TRAVERSE

There are many things to consider when preparing your servers and network for a TRAVERSE installation. The number of users, application modules, and transactional volume are only a few of the variables. Reliable performance of the system as a whole is crucial. This document is to be used as a baseline starting point for optimal hardware and software for installations, with specifics for different size installations. These recommendations for new installations are to be used as a guideline and are not guaranteed to work in all environments. TRAVERSE software is an investment in a company's future. Investment in computer hardware and network infrastructure is also critical for optimal performance.

Microsoft SQL Server Software:

Version	Supported Editions (64 bit required)			
	Express *	**Standard**	**Enterprise**	**Developer ***
2012	✓	✓	✓	✓
2014	✓	✓	✓	✓
2016	✓	✓	✓	✓
2017	✓	✓	✓	✓

Different SQL Server versions and editions have various limitations on maximum database size, and CPU/RAM utilization. Visit Microsoft's **SQL Server Editions page** https://www.microsoft.com/en-us/sql-server/sql-server-2017-editions to determine the appropriate edition of SQL Server for your application.

* SQL **Express** Edition is only applicable to certain small TRAVERSE sites (see section *SQL Server Version and Edition*).
* SQL **Developer** Edition should not be utilized in a production TRAVERSE environment.

Workstation Software:

Operating System	Supported Editions – 64 bit **		
	Professional	**Enterprise**	**Ultimate**
Windows 7	✓	✓	✓
Windows 8 / 8.1	✓	✓	
Windows 10	✓	✓	

** 64 bit windows edition required on workstations

Hardware and Server Requirements:

SQL Server Hardware	SQL Server should be installed on a dedicated server or an individual virtual machine (Hyper-V and VMWare virtual machines are supported). Baseline minimum for SQL Server or VM: • Intel XEON or similar multi-core server CPU – 64 bit • 16 GB RAM or double the size of the SQL database, whichever is larger • 500GB of disk space or better - RAID drive redundancy recommended • Sites with over 20 users – high speed SAS, SSD, or similar hard drives recommended.
Remote Desktop Server or Terminal Server (optional)	If you will be supporting multiple remote users, or want your local users to be running in a remote desktop or remote app environment, then a separate RDS Server on a dedicated server or virtual machine is strongly advised. Larger environments can have a cluster of multiple RDS servers if needed. Baseline minimum for RDS Server or Terminal Server: • Intel XEON or similar multi-core server CPU – 64 bit • 8 GB base OS RAM plus user RAM as follows: o Add 1 GB of RAM per each concurrent TRAVERSE user. RAM requirements vary depending on use case.
Windows Server O/S (for SQL or RDS servers)	Windows Server 2012, 2012-R2, 2016, or 2019 Server Operating System. 64 bit O/S required.
SQL Server versions	A standard edition of either SQL Server version 2012, 2014, 2016 or 2017 is recommended for TRAVERSE installations. Smaller sites with less than 10 users *may* be able to utilize the free SQL Server EXPRESS edition, but the limitations should be reviewed carefully (see section *SQL Server Version* later in this document)
Web Server (only required for Portal Apps, Mobile Apps, or Web API)	Windows Server 2012 or higher, with IIS role enabled. RAM: 4GB minimum, increase depending upon active user load. SSL Certificate recommended (not included). If access allowed from Internet, a dedicated server/VM recommended.
TRAVERSE Workstation	Intel Core I5 CPU or similar recommended. RAM: 8GB recommended. See *Workstation Software* on prior page for O/S versions supported.

*recommended baseline minimums for TRAVERSE installations

Detailed hardware and software requirements for SQL Server 2016/2017 can be found at,
http://msdn.microsoft.com/en-us/library/ms143506.aspx

Advanced Configuration Considerations

You can configure a TRAVERSE implementation in a different manner to best suit your business. Most of the components are portable and you can place them on any server that exists within the network environment. In this illustration below, the TRAVERSE server management and design applications are on a separate Application Server, not installed on the SQL server (having a separate Application Server is completely optional, but is a supported configuration and has some enhanced security benefits; a TRAVERSE administrator does not need login rights to the SQL server).

TRAVERSE can also make use of the flexibility of SQL Server. It is possible to use server groups for redundancy or to distribute log files to specific servers, which can be helpful in a transactional replication environment as well as enhancing performance. It is recommended that SQL cluster or failover configurations be reviewed with an Open Systems IT Consultant to confirm platform support and optimal performance.

