Technical white paper

HP recommended configurations for Microsoft Exchange Server 2013 and HP ProLiant Gen8 with direct attached storage (DAS)

Building blocks at 1000, 3000, and 5000 mailboxes

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Executive summary

The recommended configurations presented here are based on preliminary work with Microsoft® Exchange Server 2013 and an understanding of the need for additional server resources: an increase in memory, which will support changes to the Store database engine and thus reduce demands for disk input-output (I/O), and an increase in CPU demands, to support the rendering of mailbox information and a new search indexing system on the mailbox role. At the time of this publication, Microsoft has not yet published performance, sizing or best practice information, so all recommendations are based on HP best practice guidelines.

The release of Exchange 2013 will require changes in sizing and planning, as compared to the approaches used for previous versions of Exchange, as the server role architecture and functionality has also changed. Thus, a new understanding of user profiles and the impact of client access must be obtained and used to estimate server and storage resource consumption.

The recommended configurations have been designed to support 1000, 3000, or 5000 users with a mailbox size of 2.5GB and a user workload profile of 200 messages sent and received per day. The mailbox size can be customized by varying the capacity of the hard disk drives (HDDs) deployed in each solution. Each solution includes a high level diagram which describes a hardware configuration overview and a bill of materials (BOM) so that the solution can easily be ordered. Additionally, HP's Exchange Sizer can be used to explore custom solutions or to make slight changes to this set of recommended configurations. The HP Sizer for Exchange can be found at hp.com/solutions/exchange.

Deploying Microsoft Exchange Server requires careful sizing and planning to ensure a smooth deployment. Few companies have the depth or breadth of experience planning and deploying Exchange than is available with Hewlett-Packard. With decades of experience with Exchange and hundreds of thousands of deployments, HP brings a level of experience and best practices few can match. Documented solutions, like this set of recommended configurations, can provide invaluable insight to provide the user with a level of insight required to proceed with an Exchange deployment with confidence. HP recommended configurations for Exchange help to simplify that sizing and planning process by providing a concise starting point using pre-defined configurations. In addition to those, a number of "best practices" steps or considerations are provided as they relate directly to Exchange and the hardware configurations in this document.

These recommended configurations leverage the Exchange high availability features and apply best practices to the hardware design, architecture and setup. All three of these recommended configurations have been designed around an Exchange Database Availability Group (DAG) with two copies of each database; one active and one passive. For further high availability these solutions also utilize multi-role Exchange servers and a client access server (CAS) array. In order to fully benefit from the high availability features of a CAS array, an external hardware or software load balancer must be utilized.

Target audience: The information contained in this white paper is intended for IT decision makers, IT support staff and project managers involved in planning and deploying Microsoft Exchange Server solutions. For more information on Exchange terminology and best practices go to hp.com/solutions/activeanswers/exchange.

Introduction

The recommended configurations described in this document provide server and storage sizing details to assist you in planning and budgeting for your Exchange hardware deployments. Details in these recommended configurations provide server and storage requirements using the Exchange Database Availability Group (DAG) feature. The DAG replication model supports both unplanned failovers and administrator initiated switchovers at the database level. The DAG availability feature also supports combining the Client Access Server (CAS) roles on to the Mailbox (MBX) server which these recommended configurations leverage.

These solutions are designed to support 1000, 3000 and 5000 users with an estimated profile of 200 messages sent/received per user per day. To provide mailbox resiliency each solution utilizes two HP ProLiant DL380p Gen8 servers to host a two-copy DAG. Both of the servers in these solutions are multi-role Exchange servers with the MBX and CAS roles installed. The two servers are also configured in a CAS array to support client connections. To ensure fault tolerance and to distribute the client requests between CAS servers in the CAS array, a hardware or software based load balancer is required. Microsoft offers a qualification program for load balancers supporting Exchange. The following link lists the qualified load balancer solutions: http://technet.microsoft.com/en-us/exchange/gg176682.aspx.

