

## AMX Tutorial Using MySQL as an Identity Source

This tutorial uses [OrangeHRM](#) to show AMX facilities for extracting identities from a MySQL database:

- Extracting the identities from the MySQL database and creating an identity file.
- Creating a file of Active Directory user accounts.
- Running accountMatch to check the match between identities and accounts.
- Configuring the ActiveDirectory Schema and identitySync.properties to analyse the changes that would be made by identitySync.

AMX runs on Windows and must be setup as shown in the AMX Tutorial Setup document. In this tutorial identityReport and identitySync are run from the Command Line using AMXRun which sets the environment variables.

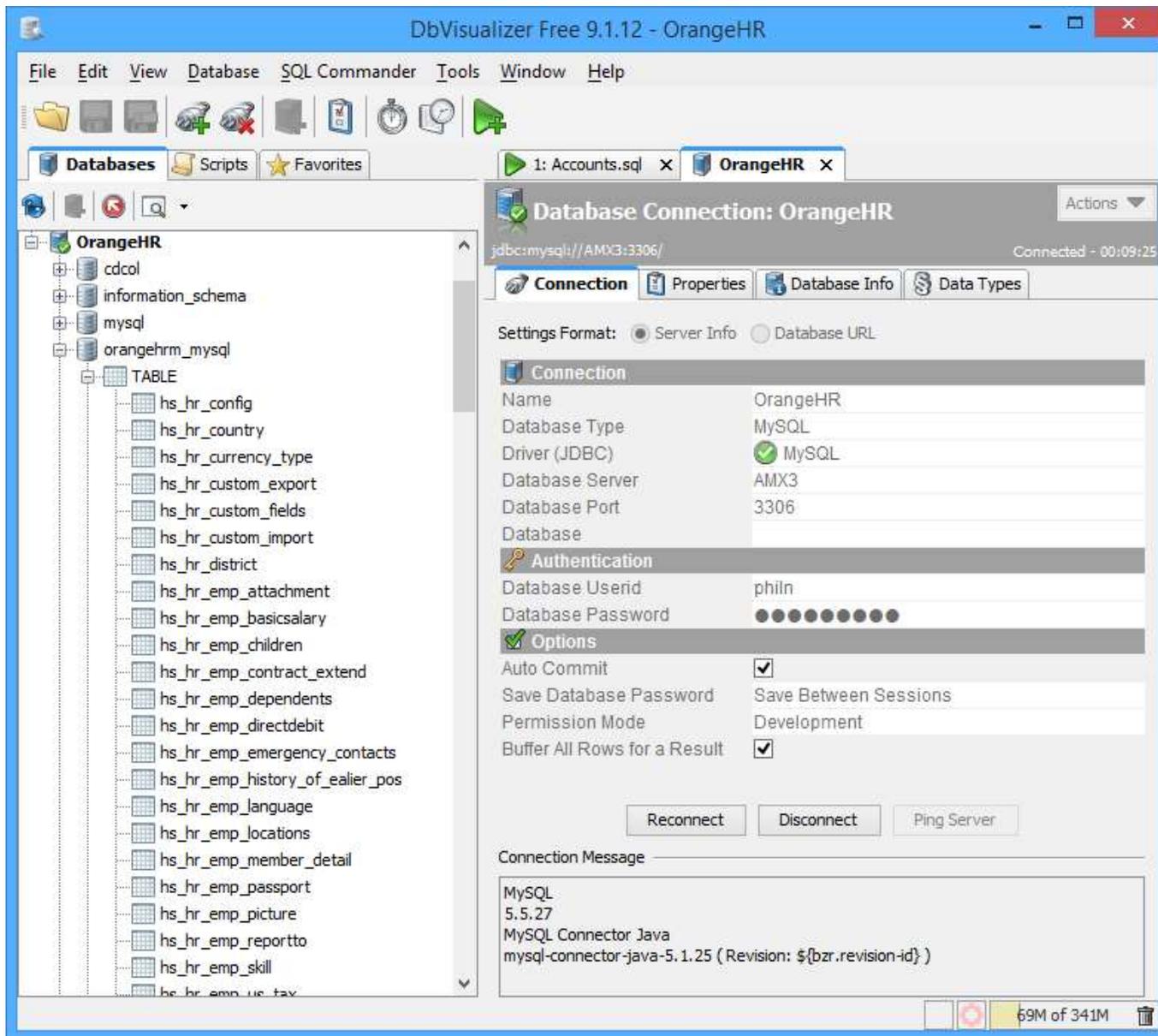
### 1. Create a new administrative account on MySQL

