



HP BladeSystem Matrix and Microsoft Exchange Server 2010

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Executive summary

Companies are facing an increasingly common dilemma. How to manage and control the rising costs of IT while still providing the applications and services necessary to support the requirements of the business? This has led to an increased interest in both more traditional hosted service models as well as an explosion of interest in cloud service models. However, for companies that have decided to maintain their own IT environments on-premise, to answer this question requires a new way of thinking about datacenter design.

Traditional datacenter design has often led to isolated infrastructure resources that are sized and deployed on an application by application basis. This often leads to a static, inflexible, and under-utilized environment that is often vastly over-provisioned upfront to meet longer term 1, 3, and 5 year capacity planning growth projections. With the HP BladeSystem Matrix (Matrix), you can address these limitations with an integrated architecture providing pools of server, storage, and network resources.

With Matrix and the included HP Insight Dynamics software, companies can change the way applications are deployed in the datacenter and move towards a service driven, standardized application deployment model. Application services can be quickly provisioned and redeployed as business demand requires based on pre-built templates which define the resource requirements of the service.

This white paper provides a brief introduction to the HP BladeSystem Matrix with a focus on the HP Insight Dynamics infrastructure orchestration capability. The paper also discusses Microsoft's new email platform Microsoft® Exchange Server 2010 (Exchange) and looks at some investments that have been made around deployment flexibility and high availability. The core theme of this white paper is how the convergence of the Matrix service-driven application deployment model facilitates a whole new paradigm for Exchange application deployment. A model designed around Exchange building-blocks and standardized tiers of service based on the HP Exchange tiered solutions program and service framework definitions. This approach enables companies to realize the benefit of the HP BladeSystem Matrix architecture, while further realizing cost benefits through service template standardization for Exchange.

The final section of the document provides an overview of an example Matrix infrastructure orchestration template based on the HP tiered solutions program gold tier service level. This Exchange service template is based on a 5,000 user building block with a mixture of physical servers and Microsoft Hyper-V virtual machine resources. The section discusses the Exchange 2010 resource requirements and describes the various resource attributes in the template.

Target audience: The information contained in this white paper is intended for solutions architects, engineers, and project managers involved in datacenter planning and design, specifically those with a focus on the planning and design of Microsoft Exchange Server 2010. Familiarity with Exchange Server 2010, HP BladeSystem Matrix, and HP Insight Dynamics will be helpful. Please see the "For more information" section for links to additional background information.

Overview

More and more companies are looking to IT to improve resource utilization, increase automation and flexibility, and reduce the time to roll out new applications. At the same time there is also a demand to reduce energy consumption, datacenter footprint, and ultimately the IT dollars spent. To accomplish this requires a shift in datacenter design methodology, away from the traditional isolated islands of IT resources towards a more efficient and dynamic, converged infrastructure datacenter design. A design where pools of infrastructure resources can be allocated as business teams request application services, enabling IT organizations to respond in a matter of hours and days, rather than weeks and months.

With the HP BladeSystem Matrix, companies can achieve this vision. The HP BladeSystem Matrix provides an integrated platform of server, storage, and network resources that can be pooled and allocated when services are requested. And the HP Insight Dynamics infrastructure orchestration component of Matrix allows IT organizations to design and publish templates for the services that line of business application teams need to deploy. This can provide an additional cost benefit to organizations through rigid standardization and elimination of customized deployment processes for every application.

The release of Exchange Server 2010 is part of a broader Microsoft launch effort called the New Efficiency launch¹. The tenets of which align to the same IT problems that are driving customer to rethink their datacenter design, fundamentally how to control IT costs while still driving business growth. And the investments that have been made in several core areas of Exchange 2010, including deployment flexibility and service reliability, facilitate bringing together Matrix with Exchange 2010 to address these issues.

This concept will be explored in more depth in the remainder of this white paper. This includes a brief overview of the underlying technologies (Exchange 2010, Matrix, and Insight Dynamics) with a specific focus on the convergence of these technologies around a service driven application deployment model. The HP tiered solutions program provides a framework for defining different tiers of service for Exchange 2010. These service definitions can be utilized to drive the Matrix infrastructure orchestration Exchange building block service templates.

The final section of this white paper provides an overview of one such service template based on the gold tier, tiered solutions service definition. The "Exchange2010GoldTier-5K" Matrix template was developed to provide an example HP Insight Dynamics infrastructure orchestration template for deploying an Exchange 2010 service for 5,000 users. This example is designed to perform the following tasks:

- Provision the infrastructure resources (server, storage, and network)
- Install the OS
- Install Exchange
- Configure Exchange to support 5,000 users with 1 GB mailboxes based on a gold tier service level requirement.

The goal of this template is to provide you a reference point and example service definition for Exchange 2010. This section also provides an overview of how to provision this Exchange service and what happens during the service creation and resource allocation phase.

¹ For more information on the "New Efficiency" launch please visit <http://www.microsoft.com/business/thenewefficiency/keynote/en/us/>

Microsoft Exchange 2010

For this discussion, we'll focus on the theme of flexibility and reliability and the changes in the design of Exchange 2010 to address these areas. The notion of flexibility speaks to the ability for companies to deploy Exchange in a variety of ways and on a variety of server and storage platforms. You can deploy Exchange using an on-premise deployment model, a hosted service, or with a combination of the two models. And the decision on which deployment model is best will be driven by the specific business requirements for your organization.

For some companies, Exchange is a mission-critical application with strict security and data protection requirements that mandates an on-premise deployment model. For other organizations, the business requirements driving the deployment of Exchange may be satisfied in a more cost-effective manner using a hosted model. This can be the case for smaller companies with IT departments that don't have dedicated Exchange IT staffing. And then there is the range of customer scenarios between mission-critical and a hosted model where deployment flexibility is key to satisfying the range of service level requirements.

