Laserfiche Hardware Planning and Specifications

White Paper

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Laserfiche®

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Introduction

This paper will walk you through the major steps you'll need to take when planning hardware needs for a Laserfiche installation and integration, from small-scale to "enterprise" installations. We'll then work through the requirements gathering phase, where you'll gather information about the complete picture of customer needs when working with Laserfiche, and perform a comprehensive survey of existing hardware and software.

Once you know what hardware and software you're working with and what you need to provide, we'll discuss what hardware selections you'll need to make to support each component of the Laserfiche system, from the Windows Server, through every Laserfiche application, to storage and backup. Finally, we'll examine four case studies of hardware configurations from existing Laserfiche customers.

Specifying and selecting hardware is more an art than a science, because there's no single answer to any given question, and because hardware needs are never the same from company to company. Though this paper contains a broad overview of the questions to ask and the decisions to make, there will be many variations in customer setups that will require you to ask questions and make decisions that we've never considered.

> **Note:** The estimates and advice in this paper are intended as guidelines only, not as rules. We make no guarantees that the hardware we suggest here will suffice for every customer's configuration.

What is "enterprise"?

The table below provides some guidelines for specifying how much processing power and memory might be required based on the number of concurrent users and the number of pages input to the system each day.

- **The green area** represents user needs that can typically be supported by a single server running Laserfiche, Web Access, and Microsoft SQL. We suggest at least a 2.5GHz quad-core processor with 8GB of RAM.

- **The pink area** represents needs that are best met by a dual-server configuration, with Laserfiche and Web Access on a single server, and Microsoft SQL on its own machine. For the Laserfiche/Web Access server, we recommend at least 2.5GHz quad-core processor with 4GB of RAM, and for the SQL server, the same processor with at least 8GB of RAM.

    o With a system of this size, organizations may consider virtualizing the Laserfiche infrastructure. We recommend allocating four processor cores and 8GBs of RAM to a single

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virtual machine hosting both the Laserfiche and Web Access servers.

> **Note:** For performance reasons, we recommend keeping Microsoft SQL on its own physical machine, even if the other applications are virtualized.

- **The blue area** represents configurations approaching "enterprise" level, for which we recommend a three-server configuration: Laserfiche, Web Access, and Microsoft SQL each on their own machine, each with a minimum of a 2.5GHz dual-core processor and 8GB of RAM.

  - For virtualization, we recommend a similar configuration where each server (except for MSSQL) resides on a dedicated virtual machine. The virtual machines should be allocated two processor cores and 4GBs of RAM.

- **Optimum storage configurations** also depend on the size of the system. For smaller Laserfiche implementations, such as the green area below, we recommend a single RAID 5 array. For the other estimated loads (both pink and blue areas), the ideal configuration is to set up three separate RAID arrays, one each for the Laserfiche volumes (RAID 5), Microsoft SQL Server data file (RAID 1 or RAID 1+0), and Microsoft SQL Server transaction logs (RAID 1 or RAID 1+0).

Active Concurrent Users

PAGES/DAY 50kb ea	10	25	50	100	200
200	15GB*	30GB	45GB	60GB	75GB
500	30GB	45GB	60GB	75GB	90GB
1,000	60GB	75GB	90GB	105GB	120GB
2,000	105GB	120GB	135GB	150GB	165GB
3,000	150GB	165GB	180GB	210GB	240GB
5,000	210GB	240GB	270GB	300GB	360GB
10,000	450GB	495GB	540GB	585GB	660GB

*Please note that all storage estimates listed are for three years, which is the estimated life of current off-the-shelf hardware.

When you're dealing with a customer and system that are truly enterprise, there are some best practices to follow. Primary among them is putting all Laserfiche components on separate servers. At Laserfiche, we've found that doing so is well worth the extra cost to avoid potential resource-sharing problems. Another consideration is additional environments—you're planning for Laserfiche in production, but you may also need to configure multiple additional support environments. Development, testing, training, and production environments may all be required for seamless performance, depending on your customer's requirements.

Lastly, as you create a hardware plan for your customer, realize that Laserfiche supports multiple cores per processor, as well as multiple sockets per server. Planning your hardware system to include multiple cores and sockets will allow you to take advantage of multi-threaded processing and help your customer's operations run more efficiently and quickly.

