ESG Lab Review

Hitachi VSP Family and Hitachi Command Suite: Automation Director

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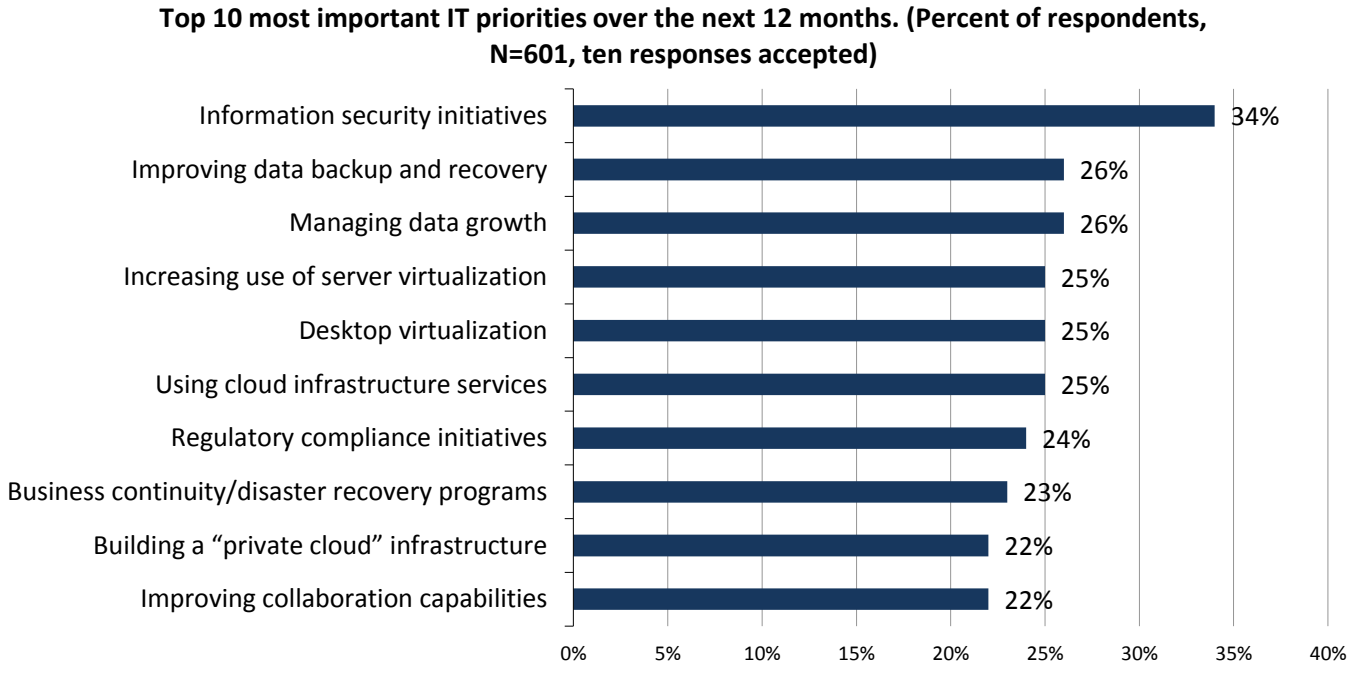
Abstract: *ESG Lab recently completed hands-on testing and analysis of the Hitachi Virtual Storage Platform (VSP) family and Hitachi Command Suite (HCS) 8.x software. This report focuses on the evolutionary enhancements to both the VSP family and HCS that enable the Hitachi Data Systems vision of one platform for all data providing shared storage services across the enterprise. This validation also focuses on how VSP and HCS can improve resilience, reduce risk, and automate administration for enterprise storage environments.*

The Challenges

The demands on and for storage are increasing rapidly. To address data growth without interrupting business operations, rapid deployment of storage and IT resources becomes a function of scalability. ESG's *2015 IT Spending Intentions Survey* revealed that, as they have been since 2010, increased use of server virtualization, improved backup and recovery, and managing data growth are all in the top ten most frequently cited 2015 IT priorities. The adoption of server virtualization is nearly ubiquitous among enterprise and midmarket organizations, and increased usage of the technology was identified by 25% of respondents as one of their most important IT priorities for 2015.[1]

Figure 1. Top Ten Most Important IT Priorities



Source: Enterprise Strategy Group, 2015.

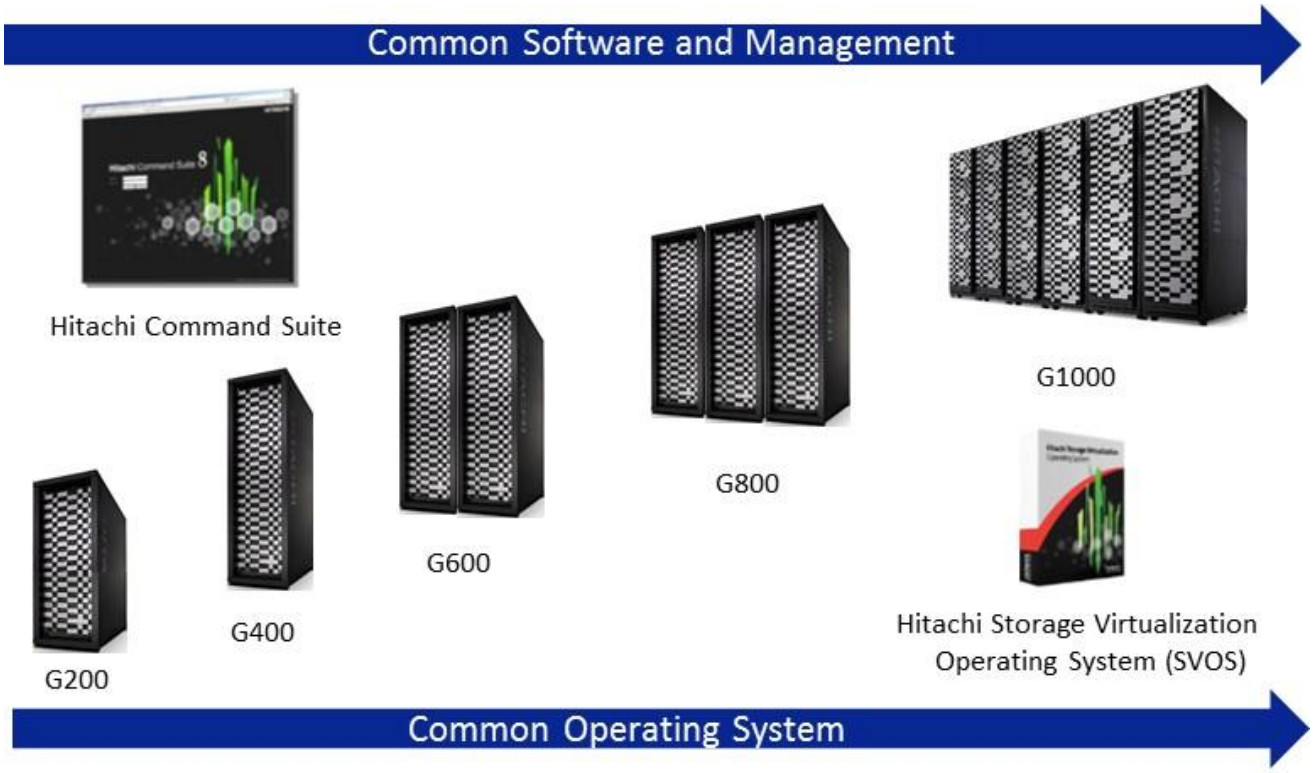
[1] Source: ESG Research Report, *2015 IT Spending Intentions Survey*, February 2015.

