Oracle Data Masking
Oracle FLEXCUBE Universal Banking
Release 12.0.3.0.0
[April] [2014]

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FINANCIAL SERVICES

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Table of Contents

1. PURPOSE 1-1

1.1 INTRODUCTION TO DATA MASKING 1-1
1.2 DATA MASKING BENEFITS 1-1
1.3 DATA MASKING FEATURES 1-1

2. HARDWARE AND SOFTWARE REQUIREMENTS (OEM GRID CONTROL SERVER) 2-1

3. DATA MASKING PROCESS FLOW 3-1

3.1 CREATING NEW DATA MASKING FORMATS FROM SCRATCH 3-1
3.2 DATA MASKING IN STAGING AREA 3-1
3.3 EXPORTING AND IMPORTING A DATA MASKING TEMPLATE 3-12
3.4 MASKING DATA 3-13
3.5 APPLICATION USE CASE 3-22
3.6 REFERENCES 3-25

1. Purpose

To conduct a proof of concept/feasibility testing of Oracle Enterprise manager 11g Database control release 11.2.0.1.0 data masking pack for FLEXCUBE data masking requirements and to document the process that would be used for data masking and to baseline templates for data masking.

1.1 Introduction to Data Masking

Some of the FLEXCUBE customers have shared production data within and outside the organization for various business purposes that are not intended for non production use.

Database administrators (DBAs) in these cases copy production data into staging or test environments to allow in-house developers or offshore testers to perform application development and application testing with the copy of live data that contains a lot of sensitive information.

The problem with data sharing is that copies of production data often contain company confidential, sensitive or personally identifiable information, access to which is restricted by government regulations. Oracle Data Masking provides a comprehensive easy-to-use solution to share production data with internal and external entities while preventing sensitive or confidential parts of the information from being disclosed to unauthorized parties.

1.2 Data Masking Benefits

The following are the data masking benefits:

- Increase Protection from accessing confidential data. The data once masked is irreversible
- Reduce restrictions on data use
- Provides the realistic data for testing, development and training environment.

1.3 Data Masking Features

The following are the data masking features:

- Automatic database referential integrity when masking primary key
- Centralized Masking formats(Format library)
- Portable masking definitions (Templates)
- Define once, execute multiple times
- View sample data before masking

2. Hardware and Software Requirements (OEM Grid Control Server)

The following are the hardware and software requirements:

- Minimum 2 GB physical memory (RAM)
- 500 MB space in TEMP directory
- 3 GB disk space for ORACLE HOME directory.
- Oracle OEM 11G Database Control Release 11.2.0.1.0

3. Data Masking Process Flow

This section explains the data masking process flow:

3.1 Creating New Data Masking Formats from Scratch

- Identify the tables that contain sensitive information. Indentify if there any child tables that refer this data with or without explicit foreign key relationships.
- Define mask formats for the sensitive data. The mask formats may be simple or complex depending on the information security needs of the organization.
- Create a masking definition to associate table columns to these mask formats. Data masking determines the database foreign key relationships and adds foreign key columns to the mask.

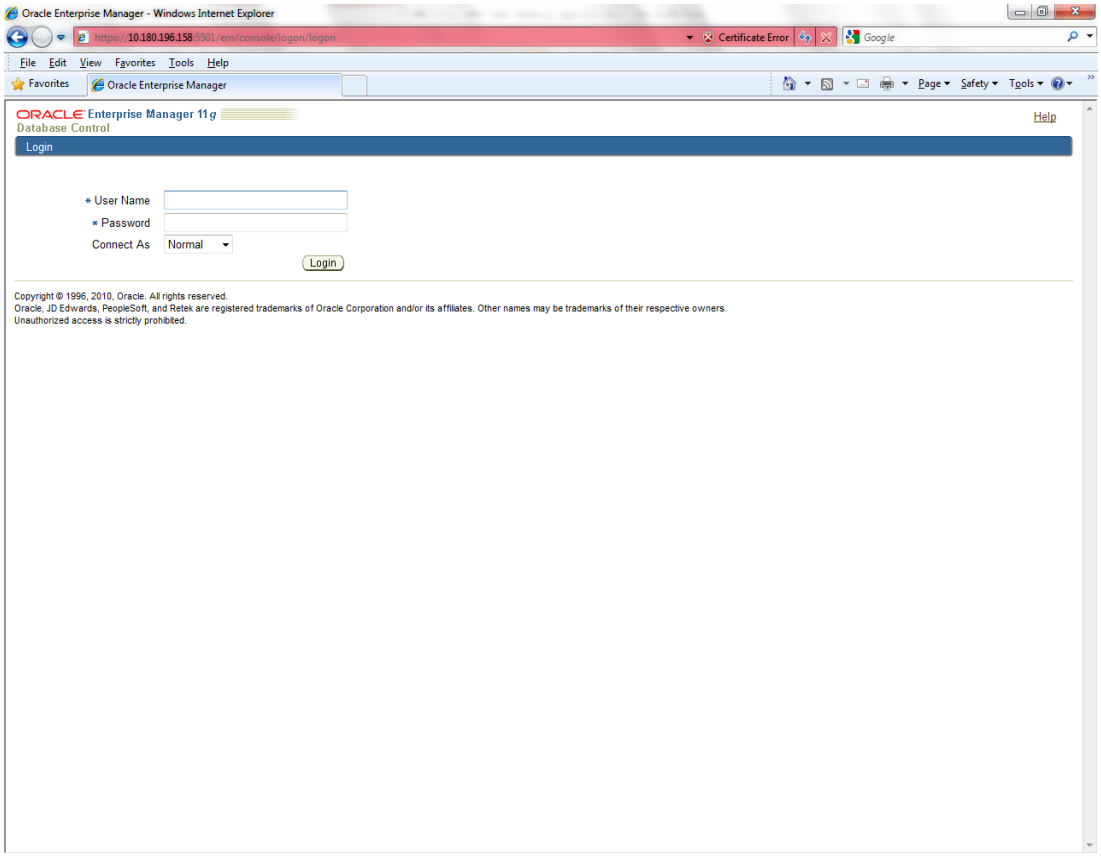
3.2 Data Masking in Staging Area

- Once the data masking template is ready the data masking operation can be performed.
- Clone the production database to a staging area that is a controlled environment; disable any database links, streams, or references to external data sources. Back up the cloned database or, at a minimum, the tables that contain masked data. This will help you restore the original data if the masking definition needs to be refined further.
- Select and apply the masking definition for the staging database and verify if the masked data meets the information security requirements.
- For the first time the data masking is attempted or after any change in the masking it is recommended that the data is reviewed to ensure that the data is desensitized and the application is tested to ensure that the application works fine.
- After masking the staging site, clone the database to a test region. When cloning the database to an external or unsecured site, export & import should be used.

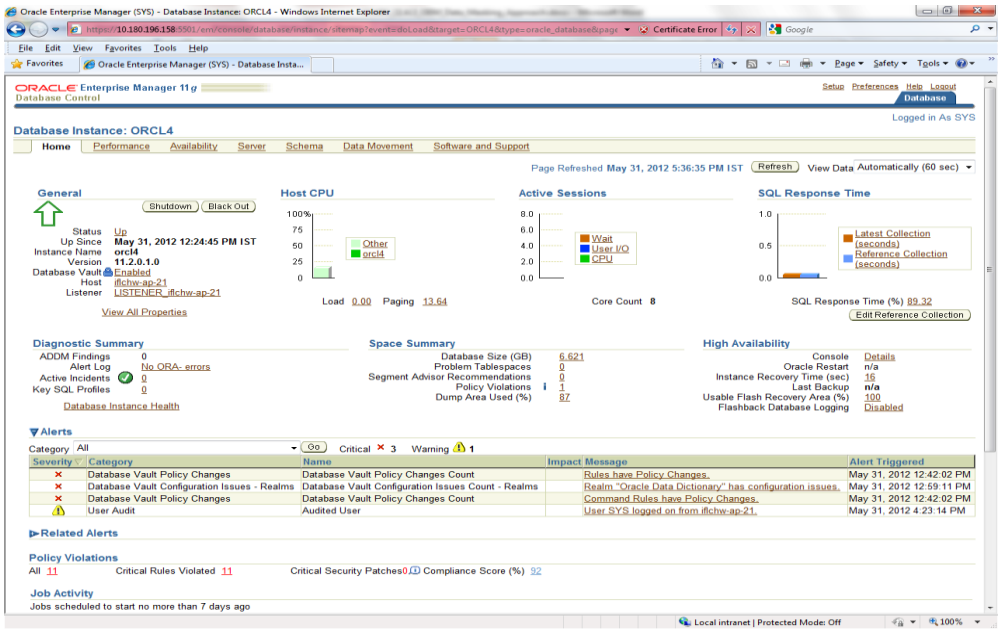
Creating a Data Masking Template

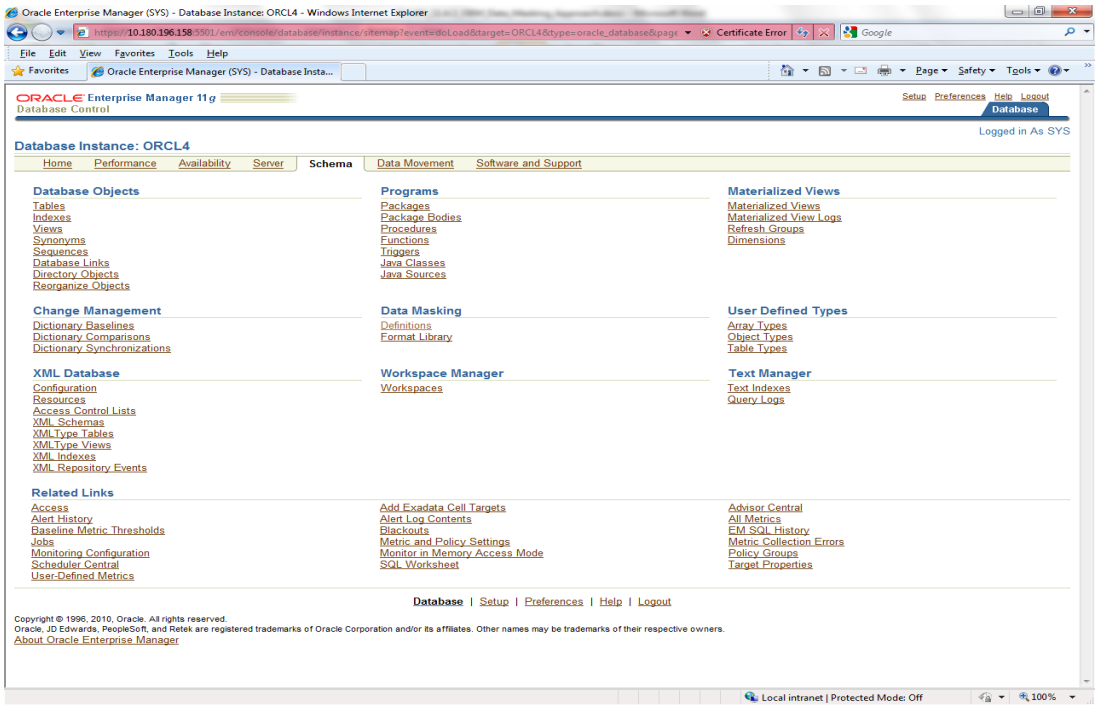
In this section we will go through the masking process step by step. We will be using an example in which we will mask **address1** column of **MSTM_CUST_ADDRESS** table in **FCCKERTMP** schema of **orcl** database.

