

EMF Model Query2-The next generation model query language

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Eclipse Con Talk

Saurav Sarkar-EMF Model
Query2

- Need for EMF is well known. Once the application is on EMF then the need for querying arises.
- Querying for objects, types of objects and the links between the objects becomes an utmost necessity.

Need for model querying

- EMF Query is a subproject under EMF project which again has two features EMF Model Query and EMF Model Query2.
- Major difference between the two is in terms of the scalability.
 - EMF Model Query execute queries by loading all the resources in the memory.
 - EMF Model Query2 in comparison execute queries by minimally loading the resources .

EMF Model Query and EMF Model Query2

The 4 things that **really matter**



Response time



Scoping



Type safety



Dirty state

Key features of Model Query2

- Scalable Query execution engine and retrieval of results of interest.
- Dirty state awareness.
- Ways of expressing Queries. AST and Textual.
- New XText based SQL like human readable language.
- Testing the model through the XText based UI.
- Pre configuring scoping before execution of queries.
- Queries are type safe.

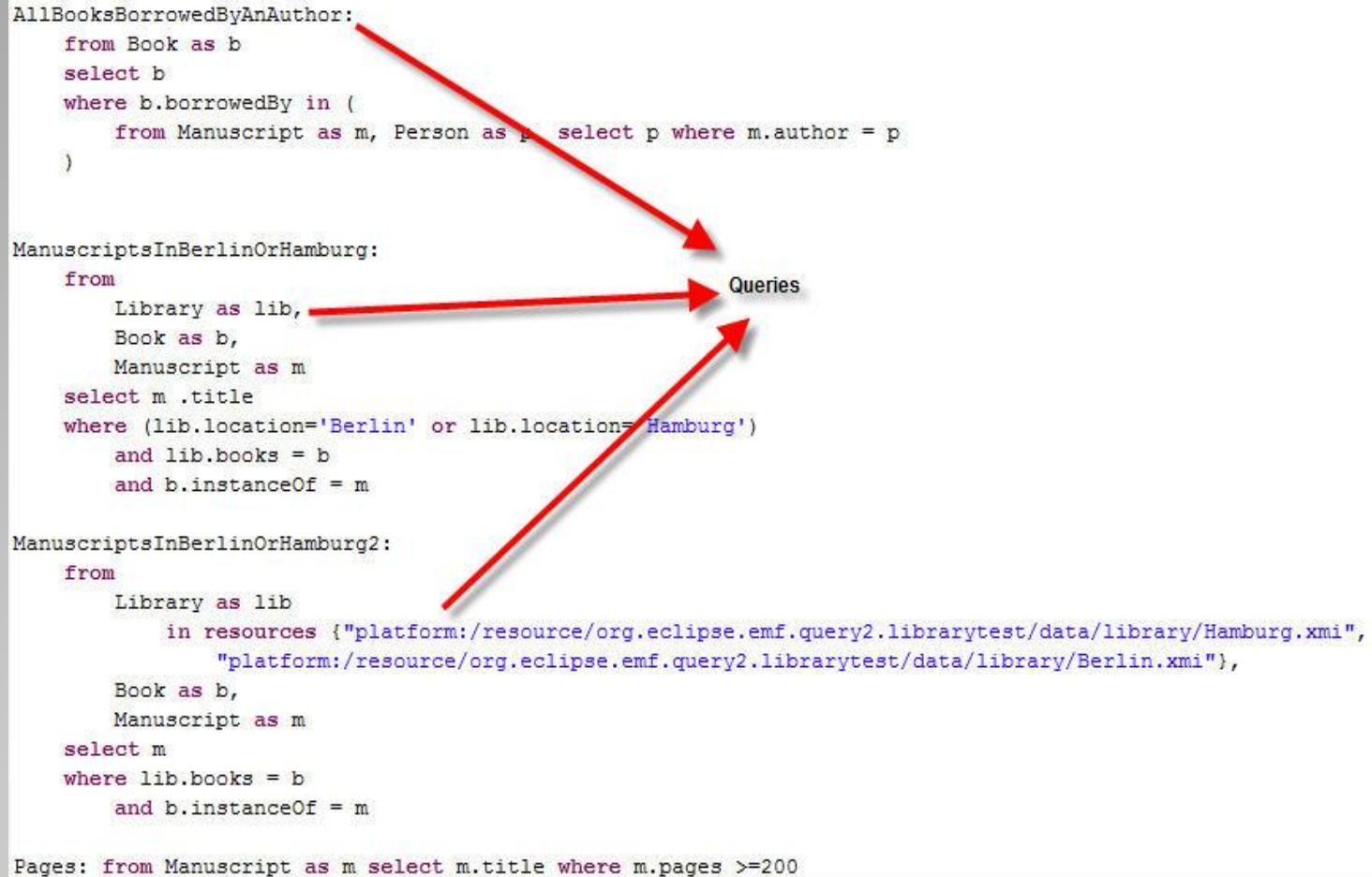
Key features of Model Query2

```
AllBooksBorrowedByAnAuthor:
  from Book as b
  select b
  where b.borrowedBy in (
    from Manuscript as m, Person as p select p where m.author = p
  )

ManuscriptsInBerlinOrHamburg:
  from
    Library as lib,
    Book as b,
    Manuscript as m
  select m .title
  where (lib.location='Berlin' or lib.location='Hamburg')
    and lib.books = b
    and b.instanceOf = m

ManuscriptsInBerlinOrHamburg2:
  from
    Library as lib
    in resources {"platform:/resource/org.eclipse.emf.query2.librarytest/data/library/Hamburg.xmi",
                "platform:/resource/org.eclipse.emf.query2.librarytest/data/library/Berlin.xmi"},
    Book as b,
    Manuscript as m
  select m
  where lib.books = b
    and b.instanceOf = m

Pages: from Manuscript as m select m.title where m.pages >=200
```

