



Oracle Enterprise Manager  
Oracle Database and Application Testing

**Data Masking Lab**

Session S318966

ORACLE®

## Oracle Enterprise Manager 11g

### Data Masking Hands-on Lab

#### *Introduction to Enterprise Manager 11g*

[Oracle Enterprise Manager 11g](#) is the centerpiece of Oracle's integrated IT management strategy, which rejects the notion of management as an after-thought. At Oracle, we design manageability into each product from the start, enabling Oracle Enterprise Manager to then serve as the integrator of manageability across the entire stack encompassing Oracle and non-Oracle technologies. Fueled by this unique vision, Oracle Enterprise Manager 11g has introduced *business-driven IT management* to help IT deliver greater business value through three highly differentiated capabilities:

- [Business-driven application management](#), which combines industry-leading capabilities in real user experience management, business transaction management and business service management to improve application users' productivity while enhancing business transaction availability
- [Integrated application-to-disk management](#), which provides deep management across the entire Oracle stack to reduce IT management complexity and eliminate disparate point tools
- [Integrated systems management and support](#), which utilizes industry-first technology bring support services into the IT management console; enabling proactive IT administration, increased application and system availability, and improved customer satisfaction

#### *Introduction to Enterprise Manager 11g Data Masking Pack*

[Oracle Data Masking pack for Enterprise Manager](#), part of Oracle's comprehensive portfolio of database security solutions, helps organizations comply with data privacy and protection mandates such as Sarbanes-Oxley, Payment Card Industry (PCI) Data Security Standard (DSS), Health Insurance Portability and Accountability Act (HIPAA), as well as numerous laws that restrict the use of actual customer data. With Oracle Data Masking, sensitive information such as credit card or social security numbers can be replaced with realistic values, allowing production data to be safely used for development, testing, or sharing with out-source or off-shore partners for other non-production purposes.

- **Comprehensive and Extensible Mask Library** --Oracle Data Masking Pack provides a centralized library of out-of-the-box mask formats for common types of sensitive data, such as credit card numbers, phone numbers, national identifiers..
- **Sensitive Data Discovery and Application Integrity** -- Using Oracle Data Masking Pack's search capabilities, information security administrators can quickly search the database to identify sensitive data. In some applications, the same sensitive data is maintained in multiple tables related by referential (primary key-foreign key) relationships. Oracle Data Masking Pack discovers these relationships and masks all related data elements automatically while preserving referential relationships.
- **Sophisticated Masking Techniques** -- Oracle Data Masking Pack provides a variety of sophisticated masking techniques to meet application requirements while ensuring data privacy: **Condition-based** masking which makes it possible to apply different mask formats to the same data set depending on the rows that match the conditions, **Compound** masking which ensures that a set of related columns is masked as a group to ensure that the masked data across the related columns retain the same relationship, and **Deterministic** masking which ensures repeatable masked values after a mask run. Enterprise may use this technique to ensure that certain values get masked to the same value across all databases.

- **Secure High Performance Mask Execution** -- Unlike traditional masking processes that are typically slow, Oracle Data Masking Pack uses highly efficient parallelized bulk operations to replace the original sensitive data with masked data. Because the entire data masking process is done in place, enterprises can be assured of a greater sense of security knowing that the sensitive data would never leave the database during the masking process.
- **Support for Heterogeneous Databases:** Oracle Data Masking Pack can support masking of data in heterogeneous databases, such as IBM DB2 and Microsoft SQLServer, through the use of Oracle Database Gateways.

**This lab will demonstrate:**

- Creating and exporting data masking formats
- Masking sensitive application data
- Using compound masking, condition-based masking and user defined masking
- **(OPTIONAL)**Deterministic masking

Please feel free to seek assistance from the instructor or Oracle Demo staff at any point in time.

Before we start taking you through the demonstration, please note the following:

- You will be given a virtual machine address to use for this lab. For ease of reference, you may want to write this below:

Virtual Machine Address: \_\_\_\_\_

- You will connect to that system using VNC. VNC password is g0Oracle12#
- Operating System Accounts: oracle/g0Oracle12# and root/g0Oracle12#
- Database(db04 and db05) Accounts: system/oracle1
- Grid Control Accounts: sysman/oracle1

**Additional information can be found at:**

**Demo Booths located at {Location}**

**Additional Sessions:**

**Moscone South: Enterprise Manager # XXXX**

**Moscone West: Enterprise Manager # XXXX**

For additional information, visit:

Oracle Enterprise Manager

[http://www.oracle.com/enterprise\\_manager/index.html](http://www.oracle.com/enterprise_manager/index.html)

## Creating and exporting data masking formats

1. Start Firefox and login to Grid Control as **sysman/oracle1** at the URL <http://dbsecurity.oracle.com:4889/em>.
2. Navigate to **TARGETS->DATABASES-> Data Masking Format Library**

The screenshot shows the Oracle Enterprise Manager interface. The 'Targets' tab is active, and the 'Databases' section is displayed. A table lists various database targets with columns for Name, Status, Alerts, Policy Violations, Compliance Score, Version, Sessions: CPU, Sessions: IO, Sessions: Other, and Instance CPU. The 'Data Masking Format Library' link is highlighted in the 'Related Links' section.

Select	Name	Status	Alerts	Policy Violations	Compliance Score (%)	Version	Sessions: CPU	Sessions: IO	Sessions: Other	Instance CPU (%)
<input checked="" type="radio"/>	av.oracle.com	↓	1	25	3	99	10.2.0.3.0			
<input type="radio"/>	db01.oracle.com	↓	5	23	6	98	11.1.0.7.0			
<input type="radio"/>	db02.oracle.com	↓	5	23	2	98	11.1.0.7.0			
<input type="radio"/>	db03.oracle.com	↓	1	25	3	99	10.2.0.4.0			
<input type="radio"/>	db04.oracle.com	↑	0	0	0	-	11.2.0.1.0	-	✓	✓
<input type="radio"/>	db06.oracle.com	↓	0	0	0	-	11.2.0.1.0			
<input type="radio"/>	emrep.oracle.com	↑	1	4	15	69	5	01	01	0

3. The format library contains a collection of ready-to-use masking formats. The library consists of format routines that you can use for masking. A masking format can either be one that you create, or one from the list of Oracle-supplied default masking formats.

The screenshot shows the 'Data Masking Format Library' page. It contains a search bar, a table of available masking formats, and buttons for 'Export', 'Import', and 'Create'. The 'Create' button is highlighted.

Select	Format	Data Type	Sample	Description	Owner
<input checked="" type="radio"/>	Anglo American First Name	Source Type	Not Generated	Anglo American First Name	SYSMAN
<input type="radio"/>	Anglo American Last Name	Source Type	Not Generated	Anglo American Last Name	SYSMAN
<input type="radio"/>	Bay Area Phone Number	Character	(650) 555-4301	Bay Area Phone Number	SYSMAN
<input type="radio"/>	Social Security Number	Character	519801035	Social Security Number	SYSMAN
<input type="radio"/>	Social Security String	Character	565-76-3244	Social Security String	SYSMAN
<input type="radio"/>	Expiration Date	Date	2014-03-31 18:04:46.0	Expiration Date	SYSMAN
<input type="radio"/>	New Hampshire Phone Number	Character	(603) 863-8404	New Hampshire Phone Number	SYSMAN
<input type="radio"/>	Visa / Master Card Number	Character	4985-2247-7415-5672	Visa / Master Card Number	SYSMAN
<input type="radio"/>	Credit Card Number With Checksum	Character	Not Generated	Dummy credit card numbers based on original type with checksum	SYSMAN
<input type="radio"/>	American Express Credit Card Number	Character	3773463270140352	~10 billion unique American Express credit card numbers	SYSMAN
<input type="radio"/>	Discover Card Credit Card Number	Character	6011707805960238	~10 billion unique Discover Card credit card numbers	SYSMAN
<input type="radio"/>	MasterCard Credit Card Number	Character	5441195343423350	~10 billion unique MasterCard credit card numbers	SYSMAN
<input type="radio"/>	Visa Credit Card Number	Character	4716803976365199	~10 billion unique Visa credit card numbers	SYSMAN
<input type="radio"/>	Generic Credit Card Number	Character	5170247925043069	~10 billion unique generic credit card numbers	SYSMAN
<input type="radio"/>	Generic Credit Card Number Formatted	Character	3453-1446-0073-5858	~10 billion unique generic credit card numbers	SYSMAN

4. Click on the Create button to begin creating a custom Masking Format.

This is a close-up view of the 'Data Masking Format Library' page, focusing on the search bar and the 'Export', 'Import', and 'Create' buttons. The 'Create' button is highlighted with a red box.

- From the Create Format Dialog, we will configure our Masking Format

**Name:** Colors  
**Description:** Colors of a rainbow

- Type 'Colors' in the Name field and 'Colors of a rainbow' in the Description Field. Before adding a field type, view the number of different options which you can mask data. Choose Array List and click the Go button.

- Define the List of Values for the Colors Format and click on the OK button when finished. The values include:
  - Red, Orange, Yellow, Green, Blue, Indigo, Violet

- You can see samples of the masked data in the Sample Masked Data Section. Click on the Refresh button to see a random sample from the defined Array List. This screen allows you to edit any values of the Masking Format. Click the OK button when you are satisfied with the entries.

**Edit Format: Colors**

\* Name: Colors  
Description: Colors of a rainbow

**Format Entries**  
Define masking format by adding one or more format entries of different types.

Add: Array List [Go]

Type	Description	Edit	Remove
Array List	List of Values: Blue,Green,Indigo,Orange,Red,Violet,Yellow		

Post Processing Function:

The function can either be a standalone function (Example: scott.masking\_func) or a function specified inside of a package (Example: scott.masking\_pkg.checksum).

**Sample Masked Data**  
Samples are generated using defined format. Use Refresh to re-generate samples.

- Red
- Orange
- Blue
- Green
- Indigo

9. Return to the Format Library screen and click on the Export button to begin the process of exporting the entire library.

Data Masking Definitions >

**Format Library**

The Format Library contains a collection of ready-to-use masking formats which can be used when creating a masking definition.

Search: Format  [Go]

10. As the dialog states, exporting a format mask can be saved and re-used in the future for masking. This mask can be shared and/or imported into another Format Library in another Enterprise Manager environment.

**Export Format Library**

A saved format library can be reused in the future for masking. It allows sharing of masking formats with other Enterprise Manager environments that use a different repository.

11. Save the file to the default location on the Desktop.

Opening masking\_fmt\_lib\_200905122009.xml

You have chosen to open

**masking\_fmt\_lib\_200905122009.xml**  
which is a: XML document  
from: http://dbsecurity.oracle.com:4889

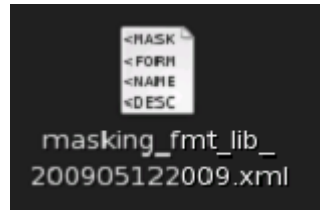
**What should Firefox do with this file?**

Open with Firefox Web Browser (default)

Save File

Do this automatically for files like this from now on.

12. Navigate to the Desktop and double-click on the newly created XML document. Your filename will be different than what has been captured here.



- If you would like to, you can review the XML document and the information that has been captured in the document.

```

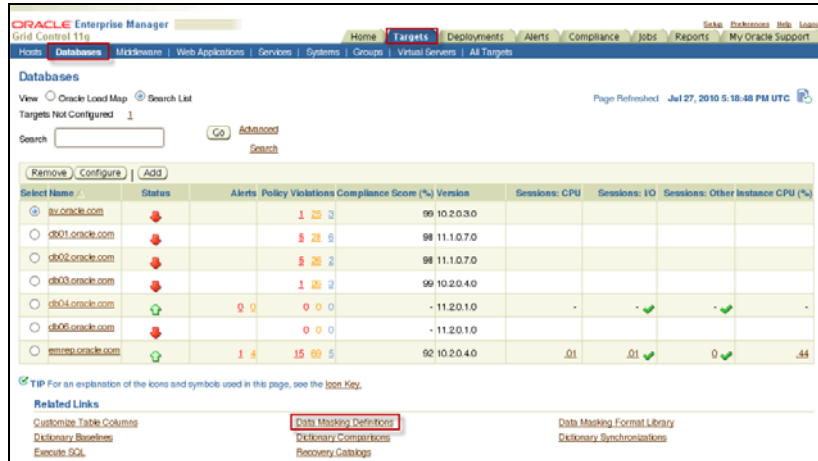
--<MASKING_FORMAT_LIBRARY META_VER="1.0" PROD_VER="10.2.0.5.0">
--<FORMAT>
  <NAME>American Express Credit Card Number</NAME>
  <DESCRIPTION>
    ~ 10 billion unique American Express credit card numbers
  </DESCRIPTION>
  <RULE_ORDER>1</RULE_ORDER>
  <RULE_CONDITION> 1 = 1 </RULE_CONDITION>
--<FORMAT_ENTRY>
  <ORDER>1</ORDER>
  <TYPE>RD</TYPE>
  <START>10</START>
  <END>10</END>
--<FORMAT_ENTRY>
  <ORDER>2</ORDER>
  <TYPE>UT</TYPE>
  <UDF>DBSNMP.DM_FMTLIB.MGMT_DM_GEN_AC</UDF>
--<FORMAT_ENTRY>
--<FORMAT>
--<FORMAT>
  <NAME>Anglo American First Name</NAME>
  <DESCRIPTION>Anglo American First Name</DESCRIPTION>
  <RULE_ORDER> 1</RULE_ORDER>
  <RULE_CONDITION> null </RULE_CONDITION>
--<FORMAT_ENTRY>
  <ORDER>1</ORDER>
  <TYPE>CC</TYPE>
  <OWNER>OE</OWNER>
  <TABLE>CUSTOMERS</TABLE>
  <COLUMN>CUST_FIRST_NAME</COLUMN>
--<FORMAT_ENTRY>
--<FORMAT>
--<FORMAT>

```

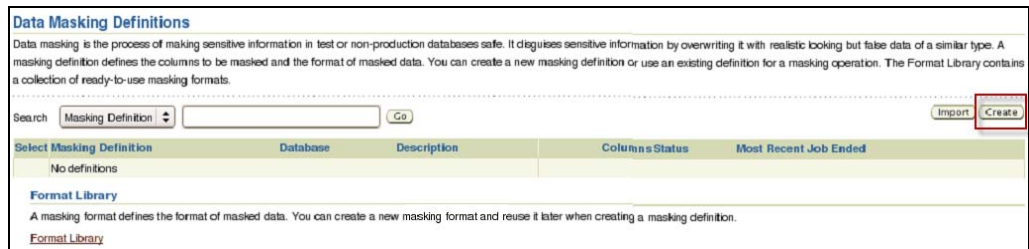


## Masking Sensitive Application Data

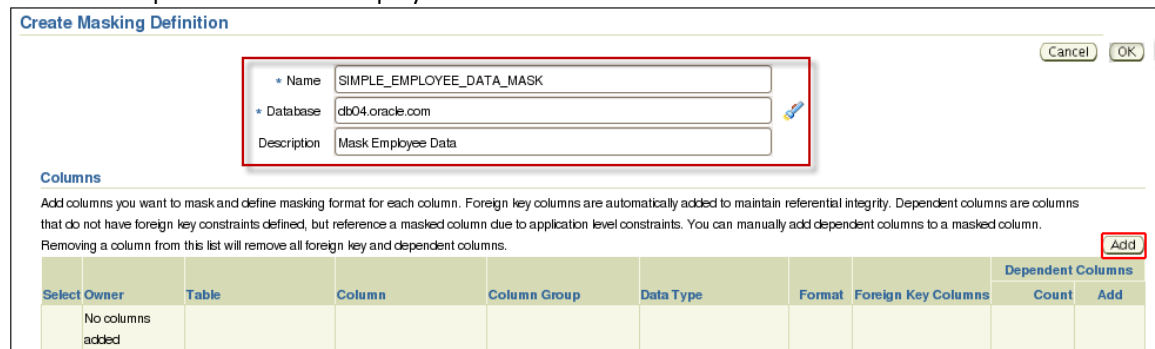
1. Navigate to the Data Masking Definitions by selecting **Targets -> Databases -> Data Masking Definitions**.



2. From the Data Masking Definitions Dialog, we will create a new definition. Click on the Create button to begin the process of masking data.



3. From the Create Masking Definition screen, type in the Name, Database and Description field with the provided values below. Continue and click on the Add button.
  - i. Name: SIMPLE\_EMPLOYEE\_DATA\_MASK  
Database: db04.oracle.com  
Description: Mask Employee Data



4. At the Database Login screen, login as system/oracle1. Leave "Connect As" set to Normal, and then click the Login button.



Database Login

Username: system  
 Password: \*\*\*\*\*  
 Database: db04.oracle.com  
 Connect As: Normal  
 Save as Preferred Credential

Cancel Login

5. We are going to search for the EMPLOYEES table in the HR Schema. Type in the following values and click on the Search button.

**Schema:** HR  
**Table Name:** EMPLOYEE  
**Column Comment:** MASK%

Data Masking Definitions > Create Masking Definition >

Add Columns

Database: db04.oracle.com Logged In As: system

Add one or more columns for masking. Foreign key columns will be added automatically. You can define masking format at once for all selected columns if they have the same data type.

Search

Schema: HR  
 Table Name: EMPLOYEES  
 Column Name:   
 Column Comment: MASK%

Mask selected columns as a group

Select Owner	Table Name	Column Name	Data Type	Comment
No columns				

Cancel Add Define Format And Add

6. Select the column for EMPLOYEE\_ID and click the Add button.

Mask selected columns as a group

Select Owner	Table Name	Column Name	Data Type	Comment
<input type="checkbox"/>	HR	EMPLOYEES	EMAIL	VARCHAR2(100) MASK candidate: HR Privacy Policy
<input checked="" type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID	NUMBER MASK candidate: HR Benefits Policy
<input type="checkbox"/>	HR	EMPLOYEES	FIRST_NAME	VARCHAR2(20) MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR	EMPLOYEES	LAST_NAME	VARCHAR2(25) MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR	EMPLOYEES	SALARY	NUMBER(8,2) MASK candidate: HR Compensation Policy

Cancel Add Define Format And Add

7. Notice how all associated foreign key columns (5) were added automatically to this Masking Definition. However, in this particular case, there is an additional table named MANAGERS that is part of the HR application, but all of its constraints are enforced by the application and NOT in the database. The MANAGERS table uses EMPLOYEE\_ID, but the relationship is not registered in the database as a foreign key constraint. Therefore, we must add a Dependent column on the EMPLOYEE\_ID column. Click on the + icon to add this Dependent Column

**Information**

Foreign key columns were added and will be masked the same way as parent columns.

