



Welch Allyn®
MDI
HL7 Information Source
Service Manual



Manufactured by Welch Allyn, Inc., Skaneateles Falls, NY U.S.A.



CAUTION: Federal law restricts this device to sale by or on the order of a physician.

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Technical Support

For information regarding product support, contact Technical Support at 1.888.667.8272, mor_tech.support@hillrom.com.



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Hillrom™

TABLE OF CONTENTS

NOTICES	2
MANUFACTURER'S RESPONSIBILITY.....	2
RESPONSIBILITY OF THE CUSTOMER.....	2
COPYRIGHT AND TRADEMARK NOTICES	2
LICENSING	2
OTHER IMPORTANT INFORMATION	2
NOTICE TO EU USERS AND/OR PATIENTS.....	2
DISPOSAL	3
WARRANTY INFORMATION	4
YOUR WELCH ALLYN WARRANTY	4
USER SAFETY INFORMATION	6
WARNING(S).....	6
CAUTIONS.....	6
NOTES	6
EQUIPMENT SYMBOLS AND MARKINGS.....	7
SYMBOL DELINEATION	7
INTRODUCTION	8
MDI INFORMATION WORKFLOW	8
PRODUCT INSTALLATION.....	9
MDI INSTALLATION	9
SYSTEM REQUIREMENTS.....	9
INSTALLATION COMPONENTS.....	10
MDI INSTALLATION PROCEDURE	11
MDI DEPENDENT SOFTWARE INSTALLATION DESCRIPTION	ERROR! BOOKMARK NOT DEFINED.
MDI PRODUCT CONFIGURATION	25
CONFIGURING JAVA	ERROR! BOOKMARK NOT DEFINED.
CONFIGURING SQL SERVER NETWORKING	25
INSTALLING THE MDI SERVICES.....	30
CONFIGURING INTERFACE ENGINE	31
DEPLOYING INTERFACE ENGINE CHANNELS.....	36
CONFIGURING THE MDI APPLICATION SECURITY	41
CONFIGURING ADT PROGRAM PARAMETERS	43
TROUBLESHOOTING	46
GLOSSARY.....	48

NOTICES

Manufacturer's Responsibility

Welch Allyn, Inc. is responsible for the effects on safety and performance only if:

- Assembly operations, extensions, readjustments, modifications, or repairs are carried out only by persons authorized by Welch Allyn, Inc.
- The application is used in accordance with the instructions for use.

Responsibility of the Customer

The user of this application is responsible for ensuring the implementation of a satisfactory maintenance schedule. Failure to do so may cause undue failure and possible health hazards.

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The MDI-HL7 interface application uses the Mirth Connect Interface Engine under the terms of the Mozilla Public License (MPL).

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Any serious incident that has occurred in relation to the device, should be reported to the manufacturer and the competent authority of the Member State in which the user and/or patient is established.

Disposal

This product and its accessories must be disposed of according to local laws and regulations. Do not dispose of this product as unsorted municipal waste. For more specific disposal information see www.welchallyn.com/weee.

WARRANTY INFORMATION

Your Welch Allyn Warranty

WELCH ALLYN, INC. (hereafter referred to as "Welch Allyn") warrants that components within Welch Allyn products (hereafter referred to as "Product/s") will be free from defects in workmanship and materials for the number of years specified on documentation accompanying the product, or previously agreed to by the purchaser and Welch Allyn, or if not otherwise noted, for a period of twelve (12) months from the date of shipment.

Consumable, disposable or single use products such as, but not limited to, PAPER or ELECTRODES are warranted to be free from defects in workmanship and materials for a period of 90 days from the date of shipment or the date of first use, whichever is sooner.

Reusable product such as, but not limited to, BATTERIES, BLOOD PRESSURE CUFFS, BLOOD PRESSURE HOSES, TRANSDUCER CABLES, Y-CABLES, PATIENT CABLES, LEAD WIRES, MAGNETIC STORAGE MEDIUMS, CARRY CASES or MOUNTS, are warranted to be free from defects in workmanship and materials for a period of 90 days. This warranty does not apply to damage to the Product/s caused by any or all of the following circumstances or conditions:

- a) Freight damage;
- b) Supplies, accessories and internal parts NOT approved by Welch Allyn;
- c) Misapplication, misuse, abuse, and/or failure to follow the Product/s instruction sheets and/or information guides;
- d) Accident;
- e) A disaster affecting the Product/s;
- f) Alterations and/or modifications to the Product/s not authorized by Welch Allyn;
- g) Other events outside of Welch Allyn's reasonable control or not arising under normal operating conditions.

THE REMEDY UNDER THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT WITHOUT CHARGE FOR LABOR OR MATERIALS, OR ANY PRODUCT/S FOUND UPON EXAMINATION BY WELCH ALLYN TO HAVE BEEN DEFECTIVE. This remedy shall be conditioned upon receipt of notice by Welch Allyn of any alleged defects promptly after discovery thereof within the warranty period. Welch Allyn's obligations under the foregoing warranty will further be conditioned upon the assumption by the purchaser of the Product/s (i) of all carrier charges with respect to any Product/s returned to Welch Allyn's principal place or any other place as specifically designated by Welch Allyn or an authorized distributor or representative of Welch Allyn, and (ii) all risk of loss in transit. It is expressly agreed that the liability of Welch Allyn is limited and that Welch Allyn does not function as an insurer. A purchaser of a Product/s, by its acceptance and purchase thereof, acknowledges and agrees that Welch Allyn is not liable for loss, harm, or damage due directly or indirectly to an occurrence or consequence there from relating to the Product/s. If Welch Allyn should be found liable to anyone under any theory (except the expressed warranty set forth herein) for loss, harm, or damage, the liability of Welch Allyn shall be limited to the lesser of the actual loss, harm, or damage, or the original purchase price of the Product/s when sold.

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USER SAFETY INFORMATION



WARNING:

Means there is the possibility of personal injury to you or others.



Caution:

Means there is the possibility of damage to the application.

Note:

Provides information to further assist in the use of the application.

NOTE: *This manual may contain screen shots and pictures. Any screen shots and pictures are provided for reference only and are not intended to convey actual operating techniques. Consult the actual screen in the host language for specific wording.*



WARNING(S)

- Reference ELI™ electrocardiograph user manuals for all warnings.
- Application is designed to operate under:
 - Microsoft Windows 10 (64-bit)
 - Microsoft Windows 11 (64-bit)
 - Microsoft Windows Server 2016
 - Microsoft Windows Server 2019
 - Microsoft Windows Server 2022
- Possible malfunction risks could be associated when installing 3rd party software. Welch Allyn, Inc. cannot verify the compatibility of all possible hardware/software combinations.
- Application is used to exchange data with 3rd party Electronic Health Record (EHR) systems. It is not possible to assure complete compatibility with all possible 3rd party EHR systems and configurations. It is recommended to contact the 3rd party EHR vendor to ensure application has been verified as compatible with a particular installation of their system.



Cautions

- Reference ELI electrocardiograph user manuals for all cautions.

Notes

- Reference ELI electrocardiograph user manuals for all notes.

EQUIPMENT SYMBOLS AND MARKINGS

Symbol Delineation



CAUTION The caution statements in this manual identify conditions or practices that could result in damage to the equipment or other property, or loss of data.



WARNING The warning statements in this manual identify conditions or practices that could lead to illness, injury, or death. In addition, when used on a patient applied part, this symbol indicates defibrillation protection is in the cables. Warning symbols will appear with a grey background in a black and white document.



Do not dispose as unsorted municipal waste. Requires separate handling for waste disposal according to local requirements



Follow instructions/directions for use (DFU) – mandatory action. A copy of the DFU is available on this website. A printed copy of the DFU can be ordered from Hillrom for delivery within 7 calendar days.



Medical Device



Model Identifier



Reorder Number

INTRODUCTION

This service manual contains information about the installation, configuration and maintenance of the MDI (Mortara Device Interface) HL7 interface.

The MDI is a suite of applications that provide interoperability with Electronic Health Record (EHR) systems that exchange medical information using HL7 technology. Supported features include:

- ADT interface-capture patient demographic information for use on Welch Allyn devices.
- Orders interface-capture ordered procedure information for use on Welch Allyn devices.
- Results reporting interface-provide results of resting ECG, stress, Holter and Cardiac Rehabilitation exams collected by the Welch Allyn devices.

MDI Information Workflow

Figure 1

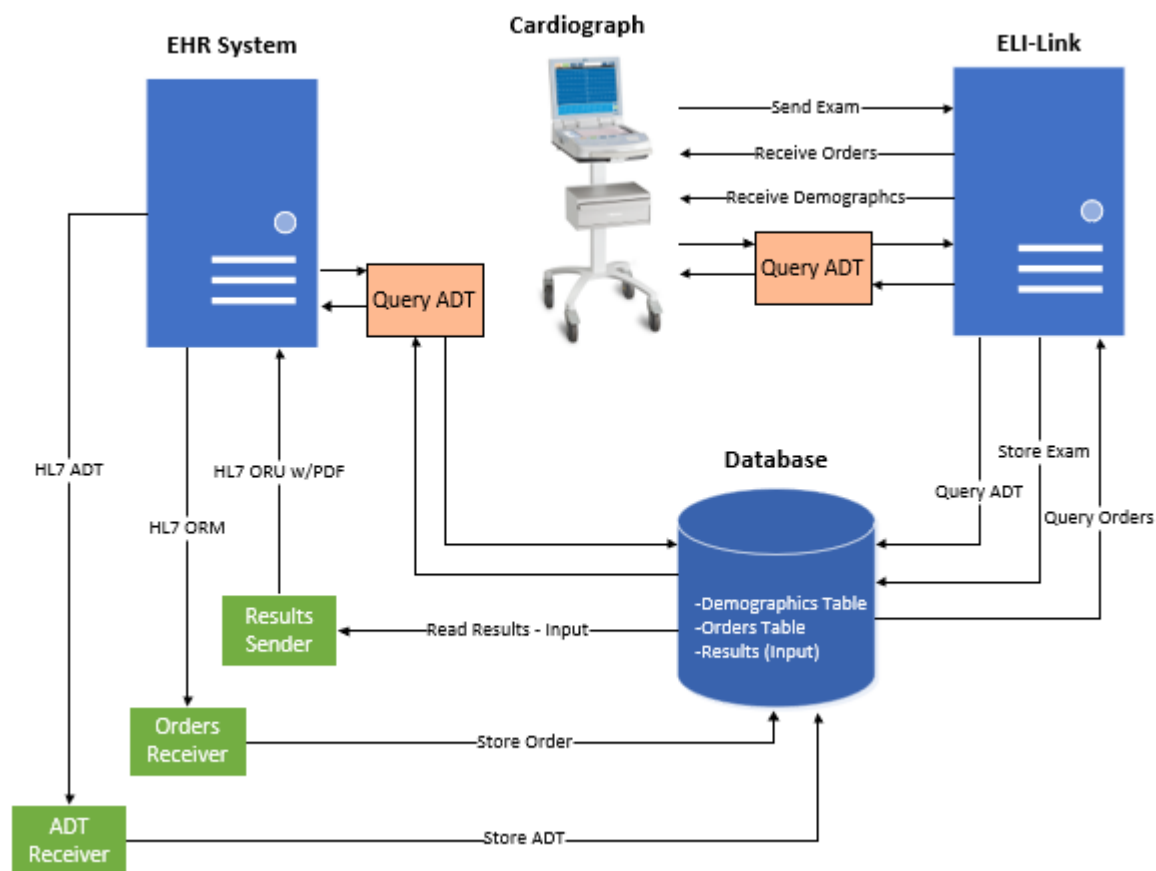


Figure 1 depicts an ECG workflow using an ELI resting ECG device and ELI Link connected to an information source (Database) that is managed by the MDI HL7 interface to an EHR application. ADT Roster is only available with ELI380 cardiographs, ADT Query is available with ELI280/380 models.

The installation and configuration of ELI Link and supported ELI cardiographs is described in the ELI Link Administration manual.

PRODUCT INSTALLATION

MDI Installation

The MDI software is provided to a customer as part of the ELI Link Software Installation DVD (P/N 107347)

The customer environment and the nature of the EHR application (local install, hosted, cloud based) will dictate which type of installation topography is prescribed:

- LAN Scenario
- LAN (MDI – HL7 Interface) – EHR Server Application Hosted Scenario
- MDI – HL7 Interface and EHR Server Application – Both Hosted Scenario

Refer to the MDI – HL7 Implementation Guide for more detail and considerations on these deployment scenarios.

System Requirements

Operating System Support

Microsoft Windows 10 (64-bit)
Microsoft Windows 11 (64-bit)
Microsoft Windows Server 2016
Microsoft Windows Server 2019
Microsoft Windows Server 2022

Hardware Support

Hardware support for the system should meet the recommended specifications as outlined for the corresponding Windows operating systems. Minimum recommended server specifications are defined below.

- Quad core processor
- 16 GB Ram preferred
- 8 GB page file (swap memory)
- 100 GB OS drive
- 100 GB data drive
- Quantity of 1 NIC 100/1000

Virtual machine considerations:

- Static MAC address assigned to the virtual NIC
- Full CPU reservation for the virtual server
- CPU count being evenly split across NUMA-nodes
- Hyperthreaded Core Sharing be set to “None”
- Full memory reservation for the virtual server
- Virtual disks being thick provisioned eager zeroed

Installation Components

The installation of the MDI software consists of the following software packages:

- Microsoft OpenJDK
- Mirth Interface Engine; Mirth Connect 4.x or higher
- MDI software

A user with **Administrative** privileges is required to install the MDI application software. Administrator privileges are not required to run the software after installation is complete.