1. Login to the Enterprise Manager as a SYS user.



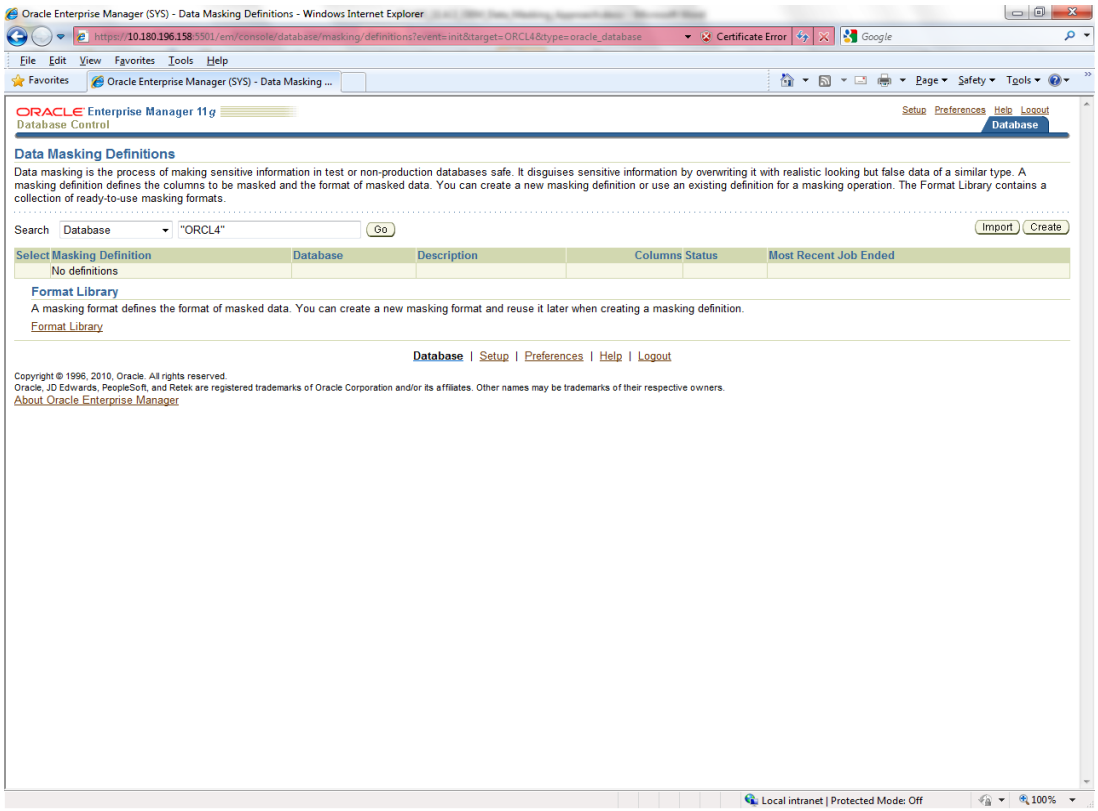
2. Click ‘Schema’ Tab available on the home page.