To provide mailbox resiliency, these Exchange Solutions are designed with one active and one passive copy of each mailbox database. During normal operations each of the servers will host roughly half the active database copies.

Exchange Server 2013

The release of Microsoft® Exchange Server 2013 will require substantial changes in sizing and planning, as compared to the approaches used for previous versions of Exchange. Exchange 2013 changes the server role architecture, moving rendering of mailbox information to the back-end Mailbox role, and focuses the front-end Client Access Server (CAS) role on proxying client connections. Thus, a new understanding of user profiles and the impact of client access must be obtained and used to estimate server and storage resource consumption. The configurations presented here are based on early work with Exchange 2013 and an understanding of the need for additional server resources: an increase in memory, which will support changes to the Store database engine and thus reduce demands for disk I/O, and an increase in CPU demands, to support the rendering of mailbox information and a new search indexing system on the mailbox role.

Exchange Server 2013 introduces the following enhancements and features which are considered in the sizing of the recommended configurations:

- Changes in server roles, with all rendering of mailbox information performed by the back-end Mailbox role
- Improved search and indexing engine including a "Smart Search" that learns from users' communication and collaboration behavior
- Re-architected "Managed Store" changing the way memory is allocated for the mailbox database engine
- Additional reduction in database I/O compared to previous Exchange versions, thus reducing the need for high performance storage or disks

Recommended configurations

The recommended configurations are as follows:

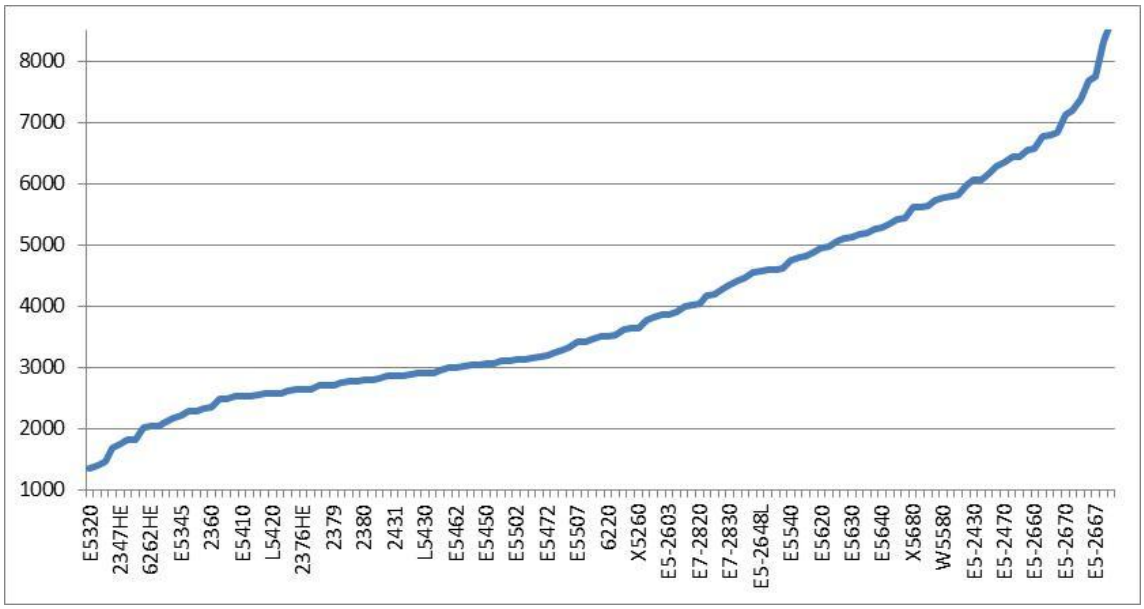
- The 1000 user solution is based on the DL380p with single Intel® Xeon® E5-2630L CPU and 32GB RAM per server. It uses the internal disks of the DL380p server for all storage, including databases.
- The 3000 user solution is based on the DL380p with single Intel Xeon E5-2660 CPU and 88GB RAM per server. It uses the disks of the HP D2600 disk enclosure for databases storage.
- The 5000 user solution is based on the HP ProLiant BL460c Gen8 Servers with dual E5-2650 CPUs and 128GB RAM per server. It uses the disks of the HP D6000 disk enclosure for databases storage.

