NHIN CONNECT System Source Code Implementation and Administration Guide

V. 2.0

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REVISION RECORDS

REVISION	DATE	DESCRIPTION
Version 1	January 28, 2009	Initial Release.
Version 2	March 31, 2009	Updated for Release 2.0. Original Implementation and Administration Guide split into 3 volumes. This is the first release of this version.

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1 OVERVIEW

This document describes the process to build and deploy the NHIN CONNECT Gateway and Adapter software.

This document includes installation and configuration instructions for the Windows Operating Systems.

2 DEVELOPMENT ENVIRONMENT DEPLOYMENT FOOTPRINT

2.1 Hardware Requirements for a Zip Full Installation

This section describes the recommended minimum hardware component infrastructure including processor performance, disk space, and RAM for the application server platform. This is provisional information subject to change based on continued development. Release 2.0 will require two computers, one for the NHIN CONNECT Gateway software and one for the NHIN CONNECT Adapter software.

Item	Version 2.0
Processor	Minimum dual 2GHz CPU
RAM	Minimum of 4 GB
Hard Disk Size	Application Dependent on the deployment configuration. For sizing purposes, assume 100K per CCD record, 1K per audit log record.
Hard Disk Speed	Minimum of 7200 RPM and 10000 RPM preferred.
Network Interface	100MB Ethernet acceptable; 1GB Ethernet desirable

2.2 Software Requirements for a Zip Full Installation

This section describes dependent software products.

Item	Description	Applies to Gateway Version	Platform
Operating System	Windows XP or higher	All	Server

Java-JRE/JDK	Java SDK 1.6 Update 11, Build 3.	All	Server
Application Server	GlassFishESB v2.0 Nightly Build 20090201	All	Server
Enterprise Service Bus (ESB)	GlassFishESB v2.0 Nightly Build 20090201	All	Server
NetBeans	GlassFishESB v2.0 Nightly Build 20090201	All	Server
Communication Stack	Metro v1.4	All	Server
Network Protocol	TCP/IP	All	Server/Client
Relational Database	MySQL 5.0	1.0	Server
Recommended Test Tools (Optional)	soapUI v2.5.1, JUnit	All	Client

3   OBTAIN MEDIA/ SOFTWARE

Download the source, third party tools, and third party components packages from the NHIN CONNECT Site.

Step	Action Input	Expected Result
1	Download the NHIN_Connect_Source _xxx_mmddyyyy.zip file from the NHIN CONNECT release site.	The file is now located on each of the Gateway and Adapter computers.
2	Download the NHIN_Connect_Third_Party_Tools_xxx _mmddyyyy.zip file from the NHIN CONNECT release site.	The file is now located on each of the Gateway and Adapter computers.
3	Download the	The file is now located on each of

NHIN_Connect_Third_Party_Compone nts_xxx_mmddyyyy.zip file from the NHIN CONNECT release site.	the Gateway and Adapter computers.	

Perform Installation

4 WINDOWS INSTALL AND CONFIGURATION INSTRUCTIONS

In order to install the full NHIN CONNECT development environment, two computers will need to be installed and configured. One computer will be used for the NHIN CONNECT Gateway software and one system will be used for the NHIN CONNECT Adapter software. The install process for both environments is identical up to the deployment steps. Each system will have a separate set of software deployed.

4.1   Unzip the NHIN CONNECT Gateway file

Step	Action Input	Expected Result
1	Unzip the NHIN_Connect_Source _xxx_mmddyyyy.zip file downloaded from NHIN CONNECT release site. Note that this should be unzipped to C:\ and it will create the correct directory structure.	It should uncompress into the C:\projects\NHINC\Current folder. This should be done on both the Gateway and Adapter computers.
2	Unzip the NHIN_Connect_Third_Party_Tools_xxx _mmddyyyy.zip file downloaded from NHIN CONNECT release site. Note that this should be unzipped to C:\ and it will create the correct directory structure.	It should uncompress to C:\NHINC\ThirdPartyTools These tools will be installed as part of the next section instructions. This should be done on both the Gateway and Adapter computers.
3	Unzip the NHIN_Connect_Third_Party_Compone nts_xxx_mmddyyy.zip file downloaded from NHIN CONNECT release site. Note that this should be unzipped to C:\ and it will create the correct directory structure.	It should uncompress to C:\NHINC\ThirdPartyComponents. These files will be used after the installation of the third party tools. This should be done on both the Gateway and Adapter computers.

4.2   INSTALL PRE-REQUISITE SOFTWARE ON WINDOWS

This section describes the installation of the Third Party tools onto both the Gateway and Adapter computers.   You should follow these instructions on both systems.

4.2.1 INSTALL JAVA SE Development Kit

Install the Java JDK 1.6 update 11 onto both the Gateway and Adapter computers.

If a different version of the JDK is already installed, then uninstall it before proceeding with these steps.

Step	Action Input	Expected Result
1	Run the Java installation located in C:\NHINC\ThirdPartyTools\Java\JavaSE6_11\jdk-6u11-windows-i586-p.exe. When prompted to enter the path for the java installation, it should be installed to C:\Java\jdk1.6.0_11. The destination folder for the Java Runtime Environment (JRE) should be directed to C:\Java\jre6.	It should install JDK 1.6 Update 11 onto the computer and place it into the C:\Java\jdk1.6.0_11 directory. This should be done on both the Gateway and Adapter computers.
2	Create the following **_system_** environment variable: JAVA_HOME and assign it the value: C:\Java\jdk1.6.0_11 (Make sure it is a "System" environment variable.). Note: Under Windows XP, the environment variables can be located under Control Panel->System->Advanced->Environment Variables. Under Windows Vista, the environment variables can be located under Control Panel->System->Advanced System Settings->Environment Variables.	There will be a new system environment variable. You can test this by opening a command window (After you have saved your new environment variable), and typing in the command: set JAVA_HOME. It will echo back the setting for JAVA_HOME. Note if your command window was already opened before creating the new environment variable, it will need to be closed and reopened for the new variable to be seen. This should be done on both the Gateway and Adapter computers.
3	Update the following **_system_** environment variable: PATH and place the following text at the beginning of what is already there – make sure that you have the semi-colon separating your new entry and what was already there. Insert at the beginning the following value: %JAVA_HOME%\bin; (Make sure it is a "System" environment variable.). Note: Under Windows XP, the environment variables can be located under Control Panel->System->Advanced->Environment Variables. Under Windows Vista, the environment variables can be located under Control	The PATH variable will now be updated. You can test this by opening a command window (After you have saved your new environment variable), and typing in the command: set PATH. It will echo back the setting for PATH. You should see "C:\Java\jdk1.6.0_11\bin;" at the beginning of the path. Note if your command window was already opened before creating the updating the environment variable, it will need to be closed and reopened for the change to be seen. This should be done on both the

	Panel->System->Advanced System Settings->Environment Variables.	Gateway and Adapter computers.