When installing in an SQL environment, the User Account must have the following two roles:

- Public
- Sysadmin (may be removed after install, but "db_owner" role is needed to access the db.
- All Software requires Administrator access.

This section will describe the process for installing the MDI instance of SQL database:

1. MDI can be configured to work with a local/remote SQL Server Enterprise or a local instance of SQL Server Express. SQL Server versions supported are 2017 and 2019.

Note, the following steps are for the Express editions only.

- a. Browse to the folder *SQL Server Installer* on the ELI Link installation DVD (P/N 107347). Launch the desired edition of Microsoft SQL Server Express, by double clicking on the appropriate .exe file as listed:

For Microsoft SQL Server 2019:

SQLEXPRA DV_x64_ENU_2019.exe

Notes

- Microsoft SQL Server Express 2017 is not provided on the DVD. If desired the executable will have to be download from the Microsoft site.
 - When 201x is used in the following steps, x is indicating 2, 7 or 9 displayed depending on the SQL Server version installed (2017 or 2019).
- b. If prompted *Do you want to allow this app to make changes to your device?* Click **Yes**.
 - c. If prompted *Choose Directory For Extracted Files*, select default (directory where .exe file is located). click **Ok**.
 - d. SQL Server Installation Center / Installation: Click **New SQL Server stand-alone installation or add features to an existing installation**
 - e. If Microsoft Updates are recommended a dialog comes up asking *Use Microsoft Update to check for updates (recommended)*. Select the box and click **Next >**.
 - f. If prompted *There are no updates for SQL Server found online*. Click **Next >**.
 - g. Installation Type, select: Perform a new installation of SQL Server. Click **Next >**.
 - h. If prompted for License Terms. **Check I accept the license terms**. If available, leave *Send feature usage...* unchecked. Click **Next >**.
 - i. SQL Server 201x Setup / Feature Selection, select the features:
 - **Database Engine Services**
 - **Management Tools – Basic**
 - **SQL Client Connectivity SDK**

Uncheck all other features. Leave the default settings for the Shared directories. Click **Next >**.

- j. SQL Server 201x Setup / Instance Configuration. Select Named Instance and enter: **MDI_ENGINE**
Leave all other default settings and click **Next >**.
- k. SQL Server 201x Setup / Server Configuration: Leave *SQL Server Data Engine Startup Type* set for **Automatic** and leave *SQL Server Browser Startup Type* set as **Manual**. Click **Next >**.
- l. SQL Server 201x Setup / Database Engine Configuration / Server Configuration tab:
 - Set Authentication Mode to: **Mixed Mode**
 - Set the custom sa password. *Example: Mdi_Engine_14*
 - Add other users/groups to the SQL Server Administrators list if necessary.
 - Click **Next >**.
- m. SQL Server 201x Setup / Complete: Verify that all features were installed successfully.
- n. If prompted *One or more affected files have operations pending. You must restart your computer after the setup process is completed.* Click **OK**.
- o. Click **Close** to exit SQL Server 201x Setup.
- p. Close the *SQL Server Installation Center* application.

MDI Installation Procedure

Starting the MDI Software Installation

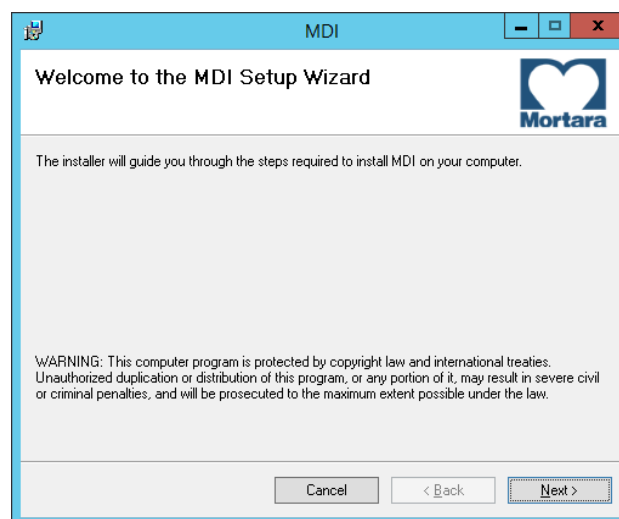
This section describes the installation of the MDI software application. Using the installation DVD, navigate to the "MDI" folder. Click on **Setup.exe**. This will launch the installation of the MDI application as defined in the MDIInstall.msi file.

NOTE: *If the MDI application is already installed, you will receive a notice that you must uninstall prior to re-installation.*

MDI Application Installation

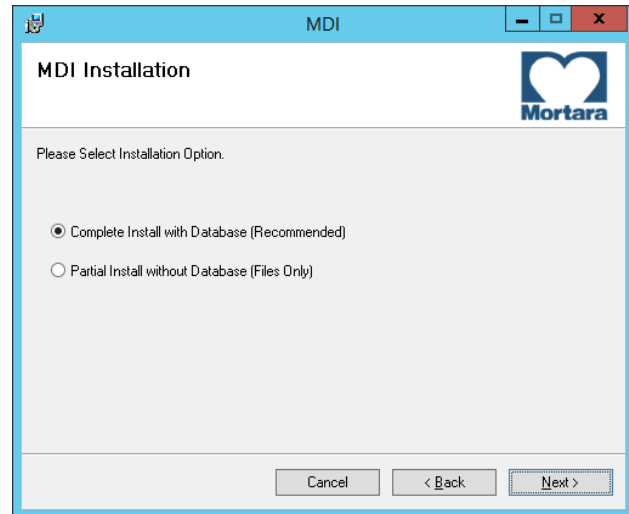
The user will be presented with the MDI Installation dialog.

Click **Next** to start the installation process.



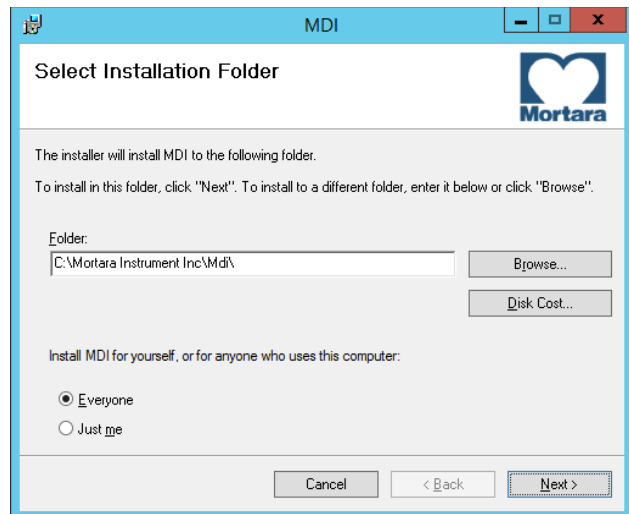
This will prompt the user with the “Select Installation Option” dialog. Select COMPLETE INSTALL WITH DATABASE (or Partial install if its an upgrade).

Click **Next** to proceed.



This will prompt the user with the “Select Installation Folder” dialog. DO NOT make any changes to the default settings. The MDI must be installed in the “Mortara Instrument Inc\Mdi” folder for proper operation.

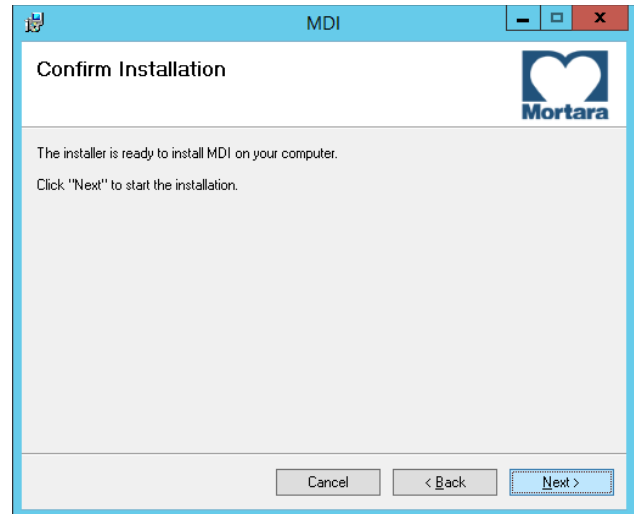
Click **Next** to proceed.



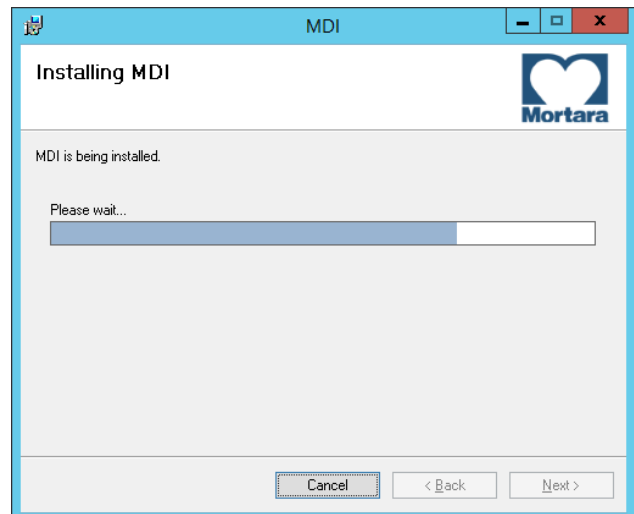
This will prompt the user with the "Confirmation" dialog.

Click **Next** to start the MDI software installation.

If prompted *Do you want to allow this app to make changes to your device?* click **Yes**.



This will display the MDI Installing dialog.



If you select the Complete Install option, the Database Connection configuration screen will appear. Enter the SQL Database connection parameters for the ELI Link Database.

Default configurations (based on MDI SQL install):

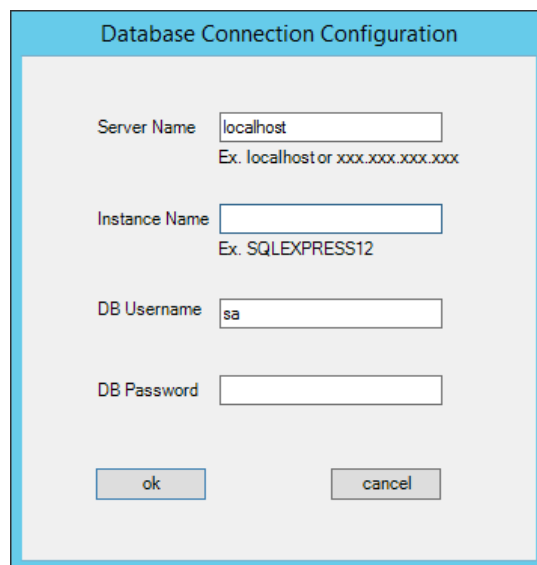
Server Name: **Localhost**

Instance Name: **MDI_ENGINE**

DB Username: **sa**

DB Password: **Mdi_Engine_14** (or your custom password)

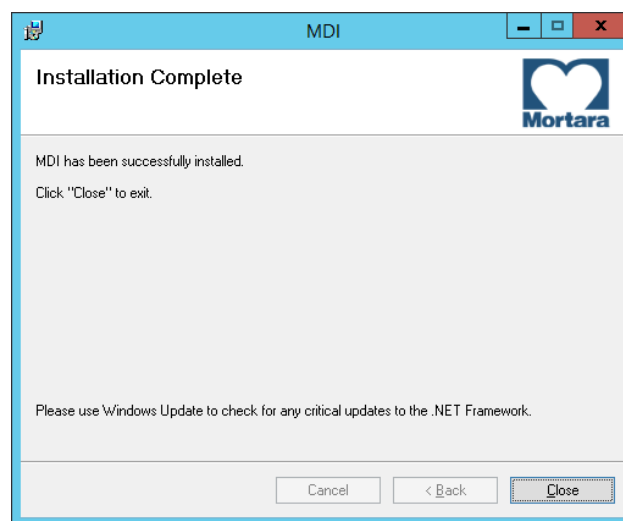
Click **Ok** to continue.



The dialog box is titled "Database Connection Configuration". It contains four input fields: "Server Name" with the value "localhost" and a hint "Ex. localhost or xxx.xxx.xxx.xxx"; "Instance Name" with a hint "Ex. SQLEXPRESS12"; "DB Username" with the value "sa"; and "DB Password" which is empty. At the bottom are "ok" and "cancel" buttons.

When the installation of the MDI software is complete, the MDI Installation Complete dialog will appear.

Click **Close** to exit the Installation.



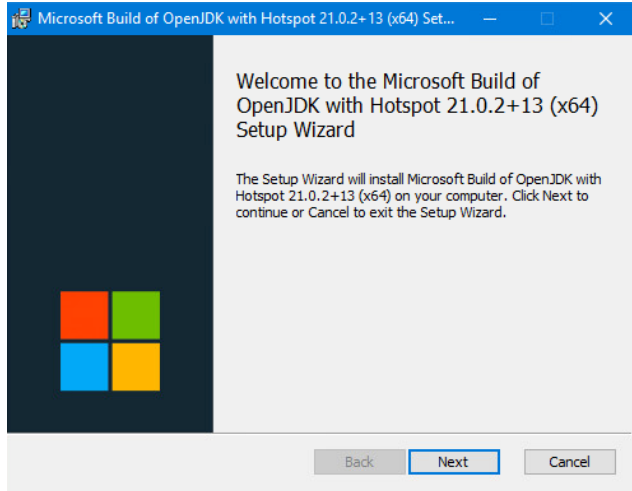
Once the installation is complete, you may elect to create a shortcut to the MDI Configuration tool. This can be done by creating a new shortcut on the desktop:

- Browse – "C:\Mortara Instrument Inc\Mdi\bin\MDI Config.exe".
- Name of Shortcut: "MDI Configuration".
- Location of Shortcut: "C:\Users\Public\Desktop"
- Open Properties Windows for MDI Configuration shortcut and select **Change Icon**. Select **OK** and then browse/select "Mortara.ico" in directory "C:\Mortara Instrument Inc\Mdi\bin\". Click **Open** and then **OK**. Select **Apply** and then **OK**.