Reliability and availability of an application service are also key business requirements that will drive the design of the application. As the importance of email messaging has grown for many companies, Exchange has become a business or even mission critical application with strict service level agreements (SLAs) for Exchange service uptime. High availability designs for Exchange have evolved over the years from a model based on Microsoft Windows® clustering (single copy clustering) with Exchange 2003 to an application replication model with Exchange 2007 including cluster continuous replication (CCR), local continuous replication (LCR), and standby continuous replication (SCR). Exchange 2010 builds upon the model of application replication from Exchange 2007 with the introduction of database availability groups (DAG).

Gone is support for traditional single copy clusters as well as CCR, LCR, and SCR. With Exchange 2010, the DAG replication model is the mechanism by which database availability is provided. A DAG consists of up to 16 mailbox servers which form the replication domain. Within a DAG, copies of a mailbox database can be replicated to other mailbox servers similar to the replication model of CCR and SCR. Then in the event that the active database copy goes offline, a replica copy can be quickly brought online to limit service downtime. And with the DAG replication model, both unplanned failovers and administrator controller switchovers can be performed at a database level, unlike CCR which limited the failover domain to entire server.

This concept of a DAG and database copies also helps to drive Exchange 2010 deployment flexibility. With enough copies of the data (generally 3 or more) you can evaluate a RAID-less Just a Bunch of Disks (JBOD) configuration or less traditional datacenter storage options such as Midline-SAS and Midline-SATA drives. Additional copy counts also allow you to mix database and log streams on a single LUN, allowing you to standardize on a single LUN size for an Exchange deployment. This latter point can help simplify the design and configuration of an Exchange service running on centralized SAN environments.

Along with these changes there are numerous other improvements and feature enhancements with the release of Exchange 2010. This includes a further reduction in storage I/O, introduction of personal archive mailboxes, and Voice Mail Preview speech-to-text capability to name but a few. For more general information on Microsoft Exchange Server 2010 please visit, www.microsoft.com/exchange.

However, the Exchange 2010 enhancements discussed in this white paper were highlighted for a specific reason. With the improvements that have been made in the areas of deployment flexibility and the introduction of the DAG model for database resiliency, Exchange 2010 deployments can be more formalized around a building-block architecture that is tied into the concept of service tiers. Think of this as a similar model to how hosted Exchange models work. You can define various classes of users within an organization around mailbox size, client types, features, and availability levels. These service tiers would drive the design requirements around server and storage hardware and,

number of database copies in a DAG, etc. These service tiers can then be standardized into an Exchange service building-block which is deployed as required by the business.

HP BladeSystem Matrix

HP BladeSystem Matrix is a converged infrastructure platform designed to simplify the deployment of applications and business services by delivering IT capacity through pools of readily deployed resources. With Matrix, customers can quickly provision and redeploy compute, storage, and network resources as the demands of the business change.

Built on the HP BladeSystem architecture, Matrix is integrated by design around proven technologies including the following components:

- HP BladeSystem c-Class c7000 enclosure
- HP BladeSystem server blades
- HP Virtual Connect Flex-10 and Virtual Connect FC
- HP Insight Dynamics and HP Insight Control software
- HP StorageWorks SANs including the Enterprise Virtual Array (EVA) 4400/6400/8400 array series²
- Factory/CTO, Factory Express, and technology implementation services facilitating the ordering and deployment process

One of the key capabilities of the HP BladeSystem Matrix is to help customers accelerate service delivery to the business. This enables IT to reduce the service delivery time for line of business applications from weeks and months down to hours and days. To deliver this key capability of HP BladeSystem Matrix, HP is delivering a powerful set of tools. With HP Insight Dynamics and HP Insight Control organizations can standardize, automate, and accelerate the process for provisioning and repurposing IT infrastructure in a consistent and highly automated manner that drives better business outcomes.

HP Insight Dynamics enables you to instantly adjust to dynamic business demands. This advanced infrastructure management software helps you to provision infrastructure in minutes, optimize infrastructure confidently, and protect continuity of services. It is a single toolkit to accelerate complex IT projects, simplify daily operations, and manage datacenter capacity and power proactively

A core component of HP Insight Dynamics is infrastructure orchestration. HP Insight Dynamics infrastructure orchestration provides the capability to provision infrastructure consistently and automatically from pools of shared resources using a self-service portal. You can rapidly provision resources ranging from a single virtual machine (VM) to complex multi-tier environments with physical and virtual servers and storage systems.

Additional detail on HP Insight Dynamics infrastructure orchestration is provided in the following section, for more general information on HP BladeSystem Matrix, please visit www.hp.com/go/matrix.

HP Insight Dynamics infrastructure orchestration

HP Insight Dynamics allows you to incorporate standardized approaches and tools for designing, provisioning, and integrating IT infrastructure, including both physical and virtual resources. With HP Insight Dynamics infrastructure orchestration, the entire IT lifecycle can be managed, from the initial design of system configurations, through the provisioning and management phase, to the eventual repurposing of assets. HP Insight Dynamics infrastructure orchestration enables IT resource requests to

² HP BladeSystem Matrix can support other FC SANs that have been certified with HP Virtual Connect FC

be handled in a systematic manner that leverages standard configurations, self-service provisioning tools, and automated approval processes. Infrastructure orchestration also helps accelerate the process of provisioning right-sized computing and storage systems to people who frequently request resources, such as test and development specialists and application owners.