The goal of ESG Lab reports is to educate IT professionals about data center technology products for companies of all types and sizes. ESG Lab reports are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objective is to go over some of the more valuable feature/functions of products, show how they can be used to solve real customer problems and identify any areas needing improvement. ESG Lab's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments. This ESG Lab report was sponsored by Hitachi.

The Solution: Hitachi VSP Family

The Hitachi VSP family is designed to deliver enterprise storage virtualization in a unified platform for midmarket to global enterprise organizations while enabling them to manage information more efficiently. Existing storage from multiple vendors can be centrally unified in a shared pool of data. Hitachi's goal was to create a highly efficient architecture that allows organizations to satisfy growth requirements and simplify operations to reduce the total cost of storage ownership.

Figure 2. Hitachi Virtual Storage Platform Family



Hitachi Data Systems has been virtualizing existing disk systems from multiple third-party vendors since the introduction of the USP in 2004. With the introduction of global-active device (GAD), Hitachi uses the concept of a "storage virtual machine" to abstract the underlying physical arrays from hosts, making site failover transparent and eliminating the need for reconfiguration.

The VSP family also supports non-disruptive migration options designed to provide large-scale migration capabilities that require less time and effort to execute, deliver continuous operations, and ensure application quality of service while maintaining data protection.

Other key capabilities of the Hitachi VSP family include:

Availability

- No interruption of service for disaster recovery due to local and remote snapshots and clones.
- System maintenance with no interruption to host I/O.
- A 100% data availability guarantee.
- Clustered, highly available file modules for nonstop access to file systems.

Ease of management

- External storage virtualization assimilates disk and solid-state storage from more than 100 models of storage from 15 vendors.

- Consistent management across heterogeneous, virtualized systems.
- Hitachi Dynamic Tiering automates data placement for optimal cost and performance efficiency.
- Multi-tenant partitioning ensures isolation between data sets at a level required by service providers.

Scalability

- VSP Family scales to over 8PB of internal storage and up to 255PB of raw externally virtualized capacity.
- File systems up to 256TB and cluster namespace for unified directory structure.
- Dynamic (thin) provisioning enables capacity-efficient scalability on demand.

Data protection

- Universal data replication provides offsite data protection and disaster recovery for multiple tiers of data on heterogeneous platforms using consistent tools and techniques.
- Writeable, crash-consistent snapshots for application-aware protection.
- File cloning and high-speed object-based replication.

Hitachi Command Suite

Hitachi Command Suite (HCS) further simplifies systems management for the VSP family, allowing complete control of Hitachi storage systems and their virtualized external storage resources leveraging common management practices from a centralized console. Hitachi Command Suite is an integrated management framework encompassing key strategic management areas of configuration, data mobility, storage analytics, data resilience and automation.

Hitachi Automation Director, a recent addition to the Hitachi Command Suite, was developed to provide management automation via programmable workflows incorporating Hitachi's best practices and business application focus. By simplifying repetitive management tasks, Hitachi Automation Director aims to improve reliability and reduce human error, providing an integrated service builder to define and customize new storage service offerings.

HCS provides visibility into both physical and virtual servers, an important feature for troubleshooting in complex environments. HCS is designed to allow administrators to tailor storage management practices for their particular infrastructure; HCS can facilitate aligning applications with IT assets based on business objectives, enabling shared resource optimization and just-in-time resource delivery.

Key capabilities of Hitachi Command Suite include:

- Unified management of Hitachi storage systems helps IT conserve administrative resources and reduce the costs required to manage virtualized storage environments.
- Agentless operation simplifies management of large storage resource deployments.
- Consolidated management of file, block, and object data from a single point of management eliminates the need to learn multiple tools.
- Automated data lifecycle management across storage tiers.
- End-to-end visibility and correlation of business applications, host servers, virtual machines, SAN switches, storage systems and logical storage devices are provided.
- Storage capacity analysis helps to identify underutilized capacity to defer additional IT investments.

The Hitachi Data Systems offering of unified enterprise storage and powerful, centralized management expands on the rock-solid legacy of Hitachi experience building enterprise storage and is designed to ameliorate the extreme challenges that arise from consolidated, virtual workloads and exponential data growth.

ESG Lab Tested

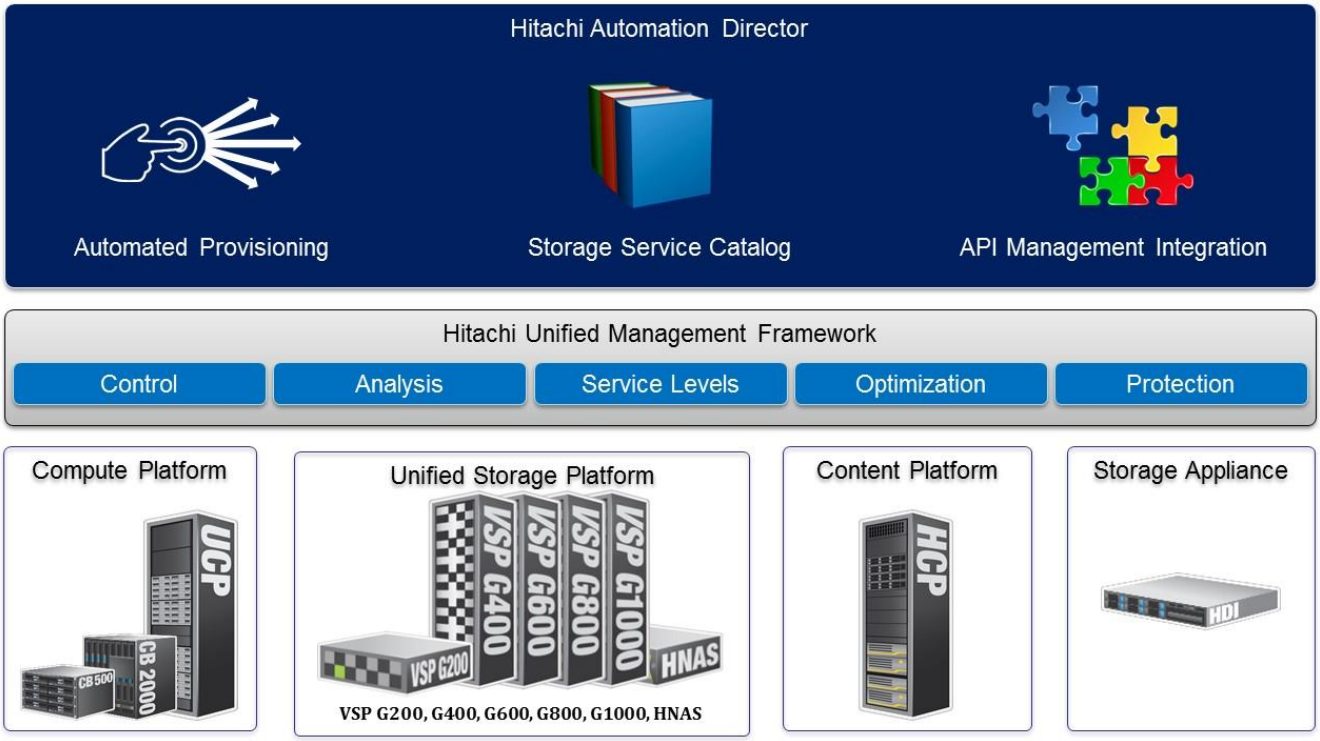
ESG Lab performed hands-on evaluation and testing of VSP G1000 and Command Suite 8 at Hitachi's facilities, in Santa Clara, California. Testing was designed to demonstrate the rapid and simple configuration of multiple VSP G1000 systems into a distributed clustered storage system. Also of interest were the latest addition to Hitachi's management system, Command Suite 8, focusing on customer-driven, non-disruptive migration of data from existing storage environments to the G1000, and customer-driven automation of routine management tasks, such as provisioning storage for new systems and business applications.

