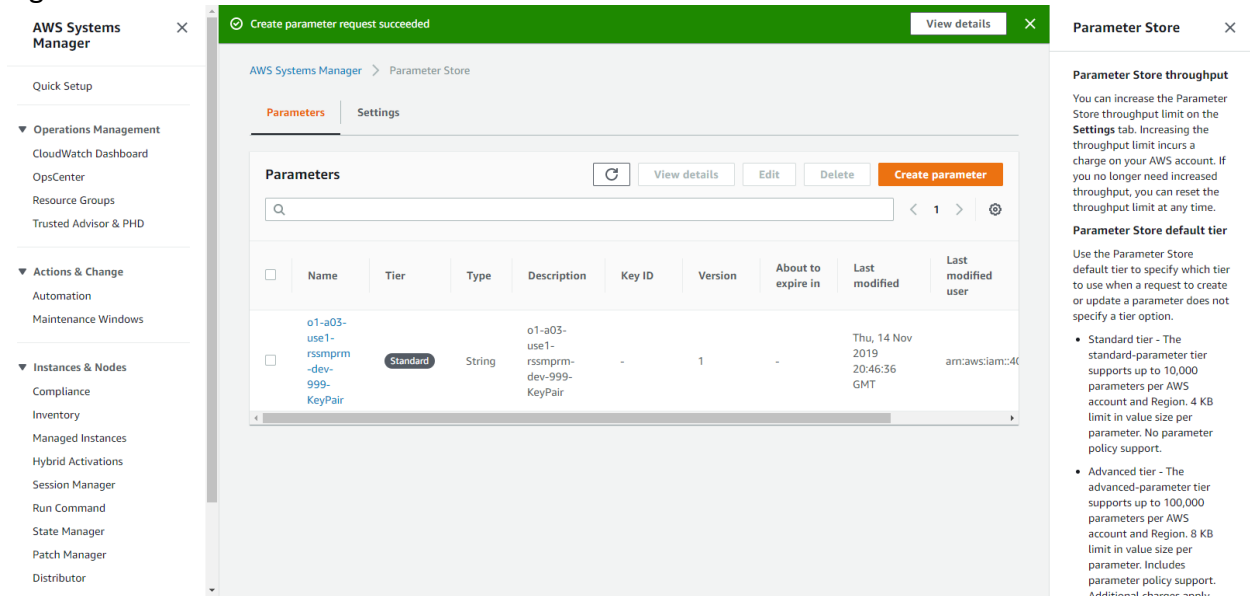
- Parameter details**
 - Name:** A text input field containing 'o1-a03-use1-rssmprm-dev-999-KeyPair'.
 - Description- Optional:** A text input field containing 'o1-a03-use1-rssmprm-dev-999-KeyPair'.
 - Tier:** Two radio button options: 'Standard' (selected) and 'Advanced'. The 'Standard' option includes a description: 'Limit of 10,000 parameters. Parameter value size up to 4 KB. Parameter policies are not available. No additional charge.' The 'Advanced' option includes a description: 'Can create more than 10,000 parameters. Parameter value size up to 8 KB. Parameter policies are available. Charges apply.'
 - Type:** Three radio button options: 'String' (selected), 'StringList', and 'SecureString'. The 'String' option includes a description: 'Any string value.' The 'StringList' option includes a description: 'Separate strings using commas.' The 'SecureString' option includes a description: 'Encrypt sensitive data using the KMS keys for your account.'
 - Value:** A text input field containing 'ret-vpc-use1-dev-01-keypair'.
 - Maximum length 4096 characters.**
- Tags - Optional**
 - Key:** A text input field containing 'Name'.
 - Value:** A text input field containing 'o1-a03-use1-rssmprm-dev-999-KeyPair'.
 - Remove tag:** A button to remove the tag.
 - Add tag:** A button to add a new tag.

At the bottom right of the console, there are two buttons: 'Cancel' and 'Create parameter'.