4.2.2 INSTALL GlassFishESB

Install GlassFishESB on both the Gateway and Adapter systems.

Step	Action Input	Expected Result
1	Run the GlassFishESB installation located in C:\NHINC\ThirdPartyTools\GlassFishESB\glassfishesb-full-installer-windows-02-01-09.exe. You should select the default values for the installation of both NetBeans and GlassFish. Make sure that the location for the JDK that GlassFishESB is using is: C:\Java\jdk1.6.0_11.	It should install GlassFishESB into the C:\GlassFishESB directory. It will install glassfish into the C:\GlassFishESB\glassfish directory and NetBeans into the C:\GlassFishESB\netbeans directory. This should be done on both the Gateway and Adapter computers.
2	Create the following _**system**_ environment variable: ANT_OPTS and assign it the value:-Xmx1024m -XX:MaxPermSize=512m (Make sure it is a "System" environment variable.). _**Be careful to type this in correctly and do not cut and paste this value. Word documents sometimes substitute non-printable characters for a '-' symbol. If this is wrong, you may see Heap space errors when you try to compile.**_ Note: Under Windows XP, the environment variables can be located under Control Panel->System->Advanced->Environment Variables. Under Windows Vista, the environment variables can be located under Control Panel->System->Advanced System Settings->Environment Variables.	There will be a new system environment variable. You can test this by opening a command window (After you have saved your new environment variable), and typing in the command: set ANT_OPTS. It will echo back the setting for ANT_OPTS. Note if your command window was already opened before creating the new environment variable, it will need to be closed and reopened for the new variable to be seen. This should be done on both the Gateway and Adapter computers.
3	Create the following _**system**_ environment variable: AS_HOME and assign it the value: C:\GlassFishESB\glassfish (Make sure it is a "System" environment variable.). Note: Under Windows XP, the	There will be a new system environment variable. You can test this by opening a command window (After you have saved your new environment variable), and typing in the command: set AS_HOME. It will echo back the

	environment variables can be located under Control Panel->System->Advanced->Environment Variables. Under Windows Vista, the environment variables can be located under Control Panel->System->Advanced System Settings->Environment Variables.	setting for AS_HOME. Note if your command window was already opened before creating the new environment variable, it will need to be closed and reopened for the new variable to be seen. This should be done on both the Gateway and Adapter computers.
4	Create the following *system* environment variable: ANT_HOME and assign it the value: C:\GlassFishESB\netbeans\java2\ant (Make sure it is a "System" environment variable.). Note: Under Windows XP, the environment variables can be located under Control Panel->System->Advanced->Environment Variables. Under Windows Vista, the environment variables can be located under Control Panel->System->Advanced System Settings->Environment Variables.	There will be a new system environment variable. You can test this by opening a command window (After you have saved your new environment variable), and typing in the command: set ANT_HOME. It will echo back the setting for ANT_HOME. Note if your command window was already opened before creating the new environment variable, it will need to be closed and reopened for the new variable to be seen. This should be done on both the Gateway and Adapter computers.
5	Update the following *system* environment variable: PATH and place the following text at the beginning of what is already there – make sure that you have the semi-colon separating your new entry and what was already there. Insert at the beginning the following value: %ANT_HOME%\bin; (Make sure it is a "System" environment variable.). Note: Under Windows XP, the environment variables can be located under Control Panel->System->Advanced->Environment Variables. Under Windows Vista, the environment variables can be located under Control Panel->System->Advanced System Settings->Environment Variables.	The PATH variable will now be updated. You can test this by opening a command window (After you have saved your new environment variable), and typing in the command: set PATH. It will echo back the setting for PATH. You should see "C:\GlassFishESB\netbeans\java2\ant\bin;" at the beginning of the path. Note if your command window was already opened before creating the updating the environment variable, it will need to be closed and reopened for the change to be seen. This should be done on both the Gateway and Adapter computers.

4.2.3 UPDATE NETBEANS ANT WITH ADDITIONAL LIBRARIES

NHIN CONNECT requires some additional libraries when using Ant to build the system. This section describes the steps necessary to put those libraries into the instance of Ant that was installed with GlassFishESB.

Step	Action Input	Expected Result
1	Copy all files from C:\projects\NHINC\Current\ThirdParty\AntExtraLibs to C:\GlassFishESB\netbeans\java2\ant\lib.	C:\GlassFishESB\netbeans\java2\ant\lib will now contain the additional libraries needed to compile NHIN CONNECT. This should be done on both the Gateway and Adapter computers.

4.2.4 INSTALL METRO 1.4

Install Metro 1.4 on both the Gateway and Adapter systems.

Step	Action Input	Expected Result
1	Open a command window and enter the following command: cd \NHINC\ThirdPartyTools\Metro1.4	The command window will show that you are in the directory: C:\NHINC\ThirdPartyTools\Metro 1.4. This should be done on both the Gateway and Adapter computers.
2	Enter the following command to extract the Metro installer and accept the license agreement that is presented: Java –jar metro-1_4-installer-nightly_02_05_09.jar	The directory: C:\NHINC\ThirdPartyTools\Metro 1.4\metro will be created along with the Metro installation files. This should be done on both the Gateway and Adapter computers.
3	Change the directory to the new sub folder by entering the following command: cd metro	The command window will show that you are in the directory: C\NHINC\ThirdPartyTools\Metro1.4\metro. This should be done on both the Gateway and Adapter computers.
4	Run the Metro install by entering the following command: ant –f metro-on-glassfish.xml install	Metro will update several files in the C:\GlassFishESB\glassfish\lib directory. Double check to ensure that you have a C:\GlassFishESB\lib\webservices-rt.jar file with today's date as its

| | | file date, and that it is 11.8 MB in size. Ensure also that you do not have a webservices-rt.zip file in the same location.

This should be done on both the Gateway and Adapter computers. |
| --- | --- | --- |

4.2.5 SETUP DEVELOPMENT GLASSFISH CERTIFICATES

In order for SAML to work within the development environment, certificates must be installed. This section outlines the steps for installing the development certificates. This should be done on both the Gateway and Adapter machines.

