



# Medical Health Record Sharing System ®

PROVIDED BY

\_err404r

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## Contents

|  |    |
|--|----|
| <b>Medical Health Record Sharing System ®</b> .....            | 0  |
| SPECIFICATIONS .....   | 2  |
| INTRODUCTION TO THIS PRODUCT .....                             | 2  |
| EXPORTING THE PATIENT’S RECORD FROM THE OPENEMR DATABASE ..... | 2  |
| SHARING THE EXPORTED PATIENT’S RECORD .....                    | 2  |
| DECODING EXISTING ENCODED PATIENT RECORD .....                 | 2  |
| PREPARATION FOR THE SETUP .....                                | 3  |
| INSTALLATION OF JAVA JDK OR JRE .....                          | 3  |
| OPENEMR SETUP .....  | 8  |
| INSTALLING XAMPP.....  | 8  |
| ADDING TOMCAT MANAGER GUI USER .....                           | 15 |
| INSTALLING OPENEMR.....  | 16 |
| REPLACING THE PATIENT REPORT FILE .....                        | 17 |
| STARTING THE SERVERS.....                                      | 18 |
| ADDING SQL STATEMENTS .....                                    | 19 |
| DEPLOYING THE MHR SHARING SYSTEM WAR FILE IN TOMCAT .....      | 21 |
| INTERACTION GUIDE .....  | 22 |
| TESTING DATA.....  | 28 |
| SOFTWARE LIMITATIONS .....                                     | 29 |

## SPECIFICATIONS

### INTRODUCTION TO THIS PRODUCT

Our team developed a module/feature for Open EMR medical system, that will save time and effort in sharing patient information between medical offices. This feature will be user-friendly, intuitive and simple to use.

There are 3 main components of this feature:

- Extracting the patient's record from the openEMR database
- Sharing the exported patient record through email
- Decoding existing encoded patient record

These will be discussed in detail in the following sections.

### EXPORTING THE PATIENT'S RECORD FROM THE OPENEMR DATABASE

Exporting the patient's record from the database follows the below stated procedure in sequential way:

- Establishing connection to the openEMR database with the predefined credentials which will have certain access privileges.
- Querying the database for a specific record.
- Converting the returned results from the query to a special XML format for medical records, CCD (Continuity of Care Document) which is a standard format for electronic health record.
- Protecting the converted CCD file by 128bit AES encryption before sending.

### SHARING THE EXPORTED PATIENT'S RECORD

Sharing the record is through email API (JavaMail) which is *implemented* and *pre-configured* in the feature to send email with the health record as an attachment.

Sending the CCD file can be seen as a procedure that follows the following pattern:

- Attaching the CCD file which is located on a temporary directory on the sending workstation will be done in the background.
- Getting the email address from the html form on the feature's page and setting it as the target email.
- Sending the email with the attachment through the preconfigured SMTP protocol.

### DECODING EXISTING ENCODED PATIENT RECORD

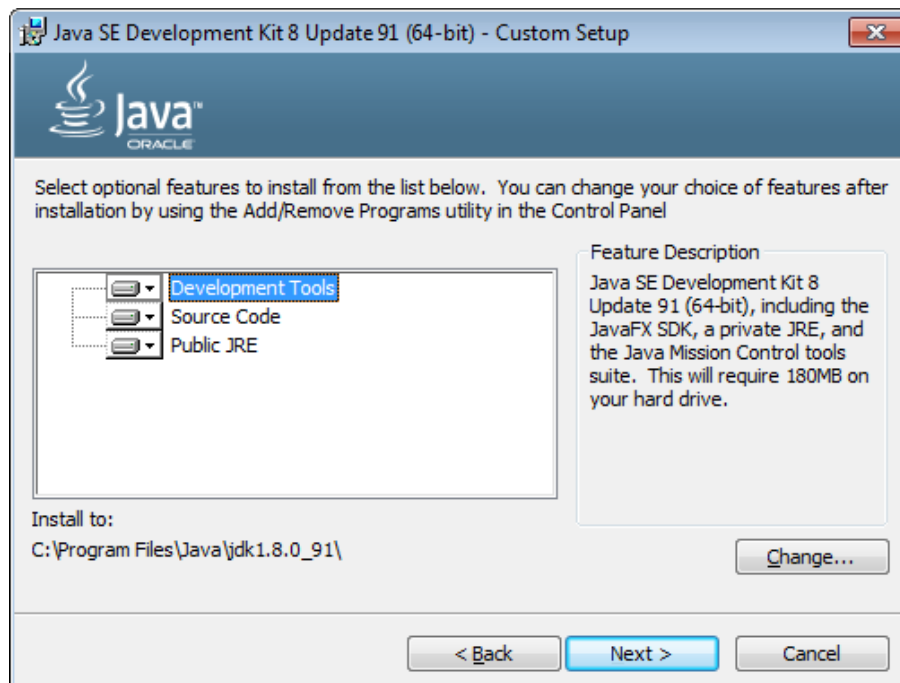
The decoding will be done in a way that gets the filename which is the timestamp and the last 4 digits of the patients Social Security Number as a key and decrypts the file using 128bit AES decryption.

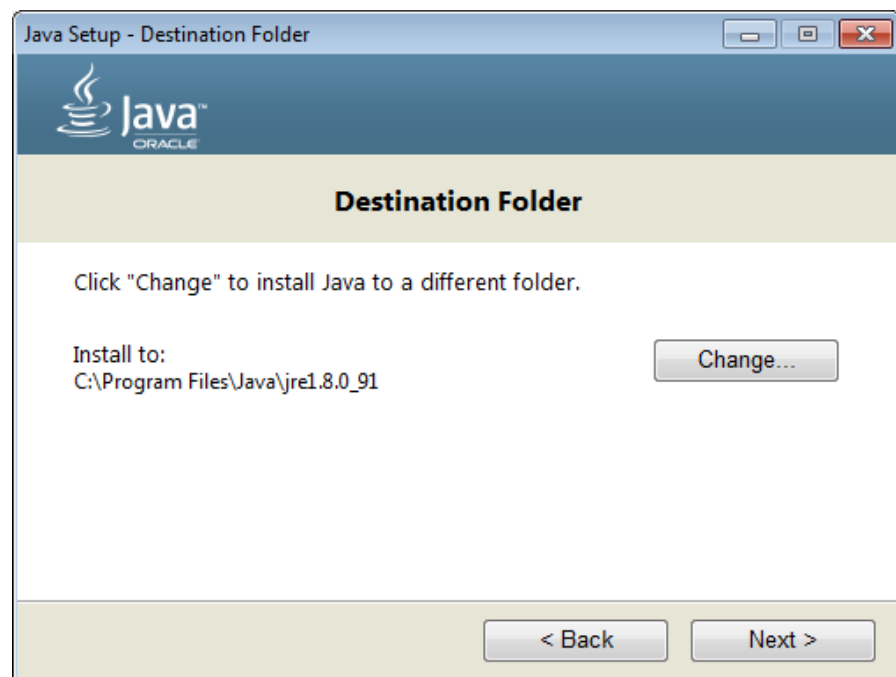
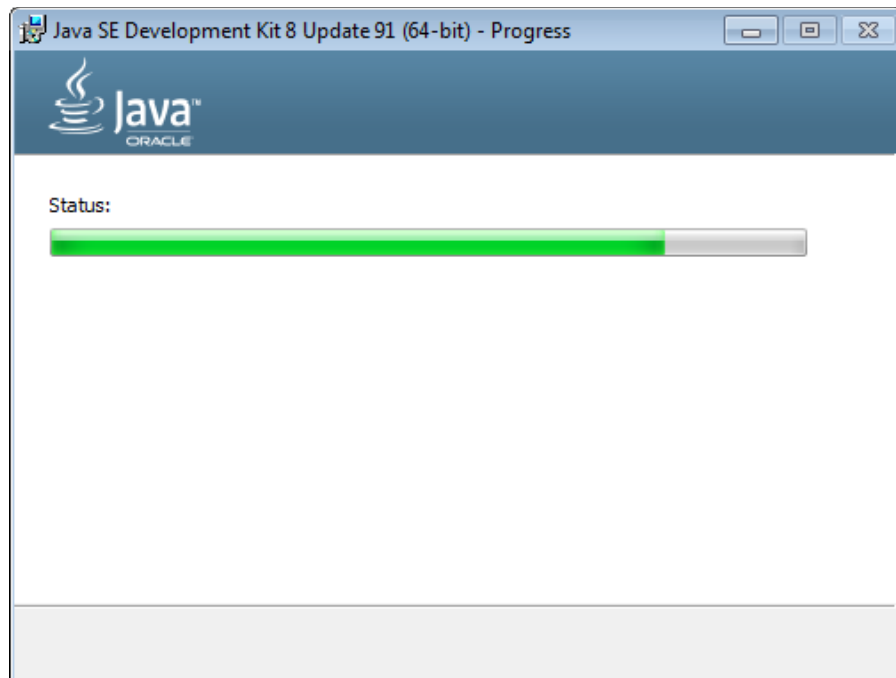
## PREPARATION FOR THE SETUP

### INSTALLATION OF JAVA JDK OR JRE

You can find the installation package available for download at

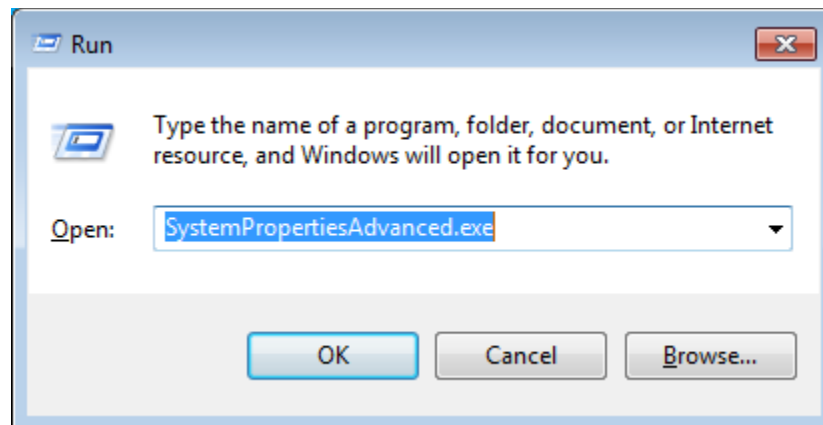
<http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html>



