RESOURCE AND PATIENT MANAGEMENT SYSTEM

TCH Forecaster Installation Instructions

(BI)

Addendum to Installation Guide and Release Notes

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Revision Changes History

Change No.	Date	Subject	Section
001	June 23, 2014	Removal of Section 2.5, step 4: "Configure EHR to Connect."	2.5
002	June 23, 2014	Updated Section 2.6 to 2.5 and removed the "The EHR is configured to connect" checklist item from the Installation Verification table.	2.6
003	August 13, 2014	Added Section 2.4 - Step 3 (instructions on ensuring that the server has Internet access and if it doesn't, instructions on how to manually download and install the TCH Forecaster) Added a troubleshooting section that gives details on where to find the logs that the TCH Forecaster creates. Added instructions on how to run the TCH Forecaster manually outside of the Tomcat.	Section 2.4

1.0 Introduction

The Texas Children's Hospital (TCH) Forecaster is a Clinical Decision Support (CDS) engine for immunizations. It provides evaluations and forecasts for immunization records using both the adult and childhood standard schedules as defined by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP).

Detailed technical information on how the TCH Forecaster works, release notes, and documentation can be found here: http://tchforecasttester.org/.

1.1 System Architecture

The TCH Forecaster is written in Java and runs as an independent service and is accessed by the Electronic Health Record (EHR) system by a plain TCP/IP connection. The EHR submits a text-based, formatted string of data that includes the patient's DOB and vaccination history and the TCH Forecaster returns a text-based, formatted string of data that includes an evaluation of the immunizations and the next doses recommended. The TCH Forecaster does not receive enough information to identify the patient and does not store any information received.

The TCH Forecaster can be deployed locally, even on the same system as which the EHR is installed on. It can also be deployed centrally and accessed remotely if desired.

As the TCH Forecaster is written in Java, it will operate on any system that supports the most recent versions of Java.

1.2 Temporary Installation

This document details the temporary installation instructions that Indian Health Service (IHS) will utilize in 2014. TCH is building a new TCH Forecaster installation that will automatically update the TCH Forecaster with updates from TCH. Until this is available, this document will provide the details on how to install the TCH Forecaster.

2.0   Installation

The TCH Forecaster requires Java 1.6 or higher, and Tomcat webserver (or equivalent Java web service). The TCH Forecaster has no minimum memory or disk space requirements beyond those required of Java and Tomcat. The TCH Forecaster itself is very small, 170kb in size, and requires the minimum amount of resources to operate.

2.1   Note for Simple Message Mover (SMM) Users

If you have already installed and are using SMM skip to Step 3 Download TCH Forecaster. The TCH Forecaster can run under the same Tomcat installation that SMM uses.

2.2   Step 1: Install Java

To install the latest version of Java on Windows:

1. Navigate to http://www.java.com/en/.

2. Click **Free Java Download**.

3. Click **Agree and Start Free Download**.

4. Run the download file and allow the installation to proceed.

Please note that the installation steps may differ for your operating system.

*   For more details on installing Java, follow the instructions on the link titled **Installation Instructions**.

*   For more details on downloads for other operating systems click **See All Java Downloads**.

2.3   Step 2: Install Tomcat

To install Tomcat:

1. Navigate to http://tomcat.apache.org/download-70.cgi.

2. Select the Binary Distribution for your OS. For Windows please select 32-bit/64-bit Windows Service Installer.

3. Install application, following all standard installation prompts.

4. Start Tomcat using your operating specific methods.

    a. For Unix-based systems, this requires running script to start Tomcat.

      b. For Windows-based systems, this requires starting Tomcat service in the service panel. Details of this are below.

2.3.1   Windows Instructions

Tomcat runs as a service in Windows. This means that it can run in the background all the time allowing the TCH Forecaster to service requests at any time. Information on how to access the service configuration panel is needed to operate the TCH Forecaster:

1. Open the Service panel by opening the control panel and searching in the search box for **Services** and selecting **View local services** or by pressing the Windows Key + R Key and typing **services.msc** and pressing Enter.

