**Modeling for the watering system**

**Introduction**

This note introduces how to learn a watering system MTheory using a relational data.

Index

[1. Installing the HML JAVA project 1](#_Toc518669866)

[2. Importing a water system relational data into MySQL 2](#_Toc518669867)

[3. Executing HML-UnBBayes 2](#_Toc518669868)

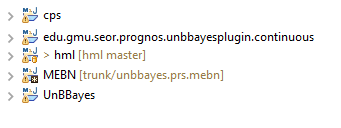
[4. Learning the WateringSystem MTheory 3](#_Toc518669869)

[5. Reasoning the WateringSystem MTheory 10](#_Toc518669870)

## Installing the HML JAVA project

For this example, install the HML project, four projects edu.gmu.seor.prognos.unbbayesplugin.continous, cps, MEBN, and UnBBayes.

<https://github.com/HML-UnBBayes/hml.git>

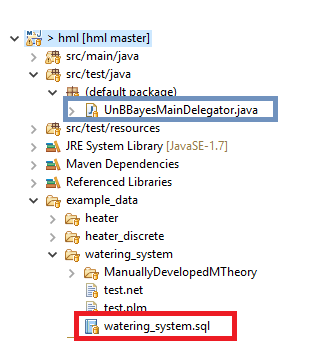


If successfully these are installed, we can see five projects as shown in the above figure.

## Importing a water system relational data into MySQL

The HML JAVA project includes a water system relational data.

By using “watering\_system.sql” in the red box, we can create the water system relational data in MySQL.



## Executing HML-UnBBayes

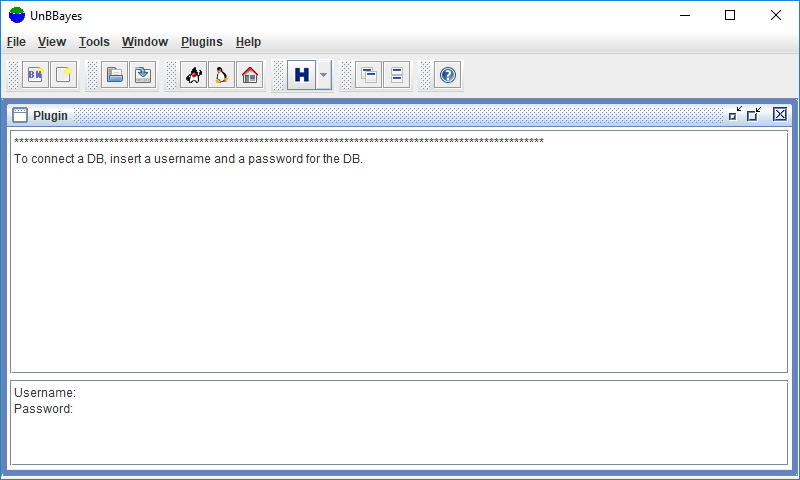
To execute HML-UnBBayes, use the “UnBBayesMainDelegator.java” file in the blue box in the above figure.

## Learning the WateringSystem MTheory

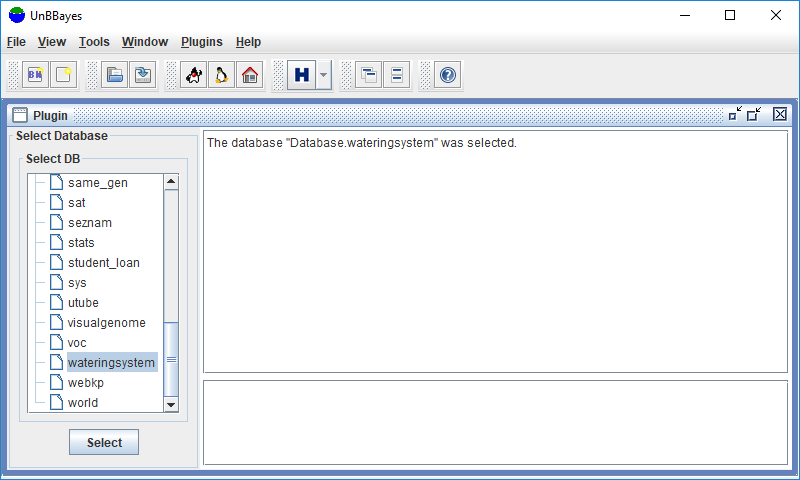
To learn the WateringSystem MTheory, click the button “H” in HML-UnBBayes.