A diagram with the word "Queries" centered on the right side. Three red arrows point from the left towards it. The top arrow originates from the first query, "AllBooksBorrowedByAnAuthor:". The middle arrow originates from the second query, "ManuscriptsInBerlinOrHamburg:". The bottom arrow originates from the third query, "ManuscriptsInBerlinOrHamburg2:". The fourth query, "Pages:", is located below the others and does not have an arrow pointing to it.

Query Editor and SQL Like Queries

```
ManuscriptsInBerlinOrHamburg2:
  from
    Library as lib
      in resources {"platform:/resource/org.eclipse.emf.
        "platform:/resource/org.eclipse.emf.query2.lib
    Book as b,
    Manuscript as m
  select m.title
  where lib.books = b
  and b.instanceOf = m
```

Query Executed

Pages: from Manuscript as m select m.title where m.pages >=200

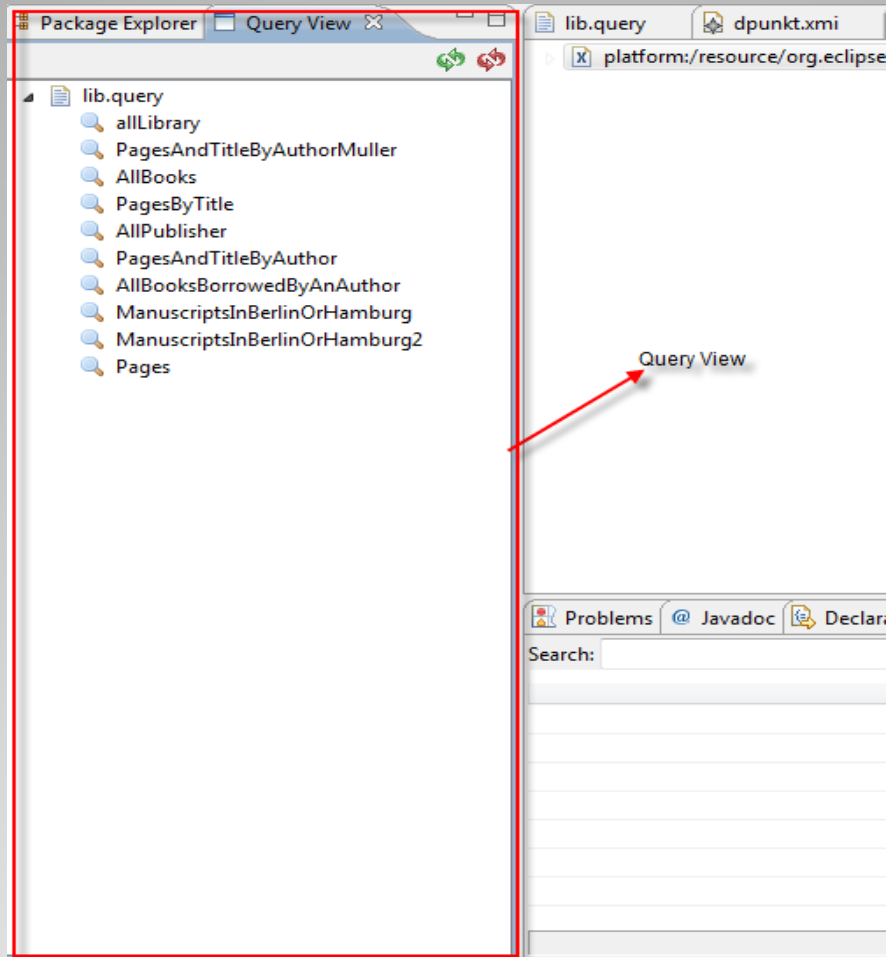
Problems | Javadoc | Declaration | Properties | Query Result View

Search:

m.title (ecore::EString)	
ABAP-Performance-Workshop	
ABAP® Objects	
ABAP® Objects	
Abenteuer Softwarequalität	
Absolute FreeBSD	
Absolute FreeBSD	
ActionScript für Programmierer	
Adobe InDesign 2 im integrierten Workflow	
Result size: 560 - query time: 202ms	

