Sample Use-case: University Management System

version 1.2

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Before going through this sample use-case, please make sure that you have Java version 8 or above.

1 Requirements

This step is for one who do not have the Eclipse installation with all required plugins on your running computer.

Eclipse IDE installation

As a suggestion, you can have the required installation of Eclipse via either following options:[1]

- **Option A**:
  For one who does not have Eclipse installed, please download the following complete installation, with all plugins used in the use case via this link:
  `http://miso.es/teaching/mde1718/eclipse.rar`
  In addition, please install the `Epsilon` plugins for ease of registering the meta-models.

  1. On the toolbar of Eclipse IDE, click `Help` / `Install New Software...`
  2. In the `Install` pop-up window, in the `Work with:` section, entered:
     `http://download.eclipse.org/epsilon/updates/2.2/`
  3. Click `Select All` then complete the installation.

- **Option B**:
  For one who does have Eclipse installed, please install the following plug-ins:

  - `Work with:`
    2020-09 - http://download.eclipse.org/releases/2020-09
    * General Purpose Tool
      · Eclipse Plug-in Development Environment
    * Modeling
      · Acceleo
      · ATL SDK - ATL Transformation Language SDK
      · Ecore Diagram Editor (SDK)
      · EMF - Eclipse Modeling Framework SDK
      · OCL Examples and Editors SDK
      · Xtext Complete SDK

[1] Taken from the content of the Formal Model Driven Engineering class.

– `Work with:`
http://download.eclipse.org/modeling/gmp/gmf-tooling/updates/releases-3.2.1/

– `Work with:`
Work with: http://download.eclipse.org/modeling/emft/henshin/updates/release

2 Execution Instructions

2.1 Import the project and run configurations to Eclipse IDE Workspace

Download the project

- For the Professors in the course of FMDE at UAM: You will find the complete project in the directory `MDS-SQLSI`.
- For others, in case you clone the project from GitHub, please follow the follwing instructions:
  1. Clone the project using URL. Example:
     `git clone https://github.com/npbhoang/MDS-SQLSI.git`
  2. Navigate to the project root. Example:
     `cd MDS-SQLSI`
  3. Checkout the correct branch for this sample use-case. Example:
     `git checkout university-use-case`

Import the project

If it is required, please create a new Eclipse workspace.

1. In Eclipse, on the tool bar, click `File` / `Import`
2. In the pop-up window, click `General` / `Existing Projects into Workspace`
3. In `Select root directory:`, browse the source project directory.
4. `Select All` projects and `Finish`.

Figure 1 shows what you should obtain in your `Package Explorer` afterwards.

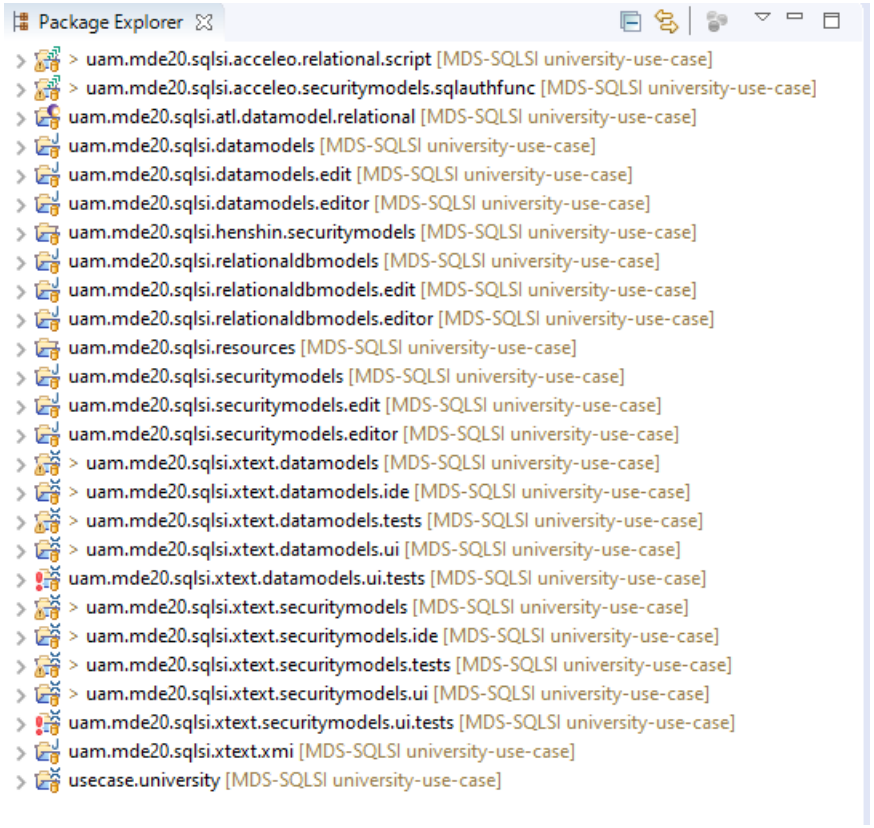

Figure 1: Package Explorer after Step 1

Import run configurations

1. In Eclipse, on the tool bar, click `File` / `Import`.
2. In the pop-up window, click `Run/Debug` / `Launch Configurations`.
3. In the pop-up window, in `From Directory:`, browse the project `uam.mde20.sqlsi.resources/launchConfigurations` (in the source project).
4. Check the directory box and click `Finish`.

