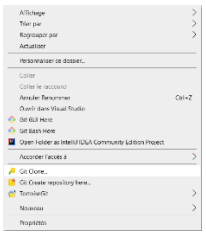
1/Installation

The source code is available on the UNIGE gitlab repository: to retrieve it, run a gitclone command on the following repository address:
https://gitlab.unige.ch/Giovanna.DiMarzo/coordination-energy



1.1/SAPERE configuration database

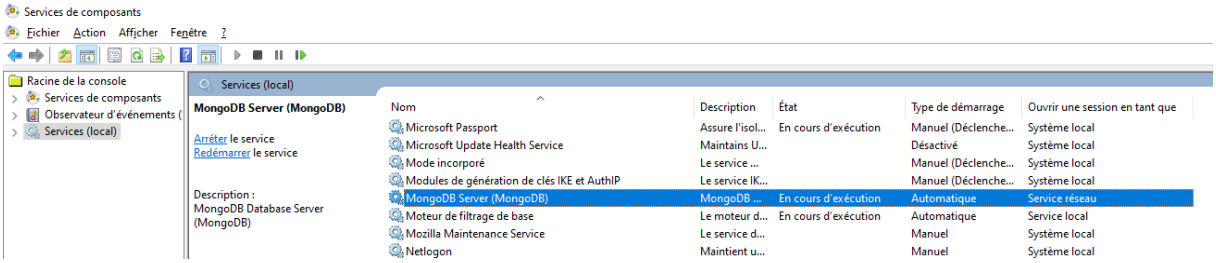
This object database is used to configure the local node: node name, its address (IP, port) and the addresses of direct neighboring nodes. It is a DBMongo database which is of object type (non-relational).

1.1.1/Installation of MongoDB server

- Install MongoDB service from:
  https://docs.mongodb.com/manual/tutorial/install-mongodb-on-windows

- Follow these steps to install MongoDB Community Edition using the MongoDB Installer wizard. The installation process installs both the MongoDB binaries as well as the default configuration file <install directory>\bin\mongod.cfg.

-During the installation process, Mongodb can be configured as a Windows service started automatically. This avoids having to start the server after each restart of the machine.



1.1.2/Installation of MongoDB client

A user interface allows to feed and request the MongoDB database

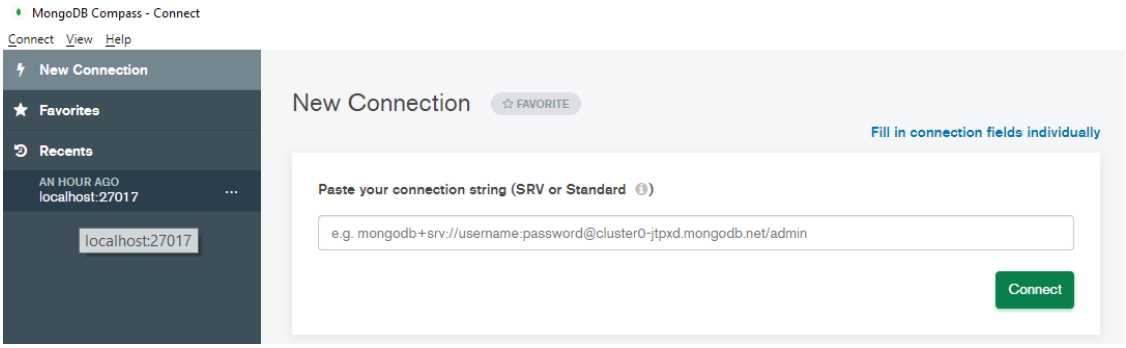
- Install “MongoDB compass”: the installer can be downloaded from
  https://www.mongodb.com/try/download/compass

1.1.3/Create a database to configure le local node

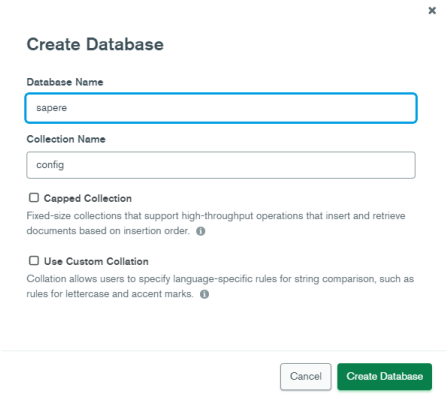
This step consists in creating a new base named "sapere" with the two collections "config" and "user" which are necessary for the node configuration.