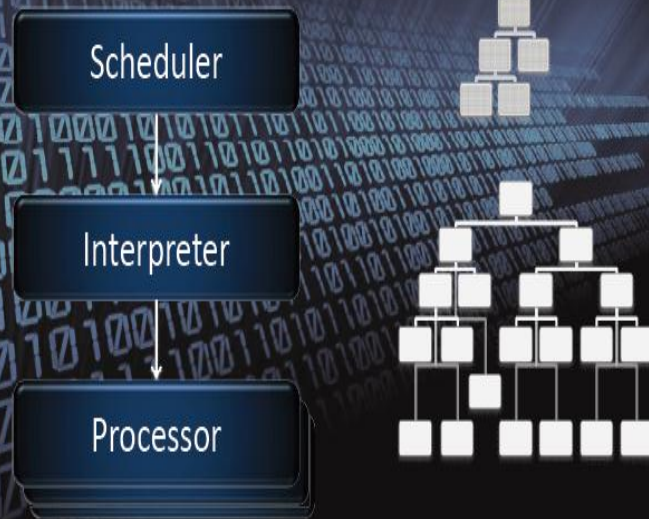
Results of the Query Executed

Query Execution and Results

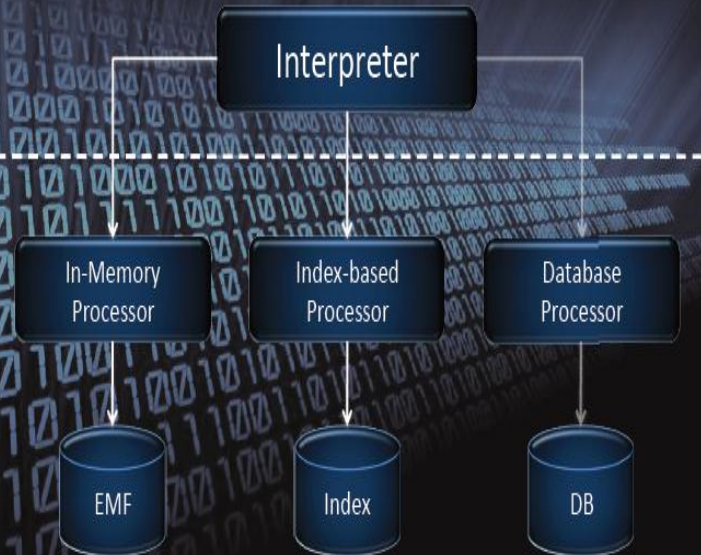


Query View-Viewing the Queries

Architectural Overview



Processing queries in multiple backends



Architectural Overview

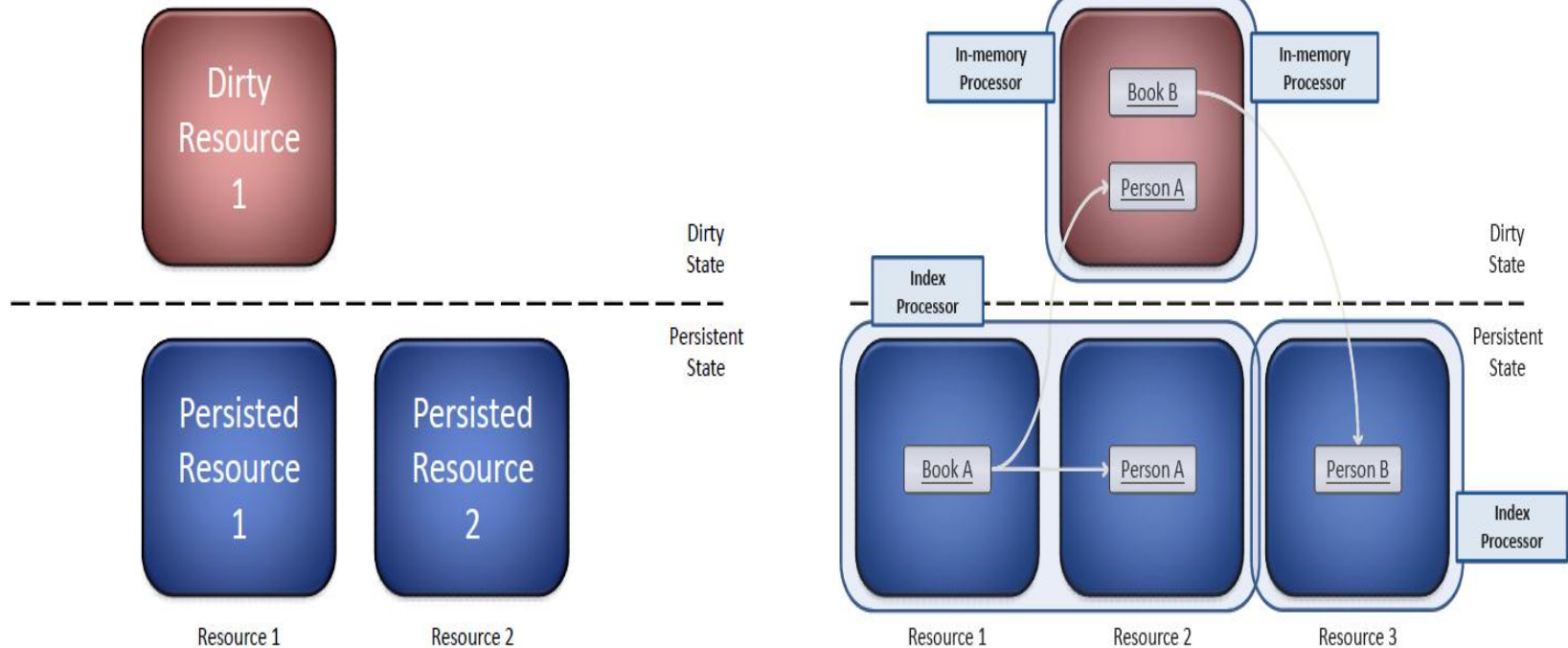
- Index provides information for narrowing the scope of resources that have to be loaded during execution.
- It contains data about resources, Eobjects and references between them. Index is able to rapidly answers queries for resources , elements and one step reference navigation-forward and backward.
- Indexes can be paged, dumped and loaded according to user scenarios.