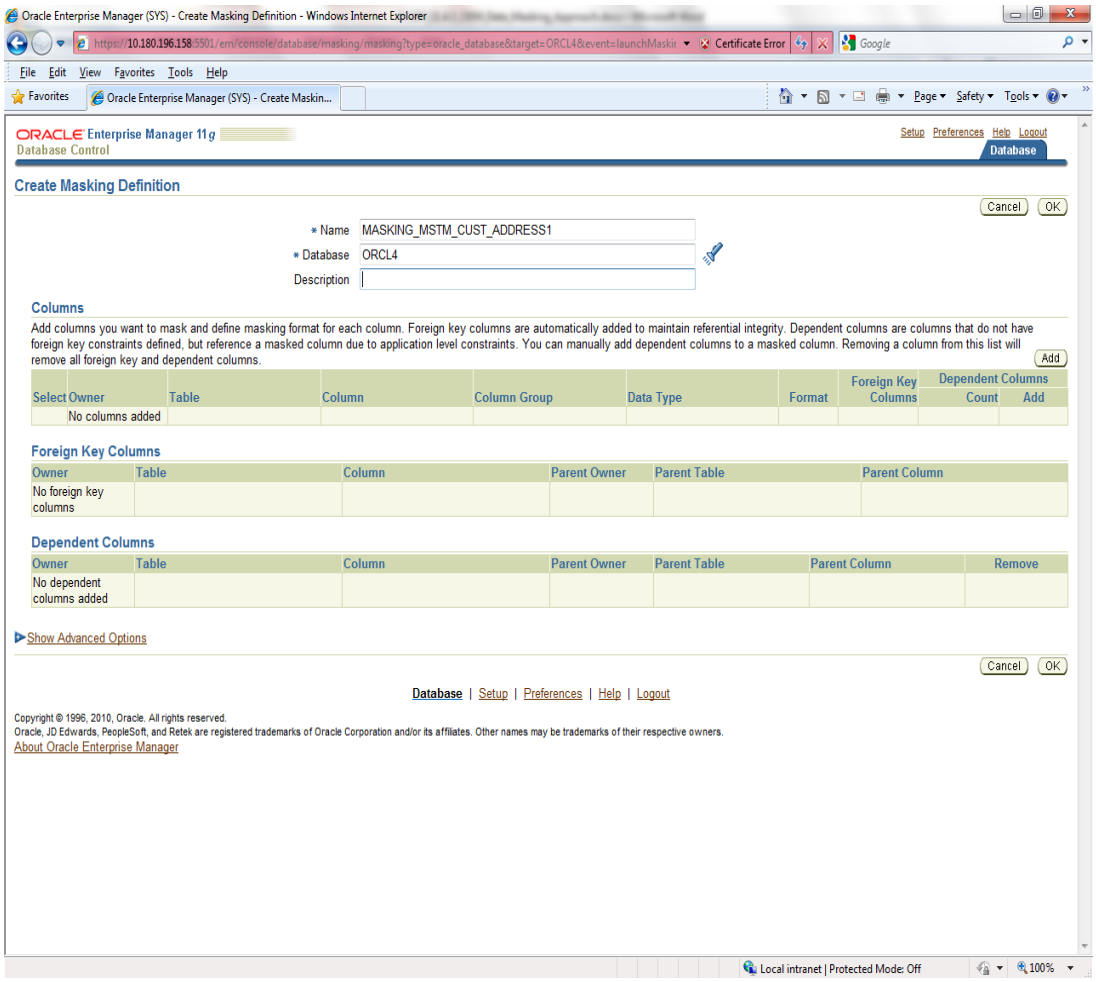


3. Click ‘Definitions’ link available under Data Masking menu.

4. This will lead to Data Masking Definitions Page. To begin masking click ‘Create’ button as shown below.

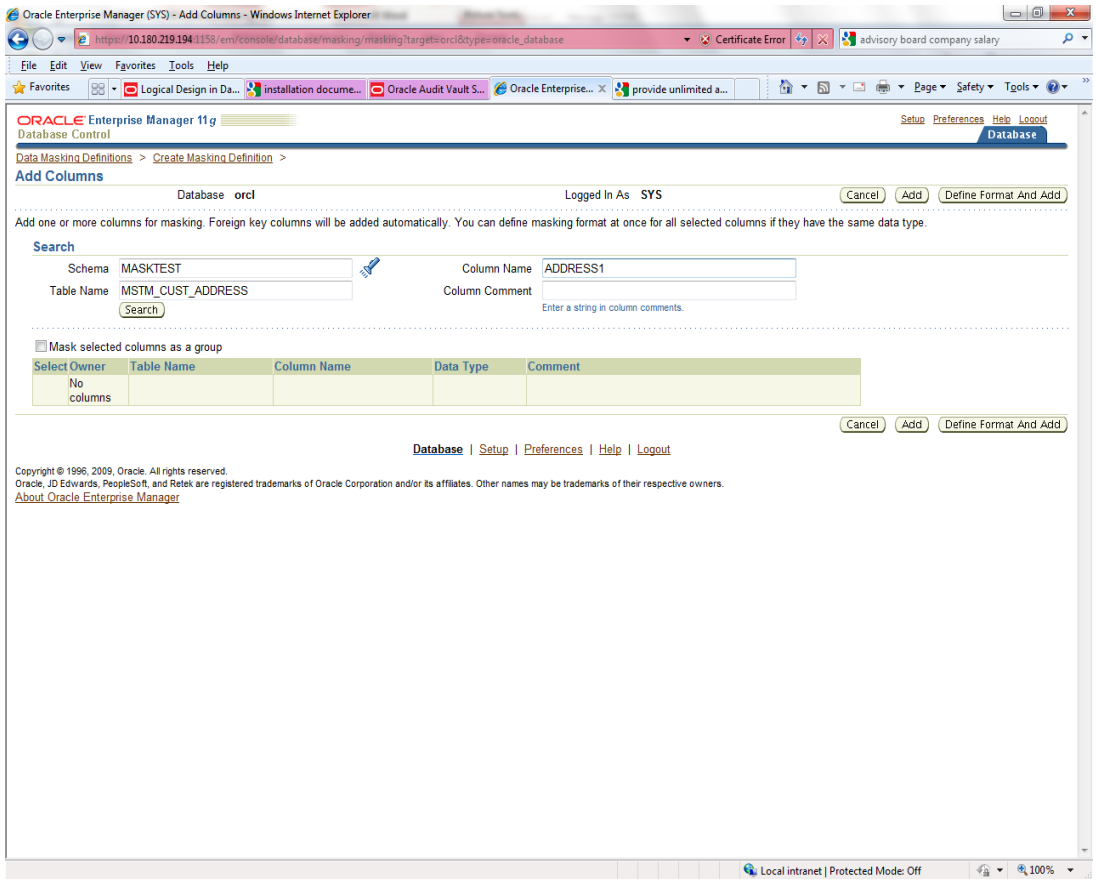


5. In the next screen, we will enter our Masking definition name. Our database name gets defaulted to **orcl4**.

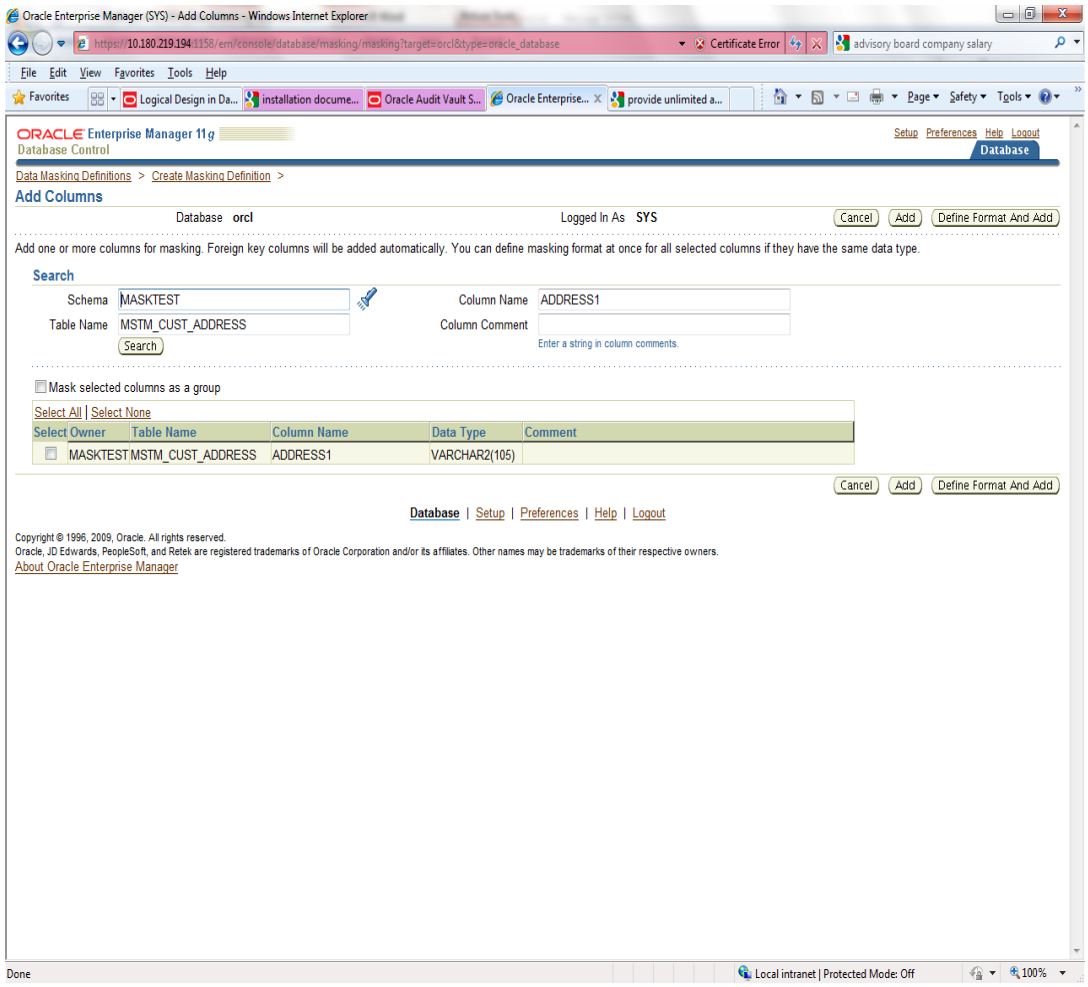


6. Click ‘Add’ Button.

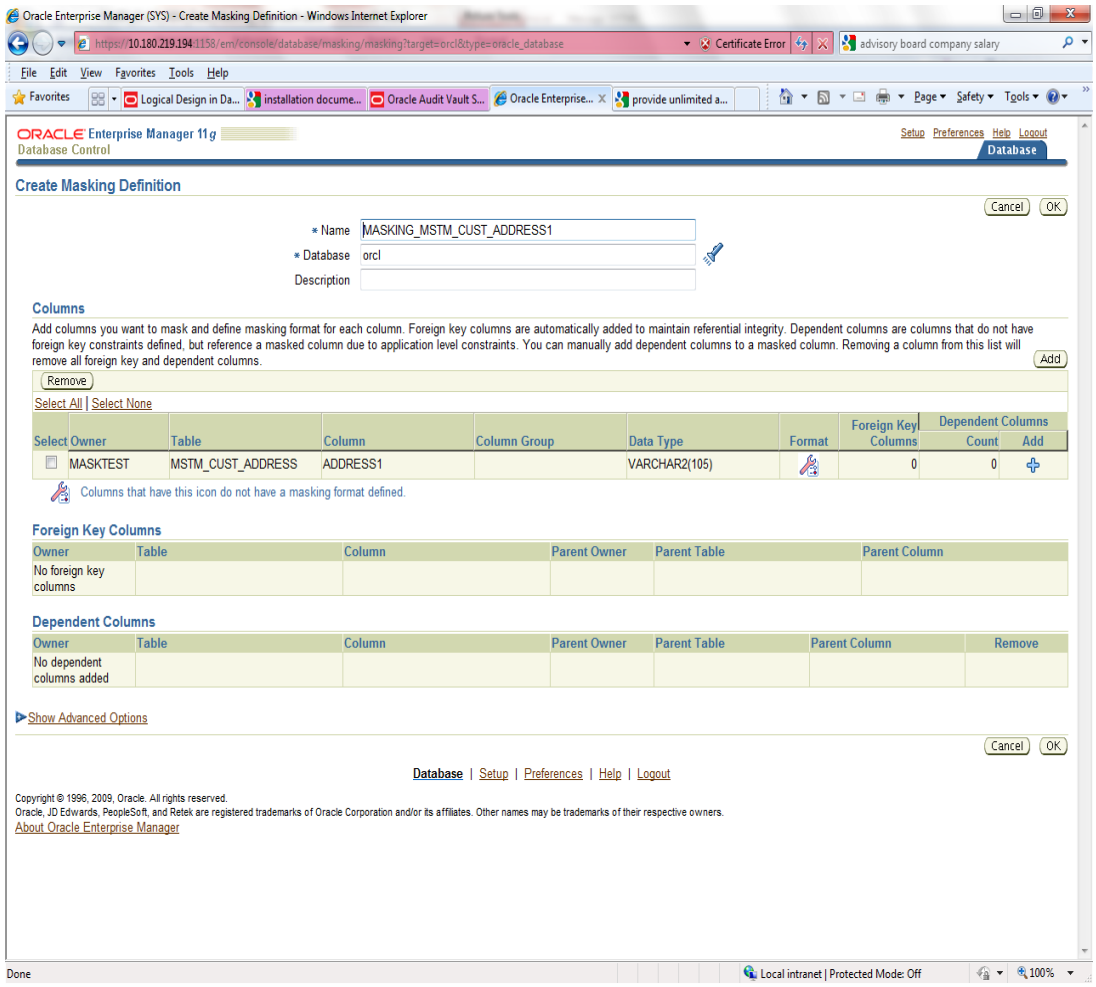
7. In this screen we will enter Schema, table, column details. For column name we can a**lso u**se wild card (e.g. %ADDR%). Next, we click on search button.



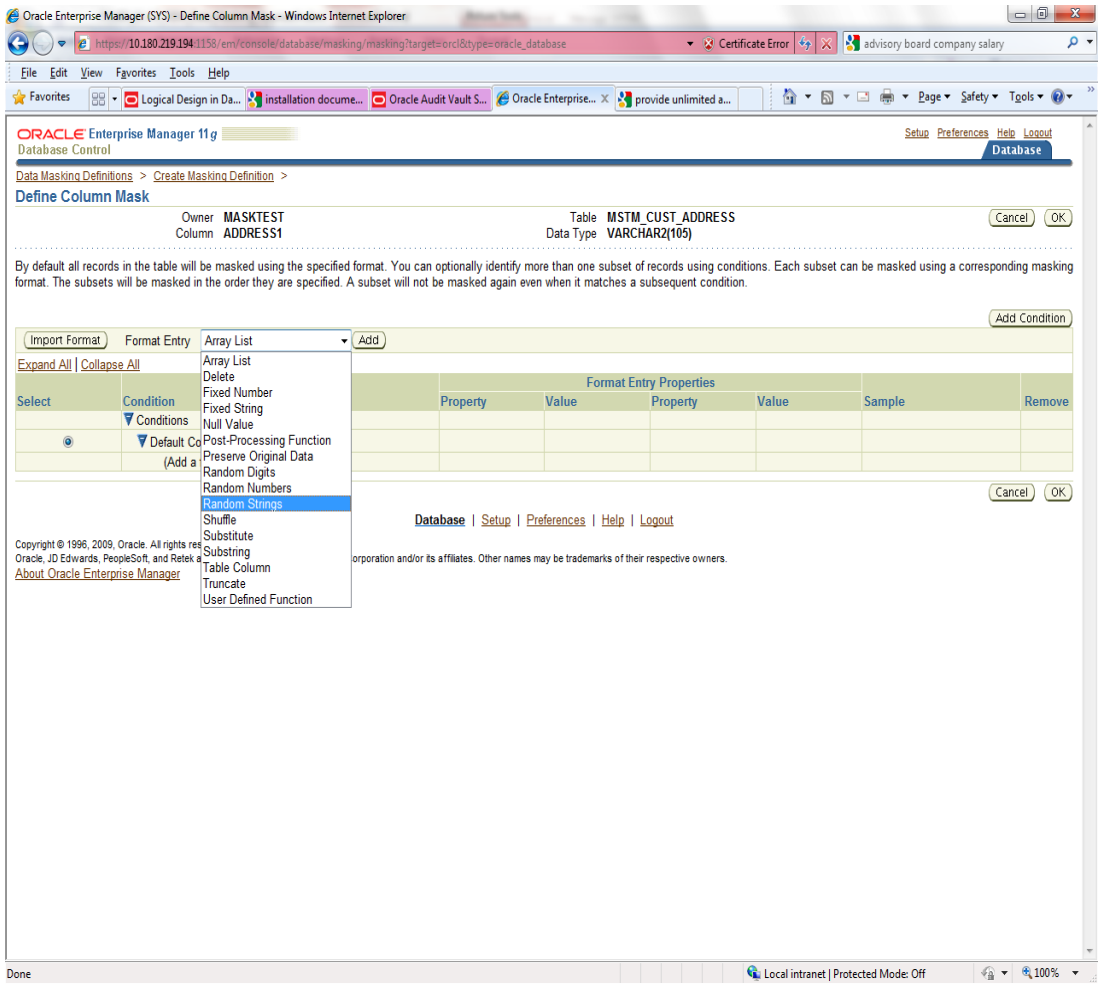
8. Click the first check box for this example and click ‘Add’.



