Millennium 3 System Requirements

This document outlines the overall technical equipment requirements for a Millennium 3 installation. It assumes the reader is familiar with the following concepts:

- Millennium 3 architecture and components. You can refer to **MPAY knowledge base article 511** for more information on the Millennium 3 architecture.

- Microsoft Windows Server and Desktop operating systems.

- Microsoft Windows (and Network) Administration.

- Microsoft SQL 2000/2005 Server installation and administration.

- Standard computer and Internet networking concepts.

- Computer hardware in a Microsoft Windows environment. This includes—but is not limited to—servers, printing, and storage technologies.

Requirements are outlined for computers that run Millennium 3 at both service bureau and the end-client sites. While the system requirements are similar for service bureau and end client sites, the required components are different. Sections have been dedicated later in this document that reviews each type of installation.

Technology changes at a rapid pace, and this document is intended to serve as a guide to assist you in evaluating the equipment that will run your Millennium 3 system according to your individual business needs and requirements.

The overall performance of your Millennium 3 environment will vary depending on:

- The equipment you select

- The size of your installation

- How your business uses Millennium 3

You should carefully consider your current and future needs when making equipment purchases. Doing your homework and forming a good plan at the beginning is essential for a successful implementation.

1. Common Requirements

The requirements detailed here in Section 1 apply to all installations of Millennium 3. This includes small client sites up to and including large service bureaus supporting thousands of customers.

1.1 Local Area Network

Millennium 3 requires a functioning Local Area Network (LAN). LAN speeds of 100Mbps and 1Gbps are common. Using a switched network will provide you with better, more consistent performance than a network using hubs.

- Small service bureaus may find that network speeds of 100Mbps is adequate for their Millennium 3 environment.

- For medium to large service bureaus, MPAY recommends that server components of the Millennium 3 environment reside on a 1Gbps switched network.

Millennium 3 uses standard Microsoft Windows file sharing, communications, and security for portions of its system. Millennium 3 also uses the TCP/IP protocol suite for much of its communications. The Windows network should provide TCP/IP access for each workstation and server that will be part of your Millennium 3 infrastructure. Dynamically assigned IP addresses (DHCP) are supported. Static IP addresses can be used if desired, but are not required. DNS or WINS name resolution should be deployed consistently on all machines on your LAN.

1.2 Internet Connectivity

Service bureaus and their customers require some form of network connection so data can be synchronized between one site and another. A full-time, high-speed Internet or point-to-point connection is highly recommended. Point-to-point connections are rarely used between a service bureau and their end-clients because of the cost and complexity in maintaining those connections.

The amount of required bandwidth will increase as the number and size of downstream sites increase. Synchronizations will typically contain 50KB–300KB of data; but, some can range from 10KB to 10+MB, depending on the amount of data at the downstream client and how much data has changed since their last synchronization.

There are many types of Internet service available, and not all have the same performance characteristics or come with an SLA (Service Level Agreement). For example, many consumer-based DSL and cable Internet service have upload speeds that are only 10–20% of your download speed. This means that all data flowing from the upstream site back to the downstream site (that is, data being "uploaded" to the Internet) will be limited by the upload speed of the connection. This will result in downstream sites taking a much longer

time to receive data from the upstream (service bureau) sync server. Furthermore, most consumer-based Internet service products have no service level guarantee on speed, uptime, or time-to-repair.

1.2.1 Network Security

A full-time Internet connection must be properly secured with a firewall to ensure only the minimum required portions of your internal network are available to external users across the Internet.

Service bureaus require a Millennium 3 Synchronization Server. This component is the only portion of the Millennium 3 environment that must be directly accessible to downstream end client sites via the Internet. The Millennium 3 Synchronization Server requires that a single "TCP port" be open through the firewall to receive outside traffic. The Synchronization Server's port setting is user-definable with a default of port 80 (HTTP). All Millennium 3 synchronization traffic is 3DES encrypted by the Millennium 3 application before being transmitted.

MPAY recommends the Synchronization Server have a static, external, TCP/IP address and a valid public DNS host name.

1.3 Windows Security Model

Millennium 3 has user- and role-based security features that can be configured to restrict access to screens and available data when using the Millennium 3 software itself. The Millennium 3 security model is specific to, and contained within, the application. It does not extend or interact with any external security models (for example, Windows Active Directory).

