



# CHAPTER 7

## Sample Code for Application Program Interfaces

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This section contains the README files for the following application program interfaces (APIs):

- Shell script for retrieving subscriber or provisioning information from an external source by using a script
- Java code for retrieving subscriber or provisioning information from an external source by using an HTTP application

The sections that describe scripts and code provide the following information:

- Location
- Purpose
- Requirements
- Description of components
- Directions for modifying the code
- Directions for troubleshooting the code
- Sample code that you can modify to meet your needs

This section contains the following topics:

- [Shell Script for Retrieving Subscriber or Provisioning Information, page 7-1](#)
- [Java Code for Retrieving Subscriber or Provisioning Information, page 7-4](#)

## Shell Script for Retrieving Subscriber or Provisioning Information

You can use a sample script written for various databases to retrieve subscriber or provisioning information from an external source. These scripts, that you can modify according to your needs, are in the README file in the following locations:

- **Linux and Solaris**
  - /opt/CSCOcbt/samples/db\_script/oracle/
  - /opt/CSCOcbt/samples/db\_script/sybase/
- **Windows**

- %CSCOCBT\_ROOT%\samples\db\_script\oracle\
- %CSCOCBT\_ROOT%\samples\db\_script\sybase\

This section provides a printed copy of that README file, formatted for this user guide.

## Purpose of Shell Script

This section describes how to use scripts written against a Sybase database. The sybase directory contains sample scripts that you can modify to meet your needs. These scripts demonstrate how to:

- Receive requests from CBT
- Query data against a Sybase database
- Return data to CBT in the format specified in [“Retrieving Data with a Script” section on page 37](#)

## Sample Script Requirements

The sample scripts have the following criteria for use:

- Sample scripts require Sybase running with CBT's database schema, which is created automatically during the CBT install.
- Sample scripts are written for the Solaris OS. To use the scripts on a Linux machine, see the [“Troubleshooting the Script” section on page 7-3](#).

After trying the sample scripts, you can tailor them for your database or any other external data source.

## Script and File Descriptions

The following list of sample scripts describes the purpose of each script or file:

- **get\_subscriber**—Queries subscriber information from the database
- **get\_provision**—Queries provisioning information from the database
- **insert\_cmts**—Invokes insert\_cmts.sql
- **insert\_cmts.sql**—Inserts CMTSs and cable modems into the database and is invoked by insert\_cmts
- **subscriberinfo.txt**—Contains subscriber information in ASCII text file format
- **add\_col\_name.pl**—Adds column names to the subscriber fields (for example, Customer Last Name) queried from get\_subscriber

## Modifying the Script

Perform the following steps to modify a script:

- 
- Step 1** Modify insert\_cmts.sql to insert a list of CMTSs and cable modems into the database.
  - Step 2** Execute insert\_cmts from the command line: `./insert_cmts`
  - Step 3** Modify subscriberinfo.txt to import subscriber information into CBT. For field descriptions, refer to online help for the Import Subscriber Data dialog box.

- Step 4** Start CBT. Log in as an Admin user.
- Step 5** Click **Import Subscriber Data**, enter the Subscriber Data File Location, and click **Start**.
- Step 6** Click **Set External Interfaces**.
- Step 7** Under Subscriber Information, select the **Script** radio button and enter the location of the get\_subscriber filename (for example, /my\_dir/get\_subscriber) in the Script Location field.
- Step 8** Under Provisioning Information, select the **Script** radio button and enter the location and the get\_provision filename (for example, /my\_dir/get\_provision) in the Script Location field.

## Troubleshooting the Script

- The get\_subscriber and get\_provision scripts can be run from the UNIX command line. The following examples show how to execute a script and the output the script produces:
 

```
./get_provision GET_PROVISION MAC 000216d5a0cf
OUT_DATA=PROVISION^172.22.85.10^172.22.127.26^

./get_provision GET_MAC IP 172.22.127.26
OUT_DATA=MAC^000216d5a0cf^

./get_subscriber GET_SUBSCRIBER MAC 000216d5a0cf
OUT_DATA=SUBSCRIBER^AccId=ID000006^Name=Name000006^Phone=6172300006^Address=175 West Tasman^ClassOfService=Policy000006^FiberNode=User A000006^

./get_subscriber GET_MAC PHONE 5106663152
OUT_DATA=MAC^000164ffeb95^000164ffc3c7^

./get_subscriber GET_ADDRESS MAC 000164ffc3c7^000164ffeb95^
OUT_DATA=ADDRESS^000164ffc3c7=170 West Tasman Drive,95134^000164ffeb95=170 West Tasman Drive,95134^
```
- The get\_subscriber script invokes add\_col\_name.pl. Modify the scriptDir to accurately reflect where add\_col\_name.pl is located.
- All scripts use /tmp as a temporary directory for creating temp files. Create the /tmp directory with read and write privileges for all users.
- If you are running the scripts on a Linux machine, make the following changes to the get\_provision, get\_subscriber, and insert\_cmts scripts:
  - Modify commLib to /bin
  - Replace dbisql to dbisqlc
- If you get Invalid Data when using echo in Window's batch file:
  - Turn off echo:
 

```
@echo off
```
  - If you are not using double quotes around the message, then the delimiter has to be "^" instead of ".".
 

```
For example:
echo OUT_DATA=PROVISION^^172.22.85.10^^172.22.127.26^^
```