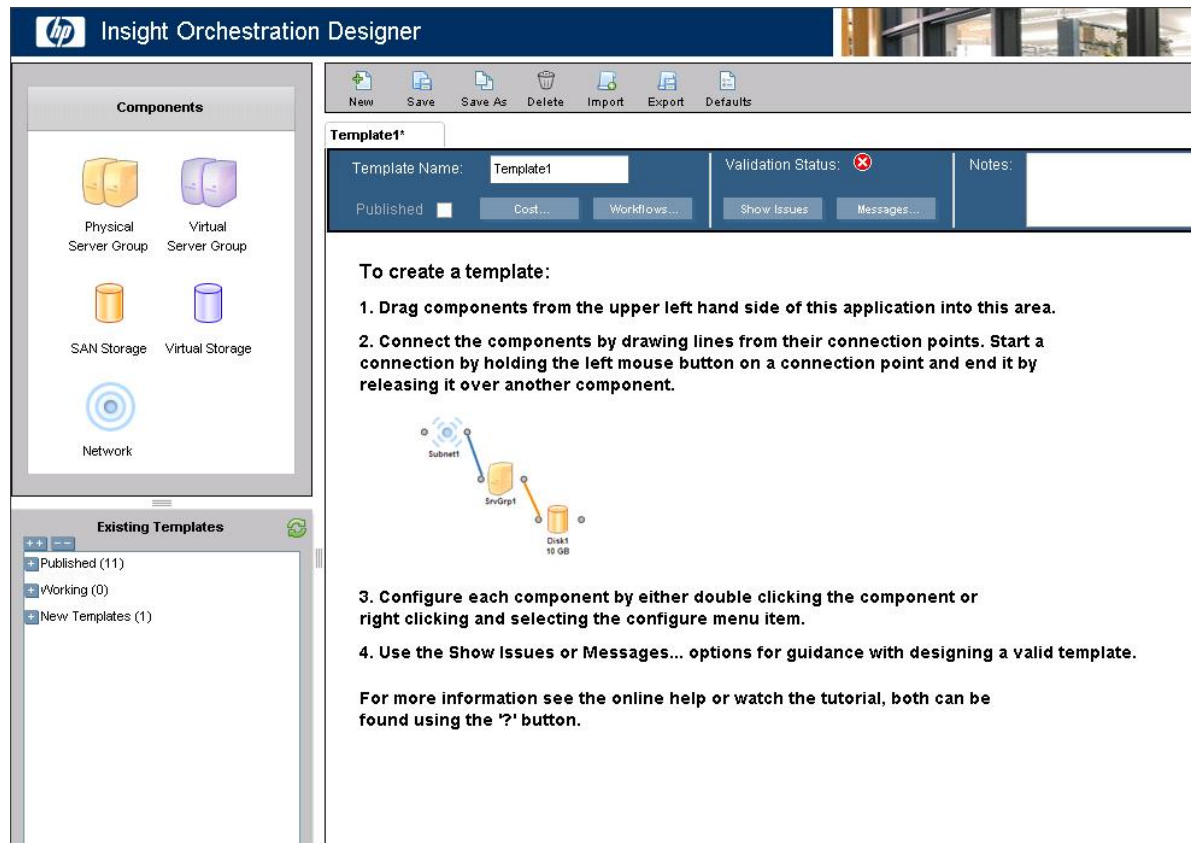
Visually design

With HP Insight Dynamics infrastructure orchestration, IT architects can visually design standardized infrastructure services that are offered to users through a Web-based catalog. A built-in design tool enables architects to create infrastructure templates that offer various system configurations and levels of services.

Rather than designing infrastructure services from scratch each time a team requests resources, IT architects can design templates with specific, approved configurations for individual servers or multi-tier, multi-mode services, and then reuse these templates over and over. These templates can incorporate existing best practices for key applications and help drive standardization and a service driven application deployment model.

An included visual design studio allows IT architects to easily create infrastructure templates using a drag-and-drop editor. Templates can include both physical and virtual elements and their detailed requirements. Figure 1 shows the infrastructure orchestration designer interface for creating templates.

Figure 1 – HP Insight Dynamics infrastructure orchestration designer



Architects also have the flexibility to create different configuration packages to meet different needs and budgets. For example, they might create small, medium, and large configurations or platinum,

gold, and silver service configurations, and then attach prices to each infrastructure package. This is the model that will be discussed for Exchange 2010 service deployment later in this white paper.

Automatically provision

Once the templates have been created, they can be made available to administrators via a web based, self-service portal. In this manner, templates drive automated, repeatable provisioning and fast deployment of resources.

Via this portal, authorized users can select the resources they need from a list of best-practice templates. They can request an infrastructure template for a specified lease period, which gives the assurance that the provisioned resources will be available for repurposing in a timely manner—and that they won't sit idle after a user has completed a project. The self-service portal is role-based. This means that different users can be granted different levels of access to provisioning tools and resource pools. For example, different levels of access for service administrators, test and development teams, application specialists, and other types of users can be specified based on their unique needs.

At this point if you have logged into the self-service portal with Administrator credentials the provisioning process will continue on to the allocation phase. If you are logged in with basic User group credentials, then administrator approval is required and the service request will pause. Once an administrator has approved the request, the provisioning process will continue on and the resources will be allocated.

When a service request is made, an email is automatically generated notifying the administrator that an approval is required. Once the administrator approves the request, the requested infrastructure configuration is automatically created and provisioned. HP Insight Dynamics can automatically provision multiple tiers, multiple nodes, physical and virtual servers, network addresses, and attached storage. After that, users can manage their infrastructure via the self-service portal and the accompanying tools. Among other capabilities, users can suspend, resume, and delete resources and flex capacity—or easily add or remove servers to an existing service to respond to changes in utilization requirements.

Seamlessly integrate

HP Insight Dynamics is designed to integrate easily and seamlessly with existing IT management tools and processes across the IT lifecycle—from design through operation and the repurposing of assets. HP Insight Dynamics infrastructure orchestration leverages an embedded version of HP Operations Orchestration (OO) software as a workflow automation tool to make infrastructure delivery processes more efficient and reliable across IT functions.