Gather Requirements for System

The first step when planning the implementation of Laserfiche for an organization is to determine what is expected from Laserfiche.

The most important question involves user base. When considering your user base, it is important to remember that there is a difference between the number of users and the number of users that might be estimated to be accessing the system—and therefore using your hardware resources—at any given time. We suggest an estimate of one-in-four total users (licenses) accessing the system at any given time. Therefore, if you're looking at 200 user licenses for an enterprise implementation, you'll want to plan for your system to accommodate 50 simultaneous users at any given time.

> **Note:** Throughout this paper, we will use the term "users" to refer to simultaneous, concurrent user load on the system. This term used here should not be confused with the number of user licenses or the previous Laserfiche licensing schema of "concurrent user licenses."

A related question is whether your customer will be deploying Laserfiche over the Web (e.g., Web Access or WebLink), and if so, to what portion of the user base, in order to calculate the amount of traffic that will be hitting your Web servers as well.

The next important question is the expected scanning volume: how many documents will be going into the system on a daily and monthly basis? The best approach is to try to predict this number over a three to four year timeframe (considering three to four years to be the typical lifespan of computer hardware). This figure should be in pages—later we will discuss converting this number to GB and its implications for storage needs. As a corollary to this, you'll need to determine if image capture will primarily be

done through an installed Laserfiche Scanning client on the same local area network (LAN) as the Laserfiche Server or via Web Scanning. Again, this information will help you calculate loads required for your Web servers as well as any effect to network bandwidth.

Workflow and Quick Fields are harder applications to specify hardware for, but for the initial requirements gathering, it's enough to know if the customer plans to use the products, how intense that use might be, and what, if any, Quick Fields add-ons they want to employ.

Evaluate Current State

Hardware and Network

After gaining a thorough understanding of what the customer expects from their Laserfiche implementation, you should survey the current system, not only to understand what resources the customer may already have in place, and what they may need to upgrade, but also to be sure you're aware of existing processes and behaviors that you will need to accommodate and/or work with.

To start, look at your customer's existing network infrastructure, beginning locally with the LAN and evaluating network speed. If your customer has remote sites, how are they connected? By a wide area network (WAN) or by virtual private network (VPN)? If remote sites connect via a WAN, be sure to evaluate that network speed, which will factor into a number of decisions. Do remote sites use a desktop client to connect across the WAN to the Laserfiche Server or do they use the thin Web Access client? If using Web Access, will there be enough users and network load to require more than one Web Access server? And how is the installation distributed to remote users?

You'll also want to make note of the specifics of the hardware in place, including who the primary hardware vendor is, as your customer may want to maintain existing contracts and/or relationships. Similarly, consider existing arrangements for storage, as enterprise customers usually have some sort of storage area network (SAN) in place. Again, access from remote business sites or partners will have an impact on retrieval times from storage. Another consideration is the customer's high-availability requirements: they may have service level agreements for disaster recovery that must be met, governing failover locally or from site-to-site.

A final consideration, based on the current state of the hardware in your customer's system, is planning for growth. Laserfiche typically likes to plan for three to four years of growth, which is considered acceptable life expectancy for off-the-shelf software.

Software

Laserfiche will need to work not only with existing hardware and networks, but also with existing customer software. Therefore, knowing what kind of software is already in use is also vital. The key components to consider are what operating systems are supported, what database systems are in use already or are preferred, and what backup software is being used with the customer's backup hardware configuration. In addition, you'll want to determine if your customer is planning to, or already does, virtualize their systems, and what virtualization software they use or prefer.

Planning

Hardware needs for each application component will be considered separately.

Windows Server 2008

For the Windows Server 2008 Standard edition, the maximum server resources supported are four processor sockets and 32GB of memory. For the Enterprise edition, the maximum server resources supported are eight processor sockets and 2TB of RAM.

Laserfiche Server

Generally speaking, having more cores is better for performance than having faster processors, and this is particularly true for the Laserfiche Server, which is a multi-threaded application and can make use of multiple processors or cores.

| Concurrent users	Cores	RAM
200-400 users	2-4	4-8GB
400-1,000 users	4-12	8-16GB
>1,000 users	Contact reseller or Regional Manager	

SQL Server

When specifying hardware for your Microsoft SQL Server, we recommend allocating a separate physical machine. The first reason for this is to protect other component resources and confine SQL to only the resources you designate. The second is that internal Laserfiche tests have shown that SQL performs better on a physical box than on a virtual machine.