In response, SSM Console displays “Create parameter request succeeded” message as Figure 8 shows below.

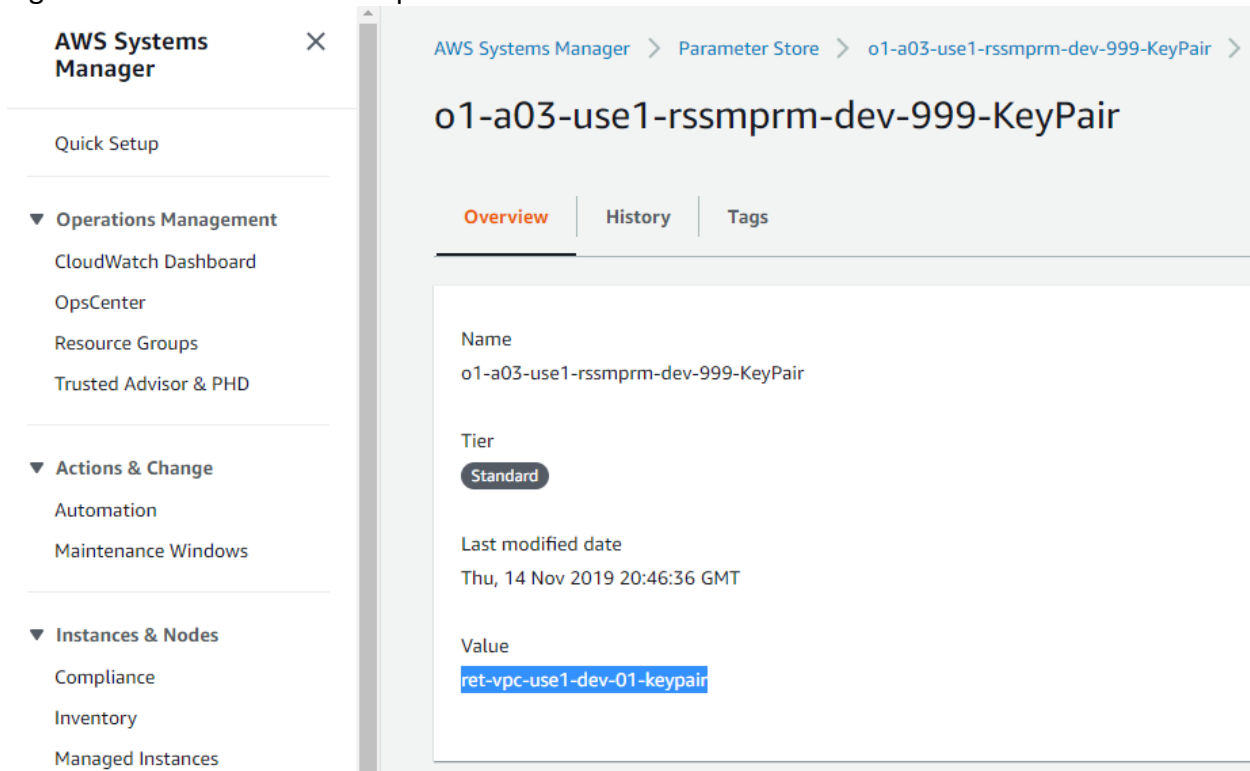
Systems Manager's Parameter Store

Figure 8 – Parameter created



Open the newly created parameter and view the value stored in it. See Figure 9 below.