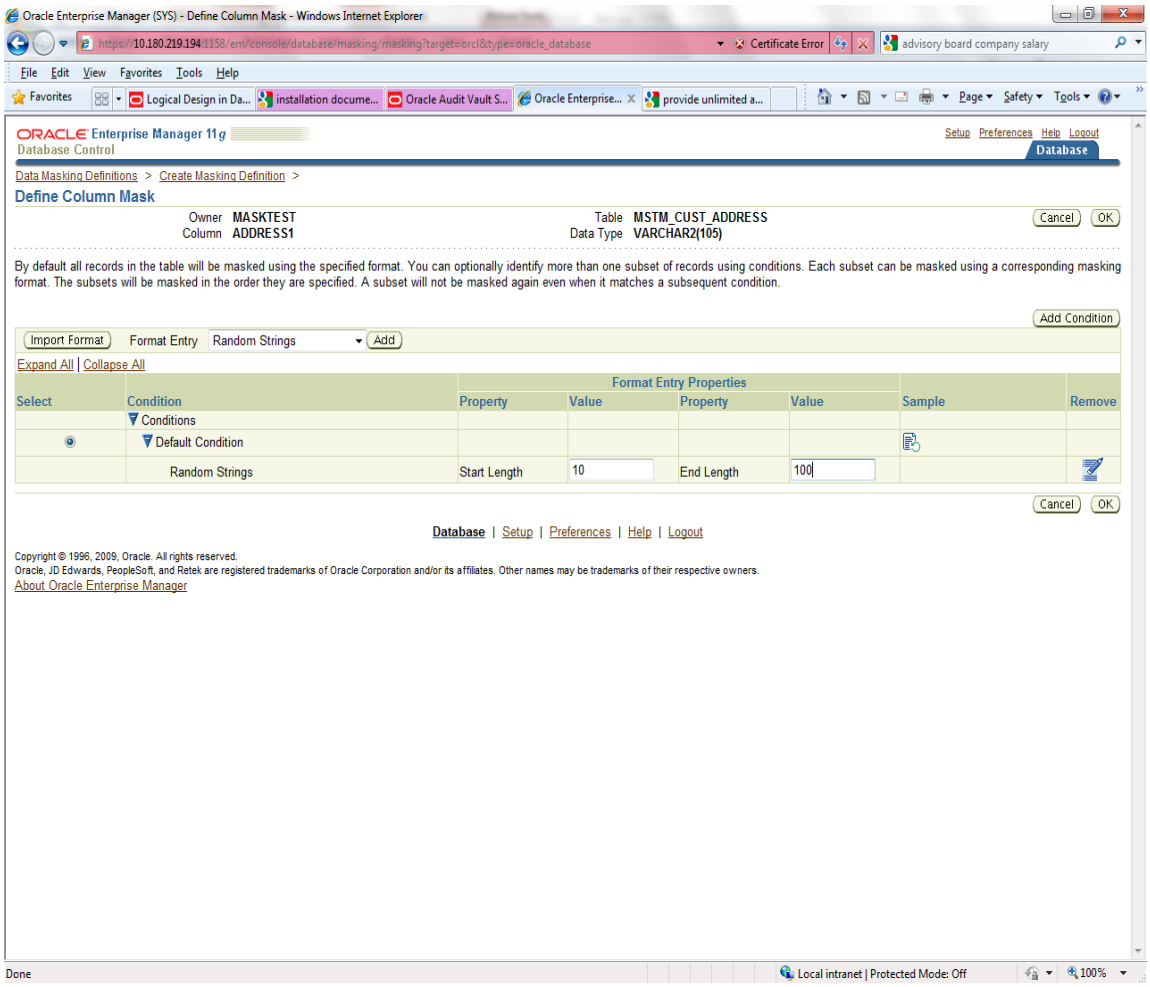
9. Now, we can see the column added in our Masking definition. The symbol below format label indicates that the Masking format has not been defined for this column. Click this icon which will take us to the section where we can define masking format for this column.



10. In this section define the Masking format for the column. In this example, select Random strings out of a total of 10 options available. Click ‘Add ’button which will take us to the next screen.



11. Select the Start and end length of our random strings which will replace the actual values of the address1 column we are masking. Click ‘OK’.


Oracle Enterprise Manager (SYS) - Define Column Mask - Windows Internet Explorer
https://10.180.219.194:1158/em/console/database/masking/masking?target=orcl&type=oracle_database
Certificate Error
advisory board company salary
File Edit View Favorites Tools Help
Favorites
Logical Design in Da...
installation docume...
Oracle Audit Vault S...
Oracle Enterprise...
provide unlimited a...
Page Safety Tools
ORACLE Enterprise Manager 11g
Database Control
Setup Preferences Help Logout
Database
Data Masking Definitions > Create Masking Definition >
Define Column Mask
Owner MASKTEST
Column ADDRESS1
Table MSTM_CUST_ADDRESS
Data Type VARCHAR2(105)
Cancel OK
By default all records in the table will be masked using the specified format. You can optionally identify more than one subset of records using conditions. Each subset can be masked using a corresponding masking format. The subsets will be masked in the order they are specified. A subset will not be masked again even when it matches a subsequent condition.
Add Condition
Import Format
Format Entry
Random Strings
Add
Expand All | Collapse All
Select
Condition
Format Entry Properties
Property
Value
Property
Value
Sample
Remove
Conditions
Default Condition
Random Strings
Start Length
10
End Length
100
Cancel OK
Database | Setup | Preferences | Help | Logout
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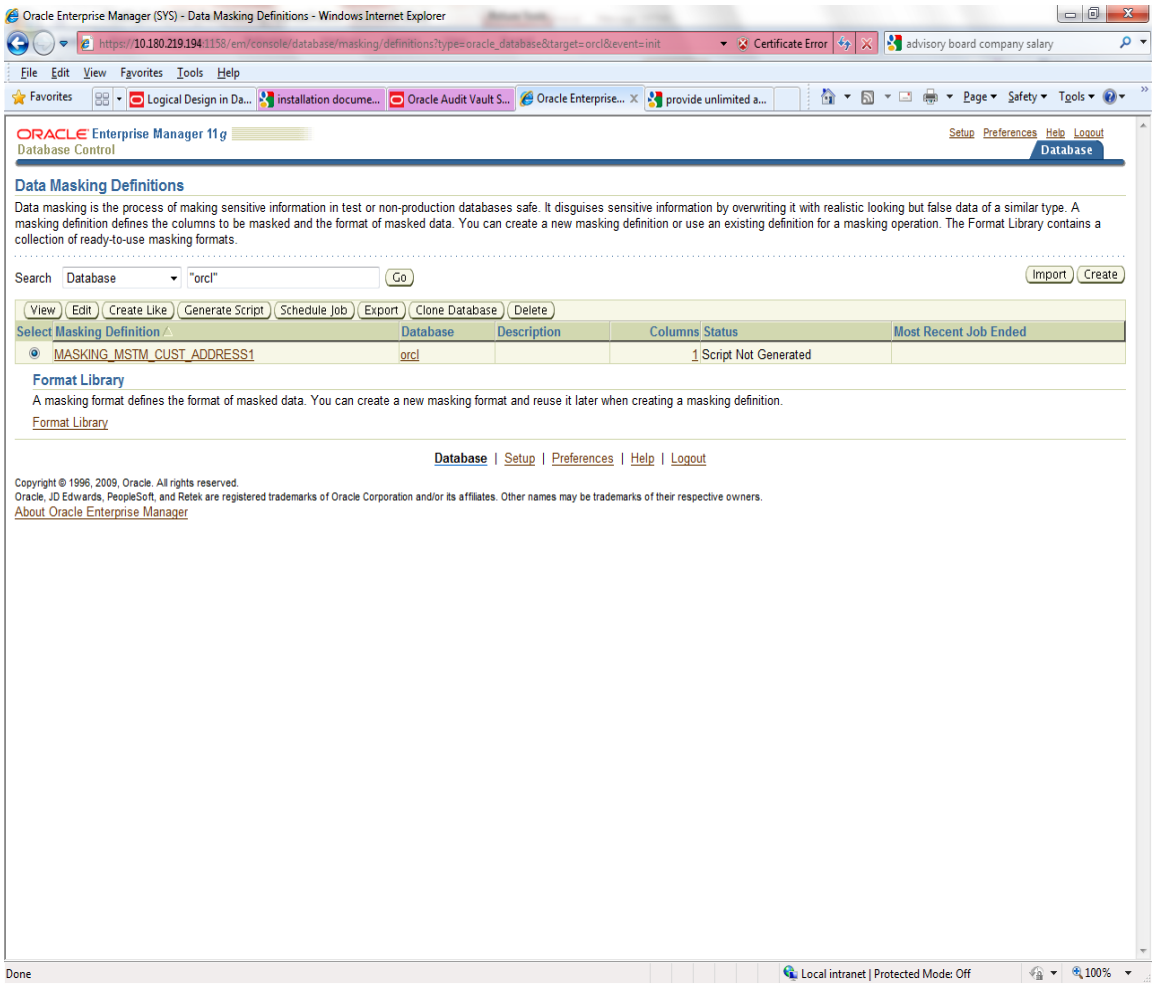
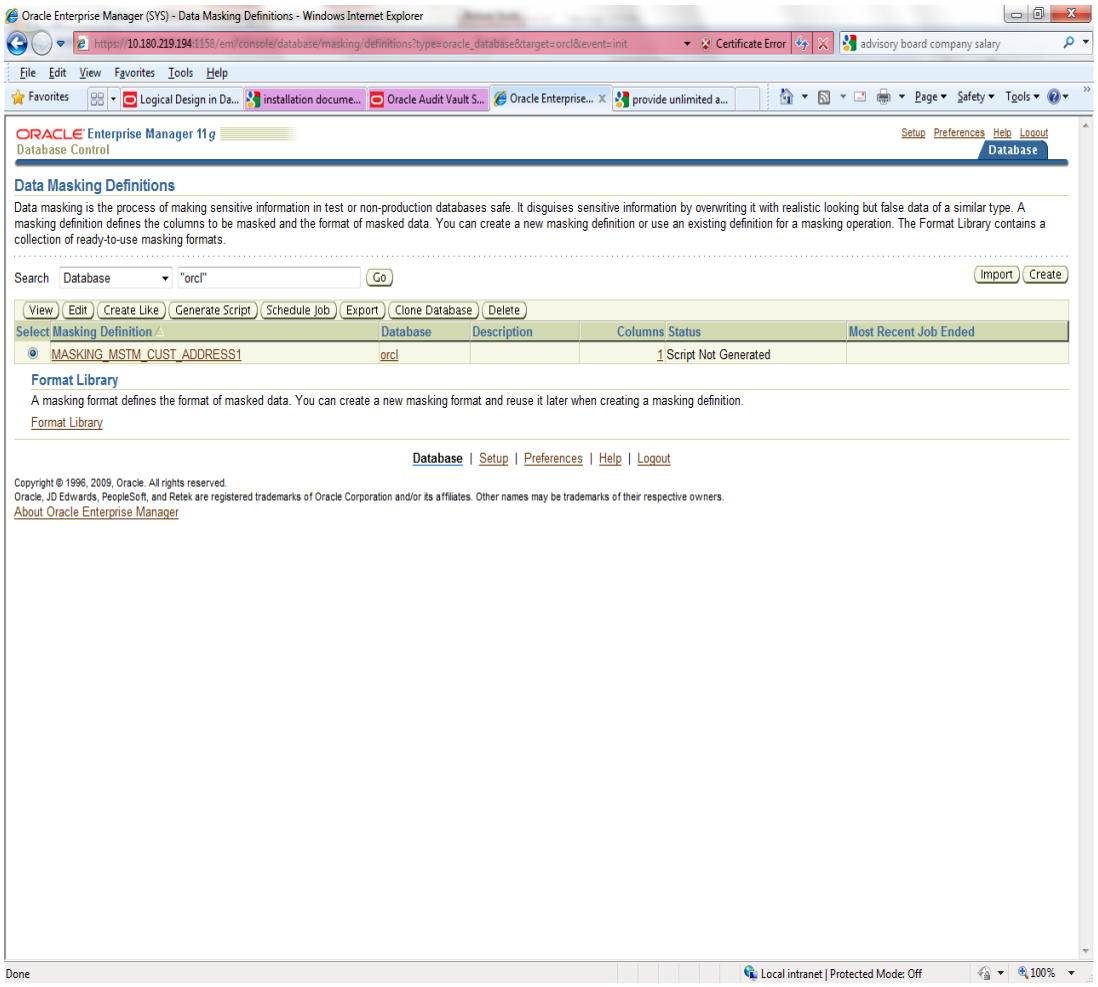
About Oracle Enterprise Manager
Done
Local intranet | Protected Mode: Off
100%

12. Now, since masking format has been defined for our column the icon under Format label has changed. The masking template which can be exported or reused.