Physical machine requirements will vary depending on the Laserfiche load estimates, as well as the version of SQL Server. The SQL Standard version supports four sockets for processors and the maximum memory supported by the operating system. The Enterprise version—which you may want to use due to its support of failover clustering, a potentially important requirement for larger Laserfiche installations—supports more sockets and memory, up to the maximum number supported by the operating system.

The numbers required for the Laserfiche SQL database fall within the limits of the Standard and Enterprise SQL versions. For a load on SQL of 200 to 1,000 concurrent Laserfiche users (remember, this is actual users hitting the system, not the number of licenses), we recommend a dual-processor, quad- or six-core configuration with 4GB to 16GB of RAM. For more than 1,000 concurrent users, we recommend multi-processor systems and more than 16GB of RAM. For more details or guidance on systems of that size, talk to your Laserfiche reseller or regional manager.

A best practice when planning and purchasing your system is to invest in multiple processors. Tests have been performed in-house in two environments: one with a SQL Server with a single Intel Xeon x5365 processor, and another exactly the same but with two processors. Search durations are similar in both systems if there's only one concurrent search. But if more users log in to the system to search at the same time, the system with more processors is faster.

Another best practice is to buy some of the fastest processors available, because searching, indexing, and full-table scans all benefit greatly from increased processor speed. In a test performed with an in-house system versus a production system configured by Laserfiche, we observed the difference in search result speed that a single gigahertz of processor speed can make. Both systems had identical specifications, except that the production site had a 2GHz processor, and our test bed had a 3GHz processor. As the graph below indicates, the in-house test bed (red bars) returned the same search results in half the time of the production system (blue bars).

Partial Match All Information Field Search
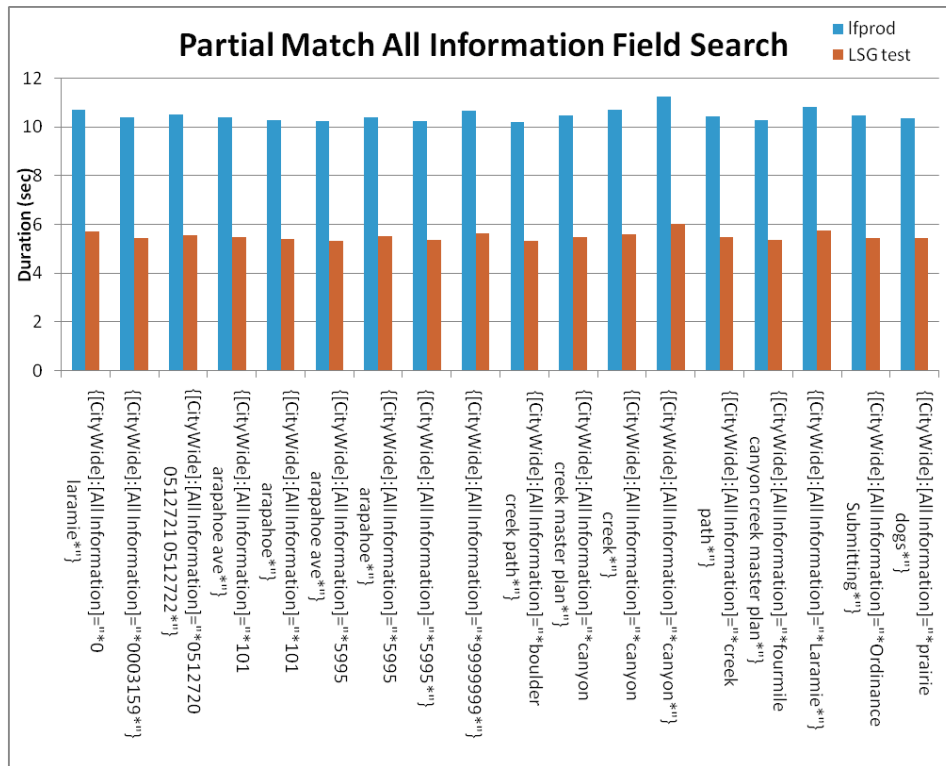
Another consideration with regard to your SQL server is how to handle multiple databases. In the Laserfiche suite, Workflow, Audit Trail, and the Laserfiche Client/Server will each require a separate database, though they don't all have to be located on separate boxes. However, the Audit Trail database in particular will benefit from being separated onto its own machine, due to its reporting function, which is very resource-intensive. Some organizations with Laserfiche even replicate all Laserfiche audit data into a separate reporting environment to minimize interference from other system demands and to maximize performance.