Indexing in Query2

- Query engine is aware of the dirty state of the resources i.e. the results are returned depending upon the state of the resources.
- Tooling support is available for dirty state execution of queries.

Dirty state Handling

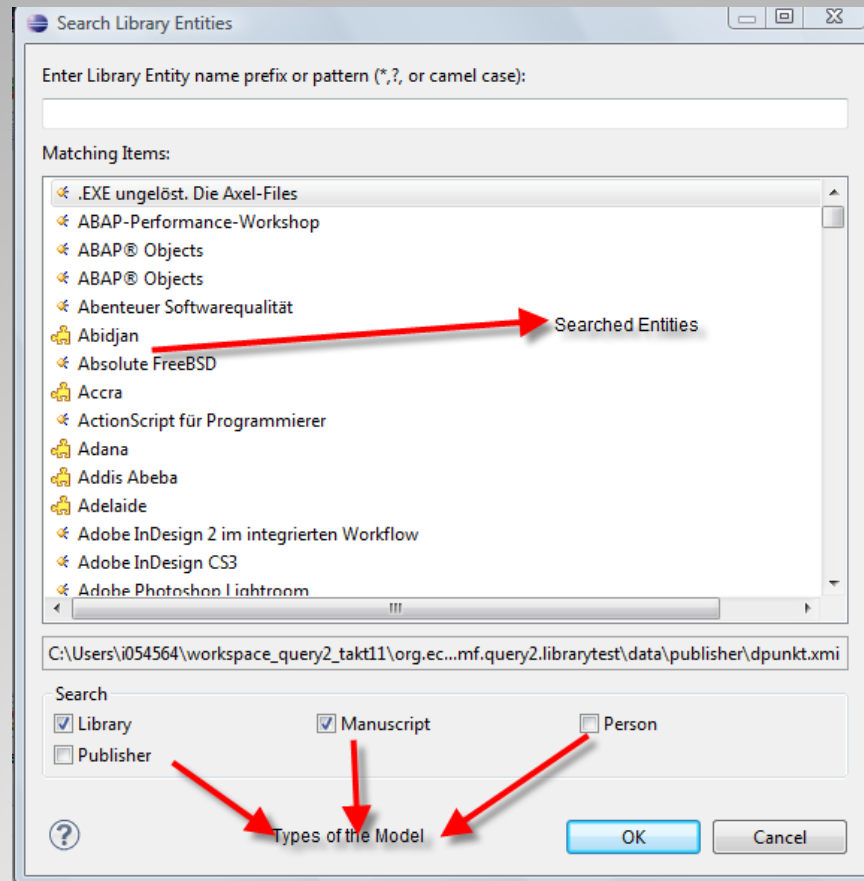
`select b, p from Book as b, Person as p
where b.borrowedBy = p`



Execution of Query with Dirty state awareness.

- Searching of model elements can be done using Query2 without actually loading the elements.
- A search UI was developed to test the scenario.