2. Tomcat will show up on the list under Apache Tomcat 7.0 Tomcat7.

3. Double click to bring up the service properties.

4. Set **Startup** type to **Automatic**. *This is critical* to ensure that Tomcat is always running even after a system reboot.

5. Notice the **Start** and **Stop** buttons. You will use these to start and stop Tomcat when needed. Every time Tomcat is started, the TCH Forecaster will download the latest TCH Forecaster from TCH. This panel can be used to essentially update your Forecaster.

2.3.2   AIX Instructions

Tomcat in AIX needs two components to function. Their respective instructions are below:

- Java- to find out if you have java installed run:

```
o  lslpp -l| grep -i java
```

- Next to find out what version:

```
o  Java –version
o  Also add to path
o  cd /etc
o  vi environment
o  update path to include java
o
   PATH=/usr/bin:/etc:/usr/sbin:/usr/ucb:/usr/bin/X11:/usr/java71_64/jre/bin
:/sbin:/usr/java14/jre/bin:/usr/java14/bin:/usr/cachesys:/usr/cachesys/bin:
/usr/cachesys/mgr:/usr/ensemble/bin:/usr/ensemble/mgr:/usr/
```

- Install Java: If you need to install the latest Java you'll need to download from IBM at this link: http://www.ibm.com/developerworks/java/jdk/aix/service.html

  – GCC-Compiler download your version of AIX latest RPM at : http://www.perzl.org/aix/index.php?n=Main.Gcc#v4.8.2

     – To install an open source application type:

```
o  rpm –Uhv  /usr5/ gcc-4.8.2-1.aix7.1.ppc.rpm
```

- Install Tomcat: To unzip and extract the apache binary distribution downloaded from http://tomcat.apache.org/download-70.cgi and follow the instructions:

```
o  gunzip /usr5/ apache-tomcat-7.0.53.tar.gz
o  tar –xopf /usr5/ apache-tomcat-7.0.53.tar
o  cd apache-tomcat-7.0.52
o  ll
   -rw-r--r--    1 root     system         56812 Feb 12 22:31 LICENSE
   -rw-r--r--    1 root     system          1192 Feb 12 22:31 NOTICE
   -rw-r--r--    1 root     system          8965 Feb 12 22:31 RELEASE-NOTES
   -rw-r--r--    1 root     system         16204 Feb 12 22:31 RUNNING.txt
   drwxr-xr-x    3 root     system          4096 Mar 24 12:18 bin/
   drwxr-xr-x    3 root     system           256 Mar 20 13:47 conf/
   drwxr-xr-x    2 root     system          4096 Mar 20 09:54 lib/
   drwxr-xr-x    2 root     system          4096 Apr 09 13:10 logs/
   drwxr-xr-x    2 root     system           256 Mar 20 09:54 temp/
   drwxr-xr-x    9 root     system          4096 Mar 24 12:18 Webapps/
   drwxr-xr-x    3 root     system           256 Mar 20 13:47 work/
```

- To start tomcat:

```
o  in tomcat directory i.e. apache-tomcat-7.0.53
o  cd /bin
o  type startup.sh and your all set.
```

2.3.3 Install in Startup Script

Place the Tomcat start script in the startup script to ensure that if the system is restarted, Tomcat will be started.

2.3.4 Install Crontab Command

The following instructions will install a command in the crontab file that the AIX cron utility uses to run scheduled maintenance activities. The command will stop and then restart Tomcat every day at 2:00 am. This will ensure that Tomcat continues to run every day and initiates the process for downloading and installing new versions of the TCH Forecaster whenever it is released. By executing this command AIX will always have the latest version of the TCH Forecaster.

1. Log in to your system as "root".

2. Cut-and-paste the following command onto the command line at the "#" prompt:

```
echo "0 2 * * * /usr5/tomcat/apache-tomcat-7.0.52/bin/shutdown.sh
>/tmp/tomcat.out 2>&1 && /usr5/tomcat/apache-tomcat-7.0.52/bin/startup.sh
>/tmp/tomcat.out 2>&1" >> /var/spool/cron/crontabs/root
```

3. When pasted, press Enter.

4. After Pressing Enter, run "crontab –l" to verify the command has been added.

2.4　Step 3: Ensure Internet Access

The TCH Forecaster automatically downloads and installs updates to the TCH Forecaster from this URL: http://tchforecasttester.org/tch-forecaster.jar . To access this URL the TCH Forecaster must be able to connect from the local machine to this address on port 80.