- Launch DBCompass

- Connect to the local service (double-click on “localhost:27017”)

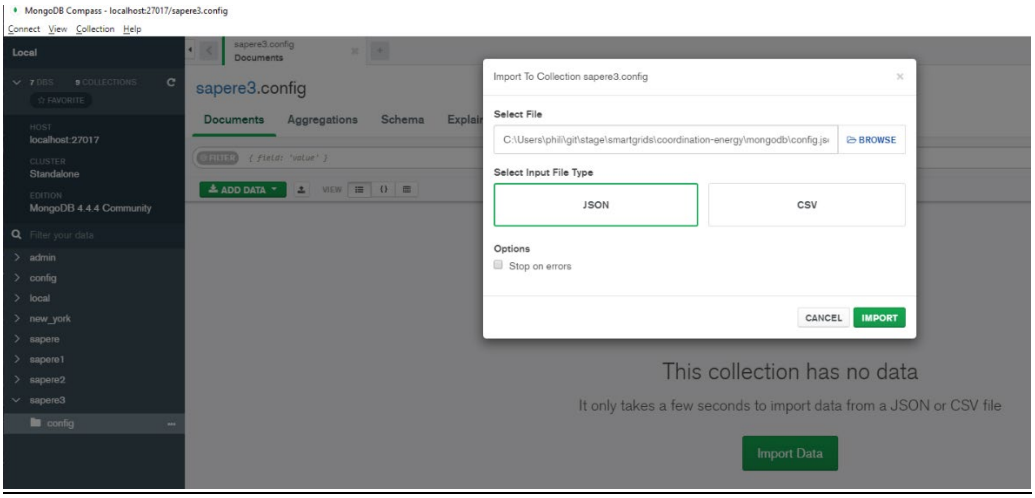


- Create a new data base by using the “+” button
- Enter a database name (For example “sapere”)
- Enter a collection Name: “config”
- Validate

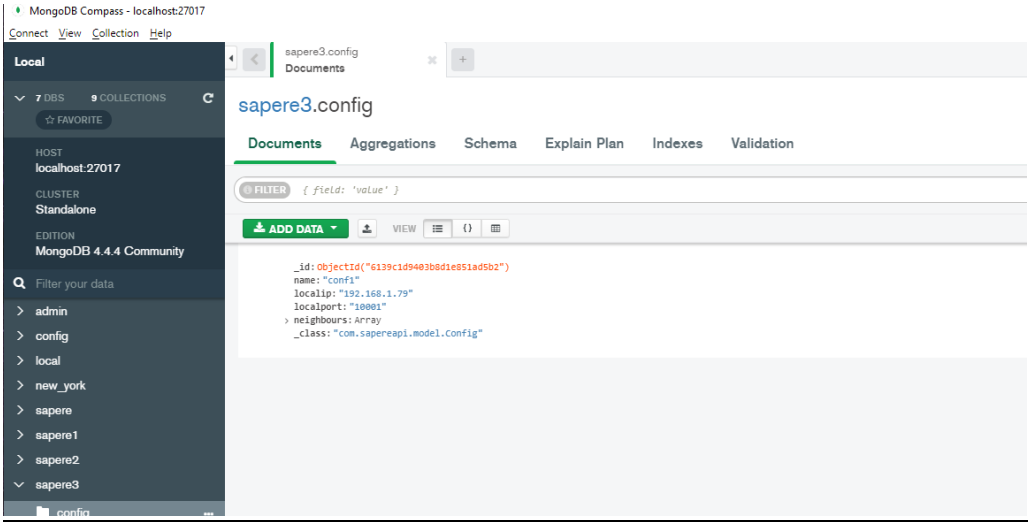


A database is created with an empty collection named “config”.

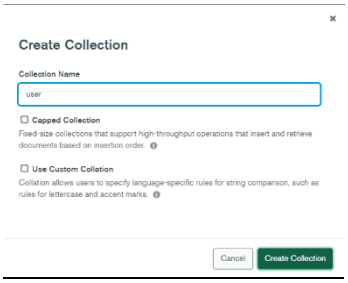
- click on the “config” collection
- use “import data” to populate this collection and select a node configuration file contained in mondb directory : for example, config.json



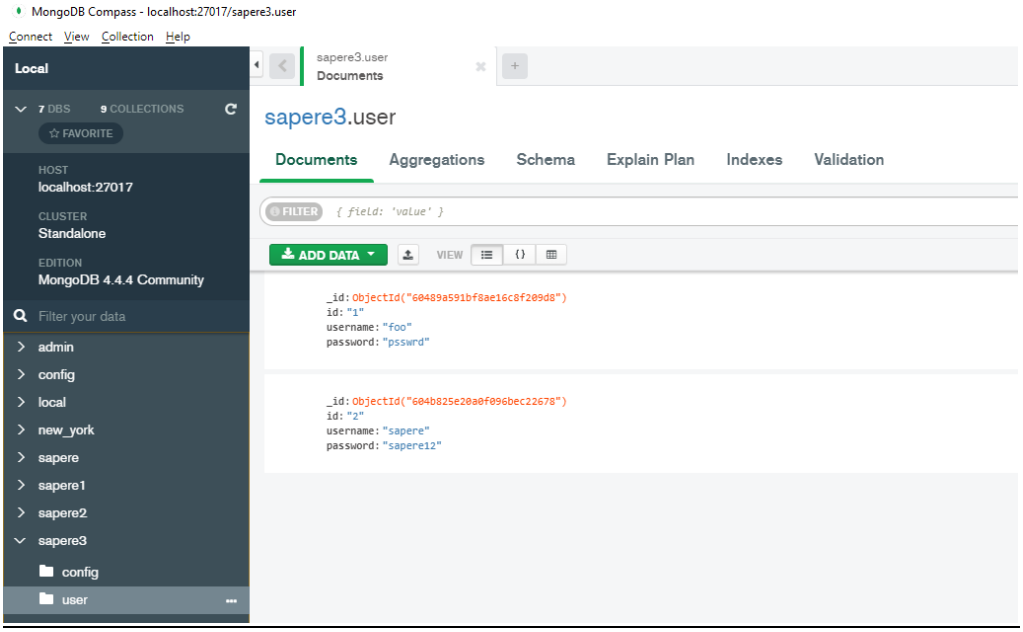
config collection after the import:



- Create a new collection names “user”



populate this collection by using user.json file contained in the same directory



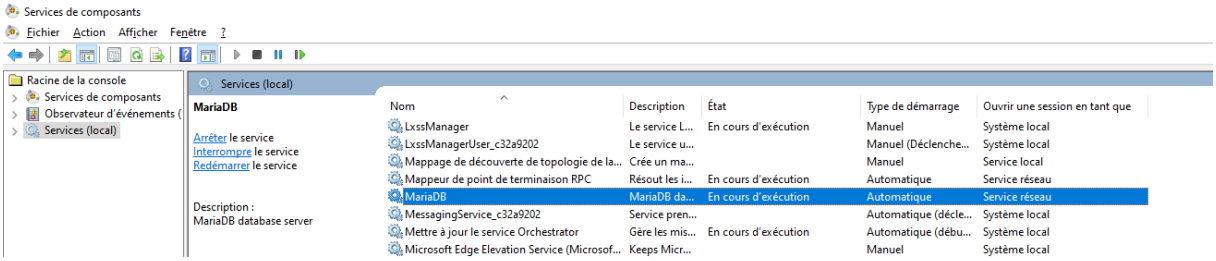
1.2/Agents database

Agents use a relational database to store event data, node state, and number of observations that generate Markov chain transition matrices.

1.2.1/Server installation

- Download le last version of MariaDB installer from: https://mariadb.org/download/
- Launch the installer file (for example for 10.6.4 version: mariadb-10.6.4-winx64.msi)
- During the installation process, MariaDB can be configured as a Windows service started automatically.

(windows service)

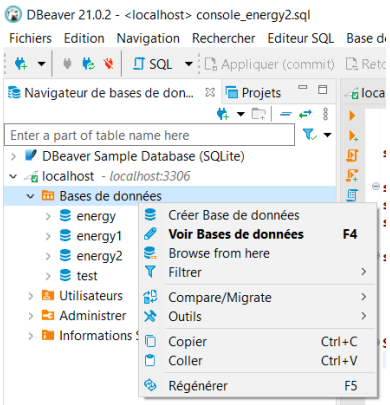


1.2.2/Client GUI installation

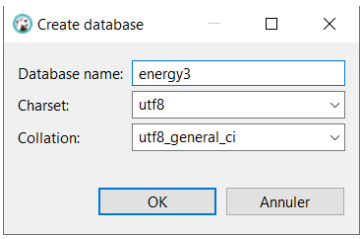
- Download the last version of DBEaver installer from: https://dbeaver.io/download/
- Install DBEaver (for example: dbeaver-ce-21.0.2-x86_64-setup.exe

1.2.3/Database creation

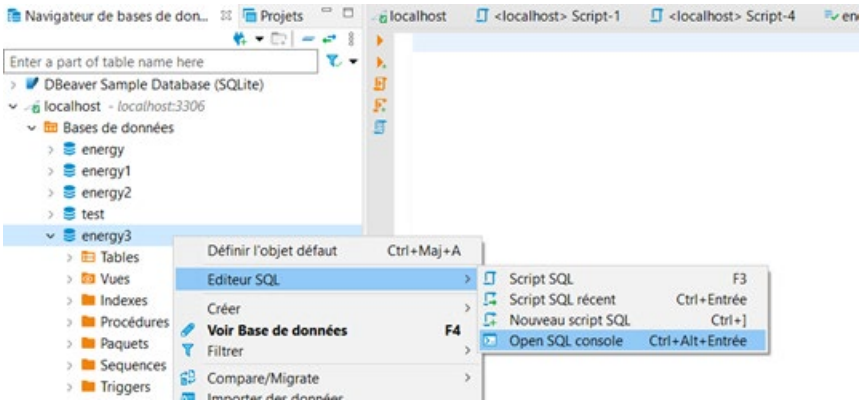
- Launch DBeaver
- On the left frame, select “localhost:3306” server, right click and select the menu to create a database



- Enter the database named (for example "energy"). The database name will have to set in the SpringBoot configuration file of SAPERE.
- keep the default charset and collation (utf8 / utf8_general_ci)