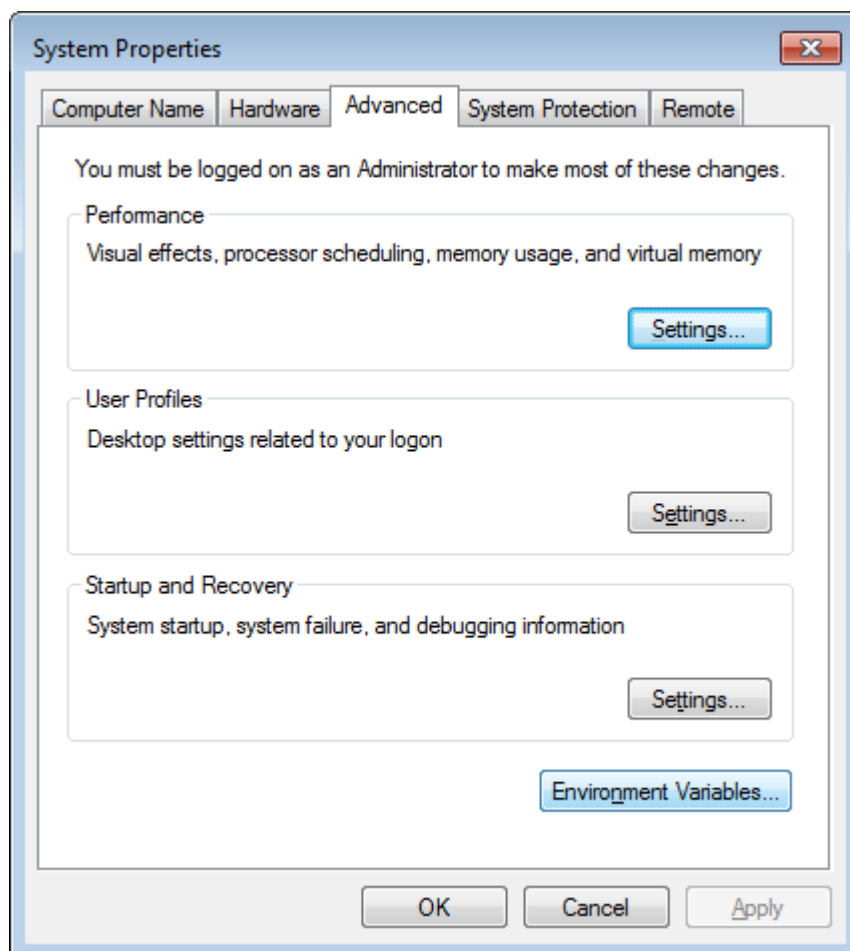


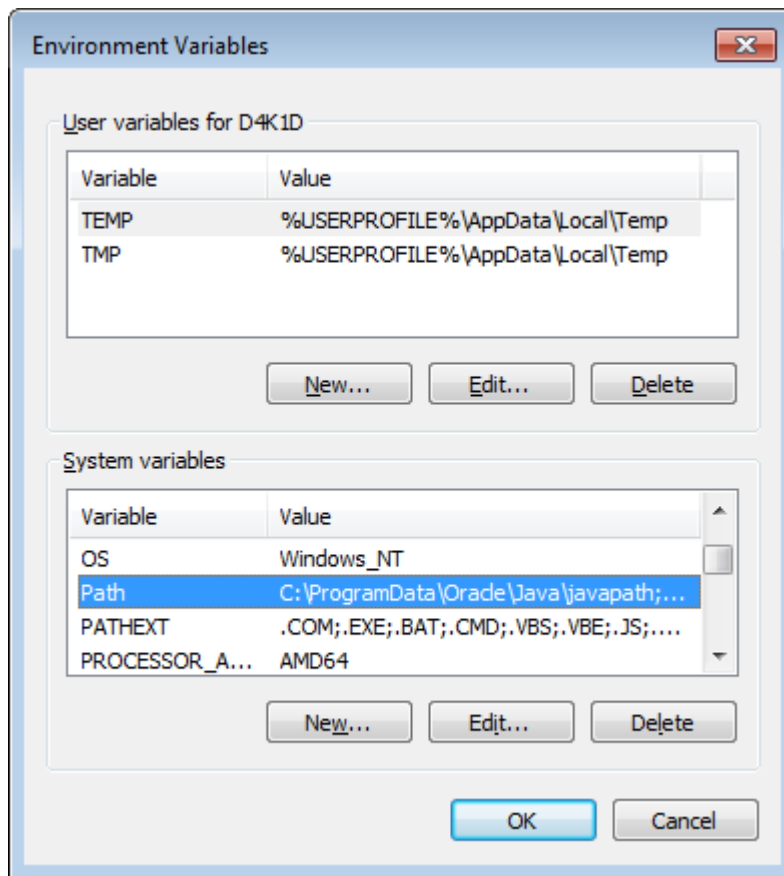


In the final step make sure that the JRE is included in the System PATH



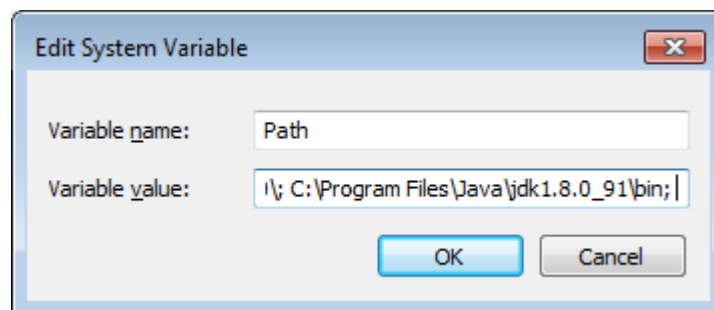
Run SystemPropertiesAdvanced.exe and then select Environment Variables on the popped up window.



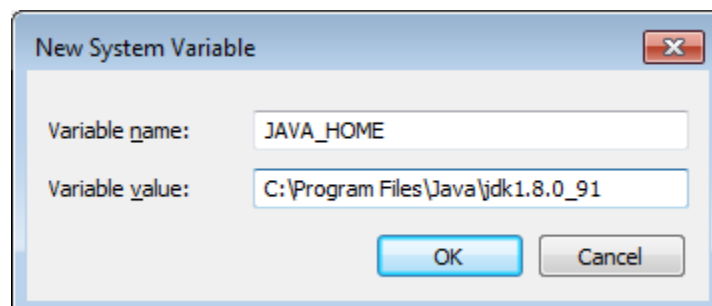


Double click on Path and then add the following line at the end of the text field:

C:\Program Files\Java\jdk1.8.0\_91\bin;

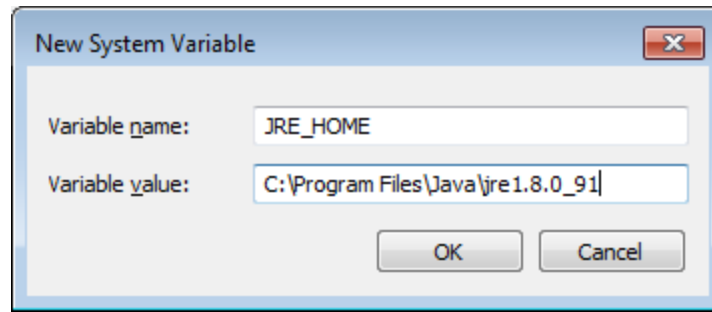


Click OK, then Click on New Variable.





New Variable again.