.NET Framework
Client Application Programs
Business Layer Components

Client Computer

SQL Server
TRAVERSE Database(s)

SQL Server

Business Layer Components
Productivity Report Files
TRAVERSE Server Manager
TRAVERSE Design Studio
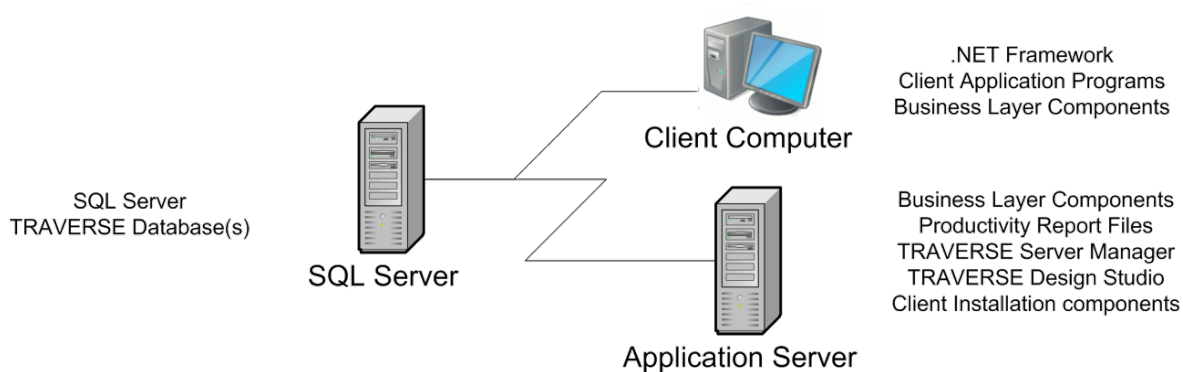Client Installation components

Application Server

Figure 1 – One example of a distributed TRAVERSE installation (optional)

Ultra-Thin (Remote Desktop) Client Considerations

TRAVERSE can also be implemented using an ultra-thin client configuration such as Microsoft's Remote Desktop Server. Note that redundant RDS server farms are supported as well.
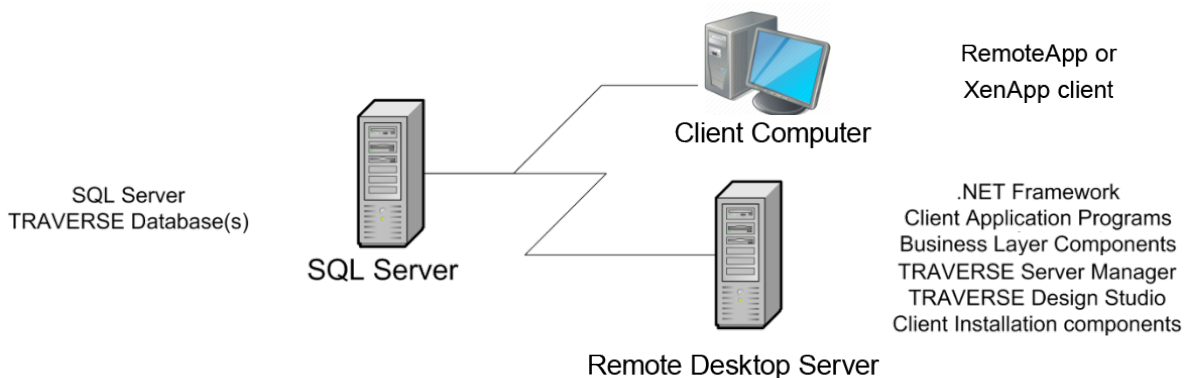

RemoteApp or
XenApp client

Client Computer

SQL Server
TRAVERSE Database(s)

SQL Server

.NET Framework
Client Application Programs
Business Layer Components
TRAVERSE Server Manager
TRAVERSE Design Studio
Client Installation components

Remote Desktop Server

Figure 2 - Ultra thin-client TRAVERSE installation example (Microsoft RDS or Citrix XenApp)

SQL Server Version and Edition

A 64-bit Standard or Enterprise Edition license of SQL Server between version 2012 and 2017 is recommended for all TRAVERSE installations. The SQL *Express* Edition is provided free of charge from Microsoft, but the Express edition may be used only in certain smaller (less than 10 user) installations as it is a scaled down version of SQL and is limited in capabilities. The Express edition utilizes a maximum of 1 processor core, 1GB of RAM and has a 10GB database size limit. There are also limited SQL tools available with Express, and lack of automated backup and maintenance plan capabilities. Performance and reliability of the TRAVERSE software can be greatly affected by the limitations of the Express edition and should be used with caution only on smaller sites willing to monitor performance and size limits.