Note that these certificates will not work for cross-gateway communication, but only for loop-back development/testing. Loopback development/testing is the situation where the gateway sends a message to itself and where it acts as both the sending and receiving gateway. If there is a need for the development machines to connect to another gateway, then real certificates will need to be installed. Follow the directions in the CONNECT Installation/Administration guide to obtain and install real certificates.

Step	Action Input	Expected Result
1	Open a command window and enter the following command: cd \NHINC\ThirdPartyTools\Metro1.4\copyv3_certs\copyv3	The command window will show that you are in the directory: C:\NHINC\ThirdPartyTools\Metro 1.4.\copyv3_certs\copyv3.

This should be done on both the Gateway and Adapter computers. |
| 2 | Enter the following command to install the certificates:

ant

Be patient, this can take a few minutes. It will start and stop the glassfish server as part of this process. | The command window will echo back the certificates that are being added to the keystore and trust files. Ignore the warning that states "currently we add non-CA certs to the GF truststore, this will not be required in later releases when WSIT starts supporting CertStore(s)"

This should be done on both the Gateway and Adapter computers. |
| 3 | Verify that the first certificate was installed by issuing the following command:
keytool -list -keystore %AS_HOME%/domains/domain1/config/cacerts.jks -alias wssip -storepass | The command will echo a certificate fingerprint that looks as follows:

"Certificate fingerprint (MD5) : 1A:0E:E9:69:7D:D0:80:AD:5C:85: |

	changeit *Note that some word processors use a different non-standard character for a '-'. Use caution when copying and pasting this command from the document. It may have an incorrect '-' character which will cause the command to fail.*	47:91:EB:0D:11:B1" If it failed, it will show the following: "keytool error: java.lang.Exception: Alias <wssip> does not exist. This should be done on both the Gateway and Adapter computers.
4	Verify that the second certificate was installed by issuing the following command: keytool -list -keystore %AS_HOME%/domains/domain1/config/keystore.jks -alias xws-security-server -storepass changeit *Note that some word processors use a different non-standard character for a '-'. Use caution when copying and pasting this command from the document. It may have an incorrect '-' character which will cause the command to fail.*	The command will echo a certificate fingerprint that looks as follows: "Certificate fingerprint (MD5) : E4:E3:A9:02:3C:B0:36:0C:C1:48: 6E:0E:3E:5C:5E:84" If it failed, it will show the following: "keytool error: java.lang.Exception: Alias <xws-security-server> does not exist. This should be done on both the Gateway and Adapter computers.

4.2.6 UPDATE DOMAIN.XML

The domain.xml file is created during the GlassFishESB install. This file is used to configure the run-time instance of GlassFish. Changes need to be made to this file to tune memory, set up logging, and configure the certificates.

Note that GlassFish must NOT be running when this file is being updated. If you have already started GlassFish, stop it before proceeding with this step. If you are following these sequence of events, then GlassFish will not be running and you can proceed. But if for some reason you started GlassFish using NetBeans outside of these instructions, please stop it now.

Step	Action Input	Expected Result
1	Make a backup of the file located at: C:\GlassFishESB\glassfish\domains\domain1\config\domain.xml. Call the backup file domain_backup.xml.	A copy of the domain.xml file will now be created in C:\GlassFishESB\glassfish\domains\domain1\config\domain_backup.xml.

		This should be done on both the Gateway and Adapter computers.
2	Open C:\GlassFishESB\glassfish\domains\domain1\config\domain.xml in a text editor.	The contents of the domain.xml file will be shown in the editor. This should be done on both the Gateway and Adapter computers.
3	Do a text search for the section containing tags: <jvm-options>.	You will see several occurrences of these tags in one section. You will be making changes to some as well as adding new ones. This should be done on both the Gateway and Adapter computers.
4	Update and/or add new memory options. In some cases these memory options already exist. If that is the case, then update them to the values shown here. If they do not exist, then create a new option at the end of the set of jvm-options with the correct settings: <jvm-options>-Xmx1230m</jvm-options> <jvm-options>-XX:MaxPermSize=256m</jvm-options> <jvm-options>-XX:PermSize=256m</jvm-options>	The memory changes will now be shown in the domain.xml file. This should be done on both the Gateway and Adapter computers.
5	Add the following options immediately following the last jvm-options tag in the domain.xml file to configure logging of XML messages to the log files: <jvm-options>-Dcom.sun.xml.ws.transport.http.HttpAdapter.dump=true</jvm-options> <jvm-options>-Dcom.sun.xml.ws.transport.http.client.HttpTransportPipe.dump=true </jvm-options> <jvm-options>-Djavax.enterprise.resource.xml.webservices.security.level=FINE</jvm-options> <jvm-options>-Djavax.enterprise.resource.webservices.jaxws=FINE</jvm-options>	This will configure glassfish to log the SOAP messages that are sent to various web services. This should be done on both the Gateway and Adapter computers.
6	Add the following options immediately following the last jvm-options tag in the domain.xml file to configure of the	This will configure glassfish so that the deployed CONNECT projects will use the specified

		deployed CONNECT projects to use the version of log4j.properties that is located in the C:\projects\NHINC\Current\Product\Production\Common\Properties directory: <jvm-options>-Dlog4j.configuration=file:/C:/projects/NHINC/Current/Product/Production/Common/Properties/log4j.properties</jvm-options>	log4j.properties file. This should be done on both the Gateway and Adapter computers.
7		Add the following options immediately following the last jvm-options tag in the domain.xml file to configure certificates for Metro to work properly *(Note that this is only if you are using the development/default certificates. If you are installing real certificates, this will be done in that sequence of steps and you should skip this one.)*: <!-- HTTP Upgrade to support 2 way SSL --> <jvm-options>-Dcom.sun.jbi.httpbc.enableClientAuth=true</jvm-options> <!-- For Development Signed Cert Security --> <jvm-options>-Djavax.net.ssl.keyStore=${com.sun.aas.instanceRoot}/config/keystore.jks</jvm-options> <jvm-options>-Djavax.net.ssl.keyStorePassword=changeit</jvm-options> <jvm-options>-Djavax.net.ssl.trustStore=${com.sun.aas.instanceRoot}/config/cacerts.jks</jvm-options> <jvm-options>-Djavax.net.ssl.trustStorePassword=changeit</jvm-options> <jvm-options>-DSERVER_KEY_ALIAS=xws-security-server</jvm-options> <jvm-options>-DCLIENT_KEY_ALIAS=xws-security-client</jvm-options>	This will set up the glassfish/Metro so that it can access the certificate stores that were created. This should be done on both the Gateway and Adapter computers.

