Immunization Patient Resources with Integrated Technology (ImmPRINT)

HL7 V 2.5.1

Master Guide

Alabama Department of Public Health, Immunization Division, Revised 08/31/16
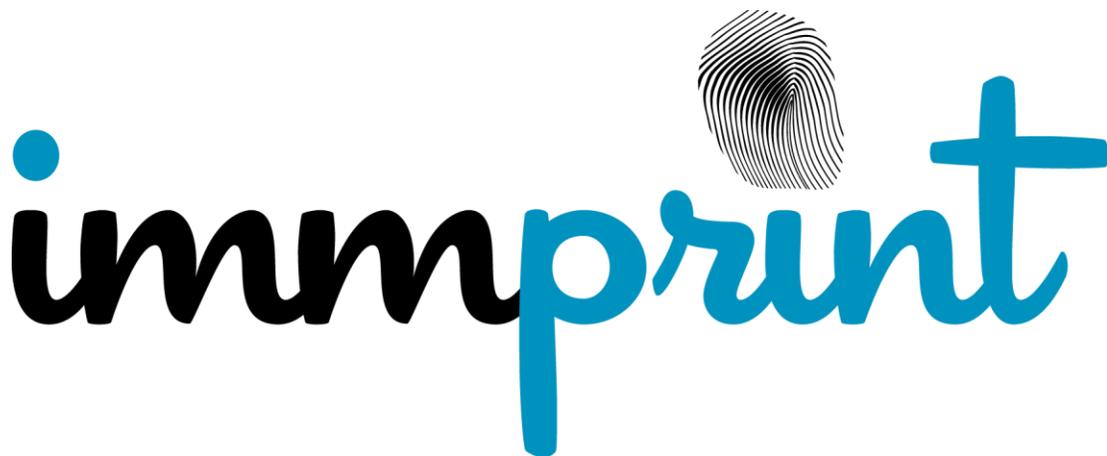
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Purpose

The purpose of this document is to provide electronic medical record (EHR) guidelines for developing interfaces between Alabama Immunization Information System (ImmPRINT) called ImmPRINT and health level 7 (HL7) healthcare providers.

Introduction

ImmPRINT supports CDC's the National Immunization Program (NIP) goal to use HL7 for immunization data. This document contains additional requirements for implementing immunization messaging using HL7 version 2.5.1. This document supplements CDC'S HL7 Version 2.5.1: Implementation Guide for Immunization Messaging. http://www.cdc.gov/vaccines/programs/iis/technical-guidance/hl7.html. For more HL7 information, please see http://www.hl7.org

ImmPRINT

According to the Code of Alabama, §22-11B1-4, the Alabama Department of Public Health (ADPH) is authorized to create and maintain Alabama's immunization registry. ImmPRINT in turn authorizes users to enter, query, and update immunization records for patients of all ages.

Message Transmission Options

ImmPRINT accepts real time HL7 (V 2.5.1) Messages. Two ways to exchange data with ImmPRINT are as follows,

- Real time Bi-directional
- Real time unsolicited updates (VXU only)

Real Time Message Processing (HL7 V 2.5.1)
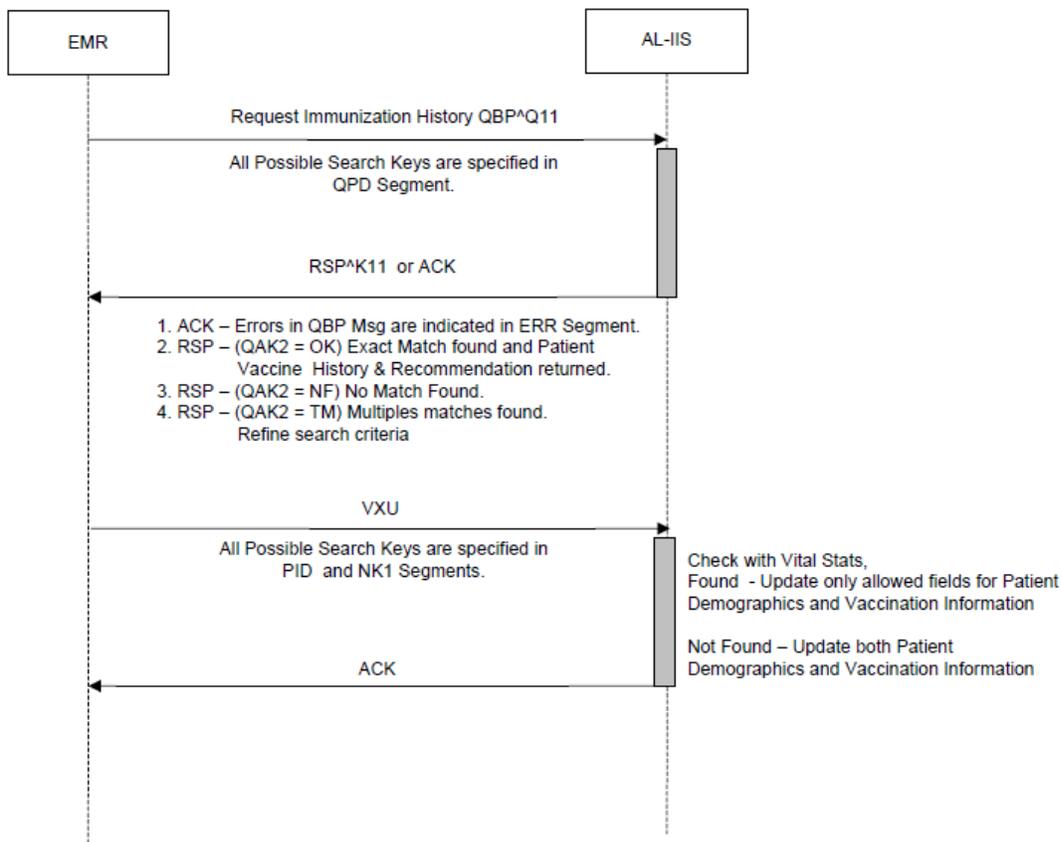
Note: EHR are asked to send Request Messages for one patient at a time. ImmPRINT does not send the list of multiple matches found. ACK indicating "Patient Not Found" and "Refine Search Criteria" or "Multiple Matches Found" will be returned. When a patient has been uniquely identified (there is only one "high confidential match" to the query), the response to the query is a RSP is generated and sent back to the querying organization. The EHR will receive a real-time ACK message to indicate the message has been successfully processed.

Guidelines for HL7 implementation:

- Send a VXU to ImmPRINT,
  - Initially send all patients' historical doses in VXU.
  - When a vaccine is administered, send a VXU real time.
- Retrieve Historical Dose from ImmPRINT.
  - Send VXU to update ImmPRINT for doses not reported.
  - Send VXQ/QBP to receive the latest vaccination history in a VXR/RSP message.
- Print Certificate of Immunization (COI)
  - Send VXU to update ImmPRINT for doses not reported.
  - Consume COI Web service, Appendix 1-4.

Query by Parameter (QBP– QBP^Q11)
Example:
MSH|^~\&|1300|220|ImmPRINT|ImmPRINT|20091130000000|27FD4841-EED9-42CD-9A5A-61751864049D |QBP^Q11^QBP_Q11|793543|P|2.5.1|||NE|||||Z34^CDCPHINVS
QPD|Z34^Request Immunization History^CDCPHINVS|37374859|123456^^^MYEHR^MR|Child^Bobbie^Q^^^^L|Que^Suzy^^^^^M|20050512|M|10 East MainSt^^Myfaircity^GA^^^L
RCP|I|5^RD^HL70126|R^real-time^HL70394

Unsolicited Vaccination Record Update (VXU)
When a VXU^V04 (Unsolicited Vaccination Record Update) message type is sent to ImmPRINT with no RXA segment, a check is done to verify if the patient exists in ImmPRINT or not. If the patient already exists in ImmPRINT, then the demographic update will occur.
Example:
MSH|^~\&|1111|222|ImmPRINT|ImmPRINT|201302111401-0600|12345AB-CDA2-RRDF-66BF-Z999XZXZWXYZA |VXU^V04^VXU_V04|1039874483.444788|P|2.5.1|||NE|AL|USA|
PID|1||MR00126198^^^MPI&2.16.840.1.113883.3.1664&ISO^MR||COPELAND^ROY^C||19551031|M||2106-3^White^HL70005|1314 MAYTON AVE^^DEMOPOLIS^AL^36732^USA^M||^PRN^PH^^^334^2897028|^WPN^PH^^^^2890319||M||V00000945571^^^BWWMH&2.16.840.1.113883.3.1664&ISO^AN^BWWMH&2.16.840.1.113883.3.1664&ISO||||N^Not Hispanic or Latino^HL70189|||||||
PD1||||CHU RO^CHU^RONNIE
NK1|1|COPELAND^JUDY|SPO^Spouse^ISO+|1314 MAYTON AVE^^DEMOPOLIS^AL^36732^USA^H|^PRN^PH^^1^334^2897028||||||||||||||||||||||||||||||||
PV1|1|I|MICU^ICU5^1^BWH|U|||CHU RO^CHU^RONNIE|||MED|||||||CHU RO^CHU^RONNIE|||V01|||||||||||||||||||BW||IN|||201302111209-0600|||||||CHU RO^CHU^RONNIE
ORC|RE|416944|444788|||||||201302111256|HSK2053^HEATHER^S||15999958^CHU^RONNIE|||||
|
RXA|0|1|201302111355|201302111355|33^pneumococcal polysaccharide PPV23^HL70292|25|ug/mL^MicroGrams Per MilliLiter ^UCUM||00^New immunization record^NIP001|VIRGINIA F MORR^MORRISON^VIRGINIA^F|^ICU5^1^109^^^^^105