[HR.EMPLOYEES.EMPLOYEE\\_ID](#) - HR.DEPARTMENTS.MANAGER\_ID; HR.EMPLOYEES.MANAGER\_ID; HR.JOB\_HISTORY.EMPLOYEE\_ID; OE.CUSTOMERS.ACCOUNT\_MGR\_ID; OE.ORDERS.SALES\_REP\_ID

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. (Add)

(Remove)

Select All | Select None

Select Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns	Count	Add
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID	NUMBER		5	0		

Columns that have this icon do not have a masking format defined.

**Foreign Key Columns**

Owner	Table	Column	Parent Owner	Parent Table	Parent Column
HR	DEPARTMENTS	MANAGER_ID	HR	EMPLOYEES	EMPLOYEE_ID
HR	EMPLOYEES	MANAGER_ID	HR	EMPLOYEES	EMPLOYEE_ID
HR	JOB_HISTORY	EMPLOYEE_ID	HR	EMPLOYEES	EMPLOYEE_ID
OE	CUSTOMERS	ACCOUNT_MGR_ID	HR	EMPLOYEES	EMPLOYEE_ID
OE	ORDERS	SALES_REP_ID	HR	EMPLOYEES	EMPLOYEE_ID

**Dependent Columns**

Owner	Table	Column	Parent Owner	Parent Table	Parent Column	Remove
No dependent columns added						

8. Type in 'HR' in the Schema and 'Managers' in the Table Name to search for the appropriate column of data. Click on the Search button to execute.

**Schema:** HR  
**Table Name:** MANAGERS

Data Masking Definitions > Create Masking Definition >

**Add Dependent Columns**

Database: db04.oracle.com | Logged In As: system | Parent Owner: HR | Parent Table: EMPLOYEES | Parent Column: EMPLOYEE\_ID | Data Type: NUMBER | (Cancel) (Add)

Search and add dependent columns that do not have foreign key constraints defined.

**Search**

Only the first 2,000 columns are displayed. Specify search criteria to limit the number of columns in the result set.

Schema: HR  
Table Name: MANAGERS  
Column Name:

(Search)

Select Owner	Table Name	Column Name	Data Type
No columns			

(Cancel) (Add)

9. Select the MGR\_ID column and click on the Add button.

**Search**

Only the first 2,000 columns are displayed. Specify search criteria to limit the number of columns in the result set.

Schema: HR  
Table Name: MANAGERS  
Column Name:

(Search)

Select All | Select None

Select Owner	Table Name	Column Name	Data Type
<input type="checkbox"/>	HR	MANAGERS	APPROVAL_LIMIT
<input type="checkbox"/>	HR	MANAGERS	MGR_COST_CENTER
<input checked="" type="checkbox"/>	HR	MANAGERS	MGR_ID


(Cancel) (Add)

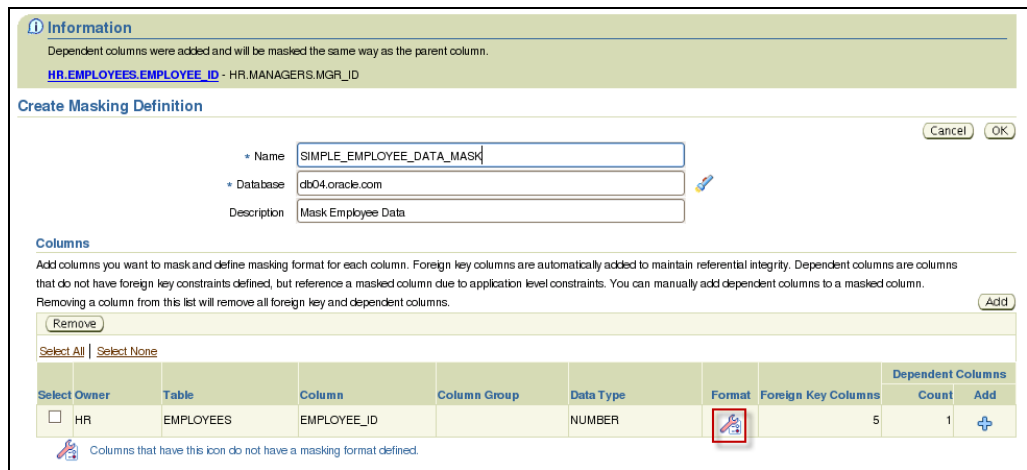
10. You have successfully added a dependent column. The dependent column HR.MANAGERS.MGR\_ID will now be masked in the same way as the parent column, HR.EMPLOYEES.EMPLOYEE\_ID.

**Information**

Dependent column(s) were added and will be masked the same way as the parent column.

HR.EMPLOYEES.EMPLOYEE\_ID - HR.MANAGERS.MGR\_ID

11. The next step is to format the EMPLOYEE\_ID column. Continue by clicking on the  icon.




**Information**  
Dependent columns were added and will be masked the same way as the parent column.  
HR.EMPLOYEES.EMPLOYEE\_ID - HR.MANAGERS.MGR\_ID

**Create Masking Definition**

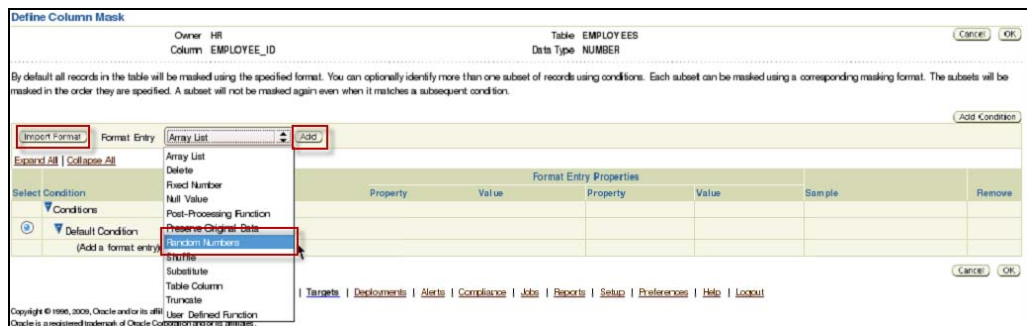
Name: SIMPLE\_EMPLOYEE\_DATA\_MASK  
Database: db04.oracle.com  
Description: Mask Employee Data

**Columns**  
Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns.

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID		NUMBER		5	1

Columns that have this icon do not have a masking format defined.

12. As previously discussed, there are many different options to format the column of data to ensure the quality of the data masking. If you were to use an existing format from the Format Library, you would click on the Import Format button. In this particular example, we are going to select Random Numbers from the drop down list box and click on the Add button.




**Define Column Mask**  
Owner: HR, Column: EMPLOYEE\_ID, Table: EMPLOYEES, Data Type: NUMBER

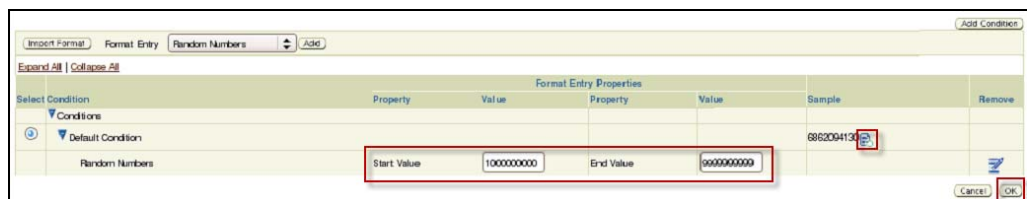
By default all records in the table will be masked using the specified format. You can optionally identify more than one subset of records using conditions. Each subset can be masked using a corresponding masking format. The subsets will be masked in the order they are specified. A subset will not be masked again even when it matches a subsequent condition.

Format Entry: Array List (dropdown), Add (button)


Property	Value	Property	Value	Sample	Remove

Format Entry Properties table is empty.

13. Enter 1000000000 for the Start Value and 9999999999 for the End Value. Click on the Sample icon  to view sample data and continue by clicking the OK button.



Format Entry: Random Numbers

Property	Value	Property	Value	Sample	Remove
Start Value	1000000000	End Value	9999999999	9882094130	

- The next step is to add additional columns in the EMPLOYEES table to include in this masking operation. Click the Add button to continue.

**Create Masking Definition** Cancel OK

Name: SIMPLE\_EMPLOYEE\_DATA\_MASK

Database: db04.oracle.com

Description: Mask Employee Data

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. Add

Remove

Select All | Select None

Select Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns	
							Count	Add
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID	NUMBER		5	1	

- Set HR as the Schema and EMPLOYEES as the Table Name and click on the Search button to query for appropriate columns.

**Add Columns** Database: db02.oracle.com Logged In As: system Cancel Add Define Format And Add

Add one or more columns for masking. Foreign key columns will be added automatically. You can define masking format at once for all selected columns if they have the same data type.

Search

Schema: HR

Table Name: EMPLOYEES Search

Column Name:

Column Comment:

Mask selected columns as a group


Select Owner	Table Name	Column Name	Data Type	Comment
No columns				

- Add 4 columns in HR.EMPLOYEES for masking (FIRST\_NAME, LAST\_NAME, PHONE\_NUMBER, SALARY). Select the 4 columns listed in the previous step and click on the Add button.

Select All | Select None

Select Owner	Table Name	Column Name	Data Type	Comment	
<input type="checkbox"/>	HR	EMPLOYEES	CITY	VARCHAR2(30)	
<input type="checkbox"/>	HR	EMPLOYEES	COMMISSION_PCT	NUMBER(2,2)	Commission percentage of the employee; Only employees in sales department eligible for commission percentage
<input type="checkbox"/>	HR	EMPLOYEES	COUNTRY_ID	CHAR(2)	
<input type="checkbox"/>	HR	EMPLOYEES	DEPARTMENT_ID	NUMBER(4)	Department id where employee works; foreign key to department_id column of the departments table
<input type="checkbox"/>	HR	EMPLOYEES	EMAIL	VARCHAR2(100)	MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID	NUMBER	MASK candidate: HR Benefits Policy
<input checked="" type="checkbox"/>	HR	EMPLOYEES	FIRST_NAME	VARCHAR2(20)	MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR	EMPLOYEES	HIRE_DATE	DATE	Date when the employee started on this job. A not null column.
<input type="checkbox"/>	HR	EMPLOYEES	JOB_ID	VARCHAR2(10)	Current job of the employee; foreign key to job_id column of the jobs table. A not null column.
<input checked="" type="checkbox"/>	HR	EMPLOYEES	LAST_NAME	VARCHAR2(25)	MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR	EMPLOYEES	MANAGER_ID	NUMBER	Manager id of the employee; has same domain as manager_id in departments table. Foreign key to employee_id column of employees table. (useful for reflexive joins and CONNECT BY query)
<input type="checkbox"/>	HR	EMPLOYEES	NATIONAL_ID	VARCHAR2(100)	
<input checked="" type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER	VARCHAR2(20)	Phone number of the employee; includes country code and area code
<input type="checkbox"/>	HR	EMPLOYEES	POSTAL_CODE	VARCHAR2(12)	
<input checked="" type="checkbox"/>	HR	EMPLOYEES	SALARY	NUMBER(8,2)	MASK candidate: HR Compensation Policy
<input type="checkbox"/>	HR	EMPLOYEES	STATE_PROVINCE	VARCHAR2(10)	
<input type="checkbox"/>	HR	EMPLOYEES	STREET_ADDRESS	VARCHAR2(40)	

Cancel **Add** Define Format And Add











17. Now that we've added 4 more columns to mask, we need to define a masking format for each column. Click on the  icon to define a masking format for the column PHONE\_NUMBER.


Columns

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. Add

Remove

Select All | Select None

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns Count	Add
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID		NUMBER		5	1	
<input type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER		VARCHAR2(20)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	FIRST_NAME		VARCHAR2(20)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	LAST_NAME		VARCHAR2(25)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	SALARY		NUMBER(8,2)		0	0	

 Columns that have this icon do not have a masking format defined.

18. For the column PHONE\_NUMBER, click on the Import Format button.

Import Format | Format Entry | Array List | Add

Expand All | Collapse All

Select Condition	Property	Value	Property	Value	Sample	Remove
Conditions						
Default Condition						

(Add a format entry)

Cancel | OK

19. From the Import Format dialog, select Bay Area Phone Number and click on the Import button.

Import Format

Database: db04.oracle.com | Logged In As: system | Cancel | Import

Owner: HR | Column: PHONE\_NUMBER

Table: EMPLOYEES | Data Type: VARCHAR2(20)

Search


Name:

Owner:

Search




Select Format	Data Type	Sample	Description	Owner	
<input type="radio"/>	Anglo American First Name	Source Type	Not Generated	Anglo American First Name	SYSMAN
<input type="radio"/>	Anglo American Last Name	Source Type	Not Generated	Anglo American Last Name	SYSMAN
<input checked="" type="radio"/>	Bay Area Phone Number	Character	(408) 555-6544	Bay Area Phone Number	SYSMAN
<input type="radio"/>	Social Security Number	Character	142521702	Social Security Number	SYSMAN
<input type="radio"/>	Social Security String	Character	883-30-9952	Social Security String	SYSMAN

Previous | 1-25 of 27 | Next 2


20. Review the Default Condition for the format masking for the PHONE\_NUMBER column. Click on the  icon to review sample data from this format mask. Click on the OK button to continue.

Import Format | Format Entry | Array List | Add

Expand All | Collapse All

Select Condition	Property	Value	Property	Value	Sample	Remove
Conditions						
Default Condition					(408) 555-7252 	
Array List	List of Values	(408),(510),(6				
Fixed String	Fixed String	555-				
Random Digits	Start Length	4	End Length	4		

Cancel | OK











- Continue by clicking on the  icon to define a masking format for the column FIRST\_NAME.


**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. (Add)

Remove

Select All | Select None

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Count	Dependent Columns
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID		NUMBER		5	1	
<input type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER		VARCHAR2(20)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	LAST_NAME		VARCHAR2(25)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	SALARY		NUMBER(8,2)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	FIRST_NAME		VARCHAR2(20)		0	0	

 Columns that have this icon do not have a masking format defined.

- For the column FIRST\_NAME, click on the Import Format button.

**Import Format** Format Entry Array List (Add) (Add Condition)

Expand All | Collapse All

Select Condition	Property	Value	Property	Value	Sample	Remove
<input checked="" type="radio"/> Conditions						
<input checked="" type="radio"/> Default Condition						
(Add a format entry)						

Cancel OK

- From the Import Format dialog, select Anglo American First Name and click on the Import button.

Select Format	Data Type	Sample	Description	Owner
<input checked="" type="radio"/> Anglo American First Name	Source Type	Not Generated	Anglo American First Name	SYSMAN
<input type="radio"/> Anglo American Last Name	Source Type	Not Generated	Anglo American Last Name	SYSMAN
<input type="radio"/> Bay Area Phone Number	Character	(510) 555-7481	Bay Area Phone Number	SYSMAN











- Repeat steps for column LAST\_NAME and select the format mask Anglo American Last Name


**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. (Add)


Remove

Select All | Select None

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Count	Dependent Columns
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID		NUMBER		5	1	
<input type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER		VARCHAR2(20)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	LAST_NAME		VARCHAR2(25)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	SALARY		NUMBER(8,2)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	FIRST_NAME		VARCHAR2(20)		0	0	

 Columns that have this icon do not have a masking format defined.

Select Format	Data Type	Sample	Description	Owner
<input type="radio"/> Anglo American First Name	Source Type	Not Generated	Anglo American First Name	SYSMAN
<input checked="" type="radio"/> Anglo American Last Name	Source Type	Not Generated	Anglo American Last Name	SYSMAN
<input type="radio"/> Bay Area Phone Number	Character	(510) 555-7481	Bay Area Phone Number	SYSMAN











25. Continue by clicking on the  icon to define a masking format for the column SALARY.


**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. Add

Remove

Select All | Select None

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Count	Add
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID		NUMBER		5	1	
<input type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER		VARCHAR2(20)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	LAST_NAME		VARCHAR2(25)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	SALARY		NUMBER(8,2)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	FIRST_NAME		VARCHAR2(20)		0	0	

 Columns that have this icon do not have a masking format defined.

26. For this column, we will randomly Shuffle the original column data within the table. Select Shuffle from the drop-down list box and then click on the Add button.

Insert Format Format Entry Array List Add

Expand All | Collapse All

Select Condition


- Conditions
  - Default Condition
  - Post-Processing Function
  - Preserve Original Data
  - Random Numbers
  - Shuffle**
  - Substitute
  - Table Column
  - Truncate

Add a format entry

Property	Value	Property	Value	Sample	Remove

Cancel OK

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27. Review the Default Condition for the format masking for the SALARY column. Click on the  icon to review sample data from this format mask. Click on the OK button to continue.