HP Operations Orchestration automates processes and orchestrates complex IT workflows across your enterprise datacenter. The software helps you simplify routine tasks as well as complex change orchestration. For example, a workflow to automate software installation and configuration after the infrastructure and OS is provisioned.

Drawing on the features of HP Operations Orchestration, infrastructure orchestration provides pre-defined content for automated workflow execution. Among other capabilities, you can:

- Attach workflows to templates to automate pre/post provisioning tasks
- Send e-mail notifications on resource requests
- Approve/reject service requests
- Coordinate manual tasks across teams as needed—for example, to ask a storage team to allocate storage capacity
- Access the HP Operations Orchestration Studio feature to customize workflows

In addition, HP Insight Dynamics infrastructure orchestration is designed to integrate with existing systems and processes from HP and third parties. For example, integration with HP Service Manager

software or to a third-party ticketing system for change management processes. Or the solution can be configured to pass service cost data to billing and chargeback systems, or to add resources to, or remove them from, a load balancer or backup schedule. HP Insight Dynamics infrastructure orchestration can also integrate with HP Server Automation software to include the application environment and ongoing lifecycle management and compliance. HP offers professional services to assist your organization with different types of integration efforts.

HP BladeSystem Matrix and Exchange 2010

Once you have made the business case justification to deploy Exchange 2010 on-premise, the next critical decision to make is deciding how the Exchange service will be deployed in your IT organization. In a more “traditional” model, Exchange would typically be deployed on dedicated IT resources, over-provisioned accordingly to accommodate any potential growth over some number of months or years. To accomplish this involved planning and coordination among numerous IT teams. This could include networking, storage, and server teams along with Exchange administrators and architects. While this deployment model is a valid, tested methodology, there are a number of issues with this approach which make it less than optimal.

For one thing, this methodology will likely take many months to roll out. This includes the planning stages, ordering and delivery of the hardware, racking and cabling the gear in the datacenter, to installing and configuring software and enabling the Exchange service for end user consumption. And not only is this a time consuming process, with the number of manual steps involved, there is a greater chance for errors to be made and delays introduced, further adding to the time required to roll out Exchange 2010. Couple these downside risks, with the relative inflexibility of this type of design, and the upfront requirement to over-provision resources for future growth capacity, and the need to reevaluate this deployment methodology is evident.

Thus, IT organizations are looking to shift to a more dynamic, flexible infrastructure designed around providing services to meet ever-changing business demands. Where infrastructure resources can be pooled and shared among numerous application services, and capacity added or removed as the service requirements change. HP BladeSystem Matrix enables IT organizations to provide this dynamic, flexible infrastructure to the business. With Matrix, Exchange architects can design standardized service templates that describe the infrastructure requirements for Exchange 2010. While behind the scenes, centralized operational teams ensure that suitable server, storage, and network resources exist in the infrastructure pools to satisfy the demands of the newly created Exchange service templates. When the time has come to roll-out the new Exchange service, an Exchange administrator can login to a self-service portal and deploy the templates in a matter of a few mouse clicks. Additionally, embedded HP OO workflows can be attached to the Exchange service templates which can kick off post-infrastructure and OS provisioning events such as the installation and configuration of Exchange 2010. This allows administrators to automate the Exchange 2010 service deployment, from the infrastructure resources all the way down to the application configuration.

Using Matrix with Exchange 2010 can help accelerate the provisioning process and provide an automated and repeatable method for rolling out your Exchange 2010 service. And by taking a template driven approach to deploying Exchange, you can easily define different service levels for the various Exchange user profiles that need to be supported in your environment. To assist in defining these Exchange 2010 service levels, HP has developed a program that provides a framework for Exchange 2010 service modeling called the HP tiered solutions program.

HP tiered solutions program

The tiered solutions program has been developed to provide customers with server and storage solutions to support different types of email users. The tiered solutions approach is designed to marry

the appropriate HP servers and storage platforms, along with configuration options within Exchange 2010, to meet different service level needs ranging from standalone server configurations to high availability configurations based on the new Exchange 2010 Database Availability Group availability feature.

The tiered solutions have been categorized into four tiers of service, bronze, silver, gold and platinum. The tiers range from providing basic mailbox services focused on cost in the bronze and silver tiers, to solutions which incorporate high availability features to meet stricter service level requirements in the gold and platinum tiers. The tiers match server and storage hardware platforms along with the appropriate Exchange availability features for each of the given tiers. The solutions are designed and configured using HP's server and storage deployment best practices and then tested using production-like configurations. Unlike prior high-water benchmark testing, the tiered solutions are tested with workloads representative of typical customer scenarios.

The bronze tier is designed for deployments where cost is a driving factor. This tier provides basic services without the additional cost of high availability and is targeted towards smaller, cost-sensitive deployments. The bronze tier uses an all-in-one approach by combining each of the primary Exchange roles Mailbox (MB), Hub Transport (HT) and the Client Access Server (CAS) on to a single server. The silver tier is targeted towards smaller environments supporting sensitive users with limited IT budgets. For increased availability, the silver tier provides support for database replication using DAGs, but limits costs by combining the Exchange roles using the all-in-one approach with two servers. The gold tier is targeted towards a wide range of customer scenarios from small to large organizations needing a high level of data protection and availability for their important users. This tier expands the servers and storage high availability options along with dedicated Exchange server roles. The highest level in the tiered solutions matrix is the platinum tier which is targeted towards enterprise deployments requiring the highest levels of data protection for their most critical users. The Platinum tier builds on the gold tier offering additional database copies and new storage options including RAID-less JBOD³, combining enterprise server and storage hardware with Exchange's high availability features.

Table 1 lists the details of each of the different tiers of service.