> **Tip:** Through customer site tests and our own Laserfiche in-house tests, we have determined that buying the second-fastest processor available may actually be the best practice. The second-fastest processors can cost as much as 20-30% less than the fastest processors on the market, and the speed differential is typically not substantial enough to warrant the premium.

Some customers may choose to utilize an existing SQL server installation for Laserfiche SQL needs. Up to a certain number of concurrent users and/or system load, this can be a cost-effective solution. We recommend a dedicated Laserfiche SQL installation for more than 50 concurrent users. Beyond that, we advise consistent monitoring of SQL usage and loads, to ensure enough resources are allocated for optimum Laserfiche performance.

Storage

The type of storage system connected to a Laserfiche implementation doesn't matter; whether it's a storage area network (SAN), direct attached storage (DAS), or network attached storage (NAS), Laserfiche can be configured to store volumes on any drive able to be referenced by a UNC storage path. Most enterprise systems, however, establish a SAN dedicated to storage needs.

The key metric for estimating storage capacity is how many images the system will house. As shown in the table below, Laserfiche recommends estimating 75GB per one million images, where each image is a single-page, 8.5x11, 300dpi, in black and white. The amount of storage space required will increase in ways not easy to predict when working with oversize and/or color images. Storage required for SQL data and log files can be estimated at a percentage of total volume storage.

Recommended configurations for storage arrays are also detailed in the table below. For volume storage, we recommend at least a RAID 5 array, specifically for its redundant data storage (parity), which employs at least three disks to protect against total failure of any one. Note that for RAID 5 arrays larger than 2TB, we recommend RAID 6, with two parity disks, due to increased possibility of a failed disk. For SQL data and log files, we recommend either a RAID 1 array, for its mirroring function, or a RAID 1+0 array, which distributes data storage and mirrors data across four or more disks.

	Sizing calculations	Storage arrays
Laserfiche volume storage	75GB per 1 million images (8.5x11, 300dpi, black/white)	RAID 5 Serial Attached SCSI recommended Serial ATA OK
SQL data file	10-15% of total volume storage	RAID 1 or RAID 1+0 Serial Attached SCSI recommended with fast drives
SQL log file	5-10% of total volume storage	RAID 1 or RAID 1+0 Serial Attached SCSI recommended with fast drives
tempdb	5% of total volume storage (for larger Laserfiche installations, usually >200 users)	Shared with SQL log file

It is worth mentioning that the ratio between the SQL data file and the transaction log can vary greatly between "simple" and "full" recovery modes. In simple mode, the transaction log will stay quite small, and as per the table

above, we would correspondingly recommend nearer to 5% of total volume storage for the SQL log file. In full mode, however, the transaction log can become very large, depending on how often you perform backups, and we would recommend closer to 10% of estimated total volume storage.

Backup

Most organizations will have backup procedures in place, so planning for Laserfiche system backup has more to do with determining the potential amount of data that will need to be backed up, in addition to current load. If a backup system isn't robust enough for the additional load or isn't completely set up, Laserfiche recommends a disk-to-disk-to-tape process: backing up to disk first—which can usually be the SAN, NAS, or DAS device—and then backing up the disk to a rotating set of tapes. If storing on a DAS, we recommend a large RAID 5 array with a number of SATA disks, or at least enough capacity for one month's worth of grandfather-father-son rotation. Larger systems should use LTO-standard backup tapes; the most recent version is LTO-4, with 800GB uncompressed capacity. Smaller systems with less data to back up can use smaller-capacity DAT drives.

> **Tip:** If backups are being performed at night, the backup server (if sufficiently large) can be shared with another low-resource server that is only used during the day, such as the VMWare Infrastructure Management server.