Insert Format Format Entry Shuffle Add

Expand All | Collapse All

Select Condition

- Conditions
  - Default Condition
  - Post-Processing Function
  - Preserve Original Data
  - Random Numbers
  - Shuffle
  - Substitute
  - Table Column
  - Truncate

Add a format entry

Property	Value	Property	Value	Sample	Remove
				2500 	

Cancel OK

28. Click on the OK button to complete the creation of a Masking Definition for the EMPLOYEES table.

**Create Masking Definition** Cancel OK

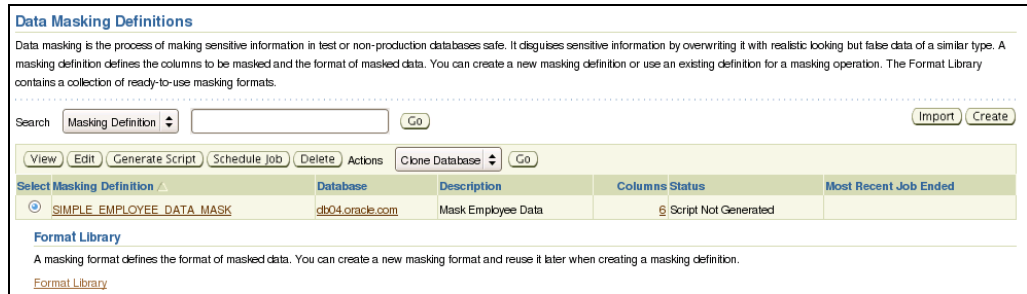
\* Name: SIMPLE\_EMPLOYEE\_DATA\_MASK

\* Database: db04.oracle.com

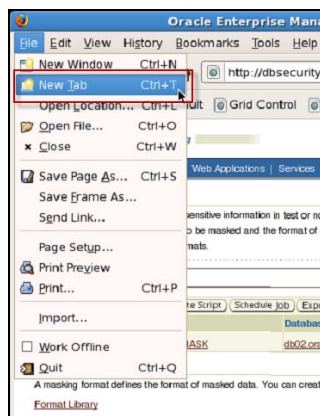
Description: Mask Employee Data



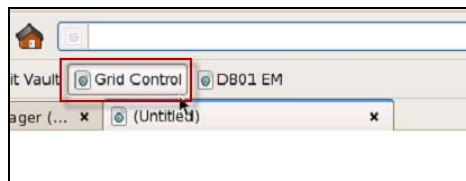
29. Review that you have now successfully created a Data Masking Definition.



30. Before we Generate the Script to mask data, let's first query the existing unmasked data to compare the results after we mask the data. In the browser, select File -> New Tab.



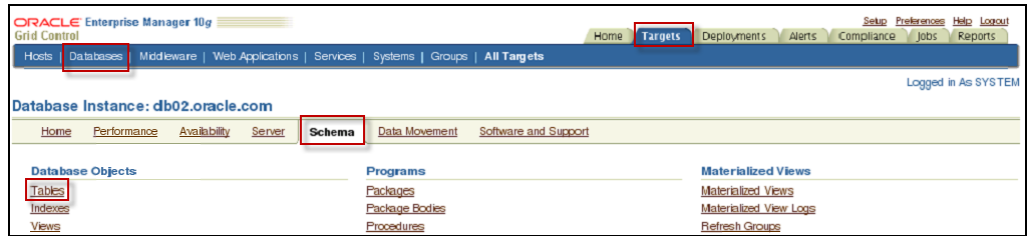
31. In the new tab, click on the shortcut to go to Enterprise Manager – Grid Control.



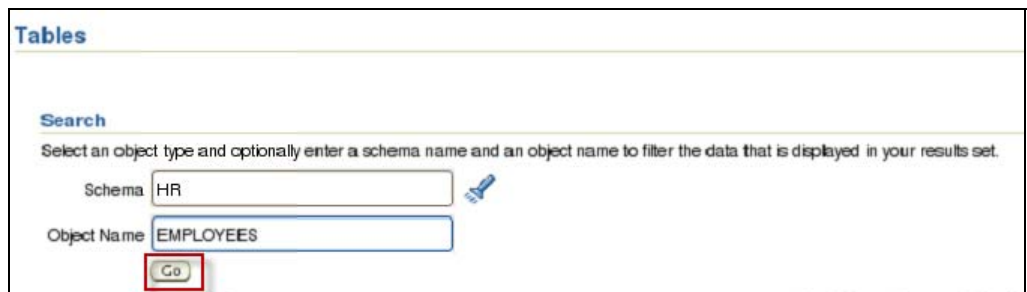
32. Navigate EM and select Targets -> Databases -> db04.oracle.com.



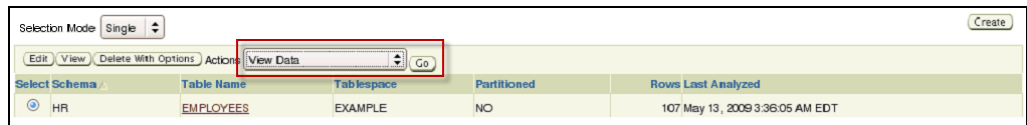
- Click on the Schema tab for db04.oracle.com and click on Tables under Database Objects.



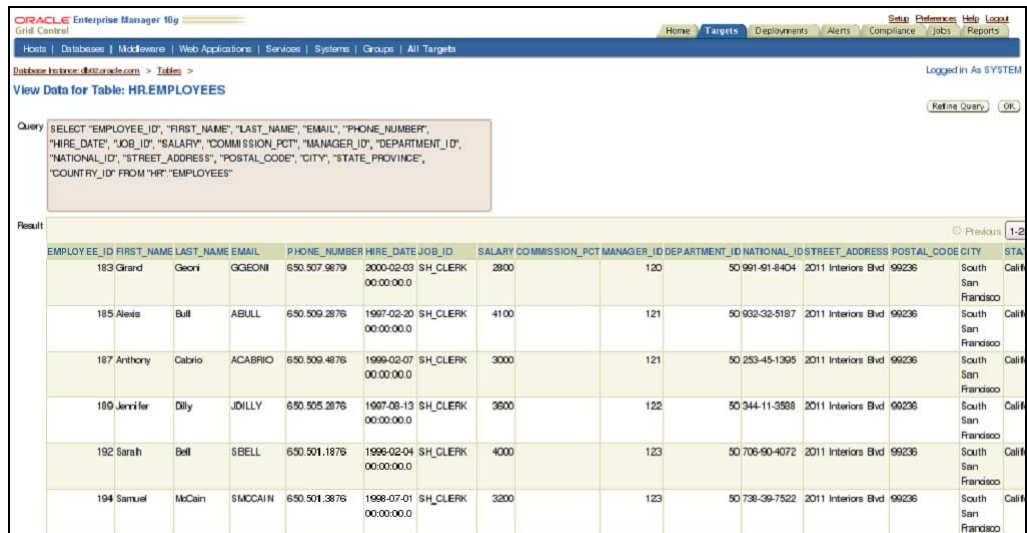
- If you are brought to the Database Login screen, login as system/oracle1. Leave "Connect As" set to Normal, and then click the Login button.
- For the table search, enter HR for the Schema and EMPLOYEES for the Object name.



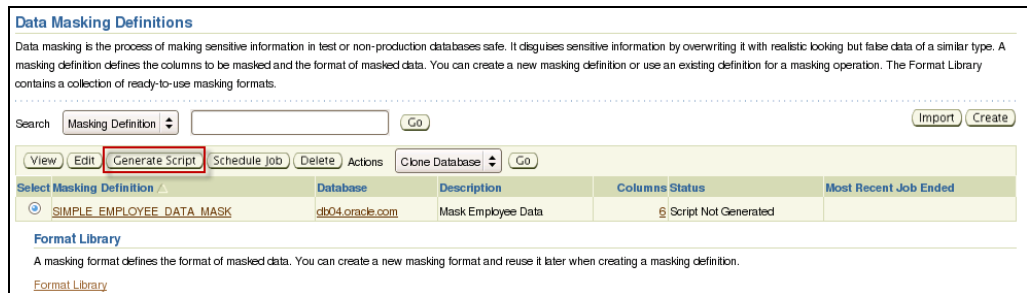
- Select View Data from the drop-down list box and click on the GO button.



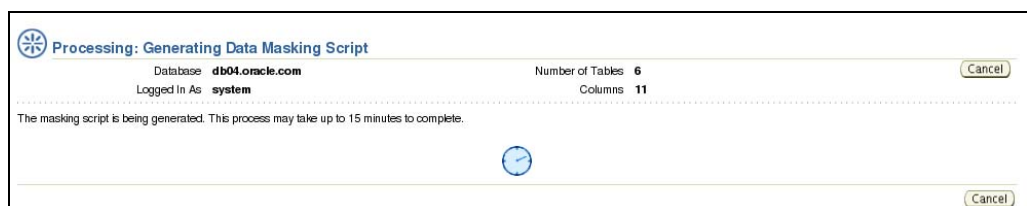
- Leave this tab open so you can later reference the data before the data masking operation is executed.



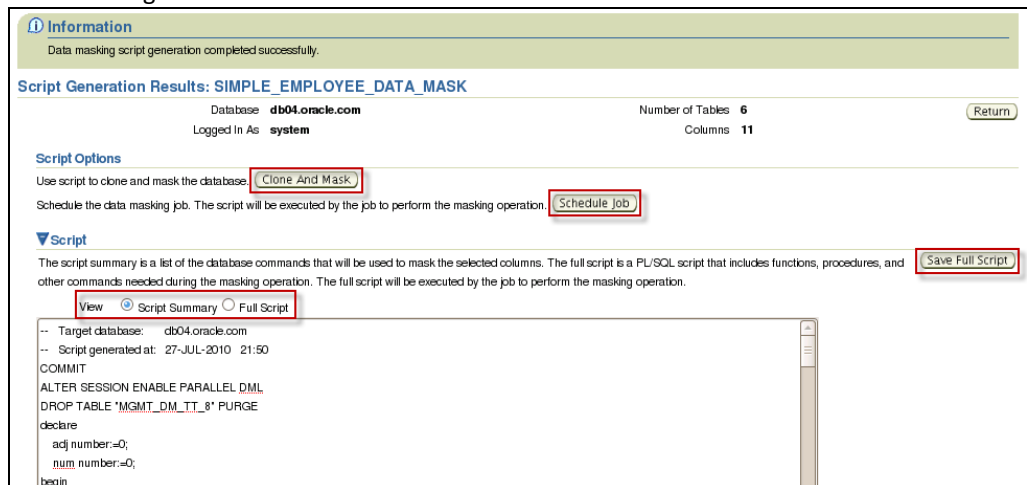
38. Navigate back to the first browser tab. The next step is to select the SIMPLE\_EMPLOYEE\_DATA\_MASK and click on the Generate Script button.



39. After clicking on the Generate Script button, the data masking script will be generated.



40. You will be forwarded to the Script Generation Results page. There are a number of areas to explore. All of the highlighted buttons and actions can also be accessed on the Data Masking Definitions screen.



41. Scroll down to the bottom of the page and expand the Impact Report section. The Impact Report will provide a summary of the script generation and important details about the objects and resources necessary to complete the job successfully. If there are any issues here, they should be corrected before moving forward.

**Impact Report**

Script Generation Summary

Most Serious Message Severity: **INFORMATION**  
 Generation Started: **Jul 27, 2010 9:50:34 PM**  
 Generation Completed: **Jul 27, 2010 9:51:06 PM**

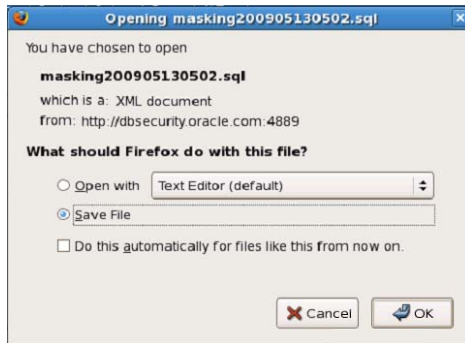
Script Generation Information

The following table provides information about the objects and resources examined during script generation and lists details of any warnings or errors detected.

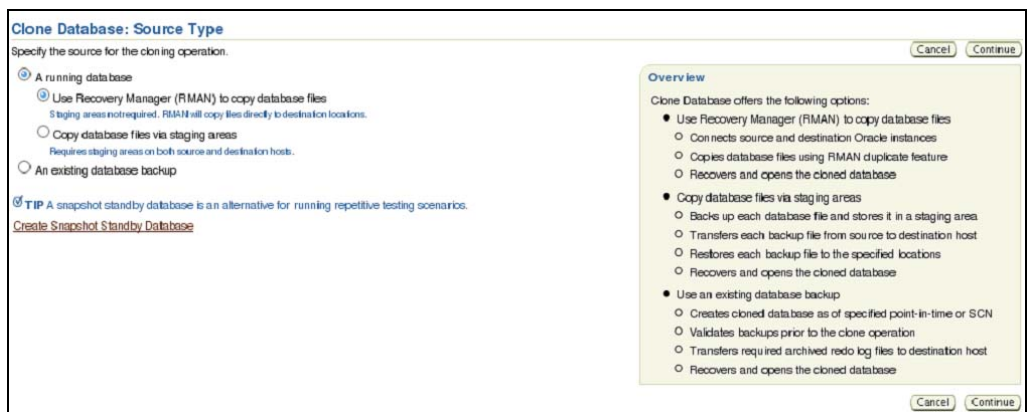
Object Name	Object Type	Message Severity	Message Type	Message
EXAMPLE	TABLESPACE	INFORMATION	Plan	Sufficient free space in Tablespace EXAMPLE. Starting Freespace with automatic extension: 33473MB. Ending Freespace: 33473MB. Lowest Freespace: 33473MB.
USERS	TABLESPACE	INFORMATION	Plan	Sufficient free space in Tablespace USERS. Starting Freespace with automatic extension: 33146MB. Ending Freespace: 33146MB. Lowest Freespace: 33146MB.
HR	USER	INFORMATION	Plan	Sufficient tablespace quota for User HR.
OE	USER	INFORMATION	Plan	Sufficient tablespace quota for User OE.

Return

- Scroll back up the page and click on the Save Full Script button. Take note of the file name of the .sql file to review in detail later. This script could be taken and executed on other targets.



- Click on the Clone Mask button under the Script Option section. Review the number of supported options to clone the database and create a staging environment for the script to be executed and data to be masked.



- Click on the browser's back button to return to the previous screen and click on the Schedule Job button to immediately schedule and run the masking operation. Provide the Host Credentials using the user: Oracle and the provided password. Click on the Submit button to execute the job.

**Schedule Data Masking Job: SIMPLE\_EMPLOYEE\_DATA\_MASK**

Database: **db04.oracle.com** Number of Tables: **6** Columns: **11** Cancel Submit

Logged In As: **system**

---

• Job Name:

Job Description:

• Script File Location:

• Script File Name:

---

**Host Credentials**

• Username:

• Password:

Save as Preferred Credential

---

**Start**

Immediately

Later

Date:

(example: Jul 27, 2010)

Time:  :   AM  PM

45. Once you submit the job, you will be forwarded to a confirmation page that the job was submitted successfully. Click on the GO button to refresh the status of the job.

**Job Submitted Successfully**

Data Masking job has been submitted successfully. Click on the View Job Details link below to view execution status.

[View Job Details](#)

**Data Masking Definitions**

Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search: Database  Go Import Create

View Edit Generate Script Schedule Job Delete Actions Clone Database Go

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Scheduled	

46. Once the job successfully completes, Repeat step 30 to 36 to create a new tab and query the masked data for a before and after comparison.

View Edit Generate Script Schedule Job Delete Actions Clone Database Go

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

47. Toggle between the two browser tabs and review the data before the masking job and after the successful masking operation of the 5 columns defined.

## Using compound masking, condition-based masking and user defined masking

1. Navigate to the Data Masking Definitions by selecting **Targets -> Databases -> Data Masking Definitions**.

The screenshot shows the Oracle Enterprise Manager interface. The 'Databases' tab is selected. A table lists several database instances. The 'Data Masking Definitions' link is highlighted in the 'Related Links' section.

Select	Name	Status	Alerts	Policy Violations	Compliance Score (%)	Version	Sessions: CPU	Sessions: IO	Sessions: Other Instance CPU (%)
<input checked="" type="radio"/>	av.oracle.com	↓		1 25 3	99	10.2.0.3.0			
<input type="radio"/>	db01.oracle.com	↓		5 28 6	98	11.1.0.7.0			
<input type="radio"/>	db02.oracle.com	↓		5 28 2	98	11.1.0.7.0			
<input type="radio"/>	db03.oracle.com	↓		1 28 3	99	10.2.0.4.0			
<input type="radio"/>	db04.oracle.com	↑	0 0	0 0 0	-	11.2.0.1.0	-	✓	✓
<input type="radio"/>	db06.oracle.com	↓		0 0 0	-	11.2.0.1.0			
<input type="radio"/>	emrep.oracle.com	↑	1 4	15 69 5	92	10.2.0.4.0	.01	.01 ✓	0 ✓ .44

2. From the **Data Masking Definitions** Dialog, we will create a new definition to create a Compound Mask with the **HR.EMPLOYEES** table. Click on the **Create** button to begin the process of creating a new data mask.

The screenshot shows the 'Data Masking Definitions' dialog box. The search criteria are set to 'Database' and 'db04.oracle.com'. The 'Create' button is highlighted. Below the search area is a table of existing definitions.

Select	Masking Definition	Database	Description	Columns Status	Most Recent Job Ended
<input checked="" type="radio"/>	SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6 Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

3. From the **Create Masking Definition** screen, type in the **Name**, **Database** and **Description** field with the provided values below. Continue and click on the **Add** button.
  - i. **Name:** HR\_COMPOUND\_MASK
  - Database:** db04.oracle.com
  - Description:** Compound Mask of HR Data

**Create Masking Definition**

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns.

Select Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns	
							Count	Add
No columns added								

- If you are brought to the **Database Login** screen, login as **system/oracle1**. Leave "Connect As" set to Normal, and then click the **Login** button.

**Database Login**

Database: db04.oracle.com

Save as Preferred Credential

- We are going to search for the **EMPLOYEES** table in the HR Schema. Type in the following values and click on the **Search** button.

**Schema:** HR  
**Table Name:** EMPLOYEE

Data Masking Definitions > Create Masking Definition >

**Add Columns**

Database: db04.oracle.com Logged In As: system

Add one or more columns for masking. Foreign key columns will be added automatically. You can define masking format at once for all selected columns if they have the same data type.

**Search**

Mask selected columns as a group

Select Owner	Table Name	Column Name	Data Type	Comment
No columns				


- Select the columns to be included in the mask. They are: **CITY, COUNTRY\_ID, PHONE\_NUMBER, POSTAL\_CODE, STATE\_PROVINCE, STREET\_ADDRESS**. Check the box to "Mask selected columns as a group" to specify that you want to use mask these columns as a compound mask and continue by clicking on the **Add** button.