2.4.1　Instructions for Manually Loading Forecaster (Optional)

If access through port 80 is not permitted, or Internet access is never available, then the TCH Forecaster jar must be installed and updated manually.

> **Note**: Only complete these steps if you know that Internet access is not available and you are prepared to manually update the software each time a new version of the TCH Forecaster is released.

Optional steps for manually loading forecaster:

1. Download the TCH Forecaster jar from here: http://tchforecasttester.org/tch-forecaster.jar

2. Determine the start folder for the Tomcat instance.

   a. On Windows machines where Tomcat is installed as a service, it is typically found here: C:\Program Files\Apache Software Foundation\Tomcat 7.0

   b. If the program is started from the \bin folder then this is the start folder

3. Save the tch-forecaster.jar in the start folder. If upgrading, overwrite the file saved there previously.

4. Continue on with the installation steps. When the TCH Forecaster is installed it will attempt to download the TCH Forecaster jar, and when it fails it will continue to look for it locally.

5. This process will need to be repeated every time an update is available in order to bring the TCH Forecaster up-to-date. (The TCH forecaster is updated about two or three times a year.)

2.5　Step 4: Download TCH Forecaster

Now that Tomcat is installed and running, the TCH Forecaster can be downloaded. The initial installation is 7.5 kb and it will in turn install a 170 kb package.

1. Download the TCH Forecaster from here: http://tchforecasttester.org/tch-forecaster.html .

   a. Right click on the **Download the TCH Forecaster** link and select **Save target as…** or **Save link as…**

   b. This should open the **File Save as** dialog box on Internet Explorer or Firefox and allow the application file to be saved to your local computer.

2. The TCH Forecaster application is called "fweb.war" and must be installed into Tomcat in order to operate on your local system.

3. Save or copy the downloaded file to the Tomcat/webapps directory.

   a. On Windows systems this is typically found here: C:\Program Files\Apache Software Foundation\Tomcat 7.0\webapps.

4. If the previous steps have been followed correctly, Tomcat will automatically create a folder named "fweb" inside the webapps folder. This happens because fweb.war is actually a zip file that Tomcat recognizes. When the fweb.war file is saved in the webapps folder, Tomcat recognizes it and expands it into a folder.

5. Once Tomcat has expanded the webapps folder, it will download a 140kb sized file named tchforecaster.jar and save it in Tomcat's /bin folder or in Tomcat's root folder. This file is the TCH Forecaster logic and is updated each time Tomcat is started.

   After completing this step, the TCH forecaster should be ready to receive requests from the EHR.

2.6   Step 5: Installation Verification

☐	Java is installed
☐	Tomcat is installed and running
☐	Tomcat is setup to automatically start (in Windows) or Tomcat start command has been added to the system startup scripts (AIX)
☐	A TCH Forecast report can be generated in the EHR for a sample patient record
☐	The version in the TCH Forecast report matches the latest version documented here: http://tchforecasttester.org/

3.0   Updating the TCH Forecaster

To update the TCH Forecaster with the latest version available from TCH:

- **For Windows**: Stop and then start the Tomcat service. The latest version will be downloaded automatically.

- **For AIX**: The crontab will be updating the forecaster on a daily basis, so manual updates should not be necessary. But if they are considered necessary, this can be done by stopping and then starting the Tomcat process.

4.0   Troubleshooting

Information about the current status of the forecaster can be found in the Tomcat logs. Tomcat creates several log files with different information and can rename them as they fill up for every day Tomcat is operational. Tomcat will write the TCH Forecaster's log to a file named something like catalina.log or tomcat8-stdout.YYYY-MM-DD.log.