These recommended configurations are based on the latest HP ProLiant Gen8 servers, as well as direct attached storage (DAS), both internal and external JBODs. The Gen8 server platform represents over two years and $300M R&D investment with over 900 patents filed and over 150 design innovations. These innovations help to save system administrators time and effort in deploying, managing and maintaining servers with Intelligent Provisioning, HP Active Health and HP Smart Update. HP Smart Memory includes advanced features to reduce power consumption and unplanned downtime. The HP Smart Socket addresses a leading cause of motherboard failures, while the HP SmartDrive addresses leading causes of data loss due to human error when an administrator removes the wrong hard drive. Those are just a few of the innovations of Gen8 servers. For more information please visit: http://h17007.www1.hp.com/us/en/whatsnew/proliantgen8/index.aspx.

The need for additional CPU and memory resources for Exchange 2013 has been factored into the recommended configurations. First, using the HP ProLiant DL380p Gen8 servers, which provide twenty-four (24) DDR3 DIMM memory slots for up to 768GB. A comparable HP BladeSystem model, the HP ProLiant BL460c Generation 8 (Gen8) Server Blade provides sixteen (16) DDR3 DIMM memory slots (8 per processor).

The demands for additional CPU resources can also be met with HP ProLiant Gen8 servers. Figure 1 below shows the rapid advancement of CPU processing power and adjusted relative megacycles, compared to a baseline of a previous generation 3GHz processor. Based on the benchmark score of the new server model, the CPU clock speed is multiplied to become adjusted relative megacycles, for example 7GHz per processor core compared to an older benchmark score. The graph below shows servers using both AMD and Intel processors, with HP ProLiant Gen8 servers representing the upper end of the scores and thus the most processing power available.

Figure 1. Rapidly increasing CPU processing power (adjusted relative megacycles)



HP Sizer for Exchange

The recommended configurations presented here have been designed using the HP Sizer for Exchange. This free, downloadable application allows the end-user to customize their input and receive an exact specification for servers and storage for Exchange. Additionally, HP's Exchange Sizer can be used to explore custom solutions or to make slight changes to this set of recommended configurations.

The HP Sizer for Exchange 2013 generates Bills of Material for various Exchange configurations, allowing the end-user to customize for their Exchange deployment.

It takes into account many factors such as email client usage and mailbox size. New to this version is the ability to read in the Microsoft Exchange Mailbox Server Role Requirements Calculator (spreadsheet) as input, making it even easier to use the HP Sizer. The HP Sizer for Exchange can be found at hp.com/solutions/exchange.

Figure 2. HP Sizer for Exchange Server 2013

Solution design criteria

These solutions were designed based on the following criteria. Many of these parameters have been derived from HP's Exchange best practices knowledge-base.

- Single Database Availability Group with two copies of each database
- Servers are multi-role with Exchange mailbox (MBX), and client access (CAS) roles
- Each user has a send/receive profile of 200 messages per day, with an estimated IOPS requirement of 0.12 IOPS which includes a 20% safety factor over the base 0.10 IOPS
- Each mailbox database and its logs are hosted on a RAID1 pair of midline (MDL) SAS disks
- Each RAID1 pair of MDL SAS disks supports 334 mailboxes based on both capacity and IOPS
- The 1000, 3000, and 5000 mailbox solutions use 3, 9, and 15 databases respectively
- When 1TB, 2TB, or 3TB MDL SAS disks are used, the average mailbox capacity is 1.25GB, 2.5GB, or 4.5GB respectively
- For fault tolerance and load balancing with the CAS role, a separate software or hardware load balancer must be used. Exchange 2013 will change the requirements for load balancing.

1000 mailbox configuration

The 1000 user solution shown below utilizes a single Intel® Xeon® E5-2630L CPU with 32GB RAM per server.

