

MimamsuPro

User's Guide

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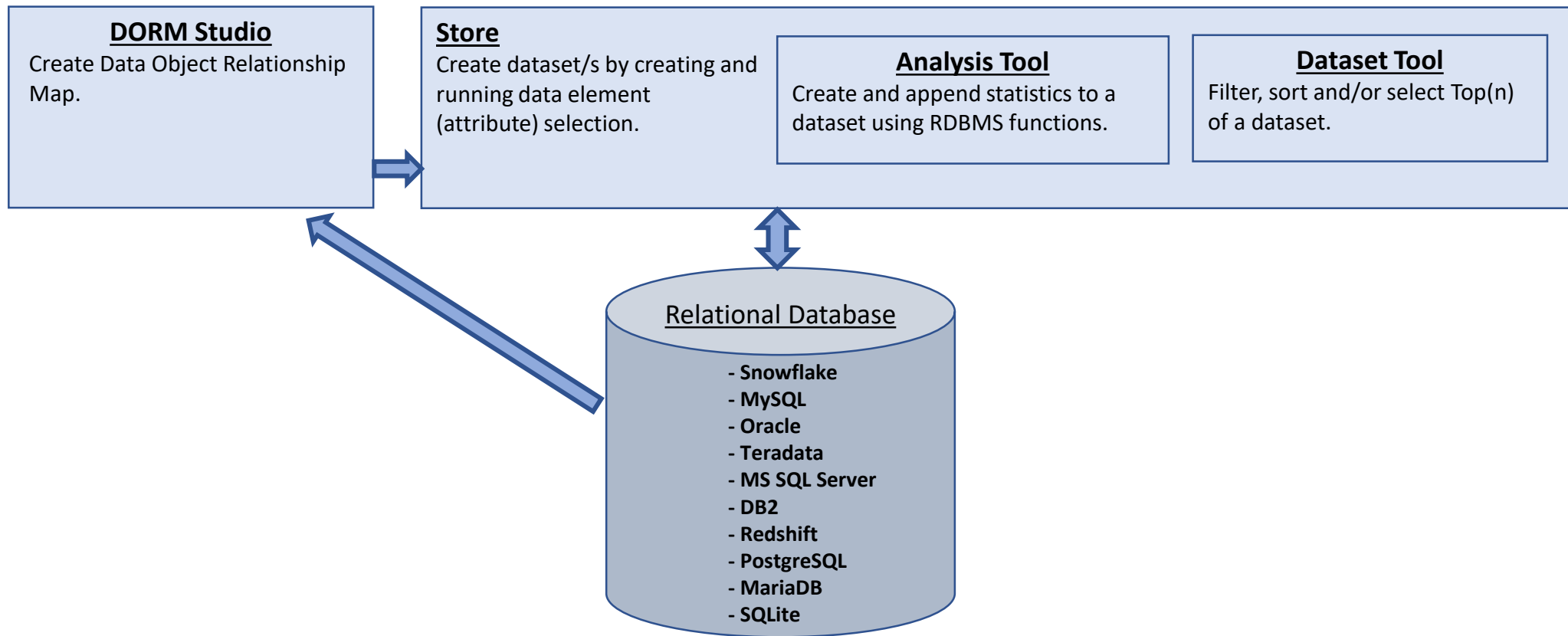
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Overview

MimamsuPro consists of four components (DORM Studio, Store, Analysis Tool and Dataset Tool). DORM Studio is a facility to create Data Object Relationship Map (DORM) of relational database(with RDOM*) in terms of objects and attributes. Store is a facility to create dataset(with metadata) of selected attributes. Analysis Tool is a facility to perform statistical analysis, and append the statistics to the dataset. Dataset Tool is to create subset and/or filter the dataset.

Datasets, statistical analysis and subsets get stored as database table/s. For datasets and subsets a metadata table gets created together with the data table. Datasets, statistical analysis and subsets tables (together with metadata tables) can also be exported as CSV files.



* see [Appendix-1: Symmetric Relational Data Object Model](#) for details.

DORM Studio: includes facility to create Data Object Relationship Map (DORM) as well as copy, import and export map features. In addition to individual interfaces for adding DOBJ, R_DOBJ, LOOK-UP and RANGE objects the facility includes interfaces to create LOOK-UP and RANGE tables as well. It also includes 'AutoMap' and 'Verify Map' features. The 'AutoMap' adds (i.e. maps) tables and columns with standard names (see '[Standard Names for Tables and Columns](#)' section) as DOBJ and R-DOBJ components automatically. The 'Verify Map' verifies database/schema content for adherence to Relational Data Object Model.

Store: is an interface, created using DORM, to create and run data element(attributes) selection to create dataset (with [Dataset Metadata](#)*). Store also includes 'Analysis Tool' and 'Dataset Tool' as part of 'Work with Dataset' feature.

Object Relations Summary: Each dataset gets created with Object Relations Summary. It is an interactive presentation of all combinations of related object counts in the dataset. The summary shows total counts of the objects at the top. The bottom part of the summary is interactive; it shows from left to right all combinations of related object counts, from left to right in descending order of object combination size.

Analysis Tool: is an interface to create and append statistics to the dataset. The tool consists of six types of functions, 1) General Functions (i.e. CASE STATEMENT, EXPRESSION), 2) DOBJ Functions (i.e. COUNT, FREQUENCY COUNT, EMBED-FN-CODE), 3) Aggregate Functions, 4) Analytic Functions, 5) String Functions and 6) Date/Time Functions. Metadata about appended statistic gets added to [Dataset Metadata](#)*. Also, when a statistic's table is exported as CSV file, two files get created; a file for statistic and a file for [Statistic Metadata](#)** . *[Note: All functions are built in functions of the database system in use.]*

Dataset Tool: includes features to subset and/or order a dataset. It also includes features to save a subset as database table and export the subset as CSV file. Each Saved subset is created with associated [Subset Metadata](#)*** table.

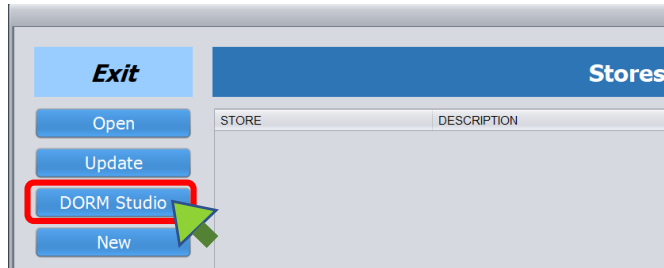
* see [Dataset Metadata](#) for details.

** see [Statistic Metadata](#) for details.

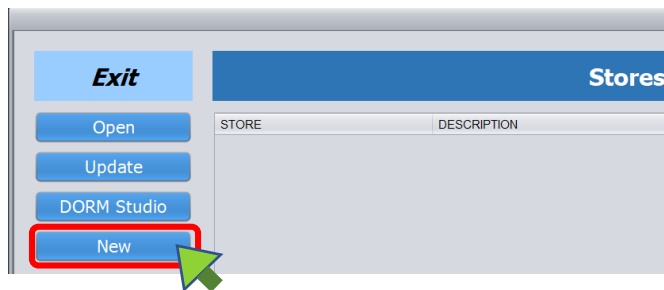
*** see [Subset Metadata](#) for details.

Quick Summary

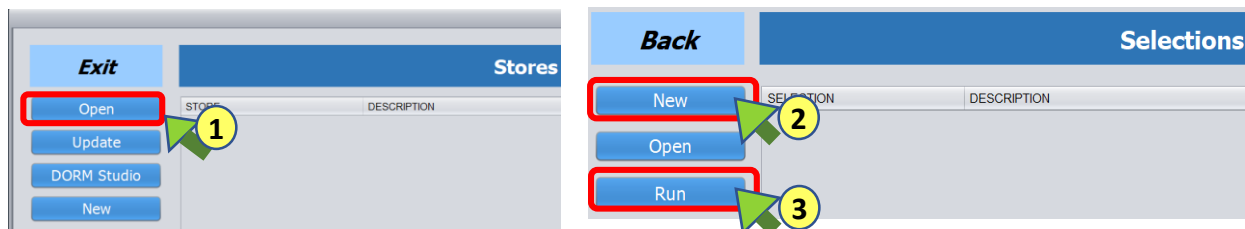
Step 1: Create Data Object Relationship Map (DORM) of the database/schemas (with RDOM*) using 'DORM Studio'.



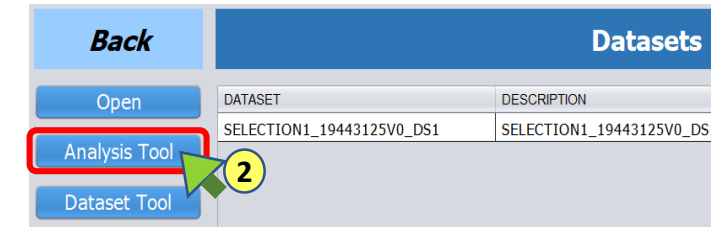
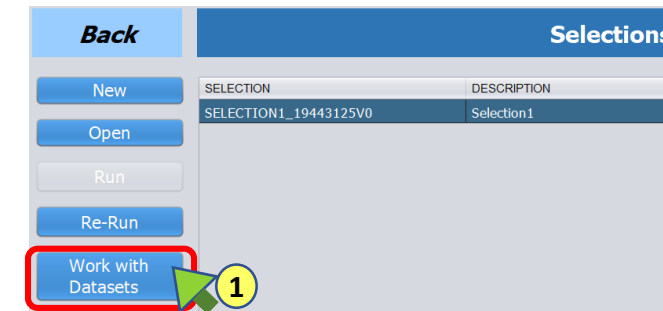
Step 2: Create 'Store' using the DORM.



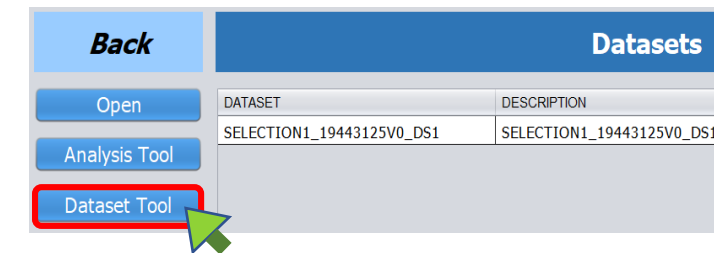
Step 3: Create and run data element 'Selection' to create dataset/s.



Step 4: Run (and append) statistics on the dataset.



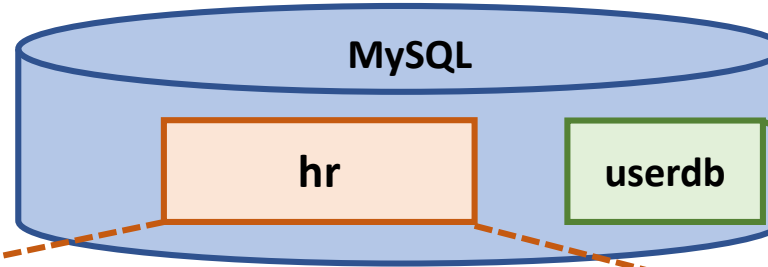
Step 5: Subset and/or filter the dataset.



* see [Appendix-1: Symmetric Relational Data Object Model](#) for details.

Example (HR Database)

This guide refers to following example. There are two databases (i.e. schemas) 'hr' and 'userdb' on MySQL server. 'hr' database tables and views contain employee and department data and 'userdb' is used to store datasets, statistical analysis and subset tables.



EMP

employee	
123 EMPLOYEE_ID	
123 MANAGER_ID	
ABC FIRST_NAME	
ABC LAST_NAME	
ABC EMAIL	
ABC PHONE_NUMBER	
🕒 HIRE_DATE	
123 SALARY	
123 COMMISSION_PCT	
ABC MGR_FIRST_NAME	
ABC MGR_LAST_NAME	

jobs_history	
123 EMPLOYEE_ID	
🕒 START_DATE	
🕒 END_DATE	
ABC JOB_ID	
123 DEPARTMENT_ID	
123 INSTANCE_SEQ	

emppay_jan2009	
123 EMPLOYEE_ID	
123 GROSS_PAY	
123 NET_PAY	

emppay_feb2009	
123 EMPLOYEE_ID	
123 GROSS_PAY	
123 NET_PAY	

emppay_mar2009	
123 EMPLOYEE_ID	
123 GROSS_PAY	
123 NET_PAY	

EMP_DEPT

emp_x_dept	
123 EMPLOYEE_ID	
123 DEPARTMENT_ID	

DEPT

department	
ABC DPTMGR_FIRST_NAME	
ABC DPTMGR_LAST_NAME	
ABC DPTMGR_EMAIL	
ABC DPTMGR_PHONE_NUMBER	
🕒 DPTMGR_HIRE_DATE	
ABC DPTMGR_JOB_ID	
123 DPTMGR_SALARY	
123 DPTMGR_COMMISSION_PCT	
123 DEPARTMENT_ID	
ABC DEPARTMENT_NAME	
123 LOCATION_ID	

LOCATION

dept_location	
123 LOCATION_ID	
ABC STREET_ADDRESS	
ABC POSTAL_CODE	
ABC CITY	
ABC STATE_PROVINCE	
ABC COUNTRY_NAME	
ABC REGION_NAME	

JOBS

jobs	
ABC JOB_ID	
ABC JOB_TITLE	
123 MIN_SALARY	
123 MAX_SALARY	

SALARY_RANK

salary_range	
23 lbound	
23 ubound	
ABC salary_rank	
ABC range	

Datasets

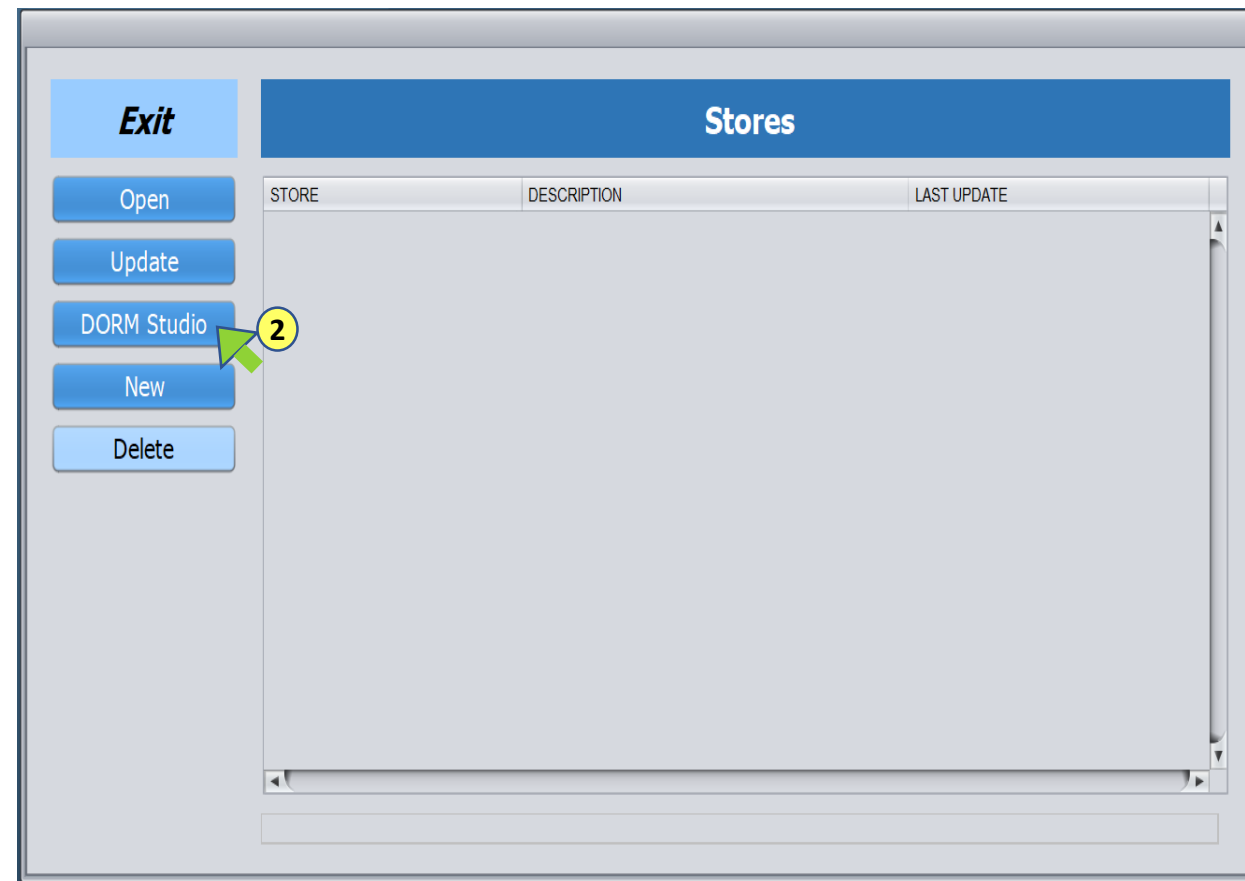
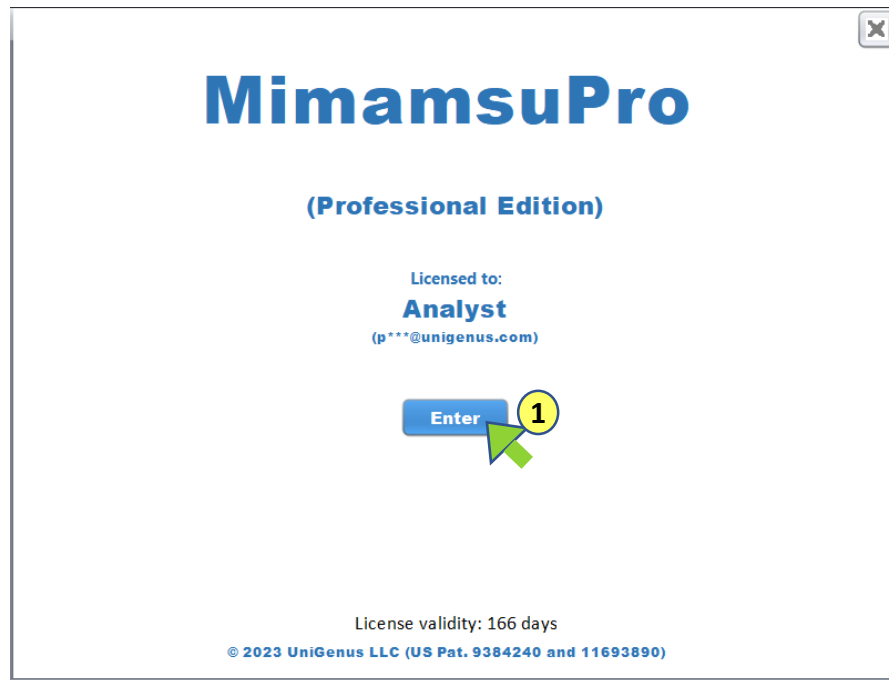
Analysis

Subsets

- DOBJ
- R-DOBJ
- LOOK-UP
- RANGE

- DORM Studio

- Open



Enter MimamsuPro.



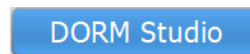
Close MimamsuPro.



Open selected store.



Update selected store (after associated map update).



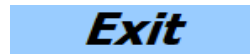
Open DORM Studio.



Create new store.



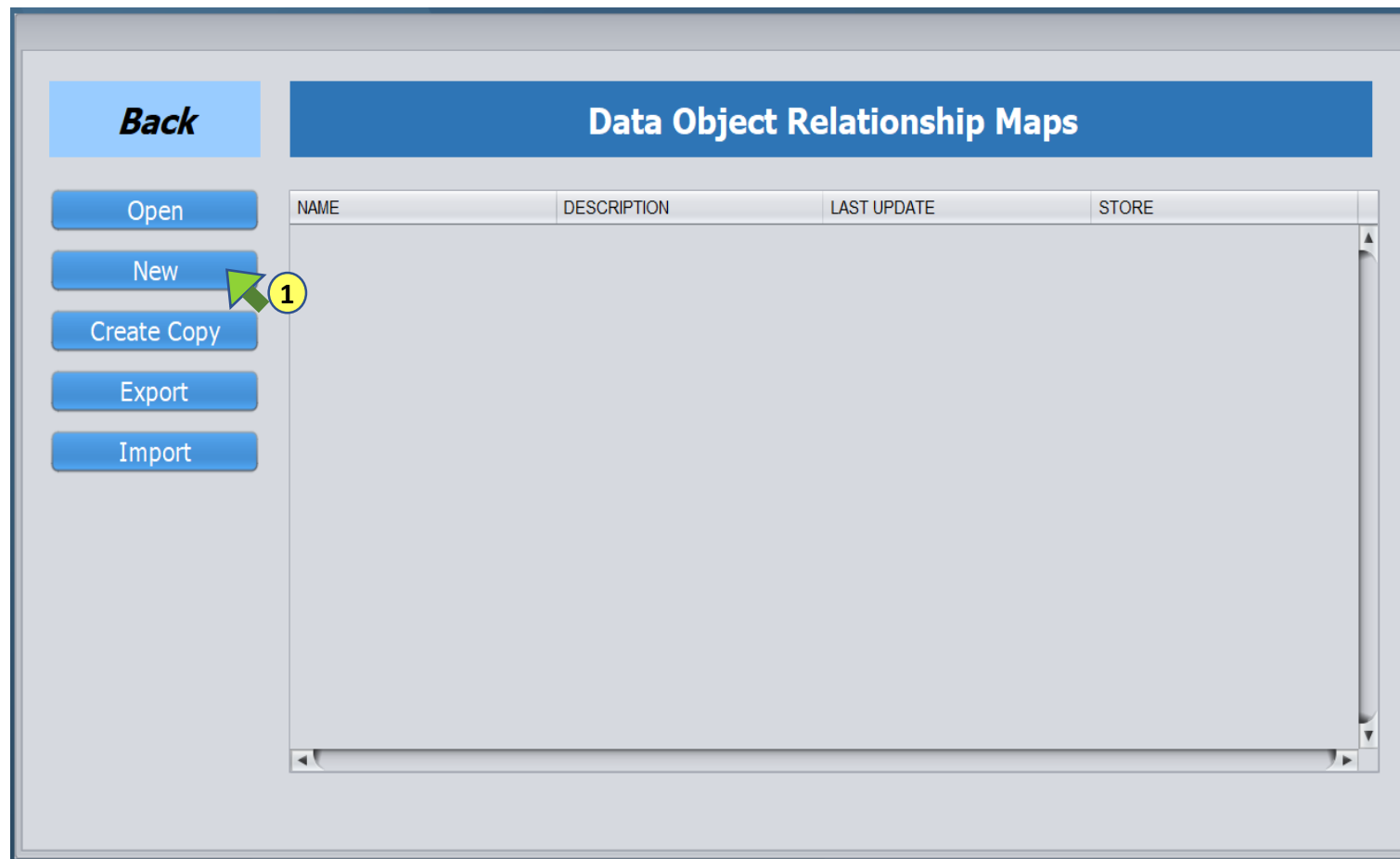
Delete selected store.



Exit MimamsuPro.

DORM Studio:

- New map



Open

Open selected map.

New

Create new map.

Create Copy

Create duplicate copy of the selected map.

Export

Export selected map as a file.

Import

Import map from a file.

Back

Return to main menu (or application home page).

NAME

Map name.

DESCRIPTION

Map description.

LAST UPDATE

Last update timestamp.

STORE

Name of associated store.

DORM Studio:

- New map
- New DOBJ

If prompted, copy/paste the link into browser, download the driver file and add using folder button.

