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Network Setup

Stand-Alone mode should be used for any installation that will only use one computer to acquire and view images. Simply select the Stand-Alone mode during the InstallShield window as shown below. No additional steps are required.

Network mode should be used for installations where several different computers will be used to acquire and view images.

To have multiple computers connect to ONE EVAsoft database, one installation must HOST the database. The Host computer must ALWAYS be on and EVAsoft must ALWAYS be running.

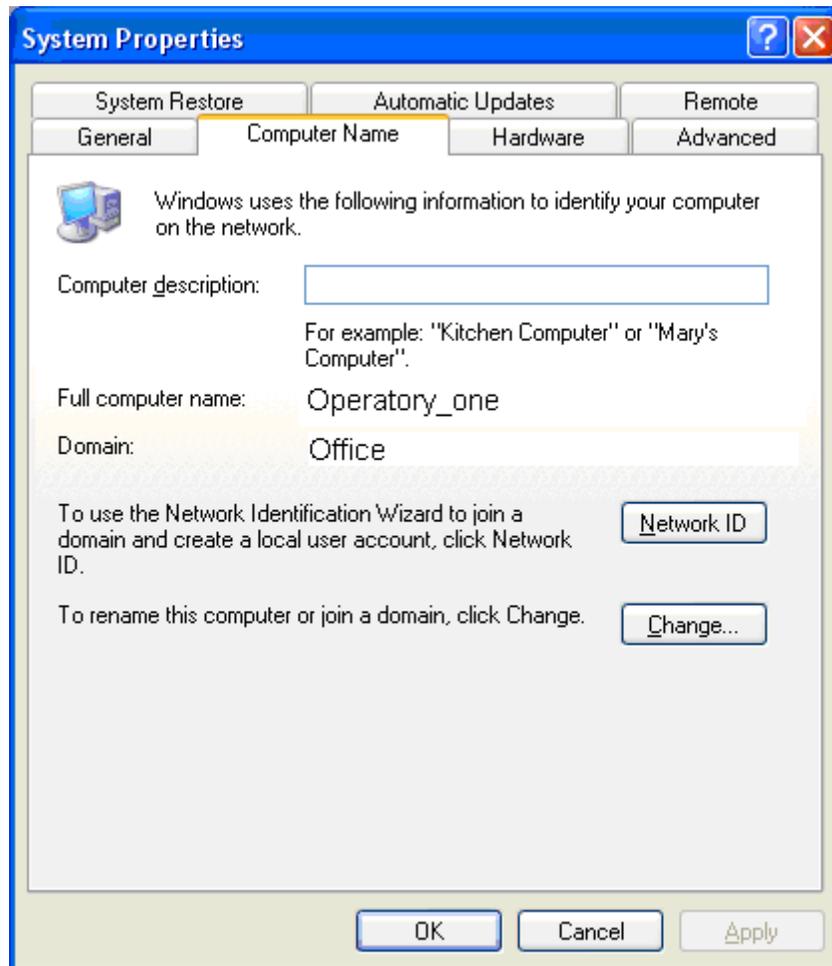
Step One: The first installation should be done on the computer (preferably a server) that will be hosting the Database. Choose the “Network Mode and Host the database” option during the InstallShield window as shown below.

Step Two: All additional computers should be installed as clients, to do that select “Network Mode and connect to already hosted database” option during the InstallShield window as shown below.



In order for all the CLIENT computers to find the HOST, the user may need to enter the computer name of the Host computer/server.

To find the computer name, right-click on **My Computer** and select **Properties** from the pop-up menu. Click on the Computer Name tab, as shown below. The Full computer name should be entered on the client computers, if EVAsoft cannot automatically find the Host.



EVAsoft Networking Checklist

For proper operation, all firewalls, routers, and bridges must allow the following network traffic.

Incoming:

Program: "c:\evasoft\jre\launch4j-tmp\evasoft.exe" Scope TCP all ports
Program : "c:\evasoft\jre\launch4j-tmp\evasoft.exe" Scope UDP all ports
Protocol : UDP Port 35678
Protocol: TCP Port 35679 and Port 1527

Outgoing:

Program: "c:\evasoft\jre\launch4j-tmp\evasoft.exe" Scope TCP all ports
Program : "c:\evasoft\jre\launch4j-tmp\evasoft.exe" Scope UDP all ports
Protocol : UDP Port 35678
Protocol: TCP Port 35679 and Port 1527

Note the program is listed above in the default installation location. If you installed in another location ensure that you point to the actually location on the local machine.