4.2.7 INSTALL THIRD PARTY COMPONENTS INTO GLASSFISH\LIB

In order to compile and run the Gateway and Adapter, the third party libraries need to be copied to the glassfish library directory. This section describes the steps necessary to do that.

Step	Action Input	Expected Result
1	Copy all of the files except webservices-rt.zip that were unzipped to: C:\NHINC\ThirdPartyComponents to C:\GlassFishESB\glassfish\lib directory. *(Note make sure that webservices-rt.zip is not copied.)*	Copies of all of the files that were unzipped into the C:\NHINC\ThirdPartyComponents will now be located in the C:\GlassFishESB\glassfish\lib directory. This should be done on both the Gateway and Adapter computers.

4.2.8 Update HTTP Binding Component Application Variables

Do the following steps to start GlassFish.

Step	Action Input	Expected Result
1	Run GlassFishESB. You can find this on the desktop, or on the Start menu at Start->All Programs->GlassFish ESB	GlassFishESB will be running with the NetBeans IDE window open on the computer. This should be done on both the Gateway and Adapter computers.
2	Select the "Services" tab in the window on the upper-left corner of the IDE. Note if you do not see the "Services" tab, Click on the "Window" menu and select "Services".	The Services tab will show with a number of items in the tab including a "Servers" icon.
3	Click on the "plus" sign in front of the "Servers" icon.	This will open the folder and show GlassFish V2 as a sub entry to that icon.
4	Right-click on "GlassFish V2" and select "Start" from the menu.	This will start GlassFish. Note if nothing is deployed, it will start relatively quickly. If there are deployed components, this can take a long time to start up. There are times when NetBeans IDE times out when starting it up. Do not be concerned, it is most likely still starting. If this occurs, click the "OK" button. You can monitor its

| | | progress by watching the GlassFish V2 output window. This window will be located in the Output Tab. If you cannot see the Output Tab, select "Window" from the menu, and click on "Output" and then "Output". The GlassFish tab is a sub tab within the Output Tab. You can also see it by right-clicking on "GlassFish V2" and selecting "View Server Log".

When GlassFish has successfully started, the line, "JBI framework startup complete." will be shown in the GlassFish V2 output window. Be aware that there will be a lot of log messages shown before this one is shown. Sometimes there are messages displayed after this one, so it is a good idea to do a search on the output window for this text. If this text is not anywhere in the output window, then GlassFish has not completed starting up successfully.

If the IDE timed out, you will need to "Right-click" on GlassFish V2 and select "Refresh" for the IDE to be updated with the current status of GlassFish.

This should be done on both the Gateway and Adapter computers. |
|---|---|---|

Now that GlassFish has been started, the HTTP Binding Component must be started and configured. Do the following steps within the NetBeans IDE to start and configure it. These steps assume that GlassFishESB is currently running.

Step	Action Input	Expected Result
1	Click on the "Services" tab to make it active. If the "Services" tab is not showing, then click on the Window menu item and select "Services".	The services tab will show on the screen.

This should be done on both the Gateway and Adapter computers. |
| 2 | Click on the "plus" sign immediately before the "JBI" folder. | This will expand the JBI folder.

This should be done on both the |

	The JBI folder is located under Servers\GlassFish V2.	Gateway and Adapter computers.
3	Click on the "plus" sign immediately before the "Binding Components" folder.	This will expand the Binding Components folder.

This should be done on both the Gateway and Adapter computers. |
| 4 | Determine if the "sun-http-binding" component is running by right-clicking the "sun-http-binding" icon and checking the context menu. If it is running, then the "Start" option will be grayed out. If it is not running then it will be an active option. If it is not running, then click on "Start" to start it. | The sun-http-binding component will be started.

Once it is started, it can be verified by right-clicking on the "sun-http-binding" icon an checking to see that the "Start" option is grayed out.

This should be done on both the Gateway and Adapter computers. |
| 5 | After the sun-http-binding component has started, open the properties window by right-clicking on the sun-http-binding component and selecting "Properties" from the menu. | This will show the "sun-http-binding" properties dialog window.

This should be done on both the Gateway and Adapter computers. |
| 6 | Locate the "Application Variables" row within the "Configuration" section of the properties. Click on the "…" button at the end of that row. | The "sun-http-binding – Application Variables" dialog window will be displayed.

This should be done on both the Gateway and Adapter computers. |
| 7 | Add a new variable by clicking on the "Add" button and then selecting the "Number" radio button from the "Select Environment Variable Type" button and then click on the "OK" button. | This will show a new empty row in the table.

This should be done on both the Gateway and Adapter computers. |
| 8 | Click on the name field of the empty row and type:

NhincHttpPort

Followed by the "Enter" key. | The name field for the new row will now show NhincHttpPort.

This should be done on both the Gateway and Adapter computers. |
| 9 | Click on the value field of the new row and type:

8080

Followed by the "Enter" key. | The value field for the new row will now show 8,080.

This should be done on both the Gateway and Adapter computers. |
| 10 | Click on the "OK" button. | The "Application Variables" will now show the following: |

Step	Action Input	Expected Result
		{[NhincHttpPort, NUMBER, 8080]} This should be done on both the Gateway and Adapter computers.
11	Click on the "Close" button.	The NetBeans IDE will now be showing and the new property has now been set. This should be done on both the Gateway and Adapter computers.

Now that the change has been made, GlasssFish must be restarted. The following table outlines the steps for stopping GlassFish. Refer to the steps earlier in this section for starting GlassFish.

Step	Action Input	Expected Result
1	Click on the "Services" tab to make it active. If the "Services" tab is not showing, then click on the Window menu item and select "Services".	The services tab will show on the screen. This should be done on both the Gateway and Adapter computers.
2	Right-click on the "GlassFish V2" icon and select "Stop". Note "GlassFish V2" is under the "Servers" folder.	GlassFish V2 will be stopped. The GlassFish V2 output window will show the words: "JBI framework termination complete."

4.2.9 INSTALL MYSQL 5.0

The Gateway and the reference implementation of the Adapter both use MySQL when a database is necessary. The programmatic access to this database was done using Hibernate. When doing the initial installation of the Gateway and Adapter, it is recommended that MySQL be installed and that the system is verified. After it has been created and verified, other relational databases can be used in place of MySQL by altering the appropriate entries in the hibernate configuration files for those projects which are accessing the database. Directions for configuring hibernate to use other databases is not defined in this document. Set up the database using the following sequence of steps.