Highway 80 East^^Demopolis^AL^36732^^^USA||||H014653|20140419|MSD^Merck and Co., Inc.^MVX||||A
RXR|IM^Intramuscular^HL70162|RD^Right Deltoid^HL70163

Patient Search Key Combinations for VXU and QBP
- ImmPRINT ID
- Site ID, Local Chart Number, First Name, Last Name, Date of Birth
- First Name, Last Name, Date of Birth
- First Name, Last Name, Date of Birth, SSN
- First Name, Last Name, Date of Birth, SSN, Address, City

Note: Above are the initial query data element combinations that will be used as exact matches to locate Patients within the registry. Your cooperation with entering your patient's chart numbers into the registry will improve the performance of the messaging process.

Additional search queries may be added in the future as identified.

Response (RSP) Acknowledgements – Segment pattern response (RSP^K11)
ImmPRINT returns an immunization history to requester for a specific patient in response to a request for immunization history. ImmPRINT sends the RSP response message (using RSP^K11^RSP_K11 trigger). Response messages are:
- "Error in query Message" - ImmPRINT acknowledges an error in the query.
- "Multiple Matches Found" - If multiple matches found, ImmPRINT acknowledges and the user must refine search criteria. ImmPRINT will not send low confidence matches.
- "No Match Found" - If no match is found, ImmPRINT will acknowledge no patient was found.
- "Exact Match Found" - ImmPRINT will send immunization history when exactly one high-confidence match is found.

Example:
MSH|^~\&|ImmPRINT|ImmPRINT|1166|1677|20130002||RSP^K11^RSP_K11|201302110955|P|2.5.1|||NE|AL|||||z32^CDCPHINVS
MSA|AA|20130211095552567655480
QAK|20130211095525|OK|z34^Request Immunization History^CDCPHINVS
QPD||Z34^Request Immunization History^HL70471|||20120123000000||2008387^^^1677^MR|||Nettles^Jo|F|20130211095525
PID|||2008387^^^^MR~14179935^^^^SR||NETTLES^JO||20120123|F
RXA|0|1|20120613|20120613|47^HIB (HBOC)^CVX|
RXA|0|1|20120404|20120404|17^HIB, UNSPECIFIED FORMULATION^CVX|
RXA|0|1|20120123|20120123|45^HEP B, UNSPECIFIED FORMULATION^CVX|
RXA|0|1|20120404|20120404|110^DTAP-HEP B-IPV^CVX|
RXA|0|1|20120404|20120404|116^ROTAVIRUS, PENTAVALENT^CVX|
RXA|0|1|20120613|20120613|133^PNEUMOCOCCAL CONJUGATE PCV 13^CVX|

Acknowledgment Messages (ACK)
Example 1:
ACK for a VXU – successfully processed message:
MSH|^~\&|ImmPRINT|ImmPRINT|1111|22|20110008||ACK|201108291201|P||||NE|NE
MSA|AA|73477|Message Successfully Processed.
Example 2:
ACK for a VXU – with data errors:
MSH|^~\&|ImmPRINT|ImmPRINT|1111|22|20110008||ACK|201108291201|P||||NE|NE

MSA|AA|73477| Patient SSN is Invalid.

Example 3:

ACK for Errors on Message Validation

MSH|^~\&|ImmPRINT|ImmPRINT|1111|22|20110008||ACK|201108291201|P||||NE|NE

MSA|AR|19970522MA53|

ERR||PID^5|101^required field missing^HL70357|E

ERR||RXA|100^required segment missing^HL70357|E

Example 4:

ACK for Errors on Message Validation (for 2.3.1 only - backward compatibility)

MSH|^~\&|ImmPRINT|ImmPRINT|1111|22|20110008||ACK|201108291201|P||||NE|NE

MSA|AE|19970522MA53|Message Rejection

ERR|MSH^1^3^1006&Required field missing&Symphonia
Validation&&MSH/SendingApplication~MSH^1^4^1006&Required field missing&Symphonia
Validation&&MSH/SendingFacility

Message Header Segment (MSH) -

MSH-3: Contact ImmPRINT to get the ID's for MSH3. Eg. 1010

MSH-4: Contact ImmPRINT to get the SITE_ID's for MSH4. Eg.579

MSH-5: Use "ImmPRINT".

MSH-6: Use "ImmPRINT".

MSH-8: This is a required field. Contact ImmPRINT to get unique GUID for Security.

Note: Please follow the same rules as MSH for FHS and BHS.

Patient Identification Segment (PID)

PID-3: It is repetitive field. Sub-components 1 (ID) and 5 (Identifier Type Code) are required.
Patient Identification number is specified in Sub-component 1 (ID) and Identifier Type Code can
be SR – State ImmPRINT ID, MR- Medical Record Number, SS- Social Security. All other ID's
will be ignored.

PID-5: Last name and First name are required in the first two components. First or Last Name
with less than 2 Characters will result in Message rejection.

PID-7: DOB is specified as follows – YYYYMMDD

PID-11: Address is required. Incomplete address and State Abbreviation with more than 2
Characters will result in Message rejection.

PID-13: Home Phone Number. ImmPRINT accepts only PRN and WPN values in component 2.
ImmPRINT will use the 6th 7th 8th and 9th components for specification of area code, phone
number, extension and text, respectively. Otherwise, ImmPRINT will assume that the phone
number is specified in the first component.

PID-19: "-"symbols are not allowed. SSN more than 9 Characters will result in Message rejection.

Pharmacy/Treatment Administration Segment (RXA)

RXA-3: Date the vaccine was given. ImmPRINT does not utilize any time component.

RXA-5:. For CVX Codes 1 to 9, key it with a prefix 0. Eg. CVX Code for MMR is "03" and not
just "3".

RXA-11: For encountered doses, send Site ID (same as MSH4) in RXA 11-4.
For Historical doses, it will be null.

RXA-15: The maximum length for Lot numbers is 10.

RXA-17: ImmPRINT does not support repetition of this field.

Note: Don't use '&' symbol in RXA/SubstanceManufacturerName/Text as it is a HL7 encoding character.

Order Request Segment (ORC)
ORC-12: Use 1st component for NPI number, components 2 – 7 to record the name & designation and "**NPI**" in the 13th component. Encountered doses with no NPI numbers will result in dose rejection. For historical doses it can be null.

Observation Result Segment (OBX)
Note: ImmPRINT accepts only one reaction per vaccine. If there are many reactions only the first one will be considered.