Mask selected columns as a group

Select Owner	Table Name	Column Name	Data Type	Comment
<input checked="" type="checkbox"/>	HR	EMPLOYEES	CITY	VARCHAR2(30)
<input type="checkbox"/>	HR	EMPLOYEES	COMMISSION_PCT	NUMBER(2,2) Commission percentage of the employee; Only employees in sales department eligible for commission percentage
<input checked="" type="checkbox"/>	HR	EMPLOYEES	COUNTRY_ID	CHAR(2)
<input type="checkbox"/>	HR	EMPLOYEES	DEPARTMENT_ID	NUMBER(4) Department id where employee works; foreign key to department_id column of the departments table
<input type="checkbox"/>	HR	EMPLOYEES	EMAIL	VARCHAR2(100) MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID	NUMBER MASK candidate: HR Benefits Policy
<input type="checkbox"/>	HR	EMPLOYEES	FIRST_NAME	VARCHAR2(30) MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR	EMPLOYEES	HIRE_DATE	DATE Date when the employee started on this job. A not null column.
<input type="checkbox"/>	HR	EMPLOYEES	JOB_ID	VARCHAR2(10) Current job of the employee; foreign key to job_id column of the jobs table. A not null column.
<input type="checkbox"/>	HR	EMPLOYEES	LAST_NAME	VARCHAR2(25) MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR	EMPLOYEES	MANAGER_ID	NUMBER Manager id of the employee; has same domain as manager_id in departments table. Foreign key to employee_id column of employees table. useful for reflexive joins and CONNECT BY query)
<input type="checkbox"/>	HR	EMPLOYEES	NATIONAL_ID	VARCHAR2(100)
<input checked="" type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER	VARCHAR2(20) Phone number of the employee; includes country code and area code
<input checked="" type="checkbox"/>	HR	EMPLOYEES	POSTAL_CODE	VARCHAR2(12)
<input type="checkbox"/>	HR	EMPLOYEES	SALARY	NUMBER MASK candidate: HR Compensation Policy
<input checked="" type="checkbox"/>	HR	EMPLOYEES	STATE_PROVINCE	VARCHAR2(10)
<input checked="" type="checkbox"/>	HR	EMPLOYEES	STREET_ADDRESS	VARCHAR2(40)

Cancel Add (Define Format And Add)

7. Continue by clicking on any of the  Format icons.

Create Masking Definition

Name: HR\_COMPOUND\_MASK  
Database: db04.oracle.com  
Description: Compound Mask of HR Data

Columns

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns.

Select Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Count	Add	
<input type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER	1	VARCHAR2(20)		0	0	+
<input type="checkbox"/>	HR	EMPLOYEES	CITY	1	VARCHAR2(30)		0	0	+
<input type="checkbox"/>	HR	EMPLOYEES	STREET_ADDRESS	1	VARCHAR2(40)		0	0	+
<input type="checkbox"/>	HR	EMPLOYEES	COUNTRY_ID	1	CHAR(2)		0	0	+
<input type="checkbox"/>	HR	EMPLOYEES	POSTAL_CODE	1	VARCHAR2(12)		0	0	+

Columns that have this icon do not have a masking format defined.

8. In the Define Group Mask screen, select the Format Type **Substitute**. By selecting Substitute, you are defining a deterministic mask—allowing a consistent masking across databases for these columns selected.

Define Group Mask

Database: db04.oracle.com  
Owner: HR  
Table: EMPLOYEES  
Logged In As: system

Format Type:

Column	Data Type	Preserve Original Data	Remove
PHONE_NUMBER	VARCHAR2(20)	<input type="checkbox"/>	
CITY	VARCHAR2(30)	<input type="checkbox"/>	
STREET_ADDRESS	VARCHAR2(40)	<input type="checkbox"/>	
COUNTRY_ID	CHAR(2)	<input type="checkbox"/>	
POSTAL_CODE	VARCHAR2(12)	<input type="checkbox"/>	

- Type **HR.MASK\_ADDRESSES** in the Masking Table and click on the **Go** button. Select the corresponding Masking Columns from the drop-down list boxes and click on the **OK** button to continue.

**Define Group Mask**

Database: **db04.oracle.com** | Owner: **HR** | Logged In As: **system** | Table: **EMPLOYEES** | Cancel OK

Format Type: **Substitute**

Masking Table: **HR.MASK\_ADDRESSES** Go

Example: SCOTT.EMP

Column	Data Type	Masking Column	Preserve Original Data	Remove
PHONE_NUMBER	VARCHAR2(20)	PHONE_NUMBER (VARCHAR2(25))	<input type="checkbox"/>	
CITY	VARCHAR2(30)	CITY (VARCHAR2(30))	<input type="checkbox"/>	
STREET_ADDRESS	VARCHAR2(40)	STREET_ADDRESS (VARCHAR2(40))	<input type="checkbox"/>	
COUNTRY_ID	CHAR(2)	COUNTRY_ID (CHAR(2))	<input type="checkbox"/>	
POSTAL_CODE	VARCHAR2(12)	POSTAL_CODE (VARCHAR2(10))	<input type="checkbox"/>	

- As an option, open another tab on your browser window and view the full contents of the **HR.MASK\_ADDRESSES** table. We have provided a screen shot so you can see a sample of the data.

**View Data for Table: HR.MASK\_ADDRESSES** Refine Query OK

Query: `SELECT 'PHONE_NUMBER', 'STREET_ADDRESS', 'CITY', 'STATE_PROVINCE', 'POSTAL_CODE', 'COUNTRY_ID' FROM 'HR'.MASK_ADDRESSES`

Result: Previous 1-25 of 319 Next 25

PHONE_NUMBER	STREET_ADDRESS	CITY	STATE_PROVINCE	POSTAL_CODE	COUNTRY_ID
+1 412 123 4962	2455 Rose Garden Rd	Pittsburgh	PA	15220	US
+1 610 123 4964	141 Schiller St	Reading	PA	19601	US
+1 610 123 4967	1125 Pawlings Rd	Norristown	PA	19403	US
+1 610 123 4969	55 Church Hill Rd	Reading	PA	19606	US
+1 717 123 4974	354 N Prince St	Lancaster	PA	17603	US
+1 412 123 4981	2899 Grand Ave	Pittsburgh	PA	15225	US
+1 412 123 4984	Po Box 39	Indiana	PA	15701	US
+1 412 123 4988	1604 Broadway Ave	Pittsburgh	PA	15216	US
+1 412 123 4991	4734 Liberty Ave	Pittsburgh	PA	15224	US
+1 717 123 4992	21 Thornwood Rd	Harrisburg	PA	17112	US
+1 814 123 4997	1808 4Th Ave	Altoona	PA	16602	US
+1 412 123 4700	Station Sq	Pittsburgh	PA	15219	US

- Notice that all of the Formats have all been defined. At this step, you could continue to add to your Masking Definition. To finish creating a Masking Definition, click the **OK** button.

**Create Masking Definition** Cancel OK

Name: **HR\_COMPOUND\_MASK**

Database: **db04.oracle.com**

Description: **Compound Mask of HR Data**

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. Remove Add

Select All | Select None

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Count	Dependent Columns	Add
<input type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER	1	VARCHAR2(20)		0	0		
<input type="checkbox"/>	HR	EMPLOYEES	CITY	1	VARCHAR2(30)		0	0		
<input type="checkbox"/>	HR	EMPLOYEES	STREET_ADDRESS	1	VARCHAR2(40)		0	0		
<input type="checkbox"/>	HR	EMPLOYEES	COUNTRY_ID	1	CHAR(2)		0	0		
<input type="checkbox"/>	HR	EMPLOYEES	POSTAL_CODE	1	VARCHAR2(12)		0	0		

- You will be brought back to the Data Masking Definitions page. Select the **HR\_COMPOUND\_MASK** and click on the **Generate Script** button.

**Data Masking Definitions**

Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Formal Library contains a collection of ready-to-use masking formats.

Search:

Select	Masking Definition	Database	Description	Columns Status	Most Recent Job Ended
<input checked="" type="radio"/>	HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5 Script Not Generated	
<input type="radio"/>	SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6 Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

**Processing: Generating Data Masking Script**

Database: **db04.oracle.com** Number of Tables: **1**

Logged In As: **system** Columns: **5**

The masking script is being generated. This process may take up to 15 minutes to complete.

- After the data masking script generation has completed successfully, scroll down the page and expand the **Impact Report** section. Choose to save the script to disk for additional review by clicking on the **Save Full Script** button.

**Information**

Data masking script generation completed successfully.

**Script Generation Results: HR\_COMPOUND\_MASK**

Database: **db04.oracle.com** Number of Tables: **1**

Logged In As: **system** Columns: **5**

**Script Options**

Use script to clone and mask the database.

Schedule the data masking job. The script will be executed by the job to perform the masking operation.

**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 executed by the job to perform the masking operation.

View:  Script Summary  Full Script

```
-- Target database: db04.oracle.com
-- Script generated at: 27-JUL-2010 22:18
COMMIT
ALTER SESSION ENABLE PARALLEL_DML
DROP TABLE 'MGMT_DM_TT_19' PURGE
declare
adj number:=0;
num number:=0;
```

- Before executing the newly created compound data masking script as we have done previously, open up another browser tab to query the before state of the **HR.EMPLOYEES** table we will be masking.
- Click on the **Schedule Job** button to execute the newly created data mask immediately schedule and run the masking operation. Provide and confirm a Substitute Format Seed, for example, string **"123456"**. Provide the Host Credentials using the user: Oracle and the provided password. Click on the **Submit** button to execute the job.

**Schedule Data Masking Job: HR\_COMPOUND\_MASK**

Database: **db04.oracle.com** Number of Tables: **1** Cancel Submit  
 Logged In As: **system** Columns: **5**

---

• Job Name:   
 Job Description:   
 • Script File Location:   
 • Script File Name:

**Substitute Format Seed**  
 A seed is required for masking definitions that use the Substitute format. The seed can be any text string.

• Seed:   
 • Confirm Seed:

**Host Credentials**

• Username:   
 • Password:   
 Save as Preferred Credential

**Start**

Immediately  
 Later

Date:

16. Once you submit the job, you will be forwarded to a confirmation page that the job was submitted successfully.

**Job Submitted Successfully**  
 Data Masking job has been submitted successfully. Click on the View Job Details link below to view execution status.  
[View Job Details](#)

**Data Masking Definitions**  
 Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search: Database  Go Import Create

View Edit Generate Script Schedule Job Delete Actions Clone Database Go

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Scheduled	
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

17. Click on the **GO** button to refresh the status of the job.

**Data Masking Definitions**  
 Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search: Database  Go Import Create

View Edit Generate Script Schedule Job Delete Actions Clone Database Go

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Succeeded	Jul 27, 2010 10:31:33 PM GMT+00:00
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

18. Once the job successfully completes, follow the provided steps again to create a new tab and query the masked data for a before and after comparison. View the data before the compound masking operation for the **HR.EMPLOYEES** table.

Oracle Enterprise Manager 11g  
Home | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Database Instance: **db04.oracle.com** > Tables > **HR.EMPLOYEES**

Query: `SELECT EMPLOYEE_ID, FIRST_NAME, LAST_NAME, EMAIL, PHONE_NUMBER, HIRE_DATE, JOB_ID, SALARY, COMMISSION_PCT, MANAGER_ID, DEPARTMENT_ID, NATIONAL_ID, STREET_ADDRESS, POSTAL_CODE, CITY, STATE_PROVINCE, COUNTRY_ID FROM HR.EMPLOYEES`

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID	STREET_ADDRESS	POSTAL_CODE	CITY	STATE_PROVINCE	COUNTRY_ID
2034190007	Mauske	Brooks	ABRIDA	+1 612 123 4068	2000-04-21 00:00:00	SA_REP	3000	.1	4001690000	80 548-304-102	1121 N 43 St	55401	Minneapolis	MIN	US	
0430000003	Fay	Balchin	ABILL	+1 414 123 4064	1997-02-20 00:00:00	SH_CLERK	6000		9730990010	30 902-92-5187	Po Box 39	15701	Indiana	PA	US	
7382915104	Dunne	Balchin	ACARRO	+1 414 123 4273	1999-02-07 00:00:00	SH_CLERK	7300		9730990010	30 253-45-1395	300 Condit St	54301	Green Bay	WI	US	
4001690000	Geart	Balchin	AERAZLR	+1 807 123 4287	1997-03-10 00:00:00	ST_MAN	9000	.3	1227790000	80 240-048-423	300 S Broadway # 707	33904	Richmond	VA	US	
9730990010	Fay	Danson	AERIPP	+1 814 123 4735	1997-04-10 00:00:00	ST_MAN	9000		1227790000	30 349-69-1018	Rt 6 E	16005	Waynes	PA	US	
4069830819	Markon	Chapman	AHUNLD	+1 301 123 4818	1990-01-03 00:00:00	IT_PROG	7900		6312622035	60 489-46-0196	11300 Staggsdale Rd	30723	Lanett	AL	US	
4049173000	Rabus	Brown	AHUTTEN	+1 185 123 4249	1997-09-19 00:00:00	SA_REP	7000	.25	8847700000	80 527-609-784	255 Great Arrow Ave	14307	Buffalo	NY	US	
7371690070	Markon	Chapman	AHOOD	+91 800 012 3711	1995-05-18 00:00:00	PL_CLERK	8400		8228300057	30 823-78-4308	1904 Vintoners Rd	381121	Bangalore	KAR	IN	
4002834070	Fay	Cleveland	AJCEVEN	+1 414 123 4376	1999-08-01 00:00:00	SA_REP	7900	.35	4208340074	80 118-308-3511	653 S Highway Rd	50214	Midvale	UT	US	
2830700000	David	Edwards	AJULSH	+1 215 123 4379	1998-04-24 00:00:00	SH_CLERK	8400		7278130071	30 905-41-9225	Vo Naticum 1932	301252	Belmont	MA	US	
9487844007	Mauske	Dalby	BERRET	+39 35 012 4355	1991-05-21 00:00:00	IT_PROG	8800		4969820819	60 938-70-2847	Vo Naticum 1941	301199	Freemantle	SA	US	
7322191048	Maureen	Dunnaway	BERRETT	+91 800 012 4803	1997-03-03 00:00:00	SA_CLERK	8200		7339920001	30 791-99-1878	1902 S Brady St	91021	Chennai	TAM	IN	
4743697072	Gulame	Roy	CDAMES	+91 800 012 3711	1997-01-29 00:00:00	ST_CLERK	8400		7278130071	30 349-794-367	1904 Vintoners Rd	301121	Bangalore	KAR	IN	
815919010	Meenakshi	Bel Geddes	CJHNSON	+38 49 812 4409	2000-01-04 00:00:00	SA_REP	3000	.1	8847700000	80 551-994-995	Vo Del Clegrove 194	301223	San Geronimo	IT	US	
9909030000	CJH	Eastwood	COLSEN	+91 800 012 4819	1998-03-30 00:00:00	SA_REP	6800	.2	9777670073	80 609-497-995	1501 Spenner St	301108	Cochran	GA	US	
8159071048	Maureen	Caplan	CUSNEY	+1 518 123 4274	1997-11-11 00:00:00	SA_CLERK	4000		4001690000	30 387-959-159	127 Lud St	12210	Albany	NY	US	
3870018008	Rob	Stands	DALEEN	+38 910 12 4507	1997-08-25 00:00:00	IT_PROG	7300		4069830819	60 136-99-4206	Plaza Salaria	301187	Roma	IT	US	
932140004	Rob	Brooks	DERNSTE	+1 745 123 4367	1997-03-24 00:00:00	SA_REP	3000	.25	9777670073	80 700-511-442	1400 Baking St Fl 4	54703	East Clute	WI	US	
4621100000	Haanah	Fawcett	DEARTE	+1 215 123 4272	1994-08-16 00:00:00	PL_ACCOUNT	7900		8925487025	100 388-29-6748	1190 Ash St	19107	Philadelphia	PA	US	
4000670000	Elisabeth	Roy	DEBART	+1 215 123 4268	2000-01-18 00:00:00	SA_CLERK	2900		7278130071	30 799-85-6200	100 N Brady St	19139	Philadelphia	PA	US	
120770043	Charles	Brown	DEBENE	+38 910 12 4391	1999-03-19 00:00:00	SA_REP	3000	.15	4001690000	80 770-138-191	Plaza Carabitea 23	301184	Roma	IT	US	
4007380000	Rob	Dench	DEE	+91 141 012 4819	2000-02-25 00:00:00	SA_REP	7700	.1	4001690000	80 195-438-885	1030 Teesl Mang Ct	301108	Kodair	IN	US	
6081430000	Markon	Blakley	DURHEIZ	+1 808 123 4274	1999-02-07 00:00:00	IT_PROG	3800		4969820819	60 847-94-8719	122 E Dayton St	53703	Madison	WI	US	
4001800101	John	Balchin	DOORREE	+1 115 123 4372	1999-09-21 00:00:00	SA_CLERK	2900		7278130071	30 799-85-6200	808 S 6th St	54403	Wisconsin	WI	US	
8128300057	Dianne	Eastwood	DURHEAL	+1 812 123 4344	1994-12-07 00:00:00	PL_MAN	11000		1227790000	30 38-549-7298	1409 Wilcox St # 200	55402	Minneapolis	MIN	US	

19. View the data after the compound masking operation for the HR.EMPLOYEES table.

Oracle Enterprise Manager 11g  
Home | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Database Instance: **db04.oracle.com** > Tables > **HR.EMPLOYEES**

Query: `SELECT EMPLOYEE_ID, FIRST_NAME, LAST_NAME, EMAIL, PHONE_NUMBER, HIRE_DATE, JOB_ID, SALARY, COMMISSION_PCT, MANAGER_ID, DEPARTMENT_ID, NATIONAL_ID, STREET_ADDRESS, POSTAL_CODE, CITY, STATE_PROVINCE, COUNTRY_ID FROM HR.EMPLOYEES`