Other Component Servers

Web Server

More cores can mean better performance from your Laserfiche Web Server because of the way ASP.NET (the .NET host for Web-based .NET applications) handles input/output threads in IIS. RAM usually isn't as important or as relevant as the number of cores, with the exception of support for certain processes, such as PDF generation (for printing or exporting).

Laserfiche Web configuration offers unique flexibility in the Laserfiche system. With the Laserfiche Web server, you can scale out and add more Web servers to handle more load, even after initial implementation, as the load on your Web server increases. The requirement to support Web-based load balancing is the ability to establish server affinity to incoming client requests at the TCP/IP level. An example of this is Microsoft Network Load Balancing, which will dynamically allocate requests across the Web to multiple Web Access servers in a cluster.

With that said, we can make some basic estimations of hardware required for user load. For 200 concurrent users, we recommend 2-4 cores and 8GB of RAM; for 300-400 concurrent users, 4-12 cores and 16GB of RAM.

Workflow Server

Laserfiche Workflow is a difficult product to specify hardware for, because the resource use of Workflow isn't driven by users. Rather, it is driven by the number of actual workflows running, and the speed at which they run is limited by the number of threads that Windows Workflow Foundation can run.

Part of the load on the Laserfiche Workflow system certainly is predictable—we can reliably estimate how many users are configuring workflows and starting rules in the Workflow Designer. But this isn't the issue. Where Workflow impacts the system most from a planning perspective is when system actions are performed by workflow instances being triggered. It's hard to know just how resource intensive an individual workflow might be, even when creating it, much less when planning for a future system.

That said, there are some guidelines to follow and some tips for maintaining Workflow performance. The first recommendation is virtualization, which would allow you to add (or remove) cores as necessary to your Workflow Server as you monitor production performance. The next recommendation is a faster processor with many cores, to take advantage of as many threads as the Windows Workflow Foundation can handle. We suggest starting with a 4-8 core system with 4-8GB of RAM.

Lastly, for Laserfiche Workflow in particular, we recommend making sure that your test systems are similar to your production systems, so that you have the best data possible for system load and resource allocation.

Quick Fields Agent Server

Though Quick Fields itself is a client-side application, it should be addressed in hardware plans because it will work the hardest of any of the Laserfiche applications, and it is very resource intensive. Faster processors will improve speed, particularly of popular add-ons like OCR that tend to be processor-intensive.

Quick Fields uses up to four threads, so we recommend a quad-core processor, and 4GB of RAM. For Quick Fields Agent, however, the baseline system you should start with is a dual quad-core with similar RAM, to take advantage of the fact that Quick Fields sessions can be allocated to specific cores. Since the number of processors or cores can be adjusted as needed, you might want to consider virtualizing the Quick Fields Agent environment. For storage sizing, you'll want to start by allocating a minimum of 15GB in the VM for the operating system and applications, plus 50KB (single-page, 8.5x11, 300dpi, in black and white) times the number of images to be scanned across all sessions.

Audit Trail

Audit Trail is also tricky to specify hardware for, because the impacts to the system depend so much on which events are selected to be logged. When planning a Laserfiche implementation that will include Audit Trail, you need to know two key points about tracking and reporting on system events: one, Audit Trail event tracking can generate huge amounts of data, which can, in turn, compete for storage space with other applications, and two, Audit Trail reporting can be an extremely resource-intensive process.

As a best practice, if you know that Audit Trail will be an important part of your system, we recommend replicating audit logs into their own reporting system in a completely separate environment. Many customers have found that this is the most efficient means of maintaining performance across their Laserfiche installation.

Use Cases

The following are real-world examples of system requirements and corresponding hardware specifications proposed and/or implemented for different customers with varying needs and system complexities.

> **Note:** Specific brand recommendations do not constitute an endorsement or suggest that those products are required. These are examples taken from actual proposed systems, and are to be used for example only.

1. Basic, Single-Server System

The customer asked for an entire turn-key system to support basic archive and retrieval. The installed system consisted of a desktop, switch, scanner, single server, two users of Laserfiche Avante, and Microsoft SQL Express.