RDBMS	Server URL
Snowflake	//<org>-<account>.snowflakecomputing.com/?db=<MyDatabase>
Teradata	//<IP or hostname>/DATABASE=<MyDatabase>,DBS_PORT=1025
Oracle	@<hostname>:1521:<sid>
SQLServer	//<hostname>:1433 (Instance Name: <instance_name>)
Redshift	//<cloudhost>.redshift.amazonaws.com:5439/<MyDatabase>
DB2	//<hostname>:50000/<DatabaseName>
MySQL	//<hostname>:3306/<?parameters>
MariaDB	//<hostname>:3306/<?parameters>
PostgreSQL	//<hostname>:5432/<DatabaseName>
SQLite	<folderPath>/<folder_name>

Name Enter name for the new map.

Description Enter brief description of the map.

Database Type Select database type from menu.

Server URL Enter server address of the database.

Username Enter your username for the database.

Password Enter your password for the database.

Connect Connect(logon) to the database.

MyDatabase(space) Select a database space for datasets, analysis and subsets.

> Add database to selected databases.

< Remove database from selected databases.

Save DB Info Save database type, database selections, address (URL) and Username.

Auto Map Auto-create map entries for DOBJ and R-DOBJ components based on the standard table and column names. (See '[Standard Names for Tables and Columns](#)'.)

Verify Map Check for NULL and duplicate values in ID columns; and verify objects relationships.

DOBJ Create/edit Data Object/s.

R-DOBJ Create/edit Relationship Data Object/s.

LOOK-UP Create/edit Look-Up object.

RANGE Create/edit Range object.

Close Close map. (all add/edits will be saved.)

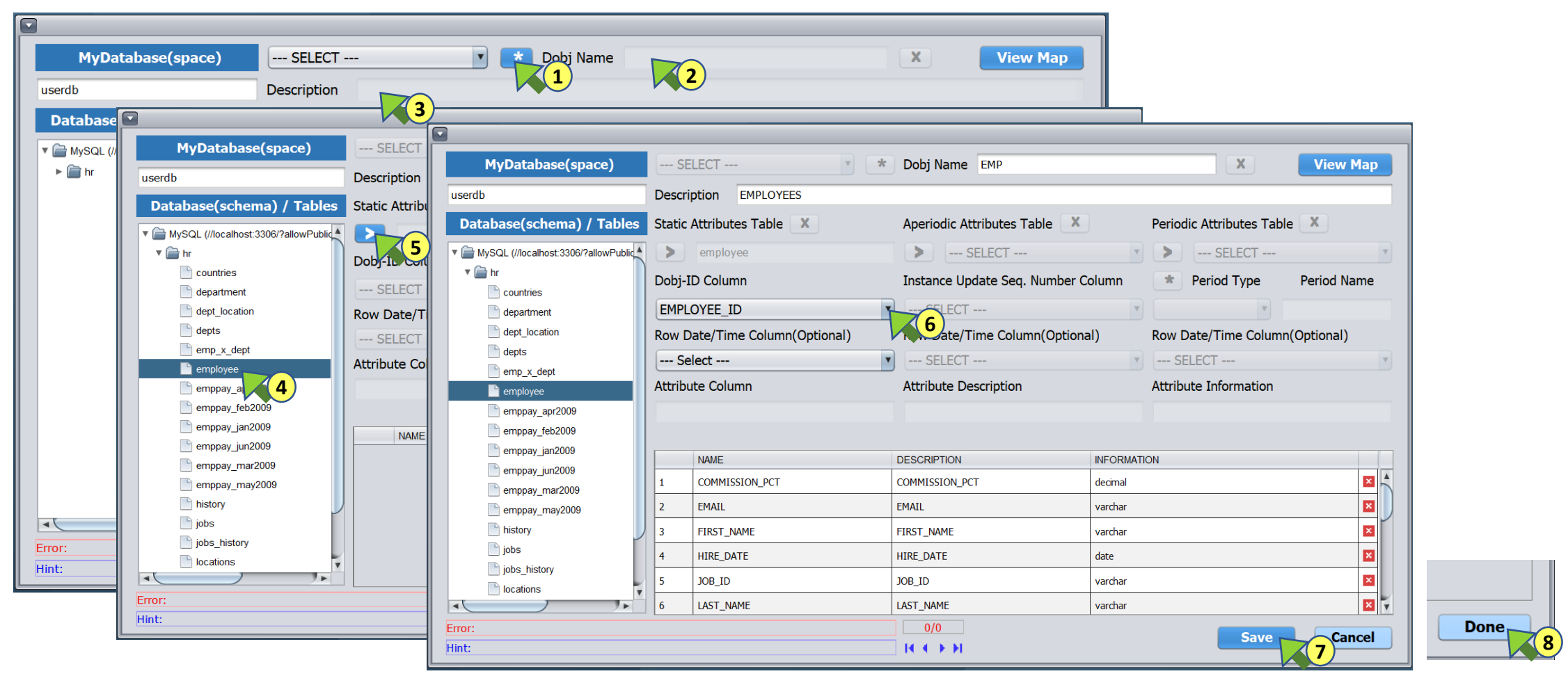
X Close map. (all add/edits will be saved.)

View Map View map in a tabular form.

X Delete map.

DORM Studio:

- New DOBJ 'EMP'
- Add Static Table



***** Create new.

Dobj Name Enter name of the Dobj.

Description Enter small description of the Dobj.

➤ Add selected table's info to Dobj.

X Delete from the map.

✖ Exclude attribute from the Dobj.

Static Attributes Table Select from left and add Static attributes table.

Dobj-ID Column Select Dobj-ID column from drop down.

Row Date/Time Column Select row timestamp column from drop down.

Aperiodic Attributes Table Select from left and add Aperiodic attributes table

Instance Update Seq. Number Column Select row update seq. column from drop down.

Periodic Attributes Table Select from left and add Periodic attributes table

Period Type Create new Period Type(or select from drop down)

Period Name Enter Period name.

Attribute Description Description of selected (from table below) attribute (editable).

Attribute Information Additional info. about selected (from table below) attribute (editable).

Save Save add/edits.

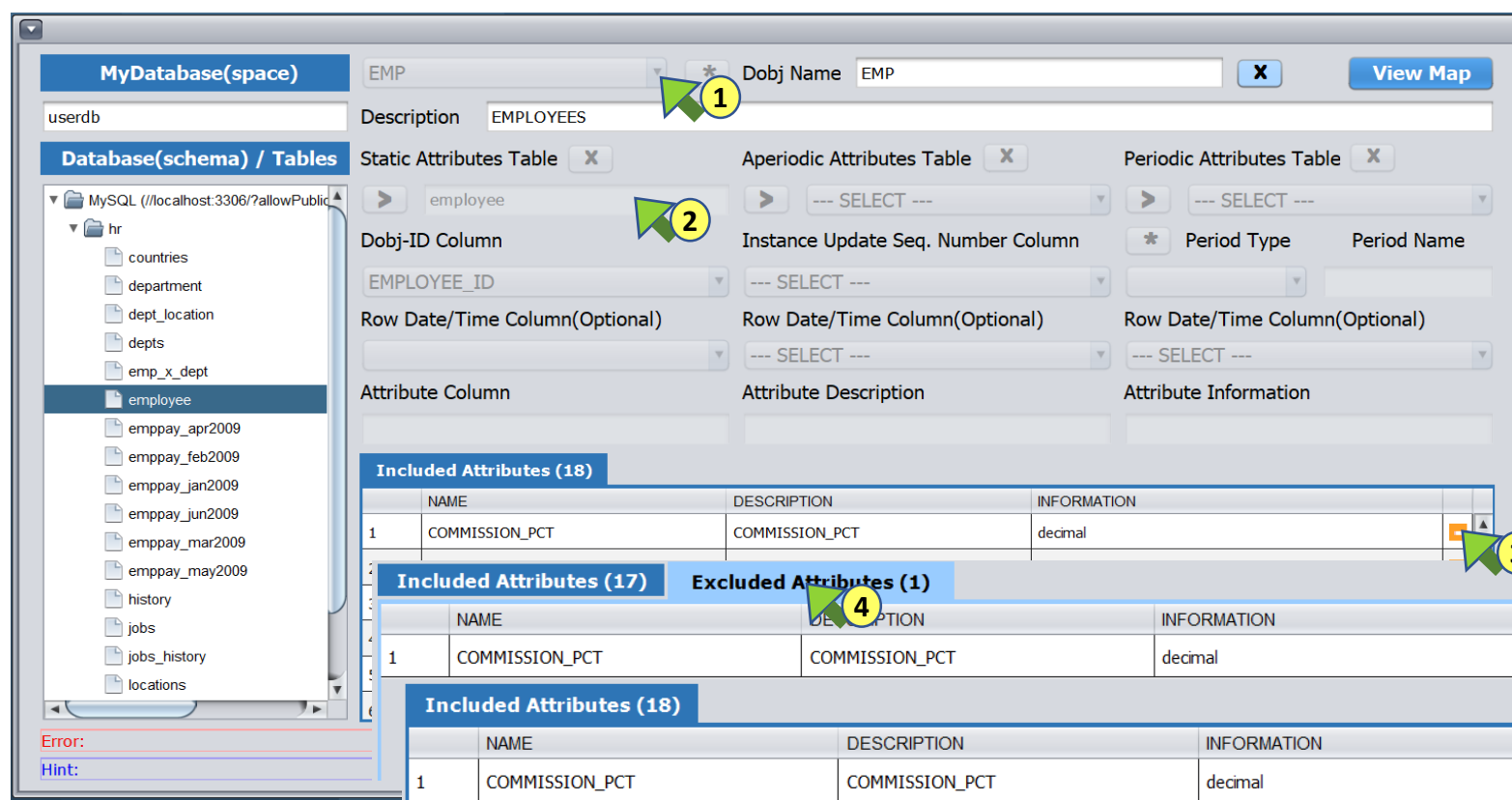
Cancel Cancel add/edits.

Done Close Dobj

View Map View map in a tabular form.

DORM Studio:

- Edit 'EMP' DOBJ
- Edit Static Table



3

4

5

6

7

***** Create new.

Dobj Name Enter name of the Dobj.

Description Enter small description of the Dobj.

> Add selected table's info to Dobj.

x Delete from the map.

Included Attributes Shows included attributes.

Excluded Attributes Shows excluded attributes.

- Exclude attribute from DOBJ.

+ Include attribute in DOBJ.

Static Attributes Table Select from left and add Static attributes table.

Dobj-ID Column Select Dobj-ID column from drop down.

Row Date/Time Column Select row timestamp column from drop down.

Aperiodic Attributes Table Select from left and add Aperiodic attributes table

Instance Update Seq. Number Column Select row update seq. column from drop down.

Periodic Attributes Table Select from left and add Periodic attributes table

Period Type Create new Period Type(or select from drop down)

Period Name Enter Period name.

Attribute Description Description of selected (from table below) attribute (editable).

Attribute Information Additional info. about selected (from table below) attribute (editable).

Save Save add/edits.

Cancel Cancel add/edits.

Done Close Dobj

View Map View map in a tabular form.

DORM Studio:

- Create Static Attributes Table

The screenshot shows the DORM Studio interface for creating a static attributes table. The main form contains the following fields and controls:

- MyDatabase(space)**: userdb
- Database(schema) / Tables**: MySQL (//localhost:3306/?allowPublicKe) > hr
- Obj Name**: OBJECT1 (Callout 1)
- Description**: Object1 (Callout 3)
- Static Attributes Table** (Callout 4)
- Obj1STATIC** (Callout 5)
- Dobj-ID Column**: OBJ1_ID (Callout 6)
- Instance Update Seq. Number Column**: --- SELECT ---
- Period Type**: --- SELECT ---
- Period Name**: --- SELECT ---
- Row Date/Time Column(Optional)**: --- SELECT ---
- Attribute Column**: Attribute1 (Callout 7)
- Attribute Description**: Attribute1_Desc (Callout 8)
- Attribute Information**: (Callout 9)
- Table**:

	NAME	DESCRIPTION	INFORMATION
1	ATTRIBUTE1	Attribute1_Desc	
- Buttons**: Save (Callout 10), Cancel

! Optional

* Repeat (7 8 9) for each Attribute.

(Continued on next page.)

* Create new.

Dobj Name Enter name of the Data Object.

Description Enter small description of the Data Object.

X Delete from the map.

X Exclude attribute from the Look-Up.

Static Attributes Table New Static attributes table name

Dobj-ID Column New Dobj-ID column name.

Attribute Column New attribute column name.

Attribute Description Description of attribute (editable).

Attribute Information Additional info. about attribute (editable).

Row Date/Time Column Column for row update date/time.

Save Save add/edits.

Cancel Cancel add/edits.

View Map View map in a tabular form.

DORM Studio:

- Create Static Attributes Table

New Table

Create Table

Database: userdb

Table: OBJ1STATIC

Columns:

- OBJ1_ID
- ATTRIBUTE1 *

Definition:

Column: ATTRIBUTE1

Data Type: VARCHAR *

Width / Constraint: (10) !

DDL Statement:

```
CREATE TABLE userdb.OBJ1STATIC (  
  OBJ1_ID VARCHAR (10)  
  ,ATTRIBUTE1 VARCHAR (10)  
)
```

Execute DDL

Cancel

- * For each column repeat ①, ② and ③ (for some data types such as VARCHAR)
- ! After typing Width (and/or Constraint) press Enter or click in DDL Statement box on the right.

Database MyDatabase (space)

Table Table to be create

Columns Columns to be created

Data Type Select Data Type for the column

Width / Constraint Enter Width and/or constraint for the column

Execute DDL

Create table in the Database

Cancel

Cancel table creation

DORM Studio:

- Edit 'EMP' DOBJ
- Add Aperiodic Table

The screenshot shows the DORM Studio interface for editing a DOBJ named 'EMP'. The 'Description' field contains 'EMPLOYEES'. The 'Dobj Name' is 'EMP'. The 'Dobj-ID Column' is set to '--- SELECT ---'. The 'Instance Update Seq. Number Column' is 'INSTANCE_SEQ'. The 'Row Date/Time Column(Optional)' is '--- Select ---'. The 'Attribute Column' is 'DEPARTMENT_ID', and the 'Attribute Description' is 'HIST_DEPARTMENT_ID'. The 'Attribute Information' is 'decimal'. A table below lists attributes with their names, descriptions, and information types. The table has 4 rows and 4 columns: NAME, DESCRIPTION, INFORMATION, and a delete icon. The first row is highlighted in blue. The interface also includes a 'Static Attributes Table', 'Aperiodic Attributes Table', and 'Periodic Attributes Table' section. A legend at the bottom explains the icons used in the interface.

	NAME	DESCRIPTION	INFORMATION	
1	DEPARTMENT_ID	HIST_DEPARTMENT_ID	decimal	✕
2	END_DATE	HIST_END_DATE	date	✕
3	JOB_ID	HIST_JOB_ID	varchar	✕
4	START_DATE	HIST_START_DATE	date	✕

* To change attribute description and/or information select (5) and edit (6).

- Create new.
- Dobj Name** Enter name of the Dobj.
- Description** Enter small description of the Dobj.
- Add selected table's info to Dobj.
- Delete from the map.
- Exclude attribute from the Dobj.
- Static Attributes Table** Select from left and add Static attributes table.
- Dobj-ID Column** Select Dobj-ID column from drop down.
- Row Date/Time Column** Select row timestamp column from drop down.
- Aperiodic Attributes Table** Select from left and add Aperiodic attributes table
- Instance Update Seq. Number Column** Select row update seq. column from drop down.
- Periodic Attributes Table** Select from left and add Periodic attributes table
- Period Type** Create new Period Type(or select from drop down)
- Period Name** Enter Period name.
- Attribute Description** Description of selected (from table below) attribute (editable).
- Attribute Information** Additional info. about selected (from table below) attribute (editable).
- Save** Save add/edits.
- Cancel** Cancel add/edits.
- Done** Close Dobj
- Close** Close DOBJ interface.
- View Map** View map in a tabular form.

DORM Studio:

- Create Aperiodic Attributes Table

The screenshot shows the DORM Studio interface for creating an Aperiodic Attributes Table. The main window is titled 'MyDatabase(space)' and contains a form with the following fields and callouts:

- 1**: Points to the 'Aperiodic Attributes Table' tab.
- 2**: Points to the 'OBJ1APERIODIC1' field.
- 3**: Points to the 'SEQ_NUM' field.
- 4**: Points to the 'Attribute Column' field.
- 5**: Points to the 'APRDCATTR1' field.
- 6**: Points to the 'APRDCATTR1' field in the 'Attribute Description' field.
- !**: Points to the 'Attribute Information' field.
- 10**: Points to the 'Save' button.

The table below shows the attributes:

	NAME	DESCRIPTION	INFORMATION
1	APRDCATTR1	APRDCATTR1	

! Optional

* Repeat (4 5 6)
for each Attribute.

(Continued on next page.)

* Create new.

Dobj Name Name of the Data Object.

Description Description of the Data Object.

X Delete from the map.

X Exclude attribute from the Look-Up.

Aperiodic Attributes Table New Aperiodic attributes table name

Instance Update Seq. Number Column New sequence number column name.

Attribute Column New attribute column name.

Attribute Description Description of attribute (editable).

Attribute Information Additional info. about attribute (editable).

Row Date/Time Column Column for row update date/time.

Save Save add/edits.

Cancel Cancel add/edits.

View Map View map in a tabular form.

DORM Studio:

- Create Aperiodic Attributes Table

Create Table

Database: userdb

Table: OBJ1APERIODIC1

Columns:

- OBJ1_ID
- SEQ_NUM
- APRDCATTR1

Definition:

Column: APRDCATTR1

Data Type: VARCHAR

Width / Constraint: (15)

DDL Statement:

```
CREATE TABLE userdb.OBJ1APERIODIC1 (  
OBJ1_ID VARCHAR (10)  
,SEQ_NUM INT  
,APRDCATTR1 VARCHAR (15)  
)
```

Execute DDL

Cancel

- * For each column repeat ①, ② and ③ (for some data types such as VARCHAR)
- ❗ After typing Width (and/or Constraint) press Enter or click in DDL Statement box on the right.

Database MyDatabase (space)

Table Table to be create

Columns Columns to be created

Data Type Select Data Type for the column

Width / Constraint Enter Width and/or constraint for the column

Execute DDL

Create table in the Database

Cancel

Cancel table creation

DORM Studio: -Add Periodic Tables

* Create New (3) or select (3) Period Type for each Periodic Attributes Table

* Create new.

Dobj Name Enter name of the Dobj.

Description Enter small description of the Dobj.

➤ Add selected table's info to Dobj.

✕ Delete from the map.

✕ Exclude attribute from the Dobj.

Static Attributes Table Select from left and add Static attributes table.

Dobj-ID Column Select Dobj-ID column from drop down.

Row Date/Time Column Select row timestamp column from drop down.

Aperiodic Attributes Table Select from left and add Aperiodic attributes table

Instance Update Seq. Number Column Select row update seq. column from drop down.

Periodic Attributes Table Select from left and add Periodic attributes table

Period Type Create new Period Type(or select from drop down)

Period Name Enter Period name.

Attribute Description Description of selected (from table below) attribute (editable).

Attribute Information Additional info. about selected (from table below) attribute (editable).

Save Save add/edits.

Cancel Cancel add/edits.

Done Close Dobj

Close Close DOBJ interface.

View Map View map in a tabular form.

DORM Studio:

- Create Periodic Attributes Table

The screenshot shows the DORM Studio interface for creating a Periodic Attributes Table. The main form has the following fields and callouts:

- Dobj Name:** OBJECT1 (Callout 1)
- Description:** Object1
- Static Attributes Table:** OBJ1STATIC
- Aperiodic Attributes Table:** --- SELECT ---
- Periodic Attributes Table:** FREQ1TABLE1 (Callout 2)
- Period Type:** P1 (Callout 3)
- Period Name:** N1 (Callout 4)
- Row Date/Time Column(Optional):** (Callout 5)
- Attribute Column:** F1ATTRIBUTE1 (Callout 6)
- Attribute Description:** F1ATTRIBUTE1 (Callout 7)
- Attribute Information:** (Callout 8)

The table below the form has the following data:

	NAME	DESCRIPTION	INFORMATION
1	F1ATTRIBUTE1	F1ATTRIBUTE1	

At the bottom right, there are **Save** and **Cancel** buttons. A red asterisk is next to the Save button (Callout 8).

* Create New (3) or select (3) Period Type for each Periodic Attributes Table

! Optional

* Repeat (5) (6) (7) for each Attribute.

(Continued on next page.)

* Create new.

Dobj Name Name of the Data Object.

Description Description of the Data Object.

X Delete from the map.

X Exclude attribute from the Look-Up.

Periodic Attributes Table New Periodic attributes table name

Period Type Type of periodic table

Period Name Name of this periodic table

Attribute Column New attribute column name.

Attribute Description Description of attribute (editable).

Attribute Information Additional info. about attribute (editable).

Row Date/Time Column Column for row update date/time.

Save Save add/edits.

Cancel Cancel add/edits.

View Map View map in a tabular form.

DORM Studio:

- Create Periodic Attributes Table

Create Table

Database: userdb

Table: FREQ1TABLE1

Columns:

- OBJ1_ID
- F1ATTRIBUTE1

Definition:

Column: F1ATTRIBUTE1

Data Type: VARCHAR

Width / Constraint: (8)

DDL Statement:

```
CREATE TABLE userdb.FREQ1TABLE1 (  
  OBJ1_ID VARCHAR (10)  
  ,F1ATTRIBUTE1 VARCHAR (8)  
)
```

Execute DDL

Cancel

- * For each column repeat ①, ② and ③ (for some data types such as VARCHAR)
- ❗ After typing Width (and/or Constraint) press Enter or click in DDL Statement box on the right.