Figure 3. 1000 user configuration

Both DL380p Gen8 servers in Figure 3 are configured with 2TB HDDs as follows:

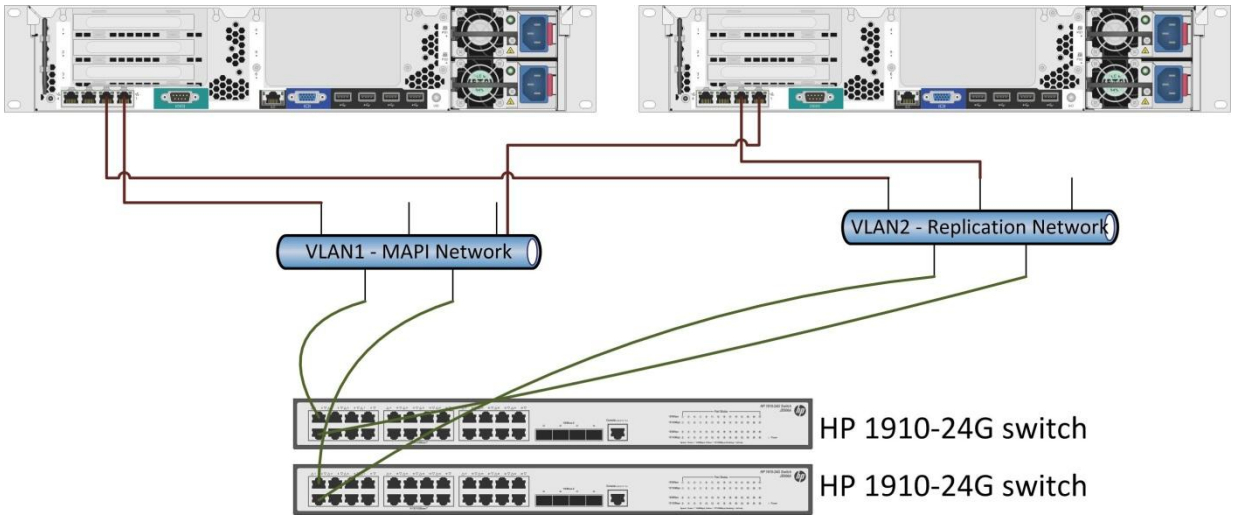
- Bays 1-2: Boot/System, Exchange binaries and transport queue
- Bay 3: Database Recovery and Maintenance drive
- Bays 4-5: Database 1 (active or passive, depending on server)
- Bay 6: Spare
- Bays 7-8: Database 2 (active or passive, depending on server)
- Bays 10-11: Database 3 (active or passive, depending on server)
- Bays 9 and 12: Future expansion (open)

Networking

The DL380p Gen8 server can be configured with either four 1GbE embedded NICs, or two 10GbE embedded NICs. This solution utilizes the 1GbE NIC option. The 10GbE option can be implemented if it better meets the requirements of a specific deployment. Figure 4 below shows the networking for these solutions utilizing redundant HP 1910-24G Ethernet switches.

Ethernet port 1 of each server connects to the MAPI network, and port 2 of each server connects to the replication network. Ports 3 and 4 can be used for management, backup, or other networks.