It may be necessary to create a database account for AMX with the appropriate read privileges. You may need the help of the MySQL Database administrator, particularly if they changed the root password from the blank default. On the database server open a command prompt, create a user and give them select privileges on the appropriate tables.

```
C:\>mysql -u root
mysql>create user 'philn'@'AMX1' identified by '*****';
mysql>grant select on orangehrm_mysql.hs_hr_employee to 'philn'@'AMX1';
mysql>grant select on orangehrm_mysql.ohrm_job_title to 'philn'@'AMX1';
mysql>grant select on orangehrm_mysql.hs_hr_emp_reportto to 'philn'@'AMX1';
```

### 2. Test Connection

Use DbVisualiser or similar tool to test the connection:



### 3. Review Views and Tables

Every HRMS system is different, AMX need the name of the view or table holding the employee details. In this case it is hs\_hr\_employees

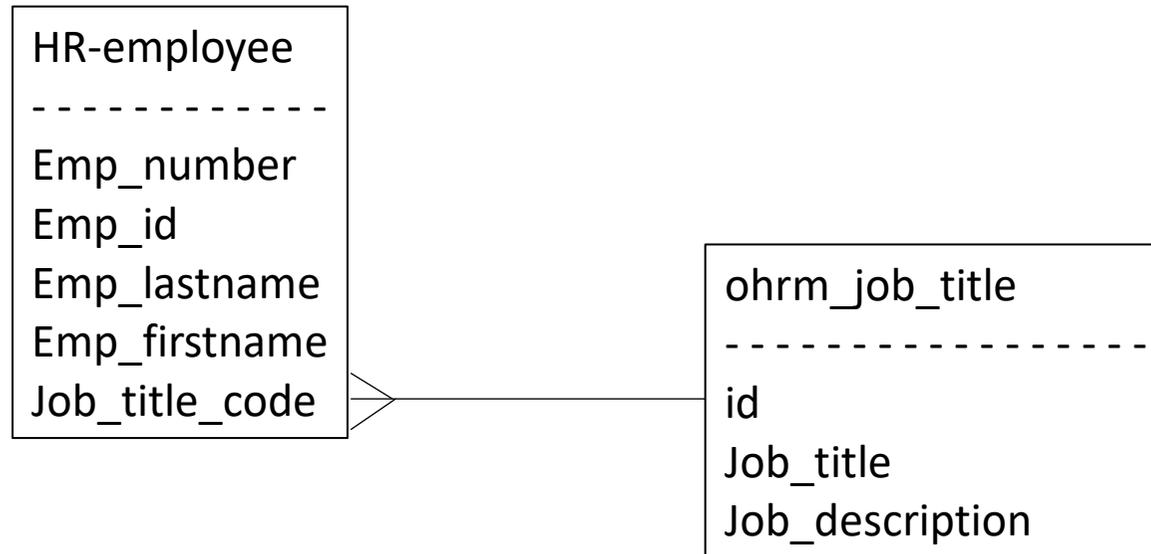
The screenshot shows the DbVisualizer Free 9.1.12 interface. The main window displays the table structure and data for the 'hs\_hr\_employee' table. The table has the following columns: emp\_number, employee\_id, emp\_lastname, emp\_firstname, emp\_middle\_name, and emp\_nick\_name. The data is displayed in a grid format with 19 rows.

