Stateless Computing with Cisco UCS and Cisco Intersight

Executive summary

This document is for individuals who are familiar with server management but who are new to the Cisco Unified Computing System™ (Cisco UCS®) and Cisco Intersight®. It describes an architecture unique to Cisco UCS and Intersight, called stateless computing, and its key concepts. This document complements Cisco Intersight Policies, which provides a detailed summary of domain, chassis, and server policies.

Cisco UCS is a revolutionary computing architecture designed for IT innovation and business acceleration. It enables fast IT by combining computing, networking, and storage infrastructure with management and virtualization capabilities to offer exceptional speed, simplicity, and scalability.

Cisco Intersight is an operations platform that helps IT teams see, control, and automate their Cisco UCS, converged, and hyperconverged infrastructure—anytime and anywhere—from one place. The Intersight SaaS platform consolidates and automates infrastructure lifecycle management from your data center to the edge in one solution. Intersight also is available as an on-premises Connected Virtual Appliance (CVA) and a Private (air-gapped) Virtual Appliance (PVA).

Stateless computing

Cisco® compute solutions are based on the architectural concept of stateless computing. Stateless computing with Cisco UCS and Intersight uses server profiles to abstract the identity and configuration of servers, allowing for flexible and dynamic server management.

Key concepts in stateless computing

Server profiles and policies

In Cisco UCS, each server's identity is defined by a server profile and its related policies. This enables the server to be stateless, meaning its identity can be transferred to another compute node if needed, facilitating rapid deployment, reconfiguration, and maintenance without physical changes.

A **server profile** is a software definition of a server's settings and identity along with its storage and networking characteristics. It contains the characteristics that previously belonged to the physical server, which are defined in **policies**, thus abstracting that information away from the physical host and placing it in the profile (Figure 1).

Server profiles and policies are stored in Intersight and then attached and deployed to the server. They are essential for automating server configuration, reducing manual steps required to configure servers, Network Interface Cards (NICs), Host Bus Adapters (HBAs), and connectivity to upstream LAN and SAN switches.

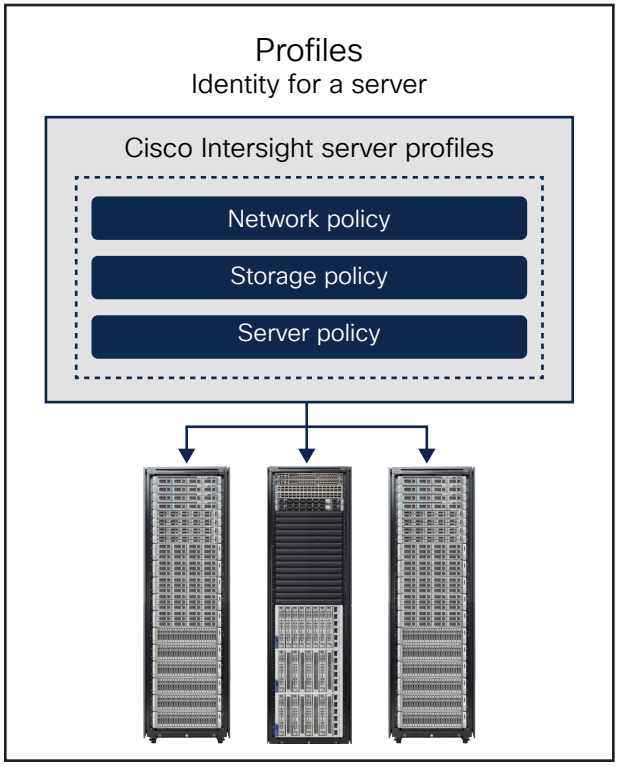


Figure 1. Server profiles abstract server settings and identity away from the physical host and place them in profiles.

Fabric interconnects

A Cisco UCS **fabric interconnect** acts as the gateway between Intersight and the UCS servers managed by Intersight, streamlining data-center operations by serving as the core point for network connectivity and management (Figure 2).

Cisco Intersight policies enhance these interconnects by enabling centralized, cloud-based configuration and operational control. These policies ensure consistent settings across fabric interconnects, optimizing performance and resource allocation, while providing seamless access to the core network and storage networks of the data center.

