Whitepaper

Techniques for Using Time Matters in Remote Offices

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Executive Summary
Many Users of Time Matters have multiple offices – either branch offices or home offices – and would like to access the same Time Matters data from all locations. Other users are "road warriors" who want to be able to get into Time Matters from remote locations. This white paper reviews the basic concepts relating to databases and remote networking. Various options for utilizing Time Matters remotely are explored.

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Techniques for using Time Matters in Remote Offices

Before discussing methods of using Time Matters in remote offices, we must first understand how databases work across various networks.

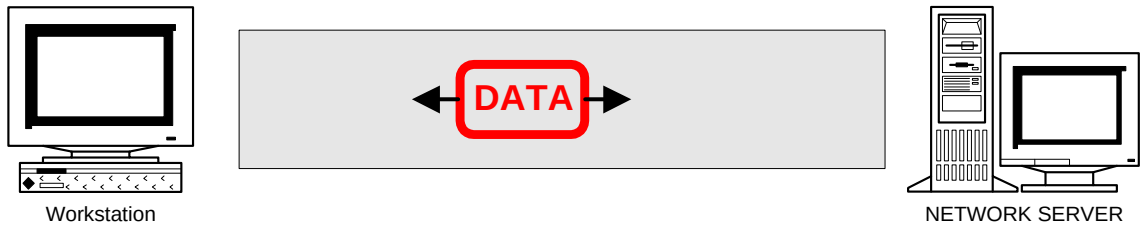
Primer on Data Transfer

All networks transfer electronic packets of data between two or more computers. Not all networks are created equal, however. The transfer rate (known as the bandwidth) of a network can vary greatly depending on the type of network and the equipment involved. There are many types of networks. The standard network found in most offices is known as a LAN (Local Area Network). Most LANs consist of a Server, Workstations, cabling and a hub or digital switch. Most LANs today operate at a speed of 100Mbs although 1GB networking is becoming more common.

When a computer connects to another computer or to a LAN that is not physically located in the same office, this is known as a WAN (Wide Area Network). To create a WAN, the remote computer must attach to the hosting system using a telecommunication connection such as dial-up, ISDN, DSL or T-1 line. These different technologies each have varying speeds of transmission. WAN speeds across any of these connections tend to be anywhere from 1/50th to 1/2000th the speed of a LAN. This inherent slowness of WANs is a limiting factor for databases (like Time Matters) operating across a WAN connection. To understand why WAN speeds limit the performance of databases, we must first understand how databases work across networks.

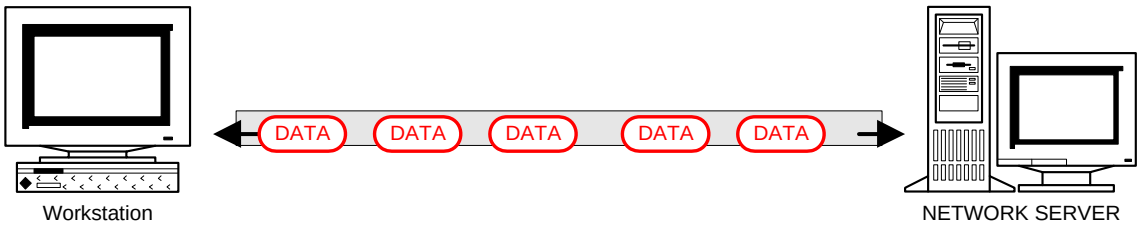
Databases are the programs most affected by slower connections since databases contain much more data than a standard e-mail, work processing document, or webpage. Databases are made up of collections of data tables organized in logical groups. In Time Matters, for example, all Contacts are grouped together in a Contacts table. Databases fall into two categories ISAM and Client/Server. The way that these two categories transfer data is very different and greatly affects how a database operates across slower connections. ISAM (Indexed Sequential Access Method) databases transfer the entire data table to the workstation across the network. Client/Server databases only transfer the records that have been requested and thus operate faster over much slower connections since less data is actually moved across the connection. ISAM databases therefore use more data bandwidth than Client/Server databases. Time Matters supports both ISAM and Client/Server databases. The Time Matters Professional Edition runs on an ISAM database and the Enterprise Edition runs on a Client/Server database engine.

The following graphics show the issue relating to data transfer over a slower network connection:



In this example the connection between the network server and the workstations is wide – representing a normal 100Mbs LAN connection. The large amounts of data easily fit

through the pipe and are not hindered by the bandwidth. In this scenario both ISAM and Client/Server database are acceptable. It is important to mention that having many users can also clog the available bandwidth with data transfer.



In this example the bandwidth is more limited representing with a WAN connection or a LAN connection that is not sufficiently fast or is clogged with traffic from many users. The data does not easily fit through the pipe in one transfer and must be broken into smaller pieces and consequently less data is transferred each second. The result is slowness and program instability.

The trick then is to be able to run Time Matters over a connection that is 1/100th the speed of a LAN connection with the same speed and reliability that is inherent with a LAN connection. Not an easy task to say the least. There are some options:

Built-In Option-Synchronization:

All Editions of Time Matters have a built-in synchronization function. Synchronization allows a main database to create a special copy known as a "clone" that can be transferred to a remote site. The clone and the main database can be synchronized to incorporate any changes from the other. This option does not take place in real-time and is thus not limited by network bandwidth. The changes are always incorporated on a cycle that must be manually performed on both sides. At this time, there is no easy way to safely create an automatic procedure to initiate a scheduled synchronization.