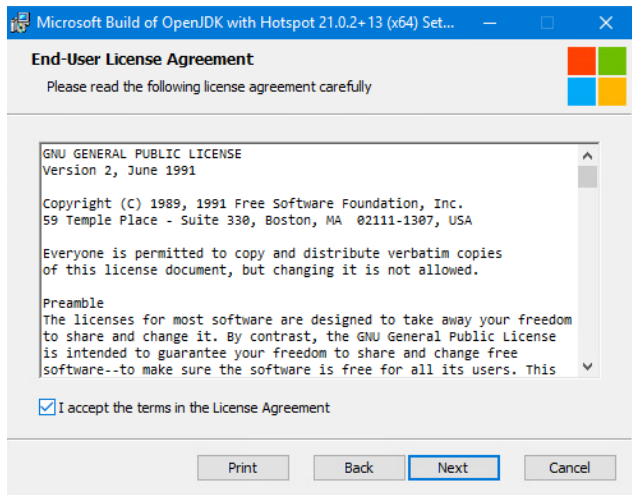


This completes the installation of the MDI application.

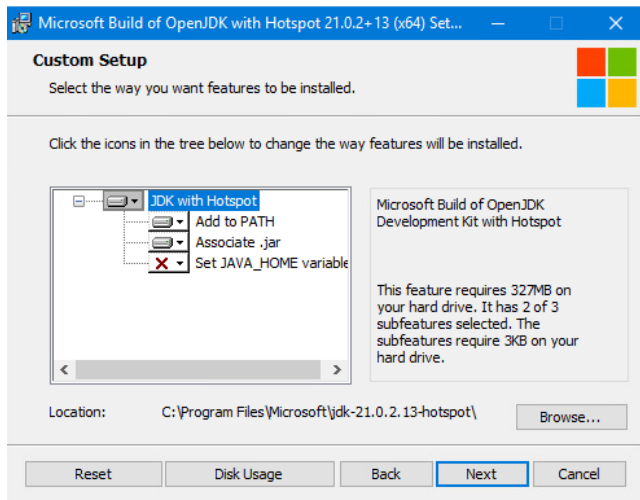
OpenJDK Installation



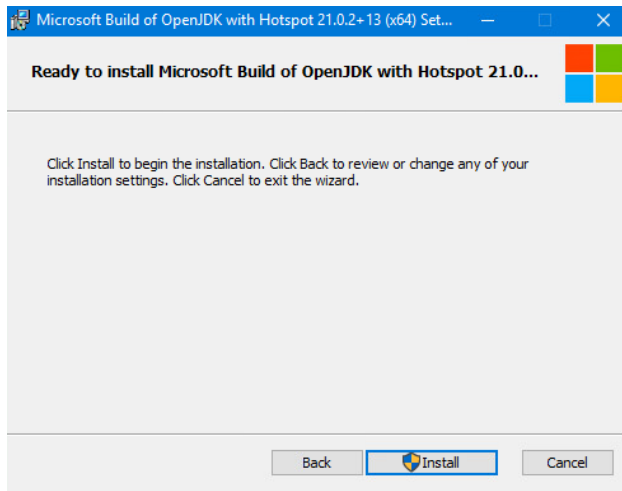
Select **Next** from the Welcome screen.



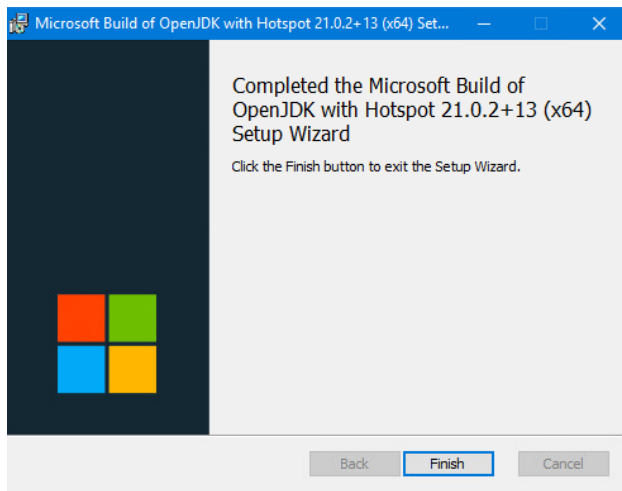
Accept the End-User License Agreement and click **Next** to continue.



Select **Next**.



Select **Install**.



Select **Finish** to complete the installation and **Reboot** the system.

Mirth Interface Engine Installation

This section installs the Mirth Connect Interface Engine. The Mirth Interface Engine is required to manage HL7 messaging between the EHR and the MDI database. It can be downloaded at the following location:

<https://github.com/nextgenhealthcare/connect/releases>

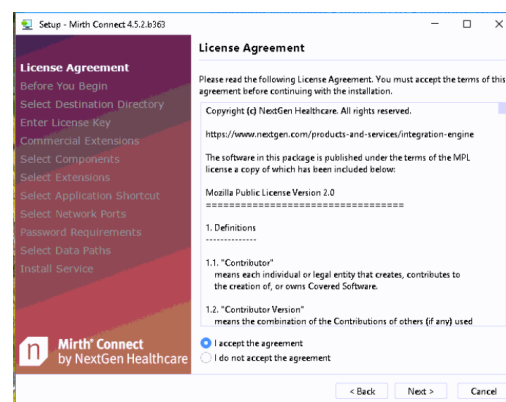
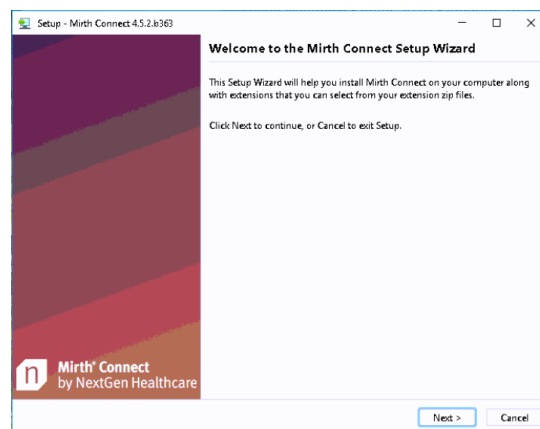
Run the mirthconnect-4.5.2.b363-windows-x64.exe

Click **Next** to continue.

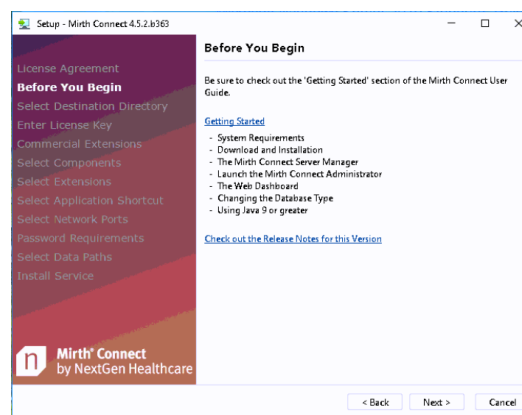
NOTE: You must always install (select Next) the Mirth Connect software. If you select Cancel, the MDI installation will fail and the MDI product will be uninstalled.

A license agreement dialog is issued indicating that use of this product shall comply with the Mozilla Public License (MPL 1.1).

Select **Accept** and click **Next** to continue.

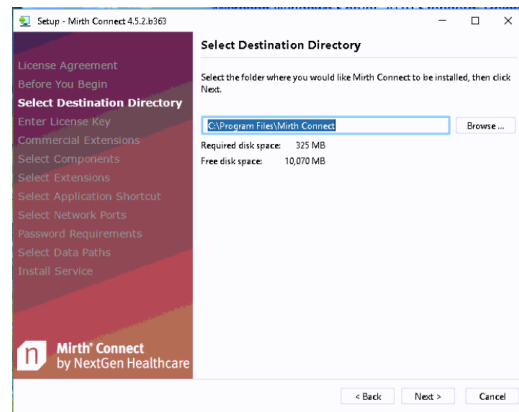


Click **Next** to continue.



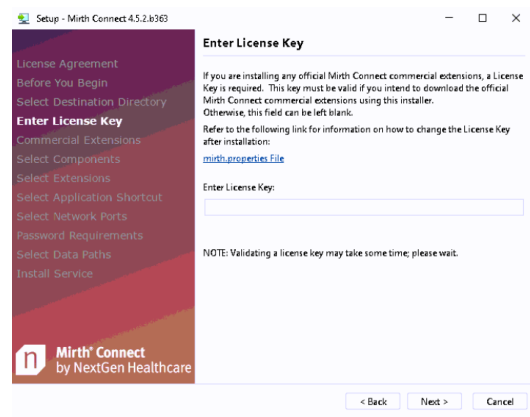
An installation folder dialog is presented. Use the default installation location.

Click **Next** to continue.

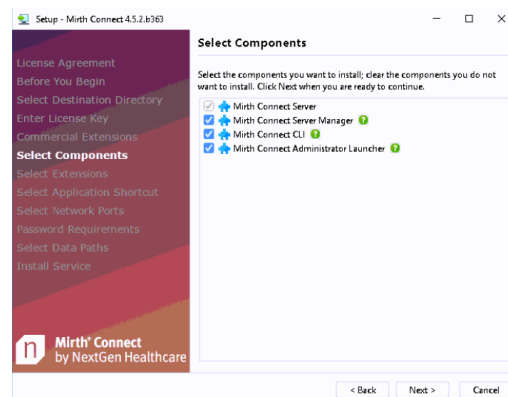


A License Key box is presented. Do not enter anything in the license key.

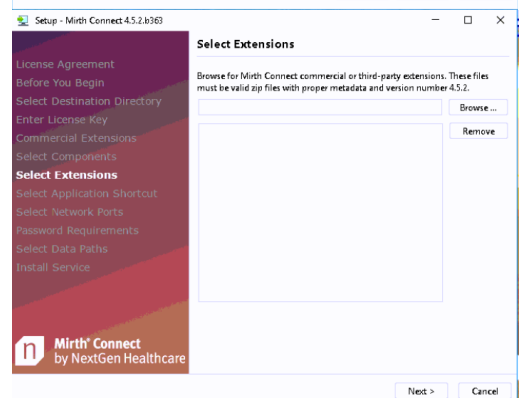
Click **Next** to continue.



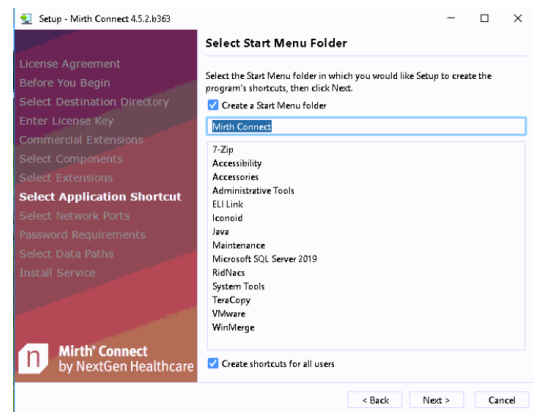
A components selection dialog is presented. Select all components.
Select All Components and click Next to continue.



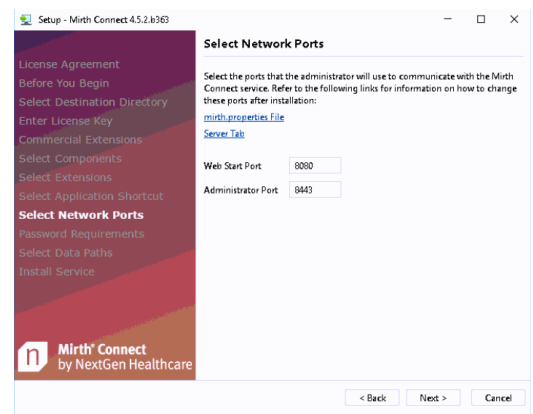
A Select Extensions dialog is presented.
Press Next to continue.



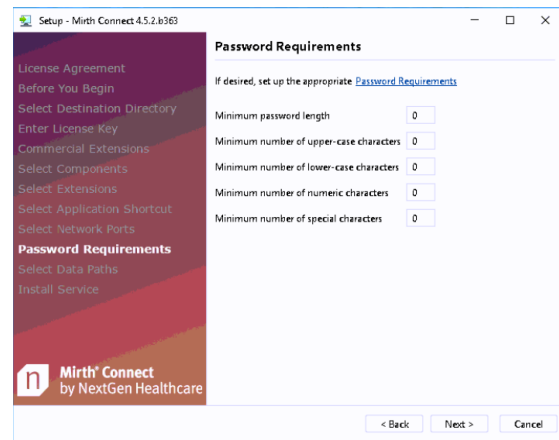
A Start Menu dialog is presented. Use the default settings. Click **Next** to continue.



A Server Settings dialog is presented. Use the default settings. Click **Next** to continue.



A Security Settings dialog is presented. Use the default settings. Click **Next** to continue.