Error Messages and Possible Solutions

Error Type	Code	Description	Cause and Possible Solution
Warnings	20101	No Match Found. Refine Search Criteria	No Match Found. Refine Criteria.
	20102	Multiple Matches Found. Refine Search Criteria	Multiple Matches found with First Name, Last Name and DOB.
	20103	Patient opted out of AL ImmPRINT	Patient opted out of Alabama ImmPRINT.
Security Errors	20200	Security credentials are Invalid and Access Denied	Please Contact ADPH Support.
Technical Errors	20301	Message Validation Failed	Check the ACK Message. ERR Segment to find the Validation Errors.
Data Errors	20302	Patient Name is Invalid	Check the Patient's Name specified in PID 5. ImmPRINT does not accept "New Born", "Baby", "Baby Boy", "Baby girl" as legal first name.
	20303	Patient Date of Birth is Invalid	Check the Patient's Date of Birth specified in PID 7 - Date Time of Birth.
	20304	Patient ImmPRINT ID and Demographics did not match with the data in the registry	May be Wrong Patient ImmPRINT. Resend the HL7 Message with IdentifierTypeCode (ImmPRINT ID) being null and all other Search keys such as Local Chart Number, First Name, Last Name and DOB
	20305	Mother Date of Birth is Invalid	Check the Mother's Date of Birth specified in NK1 16 - Date Time of Birth
	20306	Father Date of Birth is Invalid	Check the Father's Date of Birth specified in NK1 16 - Date Time of Birth
	20307	Vaccine(CVX Code) does not exist in ImmPRINT	Check the CVX Code specified in RXA 5 - Administered Code/Identifier
	20308	Vaccination Date is Invalid	Check the Vaccination Date specified in RXA 3 - Date/Time Start of Administration/Time
	20309	Vaccination Date cannot be greater than Current Date	Check the Vaccination Date specified in RXA 3 – DateTimeStartOfAdministration.
	20310	Vaccination Date cannot be less than DOB	Check the Vaccination Date specified in RXA 3 – DateTimeStartOfAdministration.
	20311	Vaccine Dosage Amount is Invalid	Check the Dosage amount specified in RXA 6 – AdministeredAmount. Default Value is 0.5.
	20312	CVX Code is Invalid	Check the CVX Code specified in RXA 5 - Administered Code/Identifier
	20313	NPI number is missing for an encountered dose.	NPI number I missing in ORC 12 - OrderingProvider/Identifier
	20314	NPI number is Invalid.	Check the NPI specified in ORC 12 - OrderingProvider/Identifier

	20315	MVX Code is missing.	MVX Code is missing in RXA 17.
	20316	Vaccination with current date cannot be Historical.	Vaccination Date equal to current date cannot be historical. Check in RXA 9 Administered Notes
	20317	Group Vaccine Found.	Vaccine in the same family group already exists on the same day.
	20318	Lot No is missing.	Lot Number is missing in RXA 15 and Substance Expiration date is missing in RXA 16..
	20319	Patient SSN is Invalid.	Check the SSN specified in PID 19 - SSN Number – Patient
	20320	Inactive Vaccine.	Vaccine was inactive during the vaccination date.
	20321	Vaccine not within acceptable age.	Patient is not eligible to get the vaccination at this age.
	20322	Lot No is Invalid.	Check the Lot Number specified in RXA 15.
System Errors	20401	Fatal Error – Contact ImmPRINT	Please Contact ADPH Support.
	20402	Database Server Down. Please try again later.	Please Contact ADPH Support.
	20403	Fatal Error - No running communication point is configured to process this request	Please Contact ADPH Support.

Technical Support Contacts
immprint@adph.state.al.us
1-800-469-4599
www.adph.org/imm

APPENDIX 1: ImmPRINT Certificate of Immunization (COI)

ImmPRINT allows sites to access and print COIs from within the EHR by passing necessary parameters listed in the Guide. ImmPRINT will provide the Security Credentials after the receipt signed Data Sharing Agreement (DSA). Please see the ImmPRINT Roadmap for the on-boarding process, http://www.adph.org/Immunization/assets/ImmPRINT_Roadmap.pdf .

For those vendors onboarded, your EHR can access the COI through below steps to allow your providers to print ADPH approved COI from their EHR.

Steps
1. After you receive credentials, go to
    https://siis.state.al.us/ImmPRINTWebServices/ImmPRINTWS.aspx

2. Pass the following information as parameters in query string:
    Loginid
    Password
    firstname
    lastname
    chartnbr
    dob
    MSH3
    MSH4
    page (Use COI as the value for the parameter "page")

APPENDIX 2:   How to Consume Web Service from .Net Windows Application

A Reference to a Web service can be added in two ways.
   a.   using Visual Studio
   b.   using Wsdl.exe tool (WSDL)

   By using Visual Studio

   1.   Open the Project and In the solution explorer, right click the project node, choose Add
        Service Reference OR
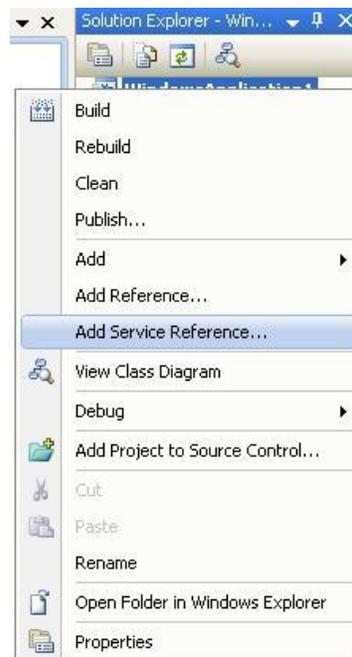
      Click on Project and choose Add Service Reference.
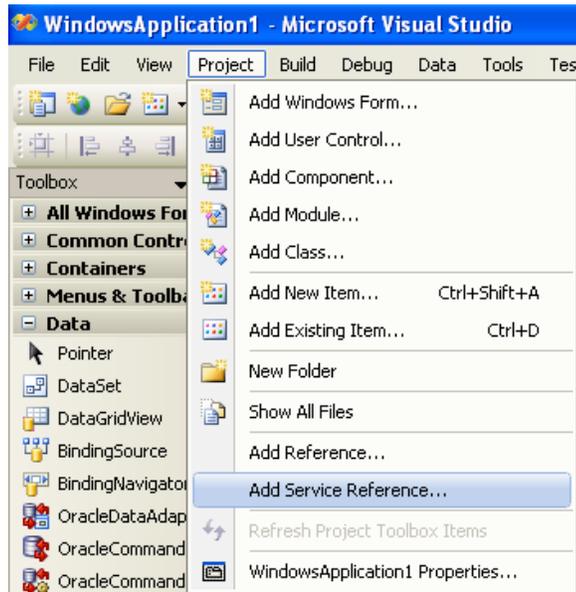
The Add Service Reference dialog box appears as below.
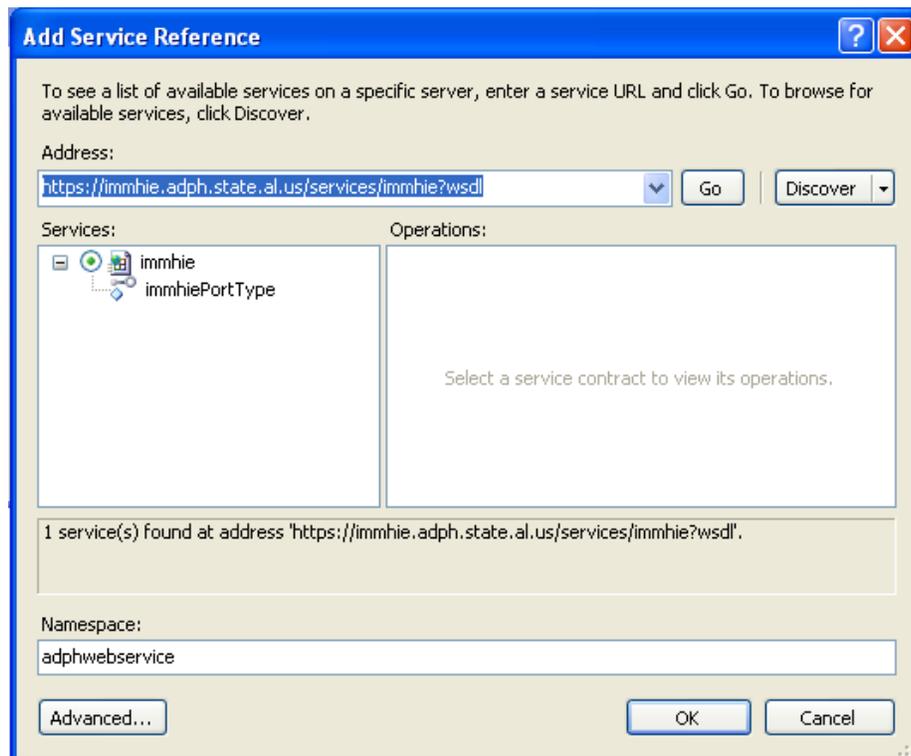
2. In the Address bar, type the WebService URL, and then press Go.
3. After WebService is located and displayed in the services. Provide a Namespace for the service and click OK.
4. The following code shows how to instantiate and use the web method.

```
Dim ws As New adphwebservice.immhiePortTypeClient
ws.aliiashl7(TextBox1.Text)
```

Using Wsdl.exe tool (WSDL)

1. Open a Command Prompt window in Visual Studio.
2. Change the folder to the location where you created the WebServiceConsumer application.
3. Type the following command:

   WSDL "<<wsdl>> " /l:VB

   Service will be created.

4. In Solution Explorer, right-click **the project**, point to **Add**, and then click **Add Existing Item**.
5. Locate and then click the service file that you created in step 4. Click **Open**.