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID	STREET_ADDRESS	POSTAL_CODE	CITY	STATE_PROVINCE	COUNTRY_ID
2034190007	Mauske	Brooks	ABRIDA	(828) 555-0035	2000-04-21 00:00:00	SA_REP	3000	.1	4001690000	80 548-304-102	Magdalen Centre, The Oxford Science	O19 92B	Oxford	UK		
0430000003	Fay	Balchin	ABILL	(603) 555-1082	1997-02-20 00:00:00	SH_CLERK	6000		9730990010	30 902-92-5187	2011 Inteleon Blvd	99236	South San Francisco	California	US	
7382915104	Dunne	Balchin	ACARRO	(803) 555-4036	1999-02-07 00:00:00	SH_CLERK	7300		9730990010	30 253-45-1395	2011 Inteleon Blvd	99236	South San Francisco	California	US	
4001690000	Geart	Balchin	AERAZLR	(408) 555-2004	1997-03-10 00:00:00	ST_MAN	9000	.3	1227790000	80 240-048-423	Magdalen Centre, The Oxford Science	O19 92B	Oxford	UK		
9730990010	Fay	Danson	AERIPP	(825) 555-3019	1997-04-10 00:00:00	ST_MAN	9000		1227790000	30 349-69-1018	2011 Inteleon Blvd	99236	South San Francisco	California	US	
4069830819	Markon	Chapman	AHUNLD	(310) 555-2101	1990-01-03 00:00:00	IT_PROG	7900		6312622035	60 489-46-0196	2014 Jabbemorey Rd	29192	Southlake	Texas	US	
4049173000	Rabus	Brown	AHUTTEN	(310) 555-1037	1997-09-19 00:00:00	SA_REP	7000	.25	8847700000	80 527-609-784	Magdalen Centre, The Oxford Science	O19 92B	Oxford	UK		
7371690070	Markon	Chapman	AHOOD	(828) 555-4099	1995-05-18 00:00:00	PL_CLERK	8400		8228300057	30 823-78-4308	2004 Chanade Rd	98199	Seattle	Washington	US	
4002834070	Fay	Cleveland	AJCEVEN	(310) 555-3073	1999-08-01 00:00:00	SA_REP	7900	.35	4208340074	80 118-308-3511	Magdalen Centre, The Oxford Science	O19 92B	Oxford	UK		
2830700000	David	Edwards	AJULSH	(310) 555-2009	1998-04-24 00:00:00	SH_CLERK	8400		7278130071	30 905-41-9225	2011 Inteleon Blvd	99236	South San Francisco	California	US	
9487844007	Mauske	Dalby	BERRET	(828) 555-7083	1991-05-21 00:00:00	IT_PROG	8800		4969820819	60 938-70-2847	2014 Jabbemorey Rd	29192	Southlake	Texas	US	
7322191048	Maureen	Dunnaway	BERRETT	(828) 555-7075	1997-03-03 00:00:00	SA_CLERK	8200		7309920001	30 791-99-1878	2011 Inteleon Blvd	99236	South San Francisco	California	US	
4743697072	Gulame	Roy	CDAMES	(310) 555-3089	1997-01-29 00:00:00	ST_CLERK	8400		7278130071	30 349-794-367	2011 Inteleon Blvd	99236	South San Francisco	California	US	
815919010	Meenakshi	Bel Geddes	CJHNSON	(803) 555-6086	2000-01-04 00:00:00	SA_REP	3000	.1	8847700000	80 551-994-995	Magdalen Centre, The Oxford Science	O19 92B	Oxford	UK		
9909030000	CJH	Eastwood	COLSEN	(408) 555-2044	1998-03-30 00:00:00	SA_REP	6800	.2	9777670073	80 609-497-995	Magdalen Centre, The Oxford Science	O19 92B	Oxford	UK		

20. Return to the **Data Masking Definition** screen. We will create a new definition in this repository by importing an existing Masking Definition.

**Data Masking Definitions**

Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search: Database

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Succeeded	Jul 27, 2010 10:31:33 PM GMT+00:00
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

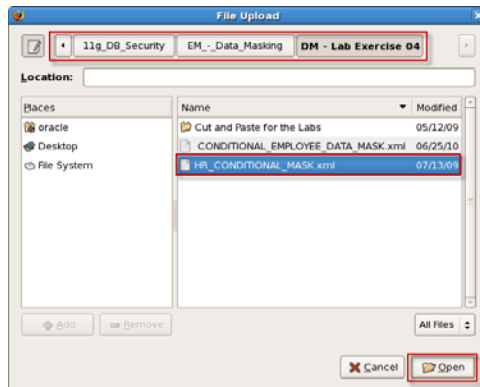
21. Click on the **Browse** button to select the Masking Definition.

**Import Masking Definition: Select File**

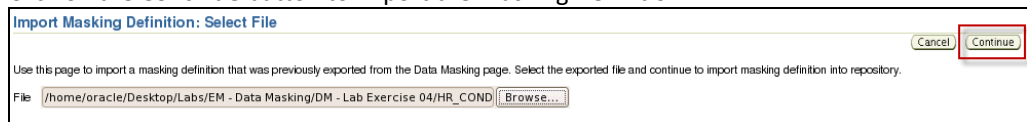
Use this page to import a masking definition that was previously exported from the Data Masking page. Select the exported file and continue to import masking definition into repository.

File

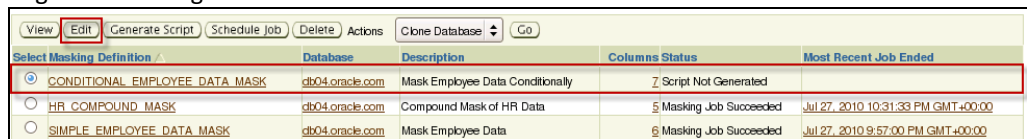
- Navigate to the folder **oracle->Desktop->Labs->11g\_DB\_Security->EM – Data\_Masking ->DM – Lab Exercise 04**, and select the file named **HR\_CONDITIONAL\_MASK.xml**. Click on the **Open** button to continue.




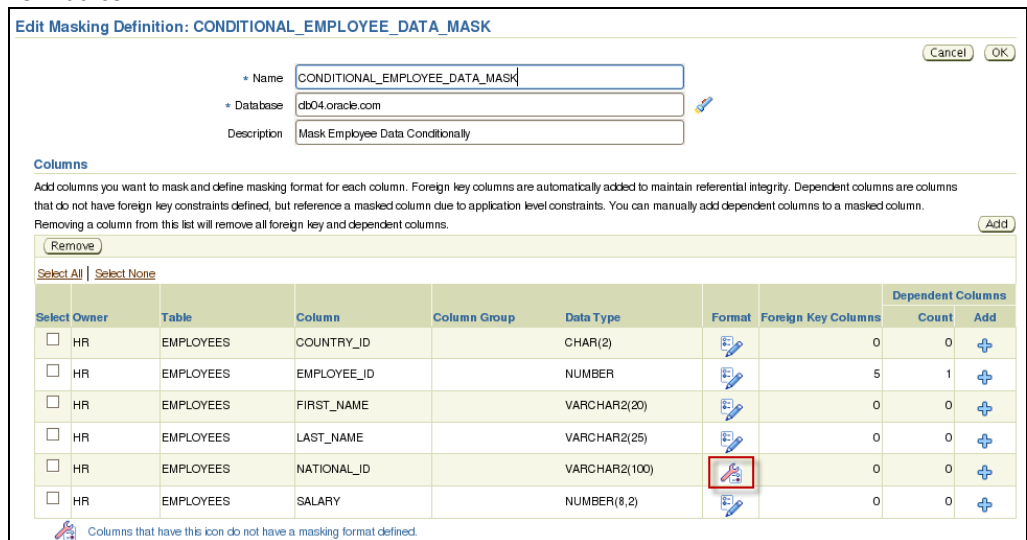
- Click on the **Continue** button to import the Masking Definition.



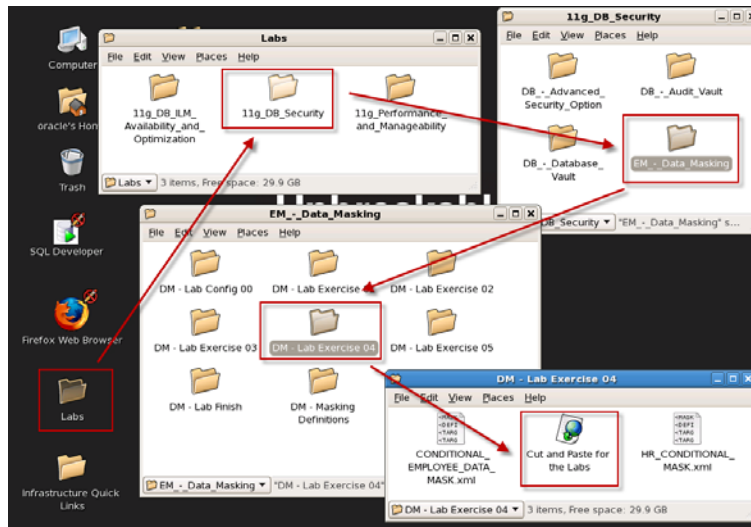
- With **CONDITIONAL\_EMPLOYEE\_DATA\_MASK** selected, click on the **Edit** button to begin customizing our conditional format.



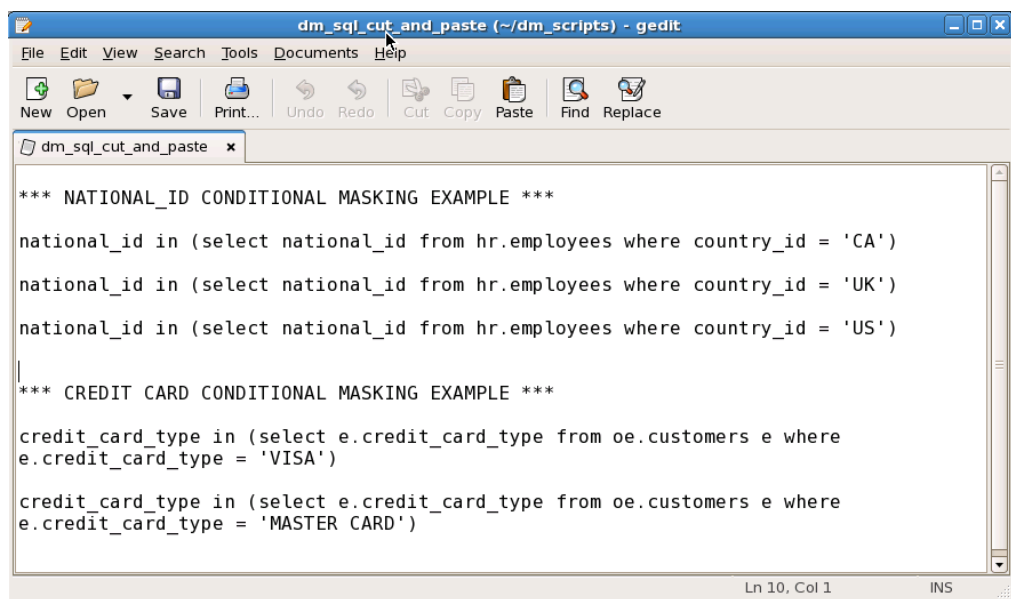
- For this conditional mask, we want to mask the **NATIONAL\_ID** column based upon the **COUNTRY\_ID** column. To configure the **NATIONAL\_ID** column format, click on the  Format icon.



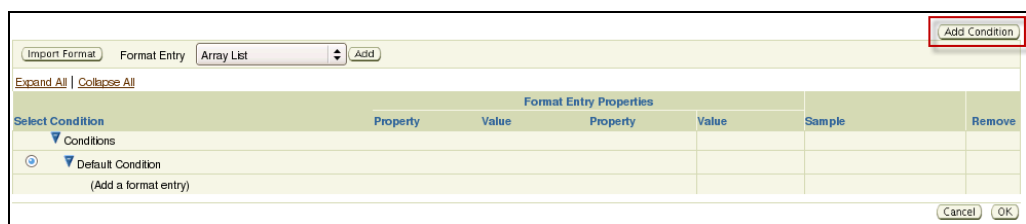
- To avoid typing errors, navigate the lab folders to access a text document with the correct SQL conditional text. Navigate the folders **oracle->Desktop->Labs->11g\_DB\_Security->EM – Data\_Masking ->DM – Lab Exercise 04**.



27. Double click on the icon **Cut and Paste for the Labs** document and open up in the emacs editor. This SQL will be used to evaluate our conditions for proper masking.



28. In the **Define Column Mask** screen, click on the **Add Condition** button. We will be adding 3 conditions based upon the SQL to test for the **COUNTRY\_ID** value.



29. Type (cut and paste) the following SQL Condition and click on the **Import Format** button.
- 1) national\_id in (select national\_id from hr.employees where country\_id = 'CA')



Import Format | Format Entry | Array List | Add

Expand All | Collapse All

Select Condition	Property	Value	Property	Value	Sample	Remove
Conditions						
<input checked="" type="radio"/> f = c.country_id and c.country_id = 'CA'						
(Add a format entry)						
<input type="radio"/> Default Condition						
(Add a format entry)						

Cancel | OK

30. If the condition is met that the **COUNTRY\_ID** value is 'CA', then we will use the Canadian **Social Insurance Number Formatted** provided out of the box with the product. Select the corresponding radio button and click on the **Import** button.

Import Format

Database db02.oracle.com | Logged In As system | Cancel | Import

Owner HR | Column NATIONAL\_ID

Table EMPLOYEES | Data Type VARCHAR2(100)


Search

Name

Owner

Search

<input type="radio"/> National Insurance Number Formatted	Character	BB 37 17 11 B	Generates unique UK National Insurance Numbers	SYSMAN
<input type="radio"/> Social Insurance Number	Character	562731000	~1 billion unique Canadian Social Insurance Numbers	SYSMAN
<input checked="" type="radio"/> Social Insurance Number Formatted	Character	972-921-308	~1 billion unique Canadian Social Insurance Numbers	SYSMAN
<input type="radio"/> Social Security Number Formatted	Character	154-29-2480	~718 million unique US Social Security Numbers	SYSMAN

31. Review the Masking Format. Click on the Sample icon  to view sample data and continue by clicking the **Add Condition** button.

Import Format | Format Entry | Array List | Add

Expand All | Collapse All


Select Condition	Property	Value	Property	Value	Sample	Remove
Conditions						
<input checked="" type="radio"/> national_id in (select e.national_id from					530-752-609	
Random Digits	Start Length	8	End Length	8		
Post-Processing Function	Package Name	DBSNMP.DM	Function Name	MGMT_DM_G		
<input type="radio"/> Default Condition						
(Add a format entry)						

Cancel | OK

32. Add the second Conditional Masking definition. Type (cut and paste) the following SQL Condition and click on the **Import Format** button.
- 1) national\_id in (select national\_id from hr.employees where country\_id = 'UK')

33. If the condition is met that the **COUNTRY\_ID** value is 'UK', then we will use the **National Insurance Number Formatted** provided out of the box with the product. Select the corresponding radio button and click on the **Import** button.

<input type="radio"/>	Generic Credit Card Number	Character	6011131505923026	~10 billion unique generic credit card numbers	SYSMAN
<input type="radio"/>	Generic Credit Card Number Formatted	Character	2149-6282-4889-1091	~10 billion unique generic credit card numbers	SYSMAN
<input checked="" type="radio"/>	National Insurance Number Formatted	Character	CC 05 64 42 C	Generates unique UK National Insurance Numbers	SYSMAN
<input type="radio"/>	Social Insurance Number	Character	192286102	~1 billion unique Canadian Social Insurance Numbers	SYSMAN
<input type="radio"/>	Social Insurance Number Formatted	Character	006-036-701	~1 billion unique Canadian Social Insurance Numbers	SYSMAN
<input type="radio"/>	Social Security Number Formatted	Character	669-73-4130	~718 million unique US Social Security Numbers	SYSMAN

34. Review the Masking Format. Click on the Sample icon  to view sample data and continue by clicking the **Add Condition** button.

35. Add the third Conditional Masking definition. Type (cut and paste) the following SQL Condition and click on the **Import Format** button.
- 1) national\_id in (select national\_id from hr.employees where country\_id = 'US')

Select Condition	Property	Value	Property	Value	Sample	Remove
<input checked="" type="radio"/>	c.country_id	=	c.country_id	'US'		
(Add a format entry)						
<input type="radio"/>	national_id	in	(select e.national_id from		GG 83 85 44 A	

36. If the condition is met that the **COUNTRY\_ID** value is 'US', then we will use the **Social Security Number Formatted** provided out of the box with the product. Select the corresponding radio button and click on the **Import** button.

<input type="radio"/>	National Insurance Number Formatted	Character	EE 57 39 13 D	Generates unique UK National Insurance Numbers	SYSMAN
<input type="radio"/>	Social Insurance Number	Character	620334508	~1 billion unique Canadian Social Insurance Numbers	SYSMAN
<input type="radio"/>	Social Insurance Number Formatted	Character	362-605-305	~1 billion unique Canadian Social Insurance Numbers	SYSMAN
<input checked="" type="radio"/>	Social Security Number Formatted	Character	439-85-8960	~718 million unique US Social Security Numbers	SYSMAN

37. The last step is to set the Default mask if the value of **COUNTRY\_ID** is not met by any of our conditions, either 'CA', 'UK' or 'US'. Select the radio button for the **Default Condition** and choose the **Preserve Original Data** mask and click on the **Add** button.

38. To finish defining a Column Mask, click the **OK** button.

39. The creation of our Condition-based mask is now complete. To finish editing the Masking Definition, click the **OK** button.

40. You will be brought back to the Data Masking Definitions page. Select the **CONDITIONAL\_EMPLOYEE\_DATA\_MASK** and click on the **Generate Script** button.

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> CONDITIONAL_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data Conditionally	7	Script Not Generated	
<input type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Succeeded	Jul 27, 2010 10:31:33 PM GMT+00:00
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

**Processing: Generating Data Masking Script**

Database: **db04.oracle.com** Number of Tables: **6** Cancel

Logged In As: **system** Columns: **12**

The masking script is being generated. This process may take up to 15 minutes to complete.

Cancel

- After the data masking script generation has completed successfully, scroll down the page and expand the **Impact Report** section. Choose to save the script to disk for additional review by clicking on the **Save Full Script** button.