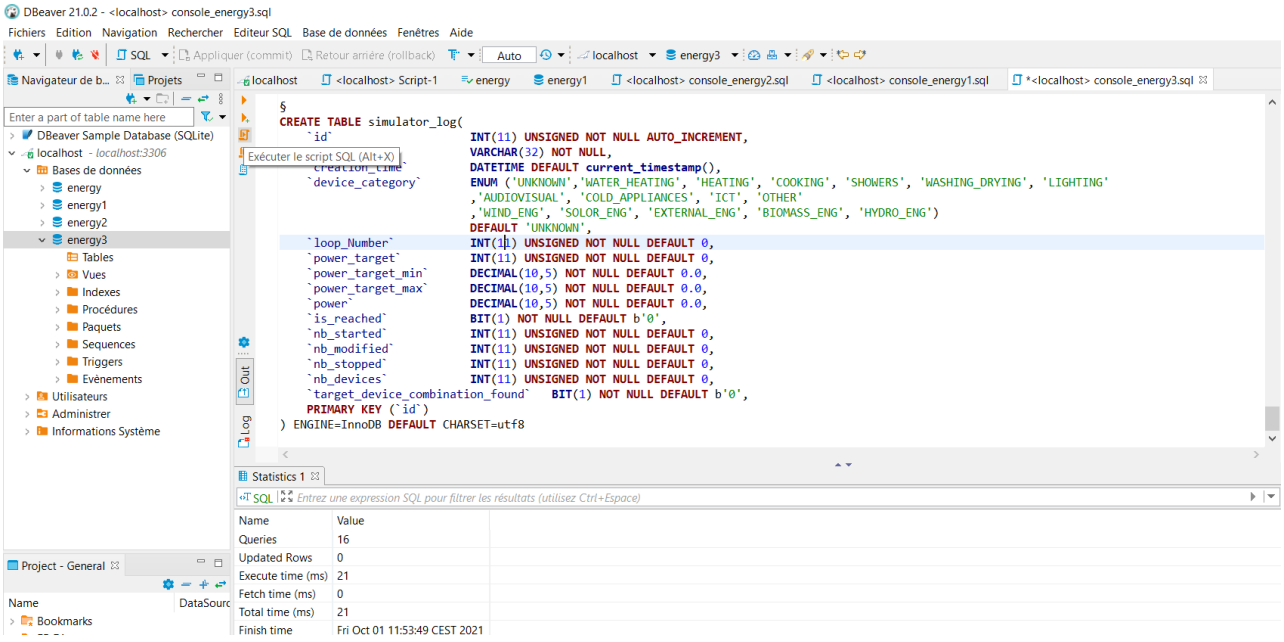


- Open a new SQL console: right clock on the new database, select “SQL Editor”-> “Open SQL console”



This console can be saved into a local file. This file is linked to the chosen database and contains the entered SQL requests. Yon can choose to store several console files linked to the same database.

- On this new database, launch the following scripts which are in the Mariadb sub-folder. For each script, copy entire the content to the console and execute it by using “Execute SQL script” button
    - 01_create_tables.sql: create the needed tables in the new database
    - 02_procedures.sql: create the needed SQL function and store procedures
    - 03_ref_data.sql: populate the referential data
    - 04_assign_rights.sql: aassign rights on this basis to the “learning_agent” account which is used by the different agents:

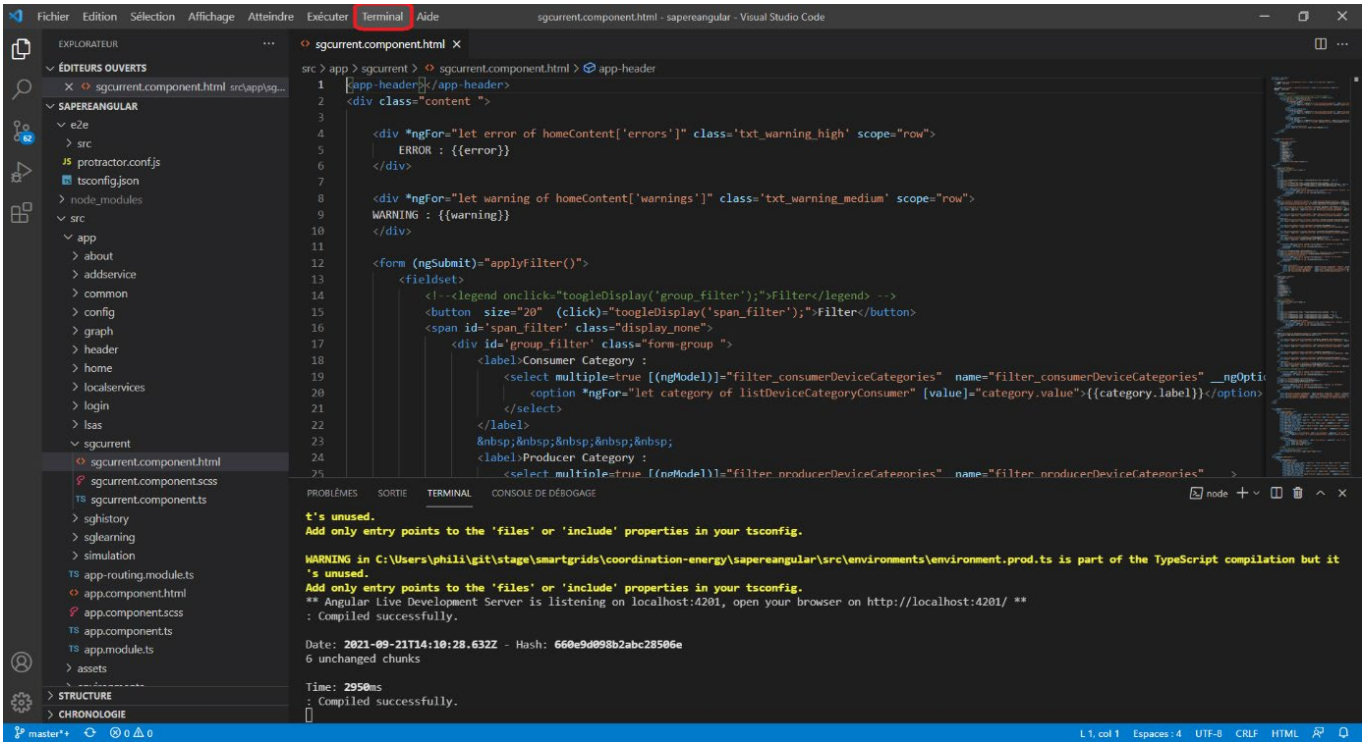


1.3/Web application:

1.3.1/ Installation of Visual Studio code

Visual Studio code is used as development environment for the web application.

- Download Visual Studio code from https://code.visualstudio.com/download
- Install Visual Studio Code
- Open the sapereangular folder from Visual Studio Code
- Launch a terminal from visual studio code (“Terminal” menu)



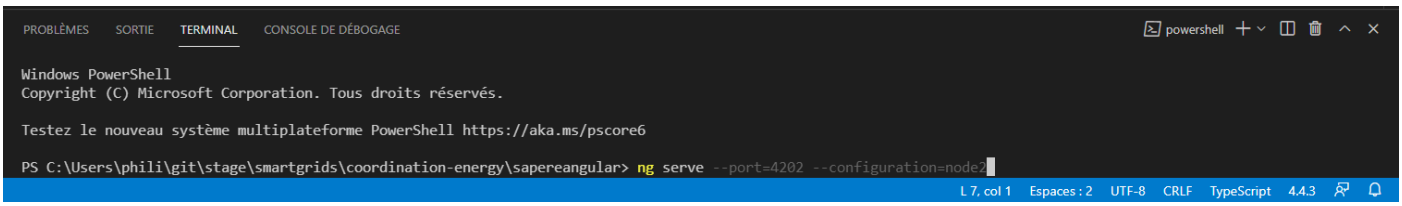
- On the new command window, go to the sapereangular directory:
- Launch the installation command: npm install --save-dev @angular-devkit/build-angular

1.3.2/ Starting the server

- Launch a terminal session
- move to sapereangular directory
- launch the starting command: ng serve --port=<port_number> --configuration=<config_name>

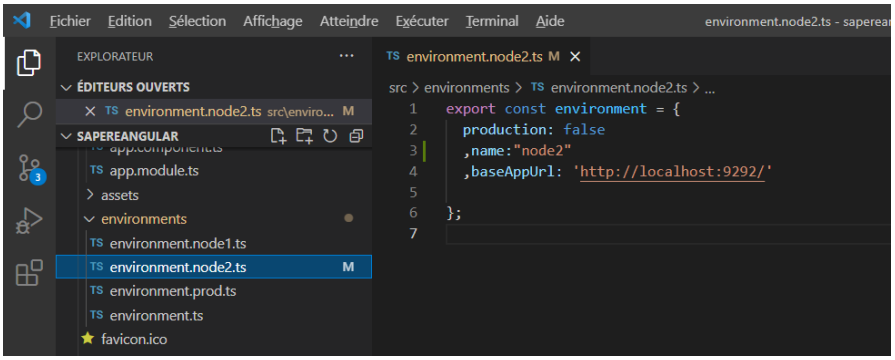
<port_number> is the port number and <config_name> is the configuration defined in the file named “environment. <config_name >.ts” and located in “environments” subdirector.

Example:



By default,

- port number is 4200
- used configuration is the default configuration which is defined in “environments/environment.ts” file “node2” configuration is chosen (as in the example above), the server uses the configuration defined in “environment. node2.ts” file.



The “baseAppUrl” field defines the address of the SAPERE micro-service located at the same node.