Keep in mind that a secure Windows Infrastructure is a critical part of a secure Millennium 3 infrastructure. Any Windows user who has full access to the Millennium SQL database or shared files, as well as possesses enough Windows or SQL knowledge, could bypass Millennium 3 security and access the data directly stored in the database tables.

The LAN should have a central Domain or Active Directory Controller that contains all user information and enforces your Windows security model. Each user workstation and central server should be a member of a Windows domain, and users should be required to login to the Windows domain on any Windows workstation before running Millennium 3.

The Windows network should be secured to restrict direct access to the SQL database files and any sensitive files that may be used or generated by Millennium 3. Specifically, the SQL Server database files do NOT need to be accessible directly via a file share—Millennium 3 will communicate with SQL Server directly over the network. In addition, the Millennium 3 shared files should be made accessible only to users who need access to them.

If the Millennium 3 Process Server and Synchronization Server are run as Windows services, a Windows user account must exist specifically for those services. Creating an account for these services allows them to run with the credentials of that account. You then

need to grant the account for these services the necessary access to the Millennium 3 shared files and printers.

Using Windows security provides a flexible and reliable way for system administrators to ensure a base level of security and easily audit any network problems.

1.4 Hardware Compatibility

All hardware should be on Microsoft's *hardware compatibility list* (HCL). Building "home grown" machines is not recommended, as not all components may conform to the Microsoft HCL and may experience problems.

MPAY supports the Millennium 3 application. It is the service bureau's responsibility to support their Windows and network environment. Investing in quality hardware with a manufacturer that stands behind their product is well worth added cost in performance and reliability.

1.5 Operating Systems

Millennium 3 is a 32-bit Windows application. In general, Millennium 3 will run on most recent Windows operating systems. MPAY currently supports Millennium 3 running on the following operating systems:

- Microsoft Windows 2000 Professional and Server
- Windows XP Professional
- Windows 2003 Server
- Windows Vista Business and Ultimate
- Windows 7 Professional and Ultimate
- Windows 2008 Server

64-bit versions of Microsoft Windows (2003 server and newer) are designed to run either 32-bit or 64-bit applications, and may be used. However, MPAY occasionally releases utilities to make specific bulk data changes. These utilities may not run correctly in a 64-bit environment. For this reason, MPAY recommends that you retain at least a small number of computers that use a 32-bit version of Microsoft Windows.

1.6 Latest Software Patches and Drivers

All computers should have the latest device drivers installed for every device in the system (video cards, disk controller cards, network cards, and so on). Purchasing a new machine **DOES NOT** guarantee the latest device drivers are installed. Verify with the hardware manufacturer that the latest drivers are installed or where you can find the updates.

Microsoft regularly releases patches, hot fixes, and security updates for their products. These updates are meant to resolve problems or address security vulnerabilities in various Microsoft products. You should have a plan to regularly test and apply these updates to ensure that your computers are kept secure and up-to-date. Millennium 3 does use some common (shared) Microsoft Windows components. It is important to test new updates in a controlled manner to ensure they do not have a negative impact on the operation of your Millennium 3 system.

1.7 Printers

Millennium 3 allows for direct or indirect output to printers:

- *Direct output* means that you are instructing Millennium 3 to run a print job (for example, checks, reports, and tax forms) and send it directly to a Millennium 3 configured printer.

- *Indirect output* means that you are instructing Millennium 3 to preview a report. The preview option will open the report in another application as defined in the report's properties. You then print the output from the application that you are using to view the print preview (such as Adobe Reader, Excel, Notepad, and so on).

Printers used for direct printing are required to be 100% HP PCL4, 5, 5e, or 6 compatible. Printers that use a software control panel or host-based driver are not supported. Color and multi-function printers that meet the PCL requirements listed above should not be used to print checks. You must add printers to Windows and Millennium 3 in order to use them for direct printing.

Printers used for indirect printing must have a valid Windows driver that works with the application that is displaying the previewed report. Printers used for indirect printing do not need to be added to Millennium 3.

1.8 Optional: Server Virtualization

Many companies are investing in server virtualization to reduce:

- Hardware costs through server consolidation
- Implementation and deployment times by developing a common Windows image
- Downtime exposure

MPAY does not have any specific recommendation on a particular server virtualization platform. In general, the Windows operating system cannot distinguish between a virtual server and a physical server.