Table 1. Tiers of service

Tiers of service	Data Availability Group	Database copies	Combined Exchange roles	Disk types	Storage type	Combined LOG and Database LUN
Bronze	No	1	MB/HT/CAS	SAS/MDL-SATA	RAID	No
Silver	Yes	2	MB/HT/CAS	iSCSI/SAS/MDL-SATA	RAID	No
Gold	Yes	2	Dedicated	FC/iSCSI/SAS/MDL-SATA	RAID	Yes
Platinum	Yes	3	Dedicated	FC/ iSCSI/SAS/MDL-SATA	RAID/ JBOD	Yes/JBOD

The HP tiered solutions program was purposefully designed to provide broad applicability across a wide range of customers and hardware infrastructure platforms (server and storage). However, this service classification framework can be applied within a single organization when defining the requirements to align with the various user profiles that exist. For example, the functionality and service level needs of a C-level executive are likely quite different than those of a part-time mall kiosk

³ Minimum of 3 database copies are recommended when using RAID-less JBOD configurations

worker. Mailbox quotas, client types and access methods, regulatory compliance needs, recovery point and recovery time objectives will vary greatly.

With the HP BladeSystem Matrix, you can take this service level concept a step further and actually create and publish service templates that clearly define the various Exchange 2010 services that will be deployed in your organization. This provides a standardized, repeatable method for rolling out specific Exchange 2010 services to meet the business requirements for your end users.

The [HP BladeSystem Matrix “Exchange2010GoldTier-5K” template overview](#) section in this white paper provides an overview of an Exchange 2010 service template and associated workflows built to automate the infrastructure and application provisioning for 5,000 users requiring a gold tier service level.

For more general information on the HP tiered solutions program for Exchange 2010 please download the, “Overview of HP tiered solutions program for Microsoft Exchange Server 2010” white paper from HP’s ActiveAnswers website, www.hp.com/solutions/activeanswers/exchange.

HP BladeSystem Matrix “Exchange2010GoldTier-5K” template overview

The “Exchange2010GoldTier-5K” Matrix template was developed to provide an example HP Insight Dynamics infrastructure orchestration template for deploying an Exchange 2010 service. This example is designed to perform the following tasks:

- Provision the infrastructure resources (server, storage, and network)
- Install the OS
- Install Exchange
- Configure Exchange to support 5,000 users with 1 GB mailboxes based on a gold tier service level requirement. This means that an Exchange DAG needs to be created as part of this service along with two copies of each database to support the availability requirements of the gold tier service.

The following two sections provide additional high-level detail regarding this gold tier service template for Exchange 2010. For more information, details, and to download the associated template package (XML file, scripts, and workflows) please visit the HP BladeSystem Matrix Community site at www.hp.com/go/matrixtemplates.

Note:

The HP BladeSystem Matrix Community site also includes addition template packages that have been created to define other Microsoft application deployments. These include several Exchange 2007 examples as well as a SharePoint 2007 collaboration and SQL Server 2008 BI solutions.

There are also additional template packages describing solutions for Oracle® and SAP configurations. Check back often as the content on this site is constantly being updated to include new examples and reference points to help you build HP BladeSystem Matrix templates.

Designing the Exchange 2010 service template

The following table (Table 2) details the Exchange resource requirements which are used to build the infrastructure orchestration template for this service. The specific server sizing guidelines used in this template design are based on the recommendations from the following Microsoft TechNet articles:

- “Understanding Processor Configurations and Exchange Performance”
[http://technet.microsoft.com/en-us/library/dd346699\(EXCHG.140\).aspx](http://technet.microsoft.com/en-us/library/dd346699(EXCHG.140).aspx)
- “Understanding Memory Configurations and Exchange Performance”
[http://technet.microsoft.com/en-us/library/dd346700\(EXCHG.140\).aspx](http://technet.microsoft.com/en-us/library/dd346700(EXCHG.140).aspx)
- “Understanding Server Role Ratios and Exchange Performance”
[http://technet.microsoft.com/en-us/library/dd346701\(EXCHG.140\).aspx](http://technet.microsoft.com/en-us/library/dd346701(EXCHG.140).aspx)

Table 2. Exchange 2010 server role resource requirements

Exchange Server Role	# of Servers	Physical Server or VM	Core count	Memory (GB)	Networks	Storage (per server)
Client Access Servers	3	VM	4	8 GB	3 NICs - 2 Production networks (NLB cluster) - 1 Management network	1 LUN - 50 GB LUN (OS/Exchange binaries)
Hub Transport Servers	2	VM	4	4 GB	2 NICs - 1 Production network (Teamed in Hyper-V parent partition) - 1 Management network	2 LUNs - 50 GB LUN (OS/Exchange binaries) - 100 GB LUN (HT queue DB and transaction logs)
Mailbox Servers	2	Physical	8	32 GB	5 NICs - 2 Production networks (Teamed) - 2 Replication networks (Teamed) - 1 Management network	5 LUNs - 50 GB LUN (OS/Exchange binaries) - 2000 GB LUN – VRAID1 (Exchange DB/Log data storage) - 2000 GB LUN – VRAID1 (Exchange DB/Log data storage) - 2000 GB LUN – VRAID1 (Exchange DB/Log data storage) - 2000 GB LUN – VRAID1 (Exchange DB/Log data storage)

For this Exchange 2010 service, a mixture of physical server and VM resources will be allocated. The Exchange CAS and HT server roles will be deployed on Hyper-V virtual machines. While the Exchange mailbox servers will be provisioned on physical server blades.

With Exchange 2010 an increased workload is placed on the Exchange 2010 CAS server as this role now serves as the MAPI endpoint for Outlook client connections. With this increased workload, Microsoft recommends a 4:3 mailbox server to CAS core ratio. Thus, this design utilizes three, four core VMs, for a total of 12 cores against the 16 mailbox processor cores. Each VM is also configured with 8 GB of memory to satisfy the 2 GB per core recommendation. From a networking perspective, 3

NICs are defined for the CAS server role. One of the NICs is serving as a dedicated management NIC (optional), while the other two NICs will be used on the production network to form the network load balancing (NLB) cluster for the three CAS Exchange servers.