Customer-driven Automation with Hitachi Automation Director

Businesses are continuing to grow, implementing new services and applications, which expand storage capacity and performance requirements. New technologies and new customer-driven, self-service operating paradigms can require new automated management practices and technologies to address the potential complexity these environments can bring with them. With the executive mantra of "do more with less" and the need to reduce both capital and operational costs, IT departments are spending more time on storage provisioning and storage administration tasks in an attempt to improve infrastructure reliability and adaptability while reducing human error.

Hitachi Automation Director addresses these challenges. Targeted at IT organizations managing complex and changing infrastructures and needing to control the operational costs of management with limited staff resources, Hitachi Automation Director delivers storage infrastructure self-service. Incorporating Hitachi's best practices and expertise with storage systems supporting large-scale business applications, Hitachi Automation Director automates the storage provisioning workflow process, transforming error-prone manual processes, simplifying management, reducing complexity, and speeding application deployments. Delivering on self-managed IT, Automation Director enables IT organizations to manage storage from the perspective of the business application and business needs, improving service and reducing costs.

Figure 3. Hitachi Command Suite



Hitachi Automation Director is built on the Hitachi Command Suite unified management framework, a single consistent system management environment spanning Hitachi compute, unified storage, content storage, and storage appliance solutions. The framework provides management capabilities for control, analytics, service levels, optimization, and data

protection. Automation Director's engine, service catalog, and REST-based API for application integration provide automated provisioning of storage requests leveraging the functionalities of Hitachi Command Suite, engineered to deliver a service-oriented model of storage system provisioning and administration.

Automation Director expands Hitachi's best practices, knowledge, and expertise with business applications running on Hitachi storage systems, providing administrators with a predefined storage service catalog, an intelligent engine for storage capacity and performance analysis, and storage infrastructure abstraction. This engine enables customers to immediately benefit from automation while still allowing for complete control and customization.

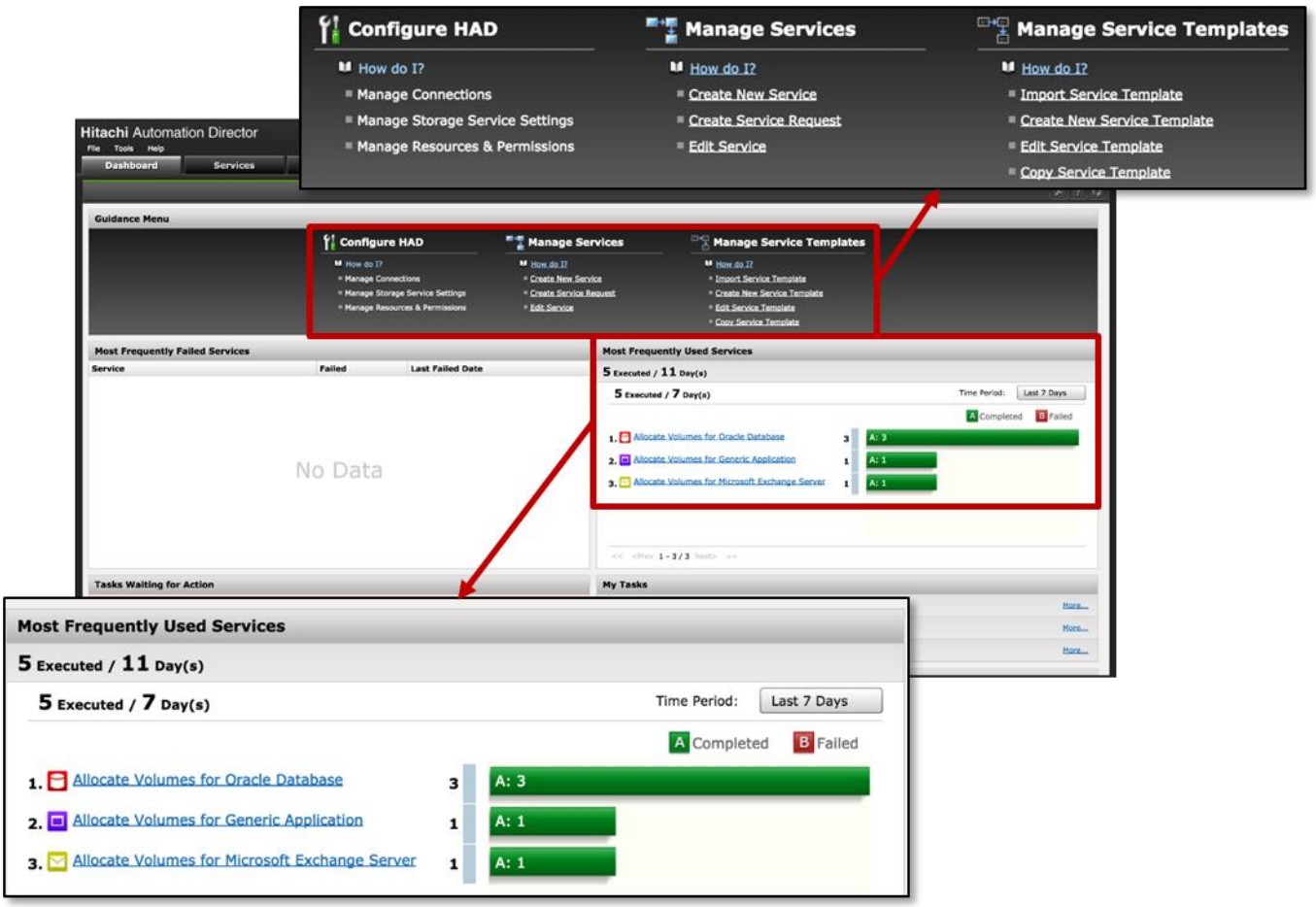
ESG Lab Testing

ESG Lab evaluated three use cases for Hitachi Automation Director: automated provisioning of storage systems, expansion of the storage services catalog, and integration into existing management applications.

