ITIL Asset and Configuration Management in the Cloud

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Abstract

Cloud initiatives require more than just the right technology. They also must be supported by organizational changes, such as people and process changes. This paper is intended for IT service management (ITSM) professionals who are supporting a hybrid cloud environment that leverages AWS. It outlines best practices for asset and configuration management, a key area in the IT Infrastructure Library (ITIL), on the AWS cloud platform.

Introduction

Leveraging the experiences of enterprise customers who have successfully integrated their cloud strategy with their IT Infrastructure Library (ITIL)-based service management practices, this paper will cover:

- Asset and Configuration Management in ITIL
- AWS Cloud Adoption Framework (AWS CAF)
- Cloud-specific Asset and Configuration Management best practices like creating a configuration management database

What Is ITIL?

The framework managed by AXELOS Limited defines a commonly used, best practice approach to IT service management (ITSM). Although it builds on ISO/IEC 20000, which provides a "formal and universal standard for organizations seeking to have their ITSM capabilities audited and certified,"[1] ITIL goes one step further to propose operational processes required to deliver the standard.

ITIL is composed of five volumes that describe the ITSM lifecycle, as defined by AXELOS:

Service Strategy	Understands organizational objectives and customer needs.
Service Design	Turns the service strategy into a plan for delivering the business objectives.
Service Transition	Develops and improves capabilities for introducing new services into supported environments.
Service Operation	Manages services in supported environments.
Continual Service Improvement	Achieves incremental and large-scale improvements to services.

Each volume addresses the capabilities that enterprises must have in place. Asset and Configuration Management is one of the chapters in the Service Transition volume. For more information, see the Axelos website.[2]

AWS Cloud Adoption Framework

AWS CAF is used to help enterprises modernize ITSM practices so that they can take advantage of the agility, security, and cost benefits afforded by public or hybrid clouds.

ITIL and AWS CAF are compatible. Like ITIL, AWS CAF organizes and describes all of the activities and processes involved in planning, creating, managing, and supporting modern IT services. It offers practical guidance and comprehensive guidelines for establishing, developing, and running cloud-based IT capabilities.

AWS CAF is built on seven perspectives:

People	Selecting and training IT personnel with appropriate skills, defining and empowering delivery teams with accountabilities and service-level agreements.
Process	Managing programs and projects to be on time, on target, and within budget while keeping risks at acceptable levels.
Security	Applying a comprehensive and rigorous method for describing the structure and behavior for an organization’s security processes, systems, and personnel.
Business	Identifying, analyzing, and measuring the effectiveness of IT investments.
Maturity	Analyzing, defining, and anticipating demand for and acceptance of planned IT capabilities and services.
Platform	Defining and describing core architectural principles, standards, and patterns that are required for optimal IT capabilities and services.
Operations	Transitioning, operating, and optimizing the hybrid IT environment, enabling efficient and automated IT service management.

AWS CAF is an important supplement to enterprise ITSM frameworks used today because it provides enterprises with practical operational advice for implementing and operating ITSM in a cloud-based IT infrastructure. For more information, see AWS Cloud Adoption Framework.[3]

Asset and Configuration Management in the Cloud

In practice, asset and configuration management aligns very closely to other ITIL processes, such as incident management, change management, problem management, or service-level management.

ITIL defines an asset as "any resource or capability that could contribute to the delivery of a service."

Examples of assets include:

- virtual or physical storage
- virtual or physical servers
- a software license
- undocumented information known to internal team members

ITIL defines configuration items as "an asset that needs to be managed in order to deliver an IT service." All configuration items are assets, but many assets are not configuration items. Examples of configuration items include a virtual or physical server or a software license. Every configuration item should be under the control of change management.