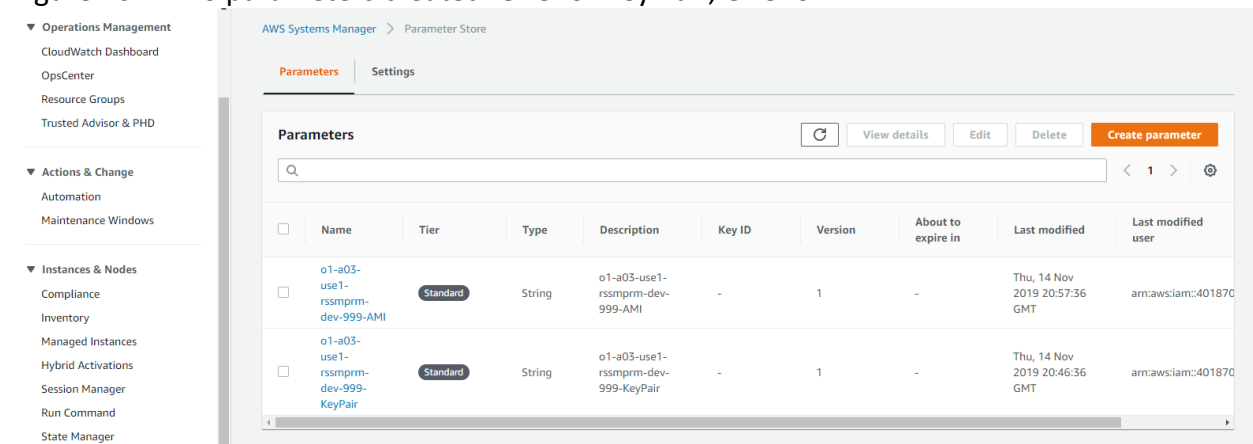
Figure 9 – Value stored in the parameter



Repeat the steps above to create another parameter so you will have two parameters, like what Figure 10 shows below in this example

Systems Manager's Parameter Store

Figure 10 – Two parameters created. One for Key Pair, One for AMI



Second parameter details:

Name: o1-a03-use1-rssmprm-dev-999-AMI
Tier: Standard
Type: String
Value: ami-0080e4c5bc078760e t2.micro
Tag: Name
Value: o1-a03-use1-rssmprm-dev-999-AMI

Be aware, the parameters exist only in the region where you created them.

Working with Parameters

Query parameters by AWS CLI

Command 1 – Display all parameters

```
[awsdclicadmin@linux721 ~]$ aws ssm describe-parameters
{
  "Parameters": [
    {
      "Name": "o1-a03-use1-rssmprm-dev-999-AMI",
      "Type": "String",
      "LastModifiedDate": 1573765056.17,
      "LastModifiedUser": "arn:aws:iam::401870208539:user/dcladmin",
      "Description": "o1-a03-use1-rssmprm-dev-999-AMI",
      "Version": 1,
      "Tier": "Standard",
      "Policies": []
    }
  ]
}
```

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```
    },
    {
      "Name": "o1-a03-use1-rssmprm-dev-999-KeyPair",
      "Type": "String",
      "LastModifiedDate": 1573764396.022,
      "LastModifiedUser": "arn:aws:iam::401870208539:user/dcladmin",
      "Description": "o1-a03-use1-rssmprm-dev-999-KeyPair",
      "Version": 1,
      "Tier": "Standard",
      "Policies": []
    }
  ]
}
[awsdclladmin@linux721 ~]$
```

Command 2 – Display one parameter name and value (AMI)

```
[awsdclladmin@linux721 ~]$ aws ssm get-parameter --name o1-a03-use1-rssmprm-dev-999-AMI
{
  "Parameter": {
    "Name": "o1-a03-use1-rssmprm-dev-999-AMI",
    "Type": "String",
    "Value": "ami-0080e4c5bc078760e t2.micro",
    "Version": 1,
    "LastModifiedDate": 1573765056.17,
    "ARN": "arn:aws:ssm:us-east-1:401870208539:parameter/o1-a03-use1-rssmprm-dev-999-AMI"
  }
}
[awsdclladmin@linux721 ~]$
```

Command 3 - Display another parameter name and value (Key Pair)