Hitachi Automation Director supports delegation of authority with three separate permission levels, allowing administrative users to manage services, manage service templates, and manage the Automation Director software. This enables IT staff to support storage self-service.

The first step was to log in to the Automation Director as a service admin, acting as a traditional storage administrator. The top section of the Automation Director dashboard (see Figure 4) is the guidance menu, which enables the user to take action over configuring the Automation Director software, manage services, and manage service templates to expand the catalog of services. The bottom section of the dashboard provides status information, including most frequently used services, the current list of errors, and running tasks.

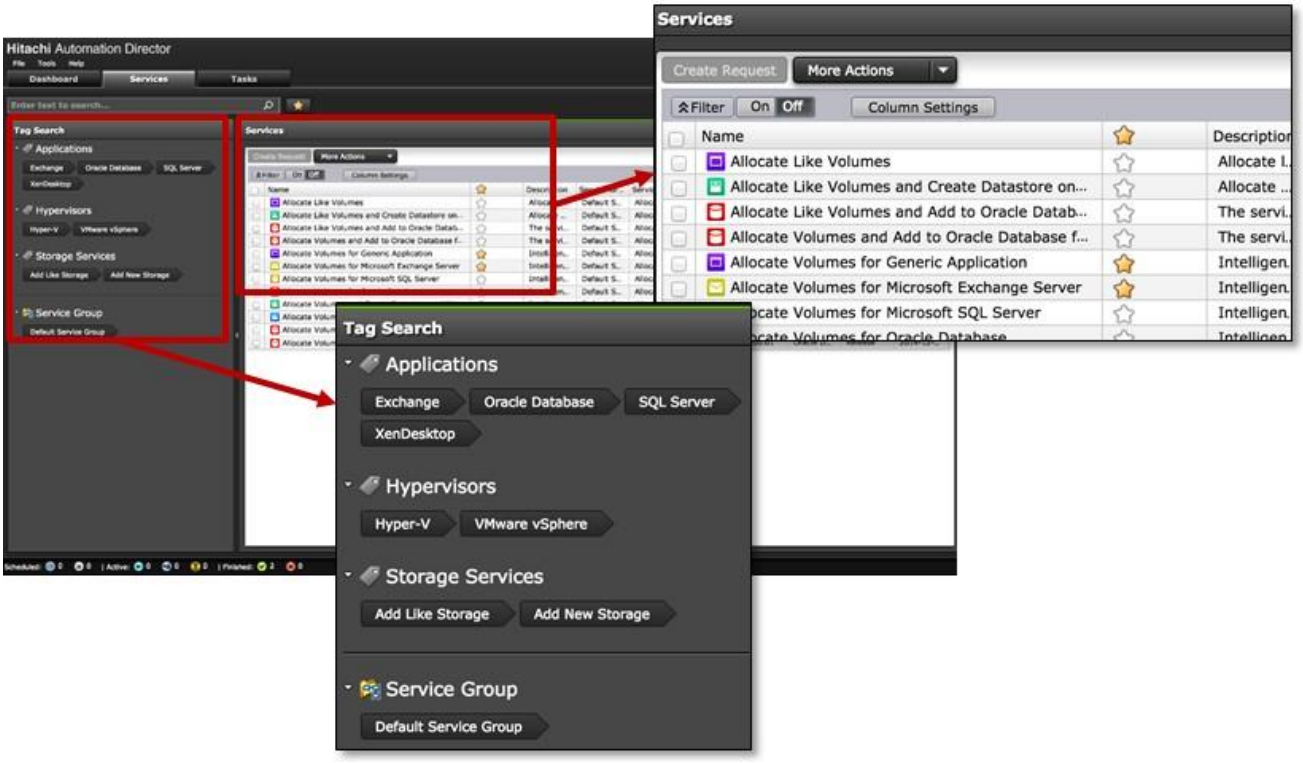
Figure 4. Automation Director Dashboard



Keeping in the same style as other parts of Hitachi Command Suite 8, Automation Director is workflow-driven, with text and graphics designed to be user-friendly and self-explanatory. Each of the three main action sections starts with a "How do I?" action linked directly to context-sensitive help. Information in the status section was presented both textually and graphically using red to indicate failures and green to indicate successes, enabling IT staff to quickly focus on areas that need attention.

ESG Lab selected "Service" to start the processes for the first use case scenario: automated provisioning. This brought up the catalog of services (see Figure 5). This use case scenario enabled ESG Lab to experience the benefits of automating storage provisioning, typically a complicated process that requires the use of multiple management tools and trained personnel.

Figure 5. Catalog of Storage Services



The left side of the catalog provides a modern search interface, searching for services tagged within groups, such as applications or hypervisors. The right side provides the list of services returned by the search. The list includes the service name, description, vendor name, version, released status, and last modified date. The powerful, flexible, and customizable user interface can be configured to provide additional information on the available services, which can be presented to the user either in a table format or in a card format.

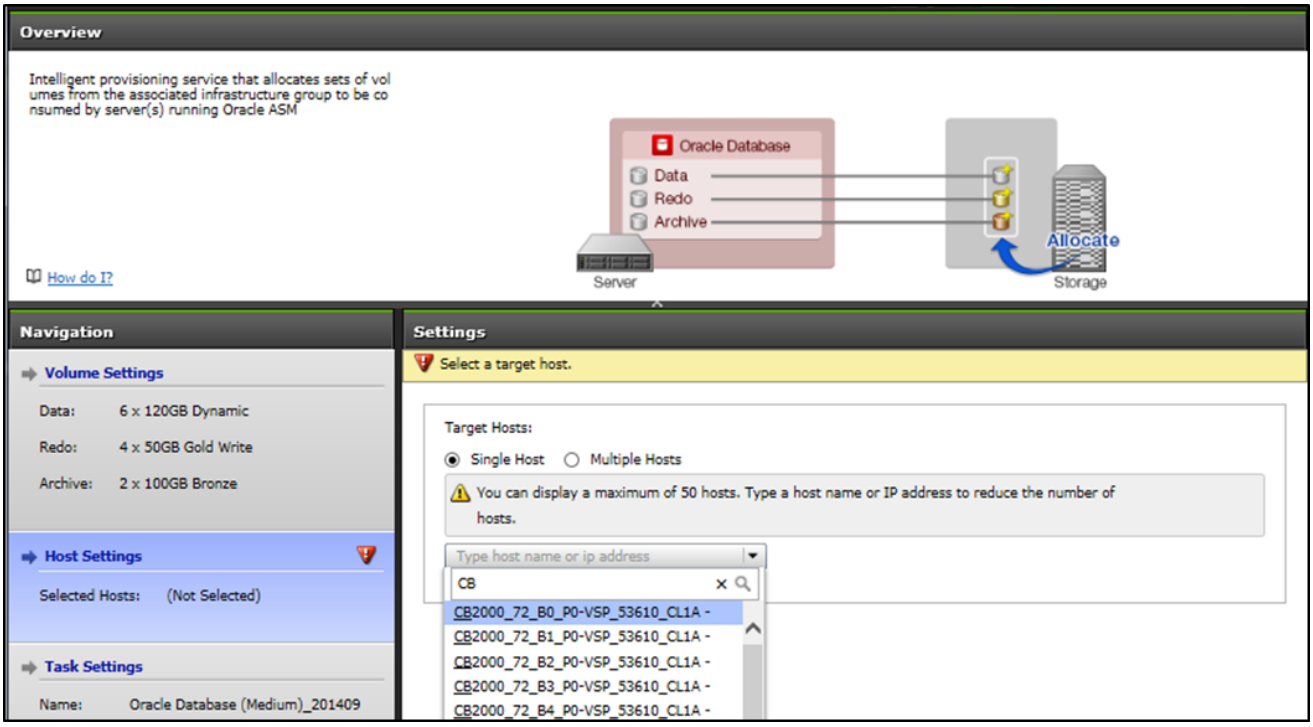
Hitachi Automation Director automates the most common storage administration task of provisioning storage. The intelligent provisioning system automates the storage array and pool selection process, leveraging the requested storage profile, current system utilization and performance, and requested infrastructure. Managing and maximizing the utilization of the infrastructure based on best practices, Automation Director removes the need to fully understand the details of the storage environment or application profiles.