Millennium 3 (like most Windows applications) is no more aware of the machine being virtual or physical than the version of Windows installed. Some server virtualization

products cannot properly handle virtual machines with more than one processor. For this reason, MPAY recommends *AGINST* using virtualization for your database server.

1.9 Optional: Remote Users & Remote Access

As previously mentioned, Millennium 3 software needs a local area network to connect end-user workstations to the various server components of your Millennium 3 environment. This requirement is similar to many other client/server-based applications in use today.

However, this requirement can present a challenge as today's business environment must increasingly support employees that telecommute. Just like other client/server applications, this often requires some type of remote access solution. Millennium 3 can function quite well in a remote access environment with the proper planning, personnel, and resources in place. Information contained in this document should provide your IT staff with the information necessary to explore this option if your business requires it.

2. The Service Bureau Millennium 3 Environment

The following requirements apply to service bureau installations of Millennium 3. Service bureau installations require a high-capacity, high-speed system, with special attention to reliability, security, and scalability. These requirements are in addition to those detailed in Section 1.

2.1 Database Server

All the data that is entered into, and calculated by, the Millennium 3 application resides in a SQL database. The database server computer runs Microsoft SQL 2000 or SQL 2005 Server and is the heart of your Millennium 3 infrastructure. A fast, reliable system that is tailored to maximize Microsoft SQL Server's performance characteristics will be a key factor to success. Microsoft has many helpful resources on their website to assist you in this area.

Since the database server is where the Millennium 3 database will reside, it should be used exclusively for Millennium 3's SQL database. The database server is machine will need spare capacity to handle your service bureau's growth in new clients and accommodate historical data for your existing clients. Smaller service bureaus that are just starting out may have only 5GB–10GB of data in their Millennium 3 database. Large service bureaus that have been on the system for a long time may have 120GB+ of data in their Millennium 3 database.

2.1.1 Database Server Hardware

Multiple processors inside the server will help significantly. If only one processor will be used, use a server with the fastest processor your business can afford. You will see better

performance by using an Intel or AMD processor designed for business server use. Processors such as the Intel Celeron and Intel Atom processors are designed for the consumer/home office market are not recommended for a Microsoft SQL database server.

A large amount of memory will help significantly. The more memory the database server has, the more data SQL Server can hold in memory for faster access. SQL Server will readily use 2 GB or more of RAM, even for small databases. This is in addition to the amount of RAM the Windows operating system will use.

- A 32-bit version of Windows is limited to 4GB of RAM.
- A 64-bit version of Windows can support up to 2TB of RAM.

The Millennium 3 application does not need to be installed on your database server.

Disk storage and performance is one of the most important aspects of the database server. The amount of storage required is relatively easy to estimate. Storage performance is more complex to figure out because of the competing technologies available. Storage performance is directly affected by the following factors:

- Hard drive rotational speed (expressed in RPM)
- Hard drive transfer rate (also known as "disk throughput")
- The database server's disk controller throughput
- RAID level

Millennium 3 needs to perform a large number of (generally small) disk read and write operations. A RAID array of fast, high-performance SCSI or SAS disks is highly recommended. RAID provides fault tolerance and is a simple way to guard against data loss due to equipment failure. There are several different types of recommended RAID configurations:

- RAID level 1 (mirroring)

  This can be the least expensive fault-tolerant RAID configuration as it only requires a minimum of two hard drives of identical size. The second hard drive contains a "mirror image" of the first. Anything that gets written to the first hard drive is automatically written to the second. If you have one hard drive fail, the system will keep running. RAID1 is fast, but its capacity is limited to the largest single hard drive available.

- RAID level 10 (striped and mirrored; also known as "duplex")

  This type of fault-tolerant RAID configuration is the fastest, can contain vast amounts of storage capacity, and is somewhat costly. Like RAID1, you have to have a duplicate "mirror" drive for every drive that you actually use to store working data. *Striping* means that the total disk space is combined into one large drive letter.