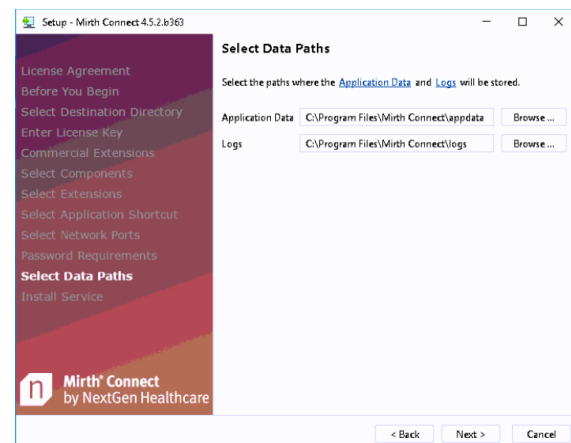
Depending on the Windows Firewall setting on the computer that the software is being installed, you may be presented with a Windows Firewall dialog. Select **Private networks** setting.

NOTE: You should not receive this message if you are an Administrative user performing the installation.

Click **Allow access** to continue.

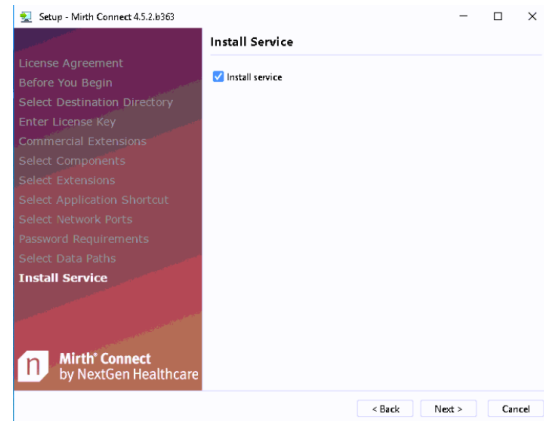
A Server Settings - Paths dialog is presented. This indicates the location of the Server log files and application data. Use the default settings.

Click **Next** to continue.

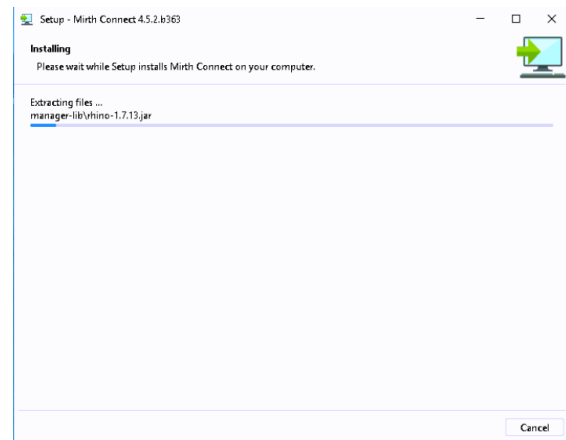


A Server Settings - Service dialog is presented. This allows you to run the Mirth interface engine as a Windows service. Select **Install service** (default).

Click **Next** to install the software.



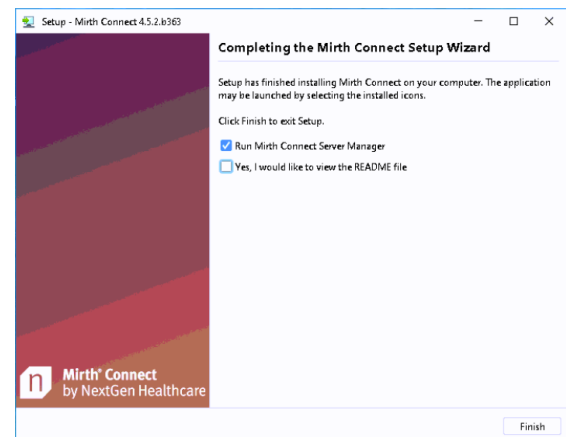
An Installing dialog will be presented as the Mirth interface engine software is being installed.



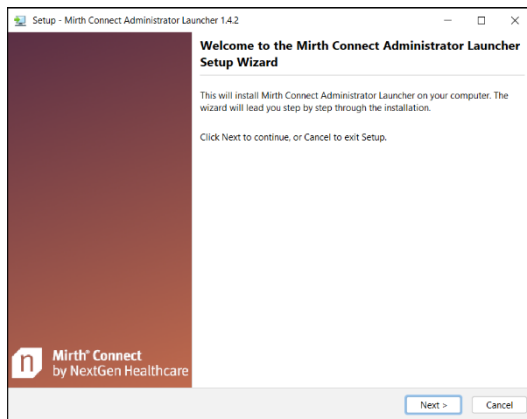
A Completing dialog will be presented when the software installation is complete. Deselect viewing the README file.

Click **Finish** to complete the installation.

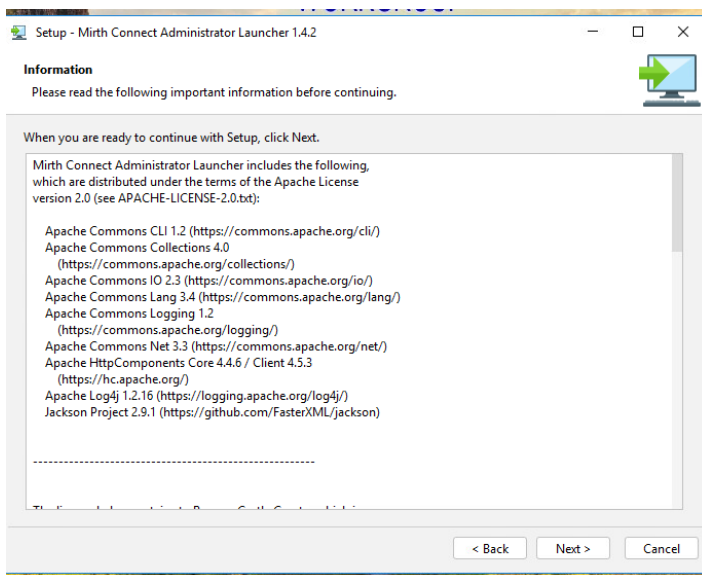
If prompted *Do you want to allow this app to make changes to your device?* Click **Yes**.



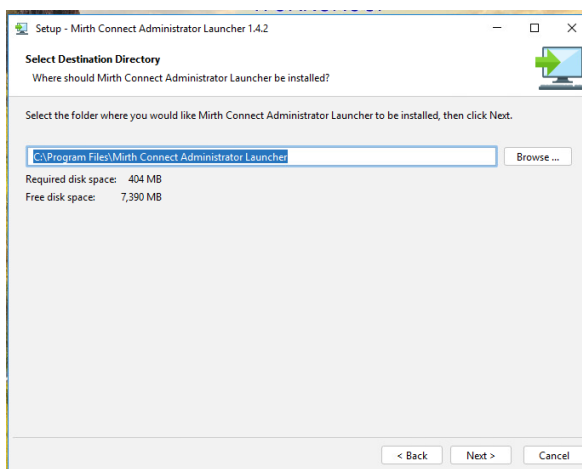
The Mirth Connect Administrator Wizard will appear.



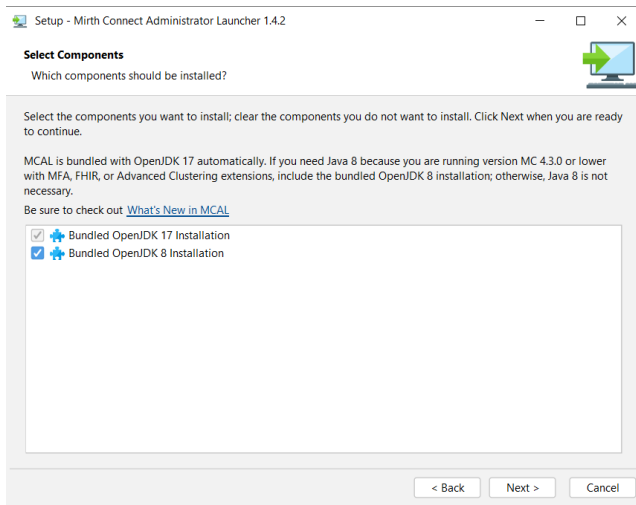
Select "Next".



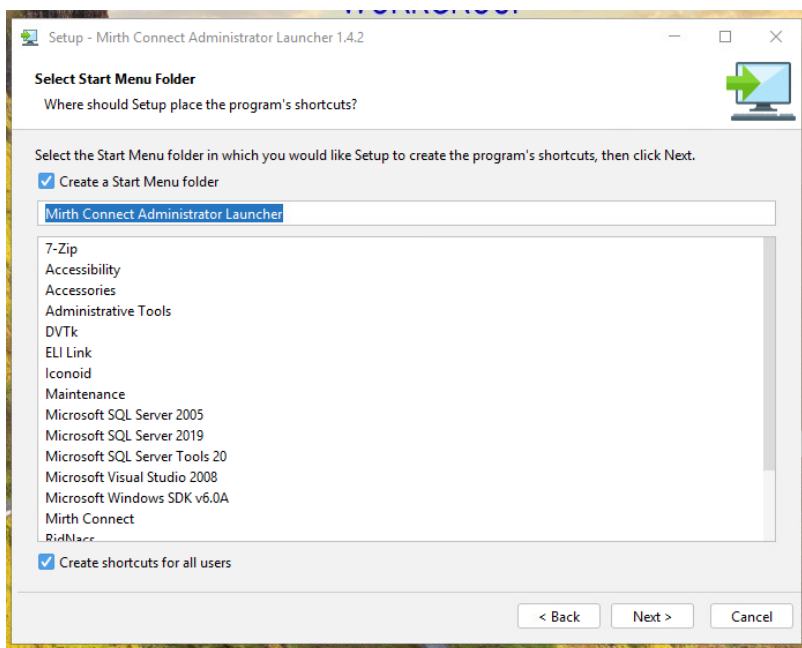
Select "Next".



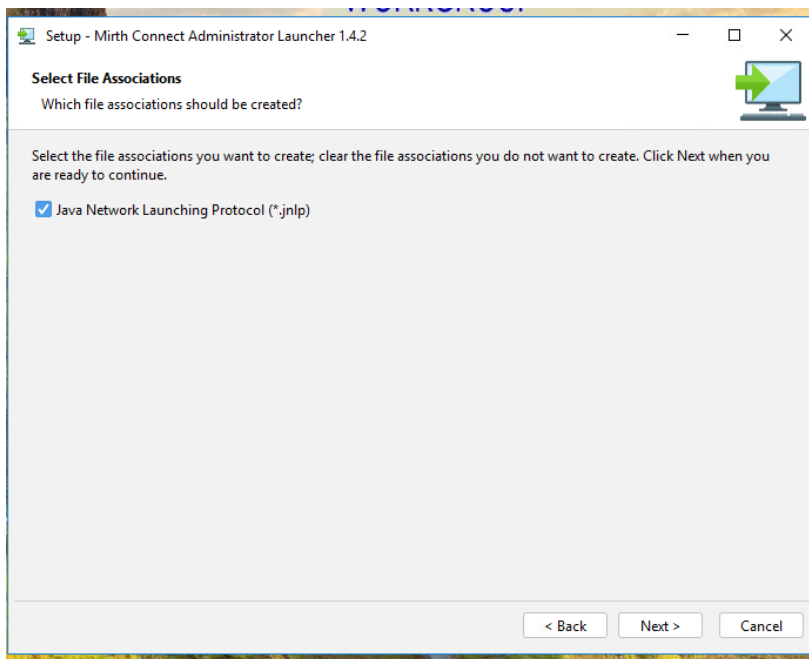
Select "Next."



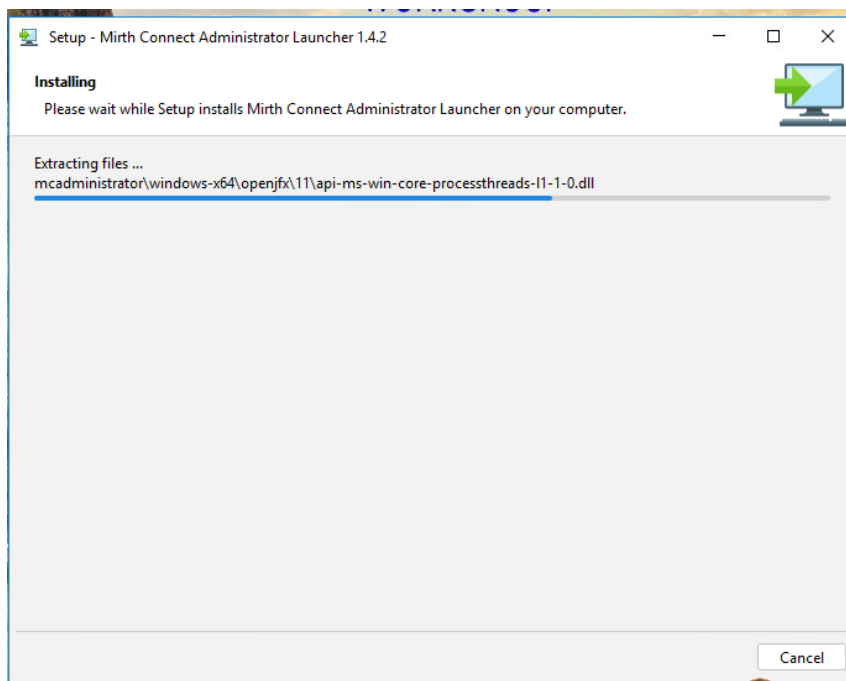
Select "Next."