Step	Action Input	Expected Result
1	Run the MySQL installation program located at: C:\NHINC\ThirdPartyTools\MySQL\Setup.exe. Accept the defaults. At the end of the install, it will ask you to select a Database Configuration, choose	This will install MySQL. This should be done on both the Gateway and Adapter computers.

Step	Action Input	Expected Result
	"Standard Configuration" and enter the following: User Name: root Password: NHIE-Gateway Make sure that it installs MySQL as a windows service.	
2	Install the MySQL GUI tools by running the setup program located at: C:\NHINC\ThirdPartyTools\MySQL\GUITools\mysql-gui-tools=5.0-r12-win32.msi. Accept all defaults.	This will add a number of tools to the start menu under MySQL that will enable you to administer the MySQL database and query the tables for content. This should be done on both the Gateway and Adapter computers.
3	Update the following ***system*** environment variable: PATH and place the following text at the beginning of what is already there – make sure that you have the semi-colon separating your new entry and what was already there. Insert at the beginning the following value: C:\Program Files\MySQL\MySQL Server 5.0\bin; (Make sure it is a "System" environment variable.). Note: Under Windows XP, the environment variables can be located under Control Panel->System->Advanced->Environment Variables. Under Windows Vista, the environment variables can be located under Control Panel->System->Advanced System Settings->Environment Variables.	The PATH variable will be updated with the new information. You can test this by opening a command window (After you have saved your new environment variable), and typing in the command: set PATH. It will echo back the setting for PATH. You should see "C:\Program Files\MySQL\MySQL Server 5.0\bin"; at the beginning of the path with quotes. Note if your command window was already opened before updating the environment variable, it will need to be closed and reopened for the new information to be seen. This will allow you to run MySQL from the command line without having to type the full path. This should be done on both the Gateway and Adapter computers.

Now that the database is installed, the MySQL administrator needs to be configured to connect to the instance of MySQL that was installed. Do the following steps to configure it.

Step	Action Input	Expected Result
1	Run the MySQL Administrator. You will find this on your windows start menu at the following location: Start->All Programs->MySQL->MySQL Administrator.	This will run the MySQL Administrator. This should be done on both the Gateway and Adapter computers.

2	Click on the small dialog box containing three periods next to the "Stored Connections" field.	This will open a dialog box entitled "Options" that will be used to configure a database connection. This should be done on both the Gateway and Adapter computers.
3	If the"Connections" panel is not showing then click on the "Connections" icon on the left-hand side of the window.	This will show the "Connections" panel on the right-hand side of the window. This should be done on both the Gateway and Adapter computers.
4	On the Connections panel, enter the following values in the specified fields after clicking on the "New Connection" button: Connection: NHINConnect Username: root Password: NHIE-Gateway Hostname: localhost Port: 3306 Schema: test Once the fields are entered, click on the "Apply" button, then click the "close" button.	After closing the "Options" window you should now see your new entry in the "Stored Connection" drop-down field. This should be done on both the Gateway and Adapter computers.
5	Select your new database under the "Stored Connections" drop down menu. Then enter the user name as root and the password as NHIE-Gateway and select OK.	This will show the "MySQL Administrator – Connection: NHINConnect" window. This should be done on both the Gateway and Adapter computers..
6	After the connection is verified, close the MySQL Administrator tool.	The MySQL Administrator will be shut down.

4.2.10 CREATE NHIN CONNECT DATABASE SCHEMAS AND TABLES

This section describes the steps necessary to create the schemas and users for the NHIN Connect database.

Step	Action Input	Expected Result
1	Open a command window and change the directory to the following: C:\NHINC\ThirdPartyTools\MySQL\DBScripts\nhincdb	The directory in the command window will now show as C:\projects\NHINC\Current\Product\DBScripts\nhincdb This should be done on both the Gateway and Adapter computers.

2	Enter the following command to create the schemas and tables: mysql -uroot -pNHIE-Gateway < nhincdb.sql	After this command has completed, the new schemas and their corresponding tables will have been created in the database. If this command completed successfully, you will see a DOS command prompt immediately. If command line usage instructions are shown, then the command did not complete. Retype the command and try again. Note that some word processors use a non-standard character for '-' and copying this command directly may not work. It may need to be typed in by hand. This should be done on both the Gateway and Adapter computers.
3	Run the MySQL Administrator. You will find this on your windows start menu at the following location: Start->All Programs->MySQL->MySQL Administrator.	This will run the MySQL Administrator. This should be done on both the Gateway and Adapter computers.
4	Select NHINConnect under the "Stored Connections" drop down menu. Then enter the user name as root and the password as NHIE-Gateway and select OK.	This will show the "MySQL Administrator – Connection: NHINConnect" window. This should be done on both the Gateway and Adapter computers..
5	Select the "User Administration" icon on the left-hand side of the window.	This will open the "User Information" tab on the right-hand side of the window. This should be done on both the Gateway and Adapter computers.
6	Click on the "Add new user" button.	This will activate the fields on the "User Information" tab on the right-hand side of the window. This should be done on both the Gateway and Adapter computers.
7	Enter the values into the following fields: MySQL User: nhincuser Password: nhincpass Confirm Password: nhincpass	This will add nhincuser as a new user. The name will show up on the left-hand side of the window in the "User Accounts" field. This should be done on both the

		Full Name: NHINC User Description: NHINC User Email: <leave blank> Contact information: <leave blank>	Gateway and Adapter computers.
8	Click on the "Schema Privileges" tab.	This will show the schemas that are available to the new user. There will be no entries in the "Assigned Privileges" field. This should be done on both the Gateway and Adapter computers.

9	The following privileges will need to be assigned for each of the new schemas:
	
	Privileges:
	    SELECT
	    INSERT
	    UPDATE
	    DELETE
	    EXECUTE
	
	Schemas:
	    aggregator
	    assigningauthoritydb
	    auditrepo
	    docrepository
	    patientcorrelationdb
	
	To make the assignment, select the schema in the "Schemata" field so that it is highlighted. This will show a set of entries in the "Available Privileges" field. Highlight the privileges stated above. You can select multiple privileges by holding down the control key as you click on them. Once all the necessary privileges are highlighted, select the "<" button to move them to the "Assigned Privileges" field.
	
	Do this same step for each schema.
		This will assign the specified privileges to the nhincuser. The privileges will now be shown in the "Assigned Privileges" field for each schema. (You must highlight the schema to see the assigned privileges for that schema).
		
		This should be done on both the Gateway and Adapter computers.