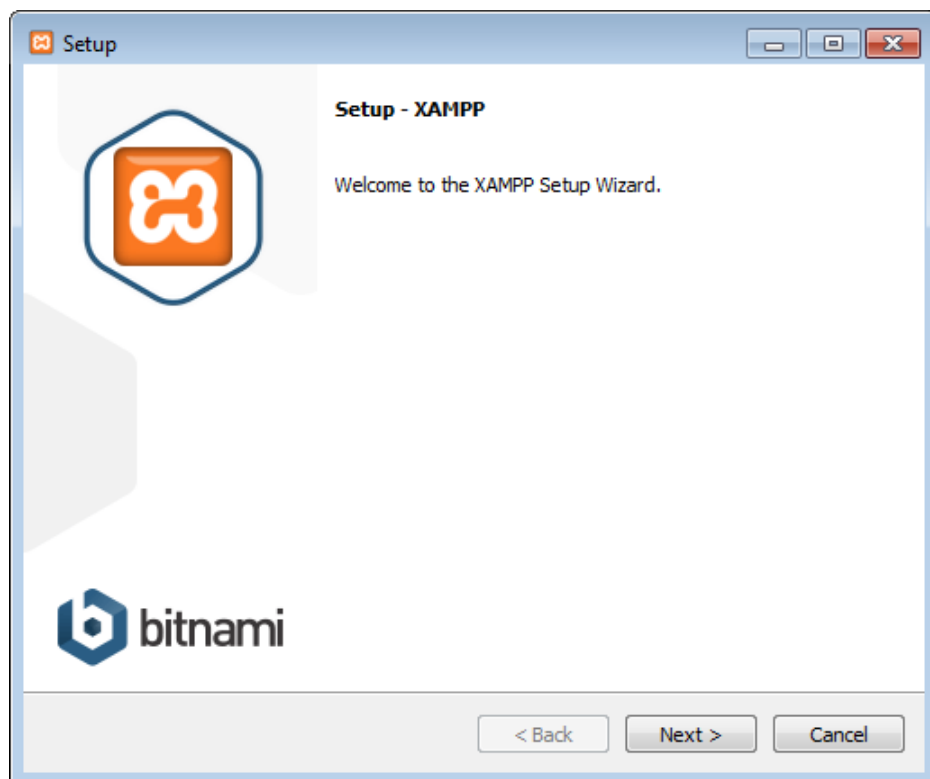


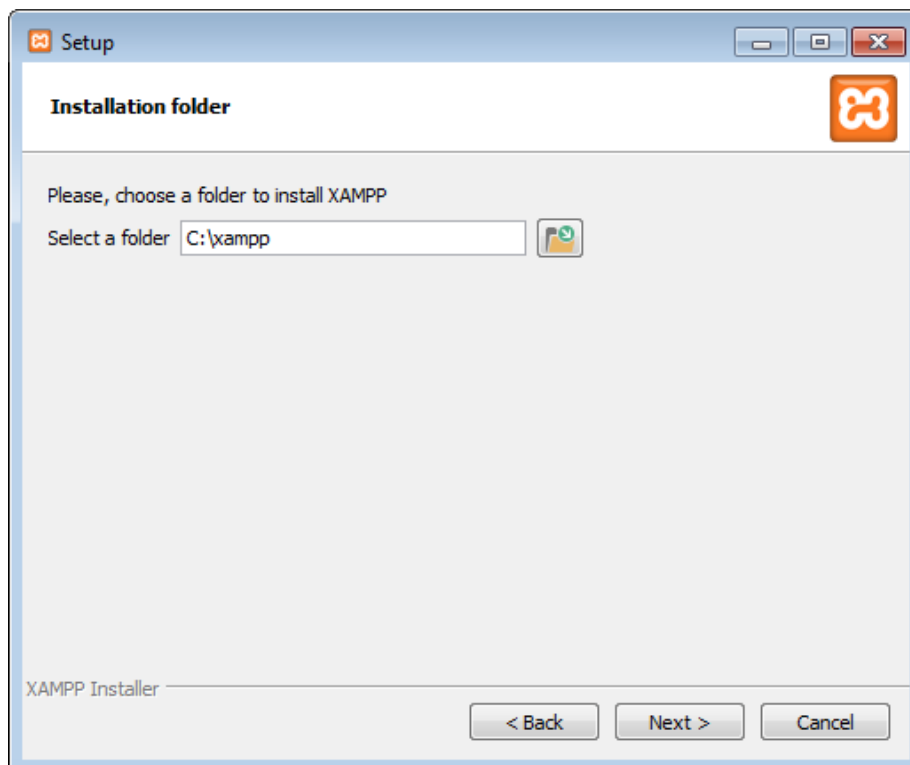
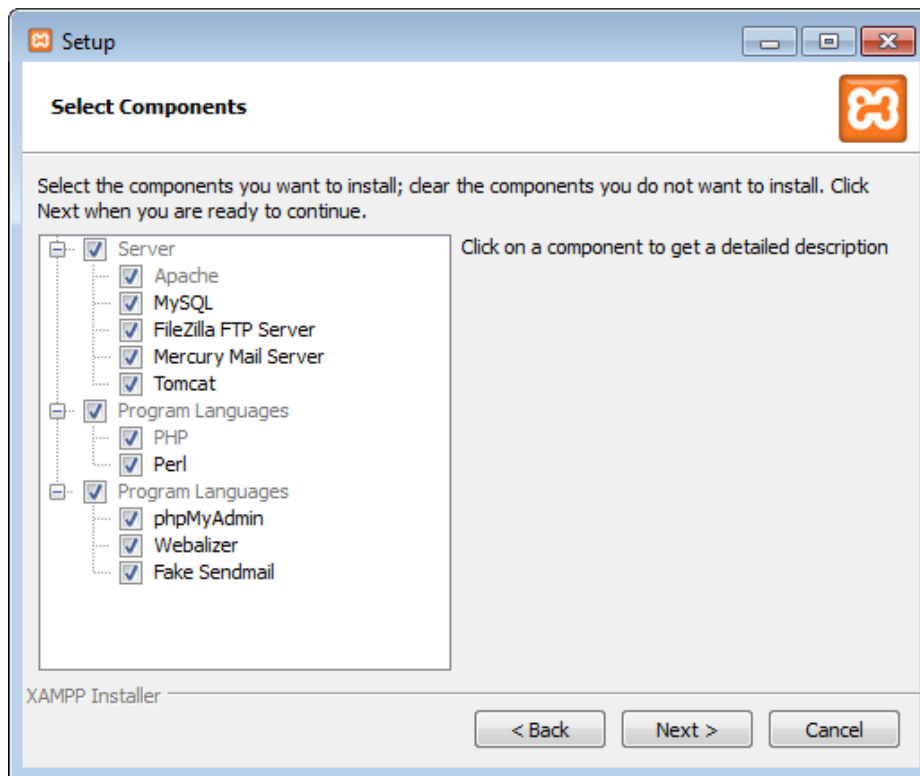
Close all open windows by clicking OK. The JDK and JRE has been successfully setup.

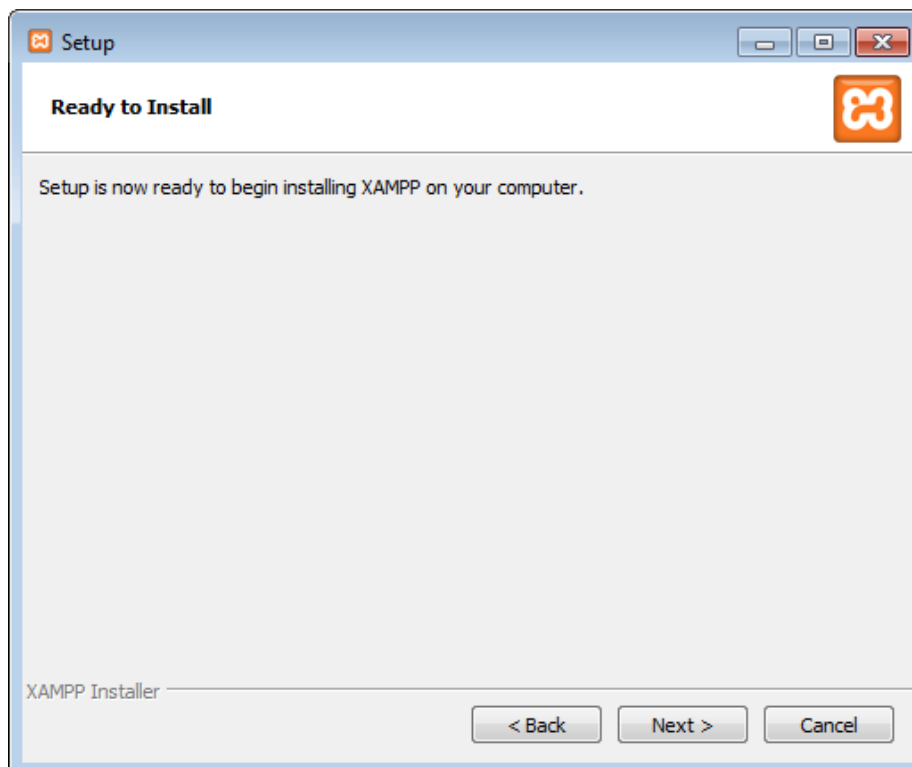
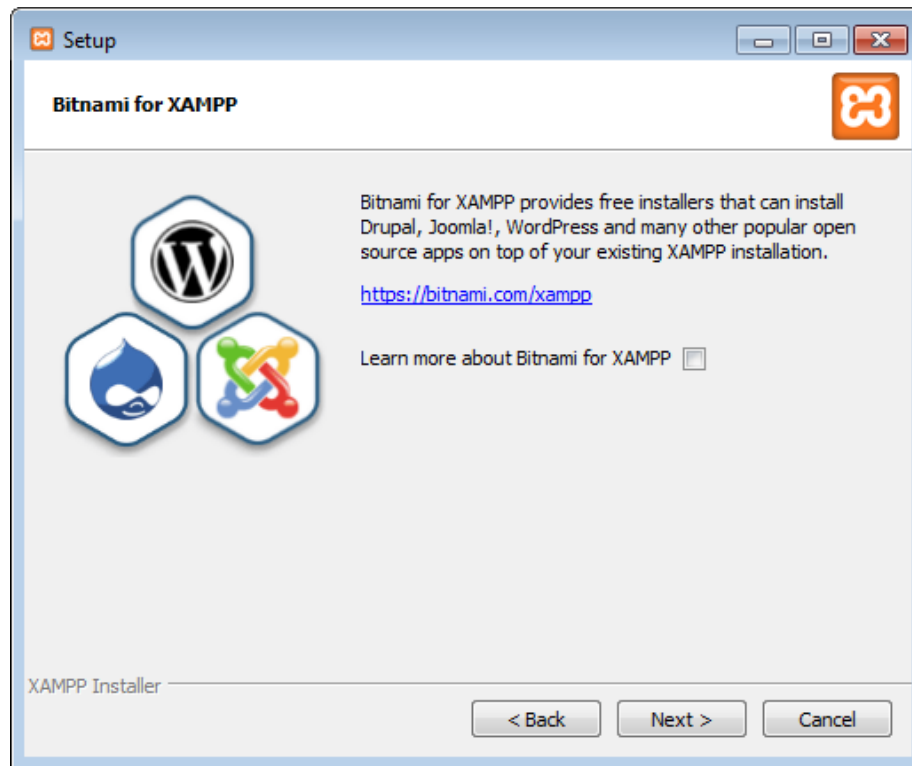
## OPENEMR SETUP