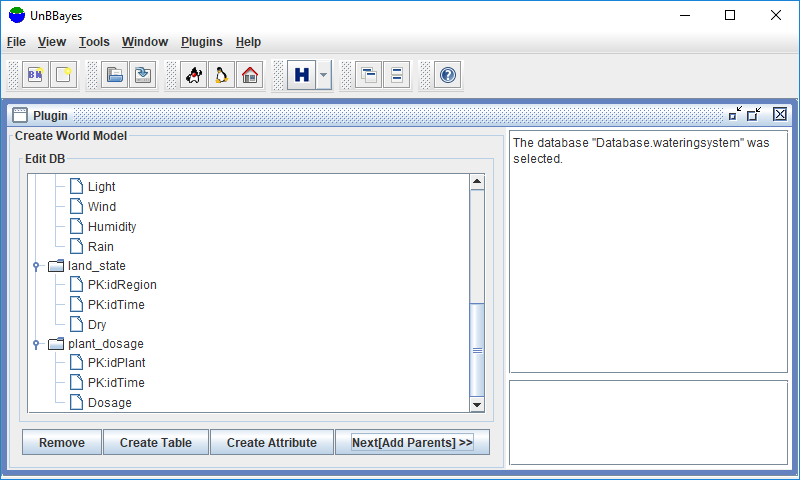
Insert the username and password for your MySQL.



Select the database “wateringsystem”.



Click the button “Next[Add Parents]>>”.

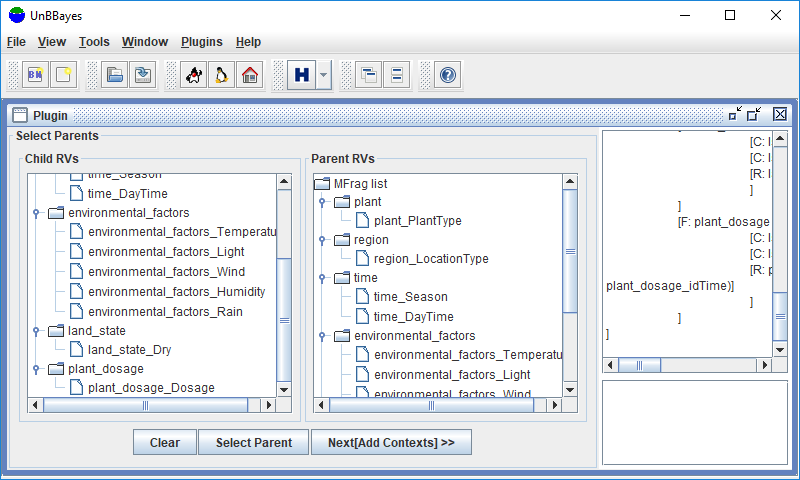


Click the item “land\_state\_Dry” in the tree view Child RVs.