- RAID level 5 (striping with parity)

  This type of fault-tolerant RAID configuration requires a minimum of three disks. The total disk space is combined (that is, striped) into one large drive letter, minus a

percentage of each disk that is reserved for fault-tolerance (that is, parity). If one hard drive fails, the system will keep running. RAID5 allows for a large amount of storage capacity. However, it has slower overall performance than RAID1 because there are proportionally more duplicate writes than RAID1 or RAID10.

RAID5 is generally **not recommended** for database servers.

- RAID levels 4 and 6

These are versions of RAID5 and are generally **not recommended** for database servers.

- Additional types of storage like SAN, iSCSI, and NAS

These generally provide a higher level of fault-tolerance and flexibility—but at a higher cost. Performance characteristics vary widely and don't always provide better data throughput. It is important to thoroughly research the performance characteristics of your options.

When employing a RAID system, do not use lazy write or battery-backed write caching controllers. SQL Server expects data writes to be committed to disk immediately, which will not happen if a write caching controller is used. Controllers that support write caching can usually have this feature disabled.

IDE disks are **NOT** recommended, as IDE drives generally operate at slower rotational and data transfer rates than SCSI and SAS drives. SATA (Serial ATA) is **NOT** recommended for database servers, as well. SATA is still a type of IDE disk. While SATA provides a big improvement in data transfer rates over standard IDE drives, these drives continue to have slower average performance than SCSI and SAS drives.

SSD (Solid State Disks) are starting to become readily available. The advantage of SSD over traditional hard drives is they have no moving parts, making data access data very fast. However, most SSD drives still use the SATA interface. Performance characteristics of SSD drives vary widely. We have no substantiated data that would help determine if this would be an appropriate solution for a service bureau's database server.

2.1.2 Database Server Software

Microsoft SQL 2000/2005 Server Standard Edition is required for Millennium 3. Microsoft SQL 2008 and SQL 2008 R2 servers have not been certified to work with Millennium 3 yet. Prior versions of Microsoft SQL Server and versions of SQL from other software companies (for example, MySQL) are **NOT** supported.

Microsoft SQL 2000/2005 Server Enterprise Edition is available, but not necessary for the vast majority of service bureau Millennium 3 installations.

Microsoft licenses SQL Server on a "per processor" or "per client" basis. Processor licenses allow for an unlimited number of computers to connect to your Microsoft SQL database. With per processor licensing and a database server with multiple processors inside, SQL Server will only use the number of processors it has been licensed for. With client licensing, SQL server will use all of the processors in a database server; however, one license must be purchased for each and every computer that requires access to the database server.

Your Microsoft SQL Server must be configured for *mixed mode authentication*, meaning the server can use SQL login accounts and Windows login accounts for database access and security.

Your Microsoft SQL Server must have a maintenance plan in place that includes appropriate backups and database optimization. Regular full database backups and transaction log backups are very important in guarding against data loss and preventing the database files from growing too large. Please refer to the Microsoft website for system requirements on the specific version of SQL Server your service bureau intends to purchase.

The importance of a reliable, high-performance, and properly maintained Microsoft SQL Server environment cannot be overstated. MPAY highly recommends that a service bureau retain the services of a Microsoft-certified SQL Database Administrator ("MS DBA") to install and configure your SQL Server. A properly qualified MS DBA can correctly configure the SQL Server for optimal performance and reliability.

2.2 Synchronization Server

Millennium 3 uses a secure TCP/IP web-based protocol for synchronization with its partner sites. An HTTP style protocol is used to communicate between upstream and downstream synchronization sites; all data is 3DES encrypted before it is transmitted. The *synchronization server* is responsible for this process.

The synchronization server is the only part of your Millennium 3 infrastructure that needs to be accessible to users across the Internet.

Millennium 3 must be installed on the synchronization server. Synchronization servers do not store any important data on its local disk long-term; therefore, backups are not critical for synchronization servers. However, the server should be fault-tolerant because customers will not be able to submit payrolls if the synchronization server is down.

2.2.1 Synchronization Server Name Resolution

Downstream sites ("end-clients") must be able to access the sync server over the Internet via TCP/IP with either a DNS hostname (such as `sync.servicebureau.com`) or a static TCP/IP address (such as `100.101.102.103`).