Database MyDatabase (space)

Table Table to be create

Columns Columns to be created

Data Type Select Data Type for the column

Width / Constraint Enter Width and/or constraint for the column

Execute DDL

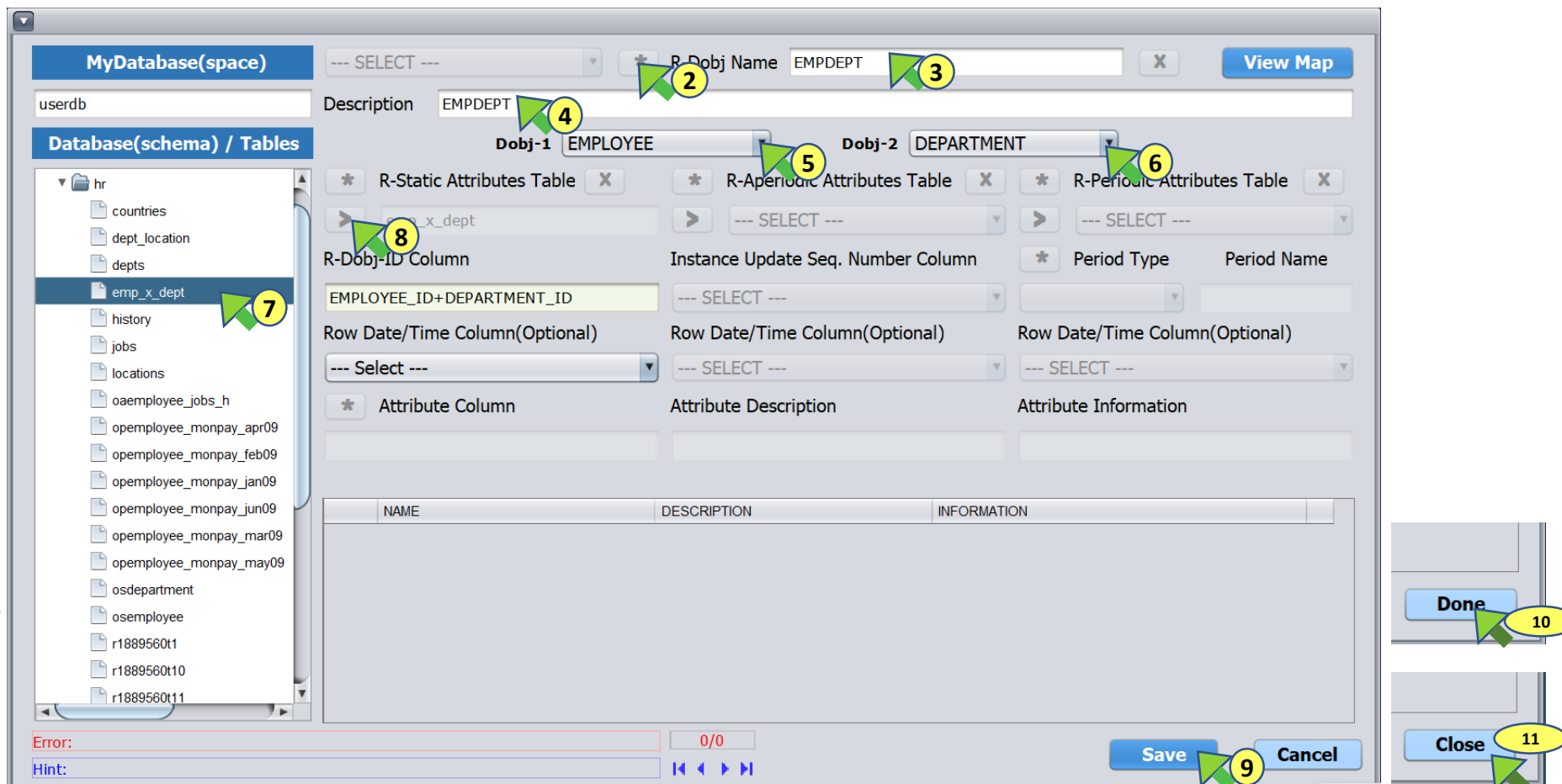
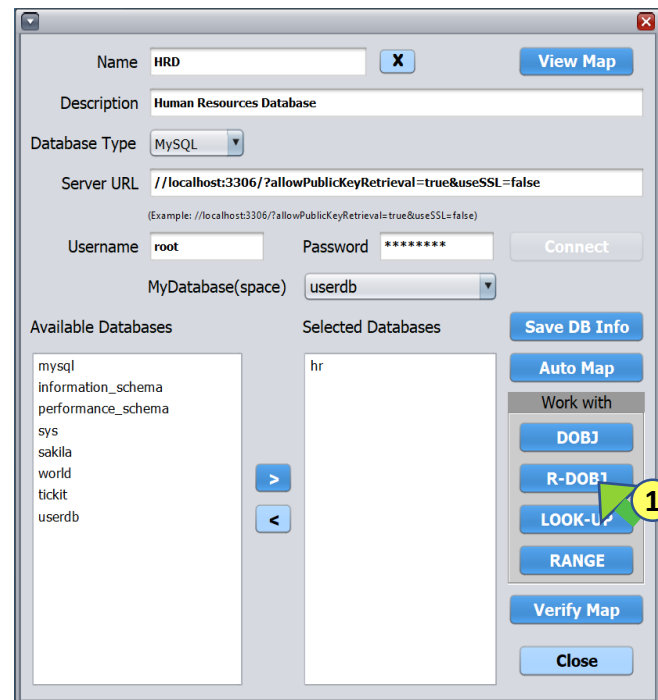
Create table in the Database

Cancel

Cancel table creation

DORM Studio:

- New R-DOBJ 'EMP_DEPT'
- Add R-Static Table



* Create new.

R-Dobj Name Enter name of the R-Dobj.

Description Enter small description of the R-Dobj.

Dobj-1 Select a Dobj.

Dobj-2 Select a Dobj

> Add selected table's info to R-Dobj.

X Delete from the map.

R-Static Attributes Table Select from left and add Static attributes table.

R-Dobj-ID Column Dobj-ID columns of both Dobjs.

Row Date/Time Column Select row timestamp column from drop down.

R-Aperiodic Attributes Table Select from left and add Aperiodic attributes table

Instance Update Seq. Number Column Select row update seq. column from drop down.

R-Periodic Attributes Table Select from left and add Periodic attributes table

Period Type Create new Period Type(or select from drop down)

Period Name Enter Period name.

Attribute Description Description of selected (from table below) attribute (editable).

Attribute Information Additional info. about selected (from table below) attribute (editable).

Save Save add/edits.

Cancel Cancel add/edits.

Done Close R-Dobj

Close Close R-DOBJ interface.

View Map View map in a tabular form.

DORM Studio:

- Create R-Static Attributes Table

The screenshot shows the 'R-Static Attributes Table' configuration in DORM Studio. The main window is titled 'MyDatabase(space)' and contains a 'Database(schema) / Tables' sidebar on the left. The main area is divided into several sections: 'Description' (EMPDEPT), 'R-Dobj-1' (EMPLOYEE) and 'R-Dobj-2' (DEPARTMENT), 'R-Static Attributes Table' (EMP_X_DEPT), 'R-Dobj-ID Column' (EMPLOYEE_ID+DEPARTMENT_ID), 'Instance Update Seq. Number Column', 'Period Type', 'Period Name', 'Row Date/Time Column(Optional)', 'Attribute Column' (ATTR1_COL), 'Attribute Description' (ATTR1), and 'Attribute Information'. A table at the bottom lists attributes with columns for NAME, DESCRIPTION, and INFORMATION. The table contains one row: 1, ATTR1_COL, ATTR1. The 'Save' button is highlighted with callout 11. Various callouts (1-11) and symbols (asterisk, exclamation mark, X) are placed over the interface to indicate specific actions and options.

! Optional

* Repeat (8 9 10) for each Attribute.

(Continued on next page.)

* Create new.

Dobj Name Enter name of the Data Object.

Description Enter small description of the Data Object.

X Delete from the map.

X Exclude attribute from the Look-Up.

Static Attributes Table New R-Static attributes table name

Attribute Column New attribute column name.

Attribute Description Description of attribute (editable).

Attribute Information Additional info. about attribute (editable).

Row Date/Time Column Column for row update date/time (optional).

Save Save add/edits.

Cancel Cancel add/edits.

View Map View map in a tabular form.

DORM Studio:

- Create R-Static Attributes Table

New Table

Create Table

Database: userdb

Table: EMP_X_DEPT

Columns:

- EMPLOYEE_ID
- DEPARTMENT_ID
- ATTR1_COL *

Definition:

Column: ATTR1_COL

Data Type: VARCHAR *

Width / Constraint: (10)

DDL Statement:

```
CREATE TABLE userdb.EMP_X_DEPT (  
EMPLOYEE_ID decimal  
,DEPARTMENT_ID decimal  
,ATTR1_COL VARCHAR (10)  
)
```

Execute DDL

Cancel

- * For each column repeat ①, ② and ③ (for some data types such as VARCHAR)
- ❗ After typing Width (and/or Constraint) press Enter or click in DDL Statement box on the right.

Database MyDatabase (space)

Table Table to be create

Columns Columns to be created

Data Type Select Data Type for the column

Width / Constraint Enter Width and/or constraint for the column

Execute DDL

Create table in the Database

Cancel

Cancel table creation

DORM Studio:

- Add R-Aperiodic attributes table: Similar to adding Aperiodic Attributes Table.

See [DOBJ: Add/Edit Aperiodic Attributes Table](#) on page 15

DORM Studio:

- Create R-Aperiodic attributes table: Similar to creating Aperiodic Attributes table.

See [DOBJ: Create Aperiodic Attributes Table](#) on page 16

DORM Studio:

- Add R-Periodic attributes table: Similar to adding Periodic Attributes Table.

See [DOBJ: Add/Edit R-Periodic Attributes Table](#) on page 18

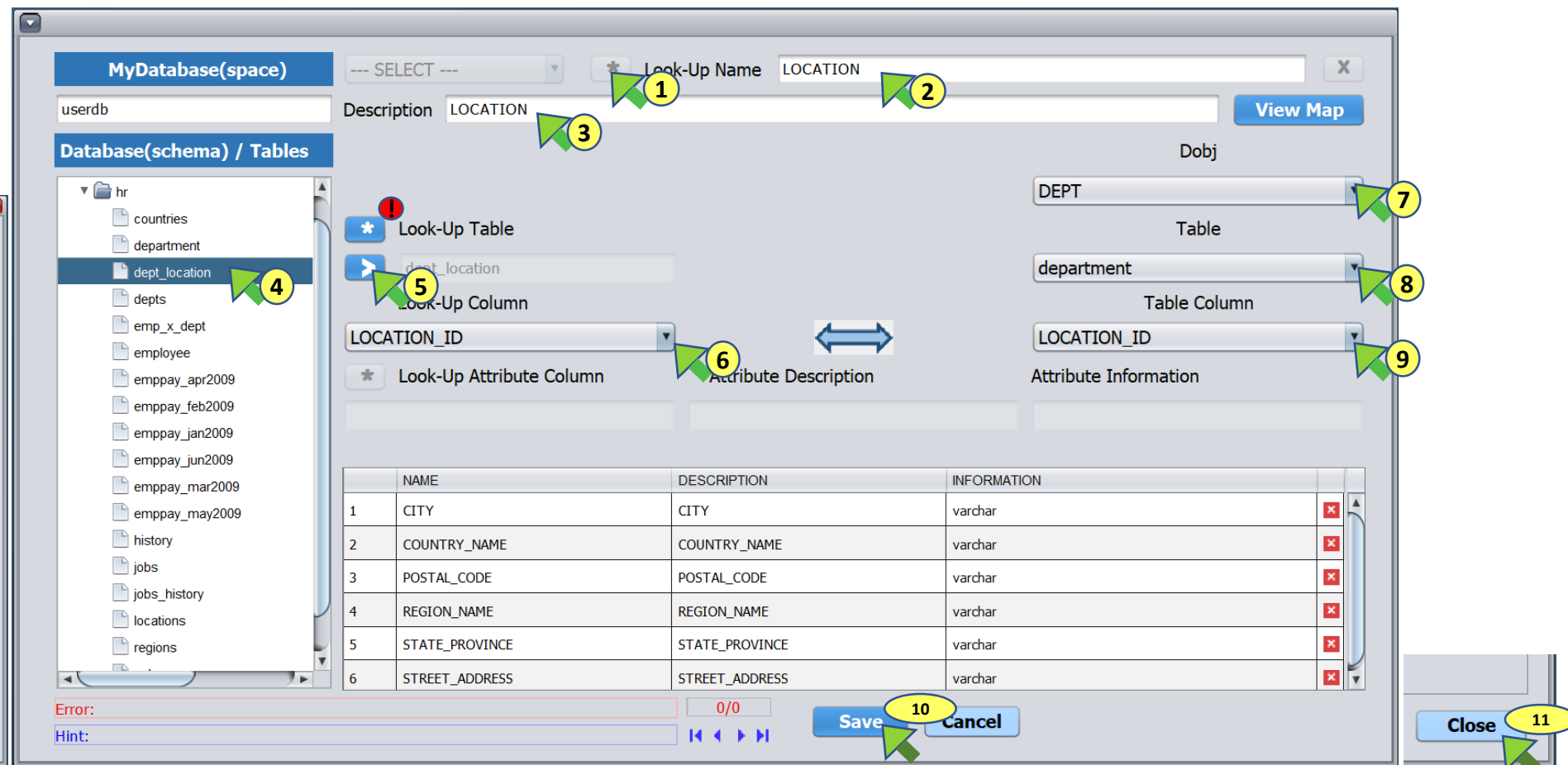
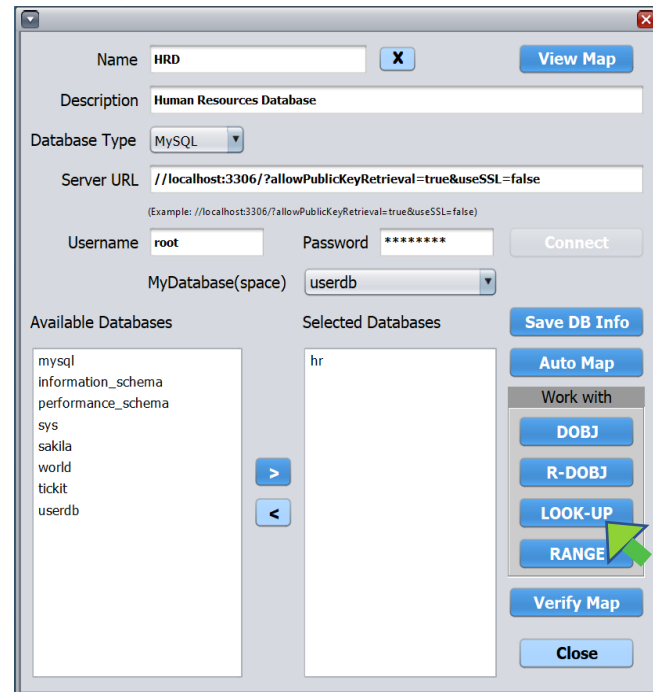
DORM Studio:

- Create R-Periodic attributes table: Similar to creating Periodic Attributes Table.

See [DOBJ: Create Periodic Attributes Table](#) on page 19

DORM Studio:

- New LOOK-UP 'LOCATION'

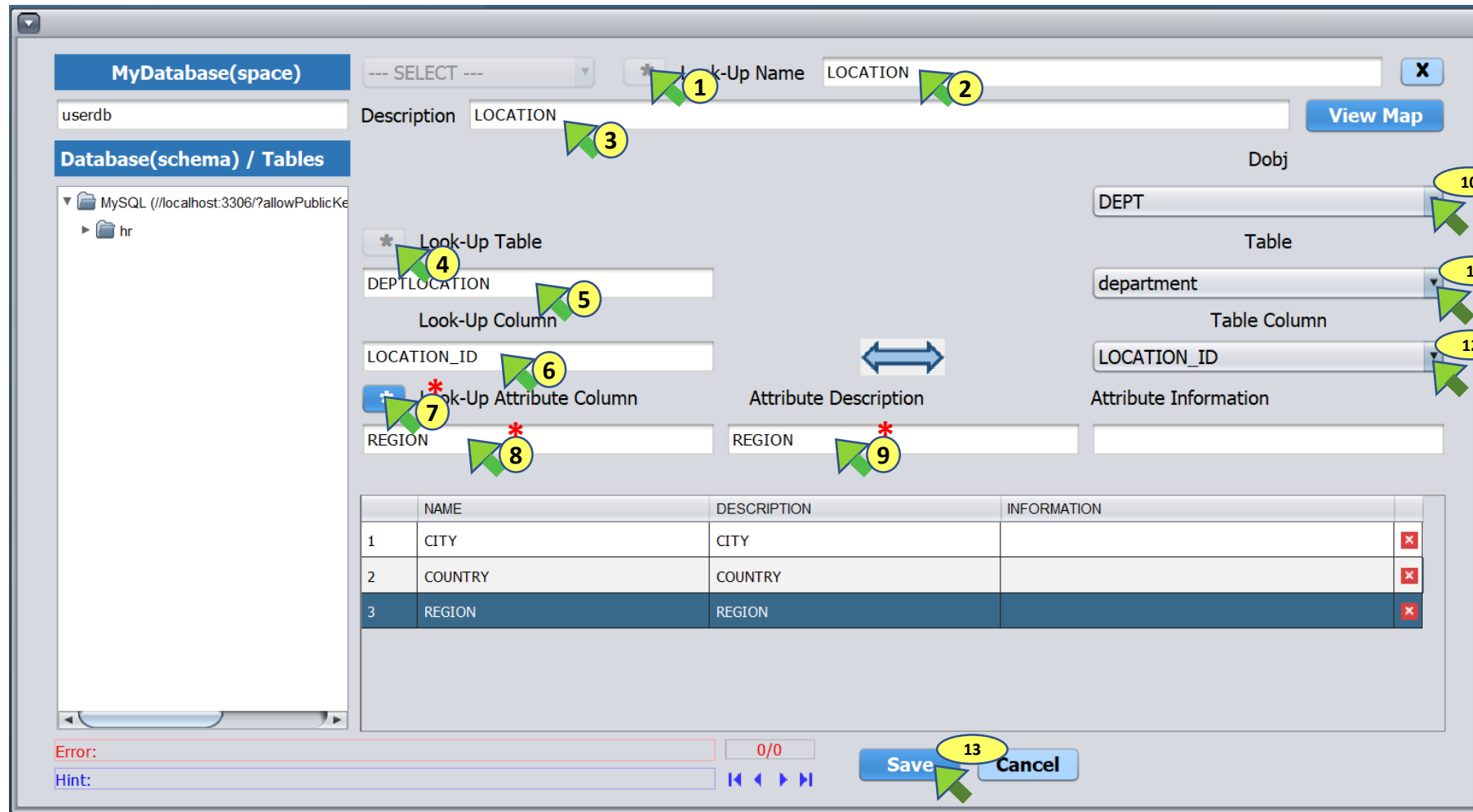


! See next page for creating a Look-Up table.

- Create new.
- Look-Up Name** Enter name of the Look-Up.
- Description** Enter small description of the Look-Up.
- Add selected table's info to Look-Up
- Delete from the map.
- Exclude attribute from the Look-Up.
- Look-Up Table** Selected look-up table
- Look-Up Column** Select look-up column
- Dobj** Select Dobj
- Table** Select a Table of selected Dobj
- Table Column** Select a column of selected Table
- Attribute Description** Description of selected (from table below) attribute (editable).
- Attribute Information** Additional info. about selected (from table below) attribute (editable).
- Save** Save add/edits.
- Cancel** Cancel add/edits.
- Close** Close DOBJ interface.
- View Map** View map in a tabular form.

DORM Studio:

- Create Look-Up Table



* Repeat (7 8 9)
for each Attribute.

(Continued on next page.)

* Create new.

Look-Up Name Enter name of the Look-Up.

Description Enter small description of the Look-Up.

Look-Up Table New look-up table name

Look-Up Column New look-up column name

Dobj Select Dobj

Table Select a Table of selected Dobj

Table Column Select a column of selected Table

Look-Up Attribute Column New look-up attribute column name

Attribute Description Description of attribute (editable).

Attribute Information Additional info. about attribute (editable).

Save Save add/edits.

Cancel Cancel add/edits.

View Map View map in a tabular form.

X Delete from the map.

X Exclude attribute

DORM Studio:

- Create Look-Up Table

New Table

Create Table

Database: userdb

Table: DEPTLOCATION

Columns:

- LOCATION_ID
- CITY
- COUNTRY
- REGION

Definition:

Column: REGION

Data Type: VARCHAR

Width / Constraint: (50)

DDL Statement:

```
CREATE TABLE userdb.DEPTLOCATION (  
LOCATION_ID INT  
,CITY VARCHAR (50)  
,COUNTRY VARCHAR (50)  
,REGION VARCHAR (50)  
)
```

Execute DDL

Cancel

- * For each column repeat 1, 2 and 3 (for some data types such as VARCHAR)
- ! After typing Width (and/or Constraint) press Enter or click in DDL Statement box on the right.

Database MyDatabase (space)

Table Table to be create

Columns Columns to be created

Data Type Select Data Type for the column

Width / Constraint Enter Width and/or constraint for the column

Execute DDL

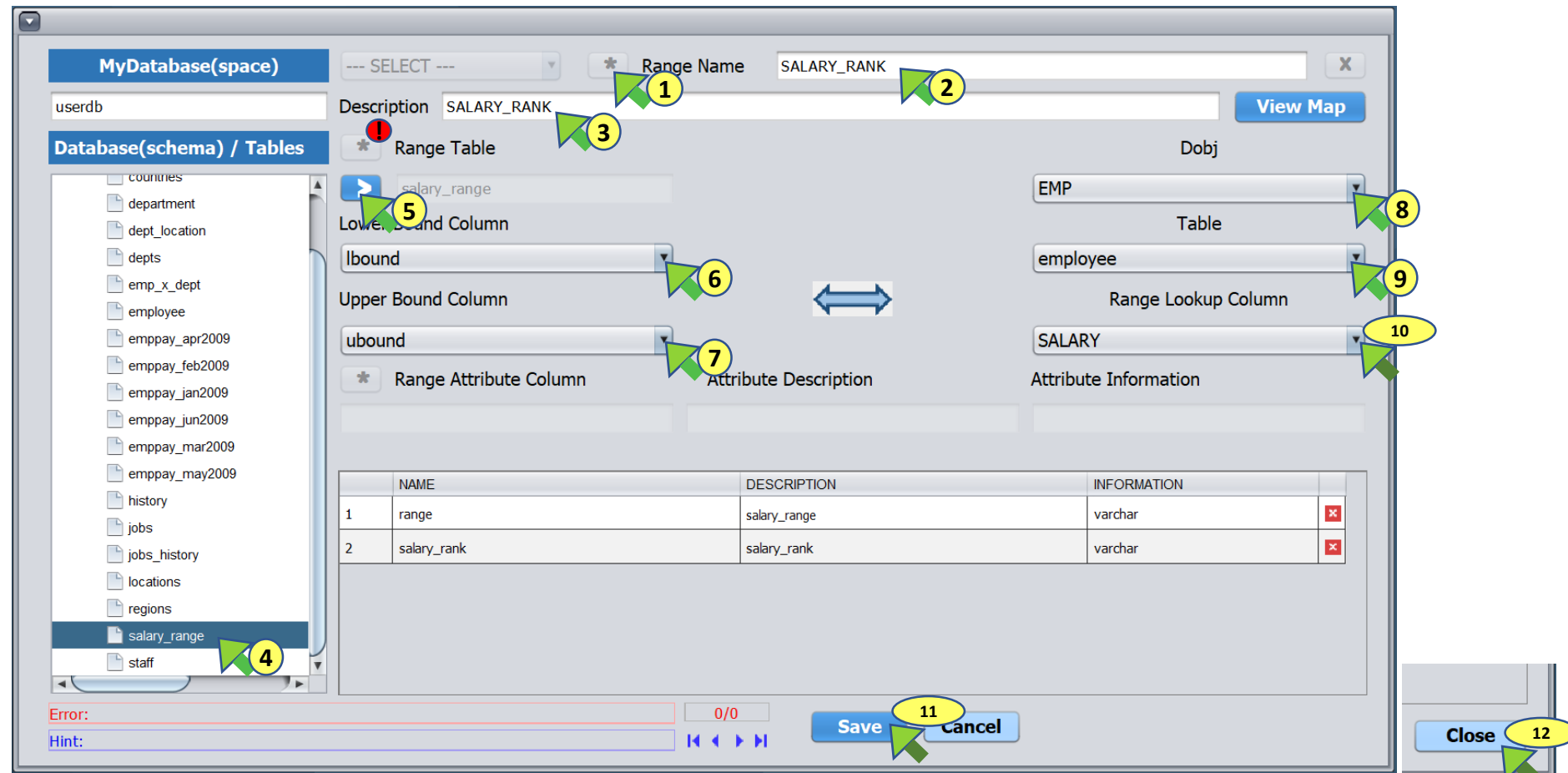
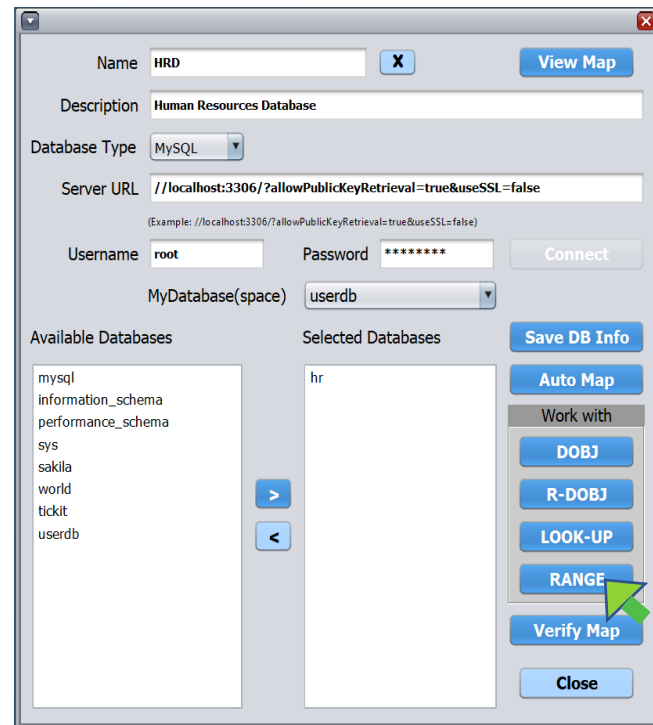
Create table in the Database

Cancel

Cancel table creation

DORM Studio:

- New RANGE 'SALARY_RANK'



❗ See next page for creating a Range table.