Networking Checklist Server/Host Part I

1. Verify that Host/Server computer is on, connected to the LAN and that EVAsoft is running.
2. Verify that the Host/Server's firewall allows the incoming and outgoing network traffic listed on page 1 of this document.
3. Note and record the NAME or IP address of the Host/Server computer _____.
4. Verify that EVAsoft is set to Host/Server mode and that the database location is listed as either the name/IP recorded above or 'localhost' (menu -> Tools -> Options -> database).
5. Verify that the drives and folders listed in the DFS (menu -> Tools -> Options -> DFS) have enough free space for file storage (each EVA image used about ~ 2 MB of disk space).
6. Note and record the Domain _____ or Workgroup _____.
7. Create a patient name = Host Computer Name and use the demonstration mode to create several images in a study.
8. Leave EVAsoft running on this computer.

Network Checklist Each Workstation/Client (Repeat for each Client PC)

- A. Verify that computer is on, connected to the LAN and that EVAsoft is running.
- B. Verify that the Workstation/Client's firewall allows the incoming and outgoing network
Traffic listed on page 1 of this document.
- C. Note and record the NAME or IP address of the client computer _____.
- D. Note and record the Domain _____ or Workgroup _____.
Verify that it is the same as step 6 of the server client check list.
- E. Verify that EVAsoft is set to Workstation/Client mode and that the database location is listed as either the name/ip recorded in step 3 of the Serve/Host checklist (menu -> Tools -> Options -> database).
- F. Verify that the drives and folders listed in the DFS (menu -> Tools -> Options -> DFS) have enough free space for file storage (each EVA image used about ~ 2 MB of disk space).
- G. Create a patient name = Client Computer Name and use the demonstration mode to create several images in a study.
- H. In the EVAsoft Patient Tab select the patient created in step 7 of the server checklist , double click on the study you created and verify that the images are displayed in the chart view tab (may take a short time to transfer the images over the network).
- I. Leave EVAsoft running on this computer.

Repeat steps A through I for each client EVAsoft computer.

Networking Checklist Server/Host Part II

9. On the server computer , in the EVAsoft Patient Tab select the patient created in step G of the client checklist for the first client computer , double click on the study you created and verify that the images are displayed in the chart view tab (may take a short time to transfer the images over the network).
10. Repeat step 9 for each client computer.
11. Client computers can be shut off but the host should remain on with EVAsoft running whenever the system is in use.

EVAsoft V2.0 Network Operation Reference

Theory of Operation:

EVAsoft is intended to operator as part of a computer network that supports both UDP and TCP. Each computer in the network is referred to as a node. Each node is uniquely identified by its IP address (e.g. 192.168.1.150) and/or by its name (e.g. computer1). The nodes together are connected on the LAN (local Area Network) to form a logical group of mutually visible nodes referred to as a domain. In order to function as a network all the EVAsoft nodes must be members of the domain (or workgroup). EVAsoft must run in one of three modes, either standalone, Server/Host network or a Workstation/Client network. In all cases, including standalone, EVAsoft uses network protocols as an integral portion of its operation. An EVAsoft network should have only one node set as EVAsoft server/host and one or more nodes set as Workstation/client. If EVAsoft is only installed on a single computer it should be set to run as Standalone. EVAsoft Safe mode is a special case of standalone.

The UDP and TCP ports and address are configurable. For the purpose of this description the default addresses are used. These addresses should not be changed except by Service/IT network personnel and then only if there is a conflict on your local network.

EVAsoft listens for UDP messages on port 35678 and TCP connections on port 35679. Additionally host/server or standalone node will run the derby database server which independently listens for TCP connections on port 1527. Additionally the EVAsoft can interact with computers using DICOM. The DICOM functions are beyond the scope of this document and are not included to avoid unnecessary complications and improve clarity.

For proper operation, all firewalls, routers, and bridges must allow the following network traffic.

Incoming:

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Program :	"c:\evasoft\jre\launch4j-tmp\evasoft.exe"	Scope UDP all ports
Protocol :	UDP	Port 35678
Protocol:	TCP	Port 35679 and Port 1527

Outgoing:

Program:	"c:\evasoft\jre\launch4j-tmp\evasoft.exe"	Scope TCP all ports
Program :	"c:\evasoft\jre\launch4j-tmp\evasoft.exe"	Scope UDP all ports
Protocol :	UDP	Port 35678
Protocol:	TCP	Port 35679 and Port 1527

Communication Network Protocols:

UDP (User Datagram Protocol) is used by EVAsoft for:

1. To multicast/broadcast to all computers on the local domain the nodes existence as an active EVAsoft node using port 35678 and multicast address 235.1.2.5.
2. To multicast/broadcast to all computers on the local domain the event of new images acquired and available for transfer on the local node.
3. On the local node as unicast messaging to 'bridge' third party software (typically Practice Management Software) to the locally running instance of EVAsoft.

