

# **Metamodelling Tutorial**

Luc Engelen, Yaping Luo, Ana-Maria Sutii

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## 1 Introduction

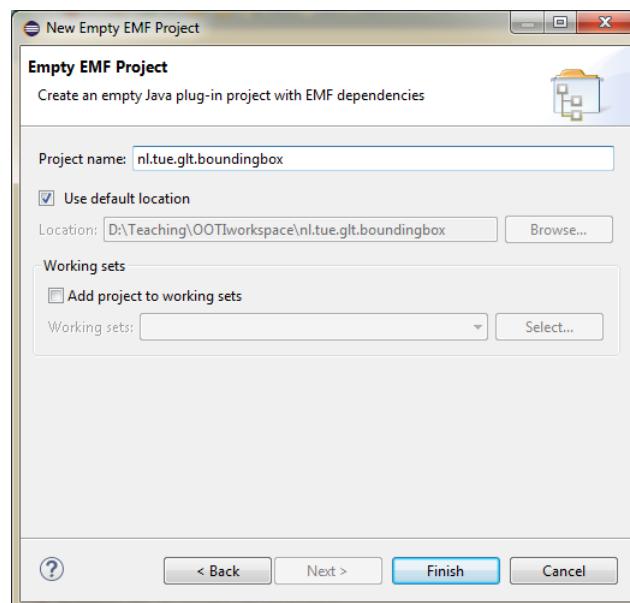
The Eclipse Modeling Framework (EMF) is a framework that extends Eclipse with functionality for modeling and metamodeling. Among other things, it introduces the concept of Ecore models and offers functionality to generate editors based on such models. After generating an editor from an Ecore model, this editor can be used to construct models. The editor ensures that each of these models adheres to the structure defined by the original Ecore model. Because of this, the original Ecore model is the metamodel for all models created using the corresponding editor.

There are a number of ways of constructing Ecore models, but this tutorial will only describe one of them. First, we construct an Ecore model manually using a tree-based editor. Then, we generate the editor that corresponds to this model. Finally, we use the generated editor to create a model for which the previously created Ecore model is the metamodel.

## 2 Creating an Ecore Model

We start by creating the Ecore model that will fulfill the role of metamodel. First, we create an empty EMF project.

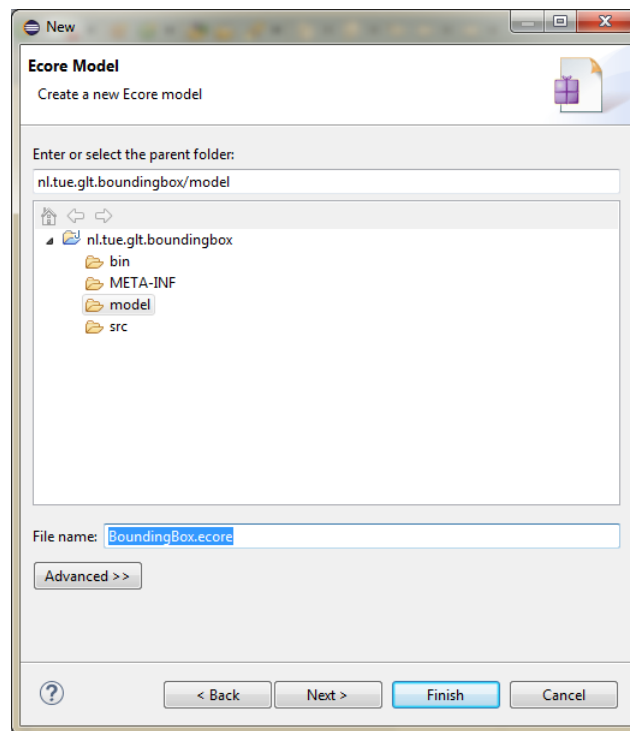
1. Right-click in the package explorer.
2. Select New.
3. Select Project. . . .
4. Select Empty EMF Project under Eclipse Modeling Framework and click Next.
5. Choose a name for the empty EMF project (like the one shown in the figure below, for instance) and click Finish.