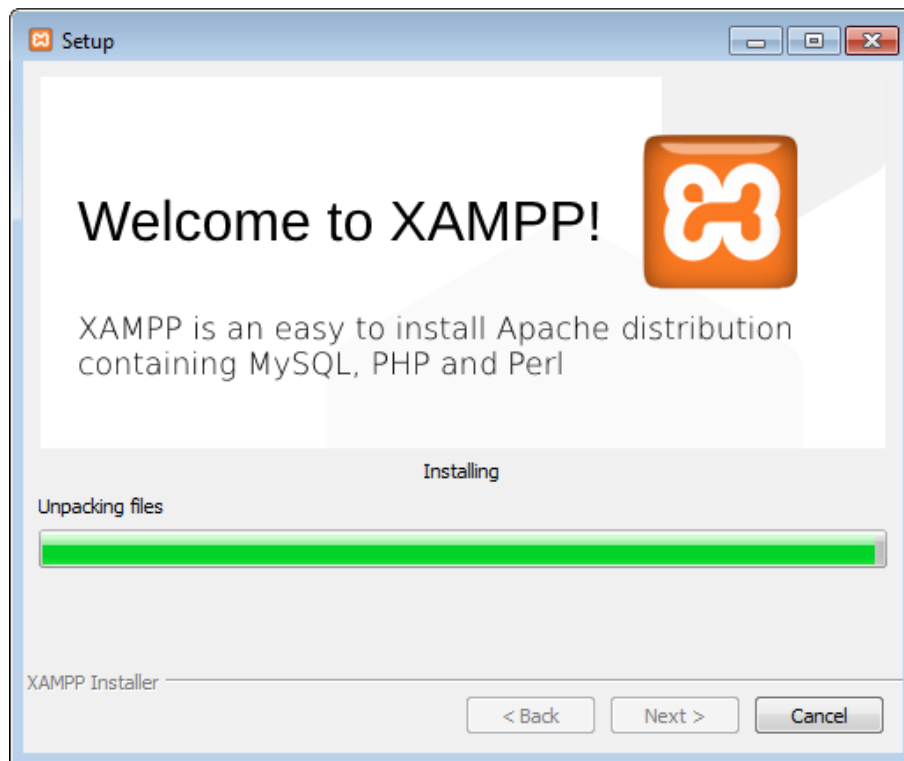
### INSTALLING XAMPP

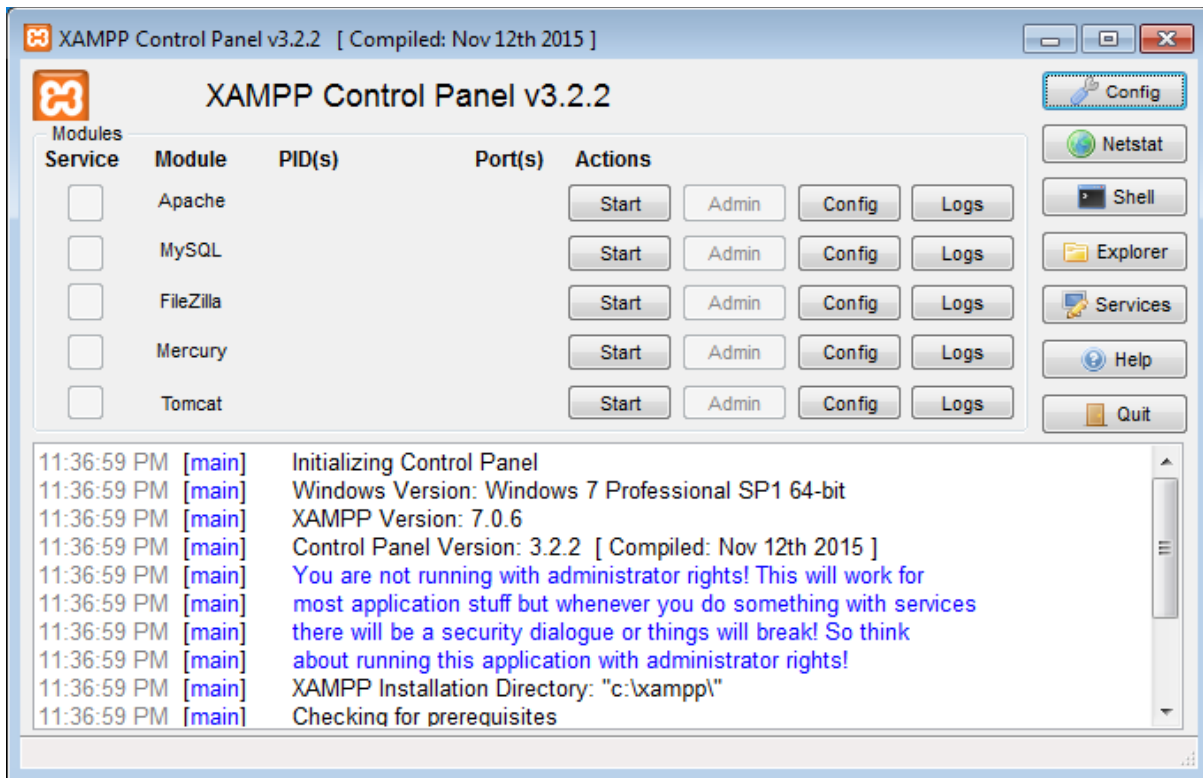
You can download the installation package at <https://www.apachefriends.org/download.html>



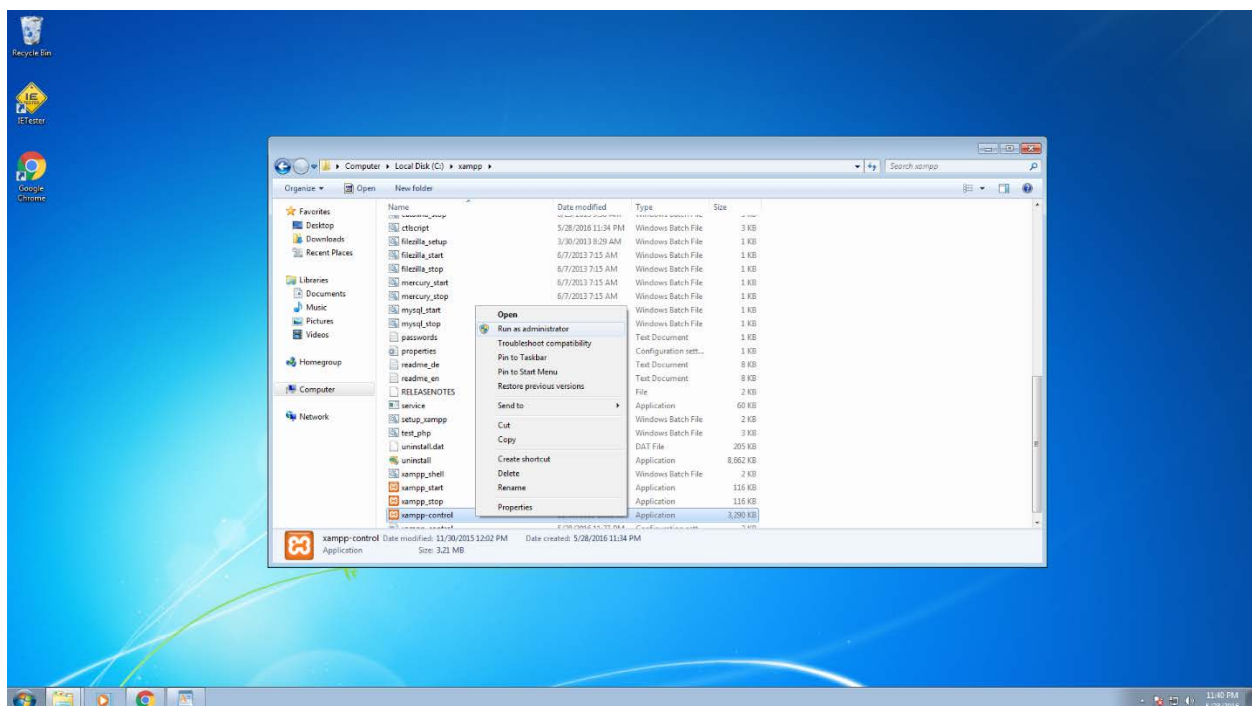




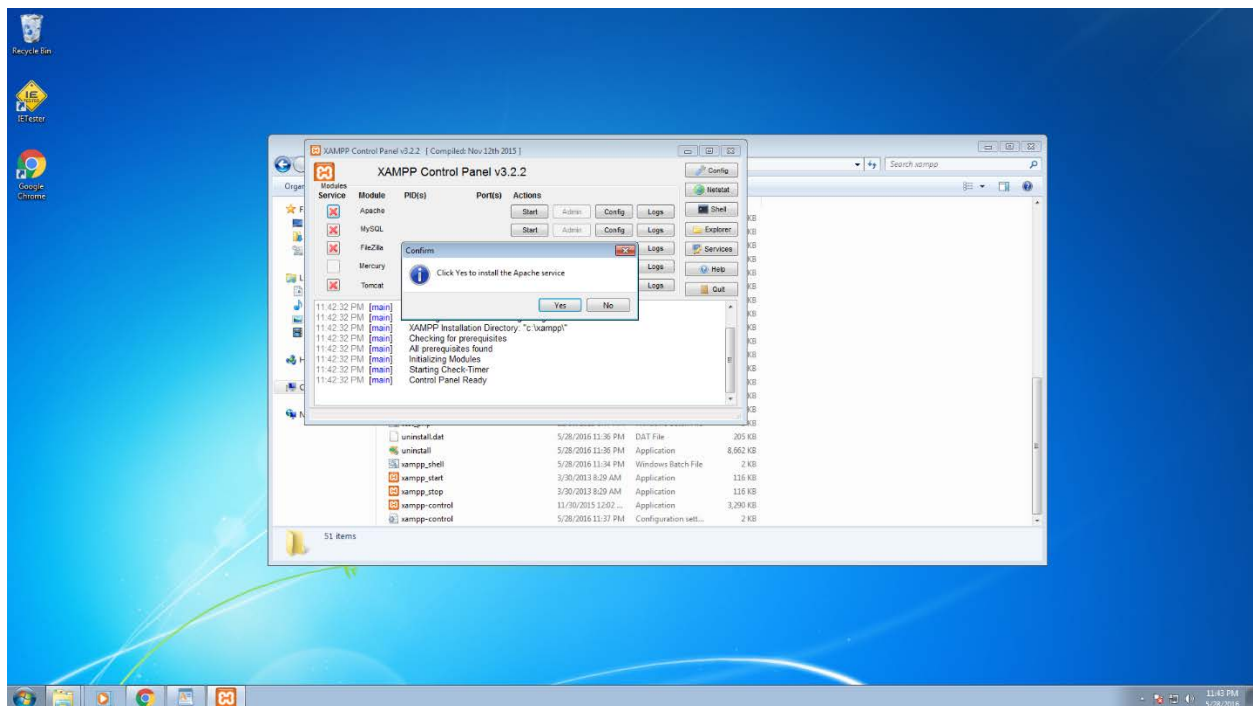
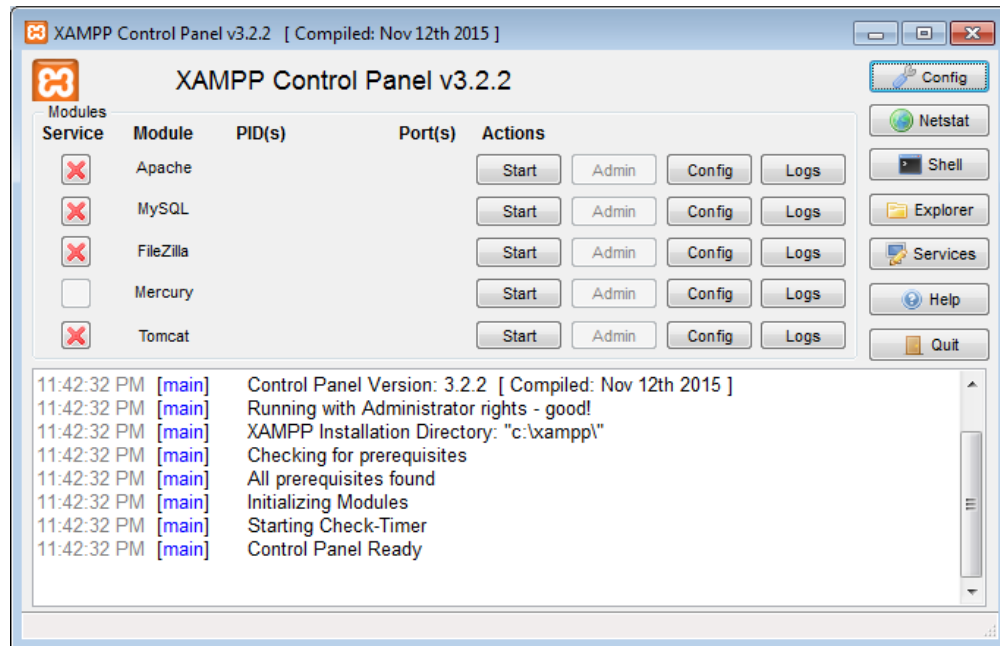