3.3 Exporting and Importing a Data Masking Template

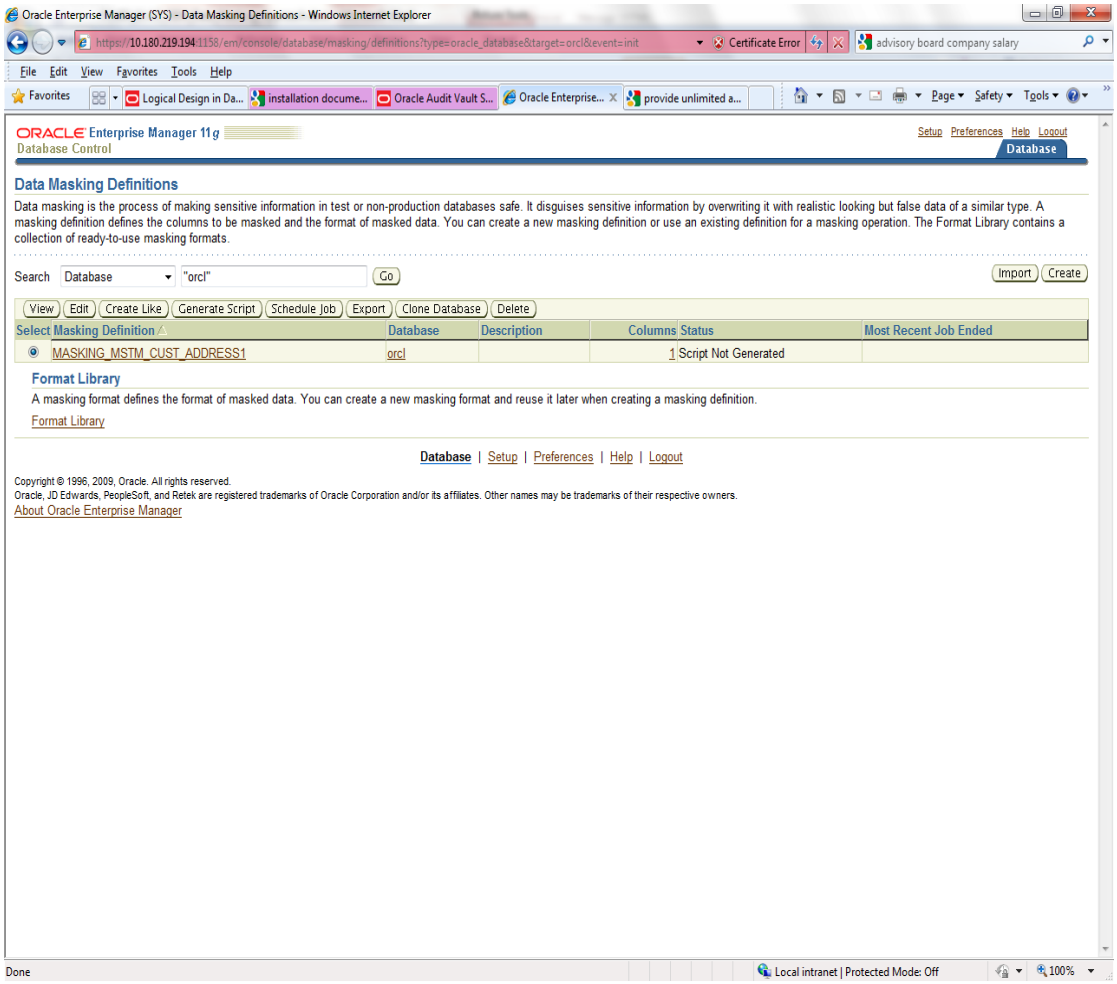
We can export our Masking definition by selecting the radio button corresponding to our definition and clicking export button. This will save our definition as an XML file which can be simply imported by clicking on the import button and browsing to the desired XML file. We need to ensure that the masking definition name in the XML should be different from all the existing masking definitions in OEM; else it will not allow us to import the XML.



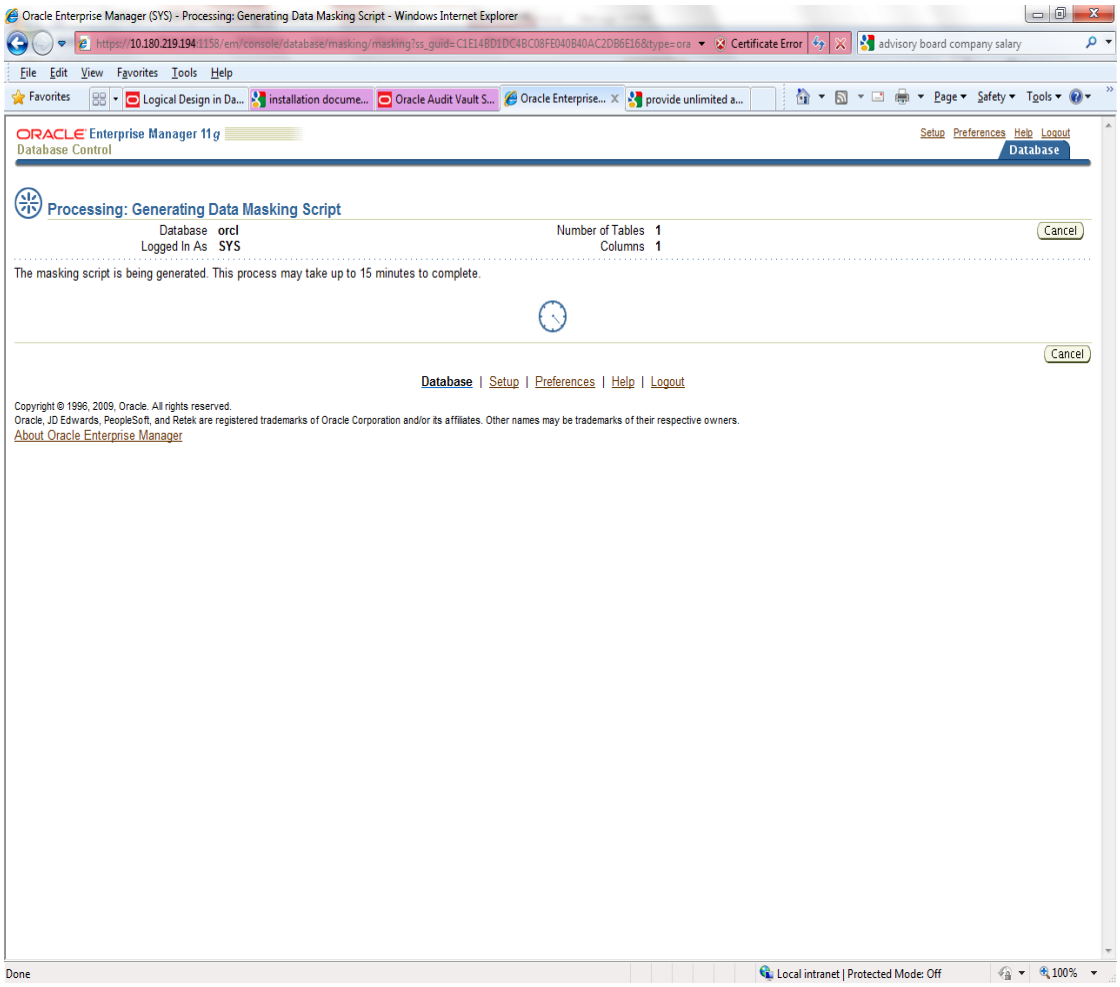
3.4 Masking Data

Following are the steps to mask data:

1. To use an existing masking template, we will come back to our masking definition screen. After we select the radio button corresponding to the Masking definition we want to apply we will click Generate Script button.



2. Masking process internally creates a new table with masked data and once done, it removes the old table and renames the newly created table to the same name as the old one. This process avoids time taken for updating large tables with millions of rows. To achieve the same, before starting the masking process OEM checks whether we have sufficient free space & quota in the tablespace where the table resides. This check is done in the screen which we are presented with next.


Oracle Enterprise Manager (SYS) - Processing: Generating Data Masking Script - Windows Internet Explorer
https://10.180.219.194:1158/em/console/database/masking/masking?ss_guid=C1E148D1DC4BC08FE040B40AC2DB6E16&type=ora
Certificate Error
advisory board company salary
File Edit View Favorites Tools Help
Favorites
Logical Design in Da...
installation docume...
Oracle Audit Vault S...
Oracle Enterprise...
provide unlimited a...
Page Safety Tools
ORACLE Enterprise Manager 11g
Database Control
Setup Preferences Help Logout
Database
Processing: Generating Data Masking Script
Database orcl
Logged In As SYS
Number of Tables 1
Columns 1
Cancel
The masking script is being generated. This process may take up to 15 minutes to complete.
Cancel
Database | Setup | Preferences | Help | Logout
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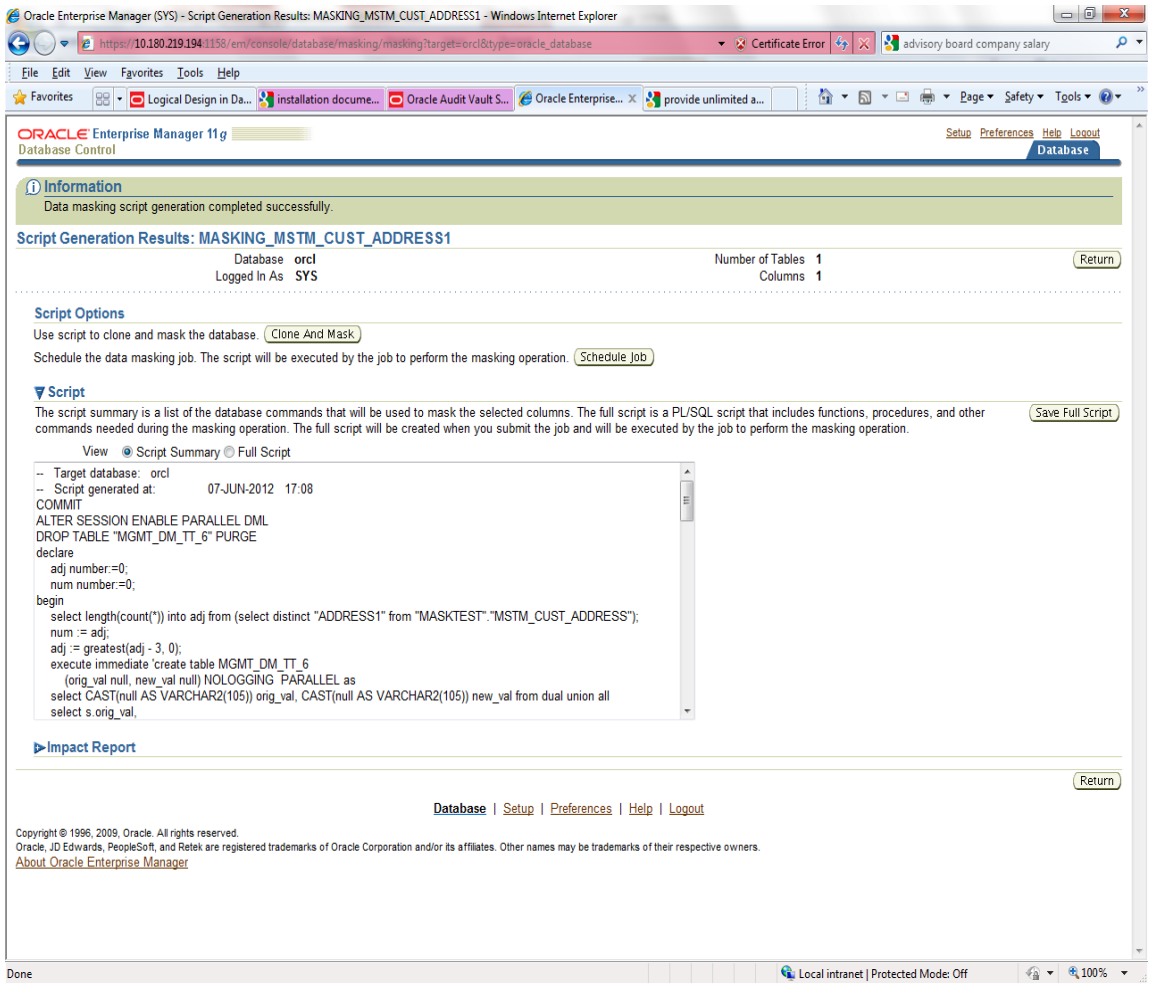
About Oracle Enterprise Manager
Done
Local intranet | Protected Mode: Off
100%