## Sample Script Code

The following sample code is extracted from the get\_subscriber script:

```
#!/bin/ksh
argc=$#
set -A argv $*
integer i=0
while let "i < $argc"; do
    case ${argv[$i]} in
        "GET_MAC") function=${argv[$i]};;
        esac
    let "i = i + 1"
done

#retrieving MAC based on Customer phone number
if [ "$function" = "GET_MAC" ] ; then

    str="SELECT MACAddress FROM SUBSCRIBERINFO where CusPhone='$in_param';";
    echo $str >> "$tmpDir/script.$filenameExt"
    str="OUTPUT TO $tmpDir/test.$filenameExt FORMAT ASCII;"
    echo $str >> "$tmpDir/script.$filenameExt"

    tmpi=`dbisqlc -q -c $dbAccess read $tmpDir/script.$filenameExt`
    rm $tmpDir/script.$filenameExt

    MAC=`$commLib/cat $tmpDir/test.$filenameExt | $commLib/sed s/\\/\\/g`
    echo $MAC > $tmpDir/test.$filenameExt
    MAC=`$commLib/cat $tmpDir/test.$filenameExt | $commLib/sed 's/ /^/g'`

    tmp="OUT_DATA=MAC^$MAC^";
    if [ $tmp = "OUT_DATA=MAC^^" ] ; then
        echo "OUT_DATA=ERROR^No data found for $in_param^";
        exit;
    fi
    echo $tmp

    rm $tmpDir/test.$filenameExt
    exit;

fi
```

## Java Code for Retrieving Subscriber or Provisioning Information

You can use an application that is running on an HTTP server to retrieve subscriber or provisioning information from an external source.

A sample application that you can modify according to your needs is in the README file in the following locations:

- **Linux and Solaris**
  - /opt/CSCOcbt/samples/db\_script/oracle/
  - /opt/CSCOcbt/samples/db\_script/sybase/
- **Windows**
  - %CSCOCBT\_ROOT%\samples\db\_script\oracle\

- %CSCOCBT\_ROOT%\samples\db\_script\sybase\

This section provides a printed copy of that README file, formatted for this user guide.

## Purpose of Java Code

This sample script file describes how to use Data Manager, a sample HTTP application. The HTTP directory contains this sample application that you can modify to meet your needs. Data Manager demonstrates how to:

- Receive requests from CBT
- Query data against an Oracle database
- Return the data to CBT in the format specified in the [“Retrieving Data with an HTTP Application” section on page 39](#)

## Sample HTTP Application Requirements

The sample HTTP application:

- Requires the Oracle database running with the schema described in create\_tbls.sql.
- Is written to use Oracle OCI, instead of the pure Java JDBC, to communicate with the database. To use the sample HTTP application on a Solaris machine, see the [“Troubleshooting the Sample HTTP Application” section on page 7-8](#).

## Module and File Descriptions

This section lists the modules and files used in Data Manager, the sample HTTP application. For a description, refer to a specific module or file. To modify Data Manager to suit your needs, refer to the next section, “Modifiable Components in the Data Manager Application.”

- Java modules:
  - DataManager.java
  - Db.java
  - DbProps.java
  - DbQuery.java
  - GetResponse.java
  - HttpManager.java
  - HttpObj.java
  - HttpRequest.java
  - HttpResponse.java
  - HttpServer.java
  - LoadOracleJDBCdriver.java
  - Logger.java
  - PostResponse.java

- ShutDown.java
- System and configuration files:
  - Makefile
  - Db-Vital.properties
  - Db-Sigma.properties
  - install
  - start\_dm
  - stop\_dm
- SQL files:
  - create\_tbls.sql
  - insert\_cmts.sql
  - insert\_subscriber.sql

## Modifiable Components in the Sample HTTP Application

- **create\_tbls.sql, insert\_cmts.sql, insert\_subscriber.sql**—Scripts that create database tables and insert data into the database.
- **DbQuery.java**—Module that queries the data from the database. The following functions were written based on the schema described in create\_tbls.sql:
  - getMacByIP
  - getMacByPhone
  - getProvInfo
  - getProvInfoExt
  - getFiberNode
  - getSubscriberInfo

If create\_tbls.sql is changed, the code for these functions must be changed accordingly.

