Travelling Example
for Eclipse Papyrus extended with MetaModelAgent

Introduction

This document describes the **Travelling Example**, containing a metamodel defining a modeling language for capturing travel alternatives between cities and an example model covering major cities in Northern Europe.

The purpose is to demonstrate domain-specific modeling and model analysis capabilities provided by Eclipse Papyrus extended with MetaModelAgent.

The example is not intended for professional use. It has only been developed as an example of the capabilities in Papyrus and MetaModelAgent and are probably of very limited practical value.

Artifacts included in the example

Figure 1: *Schematic diagram of included artifacts and how they refer to each other*

Northern Europe Traveling (Example Model)

The domain-specific example model contains countries in northern Europe, some major cities and different kind of travel alternatives between the cities.

The example model is by no meaning complete. It just covers a few major cities, connections, and transport operators. There is no guarantee that the model contains correct information and that is not important either, as the purpose of the model is only to be a useful example.

The model is using the *Travel Profile* and conforms to the metamodel *Travelling Guidelines*. The diagrams in the model are styled by the *Travelling Stylesheet*.

Travel Profile

A UML-profile that defines stereotypes and additional properties for all concepts needed in the Travelling domain. The *Northern Europe Traveling* Example Model uses this profile.

Each non-abstract stereotype in the profile has also a unique embedded icon from the icons in the nested Icons folder. The diagram in the profile is styled by the *Profile Stylesheet*, located in the nested Stylesheet folder.

Stereotype	UML Element	Description
Continent	Model	One large land mass on the earth's surface, surrounded, or mainly surrounded, by sea and usually consisting of various countries
Country	Package	A region that is identified as a distinct entity in political geography.
City	Component	A large human settlement.
Road	Information Flow	A way on land where vehicles are run.
Railway	Information Flow	A steel-track between city stations on which trains are run.
FerryRoute	Information Flow	A waterway where ferries are going.
TrainOperator	Class	A company that runs trains on a railroad.
FerryOperator	Class	A company that runs ferries between different city ports.

Travelling Guidelines (Metamodel)

The Metamodel defines the modeling rules for Travelling models using the profile above. The metamodel is used by MetaModelAgent to provide a customized UI together with model validation, model analysis and web publishing capabilities.

The metamodel uses the *MMA profile* which is built into the MetaModelAgent extension. The metaclasses in the metamodel defines how to apply the stereotypes in the *Travel profile*. The diagrams in the metamodel are styled by the *MetaModel Stylesheet* located in the nested Stylesheets folder.

Class diagrams representing "maps" displays countries that contains cities and their connections. The layout within a class diagram has normally no semantics, but in this specific there is a recommendation to organize countries and cities relative to how they geographically are located.

As it is common to be able to travel in both direction between cities. Each kind of connection (road, railway, or waterway) must be modeled twice, one in each direction.

The conveyed property of each information flow represents references to transport operators that operates on the connection that the information flow represents.
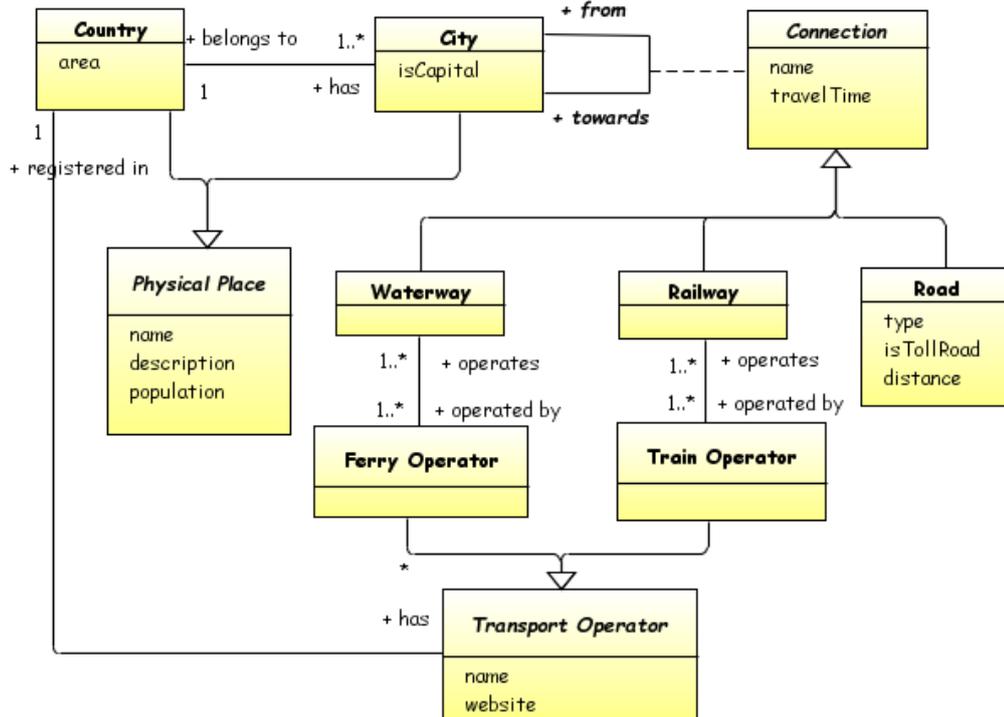
Figure 1: *Conceptual model of the concepts in the Travelling modeling domain*

Stylesheets

CSS Stylesheets are used by Papyrus to customize the graphical presentation of elements and relationships in diagrams. Stylesheets makes it easy to achieve a uniform look of the diagrams.

Travelling Stylesheet

Defines how the concepts are displayed in the diagrams in the Northern Europe Model. The stylesheet refers to the SVG symbols in the nested Symbols folder.