**Information**  
Data masking script generation completed successfully.

**Script Generation Results: CONDITIONAL\_EMPLOYEE\_DATA\_MASK**

Database: **db04.oracle.com** Number of Tables: **6** Return

Logged In As: **system** Columns: **12**

**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. Save Full Script

View:  Script Summary  Full Script

```
-- Target database: db04.oracle.com
-- Script generated at: 27-JUL-2010 23:08
COMMIT
ALTER SESSION ENABLE PARALLEL DML
DROP TABLE 'MGMT_DM_IT_43' PURGE
```

- Before executing the newly created Conditional-based data masking script as we have done previously, open up another browser tab to query the before state of the **HR.EMPLOYEES** table we will be masking.
- Click on the **Schedule Job** button to execute the newly created data mask immediately schedule and run the masking operation. Provide the Host Credentials using the user: Oracle and the provided password. Click on the **Submit** button to execute the job.

**Schedule Data Masking Job: CONDITIONAL\_EMPLOYEE\_DATA\_MASK**

Database: **db04.oracle.com** Number of Tables: **6** Columns: **12**

Logged In As: **system**

Job Name: MASKING\_JOB\_40

Job Description:

Script File Location: /u01/oracle/product/11.2.0/dbhome\_1/dbs

Script File Name: masking40.sql

**Host Credentials**

Username: oracle

Password: \*\*\*\*\*

Save as Preferred Credential

**Start**

Immediately

Later

Date: Jul 27, 2010

Time: 11:05 AM

44. Once you submit the job, you will be forwarded to a confirmation page that the job was submitted successfully.

**Job Submitted Successfully**

Data Masking job has been submitted successfully. Click on the View Job Details link below to view execution status.

[View Job Details](#)

**Data Masking Definitions**

Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search: Database: "db04.oracle.com" **Go** Import Create

View Edit Generate Script Schedule Job Delete Actions Clone Database Go

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> CONDITIONAL_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data Conditionally	7	Masking Job Scheduled	
<input type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Succeeded	Jul 27, 2010 10:31:33 PM GMT+00:00
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

45. Click on the **GO** button to refresh the status of the job.

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> CONDITIONAL_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data Conditionally	7	Masking Job Succeeded	Jul 27, 2010 11:16:05 PM GMT+00:00
<input type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Succeeded	Jul 27, 2010 10:31:33 PM GMT+00:00
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00

46. Once the job successfully completes, follow the provided steps again to create a new tab and query the masked data for a before and after comparison. View the data before the compound masking operation for the **HR.EMPLOYEES** table.

Oracle Enterprise Manager 11g  
Grid Control

Home | Targets | Discoveries | Alerts | Compliance | Jobs | Reports

Database Instance: db04.oracle.com > Tables > View Data for Table: HR.EMPLOYEES

Query: SELECT EMPLOYEE\_ID, FIRST\_NAME, LAST\_NAME, EMAIL, PHONE\_NUMBER, HIRE\_DATE, JOB\_ID, SALARY, COMMISSION\_PCT, MANAGER\_ID, DEPARTMENT\_ID, NATIONAL\_ID, STREET\_ADDRESS, POSTAL\_CODE, CITY, STATE\_PROVINCE, COUNTRY\_ID FROM HR.EMPLOYEES

Results: 20 of 107

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID	STREET_ADDRESS	POSTAL_CODE	CITY	STATE_PROVINCE	COUNTRY_ID
144	Peter	Vargas	PVARGAS	090.121.2004	1998-07-09	ST_CLERK	2500		124	30	30	111111111	95020	South San Francisco	California	US
145	Fames	Paterson	FPATERSON	011.44.1344.467.208	1997-01-05	SA_MAN	13500	.3	100	80	149-439-707	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
146	Genid	Cambrani	GCAMBRA	011.44.1344.019.008	1999-09-15	SA_MAN	11000	.3	100	80	27-1348-107	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
150	Peter	Tucker	PTUCKER	011.44.1344.120.008	1997-01-30	SA_REP	10000	.3	145	80	949-51-401	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
152	Peter	Hall	PHALL	011.44.1344.478.908	1997-08-20	SA_REP	9000	.25	145	80	903-886-513	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
153	Christopher	Olson	COLSON	011.44.1344.498.718	1996-03-09	SA_REP	8100	.2	145	80	578-184-600	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
156	Janelle	King	JKING	011.44.1345.429.008	1996-01-30	SA_REP	10000	.35	146	80	761-647-771	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
158	Alan	Mathson	AMATHSON	011.44.1345.829.008	1996-08-01	SA_REP	9000	.35	146	80	942-135-798	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
160	Louise	Dunn	LDUNN	011.44.1345.029.008	1995-12-15	SA_REP	7500	.3	146	80	237-752-608	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
163	David	Green	DGREEN	011.44.1345.229.008	1999-03-19	SA_REP	9900	.15	147	80	902-634-127	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
165	David	Lee	DLEE	011.44.1345.529.008	2000-03-23	SA_REP	8600	.1	147	80	311-101-771	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
166	Sander	Abel	SABEL	011.44.1345.029.008	2000-03-24	SA_REP	8400	.1	147	80	985-632-499	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
169	Harrison	Bloom	HBLOOM	011.44.1345.829.008	1998-03-23	SA_REP	10000	.2	148	80	108-629-108	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
171	William	Smith	WSMITH	011.44.1345.029.008	1999-02-23	SA_REP	7400	.15	148	80	439-679-770	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
173	Sandila	Kumar	SKUMAR	011.44.1345.329.008	2000-04-21	SA_REP	6100	.1	148	80	984-493-130	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
176	Jonathan	Taylor	JTAYLOR	011.44.1944.429.008	1998-03-24	SA_REP	8900	.2	149	80	270-659-808	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK

47. View the data after the compound masking operation for the HR.EMPLOYEES table.

Oracle Enterprise Manager 11g  
Grid Control

Home | Targets | Discoveries | Alerts | Compliance | Jobs | Reports

Database Instance: db04.oracle.com > Tables > View Data for Table: HR.EMPLOYEES

Query: SELECT EMPLOYEE\_ID, FIRST\_NAME, LAST\_NAME, EMAIL, PHONE\_NUMBER, HIRE\_DATE, JOB\_ID, SALARY, COMMISSION\_PCT, MANAGER\_ID, DEPARTMENT\_ID, NATIONAL\_ID, STREET\_ADDRESS, POSTAL\_CODE, CITY, STATE\_PROVINCE, COUNTRY\_ID FROM HR.EMPLOYEES

Results: 125 of 107

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID	STREET_ADDRESS	POSTAL_CODE	CITY	STATE_PROVINCE	COUNTRY_ID
173	Sandila	Kumar	SKUMAR	011.44.1345.329.008	2000-04-21	SA_REP	6100	.1	148	80	PP 70 50 12 A	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
179	Charles	Johnson	CJOHNSON	011.44.1944.429.008	2000-01-04	SA_REP	6300	.1	149	80	10 60 30 81 D	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
186	Anna	Walsh	AWALSH	090.907.98.11	1998-04-24	SH_CLERK	3100		124	30	338-44-106	2011 Intertec Blvd	95020	South San Francisco	California	US
202	Pat	Fay	PFAY	090.123.0000	1997-08-17	HR_REP	6000		201	20	830950207	147 Spadina Ave	M5V 1Z7	Toronto	Ontario	CA
159	Lindsey	Smith	LSMITH	011.44.1345.729.008	1997-02-10	SA_REP	8000	.3	146	80	88 64 70 61 B	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
130	Matthew	West	MWEST	090.123.1234	1999-07-18	ST_MAN	8000		100	50	1134-0008	2011 Intertec Blvd	95020	South San Francisco	California	US
111	Jonathan	Skam	JSKAM	515.124.4099	1997-09-30	PL_ACCOUNT	7700		108	100	48-149-2083	3004 Chastate Rd	98199	Seattle	Washington	US
117	Spil	Tobias	STOBIAS	515.127.4304	1997-07-24	PL_CLERK	2800		114	30	088-60-008 2	2004 Chastate Rd	98199	Seattle	Washington	US
103	Alexander	Hunkd	AHUNKD	980.423.4307	1990-01-03	IT_PROG	9000		102	60	660-67-6033	2014 Jubbenvoedy Rd	28192	Southlake	Texas	US
163	Bilney	Everett	BEVERETT	090.901.2878	1997-09-03	SH_CLERK	3900		123	30	511-55-3032	2011 Intertec Blvd	95020	South San Francisco	California	US
200	Jennifer	Whalen	JWHALEN	515.123.4444	1987-09-17	AD_ASST	4400		101	10	389-018005	3004 Chastate Rd	98199	Seattle	Washington	US
171	William	Smith	WSMITH	011.44.1345.029.008	1999-02-23	SA_REP	7400	.15	148	80	41 43 80 05 C	Magdalen Centre, The Oxford Science Park	019 932	Oxford	Oxford	UK
107	Diana	Lorentz	DLORNTZ	980.423.2987	1999-02-07	IT_PROG	4300		103	60	308-43-2021	2014 Jubbenvoedy Rd	28192	Southlake	Texas	US
127	James	Landy	JLANDY	090.124.1234	1999-01-14	ST_CLERK	2400		120	50	200-71-2000	2011 Intertec Blvd	95020	South San Francisco	California	US
133	Jason	Muller	JMULLER	090.127.1934	1995-09-14	ST_CLERK	3000		122	50	678-07-6097	2011 Intertec Blvd	95020	South San Francisco	California	US
108	Nancy	Greenberg	NGREENB	515.124.4999	1996-08-17	PL_MGR	12000		101	100	384-14-4050	2004 Chastate Rd	98199	Seattle	Washington	US

48. Return to the **Data Masking Definition** screen. We will create a new definition by using the **Create Like** option. Select the Masking Definition **SIMPLE\_EMPLOYEE\_DATA\_MASK** and choose the **Create Like** option from the Actions and click the **Go** button.

**Data Masking Definitions**

Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search: Database [ ] Go [ ] Import [ ] Create [ ]

View [ ] Edit [ ] Generate Script [ ] Schedule Job [ ] Delete [ ] Actions [ ] Clone Database [ ] Go [ ]

Select Masking Definition	Database	Clone Database	Columns Status	Most Recent Job Ended
<input type="radio"/> CONDITIONAL_EMPLOYEE_DATA_MASK	db04.oracle.com	Create Like	Conditionally	7 Masking Job Succeeded Jul 27, 2010 11:16:05 PM GMT+00:00
<input type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Export Save Script	5	Masking Job Succeeded Jul 27, 2010 10:31:33 PM GMT+00:00
<input checked="" type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	View Script	6	Masking Job Succeeded Jul 27, 2010 9:57:00 PM GMT+00:00

49. From the **Create Masking Definition** screen, type in the **Name**, **Database** and **Description** field with the provided values below. Continue and click on the **Add** button.

- i. **Name:** USER\_DEFINED\_MASK\_EMAIL
- Database:** db04.oracle.com
- Description:** Mask Employee Data with User Defined Mask - Email

**Create Masking Definition**

Cancel OK

Name: USER\_DEFINED\_MASK\_EMAIL  
Database: db04.oracle.com  
Description: Mask Employee Data with User Defined Mask - Email

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns.

Remove Add

Select All Select None

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns	
								Count	Add
<input type="checkbox"/>	HR	EMPLOYEES	EMPLOYEE_ID		NUMBER		5	1	
<input type="checkbox"/>	HR	EMPLOYEES	FIRST_NAME		VARCHAR2(20)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	LAST_NAME		VARCHAR2(25)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	PHONE_NUMBER		VARCHAR2(20)		0	0	
<input type="checkbox"/>	HR	EMPLOYEES	SALARY		NUMBER(8,2)		0	0	

50. For this Masking Definition, we will add the column EMAIL. We are going to search in the EMPLOYEES table in the HR Schema for the EMAIL Column name. Type in the following values and click on the **Search** button. Select the **EMAIL** column and click on the **Add** button.

- i. **Schema:** HR
- Table Name:** EMPLOYEE
- Column Name:** EMAIL

**Add Columns**

Database: db04.oracle.com Logged In As: system Cancel Add Define Format And Add

Add one or more columns for masking. Foreign key columns will be added automatically. You can define masking format at once for all selected columns if they have the same data type.

**Search**

Schema: HR Column Name: EMAIL  
Table Name: EMPLOYEES Column Comment:

Search

Mask selected columns as a group

Select All Select None

Select	Owner	Table Name	Column Name	Data Type	Comment
<input checked="" type="checkbox"/>	HR	EMPLOYEES	EMAIL	VARCHAR2(100)	MASK candidate: HR Privacy Policy

Cancel Add Define Format And Add

51. Continue by clicking on the Format icon on the EMAIL column.

<input type="checkbox"/>	HR	EMPLOYEES	EMAIL	VARCHAR2(100)		0	0	
--------------------------	----	-----------	-------	---------------	--	---	---	--

Columns that have this icon do not have a masking format defined.

52. In the Define Column Mask screen in the section of Format Entry, select **User Defined Function** from the drop-down list box and click on the Add button. After the **Default Condition** section expands, specify the **Package Name: HR** and **Function Name: EMAIL\_MASK**. Click on the **OK** button.



Define Column Mask

Owner: HR, Column: EMAIL, Table: EMPLOYEES, Data Type: VARCHAR2(100)

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.

Format Entry: User Defined Function

Select Condition	Property	Value	Property	Value	Sample	Remove
Default Condition			Package Name	HR		
User Defined Function			Function Name	EMAIL_MASK		

53. At this step, you could continue to add to your Masking Definition. To finish creating this Masking Definition, click the **OK** button.

Edit Masking Definition: USER\_DEFINED\_MASK\_EMAIL

Name: USER\_DEFINED\_MASK\_EMAIL

Database: db04.oracle.com

Description: Mask Employee Data with User Defined Mask - Email

54. You will be brought back to the Data Masking Definitions page. Select the **USER\_DEFINED\_MASK\_EMAIL** and click on the **Generate Script** button.

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input type="radio"/> CONDITIONAL_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data Conditionally	7	Masking Job Succeeded	Jul 27, 2010 11:16:05 PM GMT+00:00
<input type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Succeeded	Jul 27, 2010 10:31:33 PM GMT+00:00
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00
<input checked="" type="radio"/> USER_DEFINED_MASK_EMAIL	db04.oracle.com	Mask Employee Data with User Defined Mask - Email	7	Script Not Generated	

Processing: Generating Data Masking Script

Database: db04.oracle.com, Number of Tables: 6, Columns: 12

The masking script is being generated. This process may take up to 15 minutes to complete.

55. After the data masking script generation has completed successfully, scroll down the page and expand the **Impact Report** section. Choose to save the script to disk for additional review by clicking on the **Save Full Script** button.

Information: Data masking script generation completed successfully.

Script Generation Results: USER\_DEFINED\_MASK\_EMAIL

Database: db04.oracle.com, Number of Tables: 6, Columns: 12

Script Options: Clone And Mask, Schedule Job

Script Summary: Save Full Script

```
-- Target database: db04.oracle.com
-- Script generated at: 28-JUL-2010 00:25
COMMIT
ALTER SESSION ENABLE PARALLEL DML
DROP TABLE 'MGMT_DM_TT_63' PURGE
declare
adj number:=0;
num number:=0;
```

56. Before executing the newly created compound data masking script as we have done previously, open up another browser tab to query the before state of the **HR.EMPLOYEES** table we will be masking.
57. Click on the **Schedule Job** button to execute the newly created data mask immediately schedule and run the masking operation. Provide the Host Credentials using the user: Oracle and the provided password. Click on the **Submit** button to execute the job.

58. Once you submit the job, you will be forwarded to a confirmation page that the job was submitted successfully.

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> CONDITIONAL_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data Conditionally	7	Masking Job Succeeded	Jul 27, 2010 11:16:05 PM GMT+00:00
<input type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Succeeded	Jul 27, 2010 10:31:33 PM GMT+00:00
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00
<input type="radio"/> USER_DEFINED_MASK_EMAIL	db04.oracle.com	Mask Employee Data with User Defined Mask - Email	7	Masking Job Scheduled	

59. Click on the **GO** button to refresh the status of the job.

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/> CONDITIONAL_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data Conditionally	7	Masking Job Succeeded	Jul 27, 2010 11:16:05 PM GMT+00:00
<input type="radio"/> HR_COMPOUND_MASK	db04.oracle.com	Compound Mask of HR Data	5	Masking Job Succeeded	Jul 27, 2010 10:31:33 PM GMT+00:00
<input type="radio"/> SIMPLE_EMPLOYEE_DATA_MASK	db04.oracle.com	Mask Employee Data	6	Masking Job Succeeded	Jul 27, 2010 9:57:00 PM GMT+00:00
<input type="radio"/> USER_DEFINED_MASK_EMAIL	db04.oracle.com	Mask Employee Data with User Defined Mask - Email	7	Masking Job Succeeded	Jul 28, 2010 12:31:21 AM GMT+00:00

60. Once the job successfully completes, follow the provided steps again to create a new tab and query the masked data for a before and after comparison. View the data before the user-defined masking operation for the **HR.EMPLOYEES** table on the **EMAIL** column.

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Database Instance: db02.oracle.com > Tables > Logged in As SYSTEM

View Data for Table: HR.EMPLOYEES Refine Query OK

Query

```
SELECT 'EMPLOYEE_ID', 'FIRST_NAME', 'LAST_NAME', 'EMAIL', 'PHONE_NUMBER',
'HIRE_DATE', 'JOB_ID', 'SALARY', 'COMMISSION_PCT', 'MANAGER_ID', 'DEPARTMENT_ID',
'NATIONAL_ID', 'STREET_ADDRESS', 'POSTAL_CODE', 'CITY', 'STATE_PROVINCE',
'COUNTRY_ID' FROM 'HR'.EMPLOYEES'
```

Result

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID	STREET_ADDRESS	POSTAL_CODE	CITY	STATE_PROVINCE	COUNTRY_ID
6700154081	Graham	Belushi	MSULLIVA	+1 313 123 4230	1999-06-21 00:00:00.0	SH_CLERK	10000		7299185015		50 766-42-6975	310				
6674611078	Clara	Finney	WSMITH	+1 319 123 4301	1999-02-23 00:00:00.0	SA_REP	24000	.15	7283523029		80 142-907-184	221				
4133067045	Cary	Bates	GGEONI	+1 410 123 4813	2000-02-03 00:00:00.0	SH_CLERK	2100		7299185015		50 991-91-8404	200				
6453363033	Keir	Baldwin	ABULL	+1 412 123 4684	1997-02-20 00:00:00.0	SH_CLERK	6000		9750595016		50 932-32-5187	200				
4268540074	Rosanne	Cage	KPARTNER	+1 608 123 4374	1997-01-05 00:00:00.0	SA_MAN	2200	.3	1227795000		80 106-503-395	122				
7918770028	Louis	Ashby	TRAJS	+1 610 123 4714	1995-10-17	ST_CLERK	8000		7278130071		50 858-29-1412	835				

61. View the data after the compound masking operation for the HR.EMPLOYEES table. Notice the new masked values for EMAIL column.