APPENDIX 3: How to Consume Web service from ASP.NET Web Application

1. Open the Project and In the solution explorer, right click the project node, choose Add Web Reference:
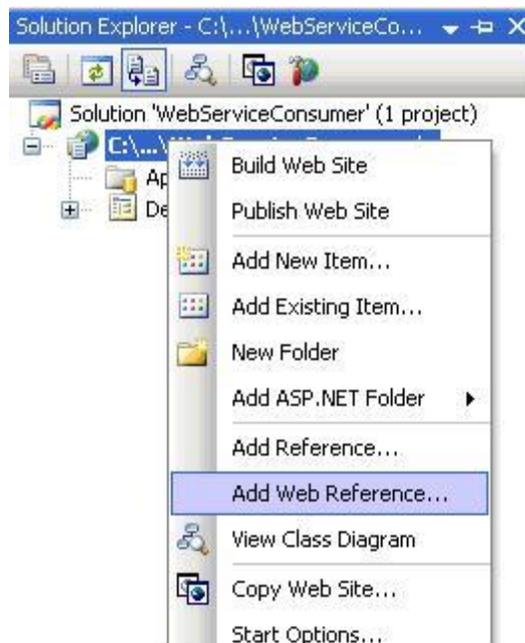
2. A new window with Add Web Reference title will be opened.
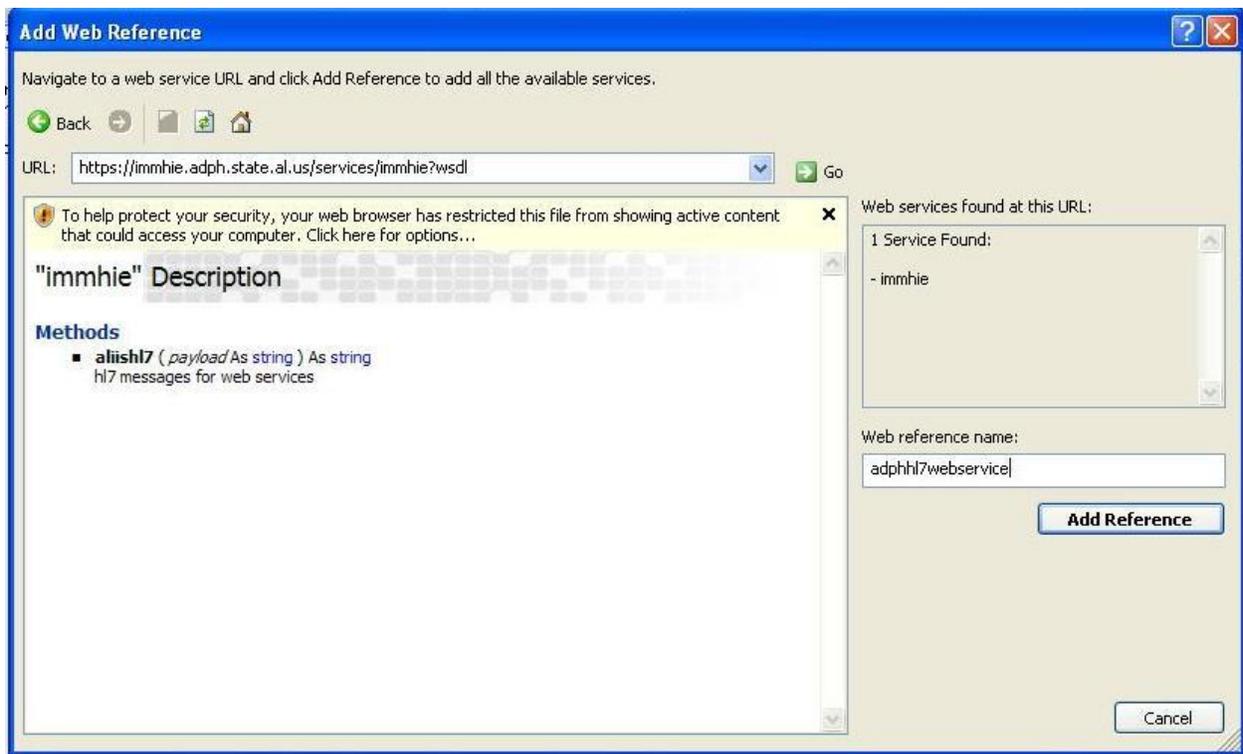
In the URL field, insert the URL for the Web service.

Clicking Go button, you will see the Web services APIs.

Set a name for your Web service reference in the Web reference name field and click Add Reference.

You have successfully added Web service reference to your project.

The following code shows how to instantiate and use the web method.

```
Dim ws As adphhie.adphhie = New adphhie.adphhie
Dim async As IAsyncResult = ws.Beginaliiashl7(SendTB.Text, Nothing, Nothing)
System.Net.ServicePointManager.ServerCertificateValidationCallback = New
RemoteCertificateValidationCallback(AddressOf RemoteCertificateValidation)
async.AsyncWaitHandle.WaitOne()
Dim result As String = ""
ws.Endaliiashl7(async, result)

Private Shared Function RemoteCertificateValidation(ByVal Sender As Object, ByVal Certificate
As X509Certificate, ByVal Chain As X509Chain, ByVal sslPolicyErrors As SslPolicyErrors) As
Boolean
    If (sslPolicyErrors <> Net.Security.SslPolicyErrors.RemoteCertificateNotAvailable) Then
        Return True
    Else
        Return False
    End If
End Function
```

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Some of the information may or may not be pertinent to your specific situation. Consequently we urge you to regard this only as one example of the process, carefully review the information below, and then, and only then, tailor a setup that best addresses your specific needs.

The Instructions below have been provided as a courtesy by UAB.

1. Download Apache Axis 2:

    Apache Axis2 is a core engine for Web services and is required to build Web Service clients. It requires JDK 1.5 and above. At UAB, we installed the latest version, JDK 1.6. Download from this location.
    http://axis.apache.org/axis2/java/core/download.cgi

2. Building a Web service Client - Set up an AXIS2_Home environmental variable and point to the path where it's installed.

Figure 4.
Since I will be ... he path.

3. Enter the command at the prompt to generate the web service client stubs from the wsdl URL
   C:\> wsdl2java –uri <u><<URL>></u>