MPAY highly recommends a DNS hostname, as this avoids having to change downstream client configurations if the upstream IP address changes. Publicly accessible TCP/IP addresses are usually owned by your Internet Service Provider (ISP). If you change ISPs, your external TCP/IP addresses will also change.

Using a DNS hostname for the sync server means the upstream network or some other network must provide a DNS server to convert names to addresses. This service is usually available from your ISP or the company with whom you registered your Internet domain name.

2.2.2 Synchronization Server Sizing

The synchronization server requires the least amount of speed, memory, and storage of all Millennium 3 environment components. Some service bureaus use a desktop computer or a low-cost server. If your service bureau uses server virtualization, the synchronization server is a prime candidate for a virtual machine. A computer with a single 2.4 GHz processor, 1GB RAM, and 36GB hard drive is the minimum recommended. The Millennium 3 synchronization server application will be installed as a Windows service. MPAY recommends you set up a special domain administrator-level account to run the Millennium 3 synchronization server *service*.

2.3 Process Server

The *process server* application is used by Millennium 3 to process jobs submitted by users. The process server application is a multi-threaded application, and will run two Millennium 3 jobs simultaneously for every physical or virtual CPU in the computer where the application is used. Process server machines benefit from fast CPUs. The minimum recommended amount of memory for a process server machine is 2GB.

There are two types of process servers:

- Dedicated

  A dedicated process server machine has Millennium 3 installed; the process server application is configured to run as a Windows service.

- Local

  Millennium 3 will start a local copy of the process server application on an end-user's workstation if a dedicated process server has not been defined and is not running.

Service bureaus need to have at least one dedicated process server. Multiple process server machines can be defined—and are recommended for redundancy. A dedicated process server machine offloads the work of processing jobs from individual end-user computers; it also allows you to control your printing environment for Millennium 3.

Any computer that is capable of running Millennium 3 can be set up as a dedicated process server machine. Process servers do not store any important data on its local disk long term, so frequent data backups are not critical for process server machines. You can control what type of Millennium 3 jobs each process server can process. This will help to better distribute the processing workload at larger service bureaus.

Planning for your dedicated process server machine(s) should focus on number of processing threads rather than on number of processing machines. Think about how many jobs you will need to process simultaneously during busy days to meet your production goals. Millennium 3 tasks—such as processing payrolls, running a report, and creating tax forms—are all made up of individual jobs. Tasks can contain one or more individual jobs. For example, your average payroll may contain between 35 and 50 individual jobs.

> **Note**
>
> Overall processing times vary widely depending on the size of the payroll, and what reports are set up to be processed with the payroll.

If you have an environment that can process 8 jobs simultaneously, individual payrolls may average between 3 and 15 minutes to process once the payroll has been submitted. If you need to process 8 jobs simultaneously, you need to have a combination of machines with 4 physical or virtual CPUs. This could mean two machines with two CPUs each or four machines with one CPU each.

You can add additional dedicated process server machines as needed. Smaller service bureaus may find that 4 processing threads provide acceptable performance. Large service bureaus may find that 16 processing threads are needed.

> **Note**
>
> - The faster your processing machine environment can process jobs, the greater load they will place on your database server during peak times. Process server performance must be balanced with database server performance.
>
> - Process server machines that have at least one free thread will query your Millennium 3 database to see if there is more work to do. This process happens twice every second for every process server machine that has at least one free thread.
>
> - Reports that end-users preview are spooled from the process server machine to the end-user's workstation over TCP port 80. Process server machines must not have any other service or software that redirects or holds this port for exclusive use.
>
> - MPAY recommends a special domain administrator-level account be set up to run the Millennium 3 Process Server Service on a dedicated process server machine. If this is not possible, **MPAY Knowledgebase article 1011** describes the minimum rights needed for any Windows account that will run an instance of the process server application.

2.4 File Server

A network file server is required to store files used by all Millennium 3 computers. Millennium 3 will access a shared set of folders via a UNC path (also known as "Millennium 3 system directories"). The windows logon account used for the process server application and synchronization server application must have full share permissions and full file & folder rights to ALL Millennium 3 system directories. End-users must have full share

permissions and full file & folder rights to the Millennium 3 system directories *except* the `TEMP` directory. A valid UNC path must be defined for each of the following folders:

- **Reports** — contains report forms
- **TaxForms** — contains tax forms
- **Temp** — contains temporary files related to jobs that have been processed
- **Archive** — contains LogChanges and Job Queue archive data (if that is set up)
- **Storeroom** — contains Storeroom data (see **MPAY knowledge base article 1165** for the *Storeroom User Guide*)
- **EFile** — contains files used for submitting taxes electronically
- **ACH** — contains files used for submitting electronic money transfers

You may also want to store logos and signature files, time import files, or special Millennium 3 utilities here. Many service bureaus configure their file server to also be their print server.