2.2 Register meta-models

Register meta-models

1. In the `Project Explorer`, navigate to `uam.mde20.sqlsi.datamodels / metamodels / datamodels.ecore`

2. Right click on `datamodels.ecore` and choose `Register EPackages`
3. In the `Project Explorer`, navigate to `uam.mde20.sqlsi.relationaldbmodels / metamodels / relationaldb.ecore`
4. Right click on `relationaldb.ecore` and choose `Register EPackages`
5. In the `Project Explorer`, navigate to `uam.mde20.sqlsi.securitymodels / metamodels / securitymodels.ecore`
6. Right click on `securitymodels.ecore` and choose `Register EPackages`

2.3 Transform models from specific DSL format to XMI format

1. In Eclipse, on the tool bar, click `Run` / `Run Configurations`.
2. In the pop-up window, navigate to the run configuation: `Java Application / [Java] Transform models to XMI`.
3. Click `Run`.
4. Refresh the `usecase.university` project in the workspace. As the result, you can see two new XMI models, one is the university data-model and the other is the university security-model.

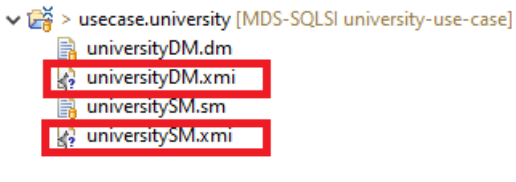

Figure 2: Project Explorer of new Eclipse instance after Step 3

2.4 Transform datamodel to relational database model, from which generate SQL schemata

Transform datamodel to relational database model

1. In Eclipse, on the tool bar, click `Run` / `Run Configurations`.
2. In the pop-up window, navigate to the run configuation: `ATL Transformation / [ATL] Transform datamodel to relaitonaldbmodel`.
3. Click `Run`.
4. Refresh the `usecase.university` project in the workspace. As the result, you can see a new XMI model, which is the university relational database model.

Generate SQL schemata from relational database model

1. In Eclipse, on the tool bar, click `Run` / `Run Configurations`.
2. In the pop-up window, navigate to the run configuation: `Acceleo Application` / `[Acceleo] Transform relationaldbmodel to DB script`.
3. Click `Run`.
4. Refresh the `usecase.university` project in the workspace. As the result, you can see a new SQL script that is executable in MySQL relational database management system.

Figure 3: Project Explorer of new Eclipse instance after Step 4

2.5 Manipulate security model then generate SQL authorization functions

Manipulate security model

1. In Eclipse, on the tool bar, click `Run` / `Run Configurations`.
2. In the pop-up window, navigate to the run configuation: `Java Application` / `[Henshin] Apply normalize transformation on securitymodel`.
3. Click `Run`.
4. Refresh the `usecase.university` project in the workspace. As the result, you can see a new XMI "transformed" model, which is the university security model in the "normalized" form.

Generate SQL authorization functions from security model

1. In Eclipse, on the tool bar, click `Run` / `Run Configurations`.
2. In the pop-up window, navigate to the run configuation: `Acceleo Application` / `[Acceleo] Transform securitymodel to SQL authorizaiton functions`.
3. Click `Run`.

4. Refresh the `usecase.university` project in the workspace. As the result, you can see a new SQL script for authorization functions that is executable in MySQL relational database management system.

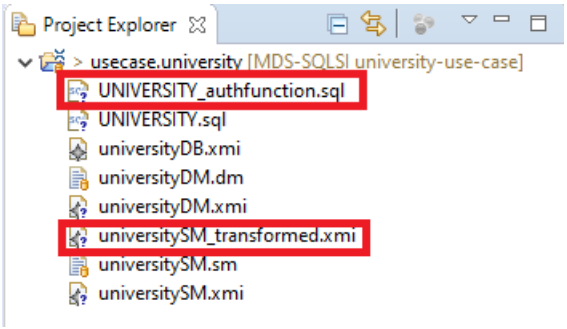

Figure 4: Project Explorer of new Eclipse instance after Step 5