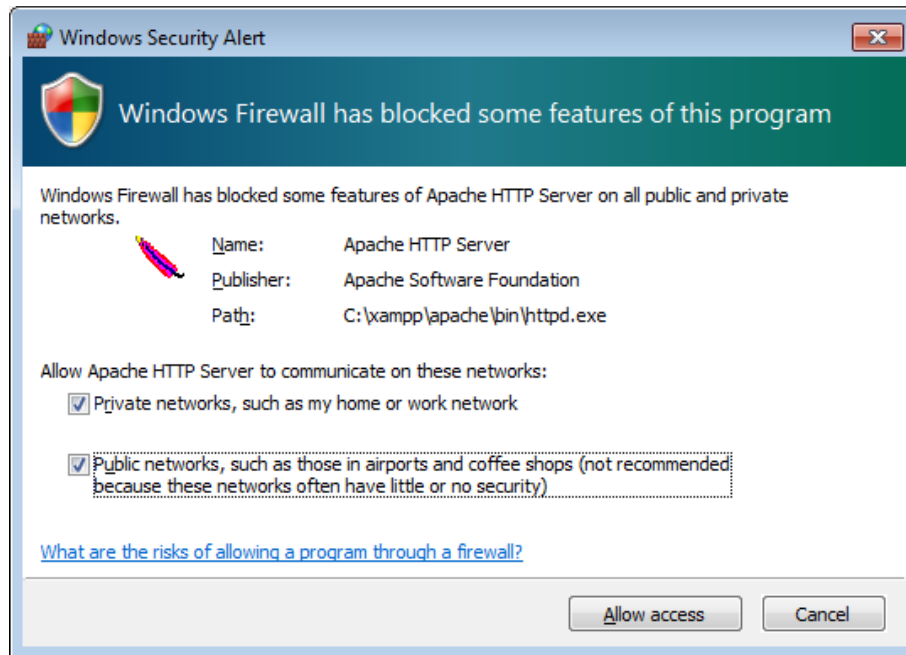


It is recommended that XAMPP is running with administrator rights because it needs permission to use some system background services needed to function properly. To run XAMPP with administrator rights, navigate to C:\xampp and right click on xampp-control.

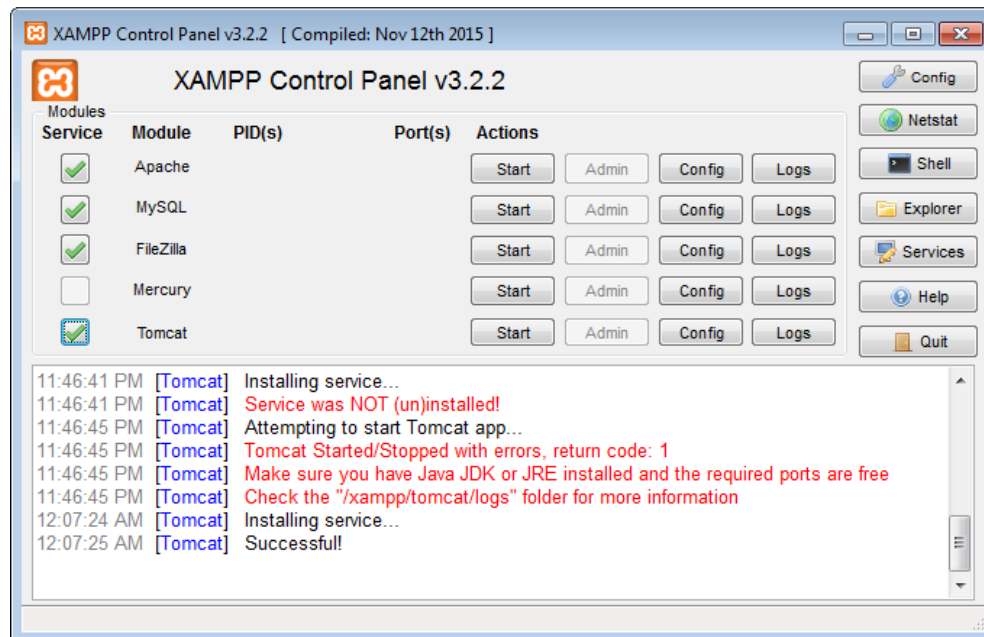


The following windows is shown and as you can see there are red X next to each server except Mercury. What we want to do now is click on each X and install the servers.





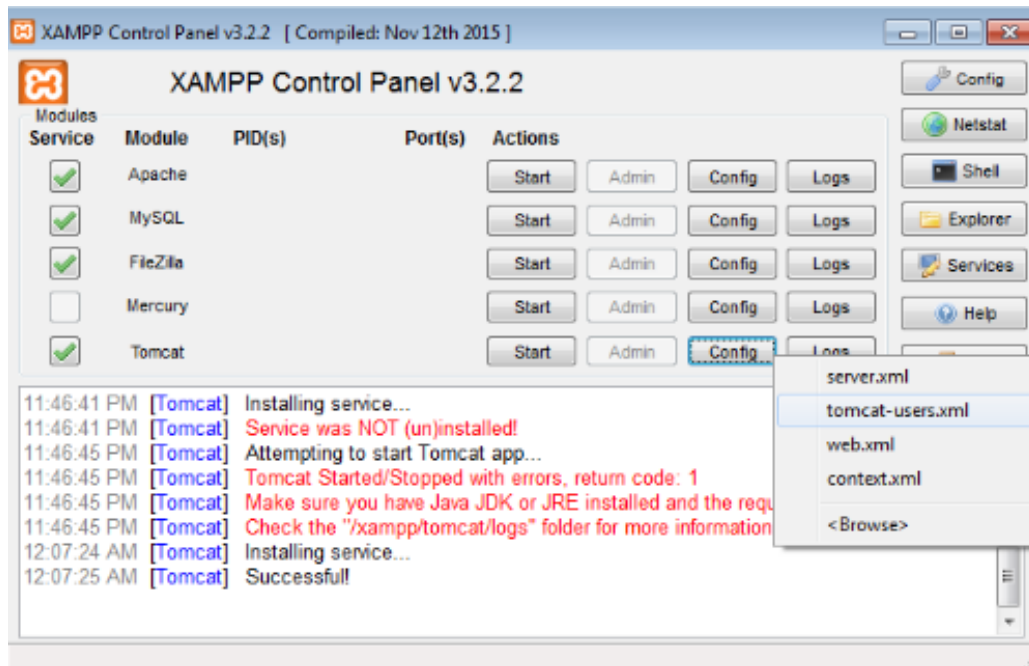
After all servers are installed here is the final result. If you have encountered an error for Tomcat server, you need to install Java JDK or JRE. You can find the guide under PREPARATION FOR THE SETUP section above. After installing Java JDK or JRE, Tomcat should be successfully installed.



## ADDING TOMCAT MANAGER GUI USER

Adding a manager GUI user will help you deploy the war file of the MHR Sharing System add-on feature for OpenEMR easier.

While XAMPP Control Panel open, click on Config button in the last row where Tomcat server is shown.



Add the following line with custom username and password.

```
tomcat-users - Notepad
File Edit Format View Help
<!--
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contributor license agreements. See the NOTICE file distributed with
this work for additional information regarding copyright ownership.
The ASF licenses this file to You under the Apache License, version 2.0
(the "License"); you may not use this file except in compliance with
the License. You may obtain a copy of the License at

http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License.
-->
<tomcat-users>
<!--
NOTE: By default, no user is included in the "manager-gui" role required
to operate the "/manager/html" web application. If you wish to use this app,
you must define such a user - the username and password are arbitrary.
-->
<!--
NOTE: The sample user and role entries below are wrapped in a comment
and thus are ignored when reading this file. Do not forget to remove
<!-- ... --> that surrounds them.
-->
<!--
<role rolename="tomcat"/>
<role rolename="role1"/>
<user username="tomcat" password="tomcat" roles="tomcat"/>
<user username="both" password="tomcat" roles="tomcat,role1"/>
<user username="role1" password="tomcat" roles="role1"/>
-->
<user username="error404" password="isthebest" roles="manager-gui"/>
</tomcat-users>
```

Save the configuration file by clicking Ctrl+S and close it.

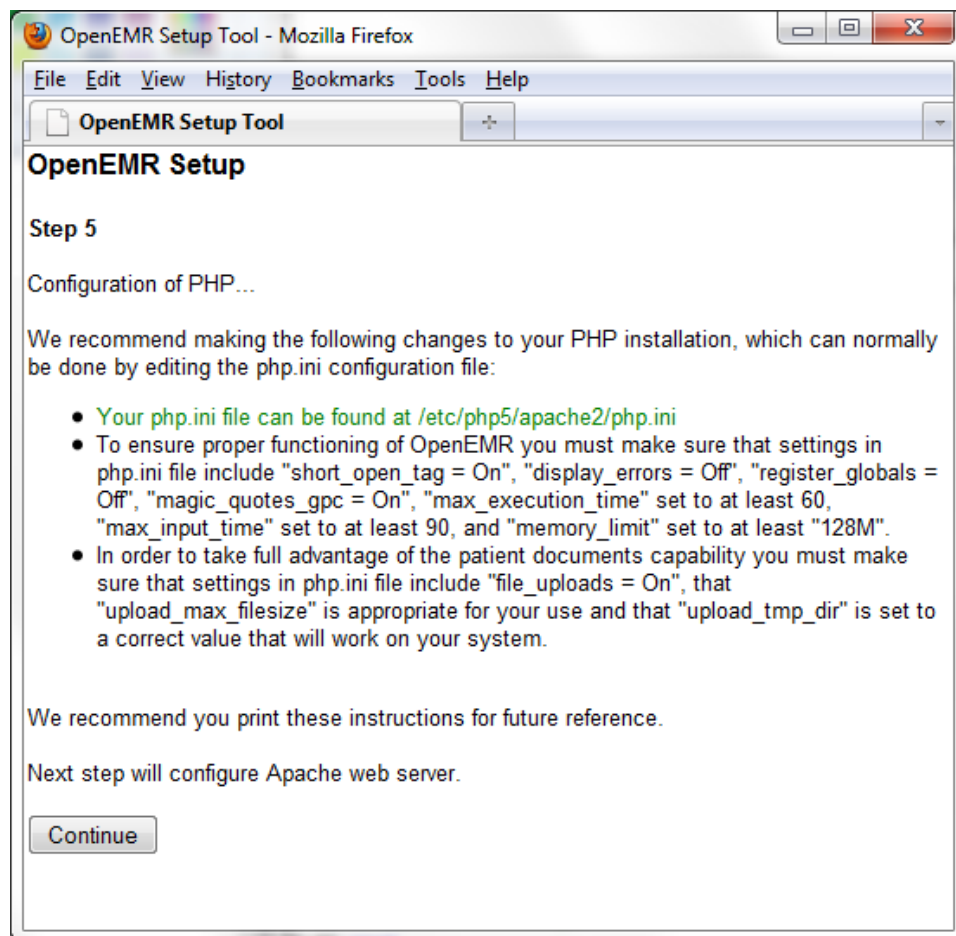


## INSTALLING OPENEMR

Navigate to [http://www.open-emr.org/wiki/index.php/OpenEMR\\_Downloads](http://www.open-emr.org/wiki/index.php/OpenEMR_Downloads) and choose the platform you are installing to. To be consistent with this guide that we have provided for you, we will select the Windows version. **After downloading the file, PLEASE follow the installation instructions that are provided on the openEMR website because they are crucial point of successful setup and run of openEMR.** Here is the direct link to it:

[http://www.open-emr.org/wiki/index.php/OpenEMR\\_4.2.2\\_Windows\\_Installation#Installing\\_OpenEMR](http://www.open-emr.org/wiki/index.php/OpenEMR_4.2.2_Windows_Installation#Installing_OpenEMR)

Configuring the PHP.ini file is one of the important steps (I suggest making a backup to this php.ini file since it is known to cause trouble to the Apache server if not configured properly). Here is a screenshot which is part of the installation guide on the openEMR site:



This configuration is for the versions earlier than 4.2.2. If you plan to install 4.2.2 and newer, then you only have to change:

display\_errors=Off

max\_execution\_time=60

max\_input\_time=90

Optional changes:

upload\_max\_filesize=<size by need in MB>

A preconfigured file php.ini can be found in the "Preconfigured files" folder which can be used to overwrite the existing php.ini file found in "C:\xampp\php\" directory.