To download SQL 2017 Express: https://www.microsoft.com/en-us/download/details.aspx?id=55994

Prerequisite Software

The TRAVERSE Server Manager and the TRAVERSE Client have a few required software components. The installers for each will typically detect and auto-install these components when needed.   They are listed for informational purposes:

- Microsoft System CLR Types for SQL 2012 (from the Microsoft SQL Server 2012 Feature Pack.)
- Microsoft .NET Framework Runtime v4.7 or higher
- Microsoft Report Viewer 2015 Runtime
- DevExpress Runtime for TRAVERSE

Installing SQL Server on a Domain Controller

For security reasons, Microsoft recommends that you do not install SQL Server on a domain controller. SQL Server Setup will not block installation on a computer that is a domain controller, but the following limitations apply:

- You cannot run SQL Server services on a domain controller under a local service account or a network service account.

- After SQL Server is installed on a computer, you cannot change the computer from a domain member to a domain controller. You must uninstall SQL Server before you change the host computer to a domain controller.

- After SQL Server is installed on a computer, you cannot change the computer from a domain controller to a domain member. You must uninstall SQL Server before you change the host computer to a domain member.

- SQL Server failover cluster instances are not supported where cluster nodes are domain controllers.

- SQL Server Setup cannot create security groups or provision SQL Server service accounts on a read-only domain controller. In this scenario, Setup will fail.

For more information follow one of the following link: http://msdn.microsoft.com/en-us/library/ms143506.aspx .

Installing SQL and TRAVERSE on a Small Business Server or Windows Server Essentials

Small Business Server (SBS) is not a supported platform for TRAVERSE. TRAVERSE should not be installed on a SBS server. If desired, a dedicated TRAVERSE/SQL server can be provided by Open Systems as a turnkey server solution.

Windows Server Essentials 2012 or 2016 is supported for very small installations of TRAVERSE, if the limitations of the Essentials edition meet the needs of a very small business wanting a single server implementation. The added limitations of installing SQL on a Domain Controller will apply, see above.

Virtual Installations (Hyper-V and VMWare)

Virtualized servers are commonplace today. A virtual server host is a physical machine that is divided into logical servers, all sharing the individual components of the host machine. Components consist of individual multicore processors, server RAM, etc. Each logical server can run an operating system and applications independently. TRAVERSE is supported and does run in a virtual environment. Make sure to size your virtual host with adequate dedicated resources (CPU cores and Memory), and that the windows server operating system is 64 bit. Configure your virtual server similarly to your physical server. If your physical SQL server size should be 16 GB, your virtual server needs to be configured to 16 GB of dedicated physical memory.

Recommendations for Hyper-V:

Best Practices for Virtualizing and Managing SQL Server: http://download.microsoft.com/download/6/1/D/61DDE9B6-AB46-48CA-8380-D7714C9CB1AB/Best_Practices_for_Virtualizing_and_Managing_SQL_Server_2012.pdf

Also refer to Microsoft's Hyper-V documentation for additional information.

Recommendations for VMWare:

- Configure all virtual disks as Eager Zeroed Thick.
- Configure all virtual network adapters as VMXNET3 devices.
- Set Power Management Settings to "High Performance."
- Do not use Distributed Resource Scheduler (DRS), instead manage disks/VMDKs manually.
- Set "Latency Sensitivity" to high (via vSphere Web Client).

Also see VMWare SQL Best Practices Guide:
http://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/solutions/sql-server-on-vmware-best-practices-guide.pdf

Hosted/Cloud Installations

TRAVERSE can be installed in hosted (cloud) environments if the SQL and Server requirements noted in this document are all met. It is possible to use either dedicated physical or virtual hosted environment installations. Follow RDS/terminal server guidelines listed above. Open Systems provides a managed Cloud Hosting Service for TRAVERSE utilizing Microsoft Cloud (Azure) data centers, contact us for more information.

Remote Desktop Server versus Client/Server

Remote Desktop Server (RDS or Terminal Server) refers to an installation where all processing is handled on the "RDS" server. A TRAVERSE client application installed on the RDS server can be published to users which RemoteApp or Remote Desktop connect via a shortcut on their local desktops to launch the TRAVERSE application. A single TRAVERSE client folder on an RDS server can be shared by all users accessing the server.