1.3.3/Adding a new configuration

If you need to add another node environment, you can add a new environment configuration

- enter the new configuration in a new file named “environments/environment. <config_name>.ts”.
- update angular.json file :
    - insert the new configuration in “configurations” block:
      add a “fileReplacements” item attached to the new configuration

      Example, for “node3” configuration:

    - insert the new configuration in “serve” -> “configuration” block

    - insert the new configuration in “e2e” -> “configuration” block:

```
"e2e": {
  "builder": "@angular-devkit/build-angular:protractor",
  "options": {
    "protractorConfig": "e2e/protractor.conf.js",
    "devServerTarget": "angular:serve"
  },
  "configurations": {
    "production": {
      "devServerTarget": "angular:serve:production"
    },
    "node1": {
      "devServerTarget": "angular:serve:node1"
    },
    "node2": {
      "devServerTarget": "angular:serve:node2"
    },
    "node3": {
      "devServerTarget": "angular:serve:node3"
    }
  }
}
```

1.4/ SAPERE micro-service

1.4.1/ Installation of Eclipse

The installer can be downloaded from:

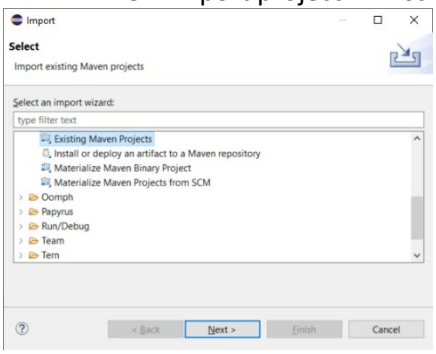
https://www.eclipse.org/downloads/packages/release/kepler/sr1/eclipse-ide-java-developers

Also, you need to install java if you haven't already.
The last version can be downloaded from:

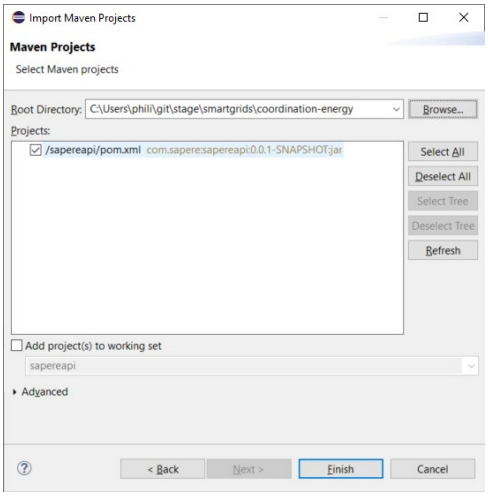
https://www.oracle.com/java/technologies/downloads/

1.4.2/Import of the SAPERE Spring-boot project

- File > Import project > Existing maven project



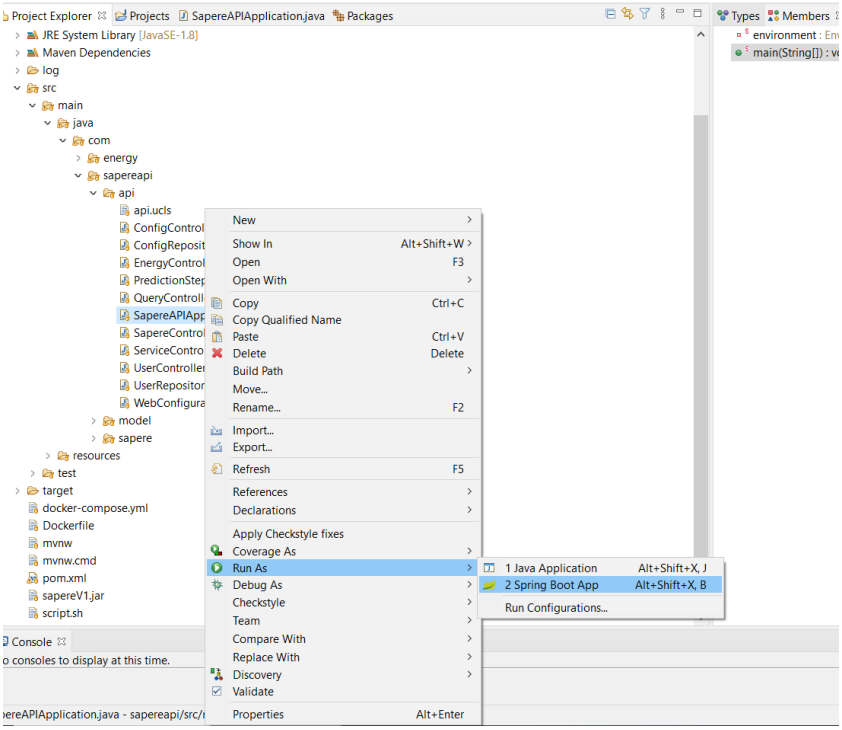
- In the file browser, select “coordination-energy” directory