- Create new.
- Look-Up Name** Enter name of the Range.
- Description** Enter small description of the Range.
- Add selected table's info to Range
- Delete from the map.
- Exclude attribute from the Range.
- Look-Up Table** Selected look-up table
- Lower Bound Column** Select lower bound column
- Upper Bound Column** Select upper bound column
- Dobj** Select Dobj
- Table** Select a Table of selected Dobj
- Table Column** Select a column of selected Table
- Attribute Description** Description of selected (from table below) attribute (editable).
- Attribute Information** Additional info. about selected (from table below) attribute (editable).
- Save** Save add/edits.
- Cancel** Cancel add/edits.
- Close** Close DOBJ interface.
- View Map** View map in a tabular form.

DORM Studio:

- Create Range Table

MyDatabase(space) --- SELECT --- Range Name SALARY_RANK X

userdb Description SALARY_RANK View Map

Database(schema) / Tables

- * Range Table
- SALARY_RANGE
- Lower Bound Column LOWER_BOUND
- Upper Bound Column UPPER_BOUND
- * Range Attribute Column SALARY_RANK
- Attribute Description SALARY_RANK
- Attribute Information

Dobj EMPLOYEE

Table osemployee

Range Lookup Column SALARY

	NAME	DESCRIPTION	INFORMATION
1	SALARY_RANGE	SALARY_RANGE	
2	SALARY_RANGE	SALARY_RANGE	

Error: 0/0

Hint: Save Cancel

* Repeat (8 9 10) for each Attribute.

(Continued on next page.)

* Create new.

Range Name Enter name of the Range association.

Description Enter small description of the range.

Range Table New range table name

Lower Bound Column New lower bound column name

Upper Bound Column New upper bound column name

Dobj Select Dobj

Table Select a Table of selected Dobj

Table Column Select a column of selected Table

Range Attribute Column New range attribute column name

Attribute Description Description of attribute (editable).

Attribute Information Additional info. about attribute (editable).

Save Save add/edits.

Cancel Cancel add/edits.

View Map View map in a tabular form.

X Delete from the map.

X Exclude attribute.

DORM Studio: - Create Range Table

Create Table

Database: userdb

Table: SALARY_RANGE

Columns:

- LOWER_BOUND
- UPPER_BOUND
- SALARY_RANGE**
- SALARY_RANK

Definition:

Column: SALARY_RANGE

Data Type: VARCHAR

Width / Constraint: (50)

DDL Statement:

```
CREATE TABLE userdb.SALARY_RANGE (  
LOWER_BOUND REAL  
,UPPER_BOUND REAL  
,SALARY_RANGE VARCHAR (50)  
,SALARY_RANK VARCHAR (50)  
)
```

Execute DDL

Cancel

- * For each column repeat ①, ② and ③ (for some data types such as VARCHAR)
- ❗ After typing Width (and/or Constraint) press Enter or click in DDL Statement box on the right.

Database MyDatabase (space)

Table Table to be create

Columns Columns to be created

Data Type Select Data Type for the column

Width / Constraint Enter Width and/or constraint for the column

Execute DDL

Create table in the Database

Cancel

Cancel table creation

Name: HRD
Description: Human Resources Database
Database Type: MySQL
Server URL: //localhost:3306/?allowPublicKeyRetrieval=true&useSSL=false
Username: root
Password: *****
MyDatabase(space): userdb
Available Databases: mysql, information_schema, performance_schema, sys, sakila, world, tickit, userdb
Selected Databases: hr
Buttons: View Map, Connect, Save DB Info, Auto Map, DOBJ, R-DOBJ, LOOK-UP, RANGE, Verify Map, Close

Map: HRD

DEPT (L) LOCATION	EMP (R) SALARY_RANK

Buttons: Details, Export to CSV, Close

Annotations: 1 (Details), 3 (DEPT cell), 5 (Close)

Map: HRD

DATA OBJECT	DATABASE.TABLE	TABLE CATEGORY	COLUMN	LOOKUP/RANGE COLUMN	LOOKUP/RANGE DATABASE.TABLE	LOOKUP/RANGE NAME
DEPARTMENTS	hr.department	S	DPTMGR_SALARY			
DEPARTMENTS	hr.department	S	LOCATION_ID			
DEPARTMENTS	hr.department	S	LOCATION_ID	CITY	hr.dept_location	LOCATION
DEPARTMENTS	hr.department	S	LOCATION_ID	COUNTRY_NAME	hr.dept_location	LOCATION
DEPARTMENTS	hr.department	S	LOCATION_ID	LOCATION_ID	hr.dept_location	LOCATION
DEPARTMENTS	hr.department	S	LOCATION ID	POSTAL CODE	hr.dept_location	LOCATION

Buttons: Export to CSV, Back

Annotation: 2 (Back)

Data Object : DEPT

DATABASE.TABLE	TABLE CATEGORY	COLUMN	LOOKUP/RANGE COLUMN	LOOKUP/RANGE DATABASE.TABLE	LOOKUP/RANGE NAME
hr.department	S	DEPARTMENT_ID			
hr.department	S	DEPARTMENT_NAME			
hr.department	S	DPTMGR_COMMISSION_PCT			
hr.department	S	DPTMGR_EMAIL			

Buttons: Export to CSV, Back

Annotation: 4 (Back)

* DOBJs are shown in diagonal sequence (i.e. DEPT and EMP), R-DOBJs are shown at row-column intersection of the two related DOBJs.

! To view details of an object, click on the cell

Details Show database, tables and columns of all the data objects

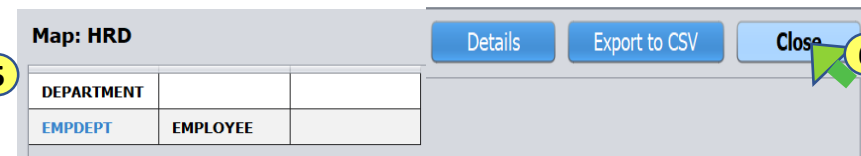
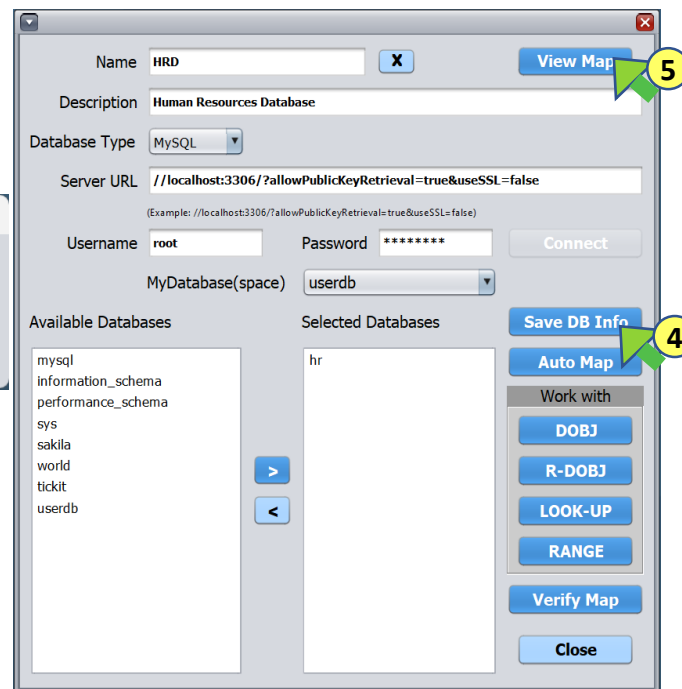
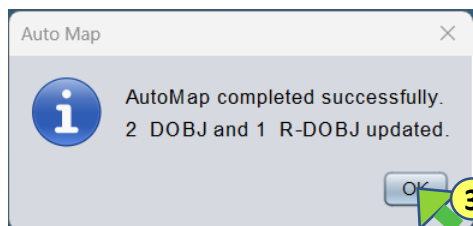
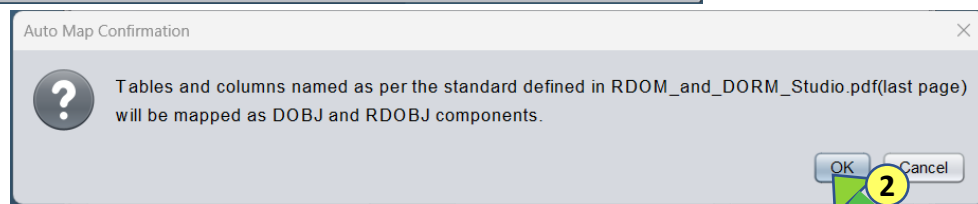
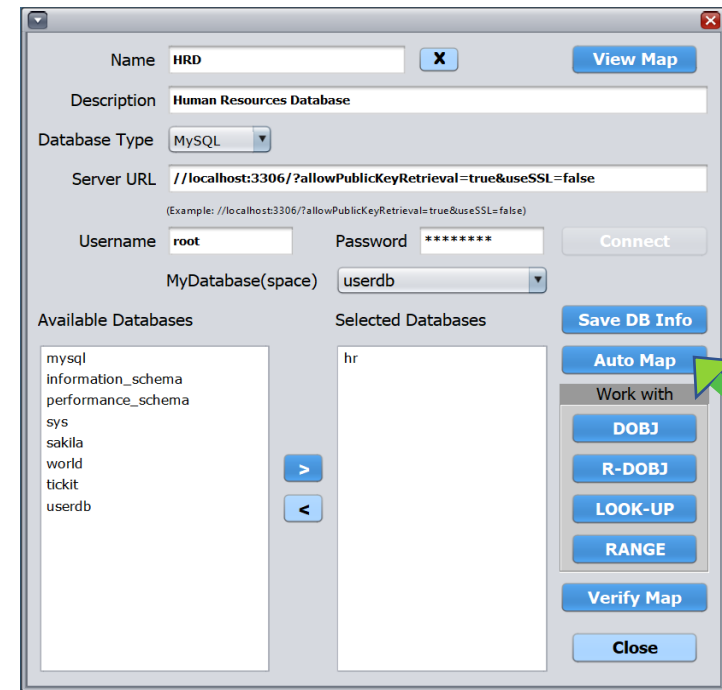
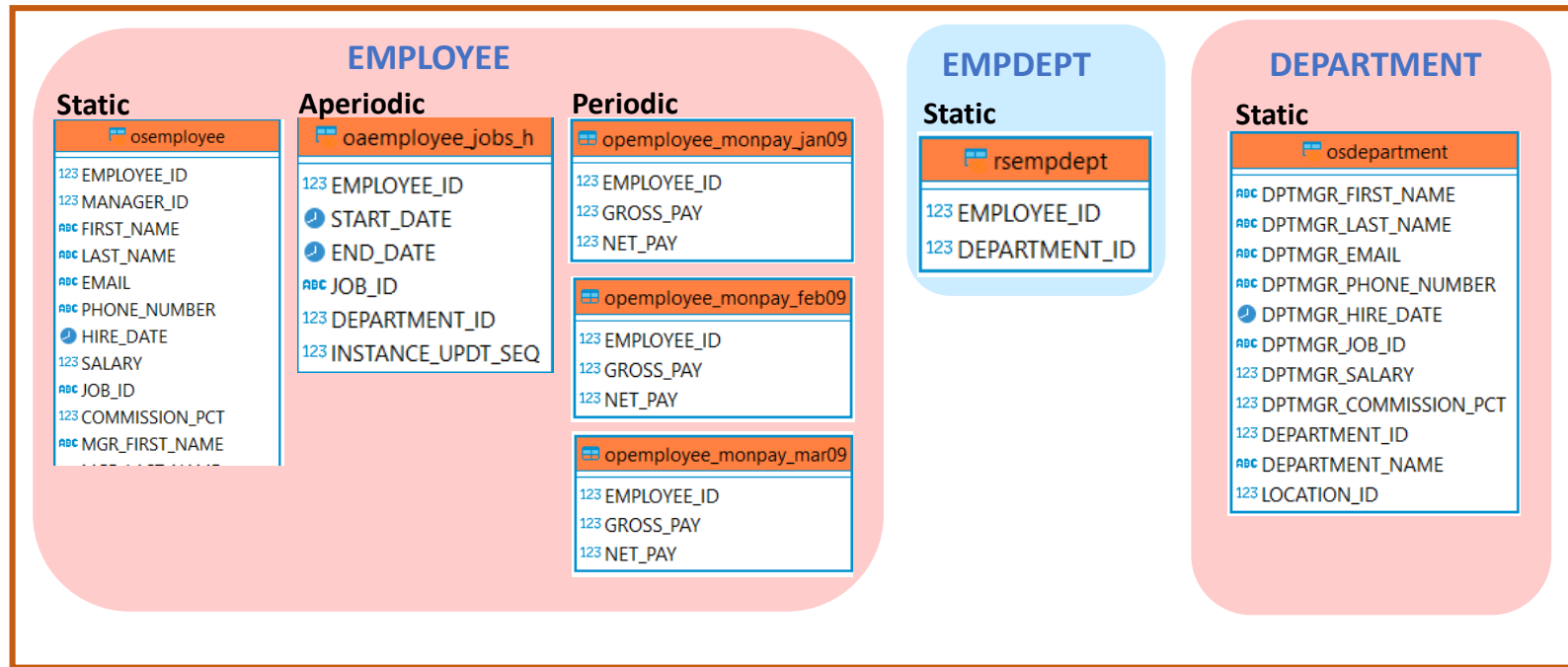
Export to CSV Export current view to CSV file.

Back Show map view

Close Close map view

AutoMap:

In this example there are two DOBJs (EMPLOYEE and DEPARTMENT) and one R-DOBJ (EMPDEPT). Tables and columns are named as per the standard*.



* See 'Standard names for tables and columns' on page 38.

- Verify Map

- Check for NULL values in ID columns of all tables.
- Check for duplicate values in ID columns of all tables.
- Verify integrity of object components relationships.

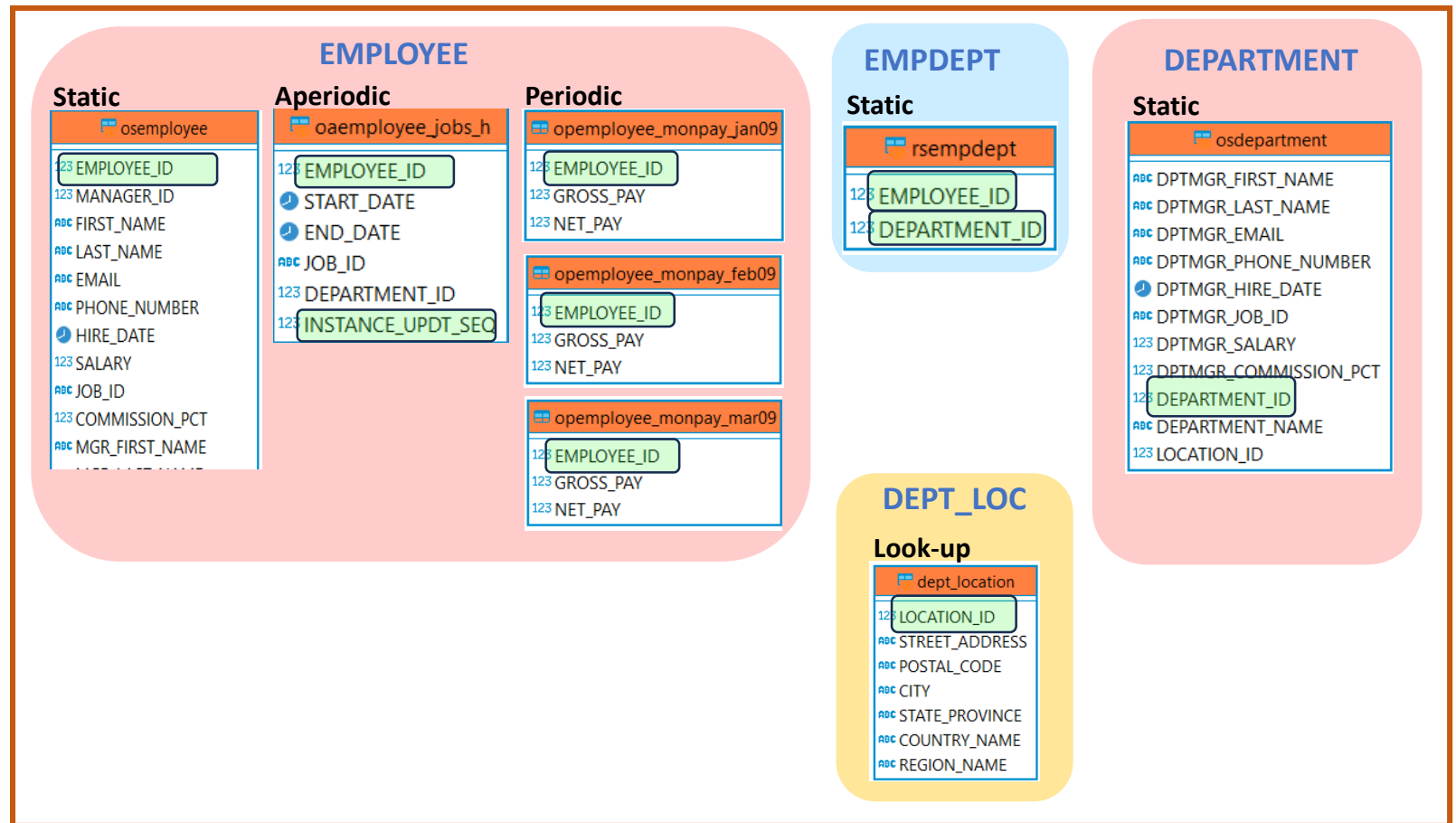
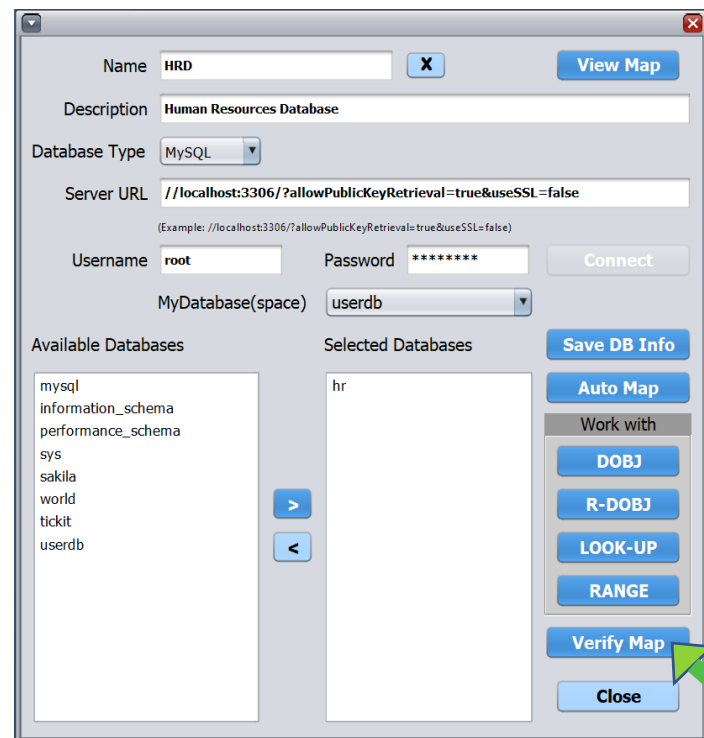
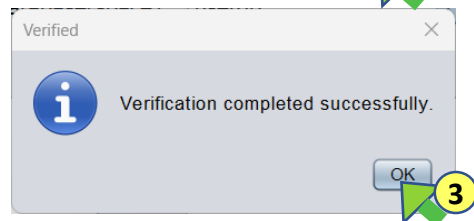
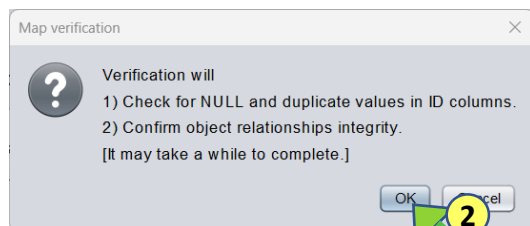


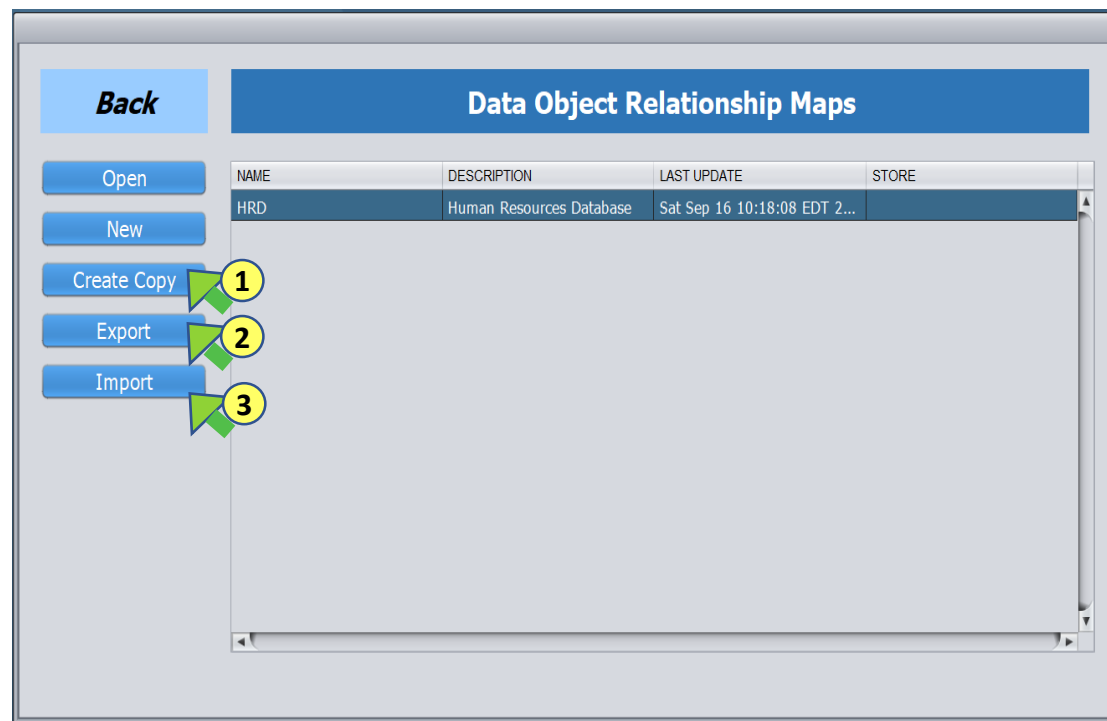
Fig. 1

- Verification process:

- 1) Check for NULL and duplicate values in ID columns (highlighted in green in Fig 1)
- 2) Check for non-ID values in object components:
 - i) EMPLOYEE_ID column of oaemployee_jobs_h table must not have value that does not exist in EMPLOYEE_ID column of osemployee table.
 - ii) EMPLOYEE_ID column of opemployee_monpay_jan09, opemployee_monpay_feb09 and opemployee_monpay_mar09 tables must not have value that does not exist in EMPLOYEE_ID column of osemployee table.
 - iii) EMPLOYEE_ID and DEPARTMENT_ID columns of rsempdept table must not have value that does not exist in EMPLOYEE_ID and DEPARTMENT_ID columns of osemployee and osdepartment tables respectively.