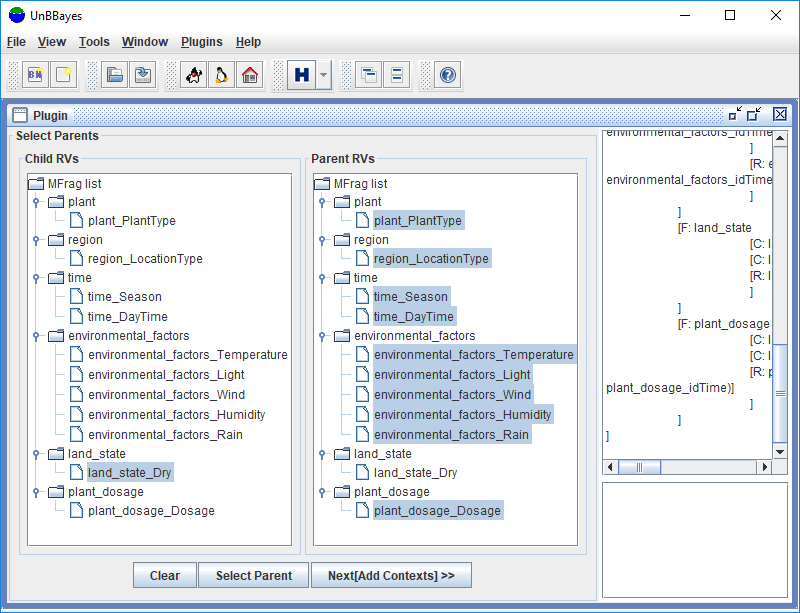
Also, click the following items in the tree view Parent RVs.

* plant\_PlantType
* region\_LocationType
* time\_Season
* time\_DayTime
* environmental\_factors\_Temperature
* environmental\_factors\_Light
* environmental\_factors\_Wind
* environmental\_factors\_Humidity
* environmental\_factors\_Rain
* plant\_dosage\_Dosage

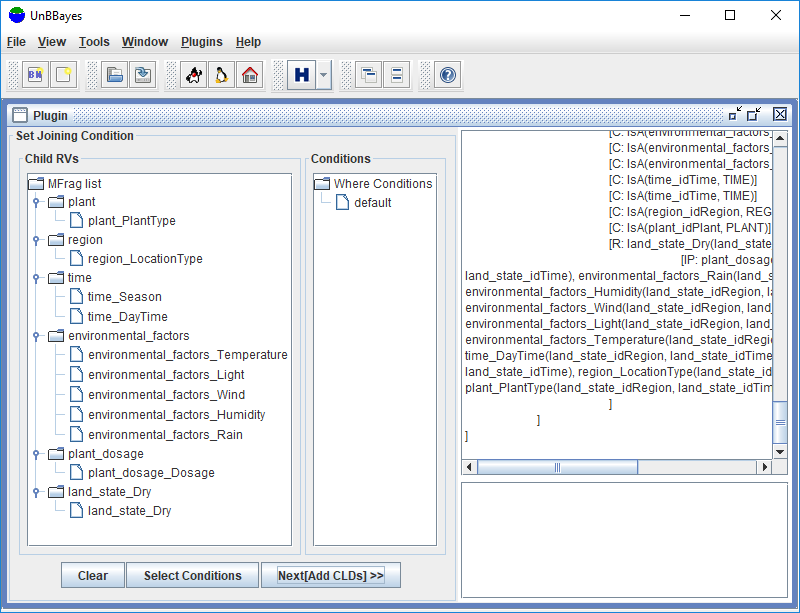
Click the button “Select Parent”.



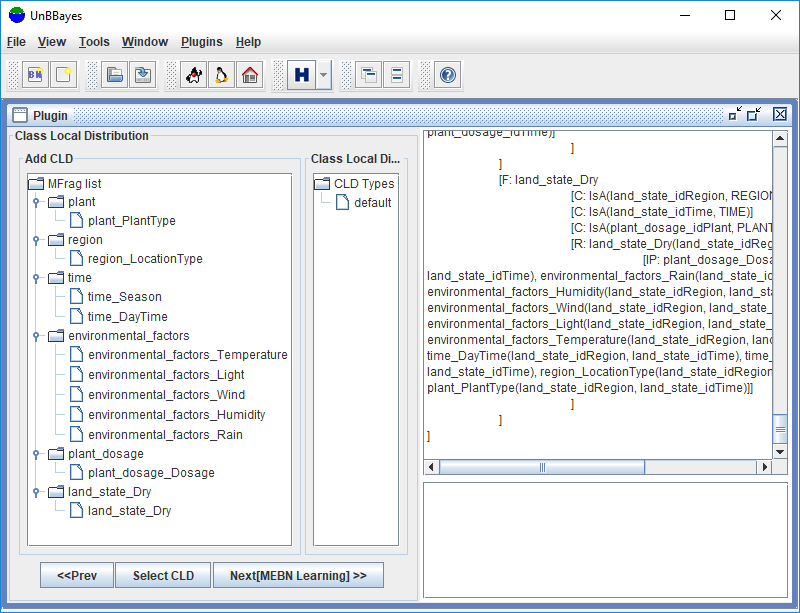
Click the button “Next[Add Contexts]>>”.