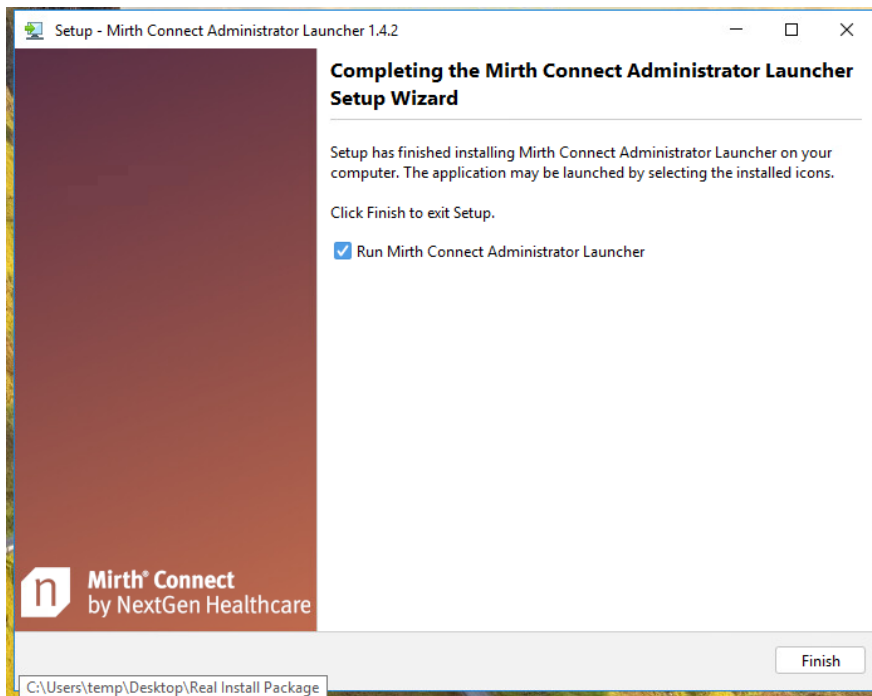
Select Next.



Click "Java Network Launching Protocol (*.jnlp)" and select "Next".



Files will begin copying.



Select "Finish".

Reboot the system after the installation has completed. Once the system has been rebooted, launch the Mirth Administrator.

Ensure that version 1.4.2 was installed. by checking the upper-left corner of the Mirth Administrator software screen.

MDI PRODUCT CONFIGURATION

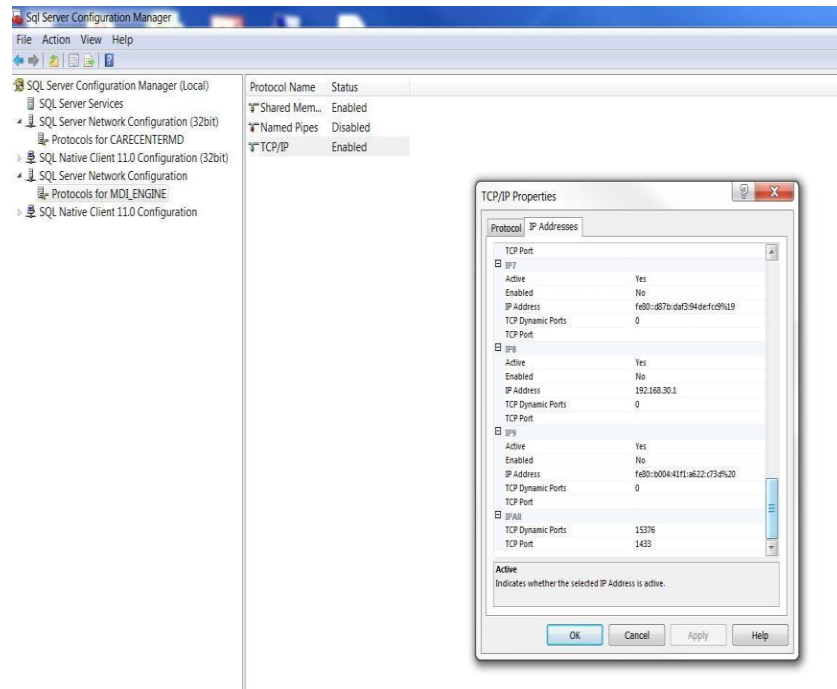
Configuring SQL Server Networking

This section configures the SQL Server Express Database Engine for use with the TCP/IP protocol. We will use the SQL Server 201x Express SQL Server Configuration Manager tool (2017 or 2019 version).

After opening the *SQL Server Configuration Manager* application, you will be presented with a menu containing various network configuration options to be selected.

- [SQL Server Network Configuration menu](#)
This section enables 1) TCP/IP network protocol for the SQL Server Database Engine and 2) port 1433 for use by the Mirth Interface engine.
 - Protocols for MDI_ENGINE submenu.
 - Enable following communications protocols:
 - Shared Memory
 - TCP/IP
 - Right Click on TCP/IP communications protocol and select Properties.
 - Select the IP Address Tab
 - Select the "IPAll" entry
 - Set the TCP Port to 1433

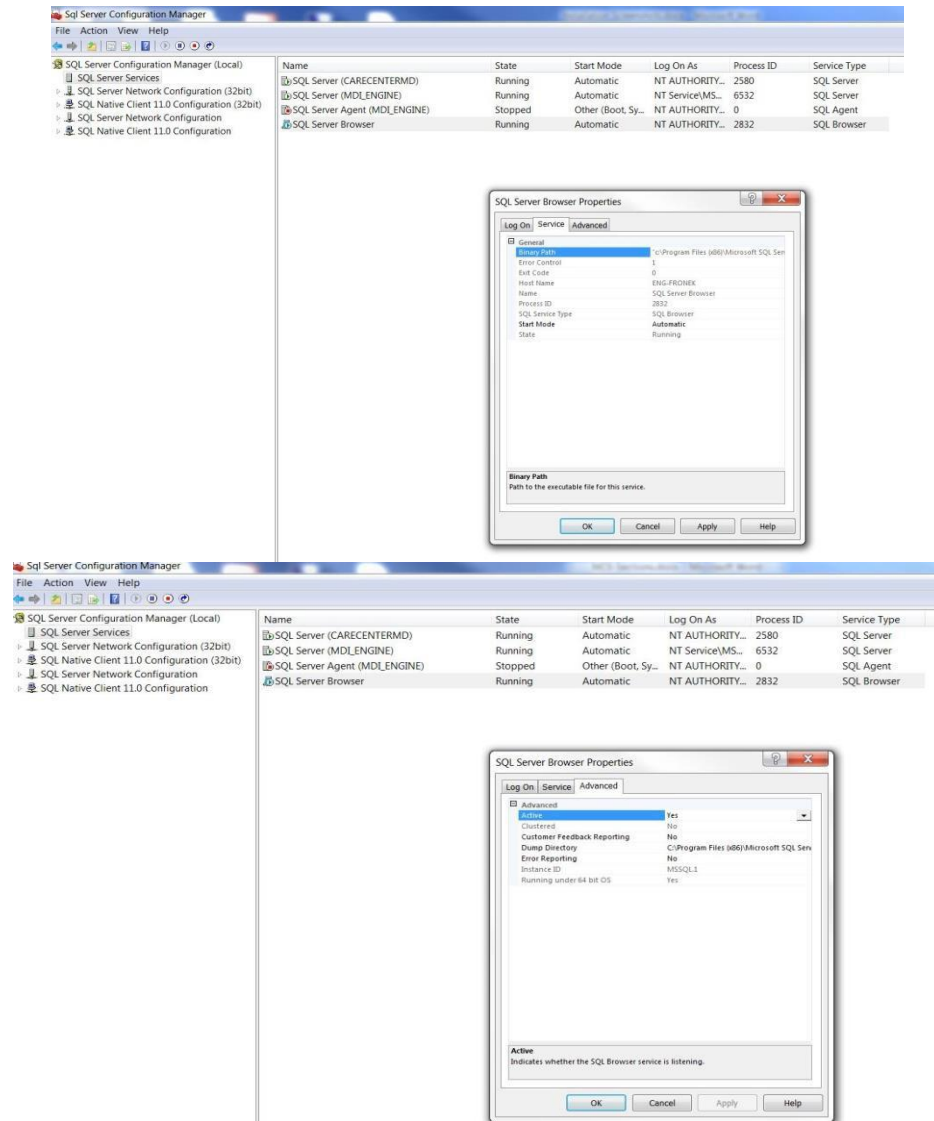
- Select Apply and OK



- SQL Server Services menu

This section enables client applications to access the MDI database over a network.

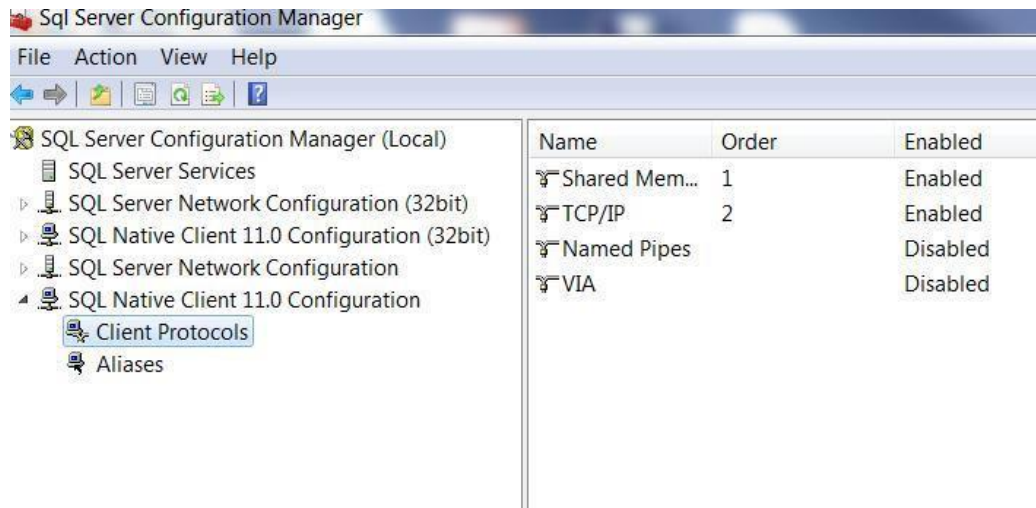
- This will display a least of services in the right hand pane.
- Right Click on SQL Server Browser service and select Properties. This will display the SQL Server Browser Properties dialog.
- Select the Service tab and ensure the Start Mode is set to Automatic.
- Select the Advanced tab and ensure Active is set to Yes.
- Select Apply followed by OK to save your changes.



- [SQL Native Client 11.0 Configuration \(32 bit\) menu](#)

This section enables a 32 bit application to access the MDI database using the TCP/IP protocol.

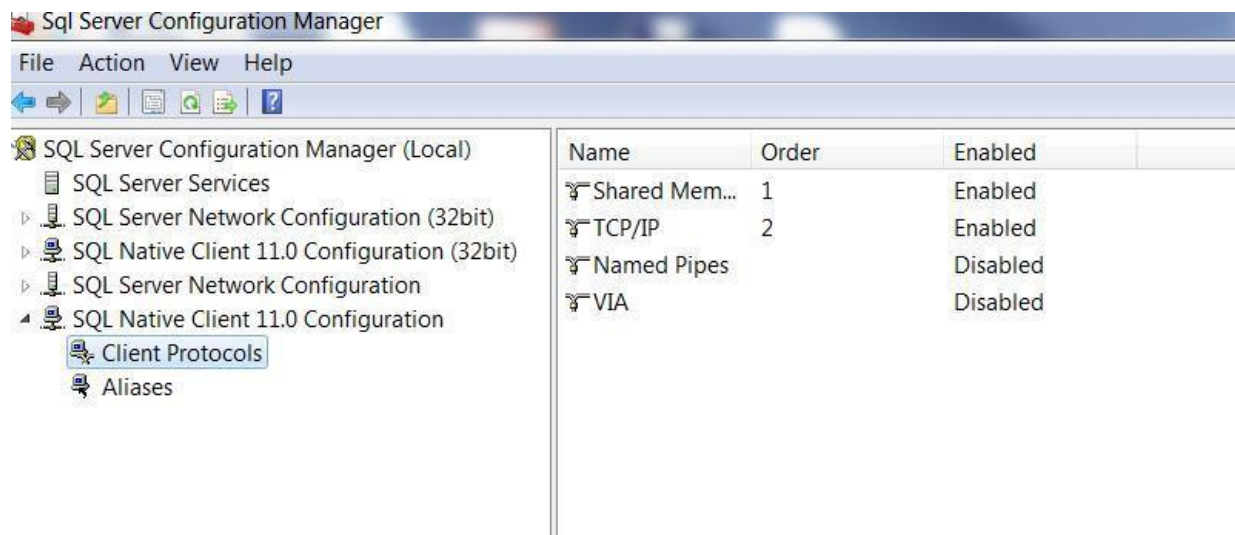
- Client Protocols submenu.
 - Enable following communications protocols:
 - Shared Memory (1)
 - TCP/IP (2)



- [SQL Native Client 11.0 Configuration menu](#)

This section enables client applications to access the MDI database using the TCP/IP protocol.