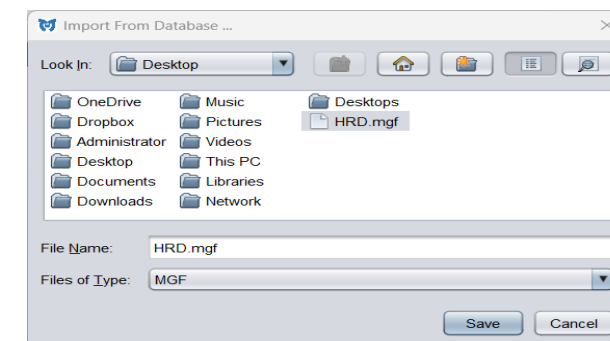
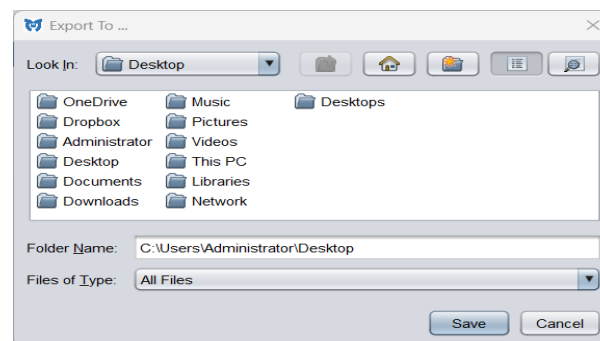
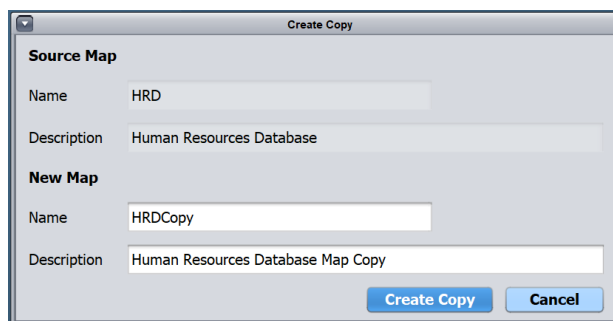
- Export/Import/Copy:



1. Create Copy: Duplicates selected map.

2. Export: Exports selected map as a file.

3. Import: Imports map from a file.



Standard names for tables and columns: DORM Studio’s AutoMap feature creates map entries for DOBJ and R-DOBJ components from the tables and columns named using following standard (Fig. 5).

DOBJ:

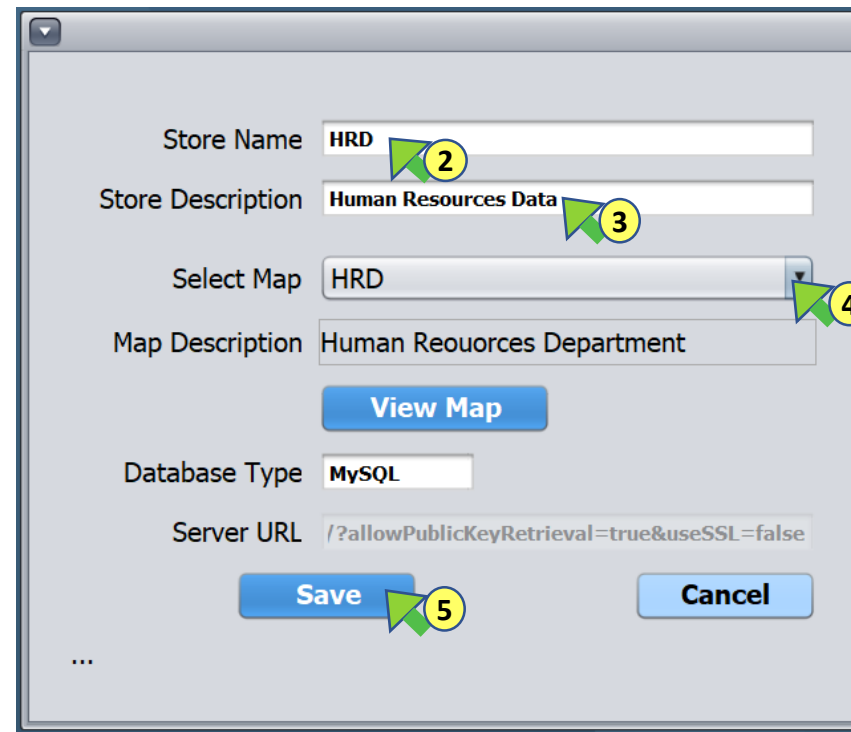
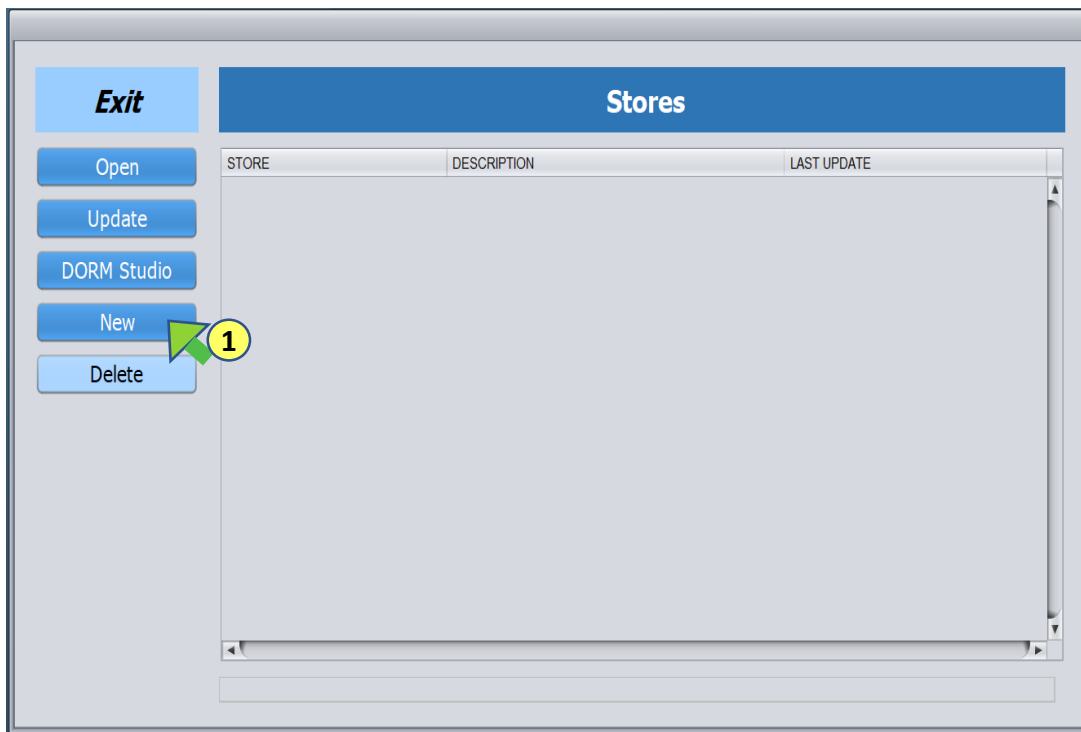
Table Type	Table Name	Column Name	Note
Static	OS<dobj>	<dobj>_ID	<dobj> is user declared DOBJ name. <dobj> must start with a character.
		INSTANCE_UPDT_DTTM	(Optional) Row update time stamp
Aperiodic	OA<dobj>_<string>	<dobj>_ID	<string> can be any set of characters.
		INSTANCE_UPDT_SEQ	Column for instance update sequence number.
		INSTANCE_UPDT_DTTM	(Optional) Row update time stamp
Periodic	OP<dobj>_<p_type>_<p_desc>	<dobj>_ID	<p_type> is user declared period type. <p_desc> is user declared period description. <p_type> and <p_desc> must not contain ‘_’ (underscore character).
		INSTANCE_UPDT_DTTM	(Optional) Row update time-stamp.

RDOBJ:

Table Type	Table Name	Column Name	Note
Static	RS<rdobj>	<dobj1id> <dobj2id>	<rdobj> is user declared RDOBJ name. <rdobj> must start with a character. <dobj1id> and <dobj2id> must be respective DOBJs’ ID column names.
		INSTANCE_UPDT_DTTM	(Optional) Row update time stamp
Aperiodic	RA<rdobj>_<string>	<dobj1id> <dobj2id>	<string> can be any set of characters.
		INSTANCE_UPDT_SEQ	Column for instance update sequence number.
		INSTANCE_UPDT_DTTM	(Optional) Row update time stamp
Periodic	RP<rdobj>_<p_type>_<p_desc>	<dobj1id> <dobj2id>	<p_type> is user declared period type. <p_desc> is user declared period description. <p_type> and <p_desc> must not contain ‘_’ (underscore character).
		INSTANCE_UPDT_DTTM	(Optional) Row update time-stamp.

Store:

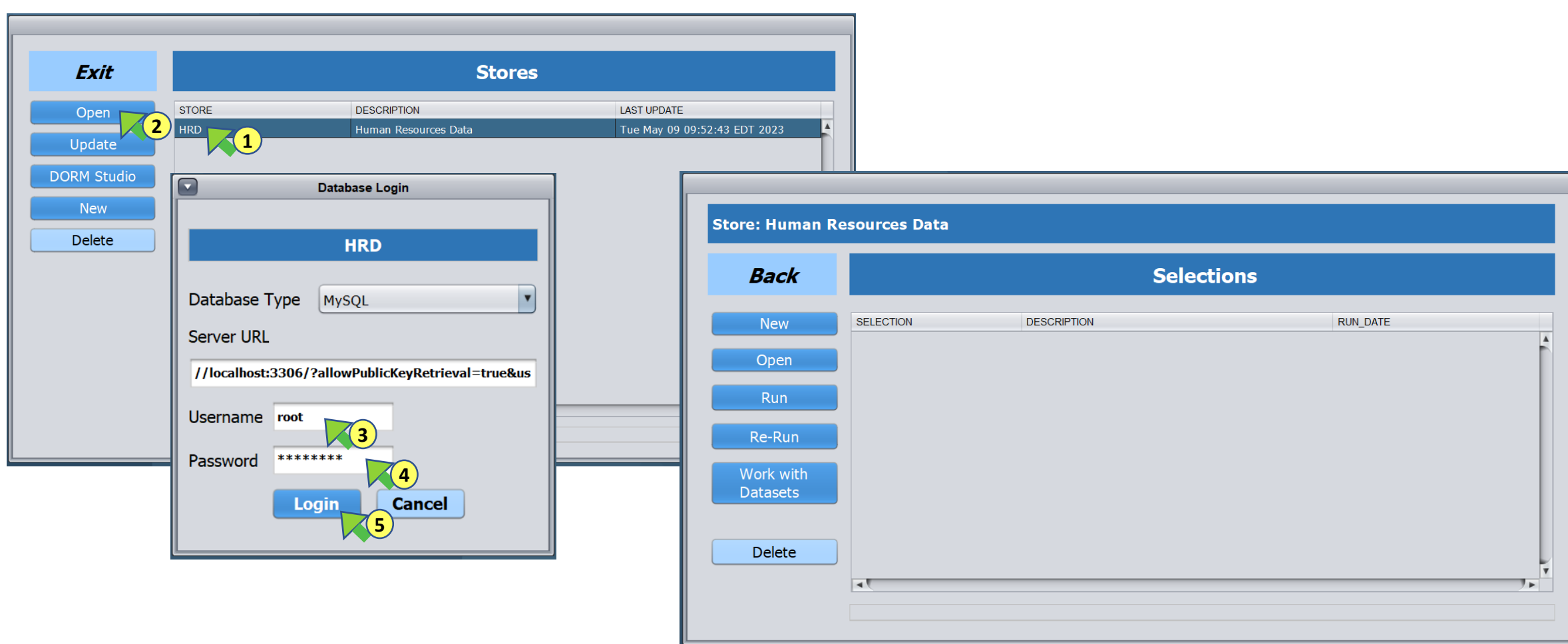
- Create new.



Open	Open selected store.
Update	Update selected store after associated map update.
DORM Studio	Open DORM Studio.
New	Create new store.
Delete	Delete selected store.
Exit	Exit application.

Store Name	Enter name of the store to be created.
Store Description	Enter brief description of the store.
Select Map	Select map to be associated with the store.
Database Type	Type of the database.
Server URL	Network address of the database.
Save	Create store.
Cancel	Cancel store creation

Store:
- Open



Database Type Type of the database associated with the store.

Server URL Network address of the database.

Username Enter database username

Password Enter database password

Login Login to the database

Cancel Cancel login

New Create new Selection.

Open Open selected Selection.

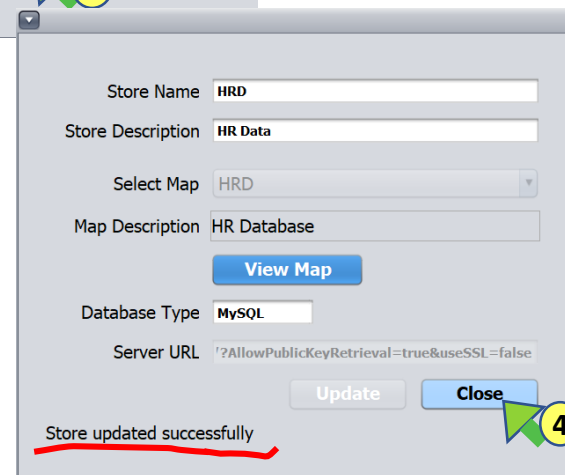
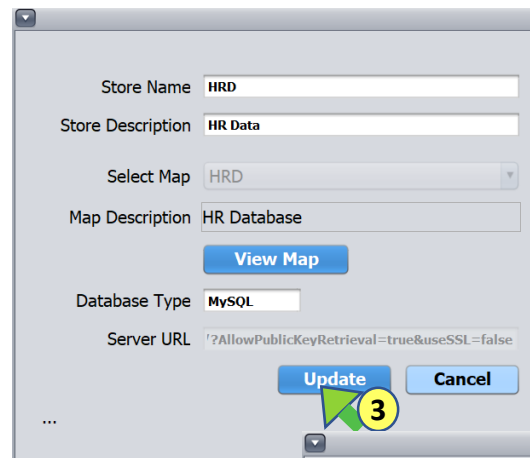
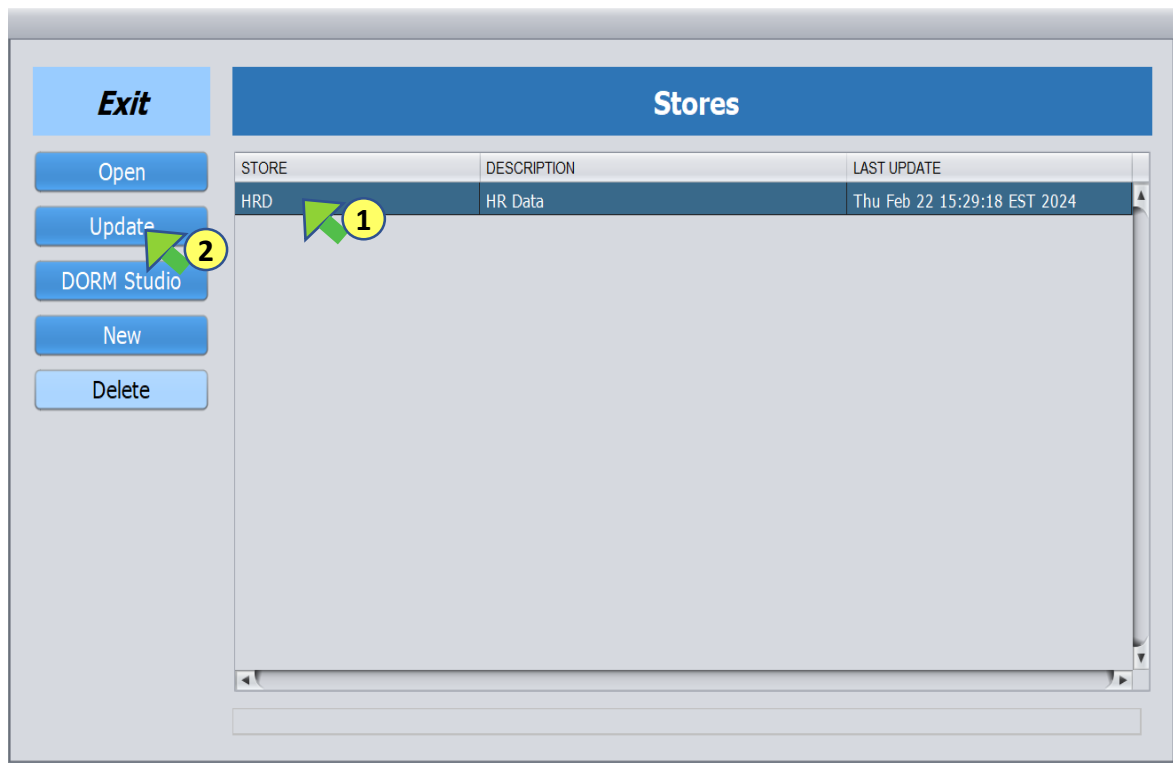
Run Run selected Selection.

Re-Run Re-Run selected Selection including associated analysis and subsetting.

Work with Datasets Open list of dataset/s created by the Selection Run (or Re-Run)

Delete Delete selected Selection and associated analysis and subsets.

Store:
- Update.



- Open** Open selected store.
- Update** Update selected store after associated map update.
- DORM Studio** Open DORM Studio.
- New** Create new store.
- Delete** Delete selected store.
- Exit** Exit application.

- Store Name** Enter name of the store to be created.
- Store Description** Enter brief description of the store.
- Select Map** Select map to be associated with the store.
- Database Type** Type of the database.
- Server URL** Network address of the database.
- Save** Create store.
- Cancel** Cancel store creation

Store:

- Create New Selection: Select attribute/s.

	OBJECT	ATTRIBUTE	OPTION	PERIOD	INFO	
1	DEPT_	DEPARTMENT_NAME			Department Name	X
2	EMP_	SALARY			decimal	X
3	EMP_	MONTHLY_GROSS_PAY		JAN2009	decimal	X
4	EMP_	MONTHLY_NET_PAY		JAN2009	decimal	X

❗ In case of aperiodic attribute, four options(ALL, CURRENT, ORIGINAL or PICK) will be available to choose from.

* Periodic attributes are shown as <period_type>_<attribute_name) with list of periods as sub-menu.

New Create new Selection.

Open Open selected Selection.

Run Run selected Selection.

Re-Run Re-Run selected Selection including analysis and subsets.

Work with Datasets Open the list of dataset/s created by the Selection Run (or Re-Run)

Delete Delete selected Selection and associated analysis and subsets.

Name Enter name of the selection.

Description Enter brief description of the selection.

Object Object of the selected attribute.

Attribute Selected attribute.

Option Select option for aperiodic attribute.

Attribute Info (optional) Enter additional information about the attribute.

Add Add selected attribute to selection.

X Remove attribute from the selection.

Save Save the selection.

Close Close selection interface.

CURRENT: Most recently added instance/s(row/s). For example, CURRENT 2 (i.e. select most recent two instances).
ORIGINAL: Initially added instance/s(row/s). For example, ORIGINAL 3 (i.e. select 1st, 2nd and 3rd instances).
ALL: All instances(rows).
PICK: Specific instance/s (rows). For example, PICK 3 5 (i.e. select 3rd and 5th instances).

Store:

- Create New Selection: Select Object/s. All attributes, of the selected object, gets added to the selection.

Store: Human Resources Data

Objects/Attributes

Name: DEPTSALARY

Description: Employee Salary and Department

Object: EMPLOYEE

Attribute: [Empty]

Option: ALL

Add

	OBJECT	ATTRIBUTE	OPTION	PERIOD	INFO
10	EMPLOYEE_	MGR_EMAIL			
11	EMPLOYEE_	MGR_FIRST_NAME			
12	EMPLOYEE_	MGR_HIRE_DATE			
13	EMPLOYEE_	MGR_JOB_ID			
14	EMPLOYEE_	MGR_LAST_NAME			
15	EMPLOYEE_	MGR_PHONE_NUMBER			
16	EMPLOYEE_	MGR_SALARY			
17	EMPLOYEE_	PHONE_NUMBER			
18	EMPLOYEE_	SALARY			
19	EMPLOYEE_	DEPARTMENT_ID	ALL*		
20	EMPLOYEE_	END_DATE	ALL		
21	EMPLOYEE_	JOB_ID_18986	ALL		
22	EMPLOYEE_	START_DATE	ALL		
23	EMPLOYEE_	MONPAY_GROSS_PAY		APR09	

* All aperiodic attributes get added with 'ALL' option.

New Create new Selection.

Open Open selected Selection.

Run Run selected Selection.

Re-Run Re-Run selected Selection including analysis and subsets.

Work with Datasets Open the list of dataset/s created by the Selection Run (or Re-Run)

Delete Delete selected Selection and associated analysis and subsets.

Name Enter name of the selection.

Description Enter brief description of the selection.

Object Object of the selected attribute.

Attribute Selected attribute.

Option Select option for aperiodic attribute.

Attribute Info (optional) Enter additional information about the attribute.