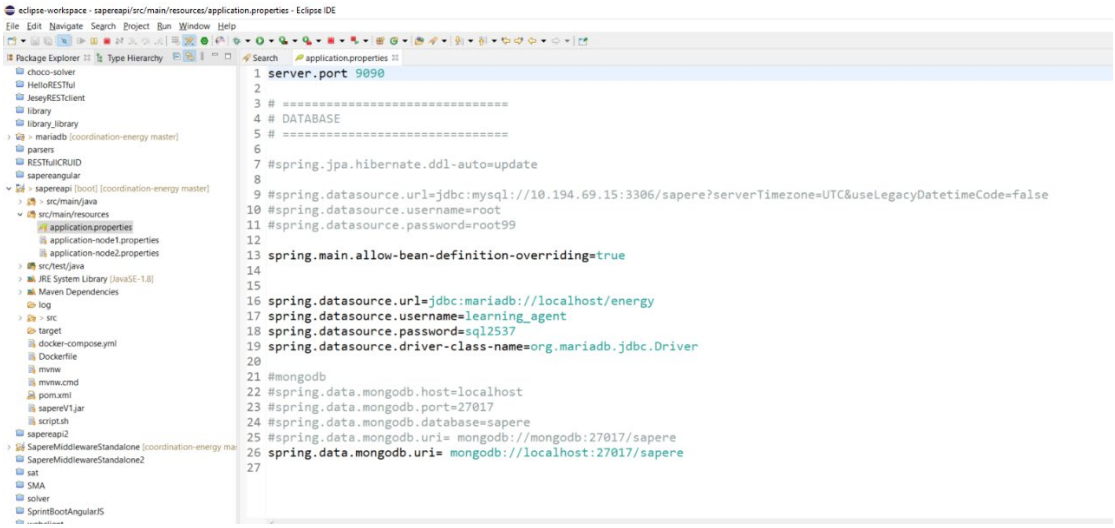
- Select sapereapi/pom.xml and click on “Finish”

1.4.2/Starting the SAPERE Spring boot application

- Select the `SapereAPIApplication class`
- `Right click on the class name and select “Run AS” -> “Spring boot app”`

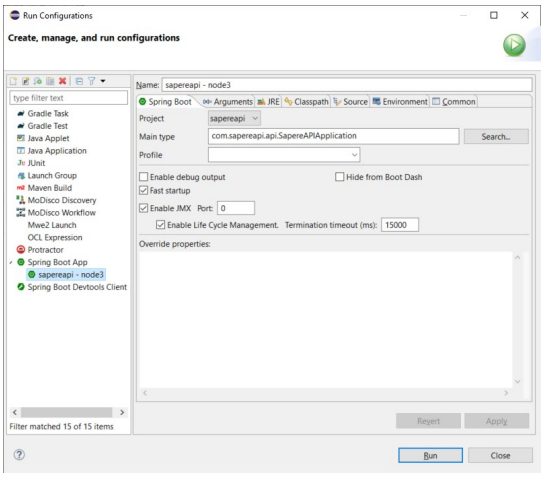


The default configuration information is in the "application.properties" file . The default server port which is set to 9090



You can change the running configuration:

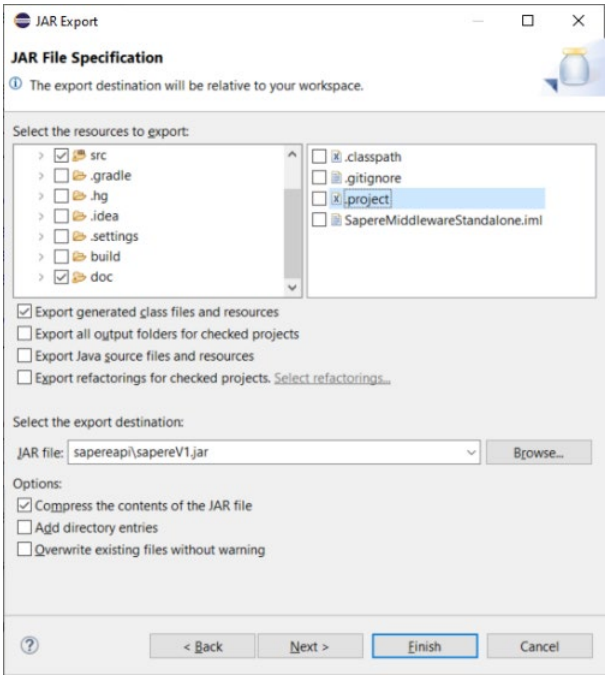
- Select the menu run -> run configuration
- Update the configuration name and the argument “Arguments”. The argument corresponds to the configuration name (“node3” for “application-node3.properties”)

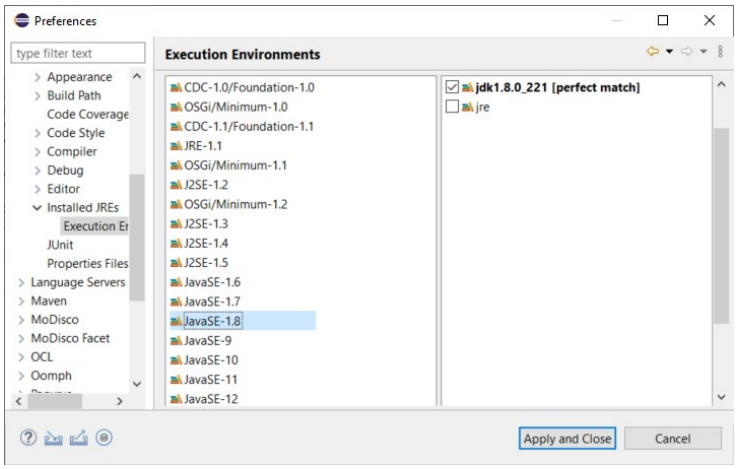


1.4.3/Regeneration of SapereV1.jar

SapereV1.jar is the core library of SAPERE

- From the Eclipse project SapereMiddleWareStandalone, export the jar: “right click“ -> ” export “ -> “jar file”
- on the right frame, deselect ".classpath", ".gitignore", ".project" and "SapereMiddlewareStandalone.iml" files because they are not necessary for the generation of this jar.
- on the left frame, deselect the "build" directory because it is not necessary for the generation of this jar.
-