ESG Lab first selected Oracle Database from the tag search on the left hand side of the service catalog, which filtered the available services to those for Oracle databases. Further narrowing the search and filtering the results, ESG Lab selected "Add Like Storage" and "Add New Storage" from the tags for storage services. From the available services, "Allocate Volumes for Oracle Database" was selected. This brought up a more detailed service template card providing additional information on the service.

The service template description was, “Intelligent allocation service that uses sets of volumes from the associated infrastructure group to be consumed by server(s) running Oracle ASM.” The detailed card had buttons for more actions including, “Create Request,” which was selected by ESG Lab and started the process to provision storage.

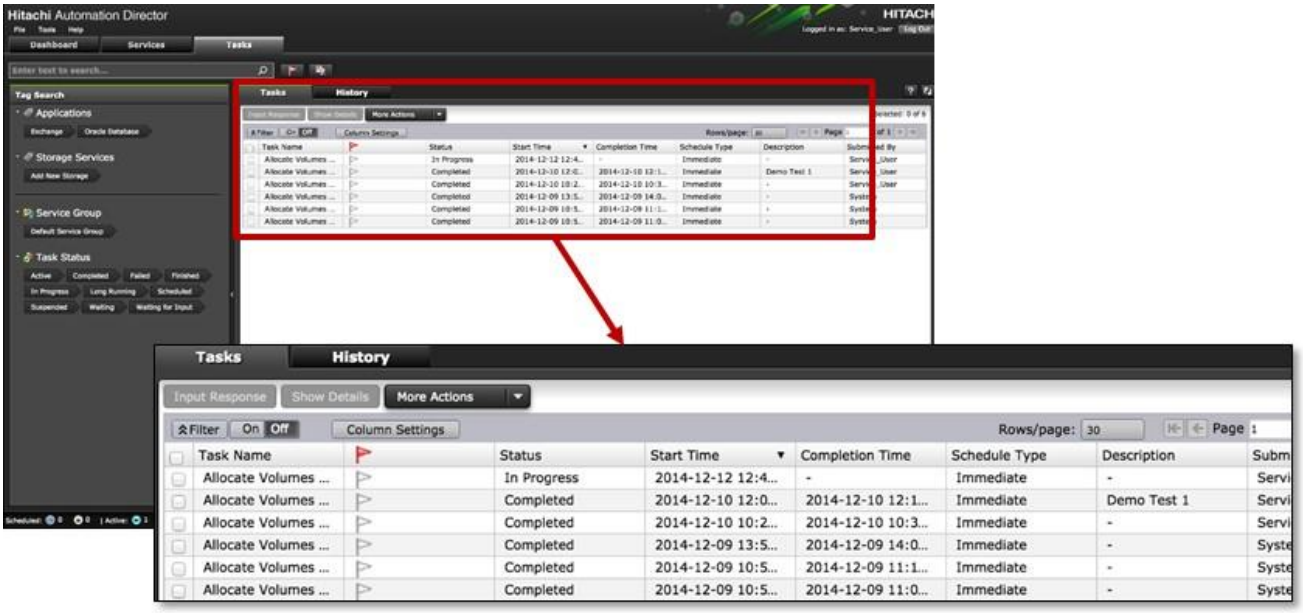
The automation workflow utilized a wizard format to collect information from the user provisioning the storage. The user was stepped through a sequence of screens obtaining the number of volumes, volume capacity, and storage profile (service level) for Oracle data, Oracle redo, and Oracle archive storage. Next, the target hosts associated with this storage were selected, as shown in Figure 6.

Figure 6. Providing Configuration for Allocating Volumes for Oracle Database



Finally, a name and description was given for the task along with the schedule defining when the task should run. The user can dictate that the task run immediately or at a later date and time. The description field was helpful in associating the task with a trouble ticket or request system. ESG Lab clicked on “Submit and View Task,” which saved the task, started the process, and displayed a list of all of the steps that were to be executed by the task, providing real-time status and progress updates (see Figure 7).