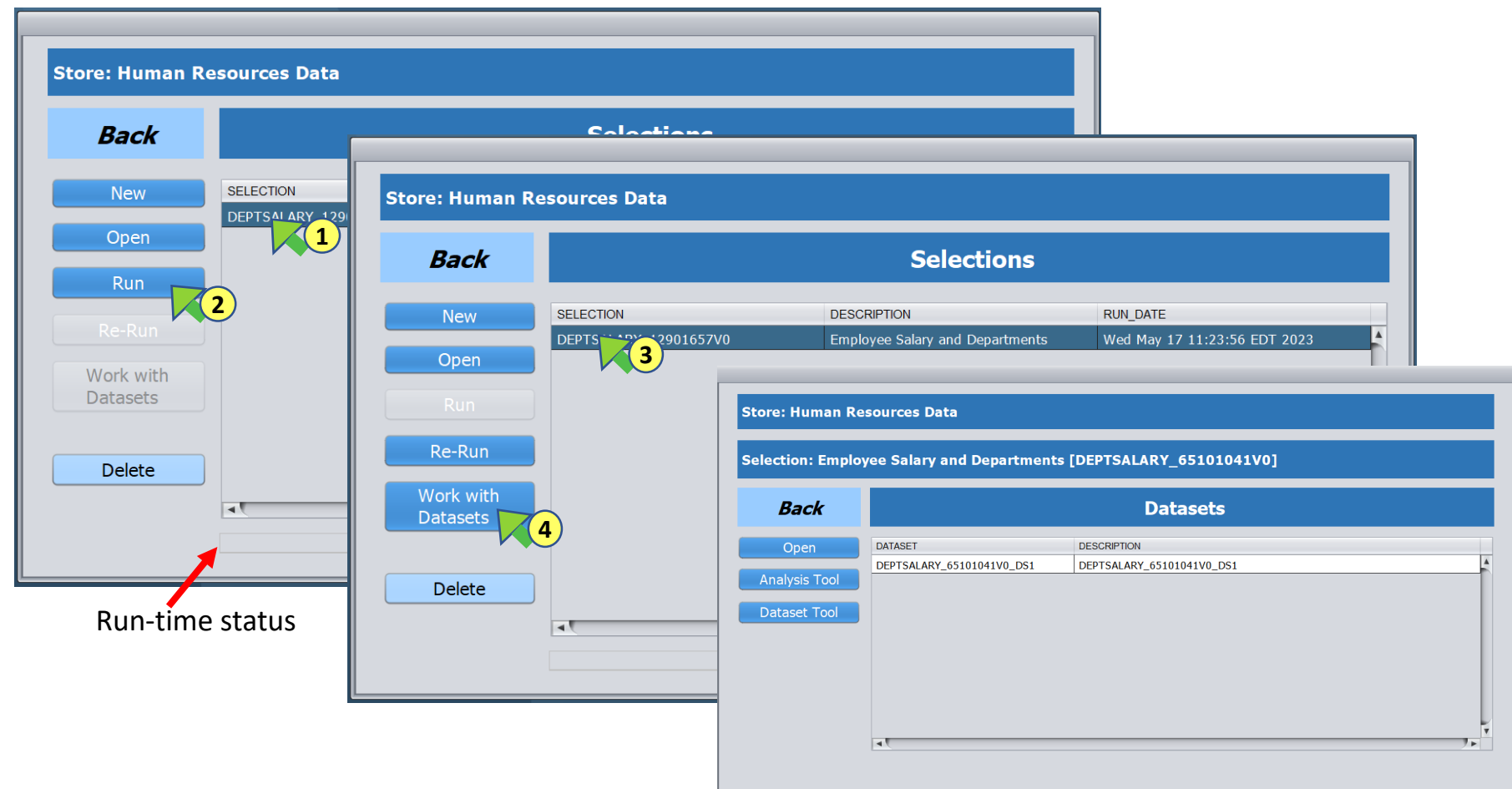
Add Add selected attribute to selection.

Remove attribute from the selection.

Save Save the selection.

Close Close selection interface.

Store:
- Run Selection.



- New** Create new Selection.
- Open** Open selected Selection.
- Run** Run selected Selection.
- Re-Run** Re-Run selected Selection including analysis and subsets.
- Work with Datasets** Open the list of dataset/s created by the Selection Run (or Re-Run)
- Delete** Delete selected Selection and associated analysis and subsets.

Work with Datasets:

- Open Dataset*
- View Object Relations Summary*

Selection : Employee Salary and Departments [DEPTSALARY_12901657V0]
Dataset : DEPTSALARY_DS1

Object Relations Summary Analysis Tool Dataset Tool Export to CSV

	DEPARTMENTS DEPARTMENT_ID	EMPLOYEES EMPLOYEE_ID	DEPARTMENTS DEPARTMENT_NAME	DEPARTMENTS REGION_NAME	EMPLOYEES FIRST_NAME	EMPLOYEES SALARY	EMPLOYEES MONTHLY_GROSS_PAY_FEB2009	EMPLOYEES MONTHLY_NET_P
1	90	100	Executive	Americas	Steven	24000.00	2000.00	1600.00
2	90	101	Executive	Americas	Neena	17000.00	1416.67	1133.33
3	90	102	Executive	Americas	Lex	17000.00	1416.67	1133.33
4	60	103	IT	Americas	Alexander	9000.00	750.00	600.00
5	60	104	IT	Americas	Bruce	6000.00	500.00	400.00

Selection: Employee Salary and Departments Dataset: DEPTSALARY_DS1

Object Group Size = 2 Object Group Size = 1

Objects Count(total)

Object Count	
DEPT_	11
EMP_	107

Related Objects Count

Object Count	
DEPT_	11
EMP_	106

Report

Selection : Employee Salary and Departments Dataset : DEPTSALARY_DS1
Subset : ObjectRelSmry04 Description : Objects: DEPARTMENT_, EMPLOYEE_

	DEPARTMENT DEPARTMENT_ID	EMPLOYEE EMPLOYEE_ID	DEPARTMENT DEPARTMENT
1	90	100	Executive
2	90	101	Executive
3	90	102	Executive

This subset (ObjectRelSmry04) is added to Report Tool.

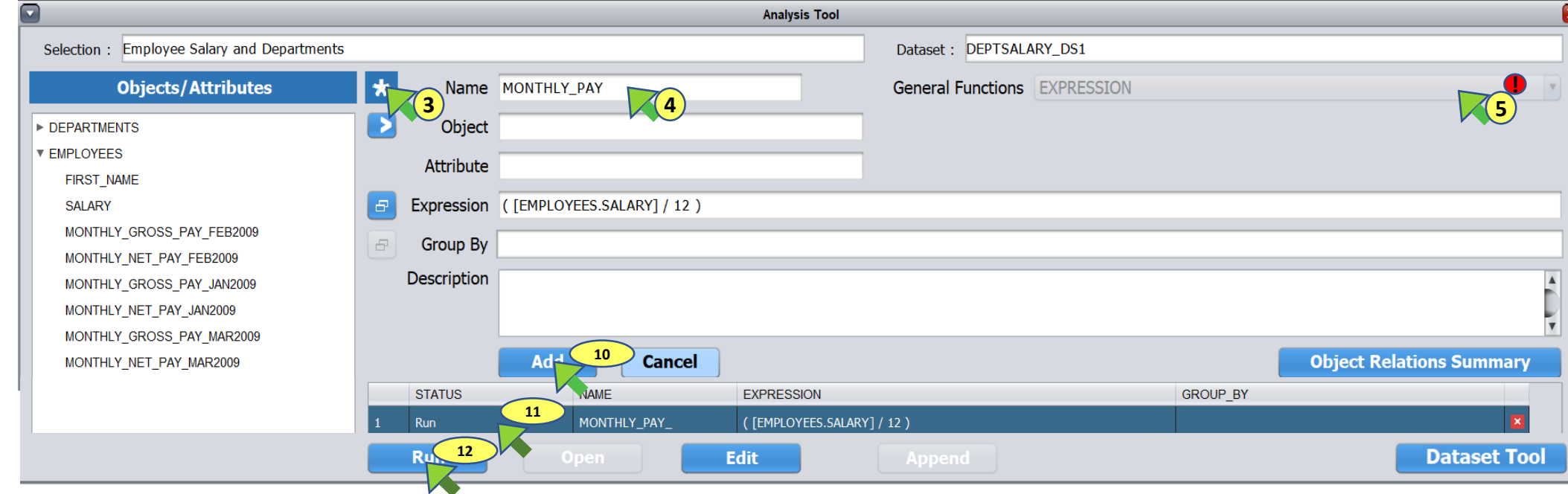
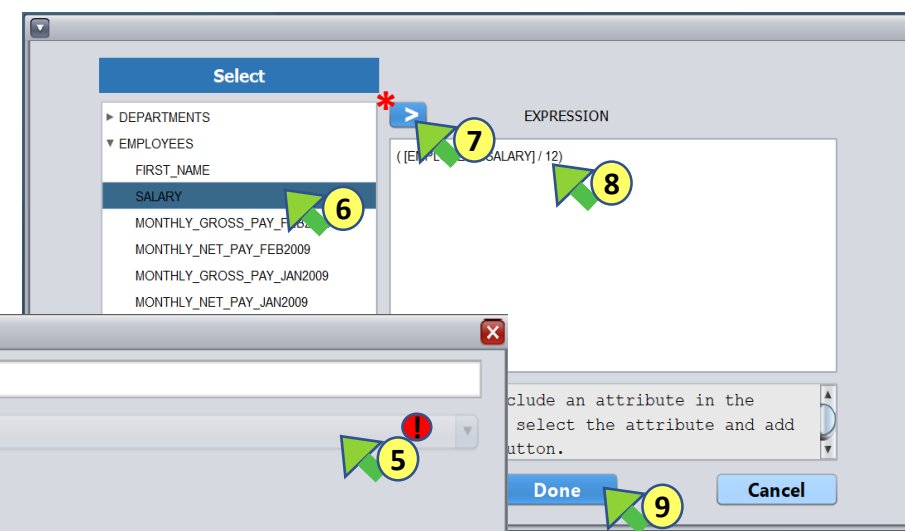
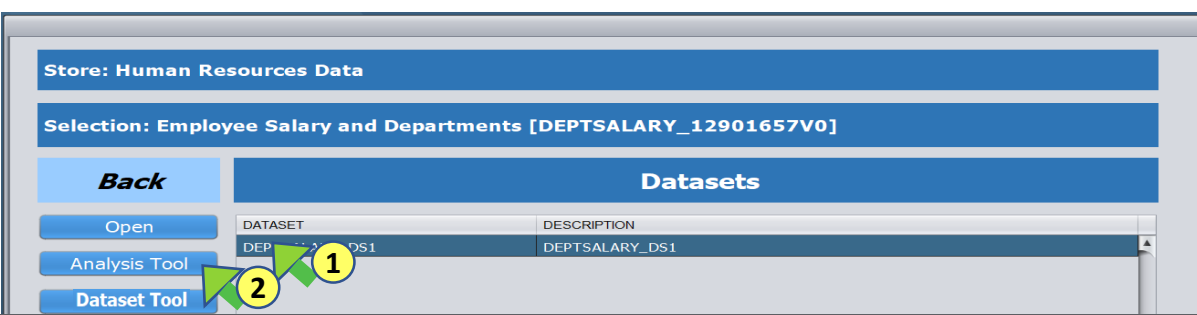
Selected attributes' information.

❗ Table (dataset) includes selected attributes plus data object IDs. Column header includes data-object names at top and attribute names.

- Object Relations Summary** View data-objects and exclusively related instances' count.
- Object Group Size** Data-object groups (combinations) in descending order(from left to right columns).
- Objects Count(total)** Total number of object instances
- Related Objects Count** Total number of related object instances
- Analysis Tool** Open Analysis Tool.
- Dataset Tool** Open Dataset Tool.
- Change Desc** Change dataset description.
- Export to CSV** Export dataset as two CSV files. (Data file and Metadata file)
- * Export to CSV** Export relationship summary as CSV file.
- View first page (first 1000 rows).
- View previous page.
- View next page.
- View last page.
- Close window.

Work with Datasets:

- Analysis Tool
- General Functions
- EXPRESSION



! Select 'EXPRESSION'

* Create new analysis.

Name Enter name.

General Functions Select a function.

> Add object/attribute to analysis.

Object Selected object.

Attribute Selected attribute.

Expression Edit expression.

Group By Edit Group By.

Description Add/Edit analysis description.

Add Add analysis to the list.

Cancel Cancel entry/edits.

Run Run selected analysis.

Open Open selected analysis result.

Edit Edit selected analysis.

Append Append statistic to the dataset.

✗ Delete selected analysis (in 'Run' or 'Saved' state).

* > Add selected attribute to Expression.

Done Finish entry.

Object Relations Summary View data-objects and their relations count.

Dataset Tool Open Dataset Tool.

Work with Datasets:

- Analysis Tool
- General Functions
- CASE STATEMENT

The screenshot shows the 'Analysis Tool' window with the following components:

- Store:** Human Resources Data
- Selection:** Employee Salary and Departments [DEPTSALARY_12901657V0]
- Buttons:** Back, Open, Analysis Tool, Dataset Tool
- Dataset Table:**

DATASET	DESCRIPTION
DEPTSALARY_DS1	DEPTSALARY_DS1
- Analysis Tool Fields:**
 - Selection: Employee Salary and Departments
 - Dataset: DEPTSALARY_DS1
 - Name: SALARY_RANK
 - Object: (empty)
 - Attribute: (empty)
 - Case Stmt: EMPLOYEES.SALARY] < 8000 THEN "LOW" WHEN ([EMPLOYEES.SALARY] >= 8000 AND [EMPLOYEES.SALARY] < 12000) THEN "MEDIUM" ELSE "HIGH"
 - Group By: (empty)
 - Description: (empty)
- General Functions:** CASE STATEMENT (selected)
- Case Statement Editor:**
 - Select: DEPARTMENTS, EMPLOYEES
 - CASE STATEMENT FOR SALARY_RANK
 - WHEN: [EMPLOYEES.SALARY] < 8000
 - THEN: "LOW"
 - ELSE: "HIGH"
 - CASE STATEMENT: [Click in the box below to validate the statement]
 - Code: CASE WHEN [EMPLOYEES.SALARY] < 8000 THEN "LOW" WHEN ([EMPLOYEES.SALARY] >= 8000 AND [EMPLOYEES.SALARY] < 12000) THEN "MEDIUM" ELSE "HIGH" END
- Buttons:** Add, Cancel, Run, Open, Edit, Append, Done, Cancel
- Object Relations Summary:** (empty)
- Dataset Tool:** (empty)

! Select 'CASE STATEMENT'

- * Create new analysis.
- Name Enter name.
- General Functions Select a function.
- > Add object/attribute to analysis.
- Object Selected object.
- Attribute Selected attribute.
- Case Stmt Edit Case Statement.
- Group By Edit Group By.
- Description Add/Edit analysis description.
- Add Add analysis to the list.
- Cancel Cancel entry/edits.
- Run Run selected analysis.
- Open Open selected analysis result.
- Edit Edit selected analysis.
- Append Append statistic to the dataset.
- * > Add selected attribute to statement.
- * * Add a WHEN/THEN clause.
- ✎ Edit selected clause (i.e. from statement)
- Done Finish entry.
- Object Relations Summary View data-objects and their relations count.
- Dataset Tool Open Dataset Tool.
- ✘ Delete selected analysis (in 'Run' or 'Saved' state).

Work with Datasets:

- Analysis Tool

- Aggregate Functions

- MAX with Group By

The screenshot shows the Analysis Tool interface with the following components and callouts:

- 1**: Analysis Tool button in the Datasets panel.
- 2**: Dataset Tool button in the Datasets panel.
- 3**: Create new analysis icon (*).
- 4**: Name field (MaxSalaryByDept).
- 5**: Selected attribute (SALARY) in the Objects/Attributes list.
- 6**: Object field (EMPLOYEES).
- 7**: Aggregate Functions dropdown (MAX).
- 8**: Group By field.
- 9**: Selected object (DEPARTMENT_NAME) in the Select dialog.
- 10**: Add button (>> Add) in the Select dialog.
- 11**: Done button in the Select dialog.
- 12**: Add button in the analysis configuration.
- 13**: Run button in the analysis configuration.
- 14**: Run button at the bottom of the tool.

STATUS	NAME	EXPRESSION	GROUP_BY	
1	Run	MAXSALARYBYDEPT_	MAX([EMPLOYEES.SALARY])	DEPARTMENT_NAME

***** Create new analysis.

Name Enter name.

Obj Functions Select a function.

> Add object/attribute to analysis.

Object Selected object.

Attribute Selected attribute.

Group By Edit Group By.

Description Add/Edit analysis description.

Add Add analysis to the list.

Cancel Cancel entry/edits.

Run Run selected analysis.

Open Open selected analysis result.

Edit Edit selected analysis.

Append Append statistic to the dataset.

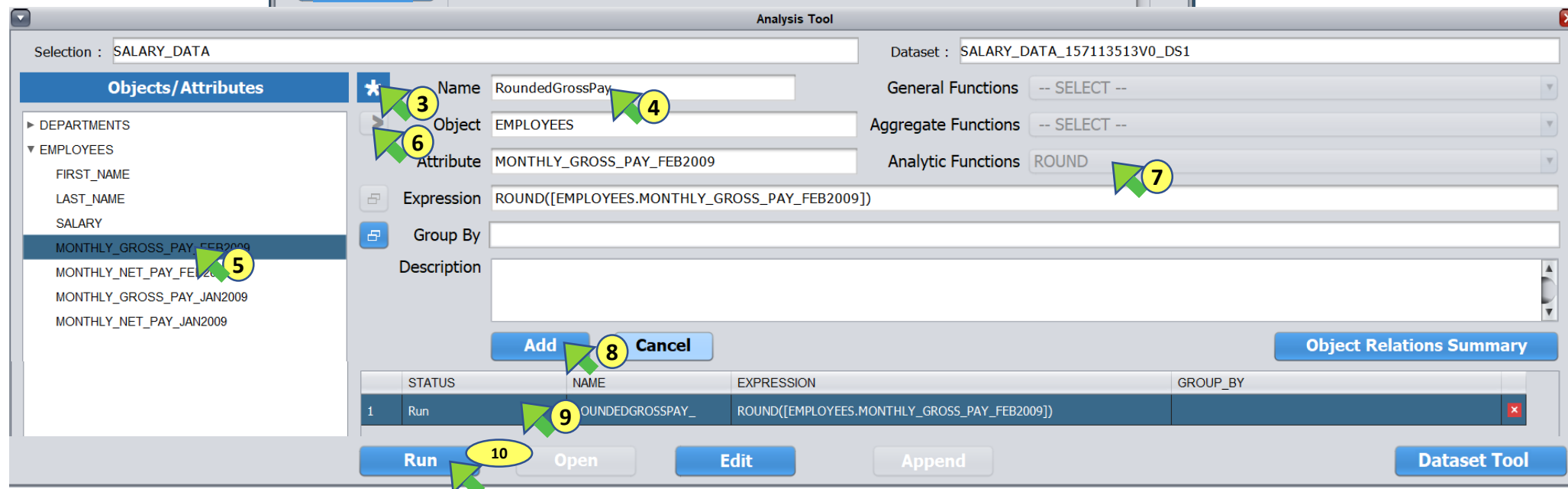
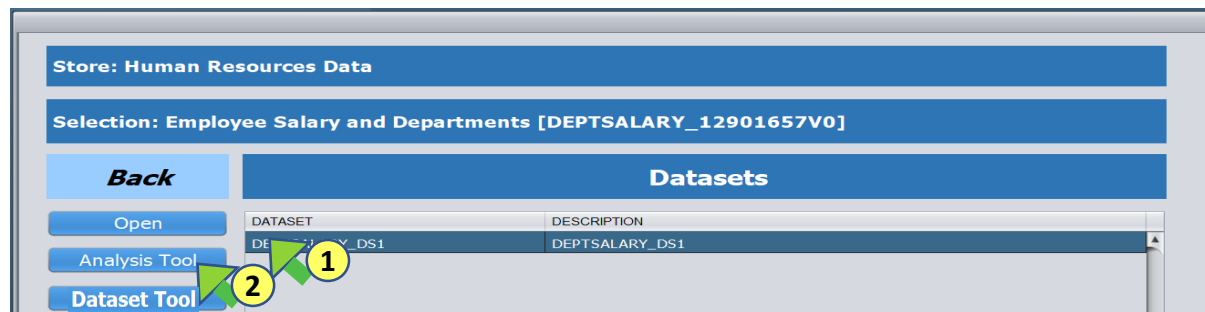
× Delete selected analysis (in 'Run' or 'Saved' state).

Object Relations Summary View data-objects and their relations count.

Dataset Tool Open Dataset Tool.

Work with Datasets:

- Analysis Tool
- Analytic Functions
- ROUND



Create new analysis.

Name Enter name.

Obj Functions Select a function.

Add object/attribute to analysis.

Object Selected object.

Attribute Selected attribute.

Description Add/Edit analysis description.

Add Add analysis to the list.

Cancel Cancel entry/edits.

Run Run selected analysis.

Open Open selected analysis result.

Edit Edit selected analysis.

Append Append statistic to the dataset.

Delete selected analysis (in 'Run' or 'Saved' state).

Object Relations Summary View data-objects and their relations count.

Dataset Tool Open Dataset Tool.

Work with Datasets:

- Analysis Tool

- String Functions

- CONCAT_TWO_WS

The screenshot shows the Analysis Tool interface with the following components and callouts:

- 1**: Dataset selection button.
- 2**: Analysis Tool button.
- 3**: Create new analysis button (*).
- 4**: Name input field.
- 5**: Object selection button (arrow).
- 6**: Object dropdown menu.
- 7**: Attribute selection button (arrow).
- 8**: String function selection button (arrow).
- 9**: String1 attribute selection button (arrow).
- 10**: String2 attribute selection button (arrow).
- 11**: Select button in the final usage dialog.
- 12**: Final Usage text area.
- 13**: Done button in the final usage dialog.
- 14**: Add button.
- 15**: Cancel button.
- 16**: Run button.

The 'Final Usage' dialog shows the following configuration:

```
Syntax: CONCAT_WS(Seperator, attr1, attr2)
Description: Returns concatenated value of two strings with seperator
Example: CONCAT_WS(' ', 'Mr', 'Smith')
Output: 'Mr.Smith'

Seperator (string Seperator): ,
String1 (string attr1): [EMPLOYEES.FIRST_NAME]
String2 (string attr2): [EMPLOYEES.LAST_NAME]

Final Usage: [Click in the box below to validate parameter]
CONCAT_WS(' ', [EMPLOYEES.FIRST_NAME], [EMPLOYEES.LAST_NAME])
```

***** Create new analysis.

Name Enter name.

Obj Functions Select a function.

> Add object/attribute to analysis.

Object Selected object.

Attribute Selected attribute.

Group By Edit Group By.

Description Add/Edit analysis description.

Add Add analysis to the list.

Cancel Cancel entry/edits.

Run Run selected analysis.

Open Open selected analysis result.

Edit Edit selected analysis.

Append Append statistic to the dataset.