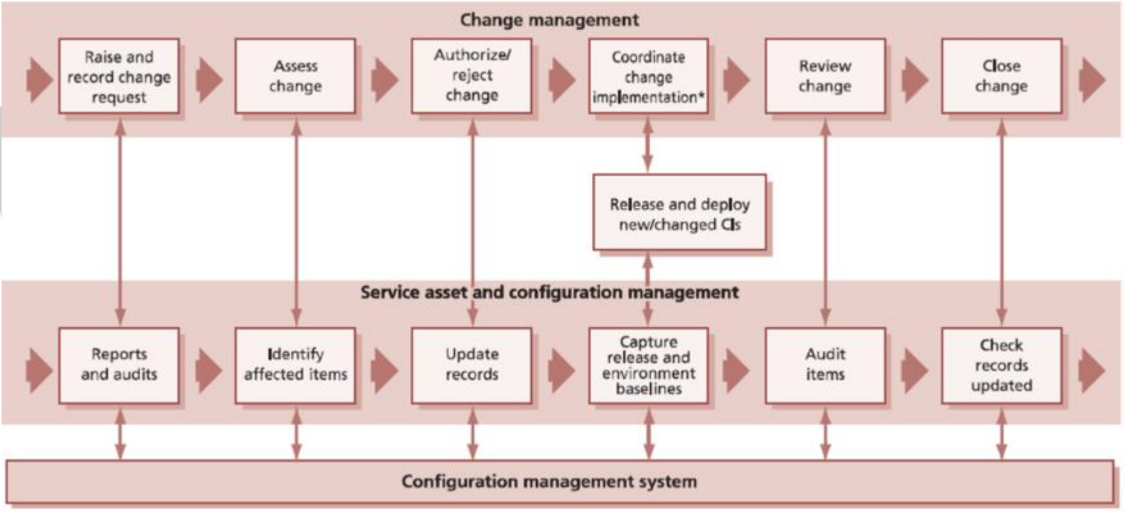
The goals of asset and configuration management are to:

- Support ITIL processes by providing accurate configuration information to assist decision making (for example, the authorization of changes, the planning of releases) and to help resolve incidents and problems faster.
- Minimize the number of quality and compliance issues caused by incorrect or inaccurate configuration of services and assets.
- Define and control the components of services and infrastructure and maintain accurate configuration information on the historical, planned, and current state of the services and infrastructure.

The value to business is:

- Optimization of the performance of assets improves the performance of the service overall. For example, it mitigates risks caused by service outages and failed licensing audits.
- Asset and configuration management provides an accurate representation of a service, release, or environment, which enables:
  - Better planning of changes and releases.
  - Improved incident and problem resolution.
  - Meeting service levels and warranties.
  - Better adherence to standards and legal and regulatory obligations (fewer non-conformances).
  - Traceable changes.
  - The ability to identify the costs for a service.

The following diagram from AXELOS shows there are elements in asset and configuration management that directly relate to elements in change management. Asset and configuration management underpins change management. Without it, the business is subject to increased risk and uncertainty.


Change management
Raise and record change request
Assess change
Authorize/ reject change
Coordinate change implementation*
Review change
Close change
Release and deploy new/changed CIs
Service asset and configuration management
Reports and audits
Identify affected items
Update records
Capture release and environment baselines
Audit items
Check records updated
Configuration management system

* Includes build and test where applicable

Figure 1: Asset and configuration management in ITIL

Asset and Configuration Management and AWS CAF

As with most specifications covered in the Service Transition volume of ITIL, asset and configuration management falls into the Cloud Service Management function of the AWS CAF Operations perspective.

People and process changes should be supported by a cloud governance forum or Center of Excellence whose role is to use AWS CAF to manage through the transition. From the perspective of ITSM, your operations should certainly have a seat at the table.

As shown in Figure 2, AWS CAF accounts for the management of assets and configuration items in a hybrid environment. Information can come from the on-premises environment or any number of cloud providers (private or public).