ORACLE Enterprise Manager 10g  
Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Hosts | Databases | Middleware | Web Applications | Services | Systems | Groups | All Targets

Database Instance: db02.oracle.com > Tables > Logged in As SYSTEM

View Data for Table: HR.EMPLOYEES Refine Query OK

Query

```
SELECT 'EMPLOYEE_ID', 'FIRST_NAME', 'LAST_NAME', 'EMAIL', 'PHONE_NUMBER',
'HIRE_DATE', 'JOB_ID', 'SALARY', 'COMMISSION_PCT', 'MANAGER_ID', 'DEPARTMENT_ID',
'NATIONAL_ID', 'STREET_ADDRESS', 'POSTAL_CODE', 'CITY', 'STATE_PROVINCE',
'COUNTRY_ID' FROM 'HR'.EMPLOYEES'
```

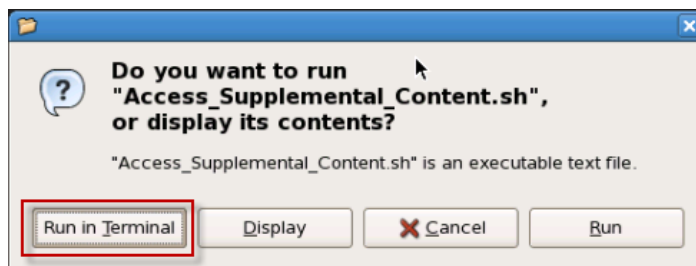
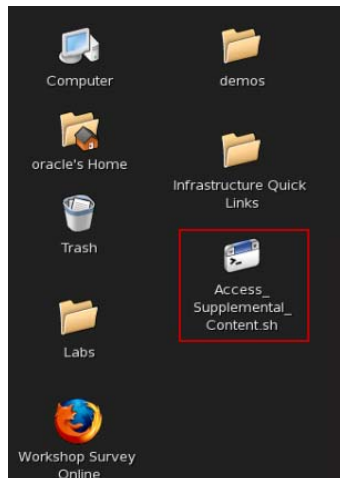
Result

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID	STREET_ADDRESS	POSTAL_CODE	CITY	STATE_PROVINCE	COUNTRY_ID
5430056067	Carol	Belushi	Ajay.9748893048.Chandar@mailinator.com	(510) 555-4001	1994-08-17 00:00:00.0	FL_MGR	8000				5739698036					
1503608097	Sissy	Allman	Billy.4786488071.Bogart@mailinator.com	(925) 555-0043	1994-06-07 00:00:00.0	AC_MGR	8000				5739698036					
8640344069	Rick	Belushi	Rosanne.1244434091.Alexander@mailinator.com	(510) 555-6025	1996-06-14 00:00:00.0	ST_CLERK	3800				6628932064					
8352284046	Carol	Andrews	Ajay.6046501022.Bradford@mailinator.com	(925) 555-6019	1997-03-03 00:00:00.0	SH_CLERK	7900				5806597068					
5806597068	Alexander	Bel Geddes	Rodolfo.1100963076.Cage@mailinator.com	(925) 555-6019	1997-10-10 00:00:00.0	ST_MAN	9000				2246631072					
9133617007	Bryan	Ashby	Kristin.4797446075.Andrews@mailinator.com	(925) 555-5023	1996-07-18 00:00:00.0	ST_MAN	7800				2246631072					

This concludes the Oracle Enterprise Manager Data Masking Hands-on Lab. If you have time, please continue the following **OPTIONAL** lab for extra credit 😊 !

## Deterministic masking (OPTIONAL – Extra Credit)

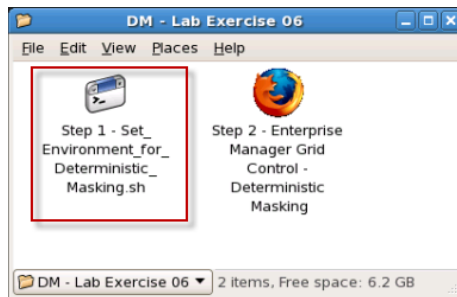
1. Navigate to the desktop and click on the icon, 'Access\_Supplemental\_Content.sh'. Click on the **Run in Terminal** button when provided the option.



2. After the **Supplemental** folder is copied to the desktop, drill down to the folder **Supplemental->11g\_DB\_Security → EM\_-\_Data\_Masking → DM – Lab Exercise 06**.



- In the **DM – Lab Exercise 06** folder, click on the icon, **'Step 1- Set Environment for Deterministic Masking.sh'** . This will set up the two database users, HR01 and HR02 that will be used in this exercise. Hit the “return” to close the window once the script is done.



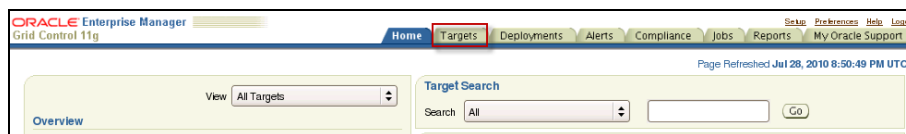
- Click on **'Step 2 – Enterprise Manager Grid Control – Deterministic Masking'** to open the browser to login into Grid Control.



- Login to Grid Control at the URL <http://dbsecurity.oracle.com:4889/em> using the User Name: sysman and the Password: oracle1. Click on the Login button.



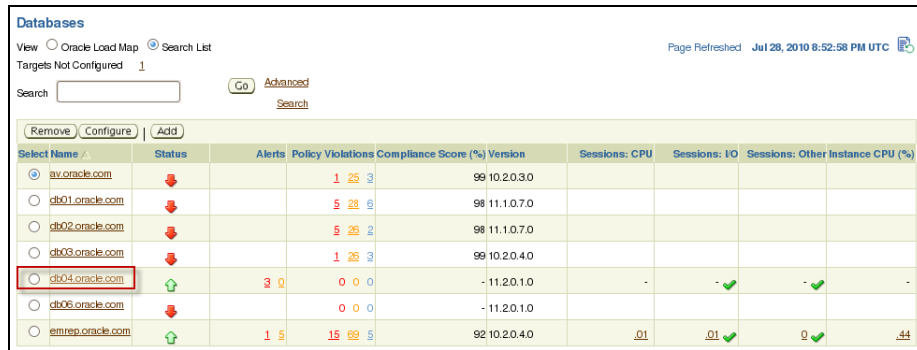
- After logging on to Enterprise Manager – Grid Control, click on the Targets tab.



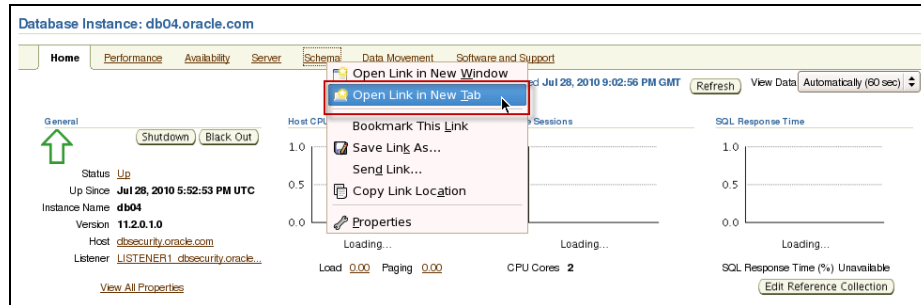
- Click on Databases.



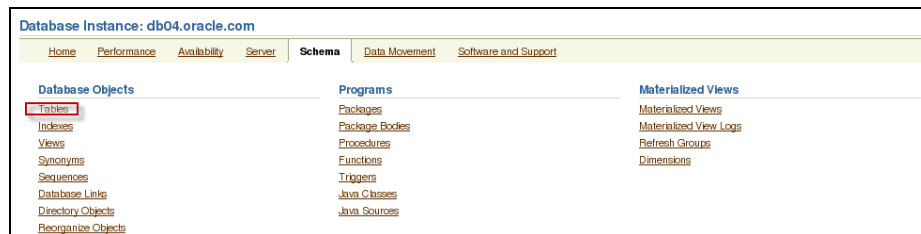
8. Click on the database link db04.oracle.com.



9. Right click on the link, 'Schema' and choose the option, 'Open Link in New Tab'.



10. In the newly opened tab, we will query the HR01 table. Click on the Tables link.



11. If prompted, login to the database using the Username: system and Password: oracle1. Click on the Login button when finished. TIP: select the option to "Save as Preferred Credential".



Database Login

Username: system  
Password: \*\*\*\*\*

Database: db04.oracle.com

Connect As: Normal

Save as Preferred Credential

Cancel Login

12. We will be querying the HR01 schema and the EMPLOYEES table. Click on the Go button.

Tables

Object Type: Table

Search

Select an object type and optionally enter a schema name and an object name to filter the data that is displayed in your results set.

Schema: HR01

Object Name: EMPLOYEES

Go

13. Select the Action to View Data and click on the Go button.

Selection Mode: Single

Actions: View Data

Go

Select Schema	Table Name	Tablespace	Partitioned	Rows Last Analyzed
HR01	EMPLOYEES	EXAMPLE	NO	

Recycle Bin

14. Click on the EMPLOYEE\_ID column to sort the data. This is the pre-masked Library data for HR01.EMPLOYEES. We will use the same steps above to view this table after the masking process.

View Data for Table: HR01.EMPLOYEES

Refine Query OK

Query

```
SELECT 'EMPLOYEE_ID', 'FIRST_NAME', 'LAST_NAME', 'EMAIL', 'PHONE_NUMBER', 'HIRE_DATE', 'JOB_ID', 'SALARY', 'COMMISSION_PCT', 'MANAGER_ID', 'DEPARTMENT_ID', 'NATIONAL_ID', 'STREET_ADDRESS', 'POSTAL_CODE', 'CITY', 'STATE_PROVINCE', 'COUNTRY_ID' FROM 'HR01'.EMPLOYEES
```

Result

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID
100	Steven	King	SKING	515.123.4567	1987-06-17	AD_PRES	24000	00.00.00.0			90 494-17-9546
101	Neena	Kochhar	NKOCHHAR	515.123.4568	1989-09-21	AD_VP	17000	00.00.00.0	100		90 625-15-1353
102	Lex	De Haan	LDEHAAN	515.123.4569	1993-01-13	AD_VP	17000	00.00.00.0	100		90 948-69-9018
103	Alexander	Hunold	AHUNOLD	590.423.4567	1990-01-03	IT_PROG	9000	00.00.00.0	102		60 544-68-5666
104	Bruce	Ernst	BERNST	590.423.4568	1991-05-21	IT_PROG	6000	00.00.00.0	103		60 473-40-4541

15. Navigate back to the first browser tab. Click on the Databases link.

ORACLE Enterprise Manager Grid Control 11g

Home Targets Deployments Alerts Compliance Jobs Reports My Oracle Support

Hosts **Databases** Middleware Web Applications Services Systems Groups Virtual Servers All Targets

Logged in As SYSTEM

16. Scroll down to the bottom of the page and select the Data Masking Definitions link.

Related Links

Customize Table Columns  
Dictionary Baselines  
Execute SQL

Data Masking Definitions  
Dictionary Comparisons  
Recovery Catalogs

Data Masking Format Library  
Dictionary Synchronizations

17. In the Data Masking Definitions screen, click on the Create button.

**Data Masking Definitions**

Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search:

Select Masking Definition	Database	Description	Columns Status	Most Recent Job Ended
No definitions				

18. From the Create Masking Definition screen, type in the Name, Database and Description field with the provided values below. Continue and click on the Add button.

Name: DETERMINISTIC\_MASKING\_EXAMPLE\_HR01  
 Database: db04.oracle.com  
 Description: Sample Deterministic Example

**Create Masking Definition**

Name:

Database:

Description:

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns.

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns	Count	Add
No columns added										

19. In the Add Columns screen, search for the EMPLOYEES table in the HR01 schema. Type in the following values and click on the Search button.

Schema: HR01  
 Table Name: EMPLOYEEE

**Add Columns**

Database: **db04.oracle.com** Logged In As: **system**

Add one or more columns for masking. Foreign key columns will be added automatically. You can define masking format at once for all selected columns if they have the same data type.

**Search**

Schema:

Table Name:

Column Name:

Column Comment:

Enter a string in column comments.

20. Select the column for EMAIL and click on the Add button.

**Add Columns**

Database: **db04.oracle.com** Logged In As: **system**

Add one or more columns for masking. Foreign key columns will be added automatically. You can define masking format at once for all selected columns if they have the same data type.

**Search**

Schema:

Table Name:

Column Name:

Column Comment:

Enter a string in column comments.

Mask selected columns as a group

Select	Owner	Table Name	Column Name	Data Type	Comment
<input type="checkbox"/>	HR01	EMPLOYEEE	CITY	VARCHAR2(30)	
<input type="checkbox"/>	HR01	EMPLOYEEE	COMMISSION_PCT	NUMBER(2,2)	Commission percentage of the employee; Only employees in sales department eligible for commission percentage
<input type="checkbox"/>	HR01	EMPLOYEEE	COUNTRY_ID	CHAR(2)	
<input type="checkbox"/>	HR01	EMPLOYEEE	DEPARTMENT_ID	NUMBER(4)	Department id where employee works; foreign key to department_id column of the departments table
<input checked="" type="checkbox"/>	HR01	EMPLOYEEE	EMAIL	VARCHAR2(100)	MASK candidate: HR Privacy Policy

21. Click on the Format icon.

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. Add

Remove

Select All | Select None

Select Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns Count	Add
<input type="checkbox"/> HR01	EMPLOYEES	EMAIL		VARCHAR2(100)		0	0	

Columns that have this icon do not have a masking format defined.

22. In the Define Column Mask section, choose the Format Entry of Substitute and click on the Add button.

**Define Column Mask**

Owner: HR01 Table: EMPLOYEES  
Column: EMAIL Data Type: VARCHAR2(100) 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: Substitute Add

Expand All | Collapse All

Select Condition	Property	Value	Property	Value	Sample	Remove
▼ Conditions						
▼ Default Condition						
(Add a format entry)						

Cancel OK

23. Enter the Table Name OE.CUSTOMERS and the Column Name CUST\_EMAIL to be used for the substitute values. Click on the OK button to proceed.

**Define Column Mask**

Owner: HR01 Table: EMPLOYEES  
Column: EMAIL Data Type: VARCHAR2(100) 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: Substitute Add

Expand All | Collapse All

Select Condition	Property	Value	Property	Value	Sample	Remove
▼ Conditions						
▼ Default Condition						
Substitute	Table Name	<span style="border: 1px solid red;">OE.CUSTOM</span>	Column Name	<span style="border: 1px solid red;">CUST_EMAIL</span>		

Cancel OK

24. After the Masking Definition has been created, click on the OK button.

**Create Masking Definition**

Cancel OK

Name: DETERMINISTIC\_MASKING\_EXAMPLE

Database: db04.oracle.com

Description: Sample Deterministic Example

**Columns**

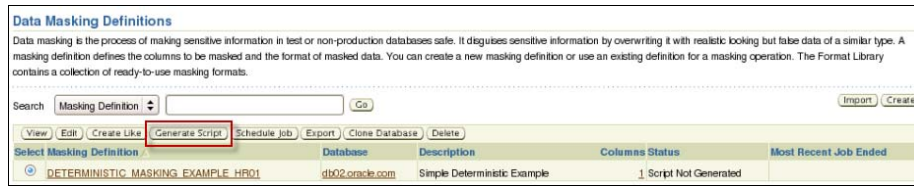
Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns. Add

Remove

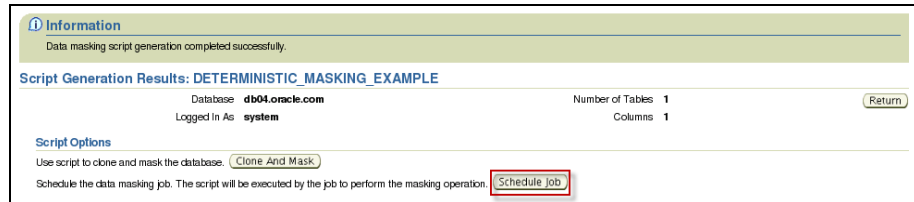
Select All | Select None

Select Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Dependent Columns Count	Add
<input type="checkbox"/> HR01	EMPLOYEES	EMAIL		VARCHAR2(100)		0	0	

25. As you have completed in previous exercises, click on the Generate Script button.

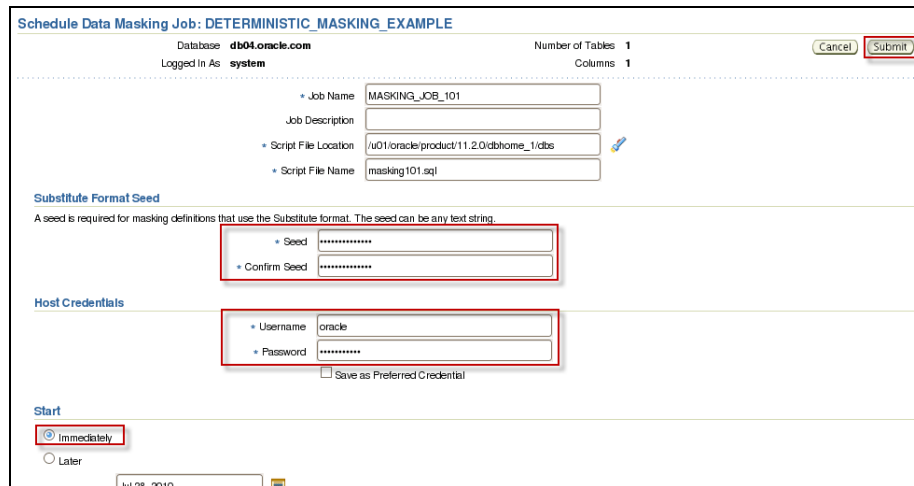


26. After the script has been generated, click on the Schedule Job button.

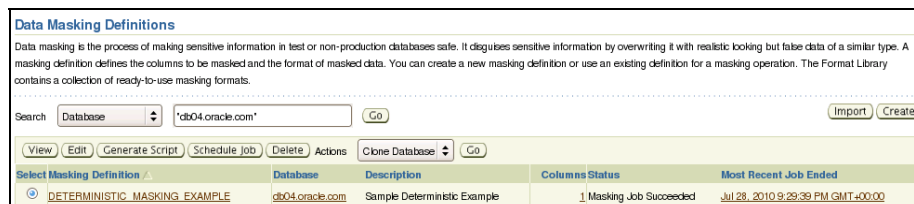


27. Provide the user credentials provided for the oracle user using the password provided (i.e. g0Oracle12#), a Substitute Format Seed (for example, a string "123456"), and click on the Submit button.