10	Click on the "Apply Changes" button to create the new user with its privileges.	The nhincuser will now show in the "User Accounts" field. This should be done on both the Gateway and Adapter computers.

4.2.11 INSTALL SOAP UI

The NHIN Connect team uses SoapUI Professional for testing the various services. SoapUI also provides a free version. Do the following steps to install the free version of SoapUI.

Step	Action Input	Expected Result
1	Install SoapUI by running the following installation program: C:\NHINC\ThirdPartyTools\SoapUI\SoapUI-2.5.1-installer.exe When prompted to choose the components to be installed – deselect the JRE 1.6.0_10 option. This is not needed as the JRE is already installed. Accept the defaults for everything else.	SoapUI will now be installed. You will see a new menu item under Start->All Programs->soapUI 2.5.1. You will also see a new icon on your desktop entitled: soapUI 2.5.1. This should be done on both the Gateway and Adapter computers.

4.3   Compile NHIN CONNECT Source

The NHIN Connect source needs to be compiled on both the Gateway and Adapter computers. A script has been provided that will do a complete compile.

However, due to a bug in GlassFishESB that has been documented at the following URL:

http://www.netbeans.org/issues/show_bug.cgi?id=160040

Even though Sun has not been able to reproduce this issue in the specified release, we are still having it in the release currently being used by NHIN Connect. As documented, once the system is completely built using these scripts, the composite applications will still not contain the correct endpoint entries in the jbi.xml file. There are two solutions to this. The first which is the solution followed in this document is to do all deployments from within NetBeans. This will essentially fix the compile issue that is occurring from the command line on the composite applications before they are deployed. The second option is to rebuild the composite applications from within NetBeans. This issue occurs on all projects that have a name that ends with the letters "CA".

Compile the full source tree by doing the following steps. Note that this needs to be done on each of the Gateway and Adapter computers.

Step	Action Input	Expected Result
1	Create the following ***system*** environment variable: NHINC_PROPERTIES_DIR and assign it the value: C:\projects\NHINC\Current\Product\Production\Common\Properties (Make sure it is a "System" environment variable.). Note: Under Windows XP, the	There will be a new system environment variable. You can test this by opening a command window (After you have saved your new environment variable), and typing in the command: set NHINC_PROPERTIES_DIR. It will echo back the setting for NHINC_PROPERTIES_DIR. Note if

	environment variables can be located under Control Panel->System->Advanced->Environment Variables. Under Windows Vista, the environment variables can be located under Control Panel->System->Advanced System Settings->Environment Variables.	your command window was already opened before creating the new environment variable, it will need to be closed and reopened for the new variable to be seen. This should be done on both the Gateway and Adapter computers.
2	Open a command window and change the directory to: C:\projects\NHINC\Current\Product	The current directory in the command window will now show as C:\projects\NHINC\Current\Product. This should be done on both the Gateway and Adapter computers.
3	Verify that the machine has a C:\temp directory. If it does not, then create one. It will be needed when compiling.	The C:\temp directory exists.
4	Type the following command to compile the source: ant -f build.xml -propertyfile build.win.properties > output.log *Be careful when copying and pasting commands that have '-' characters. Word processors use a non-ascii character for this and it can cause issues in your command. It is best to type it.*	This will compile the source code and place the output into the output.log file. Note that this compile can take anywhere from 10 minutes to longer than an hour depending on the speed of the computer. Progress can be monitored by checking the output.log file. This should be done on both the Gateway and Adapter computers.

4.4 Update Property/Configuration File Settings

Most of the property files should work as delivered, however some will need to be changed based on the environment it is being run in. This section only describes the properties that will need to be changed to enable the build environment to run. The entire list of properties that can be configured is given in the NHIN Connect Implementation and Installation Guide.

internalConnectionInfo.xml

The first file that will need to be modified is the internalConnectionInfo.xml file. This file is used by the gateway and adapter components to locate web service endpoints primarily for services that are contained within the NHIN Connect Gateway and Adapter systems. Endpoints that are external to the NHIN Connect gateway are maintained in a UDDI server which is poled periodically and that information is placed into the uddiConnectionInfo.xml file. The internalConnectionInfo.xml file can be used to override settings in the uddiConnectionInfo.xml file as well.

In order to complete these tasks, the IP address for the Gateway and Adapter computers will be needed.

Complete the following steps to prepare the internalConnectionInfo.xml file to be used in the build environment. Note that this change must be done on both the Gateway and Adapter computers.

Step	Action Input	Expected Result
1	Using a text editor open the file: C:\projects\NHINC\Current\Product\Production\Common\Properties\internalConnectionInfo_default.xml.	The editor will show the contents of this file. This should be done on both the Gateway and Adapter computers.
2	Find the following lines of text "<internalConnectionInfo> <homeCommunityId>1.1</homeCommunityId> <name>DoD</name> <description>DoD Description</description> <services>"	The editor should be displaying the beginning of the "<services>" tag
3	Insert the following after the "<services>" tag: <service> <name>adapternotificationproducercdcbiopackage</name> <description>Adapter HIEM Subscribe for Documents biopackage</description> <endpointURL>http://<Adapter-IP>:9080/NhinConnect/AdapterNotificationProducer</endpointURL> </service> <service> <name>adapternotificationproducerdocument</name> <description>Adapter HIEM Subscribe for Documents</description> <endpointURL>http://<Adapter-IP>:9080/NhinConnect/AdapterNotificationProducer</endpointURL>	The editor will display the following three new service nodes in the file at the beginning of the "<services>" tag. • Adapternotificationproducercdcbiopackage • Adapternotificationproducerdocument • adapterreidentificationservice

	`</service>`
	`<service>`
	
	`<name>adapterreidentificationservice</name>`
	
	`<description>adapterreidentificationservice</description>`
	
	`<endpointURL>http://<Adapter-IP>:8080/NhinConnect/AdapterReidentification</endpointURL>`
	
	`</service>`	

4	Verify that the following service entries exist in the file and modify or add them if they are different or do not exist:
	
	`<service>`
	
	`<name>adapternotificationconsumer</name>`
	
	`<description>Adapter HIEM Subscribe for Documents</description>`
	
	`<endpointURL>http:// <Adapter-IP>:9080/NhinConnect/AdapterNotificationConsumer</endpointURL>`
	
	`</service>`
	`<service>`
	`<name>documentretrieve</name>`
	`<description>documentretrieve</description>`
	`<endpointURL>https://<Gateway-IP>:8181/RespondingGateway_Retrieve_Service/DocRetrieve</endpointURL>`
	`</service>`
	
	`<service>`
	`<name>auditrepository</name>`
	`<description>Audit`
		The four service entries
		• adapternotificationconsumer,
		• documentretrieve,
		• auditrepository, and
		• auditrepositorymanager
		Should be present in the file with their values as displayed to the left.