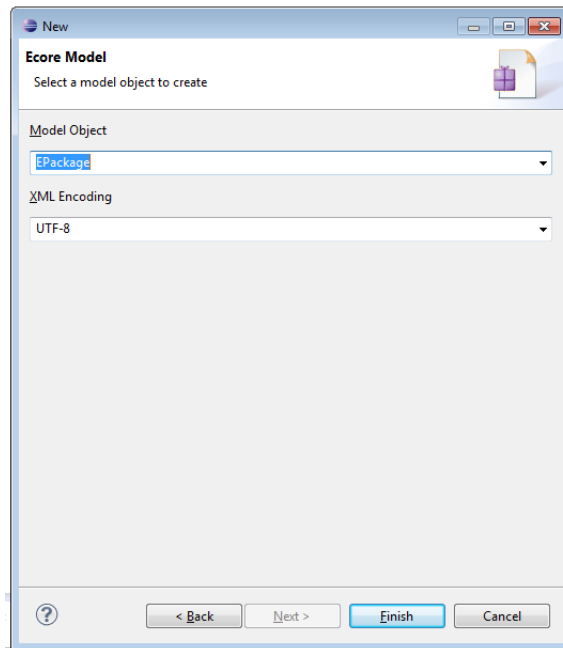
In this project we create the Ecore model.

1. Right-click the folder named model in the new project.

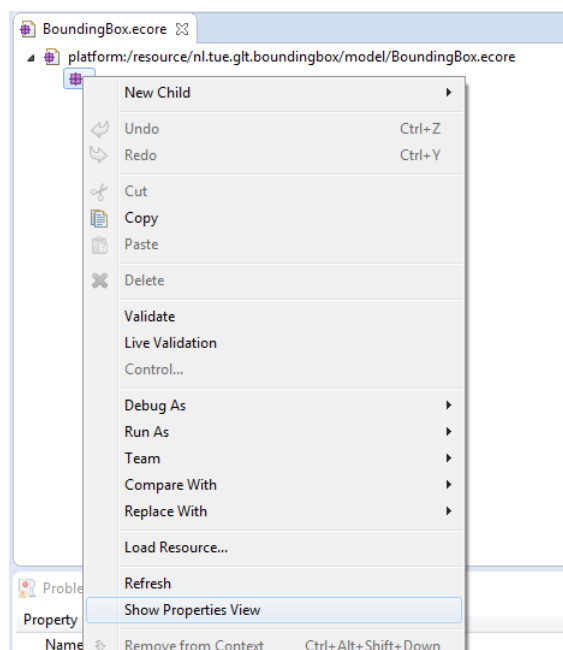
2. Select New.
3. Select Other. . . .
4. Select Ecore Model under Eclipse Modeling Framework and click Next.
5. Choose a name for the Ecore model (like the one shown in the figure below, for instance) and click Next.



6. Ensure that the Model Object is set to EPackage, as shown below, and click Finish.



7. Open the Ecore model by double clicking it (if it is not opened).
8. Click on the small triangle in the tree-based editor to show the EPackage, which is represented by a small purple figure.
9. Right-click the small figure and select Show Properties View, as shown in the screenshot below.



10. Change the data in the properties view to the data shown below.

Property	Value
Name	boundingbox
Ns Prefix	boundingbox
Ns URI	boundingbox

11. Create a new EClass in the EPackage by right-clicking the EPackage and selecting EClass under New Child.

12. Change the name of this EClass to World using the properties view.

13. In the same way, create EClasses named Move, MoveX, MoveY, MoveLeft, MoveRight, MoveUp, and MoveDown.

14. Use the properties view to make the Eclass named Move, MoveX, and MoveY abstract, by changing the value of the property Abstract to true.

15. Use the properties view to specify that Move is the super type of MoveX and MoveY, MoveX is the super type of MoveLeft and MoveRight, MoveY is the super type of MoveUp and MoveDown as shown below.

The package structure shows:

- platform/resource/nl.tue.glt.boundingbox/model/BoundingBox.ecore
  - boundingbox
    - Move
      - distance: EInt
      - MoveX -> Move
      - MoveLeft -> MoveX
      - MoveRight -> MoveX
      - MoveY -> Move
      - MoveUp -> MoveY
      - MoveDown -> MoveY
    - World

The Properties view for MoveX shows:

Property	Value
Abstract	<input checked="" type="checkbox"/> false
Default Value	
ESuper Types	Move
Instance Type Name	
Interface	<input checked="" type="checkbox"/> false
Name	MoveX

16. Add an EAttribute to Move, by right-clicking the EClass and selecting EAttribute from New Child.

17. Use the properties view to change the name of the attribute to distance, its lower bound to 1, and its EType to EInt.