- **Db-Sigma.properties**—Contains attributes of the subscriber database.
- **Db-Vital.properties**—Contains attributes of the provisioning database.

If the provisioning and subscriber data tables reside in the same database, these two files must have identical information. In Data Manager, the provisioning and subscriber data is in two separate databases.

For both files, the following settings must be changed accordingly:

- db\_sid
- db\_port
- db\_userid
- db\_password
- **Makefile**—Compiles the Java files.
- **start\_dm**—Starts the Data Manager HTTP application.

The current variable settings in start\_dm are:

```

debug_flag=1
(Send debug messages to a log file.)
port=8012
(Change to the port of your choice.)
logDir= /opt/CSCOcbt/jakarta-tomcat-4.0.3/logs
(Specify the location where the log file should be created and changes should be
written.)

```

- **stop\_dm**—Stops the Data Manager HTTP application.

The following variable settings are in stop\_dm:

```

ip=171.71.50.52
(IP address where the HTTP application is running.)
port=8012
(Port in which the HTTP application is running. This should be the same port specified
in the start_dm script.)

```

For these three scripts (Makefile, start\_dm, and stop\_dm), the following properties must be updated according to the system environment:

- ORACLE\_HOME
- JAVA\_HOME
- LIBRARY\_PATH

## Building and Running the Sample HTTP Application

1. Build class files and copy files to destination.

From the command line, type:

```
./make
```

```
./install
```

2. Start the application.

From the command line, type:

```
/opt/CSCOcbt/bin/start_dm
```

3. Stop the application.

From the command line, type:

```
/opt/CSCOcbt/bin/stop_dm
```

4. Link Data Manager to CBT.

- a. Start CBT. Log in as an **Admin** user.

- b. Click **Set External Interfaces**.

- c. Under Subscriber Information, select the **HTTP** radio button and enter the URL for the application in the **URL Location** text box:

```
http://your_machine_name:port_num/DataManager
```

5. Under Provision Information, select the **HTTP** radio button and enter the URL for the application in the **URL Location** text box:

```
http://your_machine_name:port_num/DataManager
```



### Note

In the previous steps *port\_num* is the port number that is configured in start\_dm.

## Troubleshooting the Sample HTTP Application

- Failed to create database connection.

Make sure there is connectivity between the machine and the Oracle database. A quick way to test this is to invoke the Oracle SQL\*Plus application. For example, assume that the following settings are in `Db-Vital.properties`:

- `db_sid=CBT`
- `db_userid=user1`
- `db_password=mypasswd`

From the command line, type:

```
sqlplus user1/mypasswd@CBT
```

If there is no response or an error occurs, check the `tnsnames.ora` setting.

- Makefile failed - javac not found.

Make sure that `JAVA_HOME` in the Makefile points to the correct JAVA compiler.

- Makefile failed while linking or missing Oracle library error generated during run time.

The sample HTTP application was written to use the Oracle OCI protocol for communicating with the database. Oracle OCI requires machine-dependent libraries, so make sure that the path to the libraries is set correctly in Makefile.

- Socket creation error.

This error occurs when `port_num` is changed in `start_dm` and `stop_dm`. To correct it, restart the program `/opt/CSCOcbt/bin/start_dm` program.

- DbQuery returns error status.

It is possible that some of the Oracle environment did not get set up correctly. To check this, review `oracle.csh`, update it as required, and source it. Then, run `start_dm` again.