Oracle Enterprise Manager (SYS) - Script Generation Results: MASKING_MSTM_CUST_ADDRESS1 - Windows Internet Explorer
ORACLE Enterprise Manager 11g
Database Control
Setup Preferences Help Logout
Database
Information
Data masking script generation completed successfully.
Script Generation Results: MASKING_MSTM_CUST_ADDRESS1
Database orcl
Logged In As SYS
Number of Tables 1
Columns 1
Return
Script Options
Use script to clone and mask the database. Clone And Mask
Schedule the data masking job. The script will be executed by the job to perform the masking operation. Schedule Job
Script
The script summary is a list of the database commands that will be used to mask the selected columns. The full script is a PL/SQL script that includes functions, procedures, and other commands needed during the masking operation. The full script will be created when you submit the job and will be executed by the job to perform the masking operation.
Save Full Script
View Script Summary Full Script
-- Target database: orcl
-- Script generated at: 07-JUN-2012 17:08
COMMIT
ALTER SESSION ENABLE PARALLEL DML
DROP TABLE "MGMT_DM_TT_6" PURGE
declare
adj number:=0;
num number:=0;
begin
select length(count(*)) into adj from (select distinct "ADDRESS1" from "MASKTEST"."MSTM_CUST_ADDRESS");
num := adj;
adj := greatest(adj - 3, 0);
execute immediate 'create table MGMT_DM_TT_6
(orig_val null, new_val null) NOLOGGING PARALLEL as
select CAST(null AS VARCHAR2(105)) orig_val, CAST(null AS VARCHAR2(105)) new_val from dual union all
select s.orig_val,
Impact Report
Return
Database | Setup | Preferences | Help | Logout
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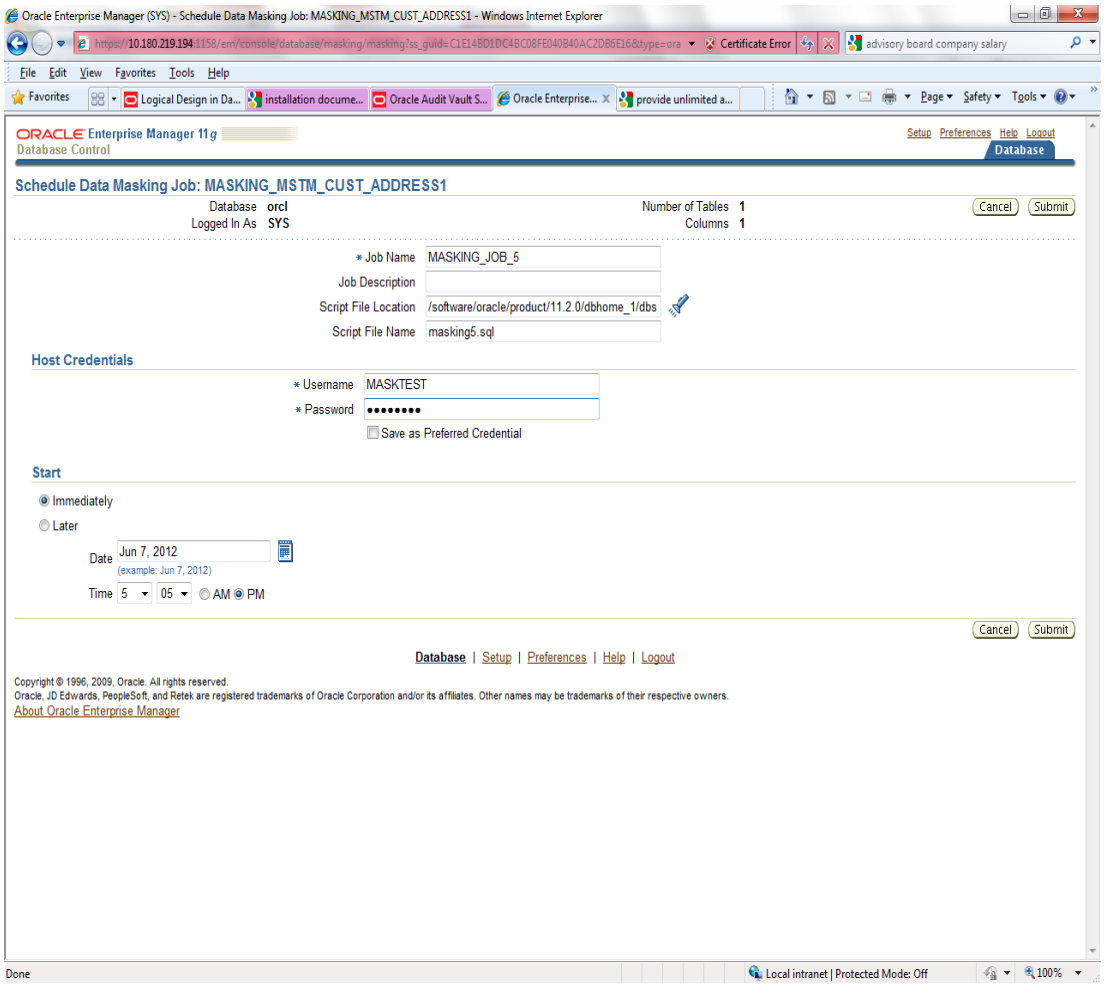
About Oracle Enterprise Manager
Done
Local intranet | Protected Mode: Off
100%