Hardware

The hardware was specifically configured to support Laserfiche Avante. The heart of the system was a server running a single Intel quad-core processor with 4GB of RAM. Storage consisted of three 250GB hard drives in a RAID 5 configuration, which provided 500GBs of usable storage. At the standard conversion of 75GB per one million images, it was estimated that this system would scale to approximately 6.5 million images.

Backup services were provided by a USB drive with removable hard drive storage. Three 500GB hard drives were also specified to support various backup rotation strategies. Support for networking between the server and desktop was provided by a gigabit Ethernet switch.

The Laserfiche Client and Scanning were installed on the workstation running a single-core Duo Intel processor and 4GBs of RAM with Windows Vista.

More Hardware Details

Purpose	Server/Processor	RAM	Storage	OS
Server	Quad Core Intel® Xeon® X3323	4GB	RAID 5, 3x250GB hard drives	Windows Server® 2008, Standard Edition
Workstation	Intel® Core™ 2 Duo Processor E8500	4GB	---	Genuine Windows Vista® Home Basic Service Pack 1

2. More-Intensive Single-Server System, plus Virtualization

The customer anticipated three years of growth to reach planned system scope for an imaging and management system. The hardware was expected to scale to 200 concurrent users (load on system, not licenses). Volume estimates for the three-year period were three million new document images.

Two physical servers were configured, both with dual, quad-core boxes with 12GB of RAM. One was dedicated to Microsoft SQL Server; the other hosted separate VMWare virtual machines for each of the Laserfiche, Workflow, and Web Access applications. Server resources were allocated to the VMs as follows: 4GB RAM for each application, four cores for Laserfiche, and two each for Workflow and Web Access.

Storage was on the customer's existing SAN, which was divided into two RAID partitions; one array in a RAID 1 configuration for the operating system and virtualization software, and another array in a RAID 5 configuration for the two VM environments. The customer provided backup services appropriate to the amount of data as specified above.

More System Details

Purpose	Server/Processor	RAM	Storage	OS
Laserfiche, Workflow, Web Access	Dual Quad-Core Intel® Xeon® E7430, 2.13GHz, 12MB L3 Cache	12GB	RAID 5, 4x146GB hard drives	Microsoft Windows Server 2003/2008, VMWare Server
SQL Server	Dual Quad-Core Intel® Xeon® E7430, 2.13GHz, 12MB L3 Cache	12GB	RAID 5, 4x146GB hard drives	SQL Server 2005/2008

3. Multi-Server System

This customer requested a system running the Laserfiche Client/Server, Workflow, Web Access, and Quick Fields/Quick Fields Agent for 250 concurrent users and 30 million images over three years. The optimal

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hardware configuration relied on Laserfiche's true n-tier architecture. Given the size of the installation and number of simultaneous connections to be supported, the Laserfiche applications and SQL Server resided on separate servers, each optimized for Laserfiche.

The physical servers were both dual, quad-core boxes with 24GB of RAM. One was dedicated to Microsoft SQL Server; the other hosted three separate VMWare virtual machines, one for Laserfiche/Web Access, one for Workflow, and one for Quick Fields Agent. Server resources were allocated to the VMs as follows: four cores and 8GB of RAM for Laserfiche/Web Access and two cores and 4GB RAM each for Workflow and Quick Fields Agent.

Special care was taken to separate the read/write loads of each component for optimal performance. On the Laserfiche Server, the operating system (OS) and applications resided on a RAID 1 array, with the Laserfiche images on a separate RAID 5 array. Similarly, on the SQL Server, the OS and applications resided on a RAID 1 array and the SQL MDF file was on a separate RAID 5 array. This configuration was estimated to be sufficient to store roughly five million TIFF images.

> **Note:** The Laserfiche Server is media independent, and will work with any storage solution that is accessible through a UNC path. This means that any existing storage solutions can be interfaced into Laserfiche with minimal administrative effort.

Storage resided on an existing enterprise SAN, which allowed for online backups of the Laserfiche volume data and SQL files.