	Repository</description> 	

<endpointURL>http://<Gateway-IP>:8080/NhinConnect/AuditRepositoryManagerService</endpointURL>
</service>

<service>
    <name>auditrepositorymanager</name>
    <description>auditrepositorymanager</description>
    <endpointURL>http://<Gateway-IP>:8080/NhinConnect/AuditRepositoryManagerService</endpointURL>
</service>

Step	Action Input	Expected Result
5	Search and replace every occurrence of the value: "<Gateway-IP>" with the IP address of the Gateway box. Note that the change should replace the "<" and ">" so it is not present in the URL anymore.	All occurrences of <Gateway-IP> will now be replaced with the IP address of the Gateway. This should be done on both the Gateway and Adapter computers.
6	Search and replace every occurrence of the value: "<Adapter-IP>" with the IP address of the Adapter box. Note that the change should replace the "<" and ">" so it is not present in the URL anymore.	All occurrences of <Adapter-IP> will now be replaced with the IP address of the Adapter. This should be done on both the Gateway and Adapter computers.
7	Copy the C:\projects\NHINC\Current\Product\Production\Common\Properties\internalConnectionInfo_default.xml to C:\projects\NHINC\Current\Product\Production\Common\Properties\internalConnectionInfo.xml. Overwrite the file that is there if necessary.	The new changed file is now called internalConnectionInfo.xml and is in place ready for use. This should be done on both the Gateway and Adapter computers.

gateway.properties

This property file contains the main settings for the gateway. Follow the steps outlined below to change this property file.

Step	Action Input	Expected Result
1	Using a text editor open the file: C:\projects\NHINC\Current\Product\Production\Common\Properties\gateway.properties.	The editor will show the contents of this file. This should be done on both the Gateway and Adapter computers.
2	Make sure that the property: UDDIInquiryEndpointURL is set to use	The correct IP address will be set for the NHIN UDDI server.

the external setting rather than the internal setting. It should be set to use the one that is preceded with the comment: "when running Outside of NHIN Connect development environment use this one..." If there is a '#' on the UDDIInquieryEndpointURL property immediately following that comment, then remove it and put one on the other occurrence of that property further down in the file.	This should be done on both the Gateway and Adapter computers.

4.5   Deploy NHIN CONNECT Components

Once the software has been compiled on both the Gateway and Adapter computers, the components need to be deployed in their respective environments. Use NetBeans to deploy each of the components. The steps for deploying a component using NetBeans is described in the following table. The next two subsections outline the components and the machine that they should be deployed on. Follow these steps for each component in the respective list.

Before deployment can be done, GlassFish must be started. The steps for starting GlassFish were given in *section 4.2.8*. Refer to that section for these steps.

The following table describes the steps necessary for deploying a single project to NetBeans. This should be done for each Project that is to be deployed. The list of projects to be deployed and the machine that they should be deployed to are outlined in the next two sections. The following steps assume that NetBeans is running and that GlassFish V2 has been started.

While developing, there are times when GlassFish V2 is unable to start for a variety of reasons. Sometimes restarting GlassFish ESB resolves this. Sometimes, a full reboot of the computer is necessary.

Step	Action Input	Expected Result
1	Click on the "Projects" tab to make it active. If the "Projects" tab is not showing, then click on the Window menu item and select "Projects".	The projects tab will show on the screen with all open projects. Initially there will be no open projects. This should be done on both the Gateway and Adapter computers.
2	Open the project to be deployed by selecting "File" from the menu and clicking on "Open Project…".	The "Open Project" window will show that can be used to browse to available projects.
3	Select the project to be opened and click on the "Open Project" button.	The project will now be shown in the "Projects" tab.
4	If the project is an "EJB", the name of	A new sub-tab will be created in

	the project will end with the letters "EJB". If project is a composite application, then the name of the project will end in the letters "CA". If the project is a web application, the name will end in "GUI".
	
	To deploy an EJB or GUI, right-click the project, and select "Undeploy and Deploy" from the menu.
	
	To deploy a composite application, right-click the project, and select "Deploy".
	
	Notes:
	    1. *Only one project should be deployed at a time. Wait until it is deployed before deploying the next one.)*
	    2. *Some projects when being deployed may give the warning: "Select server – the target server has not been set or is not a valid application server. Please select the target application server" If this occurs, simply select the GlassFish V2 server from the list and click OK.*
		the Output tab for this action. When the project is successfully deployed, it will show the following line, "Build Successful" with some information on the amount of time it took.
		
		Note that some composite applications can take a very long time to deploy. On slower computers, it can take over ½ hour. On faster computers, it can take 5 or 10 minutes.

5	Repeat steps 1-4 for each project that is to be deployed. *Note that these projects should be deployed in the same order they appear in the table.*	

Once a project is deployed within GlassFish, it can be seen under GlassFish in the services tab of the IDE. The following table shows the steps to check GlassFish to see if an EJB or composite application has been deployed.

Step	Action Input	Expected Result
1	Click on the "Services" tab to make it active. If the "Services" tab is not showing, then click on the Window menu item and select "Services".	The services tab will show on the screen.

2	Click on the "plus" sign immediately before "Servers".	This will expand the servers folder.
3	Click on the "plus" sign immediately before "GlassFish V2".	This will expand the GlassFish V2 folder.
4	Click on the "plus" sign immediately before "Applications".	This will expand the "Applications" folder.
5	Click on the "plus" sign immediately before "EJB Modules".	This will expand the "EJB Modules" folder. Note that if there are no deployed EJB projects, this will be empty. If one or more EJB projects have been deployed, then they will be shown. This folder only shows the deployed EJB modules – but not the composite applications. The composite applications are shown in a different area.
6	Click on the "plus" sign immediately before "Web Applications".	This will expand the "Web Applications" folder. Note that if there are no web applicaton projects deployed, this will be empty. This folder only shows the web applications.
7	Click on the "plus" sign immediately before the "JBI" folder. Note that the "JBI" folder is a child of the "GlassFish V2" folder.	This will expand the JBI folder.
8	Click on the "plus" sign immediately before the "Service Assemblies" folder.	This will expand the "Service Assemblies" folder and show all of the composite applications that have been deployed. If there are none deployed then the list will be empty. Note that this area is only for the composite applications. EJB projects are shown in the section defined in a previous step.