## REPLACING THE PATIENT REPORT FILE

In order openEMR to connect to the MHR Sharing System, the default patient\_report.php needs to be replaced with the preconfigured one which can be found in the **Preconfigured folder**. The .php file that needs to be replaced can be found at **C:\xampp\htdocs\openemr\interface\patient\_file\report**

**THIS SECTION IS IMPORTANT AND IF SKIPPED, THE MHR SHARING SYSTEM WILL NOT BE AVAILABLE TO OPENEMR.**

Once the patient\_report.php is replaced you will see a button "Share Report".

Continuity of Care Record (CCR)  
(Pop ups need to be enabled to see these reports)

☐ Use Date Range

**Share Report** **Generate Report** **Download**

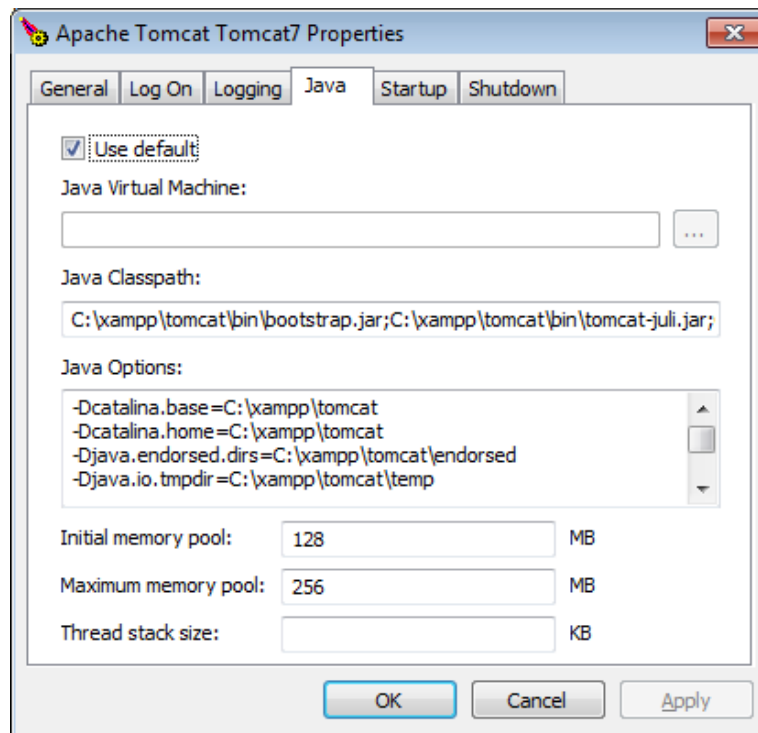
Continuity of Care Document (CCD)  
(Pop ups need to be enabled to see these reports)

**Generate Report** **Download**

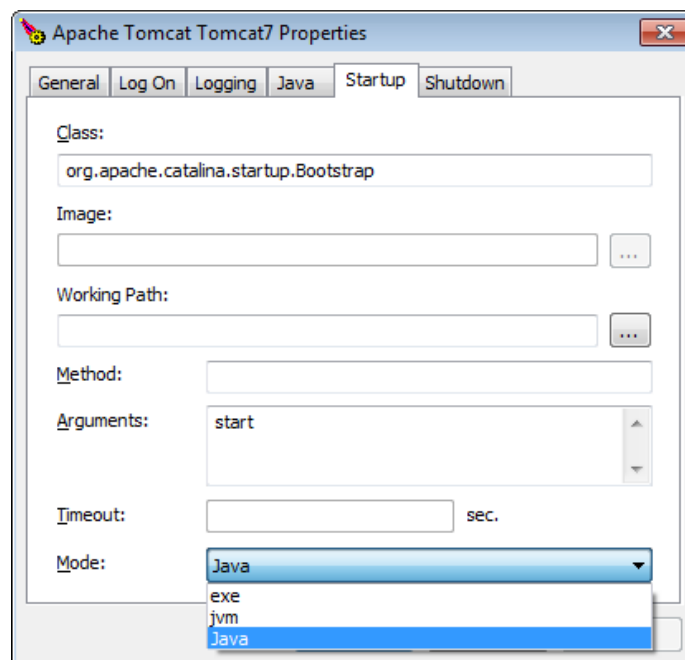
## STARTING THE SERVERS

Run XAMPP Control Panel as Administrator and click start where Apache, MySQL and Tomcat rows. If problem occurs when starting Tomcat, there is a quick fix that can be done to start working properly. Navigate to **C:\xampp\tomcat\bin** and run **tomcat7w.exe**.

Under Java tab, select Use default.

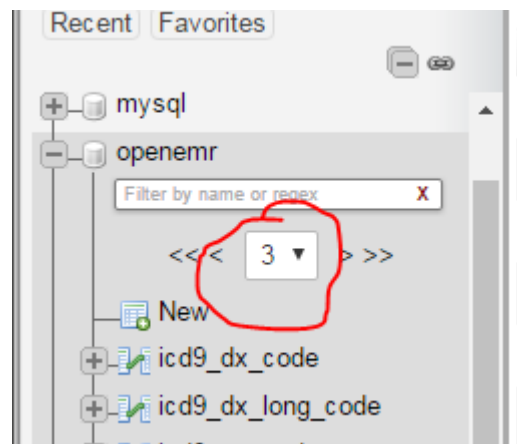
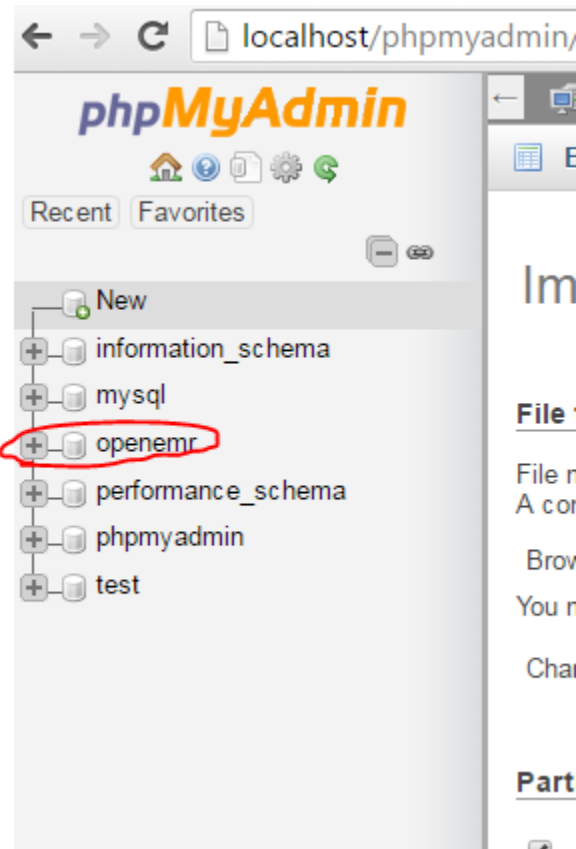


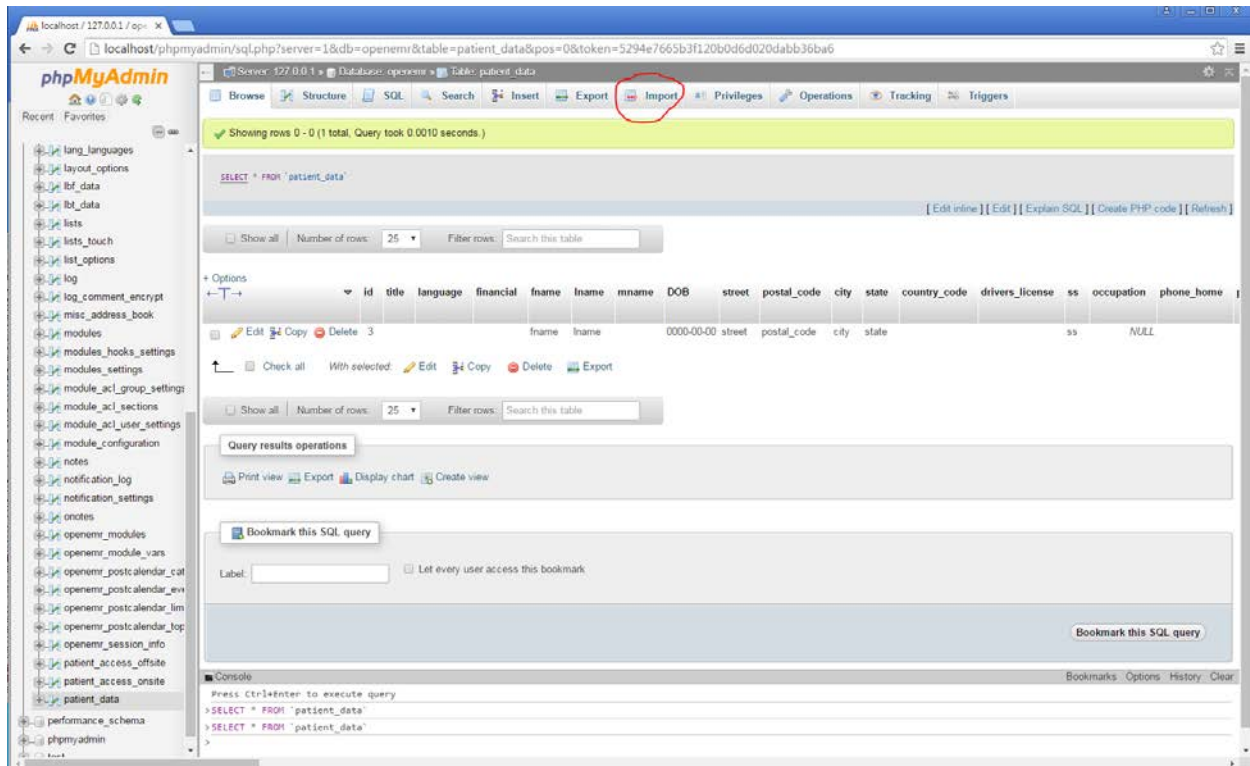
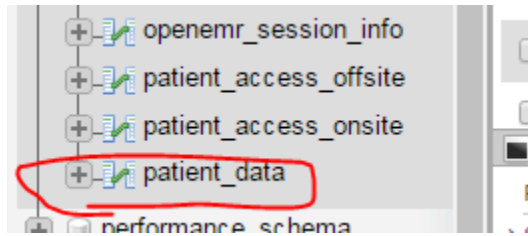
Under Startup and Shutdown tab, choose Mode: Java



## ADDING SQL STATEMENTS

In order to have sample patient data you have to import the .sql file into the patient\_data table in localhost/phpmyadmin (by default it will log you in automatically unless you have changed the root password). The patient\_data.sql can be found in the SQL Statements folder.