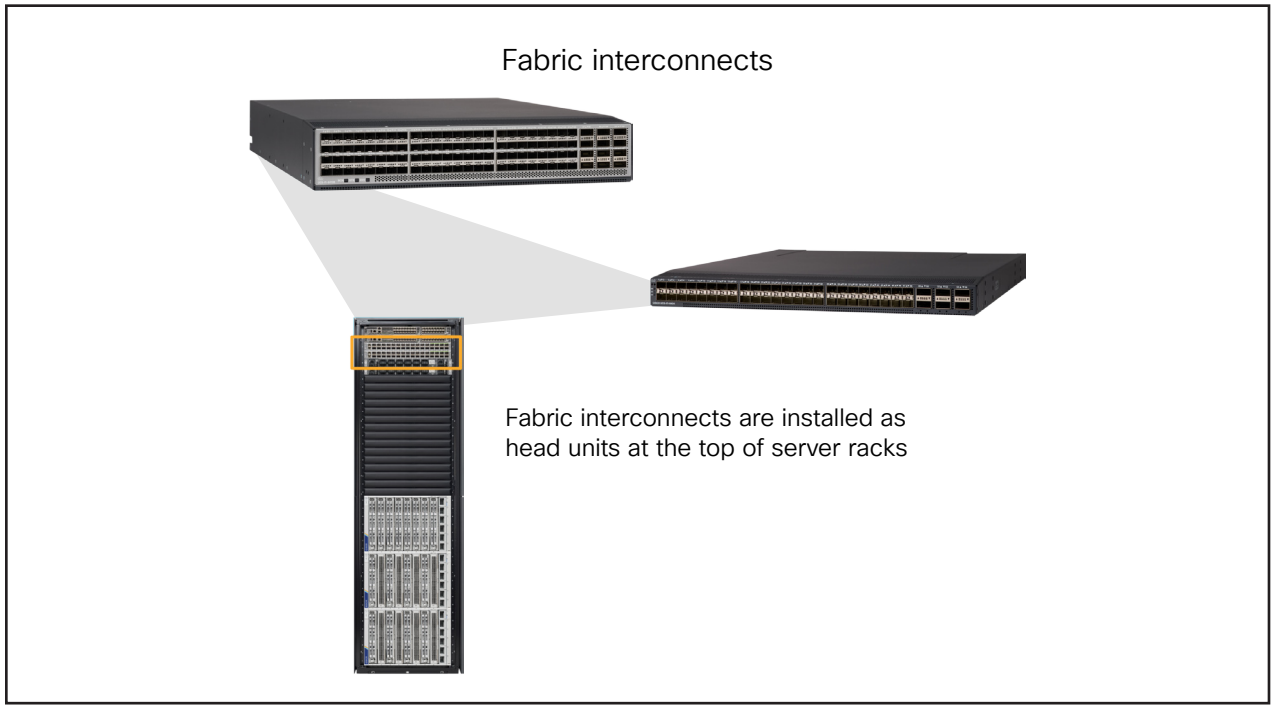


Figure 2. Fabric interconnects enable high performance, high availability, and scalable infrastructure.

Understanding profiles, policies, and templates

In Cisco Intersight, policies and profiles are closely related components that work together to manage and automate UCS domain, chassis, and server configurations.

It is first helpful to understand what a UCS domain is, along with its primary components.

A **UCS domain** is a collection of compute, networking, and storage resources that are managed as a single entity with Cisco Intersight (Figure 3).