- Make sure the jar is properly updated in the sapearpi project
- Launch the maven task "update project" from the eclipse project sapereapi
- Go to the command line in the sapereapi project
- Launch :

mvn install:install-file -Dfile=sapereV1.jar -DgroupId=com.sapere -DartifactId=sapere -Dversion=1.0 -Dpackaging=jar

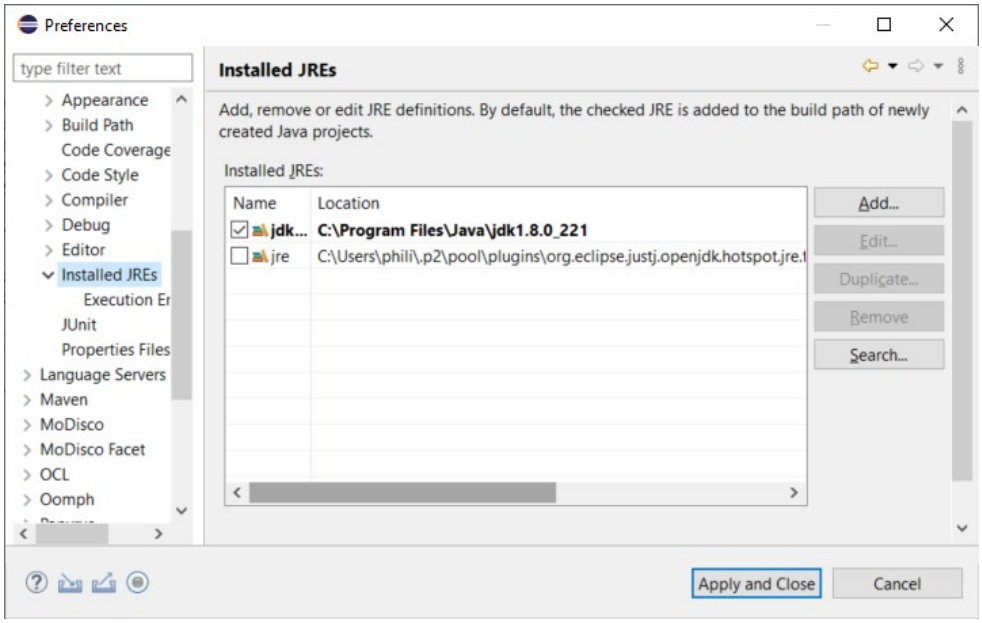
- Launch : mvn clean package

1.4.4/JDK Problem resolution:

"[ERROR] No compiler is provided in this environment. Perhaps you are running on a JRE rather than a JDK" sur la commande maven « mvn clean package »

In Windows->Preference->Installed JREs

- Select the used jdk



- idem on Execution Environment -> JavaSE-1.8

- Make sure that the system environment variables point to the JDK

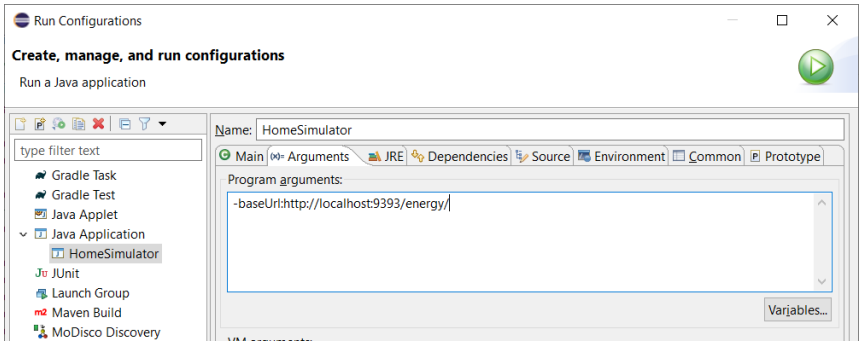
  Path : must contains « C:\Program Files\Java\jdk1.8.0_221\bin »

  JAVA_HOME : C:\Program Files\Java\jdk1.8.0_221

1.5/Running the home simulator

Select run->run configuration->

- Enter the main class com.energy.test.HomeSimulator
- Add the micro-service http address in the parameters -baseUrl:http://localhost:<server_port>/energy/



- Click on “apply” to save the configuration
- Click on Run

2/ Test with 2 node environments

Node	Start web application	Start test simulator	Mico-service start-up
Node1	ng serve –port=4201 –configuration=node1	com.energy.test.HomeSimulator -baseUrl:http://localhost:9191/energy/	com.sapereapi.api. SapereAPIApplication node1
Node2	ng serve –port=4202 --configuration=node2	com.energy.test.HomeSimulator -baseUrl:http://localhost:9292/energy/	com.sapereapi.api. SapereAPIApplication node2