```
[awsdclladmin@linux721 ~]$ aws ssm get-parameter --name o1-a03-use1-rssmprm-dev-999-KeyPair
{
  "Parameter": {
    "Name": "o1-a03-use1-rssmprm-dev-999-KeyPair",
    "Type": "String",
    "Value": "ret-vpc-use1-dev-01-keypair",
    "Version": 1,
    "LastModifiedDate": 1573764396.022,
    "ARN": "arn:aws:ssm:us-east-1:401870208539:parameter/o1-a03-use1-rssmprm-dev-999-KeyPair"
  }
}
```

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```
}
```

Command 4 – Display both parameters and their values (AMI and Key Pair)

```
[awsdcadmin@linux721 ~]$ aws ssm get-parameters --names o1-a03-use1-rssmprm-dev-999-KeyPair o1-a03-use1-rssmprm-dev-999-AMI
```

```
{
  "Parameters": [
    {
      "Name": "o1-a03-use1-rssmprm-dev-999-AMI",
      "Type": "String",
      "Value": "ami-0080e4c5bc078760e t2.micro",
      "Version": 1,
      "LastModifiedDate": 1573765056.17,
      "ARN": "arn:aws:ssm:us-east-1:401870208539:parameter/o1-a03-use1-rssmprm-dev-999-AMI"
    },
    {
      "Name": "o1-a03-use1-rssmprm-dev-999-KeyPair",
      "Type": "String",
      "Value": "ret-vpc-use1-dev-01-keypair",
      "Version": 1,
      "LastModifiedDate": 1573764396.022,
      "ARN": "arn:aws:ssm:us-east-1:401870208539:parameter/o1-a03-use1-rssmprm-dev-999-KeyPair"
    }
  ],
  "InvalidParameters": []
}
```

```
[awsdcadmin@linux721 ~]$
```

Dynamic Referencing with Systems Manager Parameter Store by CloudFormation

CloudFormation (CFN) can specify template values by referencing to SSM PS dynamically.

In your CFN stack templates, you can reference values stored externally in other services to set up your template parameters. This is called dynamic referencing. Dynamic references have a couple of benefits. For one thing, by using dynamic references, you can avoid hard-coding certain sensitive values in your templates. For another, you can leverage with functions and features available only in other services but not in CFN, such as parameter value encryption.

CloudFormation currently supports the following dynamic reference patterns:

- `ssm`, for plaintext values stored in AWS Systems Manager (SSM) Parameter Store

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- ssm-secure, for secure strings stored in AWS Systems Manager Parameter Store
- secretsmanager, for entire secrets or specific secret values that are stored in AWS Secrets Manager

Example of CFN dynamic referencing with SSM parameter store to acquire AMI ID value

Example settings

1. SSM Parameter Name: AmazonLinuxV2AMI
2. SSM Parameter Value: ami-03528cb655169a557
3. CFN template section: Parameters
4. CFN template Parameter reference name: AMIImageSSM

CFN template Parameters:

...

Parameters:

AMIImageSSM:

Description: AMI ID used for the base image of all machines. Default is Amazon Linux 2

Type: AWS::SSM::Parameter::Value<String>

Default: AmazonLinuxV2AMI

...

When running the template, user is prompted for AMIImageSSM to enter a value, which defaults to SSM parameter name AmazonLinuxV2AMI. When user continues with the default, CFN calls SSM parameter by name and retrieves the AMI ID from the parameter.

When all other CFN templates are standardized on Parameters section when it involves AMI to be used in a case like this, AMI remains as is and applies to all the templates.

When AMI needs to be changed, the change needs to occur in only place, in this case, by updating the value stored in the SSM parameter AmazonLinuxV2AMI

For more examples of dynamic referencing with SSM PS parameters, please refer to AWS CloudFormation User Guide [1], [2], [3]

References

[1] AWS Systems Manager User Guide

[2] [Using Resource Type Systems Manager Parameter in CloudFormation](#)

[3] [CloudFormation Dynamic Referencing with Systems Manager's Parameter Store](#)