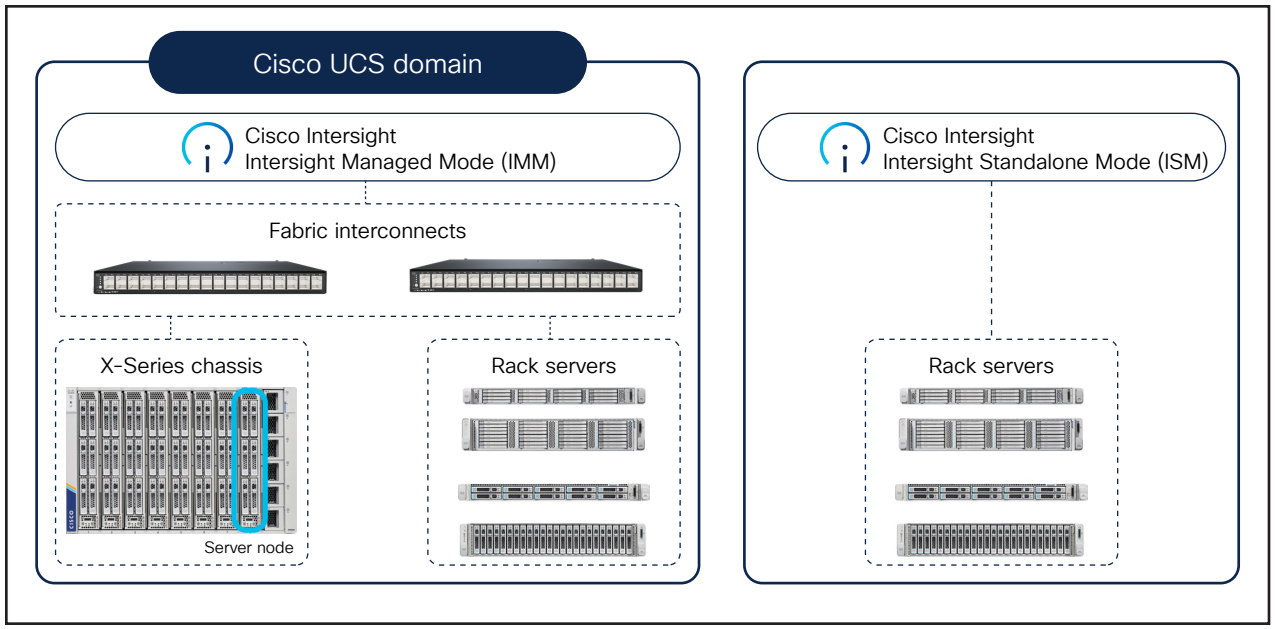


Figure 3. A UCS domain managed in Intersight Managed Mode (IMM) includes the compute, networking, and storage components that together are managed through Cisco Intersight. Alternatively, rack servers can be managed directly from Intersight with Intersight Standalone Mode (ISM).

The main components of a UCS domain include:

- **Servers:** Cisco UCS encompasses a variety of server types, including blade, modular, and rack servers. These servers provide the computing power within the domain.
- **Fabric interconnects:** these are network devices that connect servers to the network and storage. They act as the central hub for managing communication and data flow in the UCS domain.
- **Management software:** Intersight is the software used to manage all components within the UCS domain. It simplifies management by allowing administrators to control hardware and configure network settings from a single interface.
- **Unified fabric:** this integrates networking, storage, and management traffic into a single streamlined system, reducing complexity and improving efficiency.

Let's transition to profiles, which define and maintain configuration and operational consistency across the Cisco UCS infrastructure.

Types of profiles

There are three types of profiles in Cisco Intersight: domain, chassis, and server profiles (Figure 4). Each serves a distinct purpose to streamline and automate infrastructure management:

- **Domain profiles:** used to configure a pair of fabric interconnects. They allow for the configuration of ports, port channels, VLANs, and VSANs in the network as well as system QoS. This profile is essential for defining the characteristics and configurations of the ports on the fabric interconnects, ensuring consistent deployment across multiple domains. Domain profiles can be derived from templates, which help in managing large-scale deployments by applying consistent policies across multiple domains.
- **Chassis profiles (optional):** a chassis profile is used to configure and manage the settings of a UCS X-Series chassis, including power, thermal, and SNMP policies. These profiles ensure that the chassis operates according to predefined policies, which can be applied to multiple chassis for uniformity and efficiency.
- **Server profiles:** server profiles define the compute, storage, management, and network characteristics of a server, enabling resource management by aligning policies and configurations that are automatically applied upon deployment. These software definitions include LAN and SAN connectivity and are constructed through configuration settings defined in policies. Stored in Intersight, server profiles automatically configure the server and adapters to match the specified configurations, reducing manual configuration steps and minimizing errors. This automation ensures that servers are consistently configured across the infrastructure, which promotes consistency across deployments.

Domain, chassis, and server profiles collectively enhance the management of IT infrastructure by automating and standardizing configurations, thus improving operational efficiency and reducing the risk of errors.