Profile Stylesheet

Defines how the stereotypes are displayed in the diagrams in a UML-profile.

Metamodel Stylesheet

Defines how metamodel concepts are displayed in the diagrams in a metamodel.

Graphics

Icons

Copies of the icons that are embedded in the *Travel Profile*. The icons in the profile will be displayed in the different views, dialogs and wizards when running the demo. If any of the icons are changed, they must be embedded once again in the profile before they can be displayed in the UI.

SVG images

Vector-images that are referred from the *Travelling CSS Stylesheet* and used instead of standard UML-symbols for the different concepts in the diagrams in Northern Europe Model.

MetaModelAgent artifacts

The following artifacts are not part of the example. They are embedded in MetaModelAgent and only referred from the example. They are not visible in the workbench.

MMA profile

A UML profile that defines stereotypes to be used in metamodels. The *Information Model Guidelines* metamodel applies this profile.

Meta-metamodel

A metamodel that defines the rules for metamodels. This metamodel is useful when developing your own metamodel and make it possible to use MetaModelAgent even for metamodeling.

There is no need for a metamodel to have an explicit relationship to this meta-metamodel. MetaModelAgent knows that is should use this meta-metamodel when a metamodel is opened in the workbench.

Try out the example

Here are some suggestions on how to try out some of the features in MetaModelAgent by using the example.

Basics:

- Open the *Northern Europe Travelling Example Model* and activate MetaModelAgent for the model. Depending on the MetaModelAgent preference settings this may happen automatically or after acceptance in a confirmation dialog. You can also activate MetaModelAgent for the model manually by the context menu entry *MetaModelAgent -> Activate -> Travelling Guidelines*.

- Switch to the MetaModelAgent perspective. Dependent on the setting this may happen automatically. If not, you do it manually from the main menu: *Window -> Perspective -> Open Perspective -> Other*. Select *MetaModelAgent* in the list of perspectives.

- Click around in the example model and study the content of the *MMA Property View*, *MMA Guidance View*, and *MMA Summary View*.

Model editing:

- Do some editing of existing elements in the MMA Property View. You will see that only significant properties according to the metamodel is displayed and that entered values are validated directly.

- Add some new countries and/or cities using the *MetaModelAgent -> Add* context submenu. You will see that the submenu only will provide valid concepts to be created and the resulting wizard only will display properties relevant within information modeling.

- Add some elements that are not supported in a Travelling model. Note that they show up in the MMA Problem View and that they got problem decorators in the model explorer.

Basic model analysis:

- Display an overview of all cities using the *MMA Property Table View*: In the context menu of the model root select *MetaModelAgent -> Show in Property Table View -> Physical Places -> City*.

- Display an overview all railways in the *MMA Trace Matrix View*: In the context menu of the model root select *MetaModelAgent -> Show in Trace Matrix View -> Connections -> Railway*.

- Display all travel paths by road starting from Stockholm in the *MMA Trace Tree View* by selecting *MetaModelAgent -> Show in Trace Tree View -> Outgoing References -> Road*.

- Display a bar chart overview in *MMA Chart View* of the content in each Country: In the context menu of the model root select *MetaModelAgent -> Show in Chart View -> Nested Element Bar Chart -> Physical Places -> Country*. in the chart view, change level of nesting to *All* and press *Apply*.

Advanced model analysis

- Display in the MMA Trace Matrix View, between which cities traveling by ferry only, is possible either directly or by passing one or several cities on the way:
    - In the context menu of the model root select *MetaModelAgent -> Show in Trace Matrix View -> Connections -> Train*.
    - in the Matrix View´s drop-down menu, select Transitive Mode. The matrix view will then display filled cells for the combination of source target that are reachable by train. The color of the cell indicates the distance in terms of intermediate cities on the way.

- Display the shortest road route, in terms of intermediate cities, between Copenhagen and Helsinki in the MMA Trace Tree View:
    - In the context menu of the model root select *MetaModelAgent -> Show in Trace Matrix View -> Connections -> Road*.
    - in the Matrix View´s drop-down menu, select Transitive Mode.
    - Click in the intersection cell of Copenhagen and Helsinki. Bring up the context menu and select *Show shortest path(s) in the Tree View*.

- Display between which countries you can travel, without passing any other country on the way:
    - In the context menu of the model root select *MetaModelAgent -> Show in Property Table View -> Physical Places -> Country.* The MMA Property View will be filled with all countries in the model
    - Select all rows in the MMA Property Table View, bring up the context menu and select Show in Trace Matrix View-> Derived Interconnections -> *All Relations.*
    - The MMA Trace Matrix View will display filled cells for those combinations of countries that have direct contact. The color indicates how many alternative connections there are between the pair of countries.

Model publishing:

- Publish a web site of the example model by invoking MetaModelAgent->Publish web report from the context menu of the model root.

References

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www.eclipse.org

[2] Papyrus Modeling Environment home page
www.eclipse.org/papyrus

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https://wiki.eclipse.org/MDT/Papyrus/UserGuide/CSS

[5] UML Profiles in Papyrus
www.eclipse.org/papyrus/resources/PapyrusUserGuideSeries_AboutUMLProfile_v1.0.0_d20120606.pdf

[6] MetaModelAgent Metamodeling Manual
www.metamodelagent.com/documentation/MetaModelAgent_MetaModeling.pdf

[7] MetaModelAgent User Manual
www.metamodelagent.com/documentation/MetaModelAgent_UserManual.pdf

[8] MetaModelAgent Model Analysis Manual
www.metamodelagent.com/documentation/MetaModelAgent_ModelAnalysis.pdf