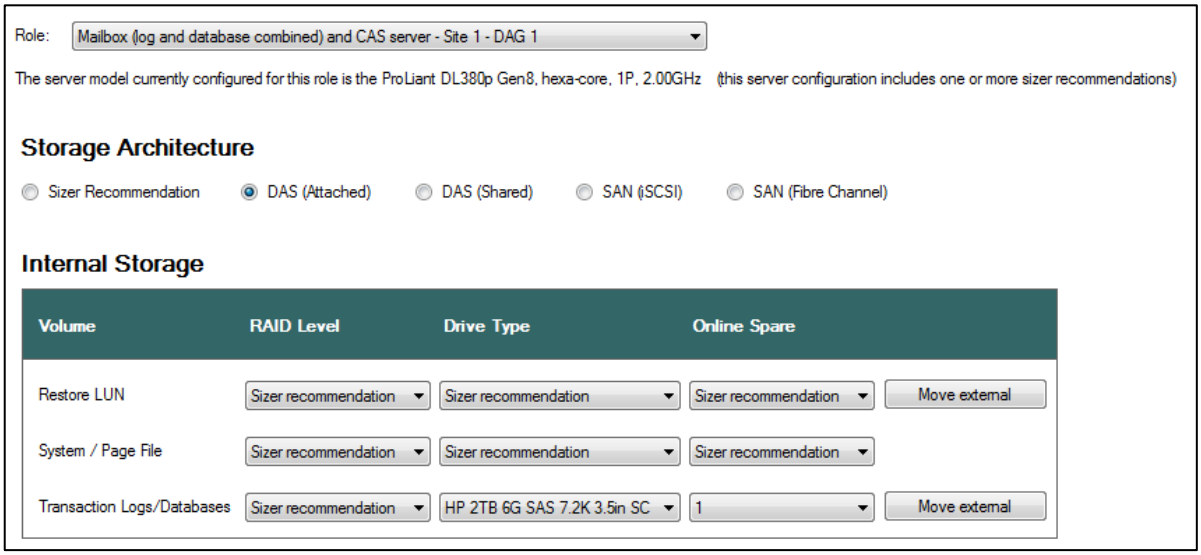
Figure 4. DL380p Gen8 networking



HP Sizer for Exchange

The figure below shows the definition of the Storage Architecture in the HP Sizer for Exchange, with custom selection of 2TB SAS drives, adding an online spare.

Figure 5. Configuring direct-attached storage in the HP Sizer for Exchange



Bill of materials

The following bill of materials lists the major server and storage hardware components needed for the recommended configurations, however this is not an exhaustive listing of all the necessary components needed to build the complete solutions. For complete configuration details, please contact your HP Reseller or HP Sales Representative.

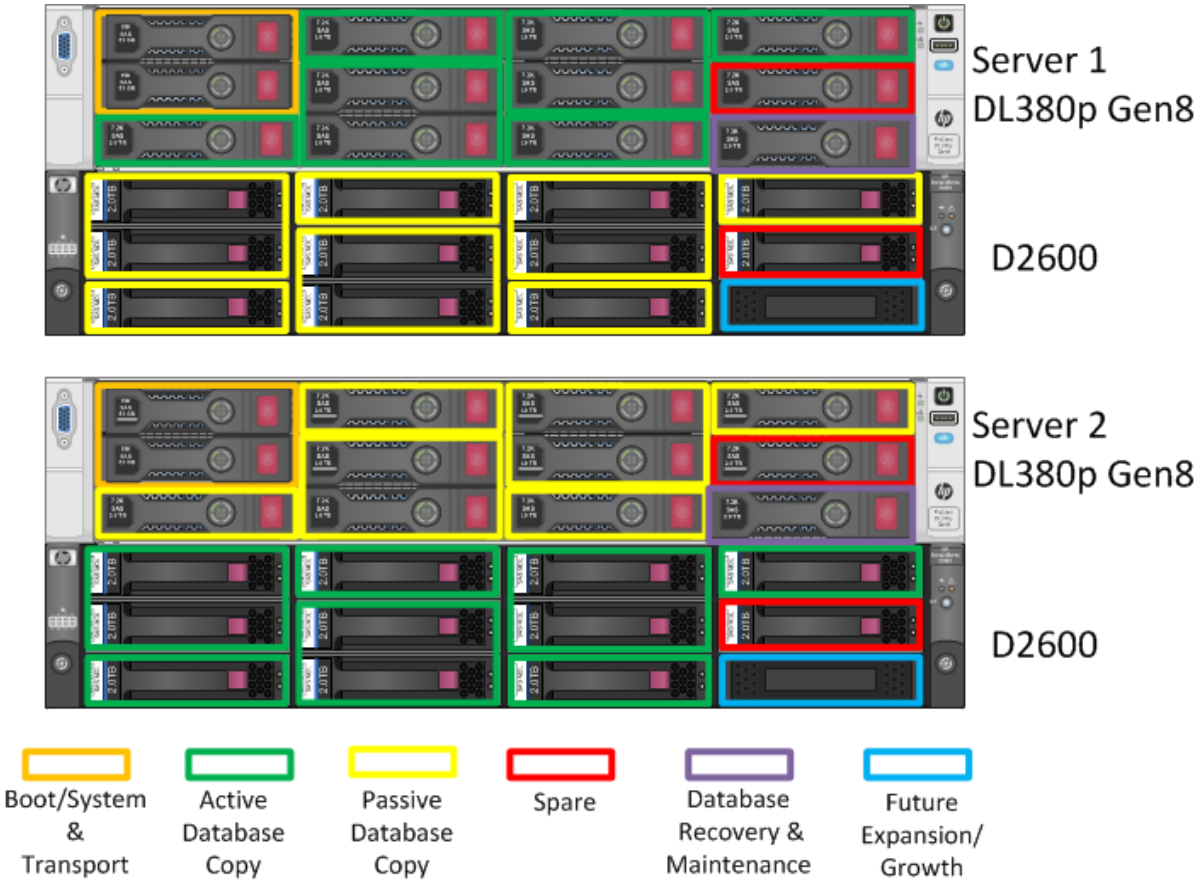
Table 1. Bill of materials for 1000 user 2.5GB mailbox solution