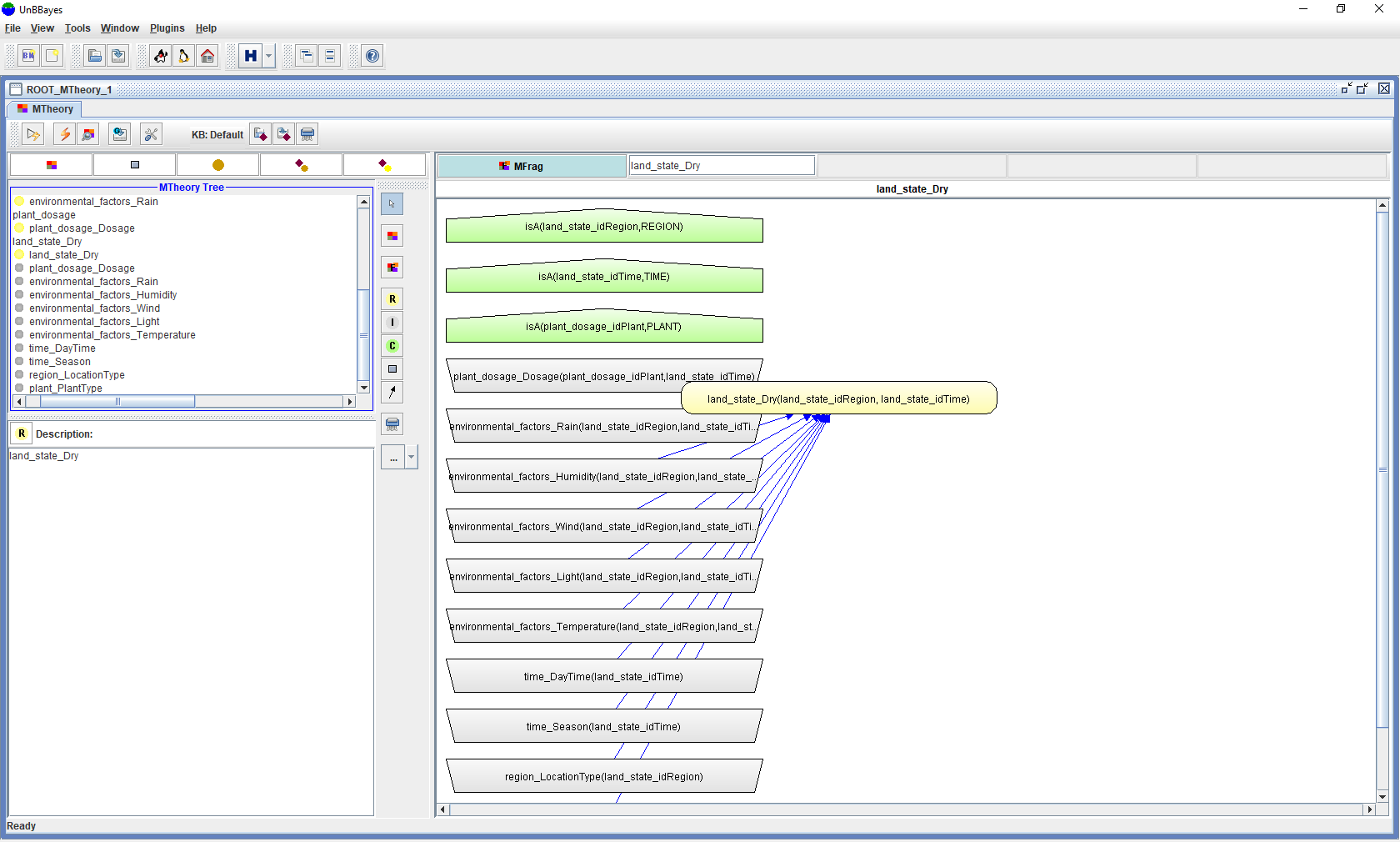
Click the button “Next[CLDs]>>”.