Oracle Enterprise Manager (SYS) - Schedule Data Masking Job: MASKING_MSTM_CUST_ADDRESS1 - Windows Internet Explorer
ORACLE Enterprise Manager 11g
Database Control
Setup Preferences Help Logout
Database
Schedule Data Masking Job: MASKING_MSTM_CUST_ADDRESS1
Database orcl
Logged In As SYS
Number of Tables 1
Columns 1
Cancel
Submit
* Job Name MASKING_JOB_5
Job Description
Script File Location /software/oracle/product/11.2.0/dbhome_1/dbs
Script File Name masking5.sql
Host Credentials
* Username MASKTEST
* Password ••••••••
Save as Preferred Credential
Start
Immediately
Later
Date Jun 7, 2012
(example: Jun 7, 2012)
Time 5 05 AM PM
Cancel
Submit
Database | Setup | Preferences | Help | Logout
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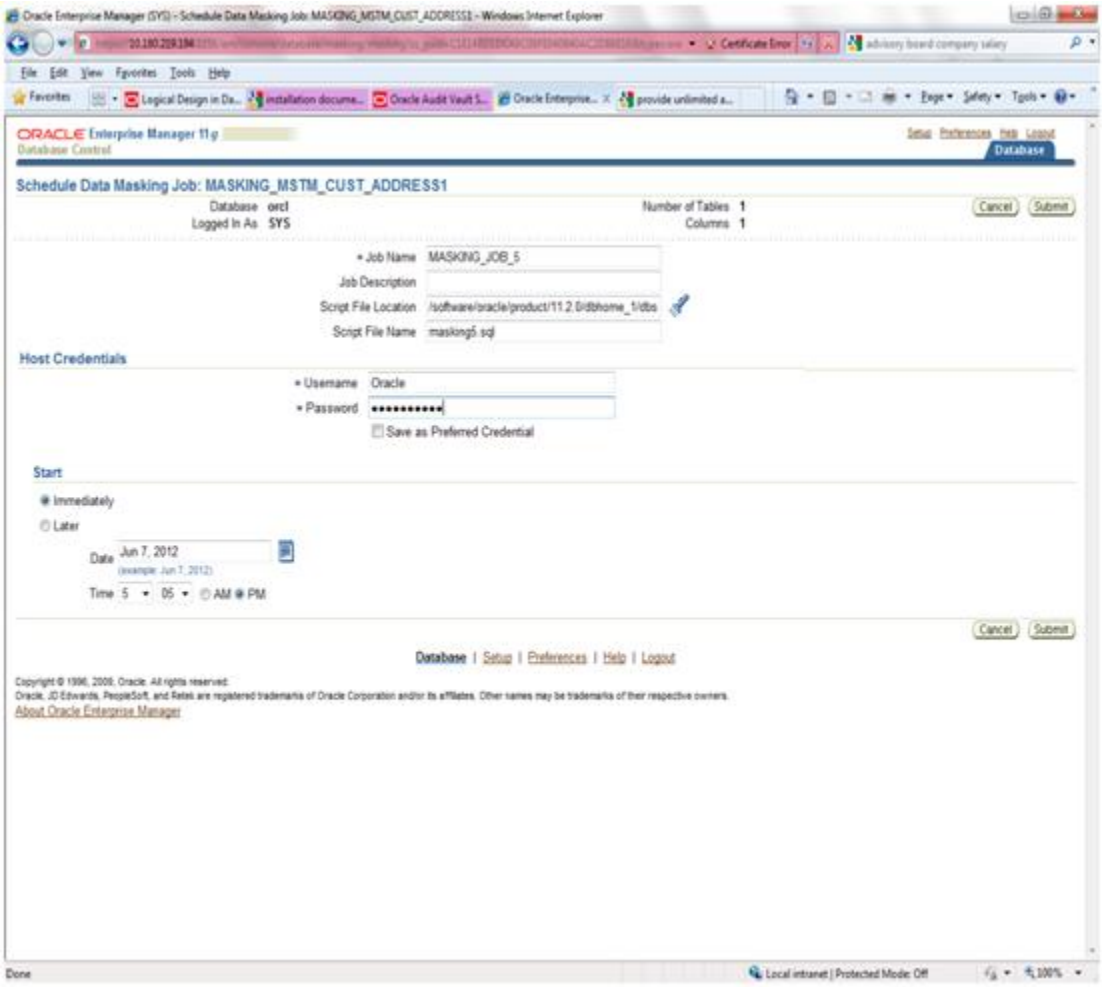
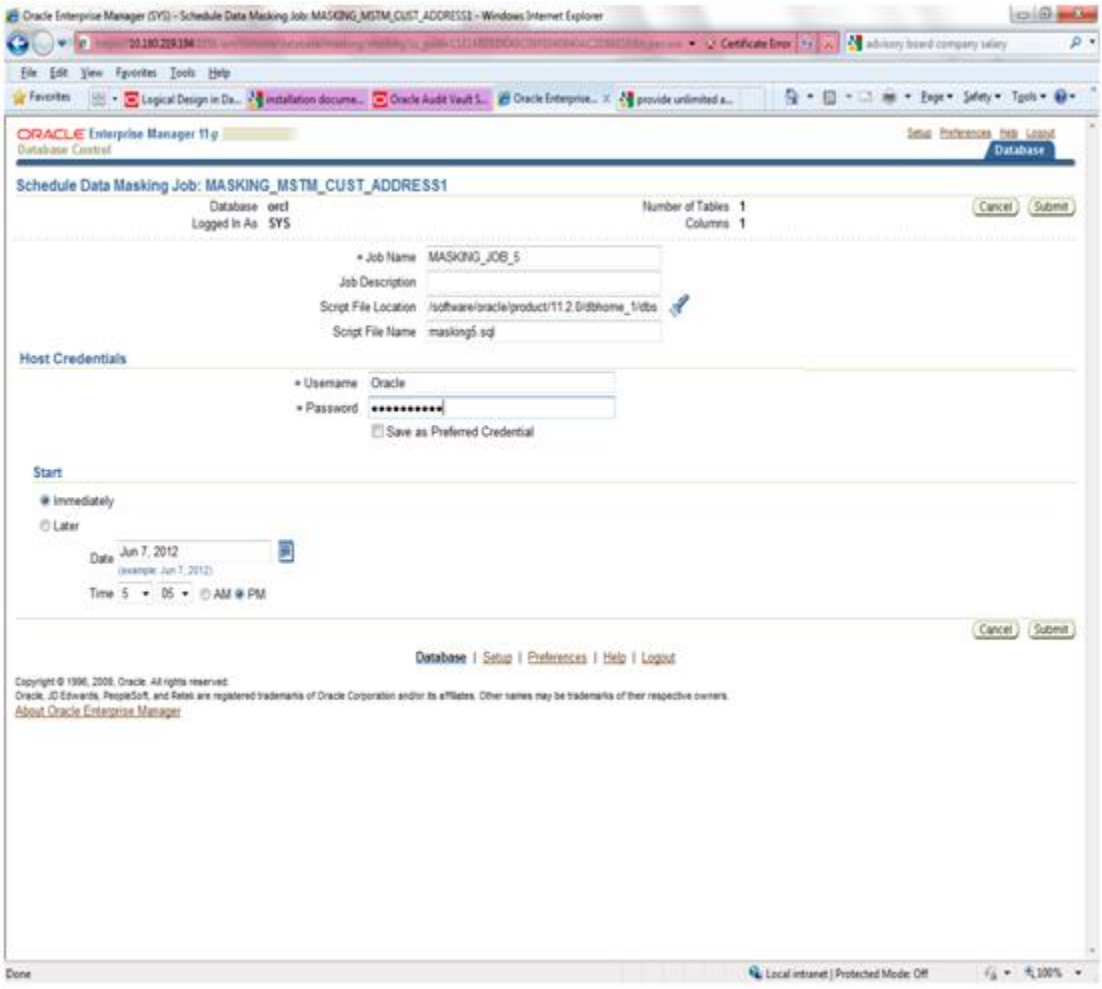
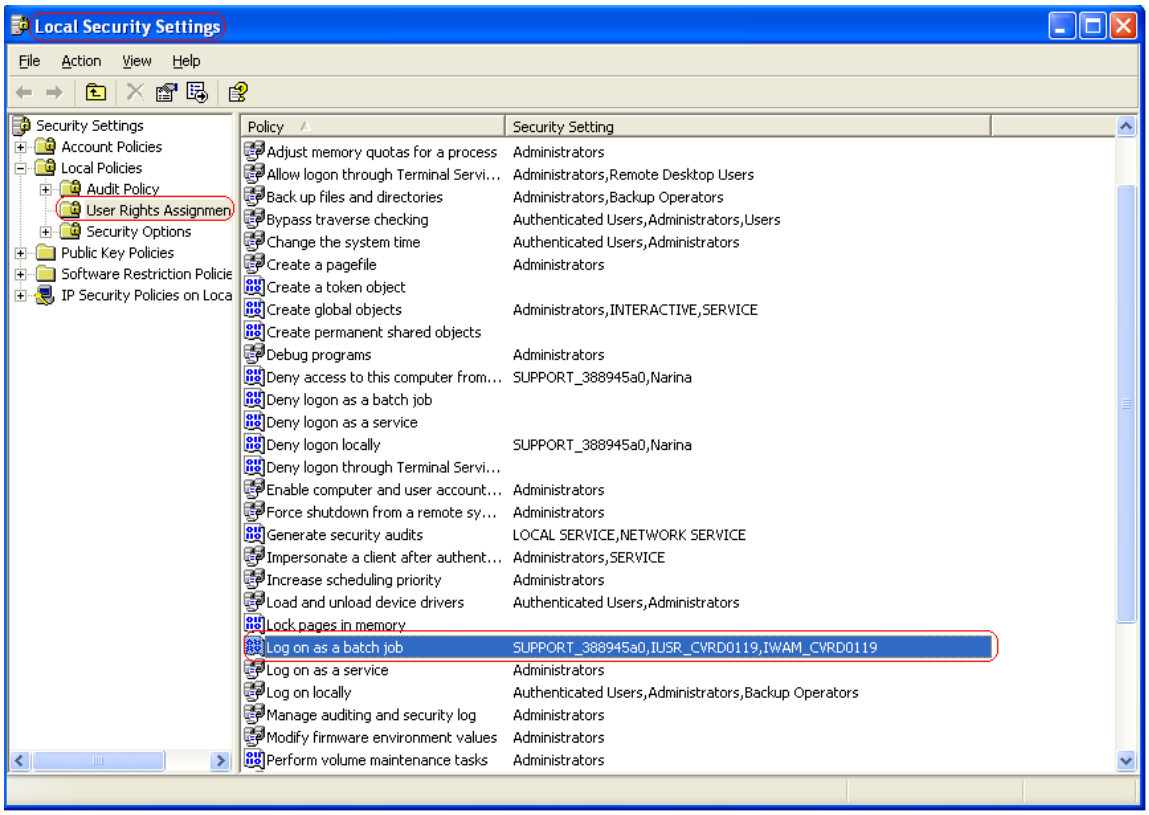
About Oracle Enterprise Manager
Done
Local intranet | Protected Mode: Off
100%



Since Masking is done via a Masking Job submitted by OEM, we need to provide Host credentials for the same to happen. In our case OEM is installed on Windows XP, so we would be giving host credentials for that box. Also, we can schedule the job as per our convenient time, in this case Immediately is selected. If your OEM is installed on a Windows box, you need to check the following point before clicking on Next.


Oracle Enterprise Manager (SYS) - Schedule Data Masking Job: MASKING_MSTM_CUST_ADDRESS1 - Windows Internet Explorer
ORACLE Enterprise Manager 11g
Database Control
Schedule Data Masking Job: MASKING_MSTM_CUST_ADDRESS1
Database orcl
Logged In As SYS
Number of Tables 1
Columns 1
Cancel
Submit
* Job Name MASKING_JOB_5
Job Description
Script File Location /software/oracle/product/11.2.0/dbhome_1/dbs
Script File Name masking5.sql
Host Credentials
* Username Oracle
* Password
Save as Preferred Credential
Start
Immediately
Later
Date Jun 7, 2012
Time 5 05 AM PM
Database | Setup | Preferences | Help | Logout
About Oracle Enterprise Manager
Done

In windows we need to ensure if our NT login account has privileges to run a batch job. For this we will go to Control Panel -> Administrative tools -> Local security policies. Here we will add our NT login user account for “Logon as a batch job” policy as shown.



In the next screen we are presented with Script summary screen, which shows a brief PL/SQL snippet of the masking process. Here we also have an option to save it as a .sql file on our machine.

On clicking Submit we are notified that our Job has been successfully submitted. To know the status of the job we need to click on our masking definition in the following screen.