4. The generated Code will be placed as shown below,
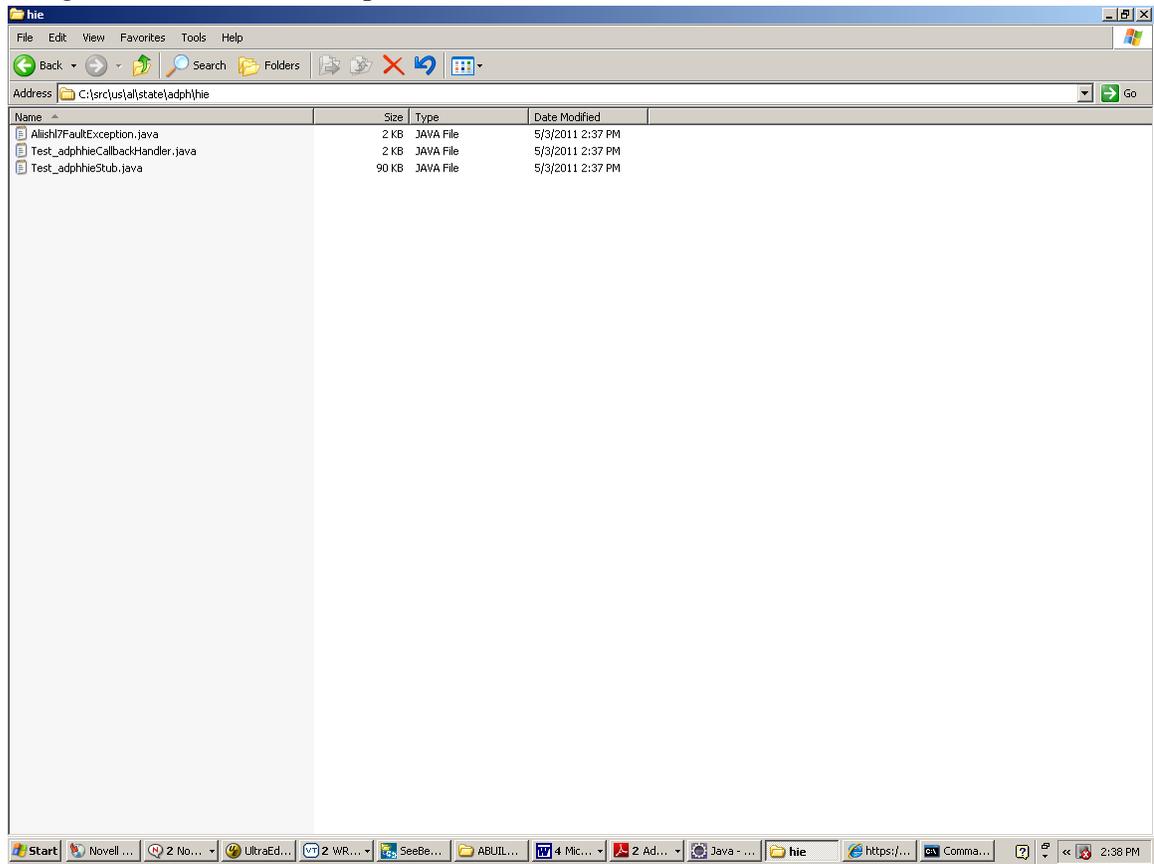
5. Installing the class files inside and IDE - Inside your favourite java IDE, create a project and import the generated web service client stubs into the java package.
**Make sure you put all the AXIS 2 jar files on the project's build path to compile the project. **
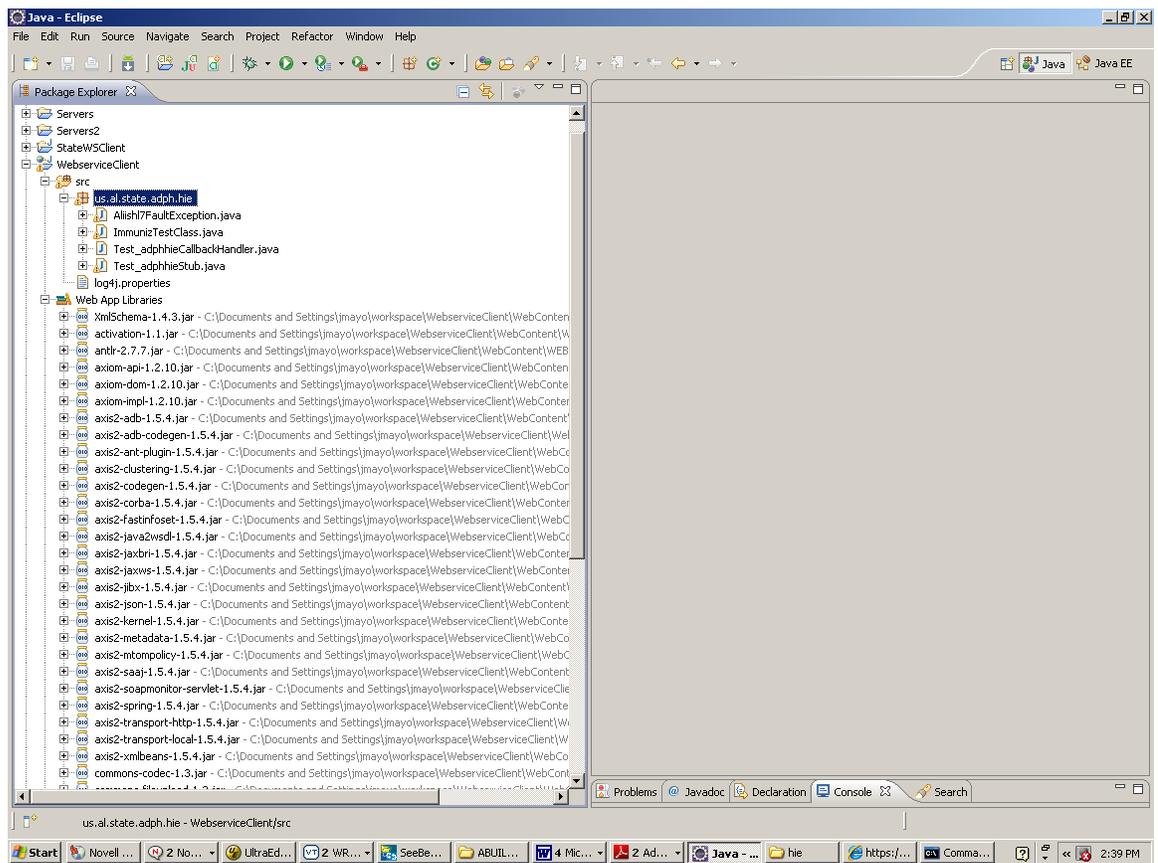
In the above example, I created project WebServiceClient and imported the source files into the package, us.al.state.adph.hie.

6. Create a Java Application class with main() as shown above to launch web service client.
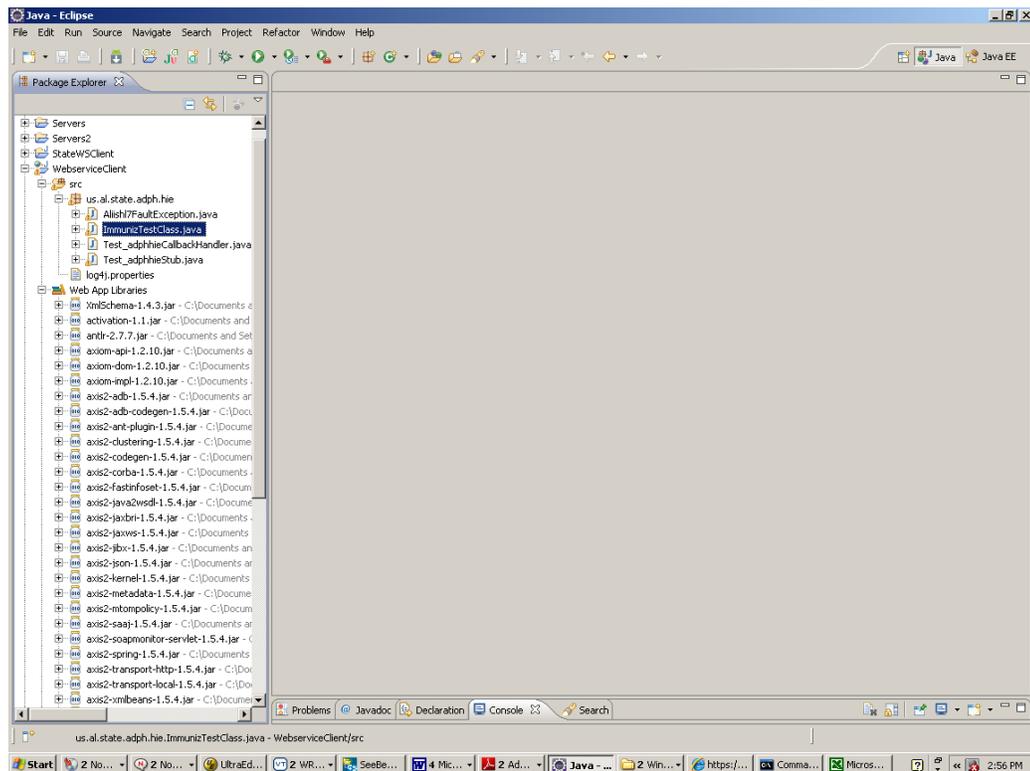
7. Code to Instantiate and use the web method,

```
public ImmunizTestClass() {
            public ImmunizTestClass() {
    try {
            Test_adphhieStub.Aliiashl7Response response = null;
            Test_adphhieStub stub = new Test_adphhieStub();
            Test_adphhieStub.Aliiashl7 aiish170 = new
Test_adphhieStub.Aliiashl7();
            aiish170.setPayload(msg);
            response = stub.aliiashl7(aiish170);
    } catch (Exception o) {
            o.printStackTrace();
    }
  }
public static void main(String[] args) {
        try {
                ImmunizTestClass starter = new ImmunizTestClass();
        } catch (Exception o) {
                o.printStackTrace();
        }
    }
}
```

8. Updating JDK 1.6 Keystore

When running the Web Service Client described above, if an error below is thrown, then the certificate in JDK 1.6 keystore must be updated.