2.5 Data Protection

Backing up and being able to recover your Millennium 3 data in the event of a catastrophic failure should be an important part of your business continuity plan. Today there are several technologies that can be used to back up your data. Common examples are:

- Traditional tape backup
- Backup to disk
- Offsite backup
- Server replication

Each technology has different capacity and speed options. All types of backups will have some performance impact on your database server. Full database backups should be scheduled during off hours to minimize this performance impact. Transaction log backups have a minimal performance impact to your database server; you should schedule them to run during regular production hours. Transaction log backups should be done in accordance with your business objectives for system uptime and data recovery. Microsoft has additional information about Transaction Log backups at:
  http://msdn.microsoft.com/en-us/library/aa173551(SQL.80).aspx

The Millennium 3 system directory files do not change often, with the exception of the `temp` files. In general, nightly or weekly backups of the Millennium 3 system directories are adequate. Backups need to be monitored on a regular basis to ensure they are completing successfully. Some type of offsite storage for backup media is recommended.

Being able to reliably restore your data is as important as performing backups. Every service bureau should identify key personnel responsible for restoring your Millennium 3 environment from the ground up in the event of a catastrophic failure. These personnel

should have written procedures on how to restore each part of the system. Regular practice (at least twice a year) of restoring your Millennium 3 environment from the ground up will help ensure that the personnel and procedures are ready to meet your business objectives of downtime and recovery.

Restoration of your Millennium 3 environment may not mean that you have the same exact equipment as before. Restoration may mean that the Millennium 3 environment is functionally equivalent to what you previously had so you can meet your business objectives. This often means that, at a minimum, you can:

- Have your employees work in the system to perform their regular duties.
- Receive Synchronizations from your end-clients.
- Deliver your normal services to your end-clients.

2.6 Workstations

Your end-users' workstations are where your employees will use the Millennium 3 user interface and, optionally, a local process server.

2.6.1 Workstation Details

Almost any Windows-based computer can be used as a Millennium 3 workstation (see Section 1.5 Operating Systems). MPAY recommends that workstations have a minimum of 512MB RAM (2GB RAM recommended for Windows Vista and Windows 7) and a minimum of 2GB free disk space.

Some additional software components must be installed in addition to Millennium 3. These include Microsoft Data Access Components (MDAC), .NET 2.0, and Internet Explorer. The Millennium 3 installer will notify you if one of these components is missing. In addition, Adobe Reader (or another PDF viewer) is required to preview reports. All of the additional components can be freely downloaded from the Internet.

MPAY recommends the Millennium 3 software be installed on all computers with a Windows login account that has local administrator privileges on the target computer(s). Allowing your end-users to be local administrators on their own workstations will make the installation and use of Millennium 3 easier. However, if your company policies prohibit end-users to be administrators of their own workstations **MPAY knowledge base article 982** describes registry entries that all end-users' must be granted FULL RIGHTS to their Windows login accounts so they will be able to successfully use Millennium 3.

MPAY recommends that any Windows Vista or Windows 7 workstation where Millennium 3 is installed should have the Windows User Account Control disabled.

3. End-Client Installations

End-client companies can be set up to manage their payroll with either the Millennium 3 application or the Payentry.com web application. (Please see **MPAY knowledge base article 870** for more information on Payentry.com). You can even mix the two based on a client's particular business needs.

Setting up end-clients to use payentry.com will drastically reduce the amount of support the service bureau has to provide because there is no software to install or maintain. End-clients that intend to work with payroll (in a single company) from multiple locations should be put on payentry.com whenever possible.

When making the decision to install Millennium 3, MPAY generally recommends different approaches for small, medium, and large end-clients. General recommendations for each are listed in the sections that follow.