4.5.1 Components to be Deployed to the Gateway Computer

This contains the list of components that should be deployed on the Gateway computer. Follow the steps outlined above for deployment from NetBeans to deploy each of these. _Make sure that these are deployed in the same order that they are lised in this table._ All source projects will be located in a subfolder of C:\projects\NHINC\Current\Product\Production. The specific subfolder is shown in the table below.

Project	Project Subfolder Location
AggregatorEJB	Gateway\AggregatorEJB

AuditRepositoryEJB	Gateway\AuditRepository
ConnectionManagerEJB	Common\ ConnectionManagerEJB
DocumentTransformEJB	Common\ DocumentTransformEJB
GatewaySubscriptionRepositoryEJB	Gateway\GatewaySubscriptionRepositoryEJB
GatewayPolicyEngineTransformatipnEjb	Gateway\ GatewayPolicyEngineTransformationEjb
NhincAuditLogDteEJB	Gateway\ NhincAuditLogDteEJB
NhincAuditQueryEJB	Gateway\ NhincAuditQueryEJB
NhincDocRetrieveEJB	Gateway\ NhincDocRetrieveEJB
NhincDocQueryEJB	Gateway\ NhincDocQueryEJB
NhincHiemSubscriptionEJB	Gateway\ NhincHiemSubscriptionEJB
NhincSubjectDiscoveryEJB	Gateway\ NhincSubjectDiscoveryEJB
NhincSubDiscDataTransformsEJB	Common\ NhincSubDiscDataTransformsEJB
PatientCorrelationEJB	Gateway\ PatientCorrelationEJB
PatientCorrelationFacadeDteEjb	Gateway\ PatientCorrelationFacadeDteEjb
PropAccessorEJB	Common\ PropAccessorEJB
SubscriptionDteEjb	Gateway\ SubscriptionDteEjb
UDDIUpdateManagerEJB	Common\ UDDIUpdateManagerEJB
EntityCA	Gateway\ EntityCA
NhinCA	Gateway\ NhinCA

4.5.2   Components to be Deployed to the Adapter Computer

This contains the list of components that should be deployed on the Adapter computer. Follow the steps outlined above for deployment from NetBeans to deploy each of these. *Make sure that these are deployed in the same order that they are lised in this table.* All source projects will be located in a subfolder of C:\projects\NHINC\Current\Product\Production. The specific subfolder is shown in the table below.

Project	Project Subfolder Location
MpiEJB	Adapters\General\ MpiEJB
AdapterMpiEJB	Adapters\General\ AdapterMpiEJB
AdapterPolicyEngineTransformEJB	Adapters\General\ AdapterPolicyEngineTransformEJB
MpiManagerEJB	Adapters\General\ MpiManagerEJB
AdapterReidentificationEJB	Adapters\General\ AdapterReidentificationEJB
ConsumerPreferencesProfileGUI	Adapters\General\ConsumerPreferencesProfileGUI
AdapterCA	Adapters\General\AdaptersCA

4.6   Third Party Components

The full catalog of third party components is outlined in the NHIN CONNECT System Integration and Installation Guide. Refer to that document for this list.

5 APPLICATION SERVER INSTALL AND CONFIGURATION VERIFICATION

SoapUI is used to test the installation and configuration of an NHIN Connect environment. A separate download can be obtained from the CONNECT Community Portal site under the CONNET Releases page that contains the SoapUI projects and the directions for running them. The tests are the same whether a binary install of the environment is being tested, or a source environment that was built and deployed is being tested.

6 INSTALLATION AND CONFIGURATION CHECKLIST

Item	Procedural Step
↑	Download the NHIN CONNECT Source Code from the NHIN CONNECT Release Site. See section 3.
	Download the NHIN CONNECT Third Party Tools from the NHIN CONNECT Release site. See section 3.
	Download the NHIN CONNECT Third Party Components from the NHIN CONNECT Release site. See section 3.
	Unzip the NHIN CONNECT Source Code to the appropriate location. See section 4.1.
	Unzip the NHIN CONNECT Third Party Tools to the appropriate location. See section 4.1.
	Unzip the NHIN CONNECT Third Party Components to the appropriate location. See section 4.1.
	Install the Java SDK. See section 4.2.1.
	Install GlassFishESB. See section 4.2.2.
	Update NetBean's version of Ant. See section 4.2.3.
	Install Metro 1.4. See section 4.2.4.
	Setup development GlassFish certificates. See section 4.2.5.
	Update the configuration information in the domain.xml file. See section 4.2.6.
	Install third party components into the GlassFish library directory. See section 4.2.7.
	Update the GlassFish HTTP Binding Component's application variables. See section 4.2.8.
	Install MySQL. See section 4.2.9.
	Create the NHIN CONNECT database schemas and tables. See section 4.2.10.
	Install SoapUI. See section 4.2.11.
	Compile NHIN CONNECT Source. See section 4.3.
	Update Property/Configuration File Settings. See section 4.4.
	Deploy NHIN CONNECT Components. See section 4.5.
	Verify server setup. See section 5.

7 ACRONYMS AND ABBREVIATIONS

Glossary of Acronyms

Acronym	Definition
CA	Certificate Authority or Composite Application depending on the context.
CAC	Common Access Card
CD	Compact Disk
CDC	Centers for Disease Control & Prevention
CMS	Centers for Medicare & Medicaid Services
DAT	Digital Audio Tape
DOD	Department of Defense
DURSA	Data Use and Reciprocal Support Agreement
DVD	Digital Video Disc
EHR	Electronic Health Record
EMR	Electronic Medical Record
ESB	Enterprise Service Bus
FHA	Federal Health Architecture
GB	Gigabyte
HDD	Hard Disk Drive
HITSP	Healthcare Information Technology Standards Panel
IDE	Integrated Drive Electronics
IHS	Indian Health Services
IPv6	Internet Protocol Version 6
MB	Megabyte
MPI	Master Patient Index
NCI	National Cancer Institute
NDMS	National Disaster Medical System
NHIE	NHIN Health Information Exchange
NHIN	Nationwide Health Information Network

NIST	National Institute of Standards and Technology
OID	Object Identifier or Home Community ID
ONC	Office of the National Coordinator
OS	Operating System
QA	Quality Assurance
RAID	Redundant Array of Inexpensive Disks
RAM	Random Access Memory
SCSI	Small Computer System Interface
SDK	Software Development Kit
SSA	Social Security Administration
SSL	Secure Sockets Layer
TBD	To Be Determined
USB	Universal Serial Bus
VA	Department of Veterans Affairs