To properly show Deterministic masking in this exercise, you must use the same Seed value for both masking jobs. New in EM 11g, Substitute Format Seeds have been introduced. This allows the user to provide seed values and have better control over non-deterministic and deterministic masking.



28. One the Masking job is complete, move to the next step.



29. In the second browser tab, click on the Tables link.

Database Instance: db02.oracle.com > Tables > Logged in As SYSTEM

View Data for Table: HR01.EMPLOYEES

Query

```
SELECT 'EMPLOYEE_ID', 'FIRST_NAME', 'LAST_NAME', 'EMAIL', 'PHONE_NUMBER',
'HIRE_DATE', 'JOB_ID', 'SALARY', 'COMMISSION_PCT', 'MANAGER_ID', 'DEPARTMENT_ID',
'NATIONAL_ID', 'STREET_ADDRESS', 'POSTAL_CODE', 'CITY', 'STATE_PROVINCE',
'COUNTRY_ID' FROM 'HR01'.EMPLOYEES
```

Result

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID
100	Steven	King	SKING	515.123.4567	1987-06-17 00:00:00.0	AD_PRES	24000				90 494-17-9546
101	Neena	Kochhar	NKOCHHAR	515.123.4568	1989-09-21 00:00:00.0	AD_VP	17000		100		90 625-15-1353

30. Query the HR01 schema and the EMPLOYEES table. Click on the Go button. Select the Action to View Data and click on the Go button. View the masked data.

Tables

Object Type: Table

Search

Select an object type and optionally enter a schema name and an object name to filter the data that is displayed in your results set.

Schema: HR01

Object Name: EMPLOYEES

Go

By default, the search terms all uppercase matches beginning with the string you entered. To run an exact or case-sensitive match, double quote the search string. You can use the wildcard symbol (%) in a double quoted string.

Selection Mode: Single

Create

Edit View Delete With Options Actions View Data Go

Select Schema	Table Name	Tablespace	Partitioned	Rows	Last Analyzed
HR01	EMPLOYEES	EXAMPLE	NO	107	Jul 28, 2010 9:29:28 PM UTC

31. Click on the EMPLOYEE\_ID column to sort the data. Keep this tab open. We will now mask the data on HR02 to demonstrate the results of the deterministic masking capability.

ORACLE Enterprise Manager 11g

Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Database Instance: db02.oracle.com > Tables > Logged in As SYSTEM

View Data for Table: HR01.EMPLOYEES

Query

```
SELECT 'EMPLOYEE_ID', 'FIRST_NAME', 'LAST_NAME', 'EMAIL', 'PHONE_NUMBER',
'HIRE_DATE', 'JOB_ID', 'SALARY', 'COMMISSION_PCT', 'MANAGER_ID', 'DEPARTMENT_ID',
'NATIONAL_ID', 'STREET_ADDRESS', 'POSTAL_CODE', 'CITY', 'STATE_PROVINCE',
'COUNTRY_ID' FROM 'HR01'.EMPLOYEES
```

Result

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID	NATIONAL_ID
183	Girard	Geoni	GGEONI	650.507.9879	2000-02-03 00:00:00.0	SH_CLERK	2800		120		50 372-96-6146

32. Navigate back to the first browser tab. Click on the Create button to create the same masking definition with the only exception being the use of the HR02 table.

ORACLE Enterprise Manager 11g

Grid Control

Home Targets Deployments Alerts Compliance Jobs Reports

Database Instance: db02.oracle.com > Tables > Logged in As SYSTEM

Data Masking Definitions

Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but false data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search: Database db02.oracle.com Go Import Create

Select Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
DETERMINISTIC MASKING EXAMPLE HR01	db02.oracle.com	Simple Deterministic Example	1	Masking Job Succeeded	Jun 8, 2010 8:11:17 AM (UTC+00:00)

33. From the Create Masking Definition screen, type in the Name, Database and Description field with the provided values below. Continue and click on the Add button.

Name: DETERMINISTIC\_MASKING\_EXAMPLE\_HR02  
 Database: db04.oracle.com  
 Description: Sample Deterministic Example

**Create Masking Definition**

Name: DETERMINISTIC\_MASKING\_EXAMPLE\_HR02  
 Database: db04.oracle.com  
 Description: Simple Deterministic Example

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns.

Select Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Count	Dependent Columns	Add
No columns added									

34. In the Add Columns screen, search for the EMPLOYEES table in the HR02 schema. Type in the following values and click on the Search button.

Schema: HR02  
 Table Name: EMPLOYEE

**Add Columns**

Database: db04.oracle.com | Logged In As: system

Search  
 Schema: HR02  
 Table Name: EMPLOYEES  
 Search

35. Select the column for EMAIL and click on the Add button.

**Add Columns**

Database: db04.oracle.com | Logged In As: system

Search  
 Schema: HR02  
 Table Name: EMPLOYEES  
 Search

Mask selected columns as a group

Select Owner	Table Name	Column Name	Data Type	Comment
<input type="checkbox"/>	HR02	EMPLOYEES	CITY	VARCHAR2(30)
<input type="checkbox"/>	HR02	EMPLOYEES	COMMISSION_PCT	NUMBER(2,2) Commission percentage of the employee; Only employees in sales department eligible for commission percentage
<input type="checkbox"/>	HR02	EMPLOYEES	COUNTRY_ID	CHAR(2)
<input type="checkbox"/>	HR02	EMPLOYEES	DEPARTMENT_ID	NUMBER(4) Department id where employee works; foreign key to department_id column of the departments table
<input checked="" type="checkbox"/>	HR02	EMPLOYEES	EMAIL	VARCHAR2(100) MASK candidate: HR Privacy Policy
<input type="checkbox"/>	HR02	EMPLOYEES	EMPLOYEE_ID	NUMBER MASK candidate: HR Benefits Policy

36. Click on the Format icon.

**Columns**

Add columns you want to mask and define masking format for each column. Foreign key columns are automatically added to maintain referential integrity. Dependent columns are columns that do not have foreign key constraints defined, but reference a masked column due to application level constraints. You can manually add dependent columns to a masked column. Removing a column from this list will remove all foreign key and dependent columns.

Select Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Count	Dependent Columns	Add
<input type="checkbox"/>	HR02	EMPLOYEES	EMAIL	VARCHAR2(100)		0	0		

Columns that have this icon do not have a masking format defined.

37. In the Define Column Mask section, choose the Format Entry of Substitute and click on the Add button.

The screenshot shows the 'Define Column Mask' dialog box. At the top, it displays 'Owner: HR02', 'Table: EMPLOYEES', 'Column: EMAIL', and 'Data Type: VARCHAR2(100)'. Below this, there is a section for 'Format Entry' with a dropdown menu currently showing 'Substitute' and an 'Add' button next to it. The 'Add' button is highlighted with a red rectangular box. There are also 'Cancel' and 'OK' buttons at the top right and bottom right of the dialog.

38. Enter the Table Name OE.CUSTOMERS and the Column Name CUST\_EMAIL to be used for the substitute values. Click on the OK button to proceed.

This screenshot shows the 'Define Column Mask' dialog box with the 'Substitute' format entry selected. In the 'Format Entry Properties' table, the 'Table Name' is set to 'OE.CUSTOMERS' and the 'Column Name' is 'CUST\_EMAIL'. Both of these text boxes are highlighted with red rectangular boxes. The 'OK' button at the bottom right is also highlighted with a red box.

Select Condition	Property	Value	Property	Value	Sample	Remove
▼ Conditions						
▼ Default Condition						
(Add a format entry)						
	Table Name	OE.CUSTOMERS	Column Name	CUST_EMAIL		

39. After the Masking Definition has been created, click on the OK button.

The screenshot shows the 'Create Masking Definition' dialog box. The 'Name' field contains 'DETERMINISTIC\_MASKING\_EXAMPLE\_HR02' and the 'Database' field contains 'db04.oracle.com'. The 'Description' is 'Simple Deterministic Example'. There are 'Cancel' and 'OK' buttons at the top right. Below the fields is a section for 'Columns' with a table listing the masked column.

Select	Owner	Table	Column	Column Group	Data Type	Format	Foreign Key Columns	Count	Dependent Columns	Add
<input type="checkbox"/>	HR02	EMPLOYEES	EMAIL		VARCHAR2(100)		0	0		

40. As you have completed in previous exercises, click on the Generate Script button.

The screenshot shows the 'Data Masking Definitions' page. It lists two masking definitions. The 'Generate Script' button for the selected definition is highlighted with a red box.

Select	Masking Definition	Database	Description	Columns Status	Most Recent Job Ended
<input type="radio"/>	DETERMINISTIC_MASKING_EXAMPLE_HR01	db04.oracle.com	Sample Deterministic Example	1 Script Generated	
<input checked="" type="radio"/>	DETERMINISTIC_MASKING_EXAMPLE_HR02	db04.oracle.com	Simple Deterministic Example	1 Script Not Generated	

41. After the script has been generated, click on the Schedule Job button.



**Information**  
Data masking script generation completed successfully.

**Script Generation Results: DETERMINISTIC\_MASKING\_EXAMPLE\_HRO2**

Database: **db04.oracle.com** Number of Tables: **1** (Return)  
 Logged In As: **system** Columns: **1**

**Script Options**  
 Use script to clone and mask the database.   
 Schedule the data masking job. The script will be executed by the job to perform the masking operation.

42. Provide the user credentials provided for the oracle user using the password provided (i.e. g0Oracle12#), the same Substitute Format Seed (i.e. seedtextstring) used in the previous step, and click on the Submit button.

Again, to properly show Deterministic masking in this exercise, you must use the same Seed value for both masking jobs.

**Schedule Data Masking Job: DETERMINISTIC\_MASKING\_EXAMPLE\_HRO2**

Database: **db04.oracle.com** Number of Tables: **1** (Cancel)   
 Logged In As: **system** Columns: **1**

Job Name:   
 Job Description:   
 Script File Location:   
 Script File Name:

**Substitute Format Seed**  
 A seed is required for masking definitions that use the Substitute format. The seed can be any text string.  
 Seed:   
 Confirm Seed:

**Host Credentials**  
 Username:   
 Password:   
 Save as Preferred Credential

**Start**  
 Immediately  
 Later  
 Date:

43. Once the masking job is complete, click on Databases link.

ORACLE Enterprise Manager  
Grid Control 11g

Home | Targets | Deployments | Alerts | Compliance | Jobs | Reports | My Oracle Support

Hosts | **Databases** | Middleware | Web Applications | Services | Systems | Groups | Virtual Servers | All Targets

**Data Masking Definitions**  
 Data masking is the process of making sensitive information in test or non-production databases safe. It disguises sensitive information by overwriting it with realistic looking but fake data of a similar type. A masking definition defines the columns to be masked and the format of masked data. You can create a new masking definition or use an existing definition for a masking operation. The Format Library contains a collection of ready-to-use masking formats.

Search: Database |  | Go | Import | Create

View | Edit | Generate Script | Schedule Job | Delete | Actions | Clone Database | Go

Select	Masking Definition	Database	Description	Columns	Status	Most Recent Job Ended
<input checked="" type="radio"/>	DETERMINISTIC_MASKING_EXAMPLE_HRO1	db04.oracle.com	Simple Deterministic Example	1	Masking Job Succeeded	Jul 28, 2010 9:48:22 PM GMT+00:00
<input type="radio"/>	DETERMINISTIC_MASKING_EXAMPLE_HRO2	db04.oracle.com	Simple Deterministic Example	1	Masking Job Succeeded	Jul 28, 2010 9:45:51 PM GMT+00:00

44. Click on the database link db04.oracle.com.

**Databases**

View:  Oracle Load Map  Search List Page Refreshed Jul 28, 2010 9:49:20 PM UTC

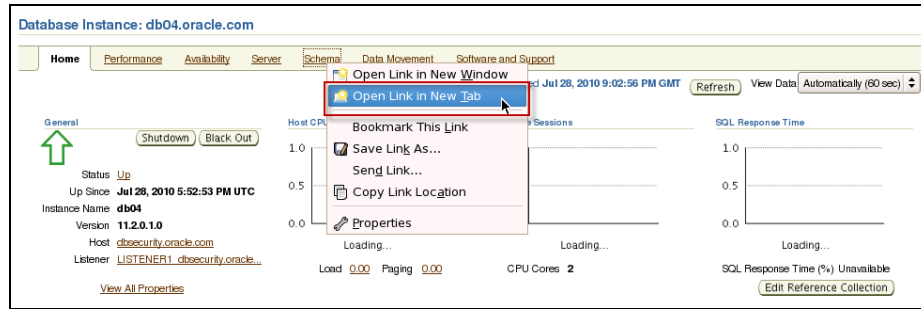
Targets Not Configured: 1

Search:  Go Advanced Search

Remove | Configure | Add

Select	Name	Status	Alerts	Policy Violations	Compliance Score (%)	Version	Sessions: CPU	Sessions: IO	Sessions: Other Instance CPU (%)
<input checked="" type="radio"/>	av.oracle.com	↓	1	25	3	99 10.2.0.3.0			
<input type="radio"/>	db01.oracle.com	↓	5	28	6	98 11.1.0.7.0			
<input type="radio"/>	db02.oracle.com	↓	5	26	2	98 11.1.0.7.0			
<input type="radio"/>	db03.oracle.com	↓	1	26	3	99 10.2.0.4.0			
<input checked="" type="radio"/>	db04.oracle.com	↑	3	0	0	- 11.2.0.1.0	-	✓	✓
<input type="radio"/>	db06.oracle.com	↓	0	0	0	- 11.2.0.1.0			
<input type="radio"/>	emrep.oracle.com	↑	1	1	15	89 92 10.2.0.4.0	.01	.01	0 ✓ .44

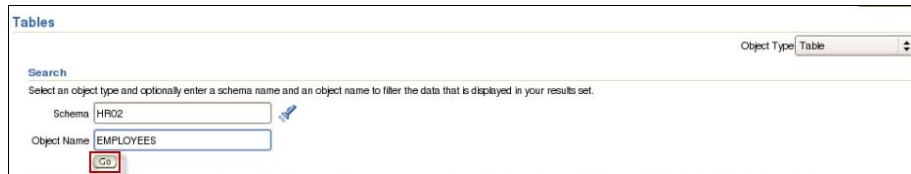
45. Right click on the link, 'Schema' and choose the option, 'Open Link in New Tab'.



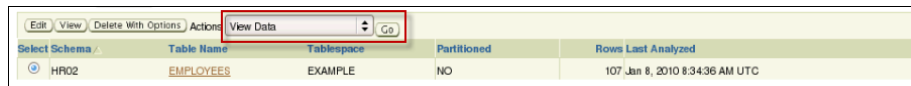
46. In the newly opened tab, we will query the HR02 table. Click on the Tables link.



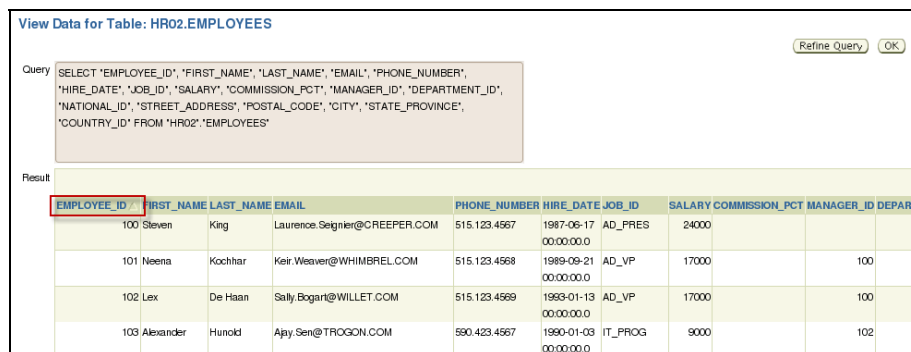
47. We will be querying the HR02 schema and the EMPLOYEES table. Click on the Go button.



48. Select the Action to View Data and click on the Go button.



49. Click on the EMPLOYEE\_ID column to sort the data.



50. Compare the two tabs and the results of the masked tables, HR01 and HR02. You will notice the results of deterministic masking. The masked values for the EMAIL column are consistent between these two tables.

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL
100	Steven	King	Alexander.Berenger@BECARD.COM
101	Neena	Kochhar	Harrison.Sutherland@GODWIT.COM
102	Lex	De Haan	Rick.Lyon@MERGANSER.COM
103	Alexander	Hunold	Hal.Stockwell@PHOEBE.COM
104	Bruce	Ernst	Shelley.Peckinpah@GODWIT.COM
105	David	Austin	Roy.Hube@SISKIN.COM
106	Valli	Pataballa	Rosanne.Douglas@ANHINGA.COM
107	Diana	Lorentz	Diane.Mason@TROGON.COM