TCP (Transport Control Protocol) is by EVAsoft for:

1. Database communication
 - a. When running as either standalone or host EVAsoft launches an instance of the derby database server.
 - b. Each node running EVAsoft independently connects to the database server running on the hosting node using TCP port 1527.
 - c. Each node independently communicates with the database using SQL over the TCP connection established above.
 - d. Data from the database (e.g. patient name, and the name of the image file but not the image file itself) is added to, searched for, displayed from this independent communications channel.
2. EVAsoft Node to Node Communications
 - a. EVAsoft requests connections to another EVAsoft node on TCP Port 35679.
 - b. EVAsoft.exe may then open additional connections on other available TCP ports as required.
 - c. EVAsoft will transmit its active node list to other nodes using this channel.
 - d. EVAsoft will ask another node if it has a local copy of an image file using this channel.
 - e. EVAsoft will transfer an image data file to another node using this channel.
 - f. Note if a node does not have a copy of an image file locally and cannot communicate with and transfer from another EVAsoft node that has the image file a 'media not found' Xbox will be displayed.

NOTE 1: EVAsoft depends on the proper operation of the LAN including but not limited to valid and unique IP addresses and name resolution.

NOTE 2: Firewall, routers switches and other network systems are frequently configured to lock down any traffic not explicitly permitted. It may be necessary to allow EVAsoft and the Protocols and ports it uses permission to received and send transmission across and through your network.

Node discovery:

EVAsoft has redundant network node identification methods to ensure proper operation. Each instance of EVAsoft maintains an active node list which contains the node names/addresses of the other computers on the network running EVAsoft.

Primary Dynamic Node Discovery Method:

When EVAsoft launches on a node it transmits a UDP message on port 35678 to broadcast/multicast address 235.1.2.5 containing 'iamalive' string, if it is a master node (hosting a database) and the name of the node it is running on. Any instance of EVAsoft properly formatted 'iamalive' message will attempt to establish a TCP connection on port 35679 to the node contained in the message. When this connection is established the receiver of the 'iamalive' message transmits the contents of its active node list to the sender of the 'iamalive' message. The sender of the 'iamalive' message then adds these nodes to its own active node list, eliminating duplicates. Each node will resend the 'iamalive' message approximately every 10 minutes.

Secondary Dynamic Node Discovery Method:

When EVAsoft launches on a node it checks if the lisa.props file contains the name/address of a node known to host an EVAsoft database. If this exists the local instance of EVAsoft will attempt to establish a TCP connection on port 35679 to this node and transmits its node name/address which the database hosting node adds to its active node list. The hosting database node then sends its list back to the original node. Each node will repeat this approximately every 10 minutes.

Static node table (when all else fails):

At startup and only at startup EVAsoft will open and read the contents of the text file nodes.txt located in the main folder (by default c:\evasoft). The contents of this folder may be manually edited to list the name of each node to be added to active node list. Note that this file is not automatically populated by the program and is not dynamically updated when new nodes are added. This is intended to be used only when the Dynamic discovery methods are not effective or reliable.

Database Communications:

In network operation EVAsoft uses a common database which is hosted and run on the server/host computer node. All text based information is stored in the database. Eventually everything you can see, create, edit, search for or otherwise access in the Patient tab (except the image thumbnails in the film strip at the bottom of the screen) is stored in the database. Each client node opens a dedicated unicast TCP channel on port 1527 to communicate with the database. In the case of the host or standalone operation this TCP channel is also established and used for database communications but the data is always on the local computer.

The database host node location and the TCP port used can be verified and if necessary edited in the EVAsoft menu Tools -> Options-> Database dialog.

Logically the files that compose this database are located in the /evasoft/primaydb of the server computer. These are binary files which are not human readable and should never be directly edited or otherwise modified.

Image Data and Communications:

Each EVAsoft node stores the images it has acquired or used locally in its distributed file system (DFS). The default location of the DFS is /evasoft/dfs1. Additional locations may be define in the EVAsoft menu Tools -> Options -> DFS. Note that each instance of EVAsoft maintains its own individual DFS and set of images.