Service bureau personnel are encouraged to test various sizes of end-client installations and learn the best configurations for the particular needs of each before installing any live end-clients. The outcome of this testing process should be to develop documented procedures for your business on:

- Surveying the end-client's needs
- Existing IT infrastructure
- Key personnel
- Step-by-step installation of the Millennium 3 environment at their location

3.1 Large End-Client Installations

The following requirements would generally apply to any installation of Millennium 3 that will be managing payroll for 500 or more active employees or have more than 4 users of the Millennium 3 software. Due to the additional amount of data, and number of end-users, large end-client installations require a fast and reliable Millennium 3 environment.

Larger clients may have an established IT staff and IT policies. In this case, special attention needs to be paid to performance, reliability, and security. Clearly defining what is acceptable use of the environment is important. Large end-client installations may also have more complex business requirements, like custom reporting and data exporting.

3.1.1 Required Millennium 3 Components

In addition to the requirements detailed in Section 1. Common Requirements, large end-client installations often require a database server and file server.

- The database server may need to have a full version of SQL Server installed. SQL Express is a free download from Microsoft, but is limited in how much data can be

stored. Please see **MPAY knowledge base article 440** for details on SQL Express. Refer to Section 2.1 Database Server for more information on the database server.

- A single, dedicated, process server may benefit larger end-clients, especially if the end-client has security concerns about letting their end-users be local administrators of their own workstations. Refer to Section 2.3 Process Server for more information on the process server.

- The file server will store Millennium 3 files shared by the end-users. Refer to Section 2.4 File Server for more information on the file server.

- Computers used as workstations should meet the requirements detailed in Section 2.6 Workstations.

3.2 Medium End-Client Installations

Medium sized end-clients often have less complex needs. The following requirements would generally apply to any installation of Millennium 3 that will be managing payroll for 50–499 active employees or have no more than 4 users of the Millennium 3 software.

Medium-sized end-clients may have a small IT staff or an IT consultant that should be engaged during the installation. Special attention needs to be paid to the setup of the environment, making it as maintenance-free as possible.

3.2.1 Required Millennium 3 Components

In addition to the requirements detailed in Section 1. Common Requirements, medium end-client installations can often experience acceptable performance by having one machine share the duties of a database server and file server. Additionally, this machine should be a server whenever possible, as opposed to an end-user's workstation.

- The database server can typically use SQL Express if a full version of SQL is not already installed. Please see **MPAY knowledge base article 440** for details on SQL Express. Refer to Section 2.1 Database Server for more information on the database server. Special attention should be paid to maximizing reliability and less on maximizing performance.

- The file server will store Millennium 3 files shared by the end-users. Refer to Section 2.4 File Server for more information on the file server.

- Computers used as workstations should meet the same requirements detailed in Section 2.6 Workstations. Each end-user's workstation will likely act as a local process server, so a dedicated processing machine is usually not needed.

3.3 Small End-Client Installations

Small-sized end-clients often have simple needs. The following requirements would generally apply to any installation of Millennium 3 that will be managing payroll for less than 50 active employees and have only 1–2 users of the Millennium 3 software.

Small-sized end-clients may not have any dedicated IT staff or IT consultants available. Special attention needs to be paid to the setup of the environment, ensuring it is as simple and maintenance-free as possible.

3.3.1 Required Millennium 3 Components

In addition to the requirements detailed in Section 1. Common Requirements, small end-client installations will often not have a dedicated server. Frequently, one end-user's workstation will share the duties of a database server and file server if multiple users are involved. In the case of a single user, all Millennium 3 components would be installed locally on their workstation.

- The computer acting as the database server will normally use SQL Express. Please see **MPAY knowledge base article 440** for details on SQL Express.
- The Millennium 3 files will be installed on each end-user's workstation. If necessary, files can shared between multiple end-users from one workstation.
- Workstations without SQL Express installed should meet the same requirements detailed in Section 2.6 Workstations. Each end-user's workstation usually acts as a local process server, so a dedicated processing machine is rarely needed.
  - The end-user's workstation where SQL Express is installed should have more memory than a standard workstation. In this case, MPAY recommends a minimum of 1GB RAM for Windows 2000, 2GB RAM for Windows XP, and 4GB RAM for Windows Vista or Windows 7.

If you have questions about the contents of this document, please contact MPAY Support.