Figure 7. Service Automation Program Status

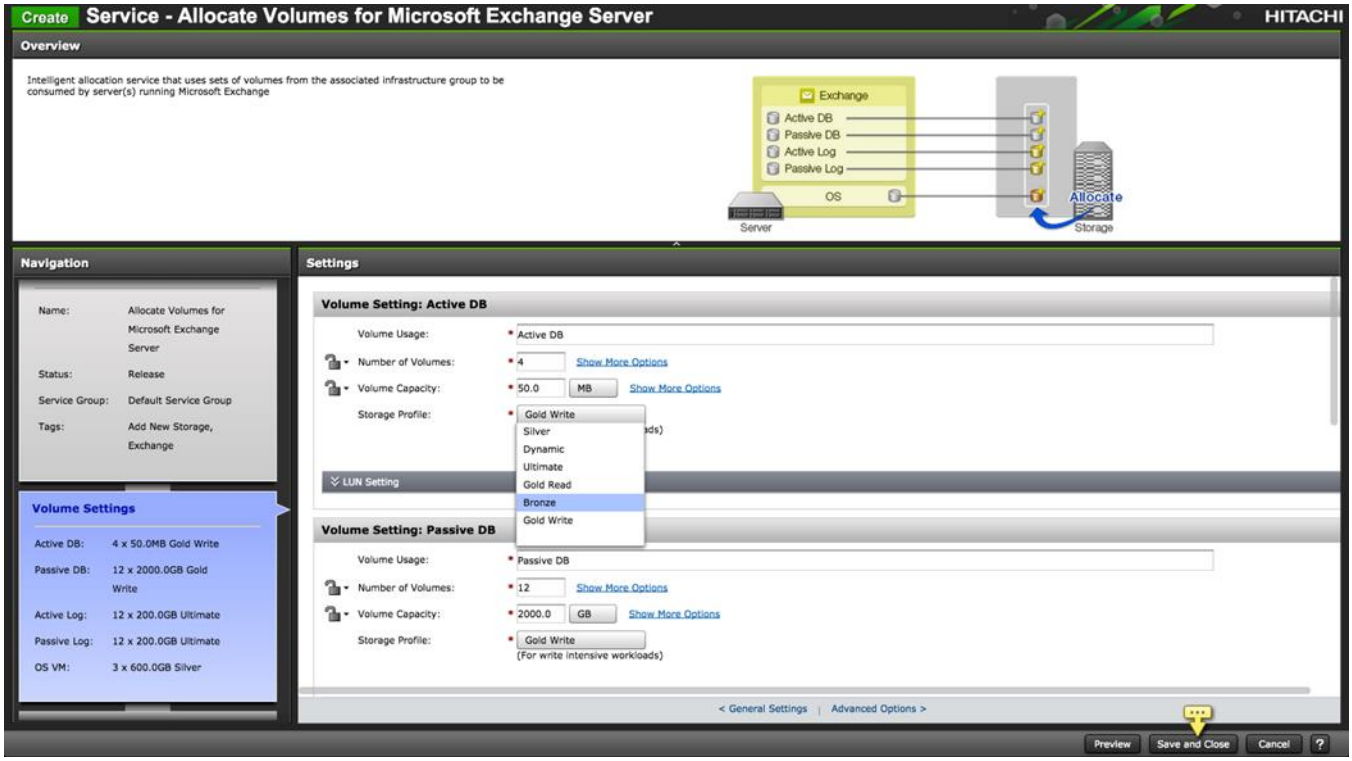


To simplify the automation process, the user was only required to specify the number of volumes and capacity and the storage profile, i.e., the service level for the storage. Using Hitachi and Oracle best practices, Automation Director made intelligent choices in order to best provision the volumes into the best pools based on capacity and performance.

The next use case ESG Lab evaluated was creating a new service using an existing service template as a model. ESG Lab logged back in to the Automation Director as a developer admin to evaluate the service template builder capabilities. At the developer admin permission level, a new "Service Templates" tab was added to the guidance section of the Automation Director dashboard.

Similar to services, service templates can be displayed in tabular or card format, and can be searched and filtered using the same tagged filtering interface. ESG Lab selected the service template to "Allocate Volumes for Microsoft Exchange Server," which opened the screen shown in Figure 8.

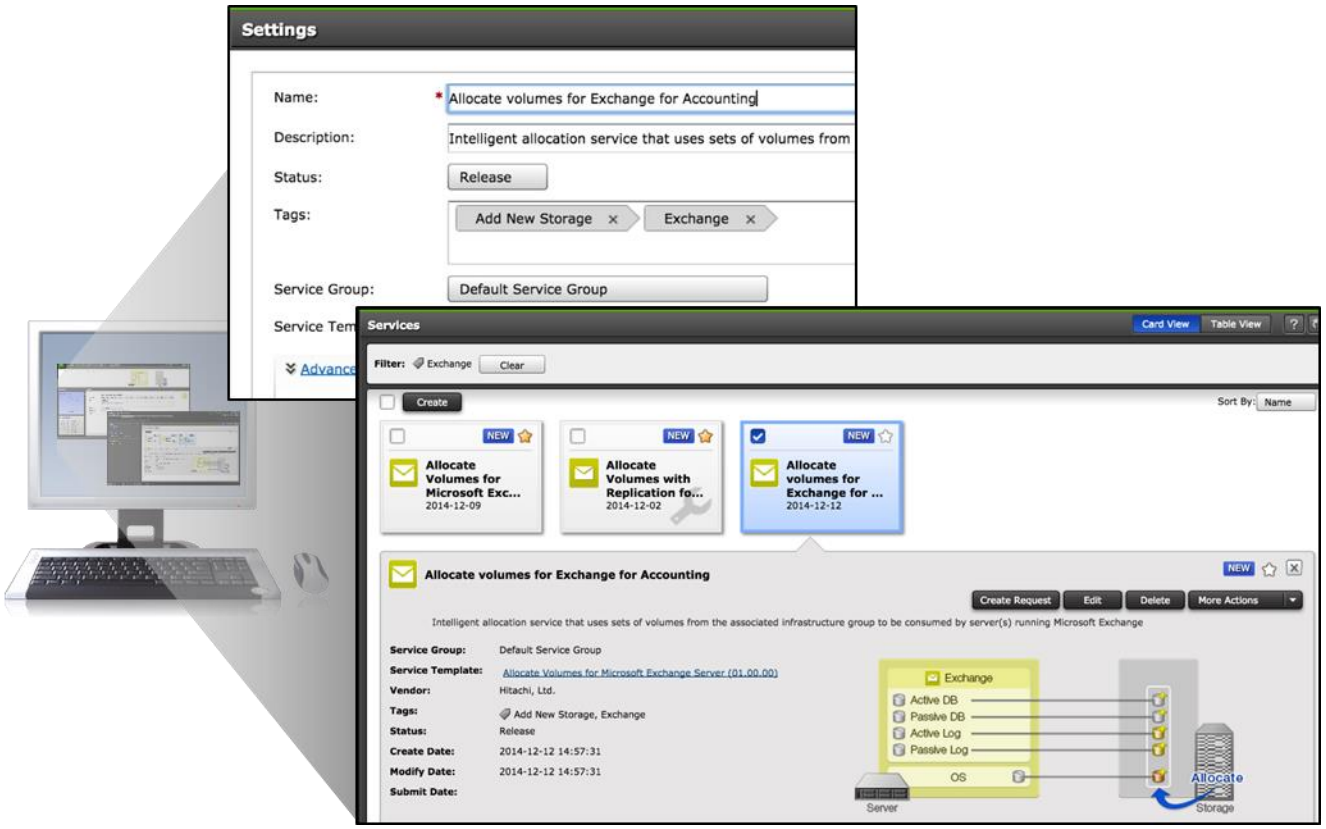
Figure 8. Copying and Modifying a Service Template



Next, ESG Lab stepped through each option and configured all parameters, specifying, for example, the number of volumes, volume capacity, and storage profile for the Microsoft Exchange active and passive databases. Next to each configurable parameter is a padlock icon, and clicking on the icon locked the configuration option, with the graphic changing from an open padlock to a closed padlock. Locking a configuration option prevents a novice storage admin executing the provisioning process from changing that parameter.

After choosing values for the parameters, ESG Lab clicked on "Save and Close" to save the service program (see Figure 9). Automation Director brought up a save window with options allowing the developer to specify the name, description, status, tags, release, and service group for the new service. In this case, ESG Lab chose to name the new service "Allocate volumes for Exchange for Accounting." When an administrator provisions storage for an Exchange server dedicated to the accounting department, he can chose this new service template and most parameters are preconfigured, making execution by less experienced staff rapid and easy, and reducing the possibilities for human error.