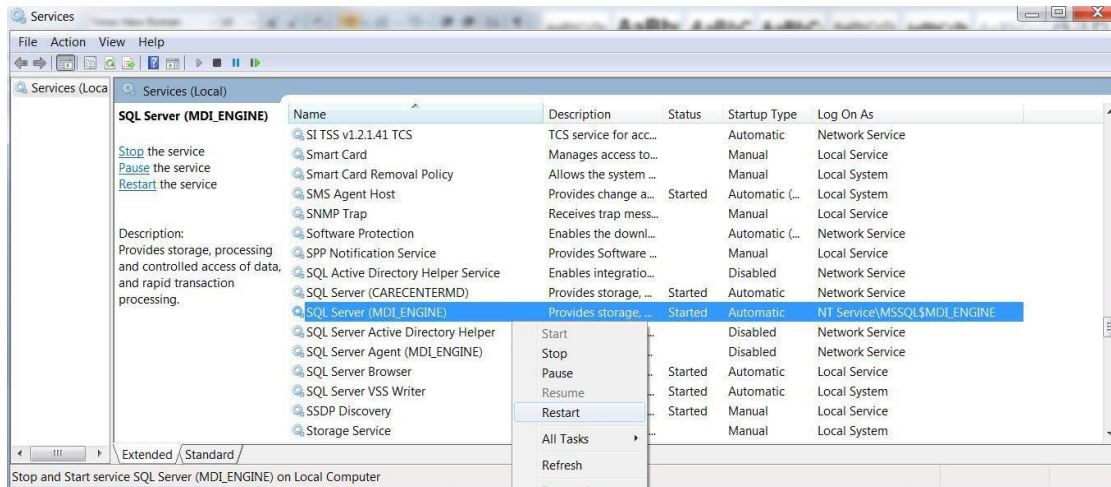
- Client Protocols submenu
 - Enable following communications protocols;
 - Shared Memory (1)
 - TCP/IP (2)



- **Final SQL Server Configuration Steps**

This section describes the steps necessary to make the changes take effect in the SQL Server Database Manager.

- Close the SQL 201x Server Configuration Manager (2017 or 2019 version).
- Re-start the SQL Server Service; Control Panel, Administrative Tools (may be under System and Security) , Services.
 - Select Restart of the SQL Server (MDI_ENGINE).



Installing the MDI Services

This section describes how to install and configure the MDI services. This operation only needs to be performed once during the initial installation. The program to install the MDI services is located found in the "bin" folder of the MDI application installation. Open an elevated command prompt (i.e. Run command prompt as Administrator) and then go to the bin folder. Type in RegisterMDIServices.bat.

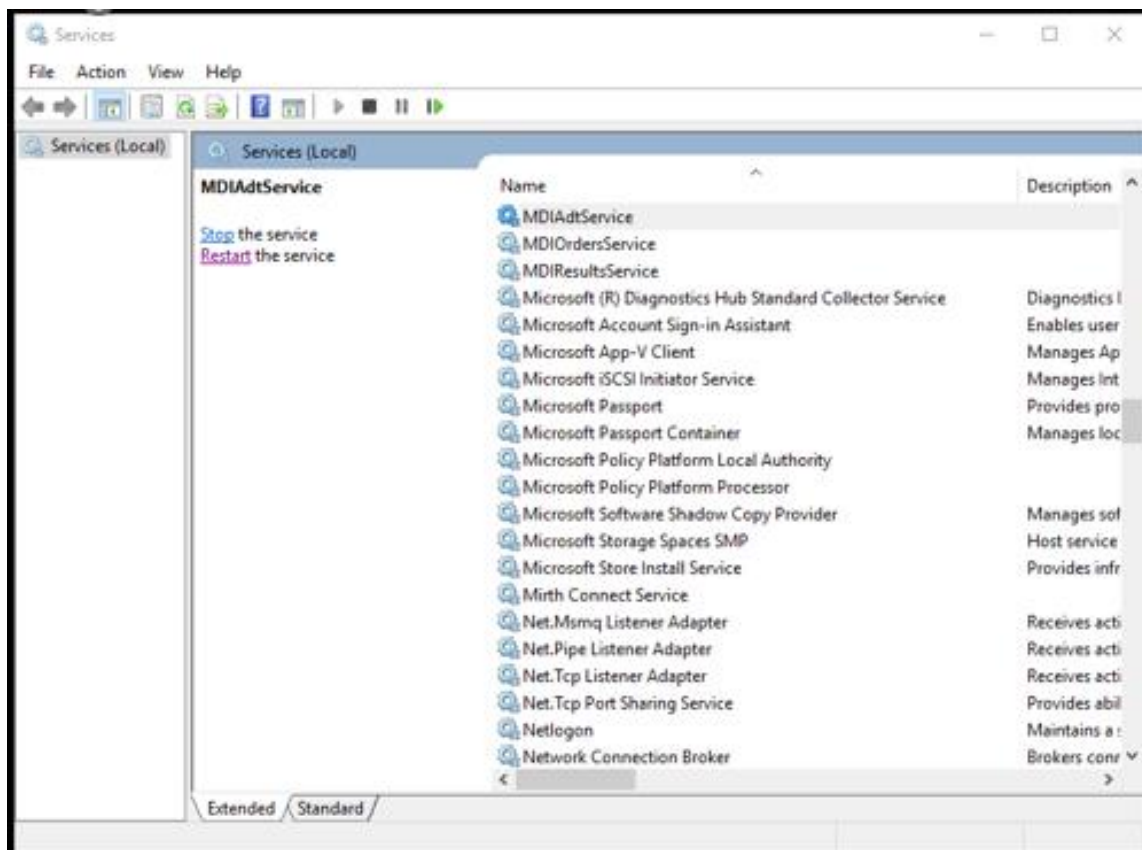
- Open an elevated DOS (CMD) window
- Change directory to the "bin" folder of the MDI application installation
- Run the RegisterMDIServices.bat

This will install the MDI ADT, Orders and Results services. It will also start the service.

To verify operation, you can open Windows Task Manager, select Services tab and look for the MDIAdtService, MDIOrdersService and MDIResultsService. It should indicate they are Running.

The services are dependent upon the Microsoft SQL Server application to be running. In order to successfully restart the services upon a reboot of the system hosting the MDI HL7 interface, it will be necessary to configure the services with a Delayed Start. This can be done by using:

- Control Panel -> Administrative Tools -> Services. Right click on the services and select Properties.
- In the General tab of the Properties dialog; select the "Startup Type" to be "Automatic (Delayed Start)".



Configuring Interface Engine

This section configures the Mirth Connect Manager and the Mirth Administrator Account for use with the MDI application. The Mirth Interface Engine is required to manage HL7 messaging between the EHR and MDI applications.

Configuring Mirth Connect Manager

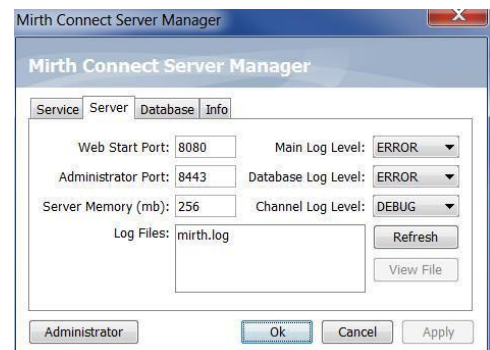
Select the **Show Manager** option by right clicking on the Mirth Interface Engine icon in the desktop tray.



This will present you with the Mirth Connect Server Manager dialog – Service tab. Ensure that “Start Mirth Connect Server Manager on system startup” is selected (default).

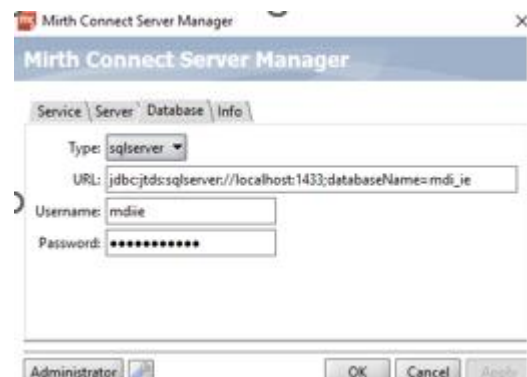


Select the **Server** tab. This will present you with the Mirth Connect Server Settings tab. Use the default values indicated in the dialog below.



Select the **Database** tab. This will present you with the Mirth Connect Server Database tab. Configure the Mirth Connect Server to use the MDI IE database using the following settings:

- Type: SQL Server/Sybase
- URL:
jdbc:jtds:sqlserver://localhost:1433;databaseName=mdi_ie
- Username: mdiie
- Password: !!20ldM14%A



After you have entered in the settings, select **Apply** followed by **OK**. This will dismiss the Show Manager dialog. This will also restart the Mirth Interface engine with the updated server settings. The Mirth Connect Manager (orange M icon in the desktop tray) will indicate success if the Mirth Interface engine is successfully started with the new settings.

If the Mirth Interface engine does not successfully start; the problem is most likely related to:

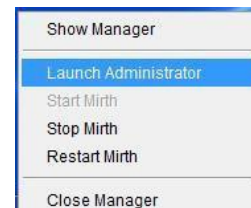
- SQL Server does not have TCP/IP Enabled
- Port #1433 is not enabled

Reference the SQL Server Express setup section for more detail on configuring these parameters. Also consult the Mirth Interface engine log file (mirth.log) for more detail on the startup failure.

Configuring Interface Engine – Administrator Account

This section configures the Mirth Connect Interface Engine Administrator account. This account is used for the deployment of interfaces and monitoring the status of such interfaces.

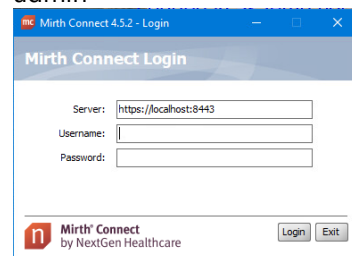
Select the “Launch Administrator” option by right clicking on the Mirth Interface Engine icon in the desktop tray.



This will launch a dialog in which you enter the user account to access the Interface Engine administrative tool. Enter the following account information:

- User Name – admin
- Password – admin

- admin



The login will detect if this is the first time you have accessed the Interface Engine administration application. This will present a dialog (which only needs to be done once).

Enter the information as outlined in the dialog with the following user credentials:

- Username – admin
- Password – admin

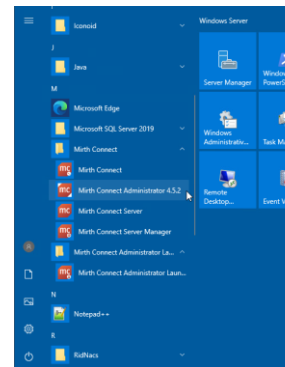
System Restart

Prior to configuring the Mirth Channels it will be necessary to power cycle (restart) the computer hosting this 3rd party software. Once the restart is complete, proceed with the next section.

Launch Mirth Administrator

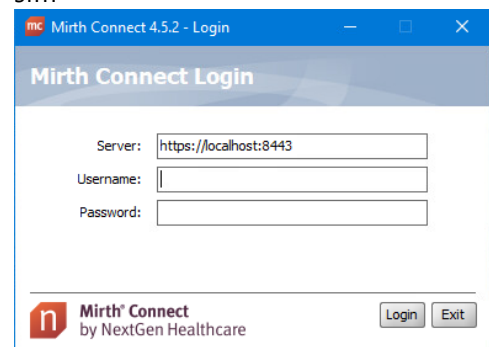
This section launches the Mirth Connect Interface Engine Administrator application which is used for the deployment of interfaces and monitoring the status of such interfaces.

Select the "Launch Administrator" option by right clicking on the Mirth Interface Engine icon in the desktop tray.



This will launch a dialog in which you enter the user account to sfm
access the Interface Engine administrative tool. Enter the
following account information:

- User Name – admin
- Password – admin



The login may detect that this is the first time you have accessed the Interface Engine administration application.

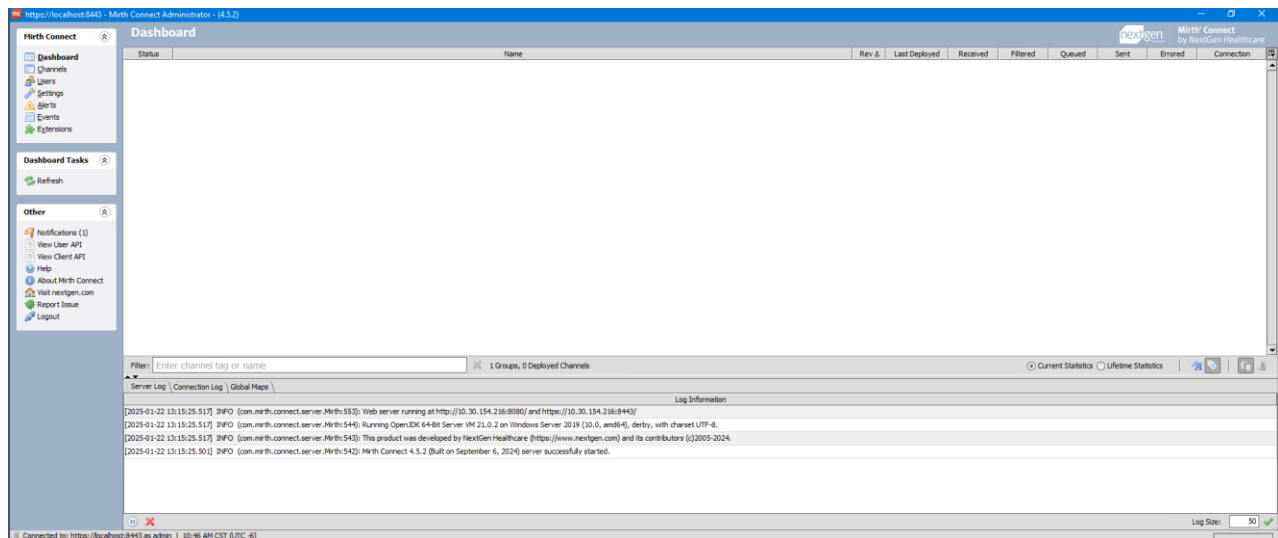
Once again enter the information as outlined in the dialog with the following user credentials:

- User Name – admin
- Password – admin
- Organization

Select "Close".

Reboot the system.