Click on GO and the query will be executed with 1000 sample patients.

## DEPLOYING THE MHR SHARING SYSTEM WAR FILE IN TOMCAT

Before starting with the deployment please make sure that Tomcat is running in XAMPP.

Navigate to **localhost:8080/manager** in your browser and use the username and password you have already set up. Go to ADDING TOMCAT MANAGER GUI USER and set one up. There are 2 options of deployment.

### OPTION 1:

The screenshot shows the Tomcat Web Application Manager interface in a web browser. The browser address bar shows the URL: `localhost:8080/manager/html?org.apache.catalina.filters.CSRF_NONCE=28A0F8DC6FED2BBD0F867E3A18E7BB18`. The page header includes the Apache Software Foundation logo and the Tomcat logo. The main title is "Tomcat Web Application Manager". Below the title, there is a message box showing "Message: OK". The interface is divided into several sections: "Manager" with links for "List Applications", "HTML Manager Help", "Manager Help", and "Server Status"; "Applications" which is a table listing deployed applications; and "Deploy" which contains fields for "Context Path (required)", "XML Configuration file URL", and "WAR or Directory URL", along with a "Deploy" button. The "Applications" table has columns for Path, Version, Display Name, Running, Sessions, and Commands. The table lists five applications: "/", "/docs", "/examples", "/host-manager", and "/manager". The "/manager" application is highlighted in green and shows 1 session. The "Deploy" section has a "WAR file to deploy" section with a "Choose File" button and a "Deploy" button.

| Path          | Version        | Display Name                    | Running | Sessions | Commands   |
|---------------|----------------|---------------------------------|---------|----------|--|
| /             | None specified | Welcome to Tomcat               | true    | 0        | Start Stop Reload Undeploy<br>Expire sessions with idle ≥ 30 minutes |
| /docs         | None specified | Tomcat Documentation            | true    | 0        | Start Stop Reload Undeploy<br>Expire sessions with idle ≥ 30 minutes |
| /examples     | None specified | Servlet and JSP Examples        | true    | 0        | Start Stop Reload Undeploy<br>Expire sessions with idle ≥ 30 minutes |
| /host-manager | None specified | Tomcat Host Manager Application | true    | 0        | Start Stop Reload Undeploy<br>Expire sessions with idle ≥ 30 minutes |
| /manager      | None specified | Tomcat Manager Application      | true    | 1        | Start Stop Reload Undeploy<br>Expire sessions with idle ≥ 30 minutes |

Undeploy Path / then enter the following information In the "Deployment directory or WAR file located on server" section. The WAR or Directory URL is different for every user so give your path name of the MHRSharing.war (which by default will be located in the project folder)

| Deploy   |   |
|--|---|
| Deploy directory or WAR file located on server |   |
| Context Path (required):                       | <input type="text" value="/"/>                                  |
| XML Configuration file URL:                    | <input type="text"/>  |
| WAR or Directory URL:                          | <input type="text" value="Z:\VM Shared Folder\MHRSharing.war"/> |
| <input type="button" value="Deploy"/>          |   |
| WAR file to deploy                             |   |
| Select WAR file to upload                      | <input type="button" value="Choose File"/> No file chosen       |
| <input type="button" value="Deploy"/>          |   |

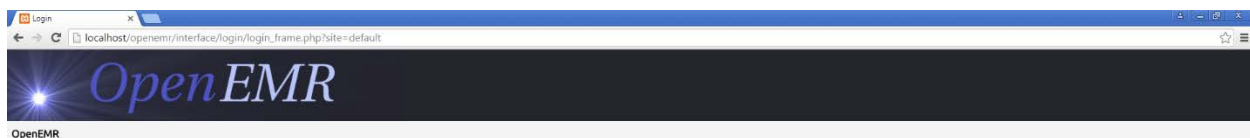
## OPTION 2:


Copy the contents of MHRSharing\_war folder into **C:\xampp\tomcat\webapps\ROOT\** (delete everything that is there first).

## INTERACTION GUIDE

When openEMR and MHR Sharing system are installed and configured, and Apache, MySQL and Tomcat are running we can proceed and go through the interaction guide.

Navigate to localhost/openEMR





Username:   
 Password:   
 Language: Default - English (Standard)

[Acknowledgments, Licensing and Certification](#)

Enter the username and password you have configured during the installation of openEMR (INSTALLING OPENEMR) and click login. Then click on patient and there should be sample patients from the SQL query.

The screenshot shows the OpenEMR main screen. On the left is a sidebar menu with options like Calendar, Messages, Patients, and more. The main area displays a table of patients with columns for Full Name, Home Phone, SSN, Date of Birth, and External ID. The first patient listed is Amy Adams with ID 359. Below the table is a 'Message and Reminder Center' with sections for Reminders and Messages.

| Full Name          | Home Phone      | SSN         | Date of Birth | External ID |
|--------------------|-----------------|-------------|---------------|-------------|
| Adams, Amy         | 1-(202)446-8254 | 206-56-9314 | 1962-06-06    |             |
| Adams, Annie       | 1-(850)581-2020 | 870-07-9623 | 1970-12-28    |             |
| Adams, Ernest      | 1-(254)336-7376 | 147-10-2249 | 1960-04-25    |             |
| Adams, Ralph       | 1-(754)890-9690 | 285-23-2538 | 1958-08-20    |             |
| Alexander, Cynthia | 1-(607)594-9224 | 788-60-0660 | 2004-10-27    |             |
| Alexander, Jack    | 1-(785)911-3363 | 919-80-5711 | 1943-11-09    |             |
| Alexander, Kevin   | 1-(651)995-2557 | 791-88-5249 | 1948-04-18    |             |
| Allen, Donna       | 1-(208)287-1549 | 717-14-2270 | 1982-11-09    |             |
| Allen, Helen       | 1-(901)647-1526 | 386-48-6564 | 1966-07-11    |             |
| Allen, Todd        | 1-(408)358-2223 | 550-40-3708 | 2007-06-20    |             |

Click on any patient and then choose Record on the top of the page (for example Amy Adams with id 359)

The screenshot shows the patient record page for Amy Adams. At the top right, it says 'DOB: 1962-06-06 Age: 53'. Below this is a navigation bar with links: History, Report (highlighted in yellow), Documents, Transactions, Issues, Ledger, and External Data. There is a 'Billing (expand)' section and a 'Demographics (collapse)' section. Below these is a tabbed interface with tabs for Who, Contact, Choices, Employer, Stats, and Misc. The 'Who' tab is active, showing patient information: Name: Amy Adams, DOB: 1962-06-06, S.S.: 206-56-9314, External ID, Sex, License/ID: 617-188-053, and Marital Status.

DOB: 1962-06-06 Age: 53

Adams, Amy

History | **Report** | Documents | Transactions | Issues | Ledger | External Data

Billing (expand)

Edit Demographics (collapse)

Who | Contact | Choices | Employer | Stats | Misc

Name: Amy Adams  
 DOB: 1962-06-06  
 S.S.: 206-56-9314  
 Marital Status:

External ID:  
 Sex:  
 License/ID: 617-188-053



localhost/openemr/interface/main/main\_screen.php?auth=login&site=default

NEW PATIENT CLEAR ACTIVE PATIENT Patient: Amy Ad. DOB: 1962-06-06

Hide Menu

Default  
☒ Top Bot ☒

Calendar  
 Flow Board  
 Messages  
 Patient/Client  
 Patients  
 New/Search  
 Summary  
 Visits

Continuity of Care Record (CCR)  
 (Pop ups need to be enabled to see these reports)

☐ Use Date Range

Share Report Generate Report Download

Continuity of Care Docu  
 (Pop ups need to be enabled to see these reports)

Generate Report Download

Patient Report Check All | Clear All

☒ Demographics ☐ Immunizations  
☐ History ☐ Patient Notes  
☐ Insurance ☐ Transactions

A new window will pop up looking like the following:

Medical Health Record Sharing System ®

1. Patient Information

ID  
 First Name  
 Last Name  
 SEARCH

2. Share Health Record

✉  
 SEND

Decode received Health Record

Choose File No file chosen  
 SSN  
 DECODE

CHLORBRIN  
 100mg  
 ONLY ONE 100mg  
 90 tablets bottle

\_err404r

Under ID enter **359**, under First name enter **Amy** and under last name enter **Adams**

## Medical Health Record Sharing System ®

### 1. Patient Information

|            |       |
|------------|-------|
| ID         | 359   |
| First Name | Amy   |
| Last Name  | Adams |