Quantity	Part Number	Description
2	665552-B21	HP DL380p Gen8 12-LFF CTO Server
4	656364-B21	HP 1200W CS Plat PL HtPlg Pwr Supply Kit
2	675092-L21	HP DL380p Gen8 E5-2630L FIO Kit
2	663476-B21	HP 2U Friction Gen8 Rail FIO Kit
8	690802-B21	HP 8GB 2Rx4 PC3-12800R-11 Kit
4	652615-B21	450GB 6G SAS 15K 3.5in SC ENT HDD
16	652757-B21	2TB 6G SAS 7.2K 3.5in SC MDL HDD
2	653206-B21	HP DL380/385GN 3 Slot PCI-E RISER Kit
2	JE006A	HP 1910-24G Switch

3000 mailbox configuration

The 3000 user solution shown below utilizes a single Intel Xeon E5-2660 CPU with 88GB RAM per server.

Figure 6. 3000 user configuration



Storage in Figure 6 is configured as follows: Both DL380p Gen8 servers are configured with 2TB HDDs.

- Bays 1 & 2: Boot, System, Exchange binaries and Transport queue files
- Bays 3 – 10: Database 1 – 4 (active and passive)
- Bay 11: Spare
- Bay 12: Database Recovery and Maintenance space

The two D2600 storage enclosures are configured with 2TB HDDs as follows:

- Bays 1 – 10: Database 5 – 9 (active and passive)
- Bay 11– Spare
- Bay 12 – Future expansion (open)

Bill of materials

The following bill of materials lists the major server and storage hardware components needed for the recommended configurations, however this is not an exhaustive listing of all the necessary components needed to build the complete solutions. For complete configuration details, please contact your HP Reseller or HP Sales Representative.