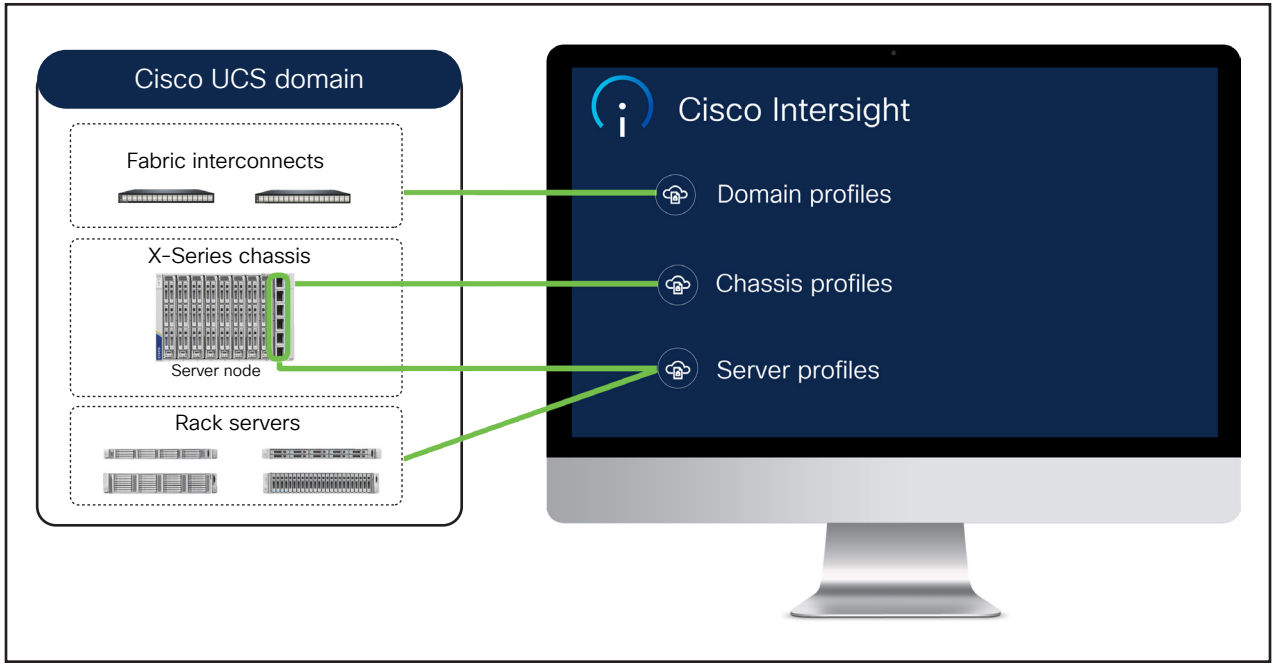


Figure 4. UCS domain, chassis, and server profiles define and maintain configuration and operational consistency across the Cisco UCS infrastructure.

Server policies

Server policies are predefined settings for standard elements of server configurations. They are used within profiles to enforce specific configurations and security settings. Policies help ensure that servers are provisioned and configured according to predefined best practices, reducing potential vulnerabilities and maintaining a standardized computing environment.

Policies can include settings for BIOS, boot order, firmware, network, and storage configurations, among others. Once configured, policies can be assigned to any number of servers through policies to provide a configuration baseline.