javax.xml.ws.WebServiceException: Failed to access the WSDL at: <<webservice URL>>. It failed with:
    sun.security.validator.ValidatorException: PKIX path building failed:
sun.security.provider.certpath.SunCertPathBuilderException: unable to find valid certification path to requested target.
    at
com.sun.xml.ws.wsdl.parser.RuntimeWSDLParser.tryWithMex(RuntimeWSDLParser.java:184
)
    at
com.sun.xml.ws.wsdl.parser.RuntimeWSDLParser.parse(RuntimeWSDLParser.java:166)
    at
com.sun.xml.ws.wsdl.parser.RuntimeWSDLParser.parse(RuntimeWSDLParser.java:131)
    at com.sun.xml.ws.client.WSServiceDelegate.parseWSDL(WSServiceDelegate.java:271)
    at com.sun.xml.ws.client.WSServiceDelegate.<init>(WSServiceDelegate.java:234)
    at com.sun.xml.ws.client.WSServiceDelegate.<init>(WSServiceDelegate.java:182)
    at com.sun.xml.ws.spi.ProviderImpl.createServiceDelegate(ProviderImpl.java:106)

http://www.java-samples.com/showtutorial.php?tutorialid=210

9. Navigate to the WSDL's URL and click the security report little lock.
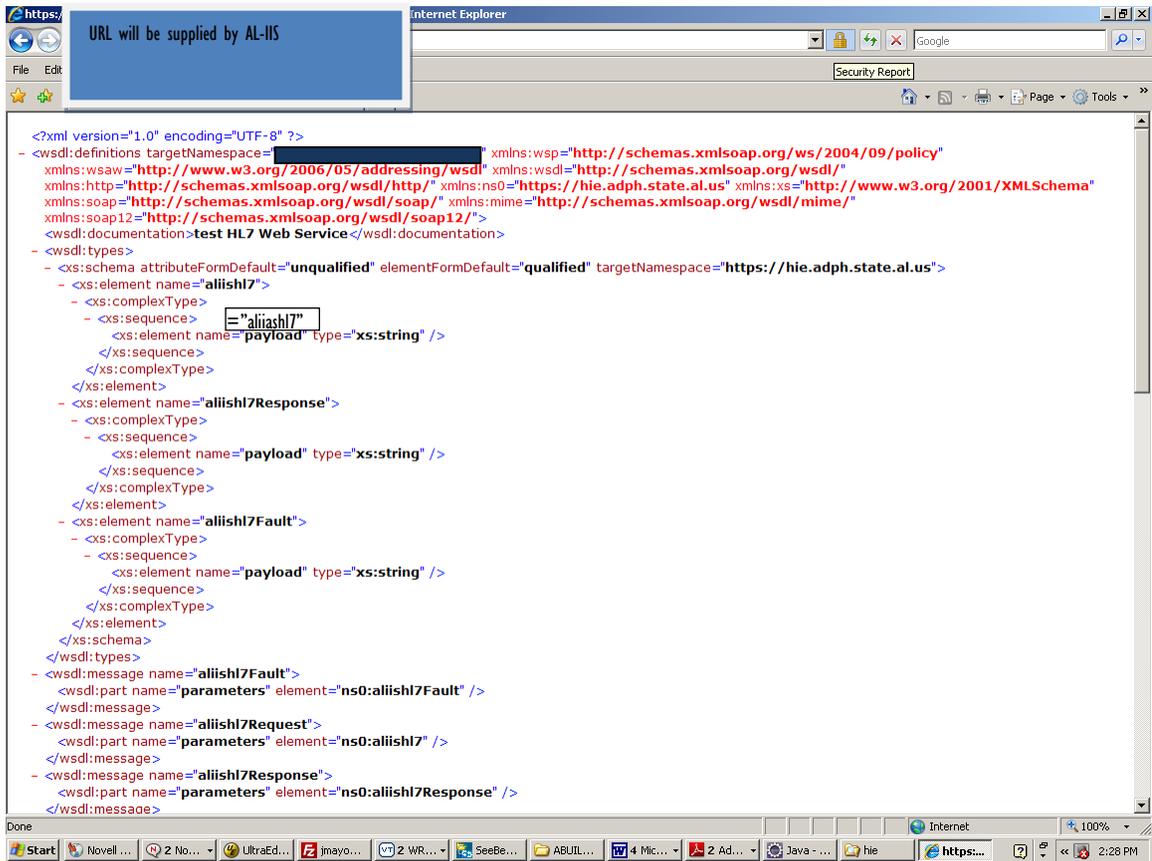
10. Click the view certificates link and click the details tab.
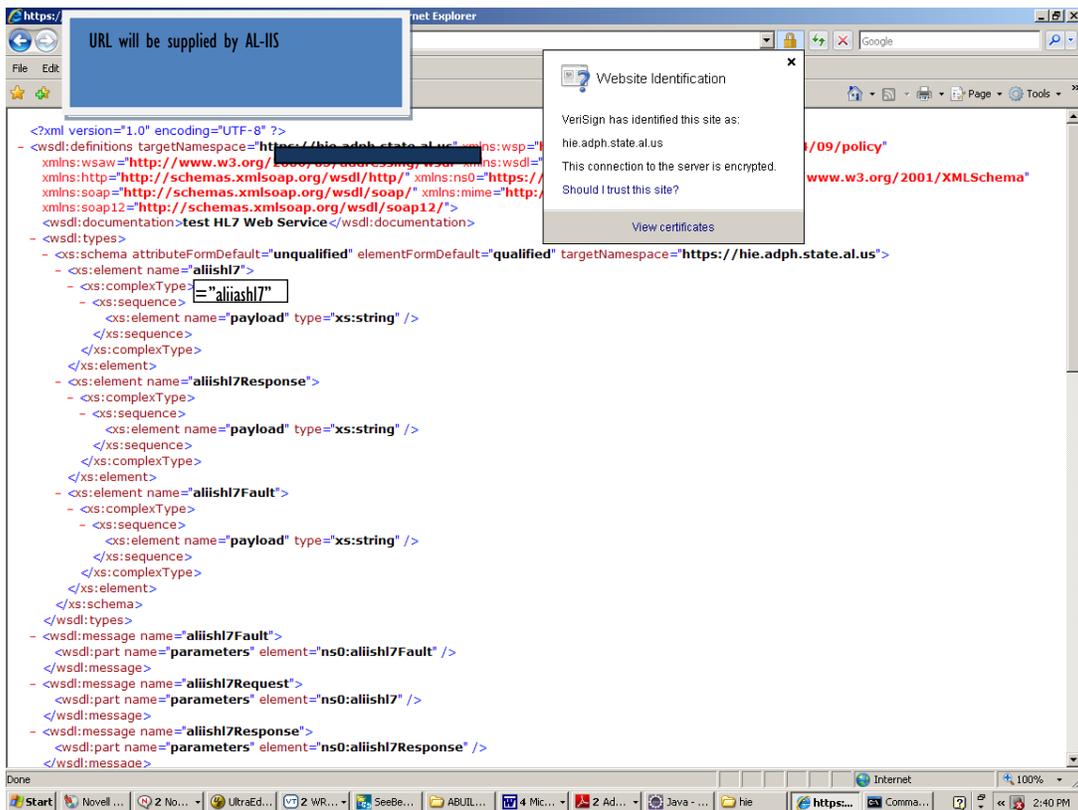
11. Click the copy to file link to download the certificate file.