Click the button “Next[MEBN Learning]>>”.



Then we can see a learned MTheory.



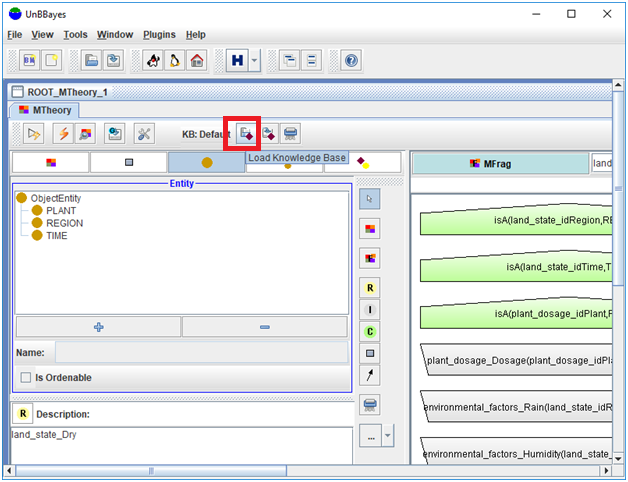
## Reasoning the WateringSystem MTheory

To reason about the node “land\_state\_Dry”, we need to set knowledge base (KB).

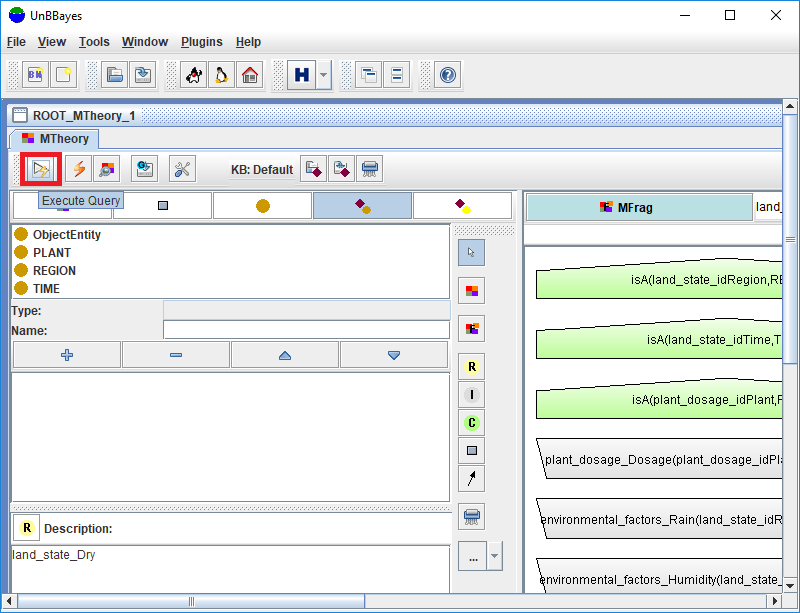
We can find a sample KB in the following folder.

example\_data/watering\_system/test.plm

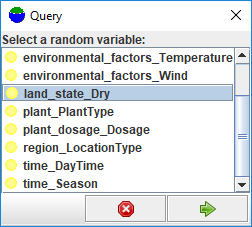
Click the button “Load Knowledge Base” and load the file “test.plm”.



To query the node “land\_state\_Dry”, click the button “Execute Query”.

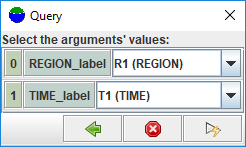


Select the item “land\_state\_Dry”.



Select the entity instant R1 for REGION\_label and the entity instance T1 for the TIME\_label.

Then click the button “Query”.



Then, we can see a reasoned SSBN from the WateringSystem MTheory.