**SEARCH**

### 2. Share Health Record



**SEND**

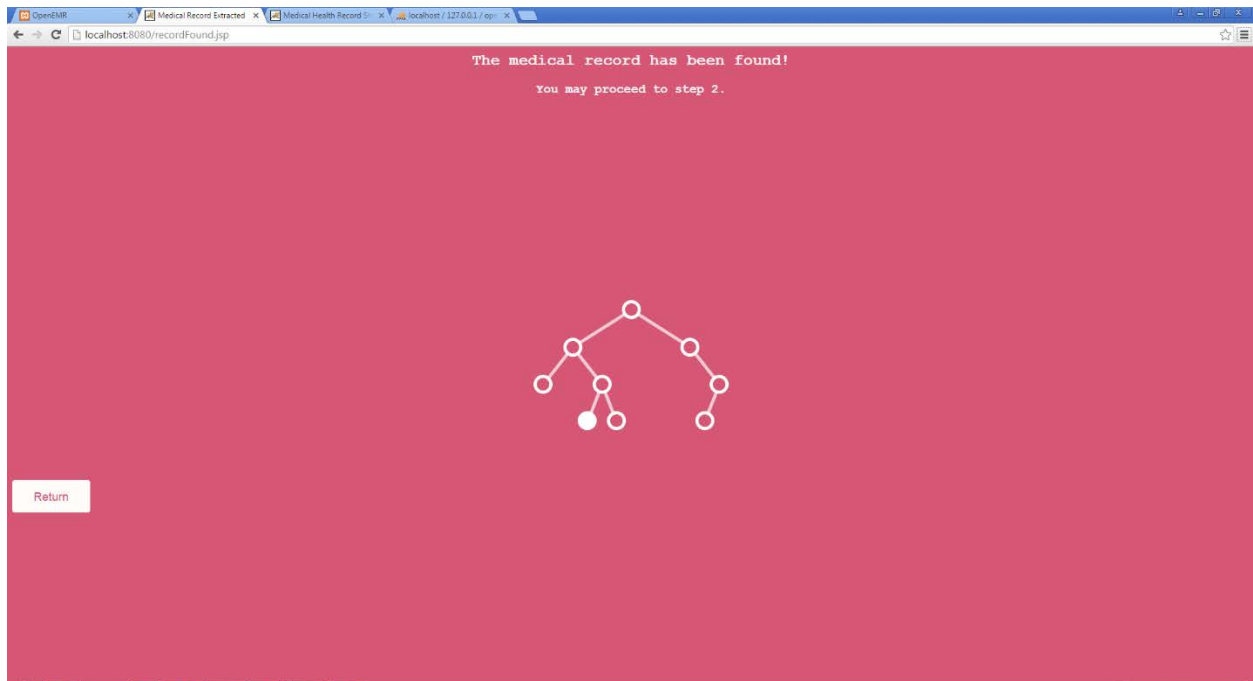
**Decode received Health Record**

No file chosen

SSN

**DECODE**

Click Search. If found it will show the following.



Click return and enter the destination email.

SEARCH

2. Share Health Record

SEND

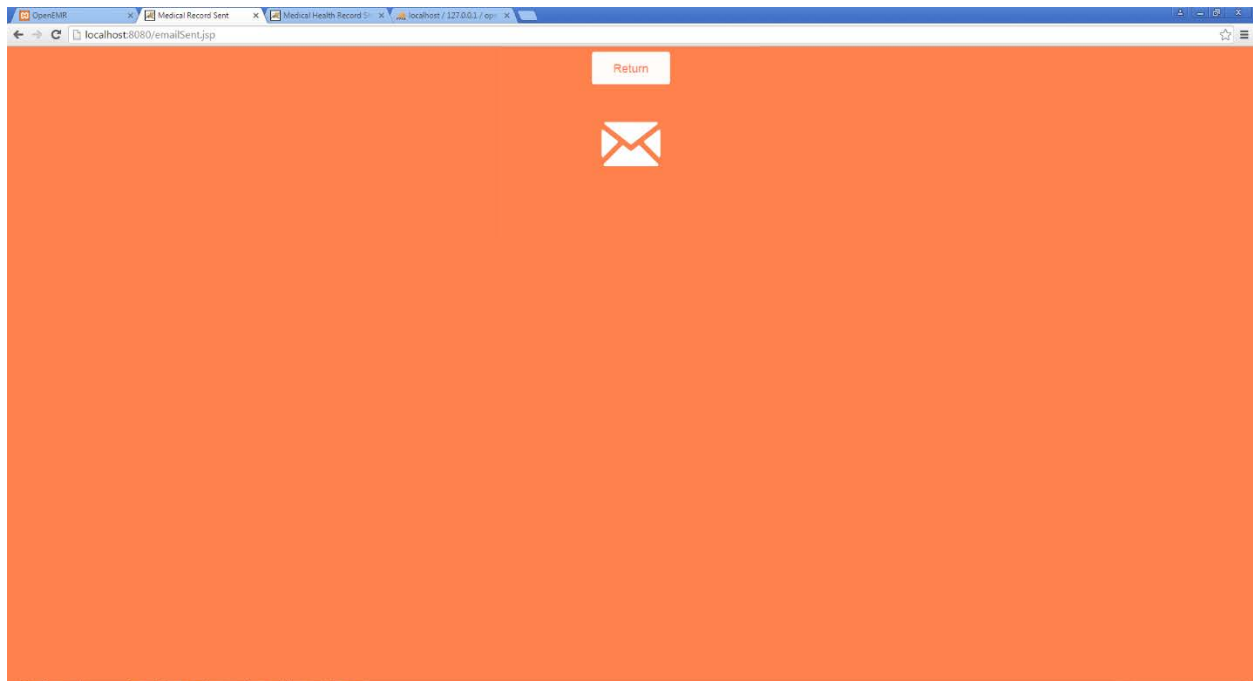
Decode received Health Record

Choose File No file chosen

LAST 4

DECODE

Click send and the following page should show up:



The patient record has been successfully sent!

To decode the record, download the received attachment and store it at some location. Then click on Choose file on the main MHR Sharing page and find the file you just downloaded. Then proceed with entering the last 4 digits of the patient's SSN.

SEND

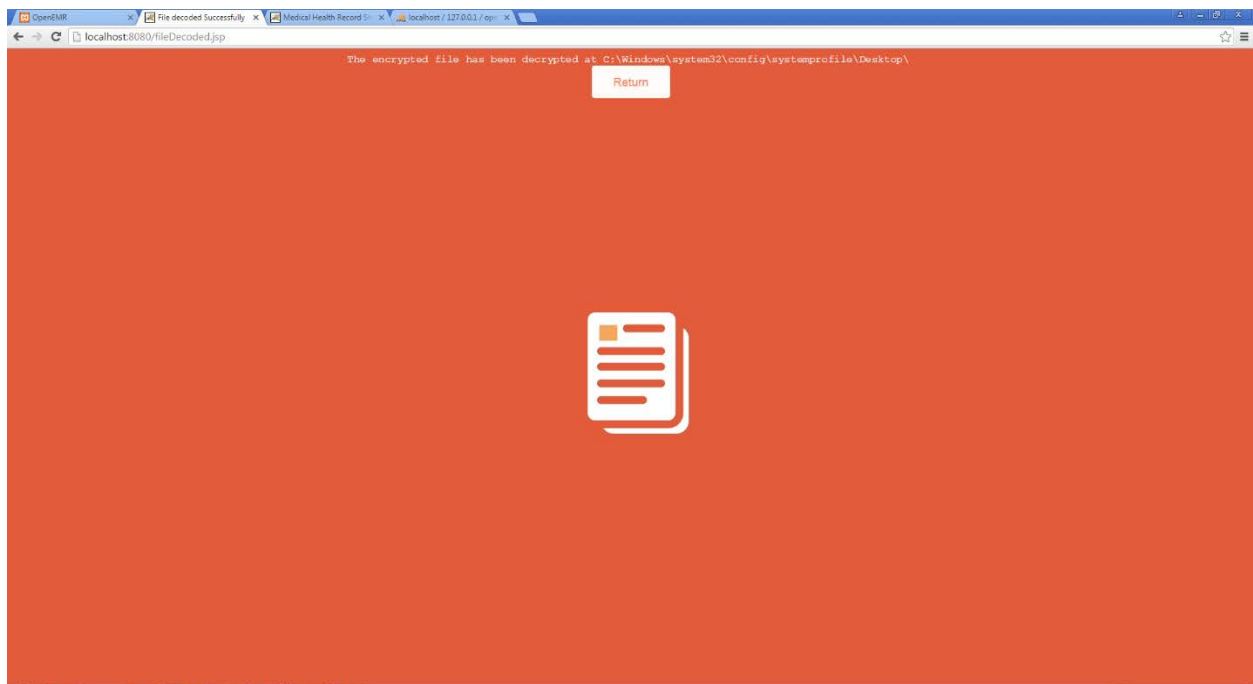
Decode received Health Record

Choose File 052920161754.xml

SSN9314  
LAST 4

DECODE

Click decode and you should see the following page where on top you can see the directory where the decrypted CCD file is.



## TESTING DATA

| id | fname      | lname     | ss          |
|----|------------|-----------|-------------|
| 1  | Patrick    | Matthews  | 764-65-9568 |
| 2  | Benjamin   | Berry     | 310-40-0579 |
| 3  | Anna       | Nichols   | 243-59-3979 |
| 4  | Judy       | Ray       | 729-32-6916 |
| 5  | Brandon    | Freeman   | 271-84-0225 |
| 6  | Bruce      | Daniels   | 531-63-5078 |
| 7  | Lois       | Mills     | 337-45-5495 |
| 8  | Louis      | Ryan      | 554-51-7240 |
| 9  | Virginia   | Rose      | 199-15-8432 |
| 10 | Chris      | Reed      | 642-97-8844 |
| 11 | Henry      | Austin    | 450-85-5869 |
| 12 | Willie     | Wallace   | 787-09-9630 |
| 13 | Anne       | James     | 264-31-4214 |
| 14 | Jacqueline | Cook      | 710-15-9877 |
| 15 | Mildred    | Bennett   | 506-90-3224 |
| 16 | Bobby      | Knight    | 259-28-3088 |
| 17 | Brian      | Gordon    | 118-11-4276 |
| 18 | Mildred    | Russell   | 312-26-4498 |
| 19 | Angela     | Lewis     | 333-36-6654 |
| 20 | Alice      | Owens     | 394-26-0860 |
| 21 | Roy        | Simmons   | 817-27-9020 |
| 22 | Jeffrey    | Green     | 692-36-7731 |
| 23 | Carl       | Robertson | 295-55-7906 |
| 24 | Mark       | Turner    | 329-02-1812 |
| 25 | Karen      | Ferguson  | 964-32-9703 |
| 26 | Randy      | Morgan    | 912-66-5027 |
| 27 | Jessica    | Fisher    | 495-57-9633 |
| 28 | Nicholas   | Webb      | 960-03-2219 |
| 29 | Steve      | Chavez    | 992-72-3503 |
| 30 | Jessica    | Elliott   | 308-99-6700 |
| 31 | Phyllis    | Arnold    | 556-09-4011 |
| 32 | George     | Mason     | 753-11-4670 |
| 33 | Bruce      | Reynolds  | 367-86-4582 |
| 34 | Mark       | Ward      | 771-12-3026 |
| 35 | Donna      | Collins   | 513-80-4204 |

## SOFTWARE LIMITATIONS

This software has the following limitations:

1. Needs tomcat server running besides openEMR's Apache
2. The php page redirects to our software
3. Manual configuration might be needed for mySQL database connection (see MHRSharing/MailRecord.java line 30)