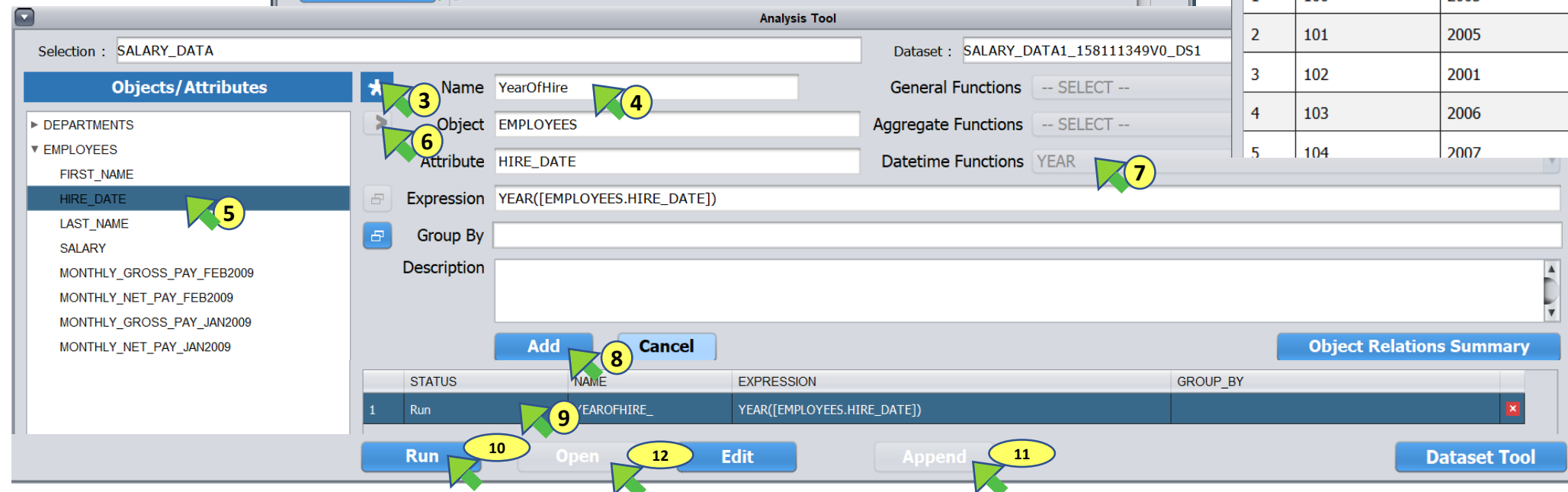
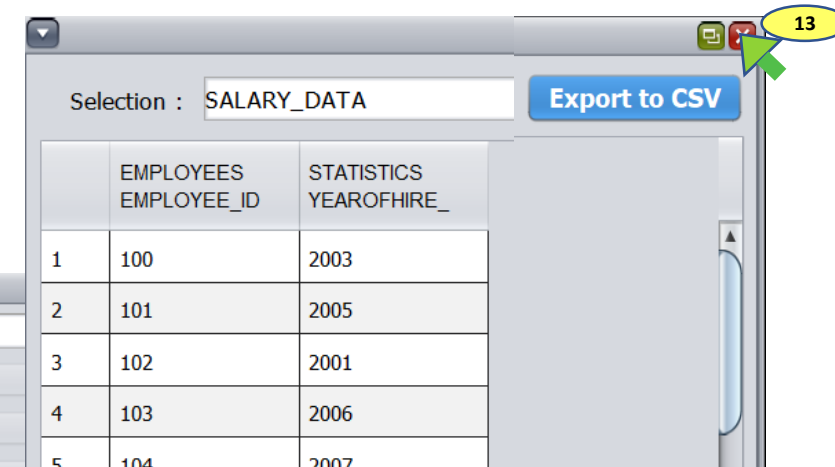
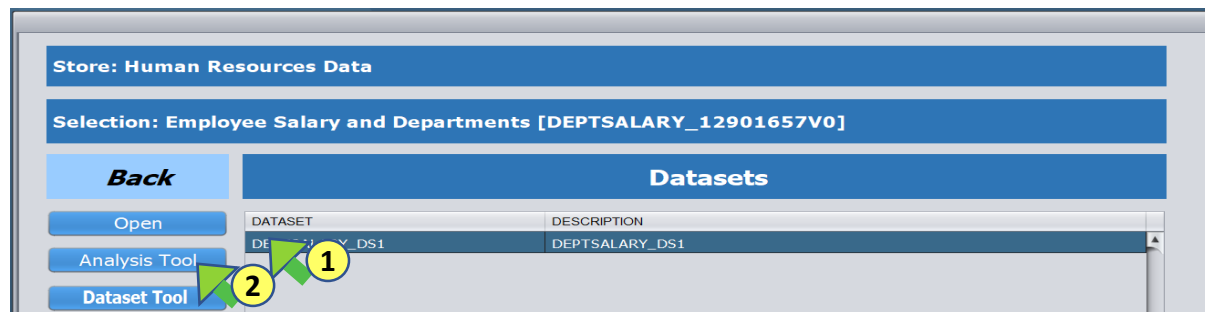
✗ Delete selected analysis (in 'Run' or 'Saved' state).

Object Relations Summary View data-objects and their relations count.

Dataset Tool Open Dataset Tool.

Work with Datasets:

- Analysis Tool
- Date Functions
- YEAR



Create new analysis.

Name Enter name.

Obj Functions Select a function.

Add object/attribute to analysis.

Object Selected object.

Attribute Selected attribute.

Description Add/Edit analysis description.

Add Add analysis to the list.

Cancel Cancel entry/edits.

Run Run selected analysis.

Open Open selected analysis result.

Edit Edit selected analysis.

Append Append statistic to the dataset.

Delete selected analysis (in 'Run' or 'Saved' state).

Object Relations Summary View data-objects and their relations count.

Dataset Tool Open Dataset Tool.

Work with Datasets:

- Dataset Tool

Selection : SALARY_DATA

Objects/Attributes

- Statistics
 - MAXSALARYBYDEPT_ (6)
 - YEAROFHIRE_ (6)
- DEPARTMENTS
- EMPLOYEES

Name: SALARYRPT (3)

Description: SALARY REPORT (4)

Filter: (5)

Sort: [EMPLOYEES.SALARY]

Select Top: (8) [EMPLOYEES.FIRST_NAME], [EMPLOYEES.LAST_NAME], [EMPLOYEES.SALARY], [Statistics.MAXSALARYBYDEPT_]

Selected attributes' information:

```
DataType=decimal(8,2) :Expression=MAX ([EMPLOYEES.SALARY]) :GroupBy=DEPARTMENT_NAME
```

STATUS	NAME	FILTER	SORT	LIMIT	SELECT
1	Preview	SALARYRPT (10)	B1_SALARY		B1_FIRST_NAME, B1_LAST_NAME, B1_SALARY...

Buttons: Add (9), Preview (11), Open (13), Edit, Save (12), Export to CSV

! If no attribute/object selected then all attributes, including object-ids, will be added to selection.

* Create new subset.

Name Enter name.

Description Add/Edit subset description.

> Filter Add object/attribute to WHERE clause.

> Sort Add object/attribute to ORDER BY clause.

> Select Add object/attribute to SELECT clause.

Top Enter number of rows to limit the subset.

Add Add subset definition to the list.

Cancel Cancel entry/edits.

✖ Delete selected subset.

Preview Preview selected subset.

Edit Edit selected subset (in Preview state).

Save Save selected subset as database table.

Open Open selected (Saved) subset.

Export to CSV Export selected (Saved) subset to CSV files.

⏪ View first page (first 1000 rows).

⏩ View previous page.

⏪ View next page.

⏩ View last page.

✖ Close window.

Store:

- Re-Run Selection.

Store: Human Resources Data

Change Periodic Table Selection

Currently Selected Tables: [EMPLOYEE_].[opemployee_monpay_jan09] (JAN09)

Change To: [hr].[opemployee_monpay_apr09] (APR09)

Add

	DATA OBJECT	CURRENT TABLE	CURRENT TABLE DESC	<->	NEW TABLE	NEW TABLE DESC
1	EMPLOYEE_	opemployee_monpay_jan09	JAN09	<->	opemployee_monpay_apr09	APR09

ReRun

Store: Human Resources Data

Back

Selections

SELECTION	DESCRIPTION	RUN_DATE
DEPTSALARY_6545548V0	Employee Salary and Departments	Tue Mar 05 16:55:52 EST 2024
DEPTSALARY_6545548V1	Employee Salary and Departments VER...	Tue Mar 05 17:20:00 EST 2024

Continue with ReRun

Cancel ReRun

Selection(DEPTSALARY_6545548V0) re-run completed successfully

* (Optionally) change selected periodic table/s to different periodic table/s of the same type. The Re-Run will use the newly selected table/s, in place of originally selected tables, in creating dataset/s and subsequently in analysis as well as subset creation.

Note: Prompt to change periodic table/s selection will only appear if periodic attribute/s were in original selection.

New	Create new Selection.
Open	Open selected Selection.
Run	Run selected Selection.
Re-Run	Re-Run selected Selection including analysis and subsets.
Work with Datasets	Open the list of dataset/s created by the Selection Run (or Re-Run)
Delete	Delete selected Selection and associated analysis and subsets.

Dataset Metadata: Each dataset is created with two tables, a data table and a metadata table. Dataset table name/s are <selection>_DS<num>. Metadata table name/s are <selection>_DS<num>_DM. Following table contains metadata table's column names and descriptions. Metadata for appended statistic is identified by ATTR_DOBJ column's value of 'STATDOBJ'.

Name	Description	STATISTIC Description*
IQ_ATTR_NAME	Column name in dataset's table	Column name in dataset's table
RESULTSET	Dataset's table name	Dataset's table name
ATTR_DB	Database/schema of the selection attribute(column)	'STAT_DB'
ATTR_TABLE	Table of the selection attribute(column)	'STAT_TBL'
ATTR_DBTYPE	Data type of the selection attribute(column)	Data type of the statistic attribute(column)
ATTR_DOBJ	Data-object of the selection attribute	'STATDOBJ'
ATTR_DOBJ_DESC	Data-object description of the selection attribute	'Statistics'
ATTR_CATGRY	Selection attribute category (i.e. Static, Aperiodic or Periodic). Null if ID attribute.	'S'
ATTR_NAME	Selection attribute name (i.e. column name). Look-up value if LKPRNG_ATTR not NULL	Data-object/s of selection attribute/s included in the statistic's formula
ATTR_DESC	Selection attribute description. Look-Up or Range attribute description if LKPRNG_ATTR not NULL	Column name in dataset(table)
C_CATGRY_OCAP_OPTION	For selection attribute category = 'C' or 'RC' (i.e. DOBJ or R-DOBJ Aperiodic attribute)	NULL
SEQ_NUM	For selection attribute category = 'C' or 'RC' instance update sequence number.	NULL
P_CATGRY_TABLE_DESC	For selection attribute category = 'P' or 'RP' (i.e. DOBJ or R-DOBJ Periodic attribute)	NULL
LKPRNG_ATTR	Look-Up or Range attribute (column)	NULL
LKPRNG_DB	Database of the Look-Up or Range attribute	NULL
LKPRNG_TABLE	Table of the Look-Up or Range attribute	NULL
LKPRNG_ATTR_DBTYPE	Data type of the Look-Up or Range attribute	NULL
ATTR_AUX_META	I = ID Attribute, L = Look-Up attribute, R = Range attribute	ID attribute/s of the data-object/s included in the statistic's formula
ATTR_AUX_INFO	Additional selection attribute information added by user. Otherwise attribute(column) data type.	Statistic type, formula, Group By (if any) of the statistic
FROM_DOBJ	Dobj1 of the selection attribute, if ATTR_CATGRY = 'R','RC','RP' otherwise data-object of the attribute	NULL
TO_DOBJ	Dobj2 of the selection attribute, if ATTR_CATGRY = 'R','RC','RP' otherwise data-object of the attribute	NULL
VIEW_ID	NULL	NULL

* If ATTR_DOBJ = 'STATDOBJ' (i.e. Metadata for appended statistics)

Statistic Metadata: Statistic table does not get created with metadata table. When a statistic table is exported, a metadata file is created together with statistic data file in CSV format. Statistic table (and exported data file) name is <selection>_DS<num>_AN<num>. Statistic metadata file name is <selection>_DS<num>_AN<num>_ANMETA.csv. Statistic metadata file contains one row for the statistic metadata and rows for dataset metadata for the other attributes of statistic table. Following table contains statistic metadata file columns and descriptions.

Name	Description
QINST_ID	Selection name
RESULTSET	Dataset(table) name
ANID	Statistic table name
STATUS	Statistic status in Analysis Tool (i.e. 'Saved' or 'Appended')
STATISTIC	Statistical function name
NAME	Statistic attribute name
DESC	NULL
DOBJATTR	Selected attribute (or NULL if General Function is selected)
GROUPBY	Group By attribute/s.
EXPRESSION	Syntactical expression
ANSQL	SQL statement to create statistic table
DSSQL	SQL statement to create dataset(table) input to compute the statistic. (experimental metadata, not generated for all statistics)
APNDSQL	SQL statement to append statistic (column) to dataset.
ANLEVEL	(For internal use)
USERDB	NULL
SSID	NULL
SSRMID	NULL
DOBJS	Data objects of the attributes included in the statistic
DOBJIDS	Data objects IDs of the attributes included in the statistic
ATTRLIST	Attributes included in the statistic
USEREXPR	Syntactical user expression (i.e. attributes expressed as '[<data-object>.<attribute>]')
COMPEXPR	Syntactical user expression in case of complex syntax. Parameters expressed as '{<name> = <value>}'
VIEW_ID	NULL

Subset Metadata: Each saved subset is created with a data and a metadata tables. Subset table name/s are <selection>_DS<num>_RP<num>. Metadata table name/s are <selection>_DS<num>_RP<num>_DM. Metadata for appended statistic is identified by ATTR_DOBJ column's value of 'STATDOBJ'. Following table contains metadata table column names and descriptions.

Name	Description	STATISTIC Description*
IQ_ATTR_NAME	Column name in dataset's table	Column name in dataset's table
RESULTSET	Dataset's table name	Dataset's table name
ATTR_DB	Database/schema of the selection attribute(column)	'STAT_DB'
ATTR_TABLE	Table of the selection attribute(column)	'STAT_TBL'
ATTR_DBTYPE	Data type of the selection attribute(column)	Data type of the statistic attribute(column)
ATTR_DOBJ	Data-object of the selection attribute	'STATDOBJ'
ATTR_DOBJ_DESC	Data-object description of the selection attribute	'Statistics'
ATTR_CATGRY	Selection attribute category (i.e. Static, Aperiodic or Periodic). Null if ID attribute.	'S'
ATTR_NAME	Selection attribute name (i.e. column name). Look-up value if LKPRNG_ATTR not NULL	Data-object/s of selection attribute/s included in the statistic's formula
ATTR_DESC	Selection attribute description. Look-Up or Range attribute description if LKPRNG_ATTR not NULL	Column name in dataset(table)
C_CATGRY_OCAP_OPTION	For selection attribute category = 'C' or 'RC' (i.e. DOBJ or R-DOBJ Aperiodic attribute)	NULL
SEQ_NUM	For selection attribute category = 'C' or 'RC' instance update sequence number.	NULL
P_CATGRY_TABLE_DESC	For selection attribute category = 'P' or 'RP' (i.e. DOBJ or R-DOBJ Periodic attribute)	NULL
LKPRNG_ATTR	Look-Up or Range attribute (column)	NULL
LKPRNG_DB	Database of the Look-Up or Range attribute	NULL
LKPRNG_TABLE	Table of the Look-Up or Range attribute	NULL
LKPRNG_ATTR_DBTYPE	Data type of the Look-Up or Range attribute	NULL
ATTR_AUX_META	I = ID Attribute, L = Look-Up attribute, R = Range attribute	ID attribute/s of the data-object/s included in the statistic's formula
ATTR_AUX_INFO	Additional selection attribute information added by user. Otherwise attribute(column) data type.	Statistic type, formula, Group By (if any) of the statistic
FROM_DOBJ	Dobj1 of the selection attribute, if ATTR_CATGRY = 'R','RC','RP' otherwise data-object of the attribute	NULL
TO_DOBJ	Dobj2 of the selection attribute, if ATTR_CATGRY = 'R','RC','RP' otherwise data-object of the attribute	NULL
VIEW_ID	NULL	NULL
RP_ID	Subset's table name	Subset's table name
RP_NAME	Subset name	Subset name
RP_DESC	Subset description	Subset description

* If ATTR_DOBJ = 'STATDOBJ' (i.e. Metadata for appended statistics)

Appendix-1:

Symmetric Relational Data Object Model (RDOM)

RDOM primarily consists of symmetric data objects (DOBJs) and symmetric bilateral relationship data objects(R-DOBJs). R-DOBJ represents many-to-many relationship between two DOBJs (or one-to-many relationship between first DOBJ to R-DOBJ and one-to-many relationship between second DOBJ to the R-DOBJ). Following is an example (Fig. 1) RDOM consisting four DOBJs (Dobj1, Dobj2, Dobj3 and Dobj4) and six R-DOBJs (RDobj1-2,RDobj1-3, RDobj2-3, Rdojb2-4, RDobj4-1 and RDobj3-4).

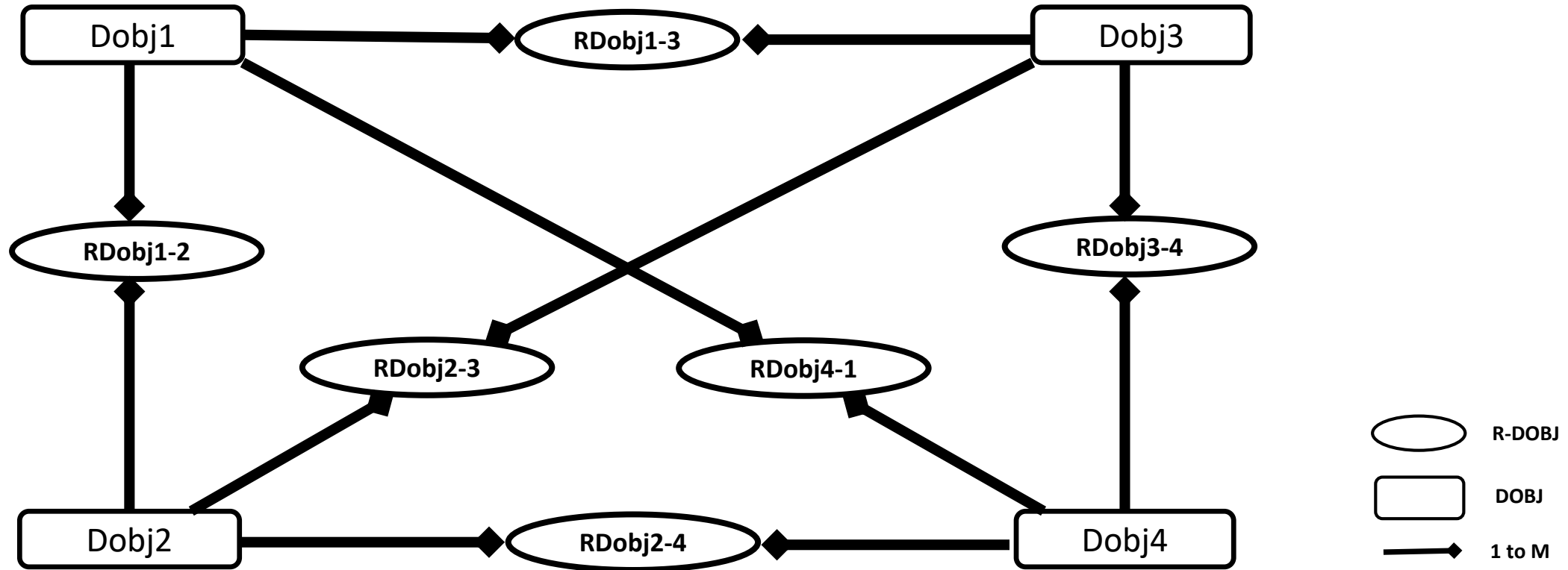


Fig. 1

DOBJ: consists of three types of relational database tables; static attributes table, aperiodic attributes table/s and periodic attributes table/s.

- **Static attributes table (S-table)**: consists of a column for DOBJ's identification (ID) attribute and columns for static attributes (whose value remains static). For example, Name and Date of Birth attributes of Customer DOBJ.
[DOBJ must have S-table with ID column. Only one S-table is allowed per DOBJ]
- **Aperiodic attributes table (A-table)**: consists of a column for DOBJ's ID attribute, a column for instance update sequence number (INSTANCE_UPDT_SEQ) and columns for aperiodic attributes (whose value changes aperiodically). INSTANCE_UPDT_SEQ column is used for storing sequentially increasing number for each update of aperiodic attribute/s value/s. For example, Mailing Address attribute of Customer. First instance of Customer's mailing address is to be stored with INSTANCE_UPDT_SEQ value of 1, next update of mailing address would be stored with INSTANCE_UPDT_SEQ value of 2 and so forth.
[DOBJ may have one or more A-tables]
- **Periodic attributes table (P-table)**: consists of a column for DOBJ's ID attribute and columns for periodic attributes (whose value is captured or recorded at every specific period). For example, monthly (or bi-weekly) employee payment attributes.
[DOBJ may have one or more sets of periodic tables]

Similarly R-DOBJ consists of three types (Static, Aperiodic and Periodic) of relational database tables. Each R-DOBJ table consists of two ID columns (for the two related DOBJ's IDs) and other columns.

DOBJ Data Model template (Fig. 2):

- **S TABLE (Static attributes table):** consists of ID column (DOBJ_ID) as primary-key and columns for static attributes (S_attr1, S_attr2, ...).
- **A TABLEs (Aperiodic attributes tables):** consist of ID column (DOBJ_ID) and sequence number column (INSTANCE_UPDT_SEQ) combined as primary-key, and columns for aperiodic attributes (A_attr_1,). Relationship from S_TABLE to A_TABLEs are of type one-to-many.
- **Pn TABLE ns (Periodic attributes tables):** consist of ID column (DOBJ_ID) as primary-key and columns for periodic attributes (P1_attr_1, P1_attr_2,...). Relationships from S_TABLE to P_TABLEs are of type one-to-one.

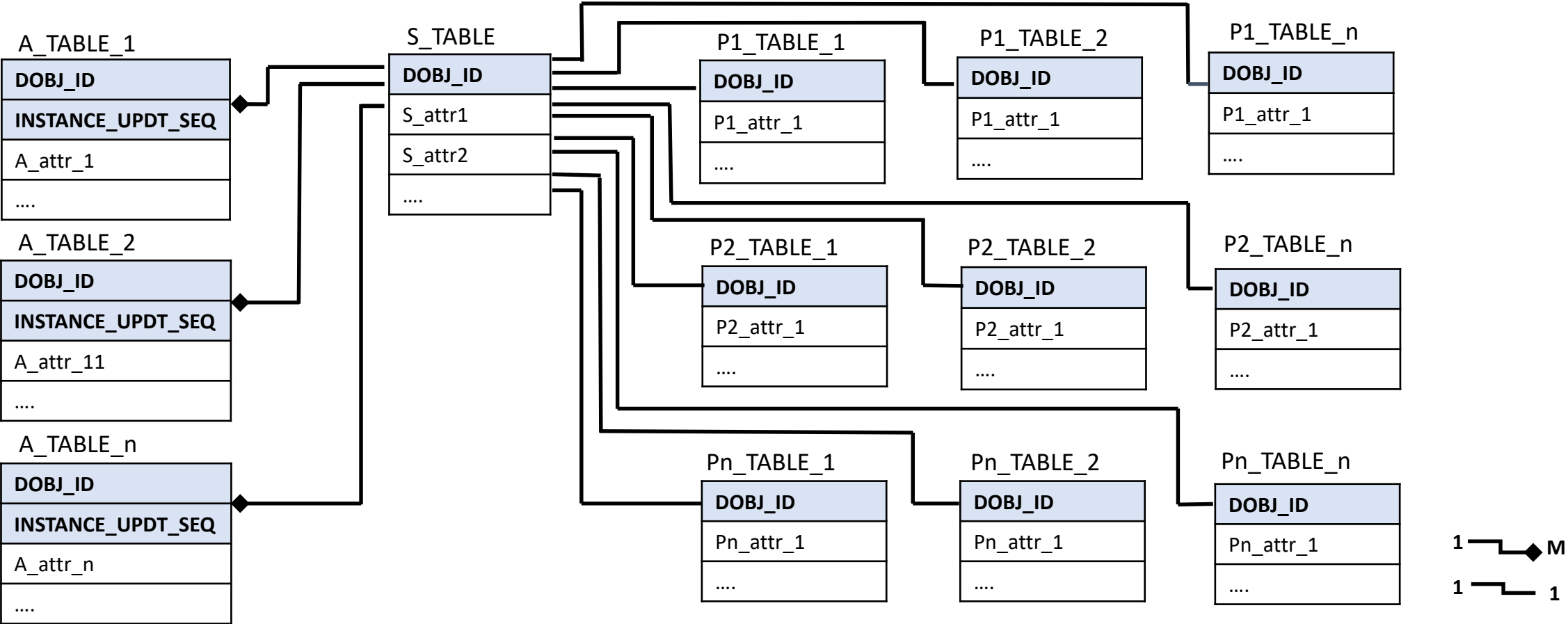


Fig. 2

R-DOBJ Data Model template (Fig. 3):

- **RS TABLE (Static attributes table):** consist of ID columns (DOBJ1_ID + DOBJ2_ID) as primary-key and columns for static attributes (RS_attr1, RS_attr2, ...).
- **RA TABLEs (Aperiodic attributes tables):** consist of ID columns (DOBJ1_ID + DOBJ2_ID) and sequence number column (INSTANCE_UPDT_SEQ) combined as primary-key, and columns for aperiodic attributes (RA_attr_1, ...). Relationship from RS_TABLE to RA_TABLEs are of type one-to-many.
- **RPn TABLE ns (Periodic attributes tables):** consist of ID columns (DOBJ1_ID + DOBJ2_ID) as primary-key and columns for periodic attributes (RP1_attr_1, RP1_attr_2,....). Relationships from RS_TABLE to RP_TABLEs are of type one-to-one.