12. Click next.

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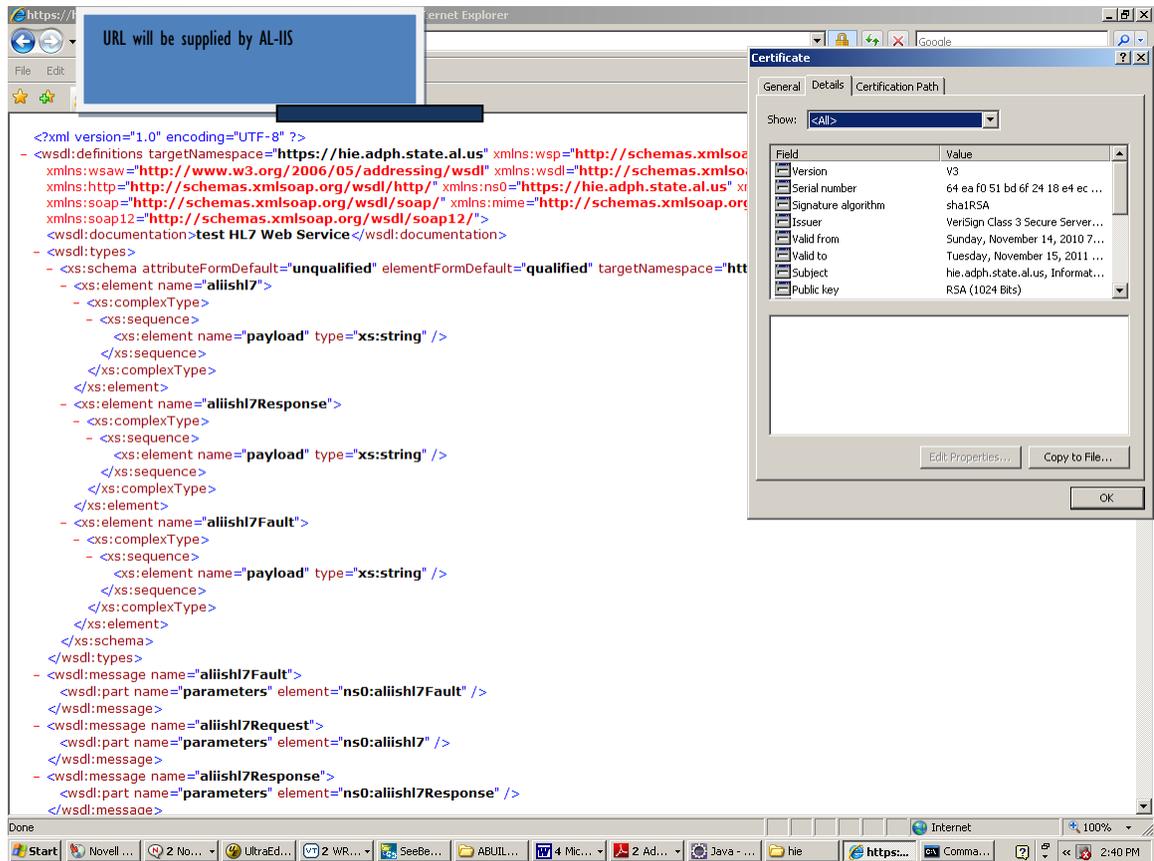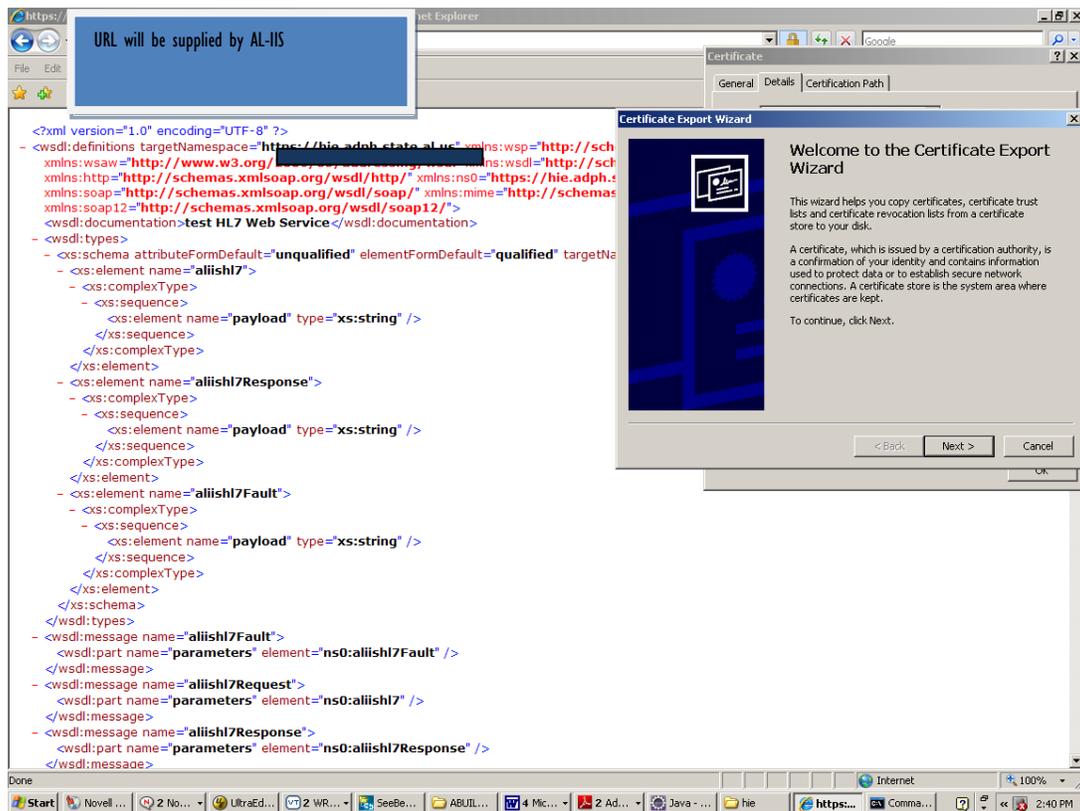
13. Keep the defaults.