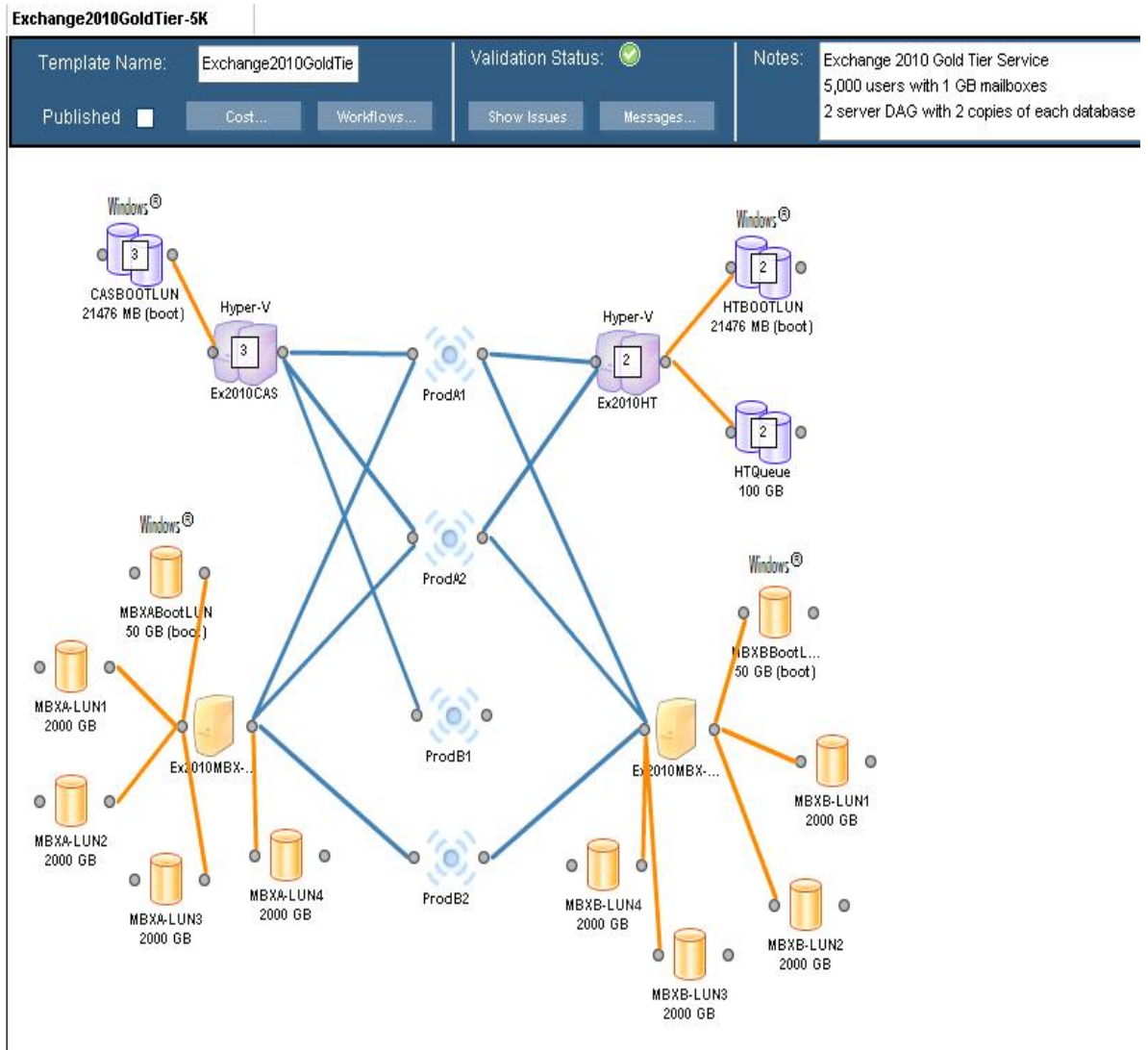
For the HT server role, 2 VMs with 4 processor cores will be over-provisioning against the recommended mailbox server to HT server core ratio of 5:1. In this case a single HT server would be capable of handling an Exchange workload based on a typical medium to heavy Exchange user profile. However, a minimum of 2 VMs is required to meet the availability requirements of the gold tier service. To support the network requirements for the HT server role, two NICs are defined. One NIC serves as a dedicated management network (optional), while the other NIC is for production traffic. Note, that it is highly advised that this production network is part of a teamed network on the Hyper-V parent partition for increased high availability.

For the two mailbox servers, the design recommendations to support 5000 users are 8 cores and 32 GB of memory per server. During normal operation, each server will host 2500 users. However, each mailbox server is sized to support 5000 active users in the event that a server failure occurs. From a networking perspective, each mailbox server will require 5 NICs. One of the NICs is dedicated for management purposes (optional), and the other four NICs will form two NIC teams to support the production and DAG replication traffic.

To support the storage requirements for 5,000 users with 1 GB mailboxes, 20 databases hosting 250 users per database will be configured. During normal operation, each mailbox server will host 10 active database copies (supporting 2500 users) while maintaining a copy of each of the 10 active database copies on the alternative server. These databases are spread evenly across the 4, 2TB LUNs, with 5 database copies and associated log files configured on each LUN. In the event of a single server going offline, the mailbox servers are designed to handle the peak load of 5,000 users across 20 active database copies on a single server.