Client/Server refers to an install where the TRAVERSE client software is installed locally on each user's workstation. Data is requested from the server and transferred to the client software for processing locally on the user's workstation then transferred back to the server.

You can have a mix of both local Client/Server and Remote Desktop or similar users.

You should consider the following when choosing between Remote Desktop and Client/Server:

a. Remote connections to the server? If there will be remote users connecting to the server via the Internet, Remote Desktop Services is the recommended method. Remote Users with *local* client installations connected over a VPN tunnel typically have very poor performance. Performance will be greatly enhanced if processing of the data is done on the server and only screen refresh and key strokes are handled on remote workstations via RDP connections. Remote Desktop, RemoteApp or Citrix are our recommended methods for remote users to access TRAVERSE and typically only requires 100-200Kbps bandwidth per remote user.

b. Remote Desktop Services is the recommended installation if installing TRAVERSE in the cloud or other hosted environment. RemoteApp is supported.

c. If installing in a Remote Desktop or RemoteApp server environment, make sure to follow Best Practices for hardware recommendations of a multiple processor server and the recommended amount of RAM per user to ensure acceptable performance.

d. Make sure to follow best practices for workstation hardware requirements for *local* client/server based installations.

TRAVERSE Installation Path
For consistency reasons, it is recommended that all TRAVERSE installations follow the default installation path, c:\Program Files\Open Systems, Inc\TRAVERSE Global. It is understandable that it may not be possible to install in the default path. Note all path information on the TRAVERSE Installation log.

Installing Databases on Separate Physical Drives
For larger installations, When installing SQL and creating databases it is best practice for performance reasons to place your tempdb, log, data and database backups on separate physical volumes.

One example recommendation of database placement might be;

Set the RAID level on your data drive volume to RAID 10 or 5, or set it to RAID 1 if the budget does not permit.

Set the RAID level on your log drive volume to RAID 1, mainly because SQL log traffic is sequential in nature and is predominantly written until a checkpoint occurs.

Set the RAID level on your tempdb drive volume to RAID 10 or 5, or set it to 1 if the budget does not permit RAID 10.

Recommended settings for growth factors for SQL databases.
Size of the databases is dependent on business data volume. The growth rate should be changed and set initially to 10%. The tempdb is used extensively by TRAVERSE and should be set with similar size and grow percentages as the company databases. See our *SQL Server Optimization* document for further details.

Anti-virus Software
Anti-virus software should be considered in all computer environments. It is important to understand the effects of anti-virus software on performance. Microsoft does not recommend scanning ldf, ndf, or mdf database files. Refer to the following link when considering anti-virus software deployment, http://support.microsoft.com/kb/309422 . Considerable testing should be completed prior to and after installing any anti-virus software to ensure that no significant performance issues have been created.

Microsoft Office Recommendations

It is recommended to use Microsoft Office 2016 or later. Microsoft Office is not required to run TRAVERSE Global, but if installed enhances TRAVERSE with optional exports and integration to Excel, Word, and Outlook.

Disaster Recovery and Maintenance Plans

A good disaster recovery plan should be considered for all TRAVERSE installations. Redundancy in hardware and software is very valuable. A good plan starts by setting up and maintaining a good backup and maintenance schedule for your databases. Offsite backup rotation or cloud-based backups are highly recommended. When selecting a local or cloud backup solution, make certain it supports live backup of SQL databases. Open Systems also offers a Managed Cloud Backup service, contact us for more information.

Re-indexing and re-organizing of the databases at regular intervals can help keep performance optimized, a weekly or monthly index reorganization maintenance plan is recommended.

Refer to the SQL Server Maintenance Plan website for additional information on establishing your automated maintenance plans, http://msdn.microsoft.com/en-us/library/ms191002.aspx .

Recommended Pre-Go live Testing

Pre-installation testing should always be completed prior to go live with any installation. Testing the software and data prior to going live is essential for determining performance issues. Testing should include the customer's data with the TRAVERSE software that the client will be using. This includes all modifications to the software. Final testing should always be completed in the customer's environment.

A "sandbox" test server can be installed to allow for easier isolated testing at your location prior to installation on your live servers. This server can be a virtual server or a physical server/workstation. Contact Open Systems for options and costs on creating a sandbox server environment.