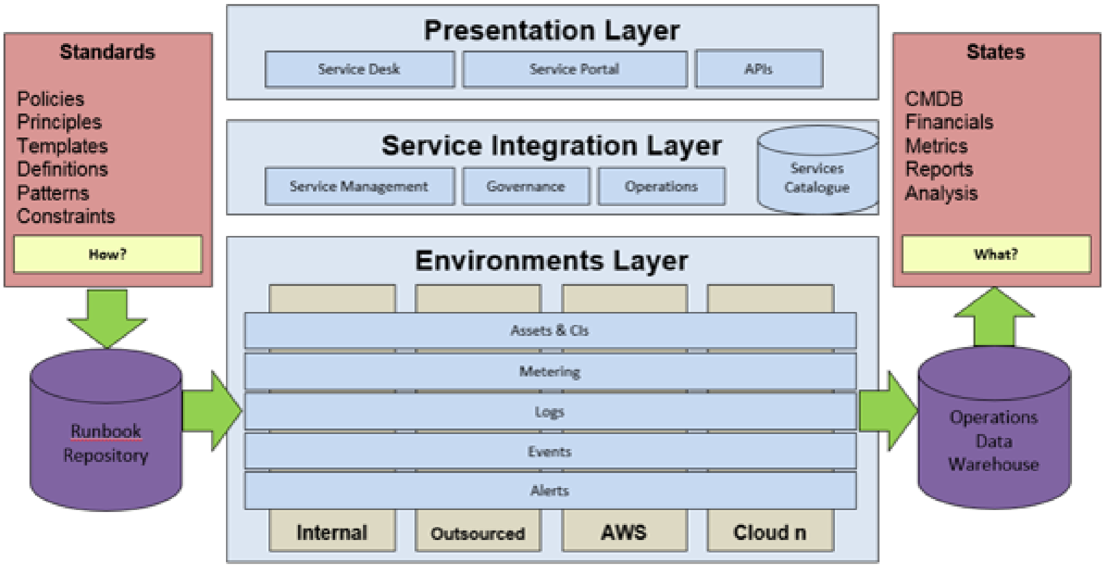


Figure 2: AWS CAF integration

Impact on Financial Management

One of the most important aspects of asset management is to ensure data is available for these financial management processes:

- Capitalization and depreciation
- Software license management

- Compliance requirements

These activities typically require comprehensive asset lifecycle management processes, which take significant cost and effort. One of the benefits of moving IT to the cloud is that the financial nature of the transaction moves from a capital expenditure (CAPEX) to an operating expenditure (OPEX). You can do away with the large capital outlays (for example, a server refresh) that require months of planning as well as amortization and depreciation.

Creating a Configuration Management Database

A configuration management database (CMDB) is used by IT to track and manage its resources. The CMDB presents a logical model of the enterprise infrastructure to give IT more control over the environment and facilitate decision-making. At a minimum, a CMDB contains the following:

- Configuration item (CI) records with all associated attributes captured.
- A relationship model between different CIs.
- A history of all service impacts in the form of incidents, changes, and problems.

In a traditional IT setup, the goals of establishing a CMDB are met through the process of:

- Discovery tools used to create a record of existing CIs.
- Comprehensive change management processes to keep track of creation and updates to CIs.
- Integration of incident and problem management data with impacted CIs with ITSM workflow tools like BMC, Hewlett-Packard, or ServiceNow.

These processes and tools in turn help organizations better understand the IT environment by providing insight into not only the impact of incidents, problems, and changes, but also financial resources, service availability, and capacity management.

There are some challenges to creating a CMDB for cloud resources due to:

- The inherent dynamic nature of cloud resource provisioning, where resources can be created or terminated through predefined business policies or application architecture elements like auto scaling.
- The difficulty of capturing cloud resources data in a format that can be imported and maintained in a single system of record for all enterprise CIs.
- A prevalence of shadow IT organizations that makes information sharing and even manual consolidation of enterprise IT assets and CIs difficult.

Configuration Management Inventory for Cloud Resources

There are two logical approaches AWS customers can take to create a CMDB for cloud resources:

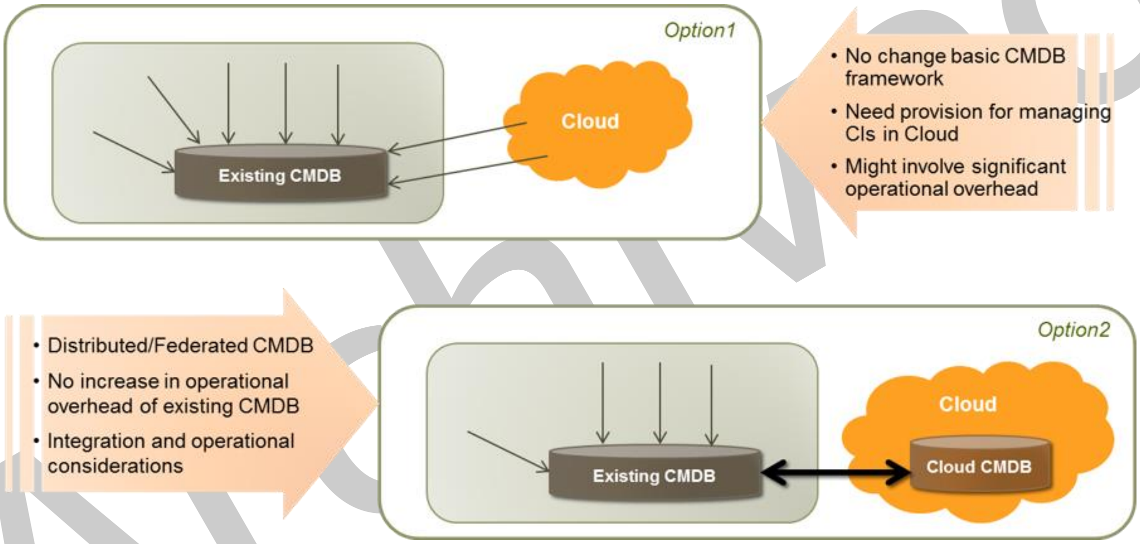

Option1
Existing CMDB
Cloud
• No change basic CMDB framework
• Need provision for managing CIs in Cloud
• Might involve significant operational overhead
• Distributed/Federated CMDB
• No increase in operational overhead of existing CMDB
• Integration and operational considerations
Option2
Existing CMDB
Cloud
Cloud CMDB

Figure 3: Options for Enterprise CMDB Systems

AWS Config helps customers manage their CIs in the cloud. AWS Config provides a detailed view of the configuration of AWS resources in an AWS account. With AWS Config, customers can do the following:

- Get a snapshot of all the supported resources associated with an AWS account at any point in time.
- Retrieve the configurations of the resources.
- Retrieve historical configurations of the resources.

- Receive a notification whenever a resource is created, modified, or deleted.
- View relationships between resources.

This information is important to any IT organization for CI discovery and recording, change tracking, audit and compliance, and security incident analysis. Customers can access this information from the AWS Config console or programmatically extract it into their CMDBs.

As an example of the potential for integration with legacy systems, ServiceNow the platform-as-a-service (PaaS) provider of enterprise service management software, is now integrated with AWS Config. This means ServiceNow users can leverage Option 1 shown in Figure 3.

Managing the Configuration Lifecycle in the Cloud

One of the goals of service asset and configuration management is to manage the CI lifecycle and track and record all changes. One of the key aspects of the cloud is a much tighter integration of the software and infrastructure configuration lifecycles. This section covers aspects of configuration lifecycle management across instance, stacks, and applications:

- **Instance creation templates**: Every IT organization has security and compliance standards for instances introduced into its IT environments. Amazon Machine Images (AMIs) are a robust way of standardizing instance creation. Users can opt for AWS- or third-party-provided predefined AMIs or define custom AMIs. If you create AMI templates for instance provisioning you can define instance configuration and environmental add-ins in a predefined and programmatic manner. A typical custom AMI might prescribe the base OS version and associated security, monitoring, and configuration management agents.
- **Instance lifecycle management**: For every instance or resource created in an IT environment, there are multiple lifecycle management activities that must be performed. Some of the standard tasks are patch management, hardening policies, version upgrades, environment variable changes, and so on. These activities can be performed manually, but most IT organizations use robust configuration management tools like Chef, Puppet, and System Center Configuration Manager to perform

these tasks. AWS allows easy integration with these tools to ensure a consistent enterprise configuration management approach.

- **Environment provisioning templates**: AWS CloudFormation is useful for provisioning end-to-end environments (also referred to as *stacks*) in a consistent and repeatable fashion, without actually provisioning each component individually. You don't need to figure out the order for provisioning AWS services or the subtleties of making those dependencies work. AWS CloudFormation takes care of this for you. You can use a template to create identical copies of the same stack without effort or errors. Templates are simple JSON-formatted text files that can be held securely leveraging your current source control mechanisms.
- **Application configuration and lifecycle management**: In today's world of agile development, development teams leverage continuous integration and continuous delivery best practices. AWS provides seamless integration with tools like Jenkins (CI) and Github for code management and deployment. Services like AWS CodePipeline, AWS CodeDeploy, and AWS CodeCommit can be used to manage the application lifecycle.

Conclusion

Service asset and configuration management processes consist of critical activities for the provisioning and maintenance of the health of IT systems. Consistent management of configuration items through their lifecycle leads to efficient and effective system health and performance. AWS enables best practices across every level of resource in an application stack. With the tools, automations, and integration available on the AWS platform, IT organizations can achieve significant productivity gains. Successful implementation and execution of service asset and configuration management processes should be seen as a shared responsibility that can be achieved through the right commitment by IT organizations, enabled by the AWS platform.

Contributors

The following individuals contributed to this document:

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Notes

[1] ITIL Service Operation Publication, AXELOS, 2007, page 5

[2] https://www.axelos.com/best-practice-solutions/itil/what-is-itil

[3] http://aws.amazon.com/professional-services/CAF/