Comparison and merge use-cases from practice with EMF Compare

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OBEO

EclipseSource
EMF Compare

Working with models

Comparing text files
EMF Compare

Working with models

Comparing models
EMF Compare

● Extensible, generic, open-source model versioning framework
  ○ Raise the unit of versioning from text line to model elements and diagrams
  ○ Compare and merge the logical structure of the model

● Generic algorithms
  ○ Reflection API to access and compare models generically
  ○ Support every modeling language that is specified in EMF

✔ Model-level comparison
✔ Model-level conflict detection
✔ Model-level merging
Typical Use Case: Version Control

- Comparison of branches and tags with the workspace
- Comparison of workspace with HEAD commit
- Merge-like operations (merge, rebase, cherry-pick)
General Comparison Process Overview
Brief Demo
Going Beyond the Typical Use Case

1. Heterogeneous models (textual and graphical)
2. Viewing the impact of model changes on artifacts
3. Processing model diffs in a browser-based review tool
Heterogeneous Comparison

- DSL approaches support different kinds of syntaxes
  - Graphical (Sirius)
  - Textual (Xtext)
  - Form-based
  - Pure XML
- Advanced users create modeling tools mixing syntaxes
Heterogeneous Comparison

- What’s the Problem?
  - **Logical Model Computation**
    - The default generic mechanism in EMF Compare works with XMI files only
    - Resolution of links in Xtext uses local index – What about remote versions?
  - **Matching of Xtext models**
    - Matching in EMF Compare is most effective when unique IDs are available
Heterogeneous Comparison

● Logical Model Computation
  ○ We have improved EMFCompare to support Xtext resources in logical models
  ○ Thanks to loadOptions.put("org.eclipse.xtext.scoping.LIVE_SCOPE", Boolean.TRUE)
  ○ Successful experimentations in 2017
  ○ Starting with eclipse Photon+1, this will be available => correct logical model computation involving Xtext resources

● Matching of Xtext objects
  ○ No generic solution found yet, analysis in progress
  ○ Specific Customizations with several customers in 2017 & 2018
  ○ Still looking for best way to match Xtext models
    ■ Use textual comparison of object serialization?
    ■ Use comparison of derived attributes?
    ■ Something else?
Heterogeneous Comparison

● Best practices:
  ○ If you only use textual syntaxes, use textual comparison
  ○ If you use a mix, use EMF Compare
    ■ Take into account advices available in our Xtext/Sirius white paper:
    ■ Reference serialization, refactoring operations, unique IDs in XMI files...
Sirius + Xtext Comparison Demo
Heterogeneous Comparison

● Pending Concerns
  ○ UI concern: Mixing textual and tree/graphical comparisons
  ○ Easily customizable Match engine for Xtext resources:
    ■ As generic as possible
    ■ With default behavior covering ‘standard’ use-cases

● You will always need to implement specific customizations
  ○ MatchEngine
  ○ We will be working on improving API to write such customizations
  ○ Your feedback, needs, requirements, suggestions, ... are welcome!
Impact of Model Changes on Generated Artifacts

- Generating artifacts from your model?
  - You probably want to know how a model change impacts those artifacts

- Fine-grained information on model changes
  - Model element that has been changed
  - Changed element’s features
  - EMF Compare’s comparison model

- Generation traceability
  - Which part of the generated artifact resulted from which part of the model
  - M2T traceability support available in Xtend and Acceleo

- Comparison model + generation traces → impact analysis
  - Of course it depends on the generator (bijective mapping)
Extensible EMF Compare UI

- Additional group providers can be added for more options
- Filters can be added and auto-activated or just added as option for users
- Elements have to adapt to a type
  Double-clicking an element will open the content merge viewer for the respective type
- Content merge viewers
  One or more content merge viewers can be provided for a defined type
Demo
Browser-based Review Tool

- Process description of model changes
  - Comparison model is an EMF model \o/
  - Java, Kotlin, Xtend, Acceleo, etc.

- Web application that can read change descriptions
  - View change description independently from modeling tool
  - Users can enter review → review document
  - Review document is again be processed
    E.g. to update a database, automate a git merge, etc.

- Several similar use cases
  - Change logs and reports
  - Migration scripts for model-related artifacts, ...
Demo

Change review
Super Coffee 3000.uml

- **Overview**
  - Date: 07/06/18
  - Time: 20:14:48
  - Model changes: 4
  - File changes: 0
  - Accepted changes: 2
  - Rejected changes: 0

- **Changed model elements**
  - **Brew (AutomaticTask)**
  - **Super Coffee 3000 (Activity)**
  - **Push (AutomaticTask)**

- **Brew (AutomaticTask)**
  - Model changes:
    - 1 change(s)
    - References change - outgoing set to

- **Super Coffee 3000 (Activity)**
  - Model changes:
    - 2 change(s)
    - References change - edge set to

- **Push (AutomaticTask)**
  - Model changes:
    - 1 change(s)
    - Stereotype attribute change - duration changed
  - File changes:
    - 1 file change(s)
      - SuperCoffee3000Vsrc-gen/SuperCoffee3000/AbstractPush.java
Processing the Comparison Model

Comparison Model

Match Model
- Matches of corresponding elements
- Scope of the comparison

Difference Model
- List of differences of each side
- Generic differences
  - Reference change
  - Attribute change
  - …

Relationships among differences
- Dependencies
- Implications
- Conflicts

EMF Compare merge viewer

EMF Compare merge engine

Your component
What’s New in EMF Compare “Photon”? 

- Composite merge operations
- Change merge decisions
- Keyboard bindings
- Better text compare
- Merge consequence switcher
- Performance improvements

- Sneak preview on upcoming features
  - Property compare content merge viewer
  - Improved mirroring support
Demo of New Features
Thanks a lot!

Questions?

Visit https://www.eclipse.org/emf/compare/ for more information

Find us later at the conference or contact us!

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