URL will be supplied by AL-IIS

14. Indicate a path to copy certificate to and click next.
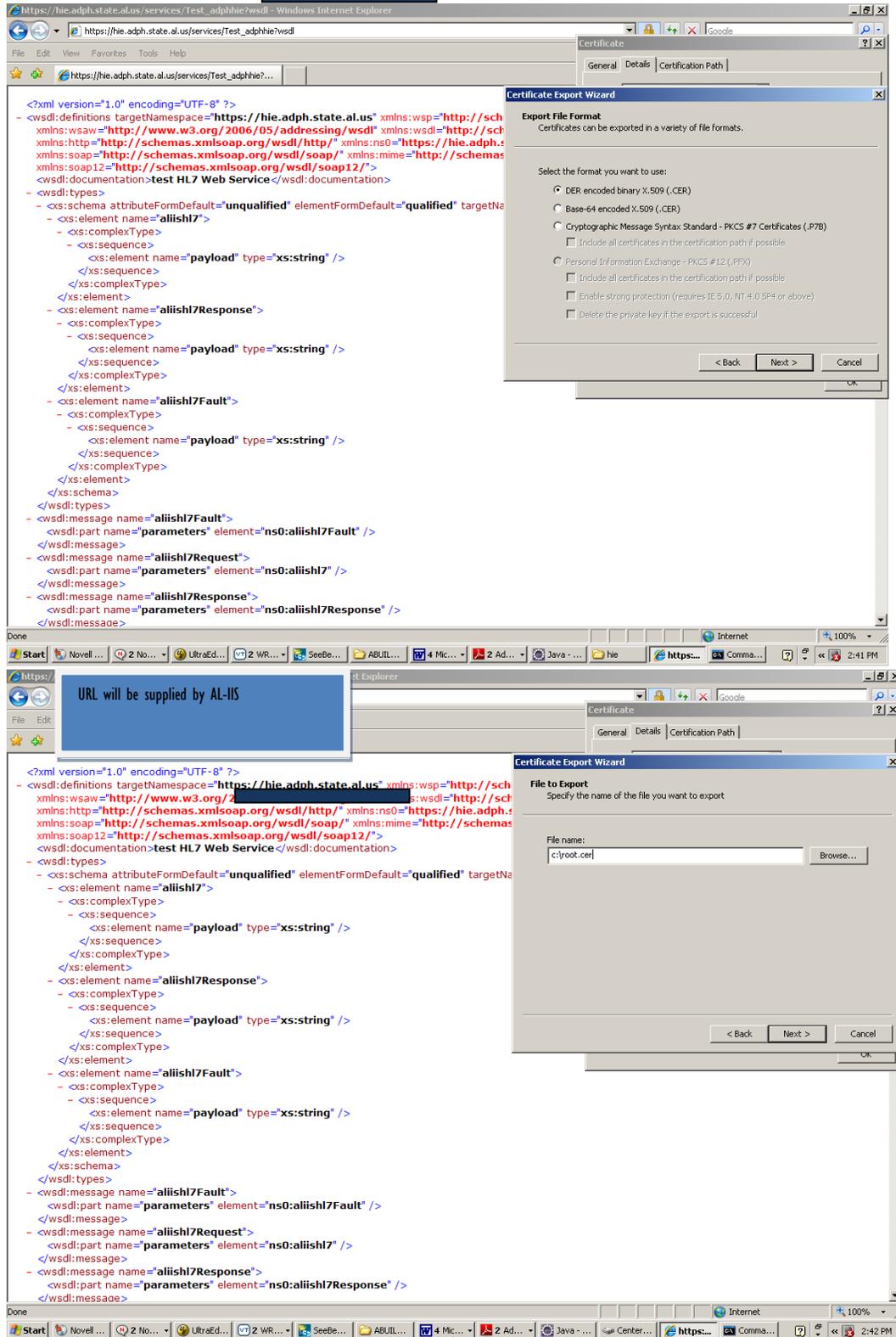
15. Click finish.
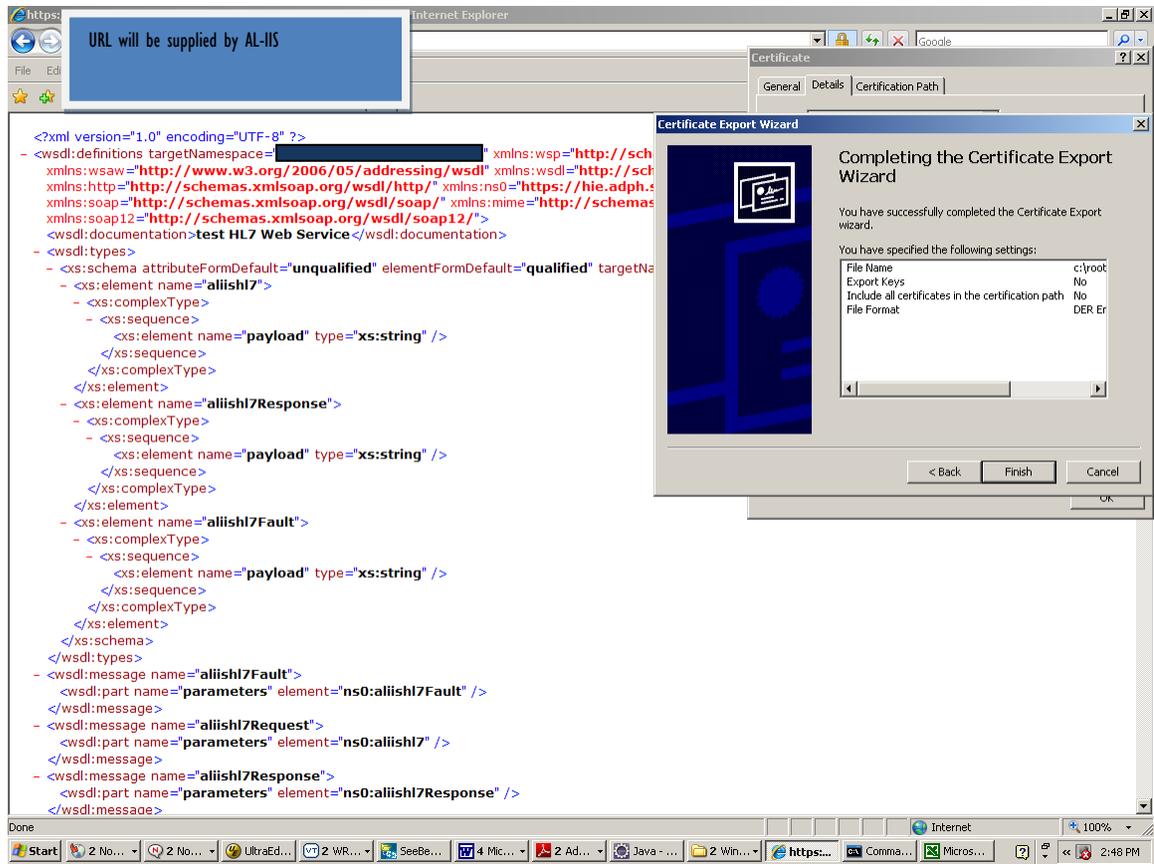
16. You will receive a pop up as follows,
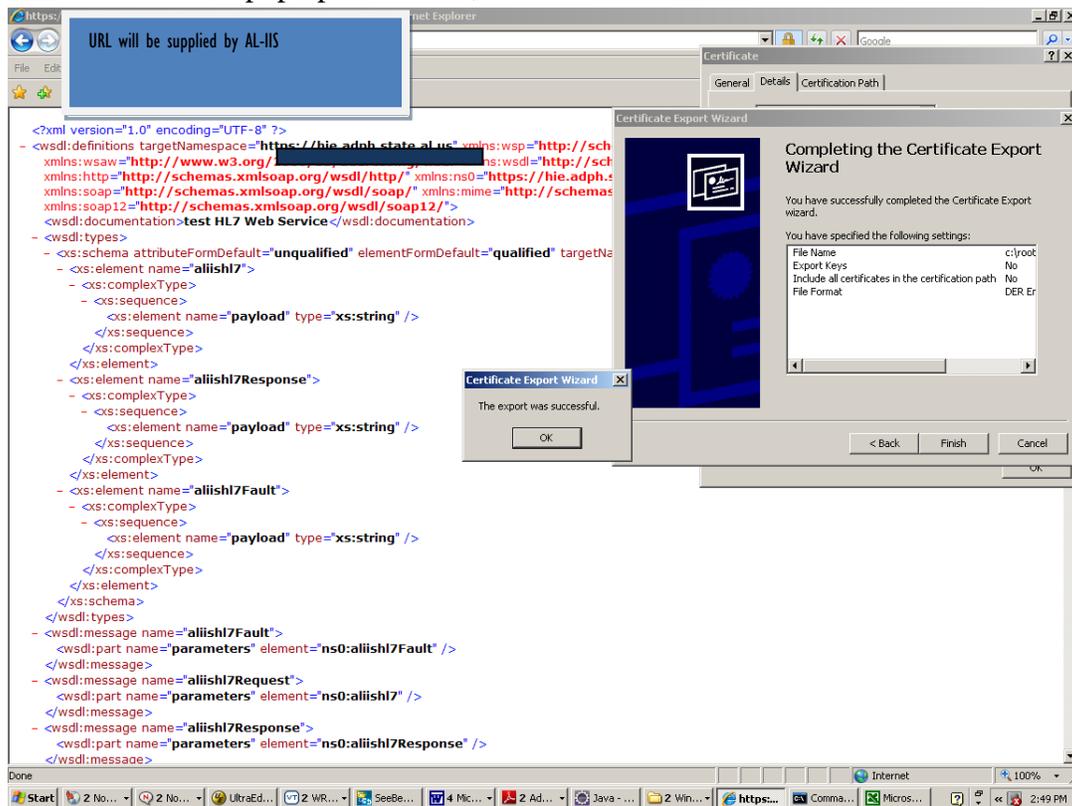
17. The certificate in the file must then be imported into the jdk 1.6 keystore.
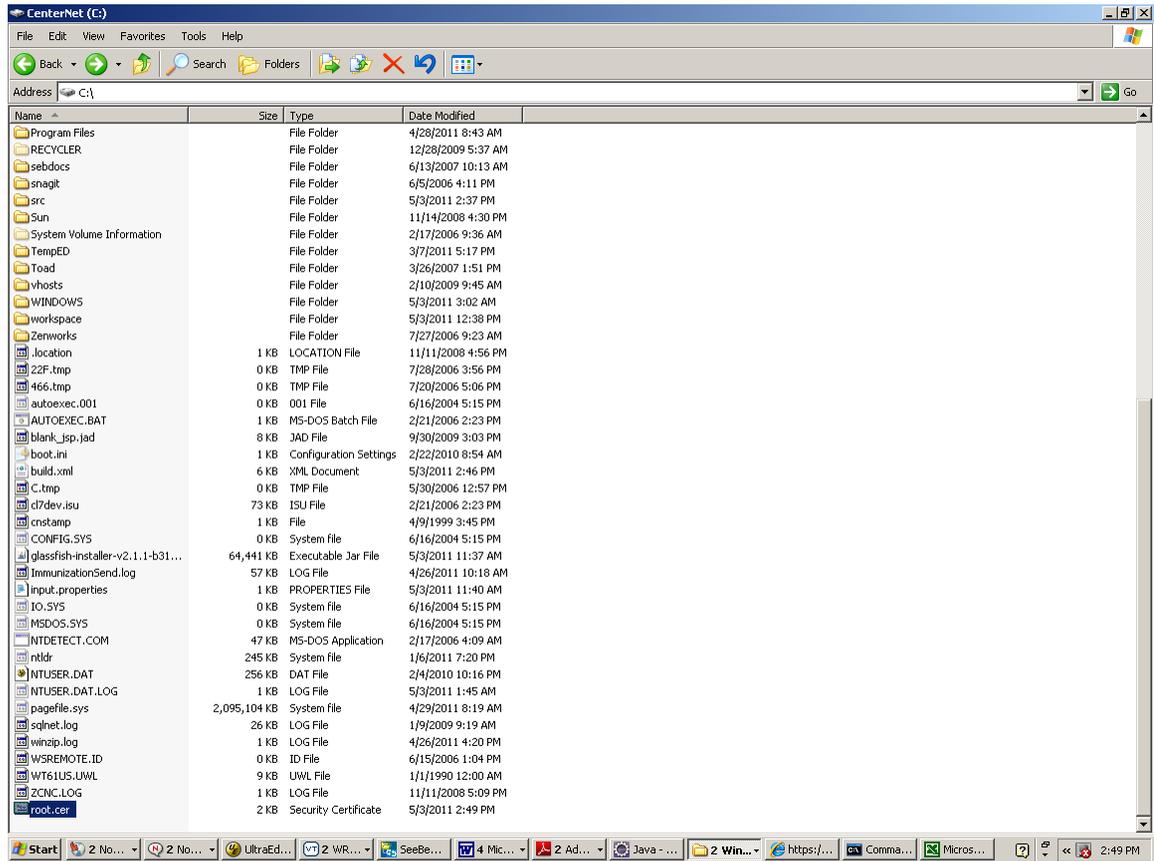
18. Navigate to the bin directory of the JDK 1.6 and issue the command above to copy the certificate into the keystore.* Java requires an annual renewal of the SSL certificate.