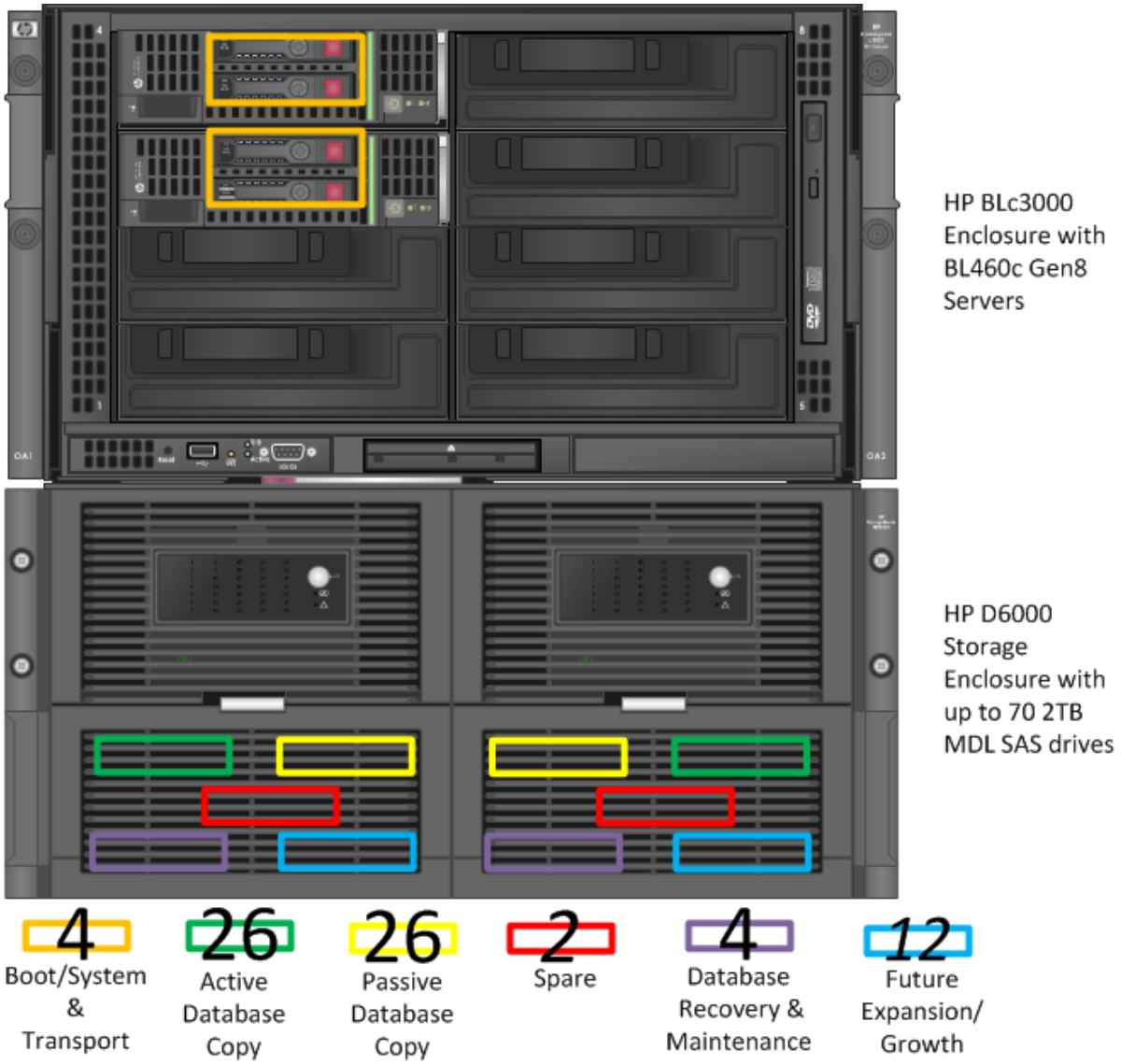
Table 2. Bill of materials for 3000 user 2.5GB mailbox solution