Here is a sample of what the THC Forecaster logs when successfully deployed:

```
Will look TCH Forecast Software at this URL:
http://tchforecasttester.org/tch-forecaster.jar
Downloaded latest TCH Forecast Software and saved here: C:\Program
Files\Apache Software Foundation\Tomcat 7.0\tch-forecaster.jar
Will start TCH Forecast Server on port: 6708
TCH Forecaster: Starting
TCH Forecaster:   + loading forecaster core
TCH Forecaster:   + loading cvx codes
TCH Forecaster: Testing
TCH Forecaster:   + Test 1: pass
TCH Forecaster:   + Test 2: pass
TCH Forecaster:   + Test 3: pass
TCH Forecaster:   + Test 4: pass
TCH Forecaster:   + Test 5: pass
TCH Forecaster:   + Test 6: pass
Connected on port 6708
```

This can be independently verified by running the following commands using telnet. (Telnet is installed on most Windows professional systems and most unix systems.)

- Open a command prompt or shell window.

- Run this command: telnet localhost 6708

- The screen will clear and telnet will wait for input from you.

- Past the following and press enter: 20140424^0^0^0^0^CREYG,ARLIE Chart#: 00-00-31^31^19830215^Male^U^0^0^0^0^0^0^0^0^0^0^0^0^0^0^0^0^0^0^0^0^~~~3484^03^20140414^0^0^0|||

- You should see forecast report returned.

4.1   Manually Operating the TCH Forecaster

Tomcat is the ideal platform to operate the TCH Forecaster as it provides a stable environment that ensures that the TCH Forecaster is up and operating and allows the TCH Forecaster to keep itself updated.

However, the TCH Forecaster can be run independently if so desired. This is particularly useful when troubleshooting. Below are the instructions:

1. Download the TCH Forecaster jar as described above in Step 3 (Section 2.4) for manually installing the TCH Forecaster.

2. Make sure that the TCH Forecaster is not running anywhere else on the same machine. (If Tomcat is running shut it down, particularly if the TCH Forecaster is installed and running in it.)

3. Run the following command in your command line or shell: java -classpath tch-forecaster.jar org.tch.forecast.core.server.ForecastServer 6708

   a. Java must be in the path or the name must be changed to reference where java is.

   b. The –classpath option must point to the tch-forecaster.jar that was downloaded. Either the command is run in the same folder as the tch-forecaster.jar or the command should be updated to point specifically to where the tch-forecaster.jar is.

   c. The last option is the port number and should be 6708 unless the TCH Forecaster has been configured to a non-standard port.

Below is an example of what the instructions should look like:

```
C:\ >java –classpath tch-forecaster.jar
org.tch.forecast.core.server.ForecastServer 6708
TCH Forecaster: Starting
TCH Forecaster:   + loading forecaster core
TCH Forecaster:   + loading cvx codes
TCH Forecaster: Testing
TCH Forecaster: TCH Forecaster:   + Test 1: TCH Forecaster: pass
TCH Forecaster: TCH Forecaster:   + Test 2: TCH Forecaster: pass
TCH Forecaster: TCH Forecaster:   + Test 3: TCH Forecaster: pass
TCH Forecaster: TCH Forecaster:   + Test 4: TCH Forecaster: pass
TCH Forecaster: TCH Forecaster:   + Test 5: TCH Forecaster: pass
TCH Forecaster: TCH Forecaster:   + Test 6: TCH Forecaster: pass
TCH Forecaster: Connected on port 6708
```

This will continue to run and respond to requests on port 6708 until the process is terminated, which can be done by pressing Ctrl + C.

This command can be included in shell script and the TCH Forecaster can be run in production this way, but doing so has the following drawbacks:

- The application will not automatically restart if the system is restarted. Shell script would need to ensure it was restarted.

- The application will not automatically update itself as it would in Tomcat.

Acronym List

ACIP	Advisory Committee on Immunization Practices
CDC	Centers for Disease Control and Preventions
CDS	Clinical Decision Support
EHR	Electronic Health Record
IHS	Indian Health Service
OS	Operating System
RPMS	Resource and Patient Management System
TCH	Texas Children's Hospital

Contact Information

If you have any questions or comments regarding this distribution, please contact the OIT Help Desk (IHS).

Phone: (888) 830-7280 (toll free)

Web: http://www.ihs.gov/helpdesk/

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