## Sample Java Code

- Set up the HTTP Connection to receive a request from CBT (`HttpManager.java`).

```
HttpRequest = new HttpRequest()
```

- Retrieve the message header (`HttpRequest.java`):

```
StringBuffer sb = new StringBuffer();
InputStream is = sock.getInputStream();
DataInputStream fromBrowser = new DataInputStream(is);
while (true) {
    msg = fromBrowser.readLine();
    if (msg.equals("")) break;
    sb.append(msg + nl); // put back the '\n\r' for newline
}
```

- Retrieve the message body (`HttpRequest.java`):

```
DataInputStream fromBrowser = sock.getInputStream();
StringBuffer sb = new StringBuffer();
```

```

for (int x=0; x < len; x++) {
    // return int range 0-255, -1: end of stream
    i = fromBrowser.read();
    if (i == -1) break;
    // however, char is 16 bits for unicode 2 bytes
    // now use 2 bytes to hold just one byte data.
    sb.append((char)i);
    //System.out.println (sb);
}

```

#### 4. Parse the message (HttpObj.java):

```

//parse and save message into Hashtable

String req_command = decodeString(command);
//System.out.println ("req_command=" + req_command);

// Parse the data from the servlet
StringTokenizer rdata = new StringTokenizer(req_command, "&");

if (rdata == null) return;

//System.out.println ("data=" + data + ", rdata=" + rdata);
while (rdata.hasMoreTokens()) {
    String cmd = rdata.nextToken();
    int index = cmd.indexOf("=");
    if (index == -1) return;
    String key = cmd.substring(0, index);
    String val = cmd.substring(index+1);
    hParams.put(key, val);
}

```

#### 5. Process the message (HttpManager.java & DataManager.java):

```

//if POST message then process the message:
if (req.getReqType().equals ("POST")) {
    req.fetchBody(sock_);
    hParams = req.getParams();
    resp = new PostResponse(req);
    String status = null;
    status = dm_.processCommand(req);
    ...
}
//examine the request type and process the message accordingly:
Hashtable hParams = req.getParams();
String task = (String)hParams.get("REQUEST");
int status = 1;

if (task.equals(GET_PROV_INFO)) {
    String sStr = "";
    String sType = (String)hParams.get("SEARCH_TYPE");
    if (sType.equals("MAC"))
    {
        String sTmp = (String)hParams.get("IN_PARAM");
        String sMac = sTmp.toLowerCase();
        Logger.debug("In Mac is " + sMac);
        sStr = DbQuery.getProvInfo(sMac);
        Logger.debug("Prov Info is " + sStr);
    }
}
.....
}

```

```

// retrieve information from the database (DbQuery.java):
public static String getProvInfo(String Mac) {

    String query = "";
    String subscriberId = "";
    String modemIp = "";
    String cmtsIp = "";
    Statement stmt = null;

    try {
        long start = (new java.util.Date()).getTime();

        start = (new java.util.Date()).getTime();
        stmt = vital_db_conn.createStatement();
        query = "select subscriberid, ipaddress,giaddr from device where deviceid =
'" + Mac + "'";
        Logger.debug(query);
        boolean bFound = false;
        ResultSet rs = stmt.executeQuery(query);
        while (rs.next()) {
            bFound = true;
            subscriberId = rs.getString(1);
            modemIp = rs.getString(2);
            cmtsIp = rs.getString(3);
            rs.clearWarnings();
        }
        rs.close();
        rs = null;
        stmt.close();
        stmt = null;

        long end = (new java.util.Date()).getTime();
        Logger.debug("total msec to execute getProvInfo: " + (end - start));
        if (!bFound)
            return ("OUT_DATA=ERROR^" + Mac + " does not exist in the Provisioning
Database.^");
        String sStr = "OUT_DATA=PROVISION^" + cmtsIp + "^" + modemIp + "^";
        return (sStr);
    }
    catch (SQLException se) {
        String sError = "OUT_DATA=ERROR^" + se.getMessage() + "^";
        if (stmt != null)
        {
            try {
                stmt.close();
            }
            catch (Exception e)
            {
            }
            stmt = null;
        }
        return sError;
    }
}
}

```

**6. Build a Post-HTTP Response to return data to CBT (HttpResponse.java):**

```
//send header to CBT
OutputStream os = null;
try {
    os = sock.getOutputStream();
}
catch (IOException e) {
    Logger.error("DataManager.HttpResponse:sendHeader: error: " + e);
    e.printStackTrace(DataManager.getLogPW());
    e.printStackTrace();
}

StringBuffer sb = new StringBuffer();
sb.append("HTTP/1.0 200 OK" + nl);
sb.append("Content-type: text/html" + nl);
byte[] b = (sb.toString()).getBytes();
try {
    os.write(b);
    os.flush();
}
catch (IOException e) {
    Logger.error("DataManager.HttpResponse:sendHeader: error write: " + e);
    e.printStackTrace(DataManager.getLogPW());
    e.printStackTrace();
}
}
```

Send result data off to CBT

```
os.write(result_data);
os.flush();
```