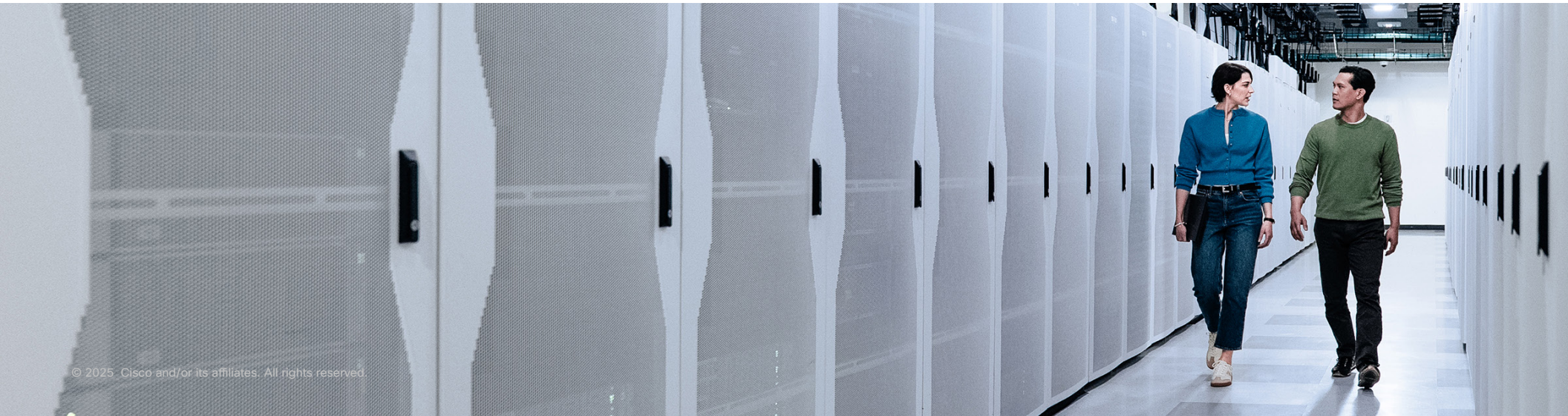
Policies can be combined into profile templates to allow for the scale out of additional profiles to meet any use case, such as server platform type and/or common configuration settings.

Templates

A template is a predefined configuration that can be used to create multiple profiles with consistent settings. They enable standardization and repeatability, thereby reducing human error and troubleshooting time. Templates are particularly useful for managing large-scale deployments because they allow administrators to define a set of configurations once and apply them across multiple devices or systems. This ensures consistency and reduces the potential for errors during configuration. Templates afford a single place to make changes and then have those changes pass to the device (for example, server or fabric interconnect).

Key features of templates in Cisco Intersight include:

- **Derive profiles:** you can derive multiple profiles from a single template, which helps in maintaining uniformity across different systems.
- **Edit and update:** any changes made to a template are automatically reflected in all derived profiles, ensuring that updates are consistently applied.
- **Cloning:** templates (as well as individual policies) can be cloned to create multiple copies, each with unique identifiers, which can be used across different organizations or environments.



The return on investment of stateless computing

Stateless computing with Cisco UCS and Cisco Intersight offers a compelling return on investment by significantly enhancing operational efficiency and scalability. By abstracting server identities and configurations into easily manageable profiles and policies, you can streamline deployment, reduce manual configuration errors, and ensure consistent settings across your IT infrastructure.

This approach not only minimizes downtime but also accelerates provisioning and maintenance, leading to faster time-to-production and improved resource utilization. The automation and standardization facilitated by Cisco Intersight further empower IT teams to optimize data center and edge operations, reduce costs, and focus on strategic initiatives, thereby maximizing their return on investment in stateless-computing solutions.

Putting it all together

Overall, the relationship between policies, profiles, and templates in Cisco Intersight is one of integration and automation, where policies define the configuration parameters that are applied through templates and profiles to manage stateless server resources efficiently and securely.

Domain, chassis, and server profiles work in conjunction with their respective templates, which enable a single point of configuration control. The profiles can be bound to, or derived from, the templates to pick up those configurations and changes (Figure 5).