*	emp_number	employee_id	emp_lastname	emp_firstname	emp_middle_name	emp_nick_name
1	1	204	Wilson	Alban		
2	2	216	Burns	Bonnie		
3	4	206	Thomson	Alpin		
4	5	207	Robertson	Andrew		
5	6	208	Engel	Anette		
6	7	209	Campbell	Angus		
7	8	210	Wright	Annabel		
8	9	211	McKenzie	Arabella		
9	10	212	Kennedy	Arline		
10	11	213	Stewart	Aulay		
11	12	214	Jones	Bethia		
12	13	215	Anderson	Blane		
13	14	216	Burns	Bonnie		
14	15	217	MacDonald	Boyd		
15	16	218	White	Brenda		
16	17	219	Scott	Calum		
17	18	220	Muir	Catriona		
18	19	221	Reid	Clyde		
19	20	222	Murphy	Colina		

Additional information from the screenshot: The interface includes a menu bar (File, Edit, View, Database, SQL Commander, Tools, Window, Help), a toolbar, and a sidebar showing a list of tables. The 'hs\_hr\_employee' table is highlighted in the sidebar. The main window also shows a toolbar with options like Info, Columns, Data, Row Count, Primary Key, Indexes, Grants, and Row Id. The status bar at the bottom indicates 'Max Rows: 10000', 'Max Chars: -1', and '73M of 341M'.

Check for joins to other tables, particularly job or current position. In this HRMS system the employee record contains the current job, and an individual's previous jobs are in a table called hs\_hr\_emp\_history\_of\_ealier\_pos. The job title which is interesting for identity management is in the ohrm\_job\_title.

Also check the difference between emp\_number and emp\_id. In most cases the emp\_id would be used in managed systems.



Using a subquery or inner select the job\_title can be selected using:

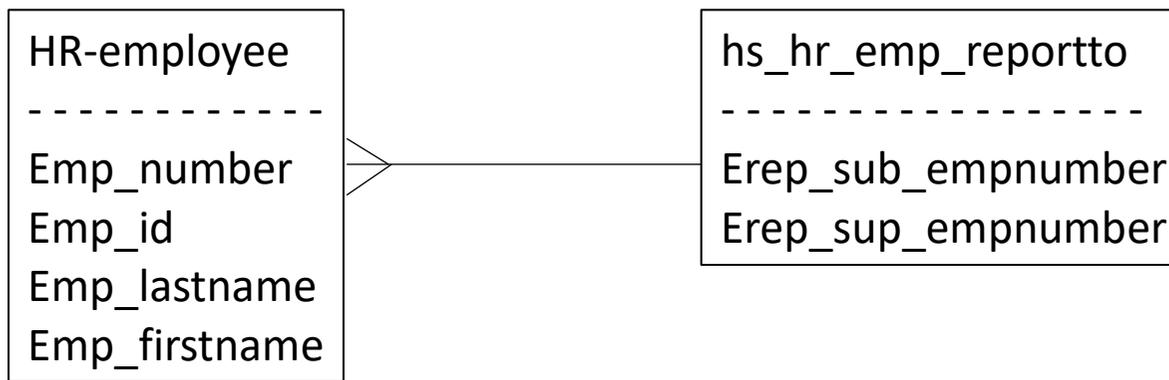
```
select employee_id,emp_lastname,emp_firstname,  
(select job_title from ohrm_job_title as job where job_title_code = job.id) as job_title  
from hs_hr_employee emp
```

The equivalent join is

```
select employee_id,emp_lastname,emp_firstname, job.job_title  
from hs_hr_employee emp  
left join ohrm_job_title as job on job_title_code = job.id
```

A left join is used so that all the records in `hs_hr_employee` are selected even when there is no match to a record in `ohrm_job_title`. These queries can be tested in dbVisualizer or similar. In testing the subquery ran a little bit quicker, though the difference was insignificant. AMX can use either a subquery or a join. Most Dbas recommend joins as giving better performance.