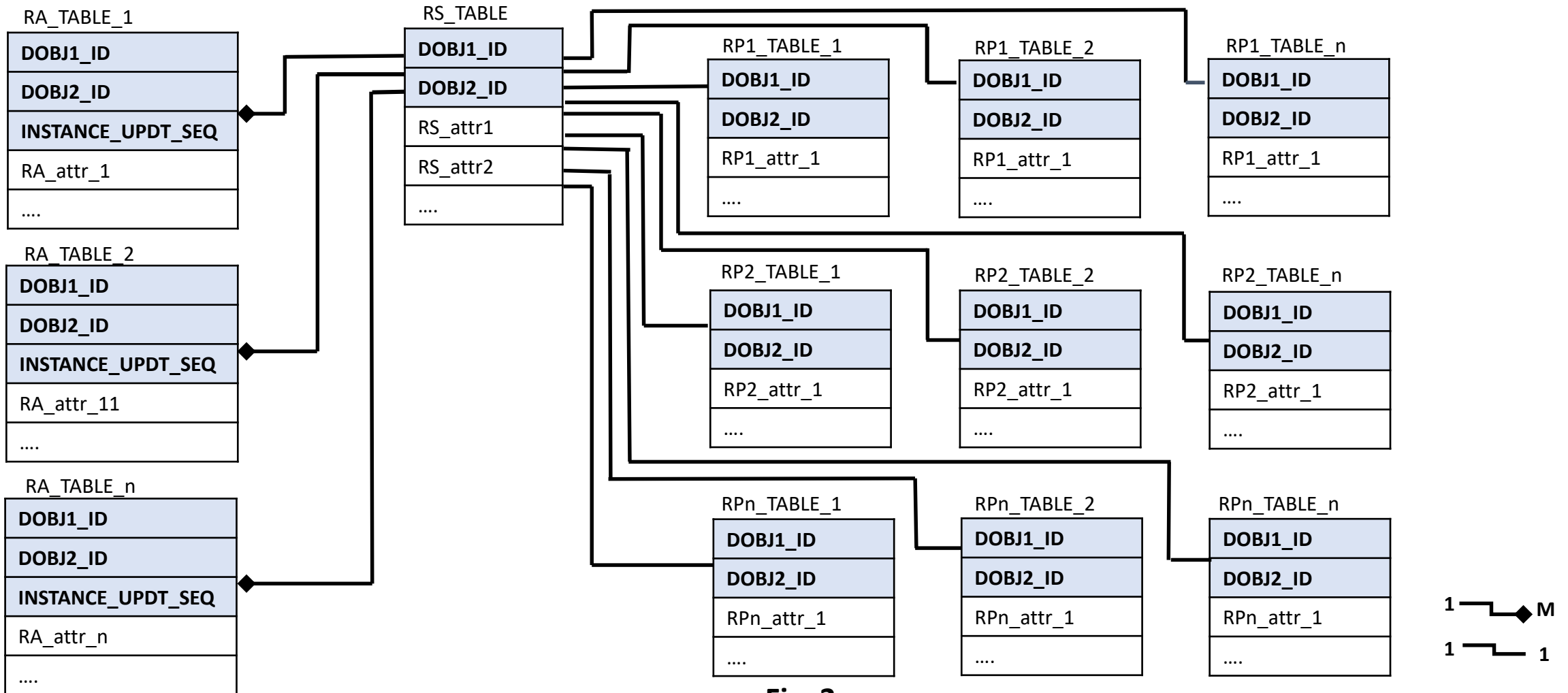


Fig. 3

In addition to DOBJ and R-DOBJ, RDOM may include Look-Up (LOOK-UP) and Range (RANGE) associations.

LOOK-UP: consists of a relational database table. The table consists of a look-up column (as primary-key) and one or more columns for look-up values (Fig.4).

RANGE: consists of a relational database table. The table consists of a column for lower bound of range, a column for upper bound of range and one or more columns for the range description/information (Fig.4). Lower bound column concatenated with upper bound column, is primary-key.

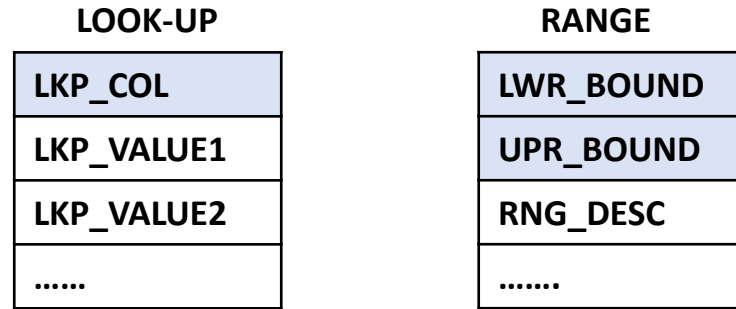


Fig. 4

- A Look-Up (and Range) may be associated with one or more non-ID columns of one or more tables of DOBJs and R-DOBJs. Also, a non-ID column may be associated with one or more Look-up (and Range).

RDOM Constraints:

- Primary-key column value in all tables (of all four types of data objects) must not be NULL.
- INSTANCE_UPDT_SEQ column value, in Aperiodic tables, must be a positive integer starting with 1 for first (or original) row for an instance.
- In a DOBJ: DOBJ_ID column of Aperiodic and Periodic tables must not contain value that does not exist in DOBJ_ID column of Static table.
- In a R-DOBJ: DOBJ1_ID and DOBJ2_ID columns of Static table must not contain value that does not exist in DOBJ_ID columns of the two respective DOBJs.
- In a R-DOBJ: DOBJ1_ID and DOBJ2_ID columns of Aperiodic and Periodic tables must not contain value that does not exist in DOBJ1_ID and DOBJ2_ID columns of Static table.

Example (continued)

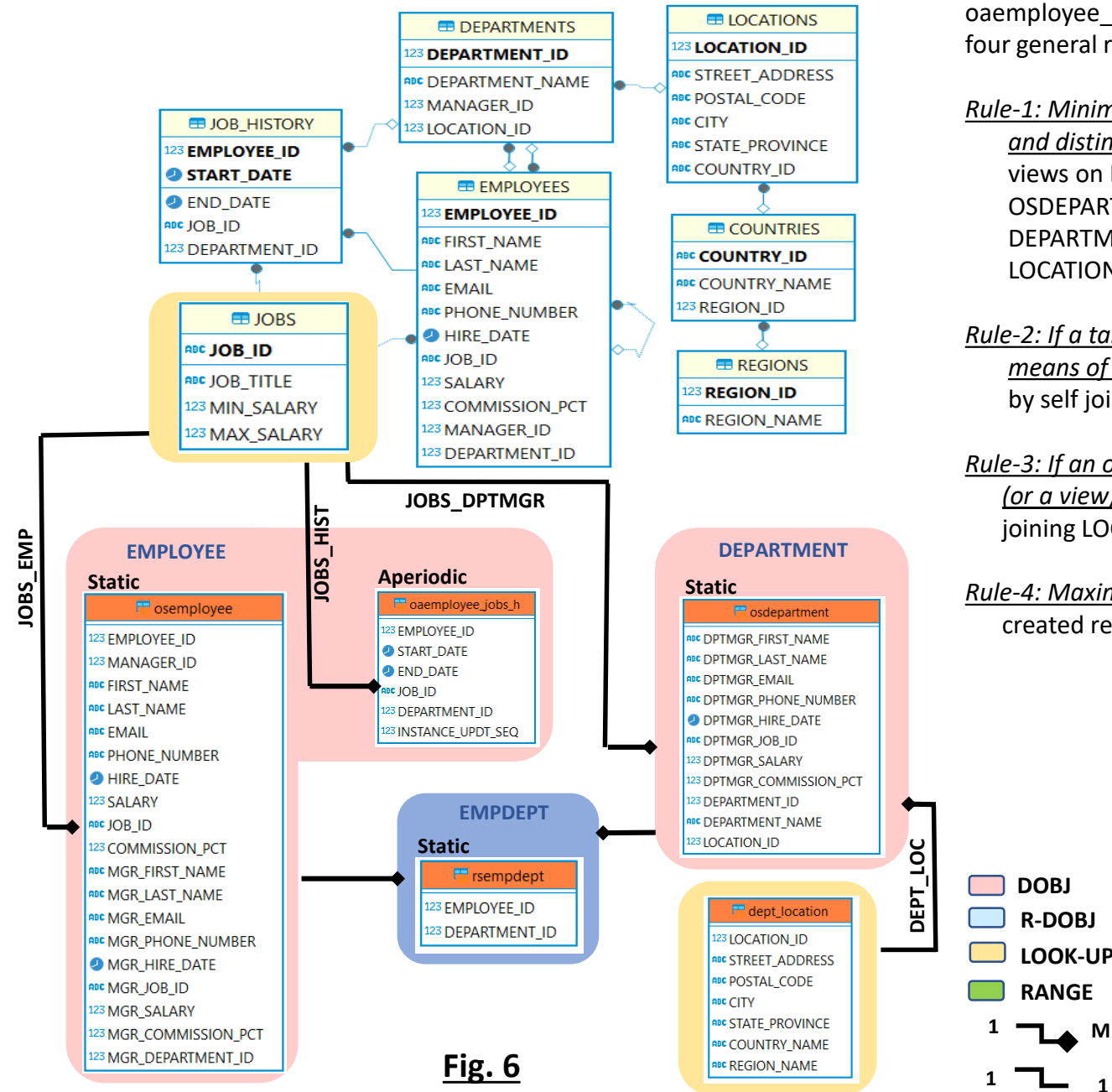


Fig. 6

To implement RDOM as Super Model on existing relational model, five views (osemployee, oaemployee_jobs_h, rsempdept, osdepartment, dept_location) are created with consideration of the four general rules.

Rule-1: Minimize number of DOBJs: By consolidating relevant tables together into DOBJs; and distinguish DOBJ tables from LOOK-UP object tables: OSEMPLOYEE and OAEMPLOYEE_JOBS_H views on EMPLOYEES and JOBS_HISTORY tables are incorporated into EMPLOYEE data object, OSDEPARTMENT view (which includes employee columns for department manager) on DEPARTMENTS table is incorporated as DEPARTMENT data object and rest of the four tables (JOBS, LOCATIONS, COUNTRIES, REGIONS) are identified as look-up tables.

Rule-2: If a table contains object hierarchy then flatten the object hierarchy into a table (or a view) by means of additional columns: OSEMPLOYEE view is created with additional columns for manager, by self joining EMPLOYEES table, to flatten Employee-Manager hierarchy.

Rule-3: If an object hierarchy exists in the form of multiple tables then combine the tables into one table (or a view): DEPT_LOCATION view is created representing location-country-region hierarchy, by joining LOCATIONS, COUNTRIES and REGIONS tables.

Rule-4: Maximize number of RDOBJs, possibly relating all DOBJs to each other: RSEMPDEPT view is created representing RDOBJ for EMPLOYEE and DEPARTMENT data objects.

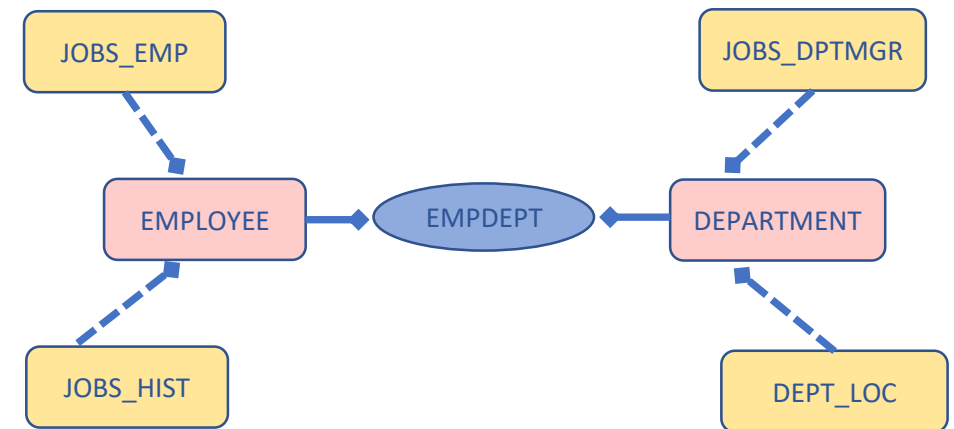


Fig. 6(a) RDOM diagram

Dataset is created by performing corresponding SQL UNION of SQL JOINS of all combinations, from largest to smallest combination, of ID attribute columns of Static attribute tables of relationship data objects and selected data objects; and then performing LEFT JOIN/s of selected data object attribute columns. In the following example, five attributes (A_COL1, A_COL2, B_COL1, D_COL1 and D_COL2) are selected from three data objects (OBJ_A, OBJ_B and OBJ_D).The dataset (Fig.2) is created by performing corresponding SQL UNION of SQL JOINS of ID columns from the three relationship data objects (ROBJ_AB, ROBJ_AD and ROBJ_BD), each combination of two R-DOBJs and three data objects (OBJ_A, OBJ_B and OBJ_D); and then performing LEFT JOIN of selected attribute columns from the three data object.

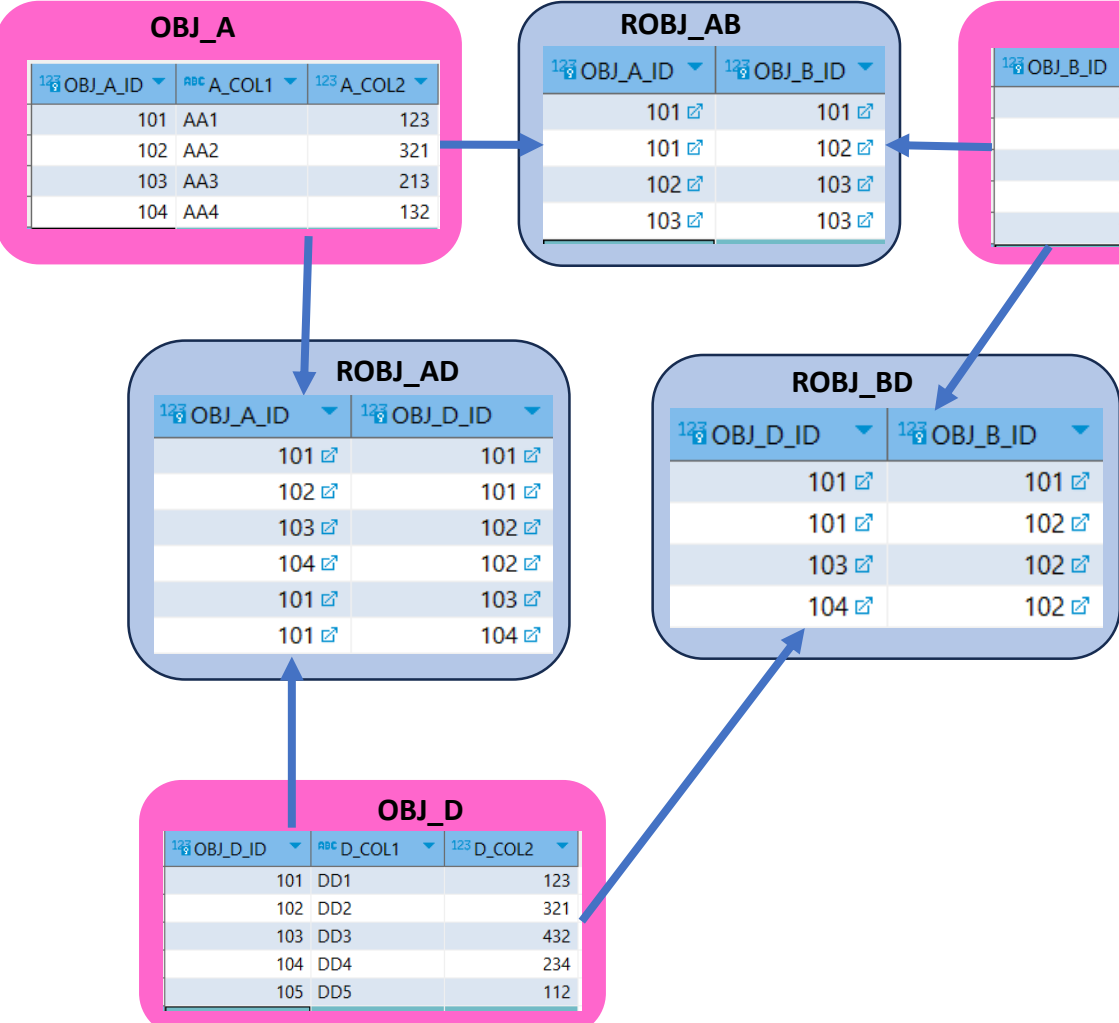


Fig. 1

	OBJ_A OBJ_A_ID	OBJ_B OBJ_B_ID	OBJ_D OBJ_D_ID	OBJ_A A_COL1	OBJ_A A_COL2	OBJ_B B_COL1	OBJ_D D_COL1	OBJ_D D_COL2
1	101	101	101	AA1	123	BB1	DD1	123
2	101	102	101	AA1	123	BB2	DD1	123
3	101	102	103	AA1	123	BB2	DD3	432
4	101	102	104	AA1	123	BB2	DD4	234
5	102	103		AA2	321	BB3		
6	103	103		AA3	213	BB3		
7	102		101	AA2	321		DD1	123
8	103		102	AA3	213		DD2	321
9	104		102	AA4	132		DD2	321
10		104				BB4		
11		105				BB5		
12			105				DD5	112

Fig. 2

Appendix-3:

Object Relations Summary:

The summary represents counts of object instances and related object instances in an interactive form.

Example: The dataset table (Fig.1) contains columns for three object IDs (i.e. A_ID, B_ID and D_ID) and attributes of the objects.

Object relations summary (Fig. 3) shows, in the area (i.e. box) at the top, total number of objects' instances in the dataset. Boxes starting from second row and first column, shows counts for exclusively related instances of all combinations of objects in descending order of the size of object combination starting from first column on the left. In this example, the box in the first column (and second row) shows 3 instances of OBJ_D, 1 instance of OBJ_A and 2 instances of OBJ_B are related to each other; similarly second column boxes shows counts for exclusively related instances among each combination of two objects; and the third column shows non-related instance counts for each object.

Selecting (clicking) the box (at 2nd column and 2nd row) shows dataset rows and columns of the exclusively related instances (Fig. 3) in the form of a table.

	OBJ_A A_ID	OBJ_B B_ID	OBJ_D D_ID	OBJ_A A_COL1	OBJ_B B_COL1	OBJ_B B_COL2	OBJ_D D_COL1
1	101	101	101	AA1	BB1	321	DD1
2	101	102	101	AA1	BB2	231	DD1
3	101	102	103	AA1	BB2	231	DD3
4	101	102	104	AA1	BB2	231	DD4
5	102	103		AA2	BB3	123	
6	103	103		AA3	BB3	123	
7	102		101	AA2			DD1
8	103		102	AA3			DD2
9	104		102	AA4			DD2
10		104			BB4	312	
11		105			BB5	213	
12			105				DD5

Fig. 7

Object Group Size = 3		Object Group Size = 2		Object Group Size = 1	
Objects Count(total)					
Object	Count				
OBJ_D_	5				
OBJ_A_	4				
OBJ_B_	5				
Related Objects Count					
Object	Count	Object	Count	Object	Count
OBJ_D_	3	OBJ_A_	2	OBJ_A_	0
OBJ_A_	1	OBJ_B_	1		
OBJ_B_	2				
		Object	Count	Object	Count
		OBJ_D_	2	OBJ_B_	2
		OBJ_A_	3		
		Object	Count	Object	Count
		OBJ_D_	0	OBJ_D_	1
		OBJ_B_	0		

Fig. 8

	OBJ_A A_ID	OBJ_B B_ID	OBJ_A A_COL1	OBJ_B B_COL1	OBJ_B B_COL2
1	102	103	AA2	BB3	123
2	103	103	AA3	BB3	123

Fig. 9

Appendix-4:

Create and Append Statistic:

Creating statistic is creating a table containing results of running a statistical function by means of SQL statement. The SQL statement is of two parts, inner SQL is to create a subset containing ID columns and selected attribute columns of the objects included in the defined statistic; outer SQL is to run the selected statistical function on the subset. Appending statistic to the dataset is to create a SQL LEFT JOIN of the dataset and table containing statistic, on ID and other attributes of selected objects. Aggregate statistic is appended to the entire dataset, aggregate statistic with GROUP BY is appended by LEFT JOINing with the dataset on the GROUP BY columns, scalar statistic is appended by LEFT JOINing with dataset on the ID columns of the selected object/s.

Example: A dataset table (Fig. 1) contains selection from three objects (OBJ_A, OBJ_B and OBJ_D). The dataset contains three ID columns (OBJ_A_ID, OBJ_B_ID and OBJ_D_ID) and four attribute columns (A_COL1, B_COL1, B_COL2 and D_COL1). A statistic table for AVG(B_COL2) with GROUP BY A_COL1 is created (Fig.2) by generating and running a SQL statement that creates a subset containing four columns and six rows (Fig.1 encircled in orange) and then calculates AVG(B_COL2) with GROUP BY A_COL1. The statistic is then appended to the dataset (Fig. 3 encircled in green) by generating and running a SQL statement that performs LEFT JOIN of the dataset with statistic table on A_COL1 (Fig.3 encircled in orange) with condition (OBJ_A_ID IS NOT NULL AND OBJ_B_ID IS NOT NULL). Metadata about the appended statistic is added to the metadata table for the dataset (see [Dataset Metadata](#) for details).

	OBJ_A OBJ_A_ID	OBJ_B OBJ_B_ID	OBJ_D OBJ_D_ID	OBJ_A A_COL1	OBJ_B B_COL1	OBJ_B B_COL2	OBJ_D D_COL1
1	101	101	101	AA1	BB1	321	DD1
2	101	102	101	AA1	BB2	231	DD1
3	101	102	103	AA1	BB2	231	DD3
4	101	102	104	AA1	BB2	231	DD4
5	102	103		AA2	BB3	123	
6	103	103		AA3	BB3	123	
7	102		101	AA2			DD1
8	103		102	AA3			DD2
9	104		102	AA4			DD2
10		104			BB4	312	
11		105			BB5	213	
12			105				DD5

Fig. 1

	STATISTICS AVG_B_COL2_	OBJ_A A_COL1
1	276.0000	AA1
2	123.0000	AA2
3	123.0000	AA3

Fig. 2

	OBJ_A OBJ_A_ID	OBJ_B OBJ_B_ID	OBJ_D OBJ_D_ID	OBJ_A A_COL1	OBJ_B B_COL1	OBJ_B B_COL2	OBJ_D D_COL1	STATISTICS AVG_B_COL2_
1	101	101	101	AA1	BB1	321	DD1	276.0000
2	101	102	101	AA1	BB2	231	DD1	276.0000
3	101	102	103	AA1	BB2	231	DD3	276.0000
4	101	102	104	AA1	BB2	231	DD4	276.0000
5	102	103		AA2	BB3	123		123.0000
6	103	103		AA3	BB3	123		123.0000
7	102		101	AA2			DD1	
8	103		102	AA3			DD2	
9	104		102	AA4			DD2	
10		104			BB4	312		
11		105			BB5	213		
12			105				DD5	

Fig. 3