Figure 2 below shows a picture of the infrastructure orchestration template mapping the resource requirements described above for this Exchange 2010 service. In the picture of the template you can see various resources that have been defined for this service. This includes physical server, virtual machine, storage, and network resources. By right-clicking on any of these icons, additional resource specific attributes (for example, CPU core count, memory requirements, storage RAID level, etc) can be set. Then when a service request is made based on a published template, the allocation process validates that all of these defined resources are available to allocate for the service.

Figure 2. Exchange 2010 gold tier infrastructure orchestration template



Looking at the specific resources requirements themselves, the four blue circle icons in the middle of the page represent the network resources. These resources correlate to various networks that have been defined within HP Virtual Connect Enterprise Manager (VCEM). Each of the network resources describes different networking attributes such as whether the network uses DHCP or static IP addresses, DNS server and windows domain information, etc. Every server resource is connected to the "ProdA1" network (blue lines) which represents the management network for this environment. The "ProdA2" network correlates to the production traffic network and is also required for each of the server resources. The "ProdB1" network is another production network and is connected to the CAS server role as the second production NIC that will be used in the NLB cluster. The "ProdB2" network represents the replication network for the Exchange DAG and is only connected to the two Exchange DAG member servers. Not visible in this diagram is that both the "ProdA2" and "ProdB2" networks have been enabled for redundancy on the mailbox servers. This means that two NICs will be provisioned on each of these networks to allow you to team the NICs for additional availability purposes. This satisfies the mailbox server requirement of a total of 5 NIC resources. The physical server resources in the template are represented by the generic yellow computer icons while the virtual machine resources are represented by the purple shaded computer icons. Both of

these resources are connected to the applicable network resources by blue lines and to the storage resources (generic yellow and purple disk icons) by orange lines. There are a total of two physical server and two virtual machine resources which have been defined.

The upper-left VM resource defines a requirement for 3 CAS servers (indicated by the number "3" on the resource icon). Attributes on this resource include the processor core, processor frequency, and minimum memory requirements. Attached to the CAS servers is a single virtual storage resource which represents the boot LUN for the server. No additional storage is required so there are no other resource attachments. Attributes of the boot LUN include the size of the LUN, RAID level, and matching tags parameters. Since this is a boot LUN, there is also an additional attribute which defines an HP Virtual Machine Management (VMM) template that will be used as the base image for the OS deployment.

The virtual machine resource in the upper-right of the diagram represents the two HT server requirements. Unlike the CAS server role, an additional LUN (beyond the boot LUN) has been added as a requirement. This LUN will be utilized as storage for the HT queue database and transaction logs.

The bottom left and bottom right server resources represent the two mailbox servers in the DAG configuration. Each mailbox server resource is linked to 5 storage resources, a boot LUN and 4 data storage LUNs. The data storage LUNs are 2 TB LUNs each of which host the database and transaction log requirements for 5 database copies. This design spreads the database copies evenly across both servers in the DAG so there is no loss of service in the event of a single server failure.

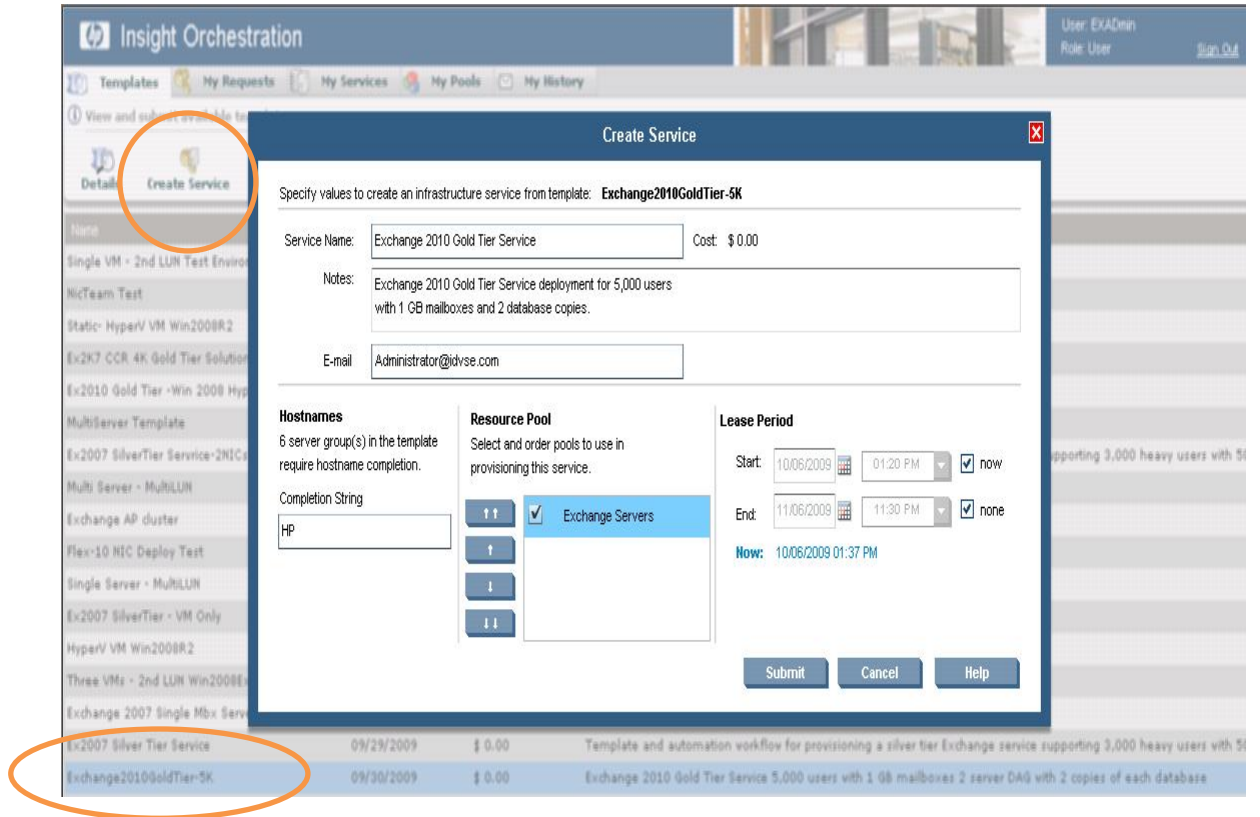
Provisioning the Exchange 2010 service

After the template has been saved and published, the service can be provisioned by logging into the self-service portal. To create a new Exchange 2010 service based on this template, launch the self-service portal, select the appropriate Exchange template (in this example "Exchange2010GoldTier-5K") and press the "Create Service" button. This opens a separate dialog box in which additional information specific to this service is required. This includes the following information:

- Name of this instantiation of the Exchange service
- String to append to the server hostnames (to ensure that the service is unique if the template is deployed multiple times)
- Server resource pool to allocate servers from
- Lease period for the resources allocated for this service. In this example, the lease is set to never expire.

This dialog box and the self-service portal window are shown in the following figure, Figure 3.

Figure 3 – Provisioning an Exchange 2010 service from the self-service portal



Once you hit submit the first step that happens is that a check is made to validate whether the requested resources are available. If the resources are available then these resources are reserved. The next step is to await approval for the request. Once an administrator has approved the request, the provisioning process will continue on and the resources will be allocated.

During the allocation phase, the infrastructure resources (server, storage, and network) defined in the design template for this service are configured. This stage includes the following steps:

- Logical servers⁴ are created and assigned to server blades which meet the minimum resource requirements (CPU core count, CPU frequency, and memory) defined for each of the Exchange servers
- A LUN resource is assigned to each logical server which meets the requirements of the boot LUN resource defined in the template (LUN size, RAID level, matching tag info)
- HP Insight Rapid Deployment Software (RDP) is called to install the OS and customize the Exchange servers with the correct hostnames and network address information.
- Additional LUN resources are added to the Exchange servers as defined in the template. This would include the single LUN for the HT servers as well as the four additional LUNs specified for each of the mailbox servers.

Once all of the resources have been allocated, the final step that is automated as part of the service creation is the execution of an embedded HP OO workflow to install and configure Exchange 2010. There are several execution points in which embedded workflows can be attached to infrastructure orchestration templates. One of these points is at the end of the “Create Service” process and can be

⁴ For more information on logical servers please see read the “Introducing logical servers: Making datacenter infrastructures more adaptive” whitepaper available to download at <http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01402013/c01402013.pdf>

leveraged to launch workflows (designed using HP OO studio) for application provisioning. For this Exchange gold tier service, an embedded HP OO workflow was written to perform the following tasks:

- Install the Windows Server 2008 server roles and features required to support Exchange 2010
- Install the necessary pre-requisite software
 - Windows 2008 SP2
 - Microsoft .NET Framework 3.5 Service Pack 1 (SP1)
 - Windows PowerShell 2.0
 - Microsoft Filter Pack
- Format and partition additional data LUNs for the HT and mailbox servers
- Install appropriate Exchange 2010 roles on the correct servers
- Role specific Exchange 2010 configuration
 - CAS servers
 - Apply Exchange license key
 - Restart the Exchange Information Store
 - HT servers
 - Apply Exchange license key
 - Restart the Exchange Information Store
 - Relocate HT queue DB and transaction logs to the second LUN
 - Mailbox servers
 - Apply Exchange license key
 - Restart the Exchange Information Store
 - Create the DAG
 - Add mailbox servers to the DAG
 - Create 10 databases on each mailbox server on the appropriate data LUNs
 - Enable a second copy of each database on the alternative mailbox server

At this point, mailboxes can be added to the Exchange 2010 environment. Additionally this workflow framework can be easily modified and extended to include additional Exchange configuration tasks specific to your Exchange service deployments.

Summary

Built on the HP BladeSystem, BladeSystem Matrix is a converged infrastructure platform providing pools of computer, storage, and network resources that can be quickly deployed. The goals of Matrix are to help accelerate provisioning, optimize IT capacity across physical and virtual environments and to ensure predictable delivery and service levels. This enables companies to address some of the key datacenter pain points facing them today including rising costs, low utilization rates, and inflexible environments.

With Matrix, powered by HP Insight Dynamics, application services can be quickly provisioned using infrastructure orchestration templates. This enables IT organizations to develop a service-driven, standardized application deployment process. Couple this with the design changes introduced in Microsoft Exchange Server 2010 focused on deployment flexibility and high availability and customers can adopt a template driven deployment model for Exchange.

This white paper discussed how this concept aligns with the HP tiered solutions program and the service levels that have been defined as part of tiered solutions framework. An example gold tier service is also highlighted to provide a concrete example of this deployment approach.

For more information

The following links provide more information on Microsoft Exchange solution content available from HP.

HP Active Answers – www.hp.com/solutions/activeanswers/exchange

Microsoft/HP Exchange solutions page – www.hp.com/solutions/microsoft/exchange

HP Insight Dynamics Reference Architectures – www.hp.com/go/idvsera

The following links provide general information on the technologies discussed in this white paper.

HP BladeSystem Matrix – www.hp.com/go/matrix

HP BladeSystem Matrix Template Community – www.hp.com/go/matrixtemplates

HP BladeSystem – www.hp.com/go/ bladesystem

HP Insight Control Software – www.hp.com/go/insightcontrol

HP Insight Dynamics – VSE – www.hp.com/go/insightdynamics

HP Flex-10 technology – see the technology brief
<http://h20000.www2.hp.com/bc/docs/support/SupportManual/c01608922/c01608922.pdf>.

To help us improve our documents, please provide feedback at

http://h20219.www2.hp.com/ActiveAnswers/us/en/solutions/technical_tools_feedback.html.

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