Hardware Specifications

Purpose	Server/Processor	RAM	Storage	OS
Laserfiche, Web Access	Dual Intel ® Xeon™ 5150 Processors at 2.66 GHz	24GB	**Application** 36GB RAID1 (2x 36GB 15k RPM SAS) **Data** 219GB RAID5 (4x 73GB 15k RPM SAS)	Windows® Server 2003, Standard Edition
SQL Server	Dual Intel® Xeon™ 7030 dual-core Processors at 2.86 GHz	24GB	2x 36GB RAID1 (4x 36GB 15k RPM SAS)	Windows® Server 2003, Standard Edition

4. Virtualization, SANs, and Failover

High-availability was of paramount importance to this customer, who wanted to use Laserfiche Client/Server, Web Access, and Workflow on a system supporting 700 users and 180 million images over three years.

Each application was dedicated to a single virtual machine on its own machine in a four-node configuration, set up such that the virtualized applications could be failed over to any of the other remaining nodes using VMWare's high availability module. In this case, the servers had the same hardware and double the amount of capacity to accommodate potential failover of virtualized applications. This architecture supports failover of up to two individual application nodes without degrading overall system performance.

Primary external storage for document images and database files resided on the existing SAN, which, at a minimum, was configurable to three separate RAID arrays. The first RAID array was dedicated to storage of the Laserfiche images, and was a RAID 5 with at least 15TBs of available storage. The second RAID array housed the Microsoft SQL transaction log in a RAID 1 configuration and a capacity of 750GBs. The third RAID array contained the Microsoft SQL data file in a RAID 1 configuration and a capacity of 2TBs. Because of this storage requirement, the Laserfiche application and SQL servers required host bus adapters proper to the current SAN environment.

The backup server backed up data to a separate SAN provided by the customer. To meet the recommended backup strategy, hard drive space was initially expected to be 15TB during the first year in operation. It was also suggested that the SAN be expandable to 45TB over the expected life of the current hardware infrastructure.

Hardware Specifications

Purpose	Server	RAM	Storage	OS
Laserfiche Application	Dual Quad-Core Intel Xeon E5440 Processor (2.83 GHz, 1333 FSB)	8GBs	RAID 1, 4 x 72 GB	VMWare Infrastructure Enterprise, Microsoft Windows Server 2003 R2
SQL Server	Dual Quad-Core Intel Xeon E5440 Processor (2.83 GHz, 1333 FSB)	8GBs	RAID 1, 4 x 72 GB, 15Krpm	VMWare Infrastructure Enterprise, Microsoft Windows Server 2003 R2; Microsoft SQL Server 2005
Workflow	Dual Quad-Core Intel Xeon E5440 Processor (2.83 GHz, 1333 FSB)	8GBs	RAID 1, 4 x 72 GB, 15Krpm	VMWare Infrastructure Enterprise, Microsoft Windows Server 2003 R2

Web Access*	Dual Quad-Core Intel Xeon E5440 Processor (2.83 GHz, 1333 FSB)	8GBs	RAID 1, 4 x 72 GB, 15Krpm	VMWare Infrastructure Enterprise, Microsoft Windows Server 2003 R2
Backup	Dual-Core Intel Xeon E5440 Processor (2.83 GHz, 1333 FSB)	2GBs	RAID 1, 2 x 72 GB, 15Krpm	Microsoft Windows Server 2003 R2
Test Environment	Dual Quad-Core Intel Xeon E5440 Processor (2.83 GHz, 1333 FSB)	16GBs	RAID 1, 2 x 72 GB,RAID 5, 8 x 146GB 15Krpm	VMWare Infrastructure Enterprise, Microsoft Windows Server 2003 R2
VMWare VirtualCenter Management Server	Dual-Core Intel Xeon E5440 Processor (2.83 GHz, 1333 FSB)	2GB	RAID 1, 2 x 72 GB, 15Krpm	VMWare VirtualCenter Management Server, Microsoft Windows Server 2003 R2

*Note that a single Web Access server has been specified as part of the solution. It is expected that as the system grows, more Web servers can be added as required.

Conclusion

As you plan for a new, fresh Laserfiche installation, the bottom line is to estimate hardware needs generously—to not skimp on hardware, because needs will only increase as time goes on and resources are added to the system. Once hardware has been purchased and put into production, you should be sure to continuously monitor the performance of products and operations across your system and add or reallocate resources as required. You should also never hesitate to ask for advice from Laserfiche and from other customers.

Laserfiche®