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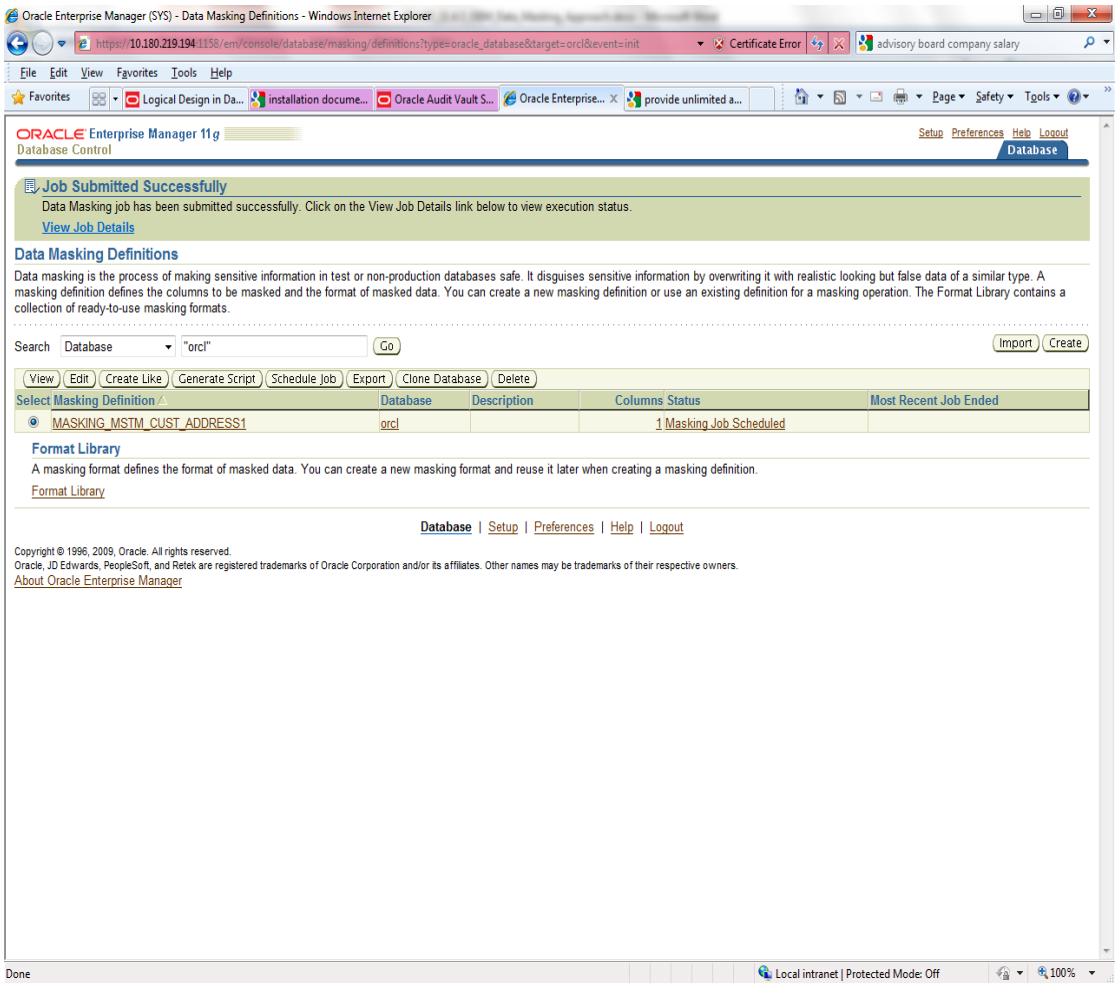
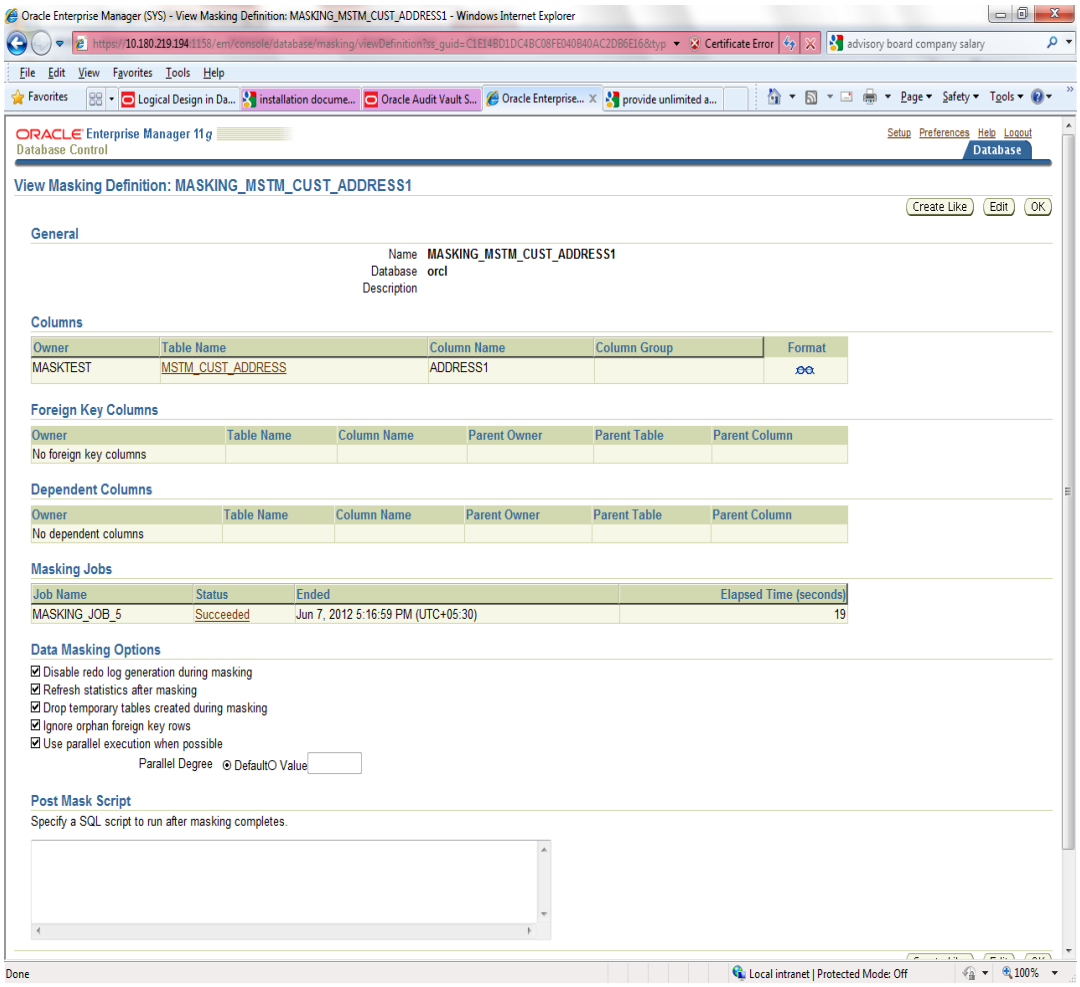


Below screen shows masking job status is succeeded and it even tells us the elapsed time for the same.


Oracle Enterprise Manager (SYS) - View Masking Definition: MASKING_MSTM_CUST_ADDRESS1 - Windows Internet Explorer
ORACLE Enterprise Manager 11g
Database Control
Setup Preferences Help Logout
Database
View Masking Definition: MASKING_MSTM_CUST_ADDRESS1
Create Like Edit OK
General
Name MASKING_MSTM_CUST_ADDRESS1
Database orcl
Description
Columns
Owner | Table Name | Column Name | Column Group | Format
MASKTEST | MSTM_CUST_ADDRESS | ADDRESS1
Foreign Key Columns
Owner | Table Name | Column Name | Parent Owner | Parent Table | Parent Column
No foreign key columns
Dependent Columns
Owner | Table Name | Column Name | Parent Owner | Parent Table | Parent Column
No dependent columns
Masking Jobs
Job Name | Status | Ended | Elapsed Time (seconds)
MASKING_JOB_5 | Succeeded | Jun 7, 2012 5:16:59 PM (UTC+05:30) | 19
Data Masking Options
Disable redo log generation during masking
Refresh statistics after masking
Drop temporary tables created during masking
Ignore orphan foreign key rows
Use parallel execution when possible
Parallel Degree Default Value
Post Mask Script
Specify a SQL script to run after masking completes.
Done
Local intranet | Protected Mode: Off
100%

3.5 Application Use Case

A standard data masking script was available as a SQL script and the script has been used as a baseline to create a Data Masking Template for FLEXCUBE. The FLEXCUBE Data masking template can be effectively enhanced to cover any additional tables that are not covered in the template. The default template covers the following entities that contain confidential and identifiable data.

This data masking template can be found as part of the FLEXCUBE release under ADAPTERS\OracleEM\Data-Masking.

Entity	**Table and Column**
Bills & Collections Contract Data	BCTB_CONTRACT_PARTIES. PARTY_NAME
	BCTB_CONTRACT_PARTIES. PARTY_ADDR1
	BCTB_CONTRACT_PARTIES. PARTY_ADDR2
	BCTB_CONTRACT_PARTIES. PARTY_ADDR3
	BCTB_CONTRACT_PARTIES. PARTY_ADDR4
	BCTB_CONTRACT_INSURANCE. INSURANCE_COMP_NAME
Broker Static Data	BRTM_BRMASTER. NAME
All Contract Advice	CSTB_CONTRACT_EVENT_ADVICE. ADDRESS_LINE1
	CSTB_CONTRACT_EVENT_ADVICE. ADDRESS_LINE2
	CSTB_CONTRACT_EVENT_ADVICE. ADDRESS_LINE3
	CSTB_CONTRACT_EVENT_ADVICE. ADDRESS_LINE4
	CSTB_CONTRACT_EVENT_ADVICE. PARTY NAME

GL Data	GLTM_GLMASTER. GL_DESC
Letters of Credit Contract Data	LCTB_CONTRACT_MASTER. CUST_NAME
	LCTB_PARTIES. CUST_ADDRESS_LIN1
	LCTB_PARTIES. CUST_ADDRESS_LIN2
	LCTB_PARTIES. CUST_ADDRESS_LIN3
	LCTB_PARTIES. CUST_ADDRESS_LIN4
	LCTB_PARTIES. CUST_NAME
	LCTB_TRANSFER_PARTIES. ADDRESS1
	LCTB_TRANSFER_PARTIES. ADDRESS2
	LCTB_TRANSFER_PARTIES. ADDRESS3
	LCTB_TRANSFER_PARTIES. ADDRESS4
	LCTB_TRANSFER_PARTIES. PARTY_NAME
Messaging Contract and Maintenance Data	MSTB_ARCHIVE_OUT. ADDRESS1
	MSTB_ARCHIVE_OUT. ADDRESS2
	MSTB_ARCHIVE_OUT. ADDRESS3
	MSTB_ARCHIVE_OUT. ADDRESS4
	MSTB_ARCHIVE_OUT. NAME
	MSTB_DLY_MSG_OUT. ADDRESS1
	MSTB_DLY_MSG_OUT. ADDRESS2
	MSTB_DLY_MSG_OUT. ADDRESS3

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	MSTB_DLY_MSG_OUT. ADDRESS4
	MSTB_DLY_MSG_OUT. NAME
	MSTB_DLY_MSG_OUT. NAME2
	MSTM_CUST_ADDRESS.ADDRESS1
	MSTM_CUST_ADDRESS.ADDRESS2
	MSTM_CUST_ADDRESS.ADDRESS3
	MSTM_CUST_ADDRESS.ADDRESS4
	MSTM_CUST_ADDRESS.NAME
Authorized Users	SMTB_USER. USER_NAME
Customer and Accounts Data	STTB_ACCOUNT. CUST_NAME1
	STTM_CUSTOMER. ADDRESS_LINE1
	STTM_CUSTOMER. ADDRESS_LINE2
	STTM_CUSTOMER. ADDRESS_LINE3
	STTM_CUSTOMER. ADDRESS_LINE4
	STTM_CUSTOMER. CUSTOMER_NAME1
	STTM_CUSTOMER. FULL_NAME
	STTM_CUSTOMER. SHORT_NAME
	STTM_CUSTOMER. SHORT_NAME2
	STTM_CUST_ACCOUNT. AC_DESC
	STTM_CUST_ACCOUNT. ADDRESS1
	STTM_CUST_ACCOUNT. ADDRESS2
	STTM_CUST_ACCOUNT. ADDRESS3
	STTM_CUST_ACCOUNT. ADDRESS4
	STTM_CUST_CORPORATE. CORPORATE_NAME

	STTM_CUST_DOMESTIC.SPOUSE_NAME
	STTM_CUST_PERSONAL. FIRST_NAME
	STTM_CUST_PERSONAL. LAST_NAME
	STTM_CUST_PERSONAL. MIDDLE_NAME
	STTM_CUST_PERSONAL_JOINT. FIRST_NAME
	STTM_CUST_PERSONAL_JOINT. LAST_NAME
	STTM_CUST_PERSONAL_JOINT. MIDDLE_NAME
	STTM_REPLICATE_ACCOUNT. AC_DESC
	STTM_REPLICATE_ACCOUNT. ADDRESS1
	STTM_REPLICATE_ACCOUNT. ADDRESS2
	STTM_REPLICATE_ACCOUNT. ADDRESS3
	STTM_REPLICATE_ACCOUNT. ADDRESS3

3.6 References

http://docs.oracle.com/cd/B16240_01/doc/em.102/b31949/database_management.htm#DAFGJEIF

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[April] [2014]
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