Figure 9. Finalizing the Service Template Customization



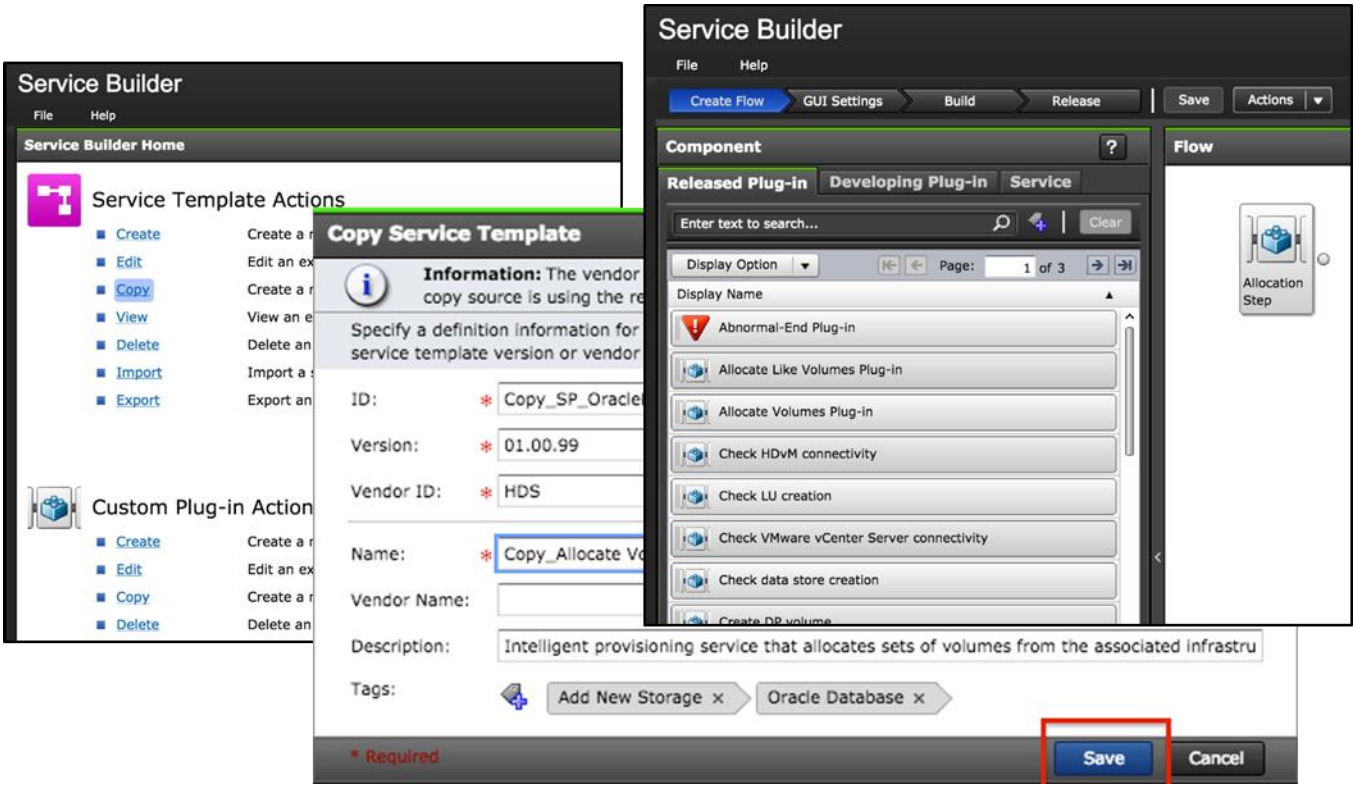
The final use case ESG Lab evaluated was building a new service template by modifying and customizing an existing service template. ESG Lab logged back in to the Automation Director as a system admin to evaluate the Service Builder capabilities. At the system admin permission level, a new "Administration" tab was added to the guidance section of the Automation Director dashboard.

ESG Lab chose the "Service Builder option" to bring up the service builder action pane, and then "Copy" to copy and modify an existing template (see Figure 10). The catalog of existing services was displayed, with a tab for released services and a tab for services still under development. The service "Allocate Volumes for Oracle Database" was chosen to be the source for the new service template.

The copy process enables the admin to create new ID, version, vendor, name, description, and tags for the new service template (see Figure 10). The data was entered, and the "Save" box was clicked, creating the copy of the template.

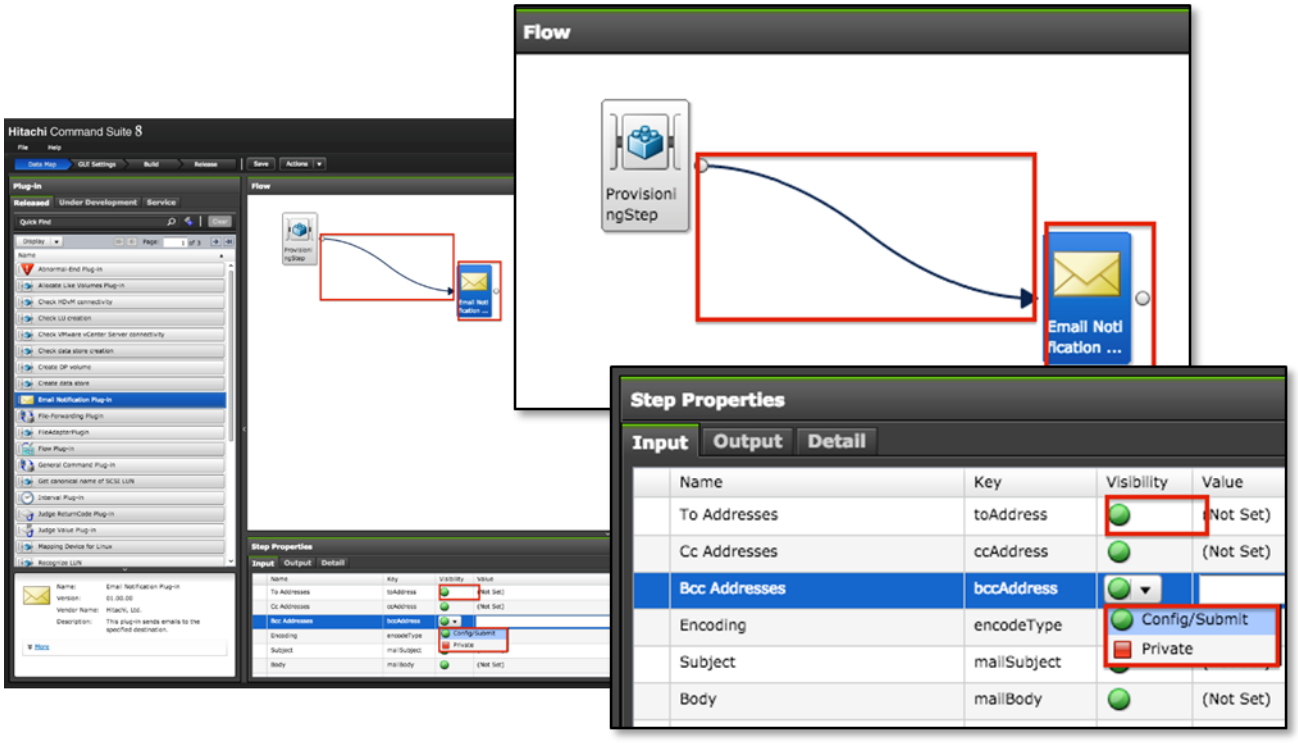
Automation Director next displayed the Service Builder workflow. At the top of the workflow was a map of the steps, starting with "Create Flow," then on to "GUI Settings," "Build," and finally "Release." Along the left was a list of available plug-ins that can be used in the template. The API is used to integrate with other homegrown or third-party applications. The Service Builder tool can be used to create new plug-ins as well.