Each image is individually storied as a DICOM format file in a directory structure. Each individual EVAsoft network image file has a unique name (e.g. 1234098765.dcm). This file name (but not the file itself) is storied in the common database and associated with the patient demographics and study information. When an instance of EVAsoft running on any node (computer A) needs to display an image (either thumbnail or full size) it first gets the file name from the database, then looks for the file in its own DFS. If it does not find the fine in its own DFS it sequentially queries each EVAsoft node in its active node list (see node discovery) on TCP port 35679 if the file exists on that EVAsoft node's DFS. The computer will respond either yes or no. If yes then computer A asks it to copy the file over TCP which is then storied locally in Computer A's DFS. Otherwise Computer A queries the next computer on its active node list until either the file is found or all computers on the active node list have been checked. If the file is not found then the "Media not found" XBox is displayed.

When an EVAsoft node acquires a new image it uses UDP on port 3568 to notify the server/host node that it has new images available. The instance of EVAsoft on the server/host node then starts a background string to open a TCP channel to copy the image file from the client's local DFS to the Servers DFS. This activity happens transparent to the user.

An instance of EVAsoft may manually generate local copies of all images using the menu -> Tools -> Replicate All Files Locally function.

Identifying and Troubleshooting EVAsoft Networking Issues

Each computer network is unique and can have a near infinite number of configurable states so it is strongly recommended that an IT professional with an expert knowledge of the local network be involve in troubleshooting any problems that cannot be quickly resolved.

If you have not done so already please use the network checklist to systematically test your network setup.

Typically network related problems with EVAsoft express themselves as one of the following symptoms followed by the recommend remedial action:

- I. EVAsoft dialog reports Error Connecting to the Database.
Possible causes:
 1. Host computer is off, offline or EVAsoft is not running.
 - a. Remedial action:
 - i. Turn on Host computer and/or EVAsoft.
 2. Client DB is pointing to the wrong computer.
 - a. Remedial actions:
 - i. Check and if necessary correct client's database to point to the Host computer.
 - ii. If the network has static IP addresses substitute the Host's IP address for the name.
 3. Firewall or Anti-virus software suite is blocking network traffic.
 - a. Remedial action:
 - i. Verify that this is the cause by temporally shutting off the firewalls.
 - ii. Some computers have multiple firewalls verify you found them all.
 - iii. Add exceptions to the firewall rules to allow EVAsoft network traffic (see checklist).
 4. Computers are on different domains or workgroups.
 - a. Remedial action:
 - i. Place all EVAsoft computers on the same Domain or Workgroup.
 5. Verify that you can 'ping' the Host from the client and the client from the host.
 - a. Redial action:
 - i. Consult local IT administrator.

II. "Media not found" Xbox images in either thumbnails or full images.

Possible causes:

1. Host computer is off, offline or EVAsoft is not running.
 - a. Remedial action:
 - i. Turn on Host computer and/or EVAsoft.
2. Images were not transfer to the Host computer before the acquiring client was shut down.
 - a. Remedial action:
 - i. Turn on all client computers, confirm that EVAsoft is running on all computers, then run EVAsofts menu->tools->Replicate All Files Locally function on the Host computer.
3. Firewall or Anti-virus software suite is blocking network traffic.
 - a. Remedial actions:
 - i. Verify that this is the cause by temporally shutting off the firewalls.
 - ii. Some computers have multiple firewalls verify you found them all.
 - iii. Add exceptions to the firewall rules to allow EVAsoft network traffic (see checklist).
4. EVAsoft could not find all the other instances of EVAsoft on the network. (Active node list incomplete)
 - a. Remedial actions:
 - i. Close EVAsoft, turn on the debugger and restart EVAsoft on all computers.
 - ii. Open menu->help-> debugger dialog open the menu->p2p->list active nodes. The list should include all the computers that are currently running EVAsoft.
 - iii. Use the text editor to manually edit and add the names of all the computer nodes running EVAsoft to nodes.txt file located in the EVAsoft folder. This file must be edited individually for each computer on the network that cannot otherwise discover the EVAsoft nodes. Important double check to avoid spelling and typographical errors. You will need to edit this file again if you add a new computer to the network later.
5. Verify that you can 'ping' the Host from the client and the client from the host.
 - a. Remedial action:
 - i. Consult local IT professional
6. Verify that name IP resolution is correct.
 - a. Remedial action:
 - i. Run ipconfig /flushdns, ipconfig /registerdns
 - ii. Consult local IT professional
7. DFS hard drive space for local or host EVAsoft is full.
 - a. Remedial action:
 - i. Add or free up hard drive space.
 - ii. Use the DFS to point to another Hard Drive location with frees space.