Advantages:

- Free – already built into Time Matters
- Works well
- Relatively easy to use once set up and trained
- Can be done via E-mail eliminating the need for a WAN

Disadvantages:

- Not real-time (only as up-to-date as the last synchronization)
- Must be performed manually on both sides (potential for human error)

Real-Time Solutions:

There are three options to allow remote offices to run Time Matters in real-time across a WAN. All the options are based on the Enterprise Edition of Time Matters. Time Matters comes in two editions; Professional and Enterprise. The Professional Edition is based on an ISAM database. The Enterprise edition is based on a Client/Server database (Currently Microsoft SQL Server – including the free SQLExpress) Client/Server databases are different from traditional desktop databases because they are designed especially for speed across low-speed connections (like the Internet) by shifting the data processing burden to the server and away from the desktop. With normal databases, the desktop requests records and the entire database is packaged

and shipped to the station, which requires a high-speed network connection (such as found in a local area network). Client/Server databases only ship the requested records, thus shrinking the transmission requirements and allowing the database to function over a much slower speed connection than would otherwise be possible. This does mean that the server must be much more powerful than would otherwise be necessary since it shoulders the main processing burden.

Option 1:

Time Matters Enterprise Edition running via remote control:

In recent years there has been a proliferation of remote control software. Microsoft Terminal Services, Citrix Metaframe, PCAnywhere and GoToMyPC.com are popular versions of remote control software. Remote control software are computer programs whereby the processing burden is further shifted to the server making the desktop computer nothing more than a "dummy box" which sends its mouse movements and keystrokes to the server computer. Remote control programs lower the amount of data that flows between the server and the desktop even more since only clicks, keystrokes and screen refreshes are sent and the data remains on the server. This helps overcome the bandwidth limitation.

Notes:

- Requires only DSL speeds but a T1 would be recommended
- Broadband is needed on both sides of the connection
- May still be too slow with many users hitting the system at the same time
- Raises the bar on hardware requirements even more
- Needs well-versed network specialist/expert to advise, setup and maintain so as not to open too many holes in the security of the network
- Only supported where the host is owned by the client and the hosting is done from the client's site. Contract/off-site hosting is not supported.

Option 2:

Time Matters Enterprise using Microsoft SQL Server Replication:

Microsoft SQL Server has a built-in function that allows replication of its databases over the Internet to other SQL Servers. This function known as "replication" is similar to the internal "synchronization that Time Matters does. Thus the Main Office could send Branch Office 1 and Branch Office 2, a copy of the starting database and then the offices could automatically send changes back and forth on a set schedule (every 15 minutes, every 45 minutes, every three hours, etc.). This merge replication occurs seamlessly in the background without end user intervention. This means that changes made in one office would always be behind the other offices by at least a few minutes. The time difference is called the latency of the connection and is affected by the speed of the servers and the speed of the connection between the servers. The latency between two branch offices could be fairly high (could be on the order of a few hours) since the changes would first be routed through the central office. Replication setup for many remote offices can be challenging and an outside network and/or SQL specialist might need to be consulted regarding the exact setup.

SQL Replication has some strong advantages in that both sides (Main Office and Branch Office) have their own separate databases thereby reducing performance issues relating to network speed (as long as the hardware in all offices is up to specification.) Replication can be set for a very short latency so that only a small lag time will exist between the offices. The servers of all offices still need to be powerful, but not as

powerful as if using Terminal Services since the burden would be divided among the servers. Another advantage is built-in redundancy: if the central office were to go down or if the Internet connection were to be lost, all offices could continue to operate and re-synchronize when the connection is operational again.

Replication also has many advantages over the normal Time Matters synchronization. Replication transfers settings as well as data; program setups; users; security setting, pop-up messages are all transferred in a SQL replication. Replication also works without end-user intervention, thus lowering the possibility of human error.

Notes:

- Requires only DSL Speeds but a T1 would be recommended
- Some manual reconciliation will be required rarely
- Currently only works with full version Microsoft SQL Server (SQL Server Express or MSDE can be a Replication client but cannot initiate a replication.)

There is a white paper in the Time Matters Service Center that details the steps to set up and maintain a SQL replication for both Time Matters and Billing Matters

World Server:

Time Matters offers an additional version called the World Server. World Server allows Time Matters to run within a web browser. The Browser Application's user interface is nearly identical to the Desktop Application with much of the same core functionality but can be used over standard broadband Internet connections. This solution also allows for remote users (other than the branch offices) to quickly get access to Time Matters while on the road from any web browser.

Notes:

- Requires only DSL speeds (T1 would be recommended for larger offices sharing a connection or for connections where large amounts of information are being moved)
- Can be quicker than Citrix/Terminal Services
- Allows all remote users to gain easy access to the data – i.e. stay-at-home workers, traveling employees can get real-time data.

Disadvantage:

- Currently there are some features that are not available to the Browser Application
- Extra cost
- Can require specialized network knowledge to set up

Some Considerations:

With all three methods described above, office data is centralized in one or two places (the replication method shares the data between two or more offices.) There are some points about centralizing data that must be made: If all office data is centralized, one must take greater precautions than normal since the entire staff is dependant on this one source of data:

- Greater precautions against hackers.

- Greater precautions against virus and power outage or machine failure.
- Greater precautions against theft & physical destruction.

To this end, it is recommended that you obtain an assessment from your hardware/network technician on the following topics:

- Firewall / Anti-virus
  - Security Audit
  - Centralized Anti-virus updates that distribute to the workstations
- Redundancy
  - Mirrored hard drives (RAID array)
  - Redundant power supplies
  - Backup telecommunication lines
  - Etc.
- Uninterruptible Power Supply (Battery Backup)
- Rotating Backups
  - Backups taken off-site
  - Media swapped on a cycle
- Physical security
  - Locks/Alarms/Fire safety
  - Disaster Recovery plan