A person's manager is held in the table `hs_hr_emp_reportto` and the `empnumber` is stored rather than the manager's `employee_id`.



To combine this table with the employee table to create a consolidated report containing the manager's `employee_id` use a left join between the tables. A left join includes all the records in the left table, `hs_hr_employees` and any records that match in `hs_hr_emp_reportto`.

```
select employee_id,emp_lastname,emp_firstname,mgr.erep_sup_emp_number
from hs_hr_employee emp
left join hs_hr_emp_reportto mgr on emp.emp_number = mgr.erep_sub_emp_number;
```

The next issue is that the `emp_numbers` are distinct to `employee_id`, so to obtain the `employee_id`, the `emp_number` must be selected from `hs_hr_employees`. This uses a subquery or inner query as well as a left join.

```
select employee_id,emp_lastname,emp_firstname,mgr.erep_sup_emp_number,
(select employee_id from hs_hr_employee where emp_number = mgr.erep_sup_emp_number) as manager_id
```

```
from hs_hr_employee emp
left join hs_hr_emp_reportto mgr on emp.emp_number = mgr.erep_sub_emp_number;
```

Use dbVisualizer to test this before attempting to use it in identitySync, the result is for example:

employee_id	emp_lastname	emp_firstname	erep_sup_emp_number	manager_id
302	Small	Aileen	2	216
303	Small	Alison	2	216
304	O'Brian	Sean	2	216

#### 4. Extract Identities from the Database

Use identityReport to Extract Identities from the MySQL database.

#### 5. Update Orange properties

Open Orange1.properties. Use the same connection details that were used in dbVisualizer for the properties file. These are:

DatabasIdentityResource1 = AMX3:3306/orangehrm\_mysql

DatabasIdentityUser1 = philn

DatabasIdentityPasswd1 = MySQLPasswd.txt

1. Use the same connection details that were used in dbVisualizer for the properties file. These are hostname:port/database. The port and database are usually 3306 and orangehrm\_mysql. For example:  
DatabaseIdentityResource1 = AMX3:3306/orangehrm\_mysql
2. Add the accountName of a database account with read access to the database. For example:  
DatabaseIdentityUser1 = philn  
DatabaseIdentityPasswd1 = MySQLPasswd.txt
3. Create the MySQLPasswd.txt file and add the password in the first line. The password will be encrypted when identityReport first runs.

## 6. Run identityReport

Run identityReport.exe Orange1.properties, the resulting identity\_check.csv file should contain values identical to the one obtained in step 4. The connection values and schema can be used in identitySync to synchronise Identities and their Accounts.

## 7. Review the Results

Open the IdentityReportOrange1.csv file in Excel, and the OrangeSchema1.txt file in a text editor.

- Active is Y or N, the termination code is used as a marker for N. This is formed by the schema entry for termination\_id replacing any value with N and defaulting a null entry as Y.

```
termination_id,active;replace/[0-9]/N/
```

- Notice that the subqueries are defined in the Schema as the staging attribute on the left side