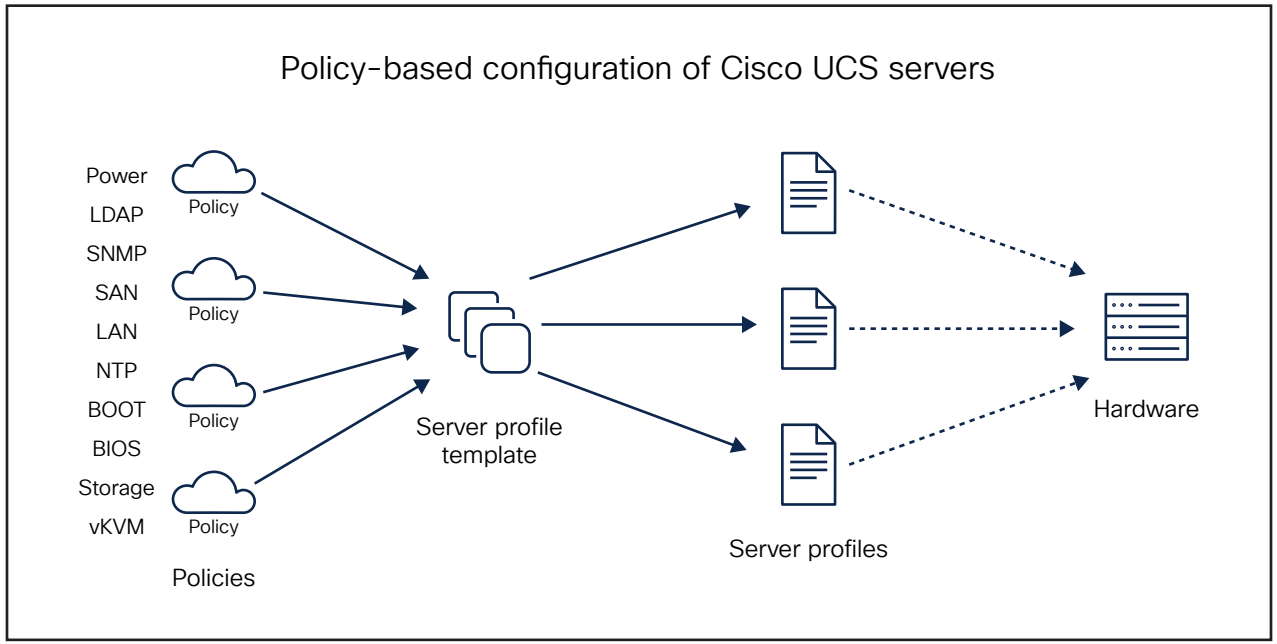


Figure 5. In Cisco Intersight, policies configure UCS servers, using templates and profiles to automate and standardize configurations, enhancing security and efficiency.

Glossary

- **Domain:** a group of Cisco UCS servers attached to a fabric interconnect with a maximum of 20 chassis or 160 servers, which can be configured and managed as a single entity.
- **Fabric interconnect:** a networking switch that serves as the central hub for connecting a Cisco UCS chassis, which are racks where server components are housed. It is a key component of the Cisco Unified Computing System (Cisco UCS), designed to enhance scalability and reduce data center costs by integrating all elements into a unified platform. This setup allows the UCS fabric interconnect to facilitate access to both networks and storage.
- **Policies:** configurations that define specific settings and behaviors for various components within the infrastructure. Policies help enforce secure deployments and ensure consistency across server configurations.
- **Pools:** the basic building blocks for uniquely identifying hardware resources. Pools are classified into Identity (ID) pools and resource pools. ID pools are used to manage unique identifiers for various network and server resources, such as IP pools, MAC address pools, UUID pools, WWNN and WWPN pools, and IQN pools. Resource pools allow you to logically group and manage hardware, such as discovered servers, which can be assigned to server profile templates or individual server profiles.
- **Profiles:** software definitions that encapsulate the configuration settings for domains, chassis, and servers and their connectivity to LAN and SAN networks. These profiles are essential for defining the compute, network, and storage characteristics of a server within the UCS infrastructure. They help in automating the configuration of servers, adapters, fabric extenders, and fabric interconnects, thereby reducing manual configuration steps and ensuring consistency across deployments.
- A **domain profile** in Cisco Intersight is used to configure a pair of fabric interconnects. It allows for the configuration of ports, port channels, VLANs, and VSANs in the network. This profile is essential for defining the characteristics and configurations of the ports on the fabric interconnects, ensuring consistent deployment across multiple domains. Domain profiles can be derived from templates, which help in managing large-scale deployments by applying consistent policies across multiple domains.
- A **server profile** in Cisco Intersight defines the compute, storage, management, and network characteristics of a server. It streamlines resource management by aligning policies and configurations, ensuring that servers are consistently configured according to predefined settings. Server profiles can be created using a wizard or derived from templates, which simplifies the provisioning and deployment of servers by automating the configuration process.
- **Template:** a template is a predefined configuration that can be used to create multiple profiles with consistent settings. Templates are particularly useful for managing large-scale deployments because they allow administrators to define a set of configurations once and apply them across multiple devices or systems. This ensures consistency and reduces the potential for errors during configuration.

Get started

Take the next step in learning how stateless computing with Cisco UCS and Cisco Intersight can help you achieve new levels of efficiency. Learn more about UCS and Intersight, or schedule a custom demo.

If you're just beginning your journey with Cisco UCS and Cisco Intersight, see Cisco Intersight Policies to jump start onboarding.

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