18. Add an EReference to World, by right-clicking the EClass and selecting EReference from New Child.

19. Use the properties view to change the name of the reference to moveCommands, its EType to Move, its upper bound to -1, and its containment property to true. An upper bound of -1 indicates that there is no limit to the number of references to instances of Move. By setting

the containment property of the reference to `true`, the instances of `Move` that an instance of `World` refers to belong to this instance. This means that the instances of `Move` will be deleted when the instance of `World` that refers to them is deleted.

### 3 Generating an Editor

The EMF framework is unable to generate an editor from an Ecore model directly. Instead, we need to derive a generator model from the Ecore model first.

1. Right-click the Ecore model.
2. Select `New`.
3. Select `Other...`
4. Select `EMF Generator Model` under `Eclipse Modeling Framework`.
5. Click `Next`.
6. Ensure that the name of the generator model is the same as the name of your Ecore model and click `Next`.
7. Select Ecore model and click `Next`.
8. Click `Load` and then `Next`.
9. Click `Finish`.

From this generator model, we can generate the Java code for the editor.

1. Right-click the top-most item of the generator model.
2. Select `Generate All`.

To use the editor we just generated within Eclipse, we have to export the project as a plug-in.

1. Right-click the view of the package explorer.
2. Select `Export...`
3. Select `Deployable plug-ins and fragments` under `Plug-in Development`.
4. Click `Next`.
5. Click `Select All`.
6. Change the directory listed on the tab `Destination` to your Eclipse directory. Be careful that you do not list the plug-in directory of your installation of Eclipse here, but the Eclipse directory itself.
7. Click `Finish`.

Before you can use the editor you have just generated, you need to restart Eclipse.

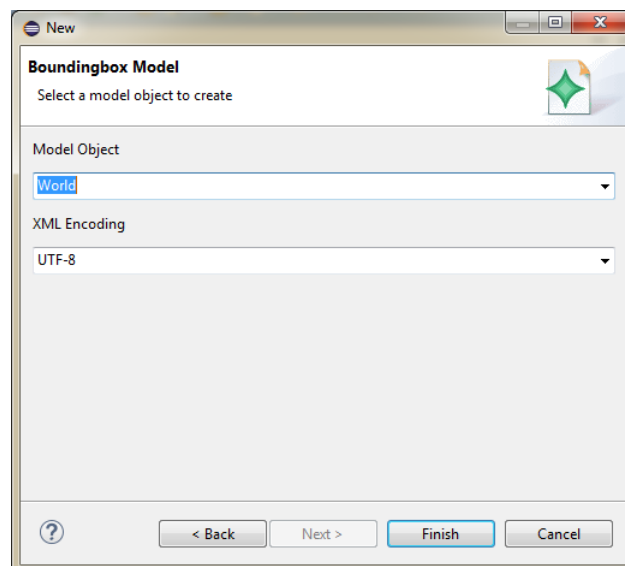
### 4 Creating a model

After restarting Eclipse, we create a new project and a `BoundingBox` model. We start by creating the project.

1. Right-click the view of the package explorer.
2. Select New.
3. Select Project. . . .
4. Select Project under General.
5. Choose a name for the project and click Finish.

Next, we create a BoundingBox model.

1. Right-click the project in the package explorer.
2. Select New.
3. Select Other. . . .
4. Select BoundingBox Model under Example EMF Model Creation Wizards and next.
5. Choose a name for the file and next.
6. Select World as Model Object.



7. Click Finish.

Now, you can create a BoundingBox model in the same way you created the Ecore model before.

## 5 Extra Information

The Ecore Diagram View provides a graphical environment to create, edit and maintain Ecore models. If you are interested in the latest Ecore Diagram View, you could look at <http://www.eclipse.org/ecoretools/overview.html>. The download link and user guide are provided on the website.