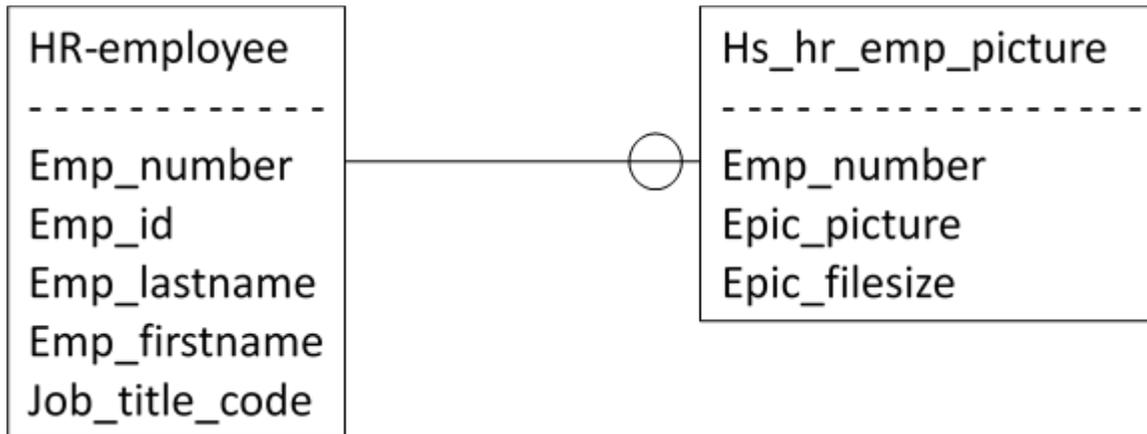
```
(select job_title from ohrm_job_title as job where job_title_code = job.id),job
```

This technique is common in HRMS systems can be used for any situation where the employee record has the primary keys of another table providing the full descriptive name of the attribute.

Notice also that the “as job” used in the select statement used in dbVisualizer is not required by identityReport.

## 8. Extract Images

Images are held in hs\_hr\_emp\_picture, each employee record may have 0 or 1 picture. In OrangeSchema2.txt, another left join is used to select the picture.



```
select emp_gender,emp_street2,emp_street1,emp_middle_name,sal_grd_code,
```

```

(select job_title from ohrm_job_title as job where job_title_code = job.id),
emp_work_telephone,emp_dri_lice_exp_date,emp_mobile,ethnic_race_code,emp_status,provin_code,epic_picture,
emp_sin_num,
(select employee_id from hs_hr_employee where emp_number = mgr.erep_sup_emp_number),
emp_lastname,coun_code,emp_nick_name,emp_firstname,city_code,emp_birthday,eeo_cat_code,epic_file_size,emp
_dri_lice_num,emp_marital_status,emp_hm_telephone,emp_smoker,emp_zipcode,nation_code,joined_date,emp_othe
r_id,emp_work_email,work_station,emp_ssn_num,emp_oth_email,emp.emp_number,employee_id,emp_military_servic
e,termination_id,OCTET_LENGTH(epic_picture)

from orangehrm_mysql.hs_hr_employee emp
left join hs_hr_emp_reportto mgr on emp.emp_number = mgr.erep_sub_emp_number
left join hs_hr_emp_picture on emp.emp_number = hs_hr_emp_picture.emp_number

```

The OrangeSchema2.txt file can then select epic\_picture which is a binary object. Binary objects must have their associated sizes, this can be found in the epic\_file\_size or in MySQL by using the OCTET\_LENGTH function.

AMX requires the metaverse attribute name of the binary object length to be the binary object name with Size appended. For example

```

epic_picture,imageFile;syncFile
OCTET_LENGTH(epic_picture),imageFileSize

```

The images will be stored in a subdirectory with the name of the binary object's metaverse name, imageFile in this case. Create a subdirectory with this name.

## 9. Run IdentityReport

Run identityReport.exe Orange2.properties.

## 10. Review the Results

Open the IdentityReportOrange2.csv and note the name of the image file is now included in the report. The images will be stored in the subdirectory imageFile.

AMX uses identity sources to manage accounts, to do this identitySync is used with the same schema and properties as shown above. IdentitySync tutorials are available and they show how to synchronise attributes. Pictures are synchronised by comparing image files, these are extracted from the Active Directory using a schema entry such as:

```
thumbnailPhoto, ImageFile; syncFile
```

Images may have been loaded into the Active Directory from multiple sources over time and identitySync will preserve them. So identitySync will update any images in the Active Directory that are found to be different between the HRMS system, but it will never clear images from the Active Directory that are missing from the HRMS system.