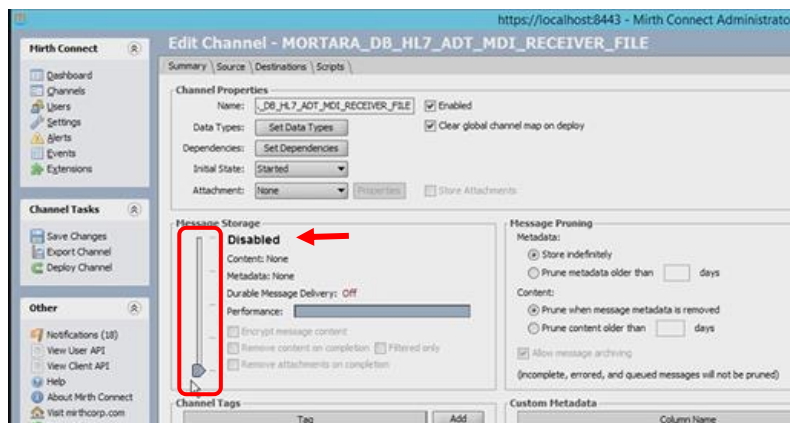
Once you have successfully logged into the Interface Engine administrative application, you will be presented with a screen upon which you can perform administrative actions.



Disabling Message Logging – ONLY NEEDED IF USING SQL EXPRESS (for 10GB file size limit)

Note – Disabling message storage will remove all information needed to troubleshoot problems encountered during the installation process. If using SQL Express, message logging may be left enabled until the system is ready to Go Live in a production environment, once no open issues remain.

- From the administrative application, click on the “Dashboard” icon in the left column.
- Left click row over "MORTARA_DB_HL7_ADT_MDI_RECIEVER_FILE" and then right click to select "Start".
- Disable message logging in “MORTARA_DB_HL7_ADT_MDI_RECIEVER_FILE" channel properties to avoid exceeding the 10GB file size limit.



Message Pruning - Optional:

If Message Logging is not DISABLED, Message Pruning can be setup to reduce message volume stored on the system.

Message Pruning

Metadata:

☐ Store indefinitely

☒ Prune metadata older than days

Content:

☐ Prune when message metadata is removed

☒ Prune content older than days

☒ Allow message archiving

(incomplete, errored, and queued messages will not be pruned)

Data Pruning - Optional:

These settings can be used to reduce the size and history of logged events in the system, if logging is desired for a defined period of time.

1. Select “Settings”
2. Select “Data Pruner” tab
3. Set a schedule
4. Save the settings.

The screenshot shows the Mirth Connect Administrator interface at the URL <https://localhost:8443>. The left sidebar contains navigation links: Dashboard, Channels, Users, Settings, Alerts, Events, and Extensions. The 'Settings' link is selected. The main content area is titled 'Settings' and shows the 'Data Pruner' configuration. The 'Status' section indicates the current state is 'Not running', with the last process completed on Jan 30, 10:48:00 AM. The 'Schedule' section has 'Enable' set to 'Yes' and 'Schedule Type' set to 'Time'. The 'Prune Settings' section has 'Block Size' set to 2000, 'Prune Events' set to 'Yes', and 'Prune Event Age' set to 30 days. The 'Archive Settings' section has 'Enable Archiving' set to 'Yes', 'Archive Block Size' set to 10, 'Content' set to 'HL7 v2.x message', 'Compression' set to 'None', and 'Password Protect' set to 'No'. The 'File Pattern' field is empty. A table on the right side of the interface lists various message attributes: Message ID, Set ver ID, Channel ID, Original File Name, Formatted Message Date, Formatted Current Date, Timestamp, Unique ID, and Count.

Deploying Interface Engine Channels

This section describes how to deploy an HL7 ADT, ORM and ORU channels using the Mirth Connect Interface Engine. For purposes of example we will import the HL7 ADT File Reader channel.

Login to the Mirth Administrator application using the “admin” account. This will display the

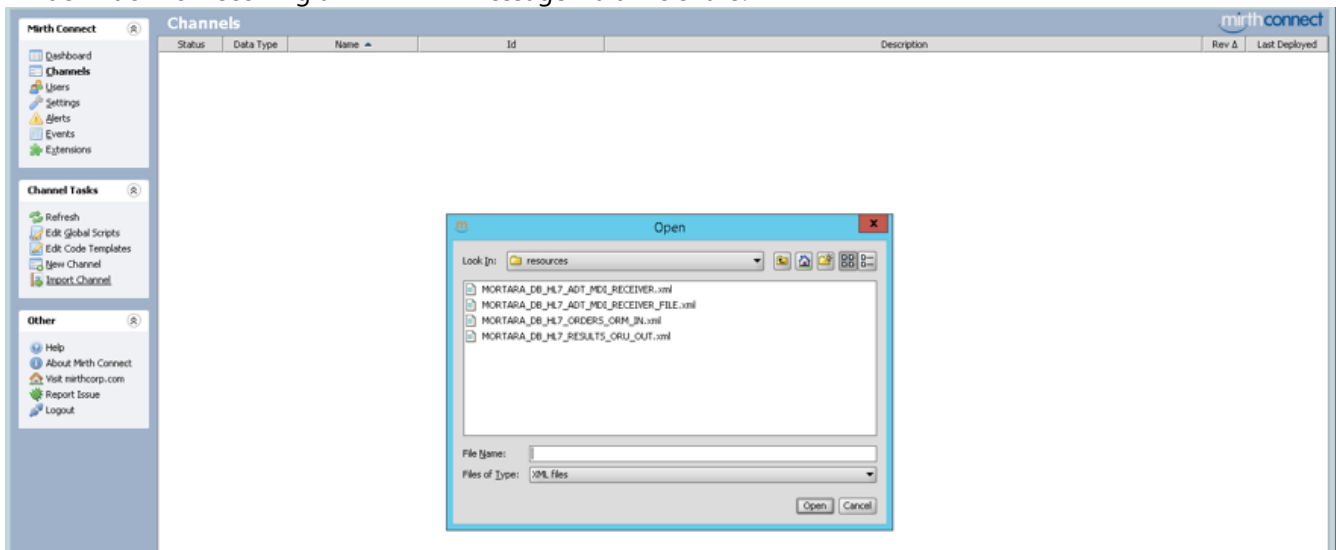
main Mirth Administrator page.

To deploy a channel, perform the following steps:

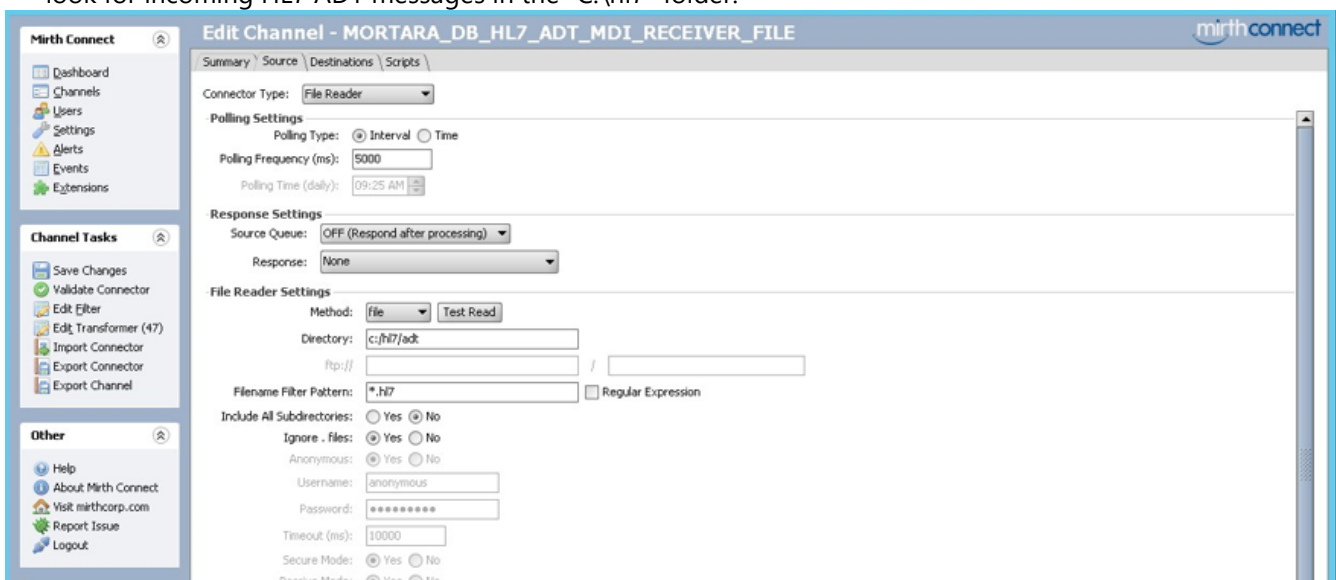
- Mirth Connect menu; Select Channels
- Channel Tasks menu; Select Import

Note: The channel for PDQ is found in the following directory "C:\ProgramData\Mortara Instrument Inc\ELI Link\PDQMirthResources" and is not with all the other channels.

This will display the following dialog which allows the user to select a channel file to import. In this case we are selecting the "MORTARA_DB_HL7_ADT_MDI_RECEIVER_FILE.xml" which contains the channel definition for receiving an HL7 ADT message via a file share.



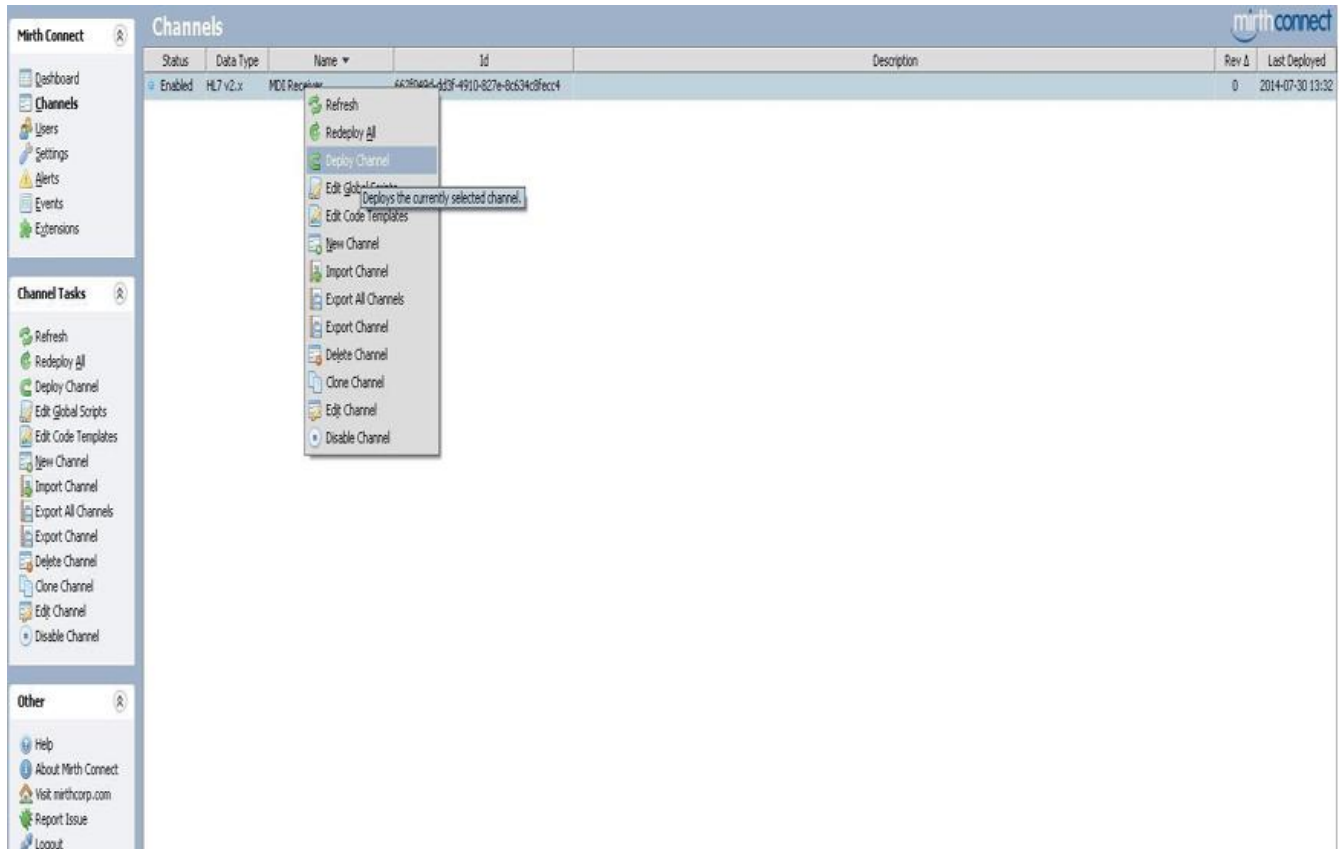
Once the channel file has been selected the "Edit Channel" windows will be displayed. It has four tabs; Summary, Source, Destinations, Scripts. Each describes the characteristics of the channel. The following dialog displays the "Source" information for the channel. You can see that the Mirth Interface engine will look for incoming HL7 ADT messages in the "C:\hl7" folder.



Create a folder on the C drive and labeled hl7. Next, open the hl7 folder and create the following subfolders:

- adt
- orm
- out

Once the channel has been reviewed, **Save** the channel. This action will display the Mirth – Channels dialog. This dialog presents all the channels that are known to the Mirth Interface engine. You will see the “MDI Receiver” channel in the list. Right click on the **MDI Receiver** channel and select **Deploy Channel**. This will start the channel for use.



Repeat the steps above to import the ORM and ORU channels.