Quantity	Part Number	Description
2	665552-B21	HP DL380p Gen8 12-LFF CTO Server
4	656364-B21	HP 1200W CS Plat PL HtPlg Pwr Supply Kit
2	662242-L21	HP DL380p Gen8 E5-2660 FIO Kit
2	663476-B21	HP 2U Friction Gen8 Rail FIO Kit
22	690802-B21	HP 8GB 2Rx4 PC3-12800R-11 Kit
4	652615-B21	450GB 6G SAS 15K 3.5in SC ENT HDD
18	652757-B21	2TB 6G SAS 7.2K 3.5in SC MDL HDD
8	407339-B21	HP Ext Mini SAS 2m Cable
10	507616-B21	HP 2TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port MDL HDD
2	BK782A	HP D2600 2TB 6G SAS LFF MDL 12 TB Bundle
2	631673-B21	HP Smart Array P421/1GB FBWC Controller
2	HA109A3#14C	D2000 Disk Enclosure JW Support
2	HA113A1#5BW	ProLiant Add On Options Installation SVC
2	653206-B21	HP DL380/385GN 3 Slot PCI-E RISER Kit
2	BC377A	HP Smart Array Advanced Pack 2.0 No Media 1 Server 1yr 24x7 Support Software
2	JE006A	HP 1910-24G Switch

5000 mailbox configuration

The 5000 user solution shown below utilizes BL460c Gen8 Servers with dual E5-2650 CPUs and 128GB RAM per server.

Figure 7. 5000 user configuration



Storage in the D6000 is configured as follows, with 2TB HDDs:

- Bays 1 –26: Database 1 – 13 (active and passive)
- Bay 27: Spare
- Bay 28-29: Database Recovery and Maintenance space
- Bay 30-35 – Future expansion (open)

Note that each side contains 35 drives and the configuration can be the same on each. For more information on the HP D6000 see http://h18000.www1.hp.com/products/quickspecs/14419_div/14419_div.html.

Information on the HP 6Gb SAS Switch for HP BladeSystem c-Class is available here.

Bill of materials

The following bill of materials lists the major server and storage hardware components needed for the recommended configurations, however this is not an exhaustive listing of all the necessary components needed to build the complete solutions. For complete configuration details, please contact your HP Reseller or HP Sales Representative.

Table 3. Bill of materials for 5000 user 2.5GB mailbox solution

Quantity	Description	Part Number
1	536841-B21	HP BladeSystem c3000 Enclosure, Single Phase with 2 Power Supplies, 4 fans, 8 ICE 30 Day Eval Licenses
2	666159-B21	HP BL460c Gen8 E5-2650 1P 32GB Svr
2	662066-B21	HP BL460c Gen8 E5-2650 Kit (2.0 GHz, 20MB Cache, 95W)
24	690802-B21	HP 8GB 2Rx4 PC3-12800R-11 Kit
4	652605-B21	146GB 6G SAS 15K 2.5in SC ENT HDD
2	407337-B21	HP Ext Mini SAS 1m Cable
2	650072-B21	HP Smart Array P721m/2G FBWC 4-ports Ext Mezzanine SAS Controller
2	AJ864A	HP 3Gb SAS BL-c Switch
2	HA109A3#9LZ	3GB SAS BL Switch Support
1	QQ697A	HP D6000 2TB 6G SAS LFF MDL 70TB Bundle
23	507616-B21	HP 2TB 6G SAS 7.2K 3.5in DP MDL HDD
1	HA109A3#4ZZ	HW Support

Implementing a proof-of-concept

As a matter of best practice for all Exchange deployments, HP recommends implementing a proof-of-concept using a test environment that matches as closely as possible the planned production environment. In this way, appropriate performance and scalability characterizations can be obtained. For help with a proof-of-concept, contact an HP Services representative (hp.com/large/contact/enterprise/index.html) or your HP partner.

For more information

To read more about HP solutions for Exchange, including best practices and additional testing of HP server and storage products with Exchange, please see: hp.com/solutions/exchange

For additional information on HP Sizer for Microsoft Exchange Server, please see: hp.com/solutions/exchange

For general information on Exchange sizing and best practices, there are several white papers and planning tools that are free to download from: hp.com/solutions/activeanswers/exchange

For more information on the HP D6000 see http://h18000.www1.hp.com/products/quickspecs/14419_div/14419_div.html

Information on the HP 6Gb SAS Switch for HP BladeSystem c-Class is available http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&lang=en&cc=in&docIndexId=66865&taskId=101&prodTypeId=3709945&prodSeriesId=5078003

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