Figure 10. Modifying a Workflow



ESG Lab chose the "Email Notification" plug-in to add an e-mail notification to the flow of the template. The Service Builder followed the same model as the rest of Automation Director, providing both text and graphical information to guide the user. The specific e-mail parameters to be used in the service template were selected (see Figure 11).

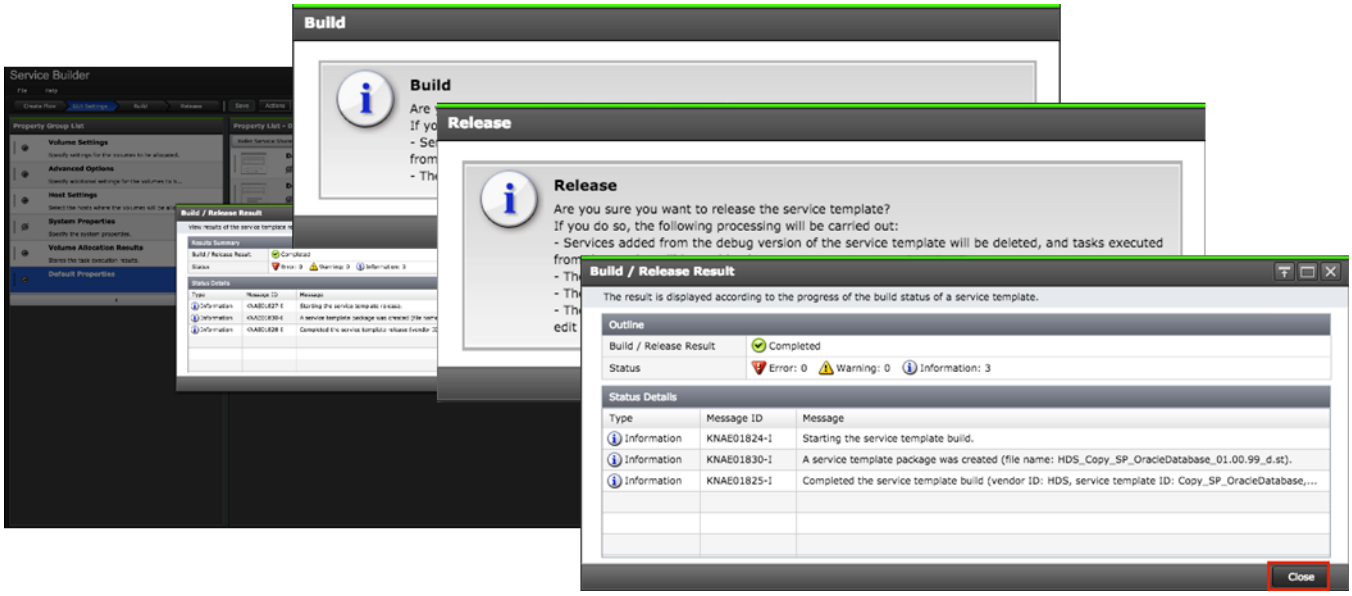
Figure 11. Adding Additional Steps to the Flow



When the service will be executed, additional parameters will be provided, enabling the administrator to configure the "to, cc, and bcc" addresses as well as the e-mail body. Because the flow was configured to first execute the provision step and then execute the e-mail step, when executed, the e-mail will be sent after the provisioning operation, enabling unattended execution by the administrator.

ESG Lab then selected to build the template, and Automation Director compiled all components of the new template and provided the status, as shown in Figure 12. The compiled version of the template contains debug information, allowing the admin to go through the typical program/build/debug cycle.

Figure 12. Building and Releasing the New Service



Satisfied with the results from the build/debug stage, ESG Lab chose to release the template. The release process deletes services added by the debug version; the tasks executed during the debug phase are archived; and the debug version of the template is deleted. A release version of the template is built without debug information, and this released version is imported into the services templates catalog, making it available for use in the production environment.

Why This Matters

Provisioning SAN-attached clusters of servers to virtual pools of storage is only part of an increasingly complex environment for IT and is increasingly difficult to execute using traditional methods. Time and money are wasted and errors are likely as administrators manually configure each path for each host and volume. In the best case, errors are discovered and corrected when an application can't find the storage it needs. In the worst case, an organization is left vulnerable to loss of access to data due to a hardware failure.

Hitachi Automation Director increases efficiency and reduces risk. ESG Lab found that Hitachi Automation Director provides a set of prebuilt templates that can be used to build a customized service catalog. These templates are based on best practices and enable seamless provisioning of storage to servers for specific applications using simple, repeatable procedures.

ESG Lab used Hitachi Automation Director to provision storage using these services nearly instantly and with no manual configuration required. In addition, Automation Director provides inbuilt intelligence, which eliminates the need for users to perform detailed capacity and performance analysis to determine the optimal location for new capacity allocations.

The Bigger Truth

IT professionals are being tasked with justifying every move of their storage strategy. How can organizations keep pace with capacity that is doubling every two to four years while staying within budget? How will storage investments be protected now and in the future? How can more capacity be managed with better performance and service levels with existing staff? Will storage investments complement—or complicate—virtual server consolidation initiatives? How will IT create a winning strategy that works for both the team *and* the organization?

ESG is not only impressed with the ability of Hitachi to continually improve the functionality, capacity, and performance of its entire storage family, but also with its focus on continuously improving manageability.

A recent ESG survey found that increasing use of server virtualization was again reported as one of the most important IT priorities, with data growth and data center consolidation cited nearly as many times.[2] For many of those who have already implemented server virtualization, the next target is storage virtualization. To complement storage virtualization, automated data management makes such implementations practical. The sheer size of a typical modern data center makes old-fashioned storage management techniques obsolete.

ESG Lab validated that the Hitachi VSP family and Hitachi Command Suite work smoothly together to provide an agile, automated, highly available virtualized storage platform. This Hitachi Data Systems solution can repurpose storage from third-party vendors, virtualize it, and combine it into integrated storage pools, simplifying cloud implementations, maximizing service levels, and minimizing costs.

ESG Lab also examined ease of use and management using Hitachi Automation Director. Hitachi Automation Director proved to be an incredibly versatile and customizable provisioning engine. With this solution, Hitachi delivers dependable, pre-validated performance and an affordable antidote to the administrative complexity involved in managing multiple petabytes of data on heterogeneous systems. The best-practice, application-aware service templates made set up and storage management a breeze, and the ability to customize extended the solution's scope without sacrificing agility.

Today's storage environment is rapidly increasing in size and complexity, while end-users have ever-higher expectations of instant access and around-the-clock availability. From the speed and automated operation of Dynamic Tiering to the dramatic manageability improvements of Hitachi Command Suite and VM-aware technology, the breadth and depth of the features offered by Hitachi can be used to meet the precise needs of any organization. The VSP G1000 combined with Hitachi Command Suite offers easy-to-manage scalability, management automation, and reduced operational costs—powerful and worthy of serious consideration by any IT organization being asked, once again, to do "more with less" in its data center.

[2] Source: ESG Research Report, *2015 IT Spending Intentions Survey*, February 2015.