Once the channels have been deployed the status of the channels will be set to “Started”. The following dialog demonstrates the status of “Started” for the MDI Receiver channel. The channel has been expanded to depict the “source” and “destination (ADT dest)” of the channel. In the case of this channel; the ADT destination is defined as a patient record in the MDI Queue database.

The screenshot displays the Mirth Connect Dashboard. On the left, a sidebar contains navigation links: Dashboard, Channels, Users, Settings, Alerts, Events, and Extensions. Below these are Dashboard Tasks (Refresh) and Other links (Help, About Mirth Connect, Visit mirthcorp.com, Report Issue, Logout). The main area shows a table of channels with columns: Status, Name, Rev #, Last Deployed, Received, Filtered, Queued, Sent, Errored, and Connection. The table lists several channels, including '44MORTARA_DB_HLT_RESULTS_ORU_OUT', 'Source', 'Destination 1', 'MORTARA_DB_HLT_ADT_MDI_RECEIVER_FILE', 'Source', 'ADT dest', 'MORTARA_DB_HLT_ORDERS_ORU_IN', 'Source', and 'ORM dest'. All channels are in a 'Started' state. Below the table, there is a section for '3 Deployed Channels' with tabs for 'Server Log' and 'Connection Log'. The 'Server Log' tab is active, showing log information with timestamps and messages, including warnings and errors related to XML parsing and external DTDs.

Status	Name	Rev #	Last Deployed	Received	Filtered	Queued	Sent	Errored	Connection
Started	44MORTARA_DB_HLT_RESULTS_ORU_OUT	0	2016-12-16 09:34	0	0	0	0	0	Idle
Started	Source	--	--	0	0	0	0	0	Idle
Started	Destination 1	--	--	0	0	0	0	0	Idle
Started	MORTARA_DB_HLT_ADT_MDI_RECEIVER_FILE	0	2016-12-16 09:34	0	0	0	0	0	Idle
Started	Source	--	--	0	0	0	0	0	Idle
Started	ADT dest	--	--	0	0	0	0	0	Idle
Started	MORTARA_DB_HLT_ORDERS_ORU_IN	0	2016-12-16 09:34	0	0	0	0	0	Idle
Started	Source	--	--	0	0	0	0	0	Idle
Started	ORM dest	--	--	0	0	0	0	0	Idle

3 Deployed Channels

Show: ☒ Current Statistics ☐ Lifetime Statistics

Server Log | Connection Log

Log Information

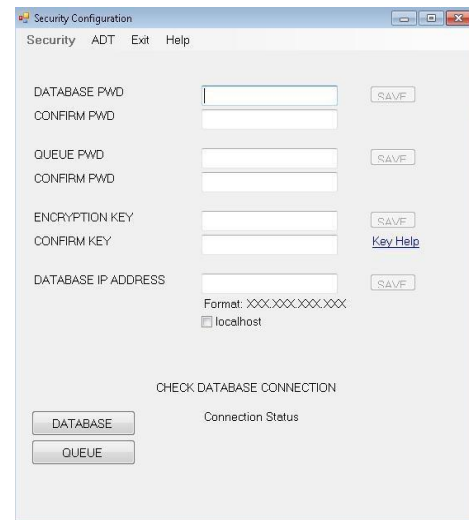
```
[2016-12-15 14:14:35,744] INFO (com.mirth.connect.server.Mirth:587): Running Java HotSpot(TM) Client VM 1.7.0_67 on Windows Server 2012 (6.2, x86), sqlserver, with charset windows-1252.
[2016-12-15 14:14:35,744] INFO (com.mirth.connect.server.Mirth:586): This product was developed by Mirth Corporation (http://www.mirthcorp.com) and its contributors (c)2005-2016.
[2016-12-15 14:14:35,744] INFO (com.mirth.connect.server.Mirth:585): Mirth Connect 3.0.0.6931 (Built on September 30, 2013) server successfully started.
[2016-12-15 14:14:31,681] ERROR (Server:146): WARNING: 'org.apache.xerces.jaxp.SAXParserImpl: Property 'http://javax.xml.XMLConstants/property/accessExternalDTD' is not recognized.'
[2016-12-15 14:14:31,681] ERROR (Server:146): Compiler warnings:
[2016-12-15 14:14:30,072] ERROR (Server:146): Warning: org.apache.xerces.jaxp.SAXParserImpl$3JAXPSAXParser: Property 'http://www.oracle.com/xml/jaxp/properties/entityExpansionLimit' is not recognized.
```

Configuring the MDI Application Security

This section describes the configuration of the MDI application security components. The MDI Configuration program is a user interface application that configures the resources used by applications that utilize the MDI interface; e.g. ADT and ELI Link.

This program is located in the "bin" folder of the MDI installation.

Utilize the Security menu when setting application security parameters. This will present you with the Security screen.



The security screen allows you to modify the passwords for the MDI.API.config file;

- MDI Database and MDI Queue

It allows you to modify the encryption key which is used to encrypt the passwords, and it allows you to modify the TCP/IP address of the machine where the SQL Server database instance is located. Note that the two databases are included in the database instance.

Clicking the "Database" or "Queue" buttons will validate the database connection to the respective database; using the IP Address, encryption key and user account (including the password). Changes are saved to the MDI_API.config file; which is located in the "bin" folder of the MDI installation.

Considerations:

- Passwords cannot contain the '&' ampersand character.
- Encryption Key must be exactly 8 characters and cannot contain the '&' character.
- TCP/IP Address format must be XXX.XXX.XXX.XXX. When saving the IP address, the format is validated.
- TCP/IP address: if all MDI applications (including ELI Link) will be running on the same system, you can use "localhost" as the address.
- Applications that utilize the MDI_API.config file will honor updates to the configuration file in real time:
 - ADT service
 - ELI Link (on next database connection)

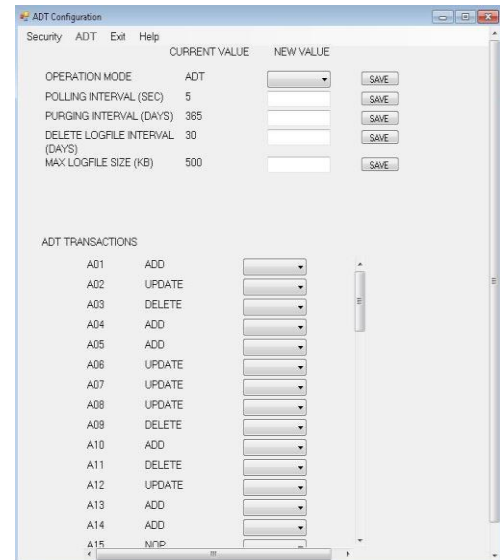
NOTE: If ELI Link is not installed on the same system as the MDI applications; it will need to have the updated configuration file manually copied to the "C:\Mortara Instrument Inc\ELI Link folder.

- The Interface Engine writes ADT messages to the MDI Queue database. The Interface Engine does not use the MDI_API.config file. The user credentials to access the MDI Queue database are included in the channel(s) configuration. If the password is changed for the MDI Queue database, the password must also be updated (manually) for all applicable channels in the Interface Engine.

Configuring ADT Program Parameters

The MDI Configuration program is a user interface application that configures the following resources used by applications that utilize the MDI interface; e.g. ADT and ELI Link.

Utilize the ADT menu when setting ADT program parameters. This will present you with the ADT screen.



The ADT screen allows you to modify the following configuration settings:

- Operation Mode
 - Operation mode can be set to 'ADT', 'Orders' or 'All'.
 - For purpose of supporting the ELI Link Patient Roster; select ADT or ALL.
- Polling Interval
 - This interval (in seconds) determines how often the ADT service will check for patient records in the Queue database.
 - Default value is 5 seconds.
 - Considerations:
 - Value should be entered in a numeric format
 - Value cannot be negative
 - Value cannot have decimal points
- Purging Interval
 - This interval (in days) is used to compute what is called a purging date. This purging date is computed from the current date and then subtracting the # of days indicated in the purging interval. This purging date is then used when checking to purge all patient records from the Database that have a transaction date older than the purging date.
 - The purging operation is performed once every 24 hours.
 - Default value is 365 days.
 - Considerations
 - Value should be entered in a numeric format
 - Value cannot be negative
 - Value cannot have decimal points
- Delete Log File Interval
 - This interval (in days) is used to compute the date in which the ADT log files are eligible for deletion, This deletion date is computed from the current date and then subtracting the # of days indicated in the

- deletion interval. This deletion date is then used when checking to delete all ADT log files that have a "update" date older than the deletion date.
- The deletion operation is performed once every 24 hours.
 - Default value is 30 days.
 - Considerations
 - Value should be entered in a numeric format
 - Value cannot be negative
 - Value cannot have decimal points
 - Maximum Log File Size
 - The maximum log file size parameter (in kilobytes) is used by the ADT program to determine if a new log file should be allocated for use. If the size of the current log file exceeds the maximum size indicated, the ADT program will allocate a new log file based on the current date.
 - The maximum log file size check is done once every 24 hours. Therefore, it is possible for an actual log file to exceed the maximum indicated.
 - Default value is 500 kB.
 - Considerations
 - Value should be entered in a numeric format
 - Value cannot be negative
 - Value cannot have decimal points
 - ADT Transactions

ADT Transactions can be customized using the ADT Transactions section of the ADT screen. ADT Event Type Codes A01 – A62 are supported. NOTE: A19 is always disabled. The Interface engine will be configured to filter out ADT Event Type Codes. For those ADT messages that the Interface engine stores to the Queue; the ADT program will process them based on the directive configured in this application.

ADT TRANSACTIONS	
A01	ADD
A02	DELETE
A03	UPDATE
A04	NOP
A05	MERGE
A06	DELETE
A07	ADD
A08	ADD
A09	ADD
A10	ADD
A11	ADD
A12	ADD
A13	ADD
A14	ADD
A15	ADD

SAVE EVENT CODES

Each ADT Event Type Code is associated with a database transaction type that is applied to the patient records found in the MDI database. The database transaction types are:

- ADD; add patient record
- DELETE; delete patient record (by Facility ID, Account #, MRN)
- UPDATE; update patient record (by Facility ID, Account #, MRN)
- NOP; do nothing
- MERGE; merge patient record (update all patient records by Facility ID, Account #, MRN to new MRN,...)

Changes in the ADT screen are saved to the ADT.config file; which is located in the "bin" folder of the MDI installation. The ADT service will automatically re-initialize based on changes detected in the configuration file. Only the ADT service (program) uses the ADT.config file; no other applications are dependent upon it.

TROUBLESHOOTING

1. Port Numbers used by the MDI Application
 - 8080
 - 1433
2. Mirth Interface Engine is not running
 - a. Check port #'s 8080 and 1433 are not blocked by a firewall
 - b. Check that the password used by the MDI Interface Engine database is correct
 - c. Validate the connection string to the MDI Interface Engine database
3. ADT messages not being processed into the MDI Queue database
 - a. Check that the password used by the MDI Queue database is correct.
 - i. The password must be manually changed in the associated interface engine channel if it has been changed by the MDI Configuration tool.
 - b. Verify that the messages are not filtered out based on HL7 facility ID or service location
4. Order messages not being processed into the MDI Queue database
 - a. Check that the password used by the MDI Queue database is correct.
 - i. The password must be manually changed in the associated interface engine channel if it has been changed by the MDI Configuration tool.
 - b. Verify that the messages are not filtered out based on HL7 facility ID, service location or modality
5. ADT Service is not running
 - a. Verify the MDI Queue and Database are installed
 - b. Check that the passwords used by the MDI Queue and Database are correct.
 - c. Ensure the ADT service is enabled for Automatic – Delayed Start
6. ADT messages not being processed by the ADT program
 - a. Verify that the ADT event code type/ADT transaction pair are assigned correctly. View/modify via the MDI Configuration tool.
7. Order messages not being updated properly by the ADT program
 - a. Verify that the ADT event code type/order transaction pair are assigned correctly. View/modify via the MDI Configuration tool.
8. Client application (e.g. ELI Link) cannot access MDI Database
 - a. Verify that the MDI_API.config file used by client application is the same as that used by the MDI applications
 - i. If the client application is not running on the same computer/system as the MDI application; it will be necessary to copy the MDI_API.config file from the MDI application environment to the appropriate location where the client application is running.
 - b. If the client application is not running on the same computer/system as the MDI application; ensure that SQL Browsing is enabled on the system running the MDI application.
 - c. Verify that the IP Address defined for accessing the MDI Database is correct
9. Database password or encryption key are not working
 - a. Obtain the MDI_API.config file from the customer
 - b. Install the configuration file into the MDI "bin" installation folder on the local support computer
 - c. Open the MDI Configuration tool in the "show password" mode.
 - d. Review the password accounts for the Database and Queue databases. You can

also review the encryption key.

- e. Make modifications as necessary to the password and encryption keys to guarantee that they work.
- f. NOTE: Modify the shortcut to the MDI Configuration tool with the "-showpwd" option; "C:\Mortara Instrument Inc\Mdi\bin\MDI Config.exe"
-showpwd

Glossary

ADT	HL7 Admit/Transfer/Discharge message
ORM	HL7 General Order Message
ORU	HL7 Result Messages
EHR	Electronic Health Record System
HL7	Health Level Seven. It is a standard that defines the transport of medical information. It is an ASCII format based communications standard. Widely used by healthcare information systems.
Interface Engine	Application that acts as a broker between systems that exchange medical information via HL7. This broker converts HL7 messages into compatible formats for the participating systems.
MDI	Mortara Device Interface. Welch Allyn application that provides HL7 interface capability to Welch Allyn diagnostic devices.
SQL	Structured Query Language. Is a <u>special-purpose programming language</u> designed for managing data held in a <u>relational database management system</u> (RDBMS).