Development tooling and scenarios achieved through Query2- Searching

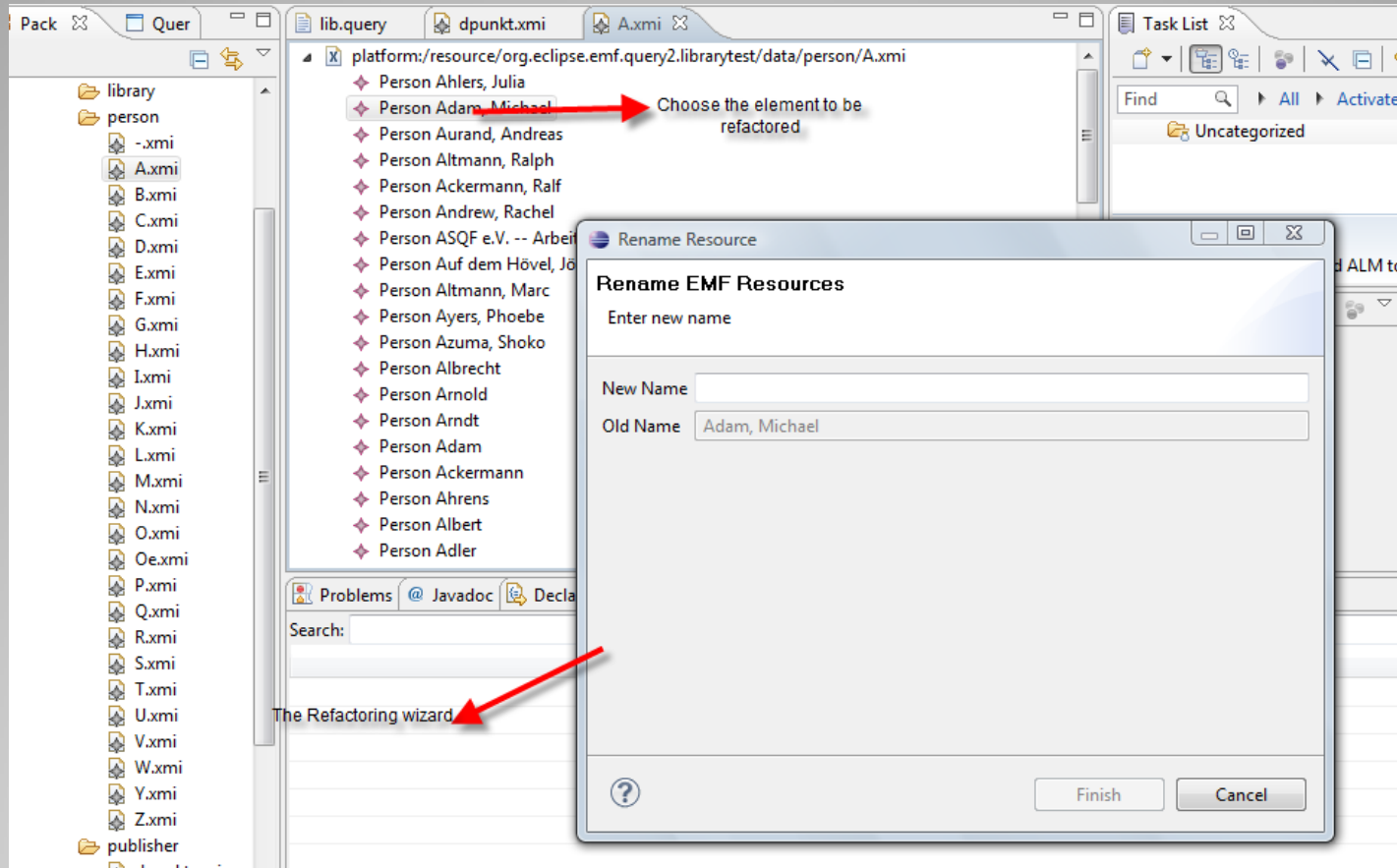


Search EMF Models using Query2

Saurav Sarkar-EMF Model
Query2

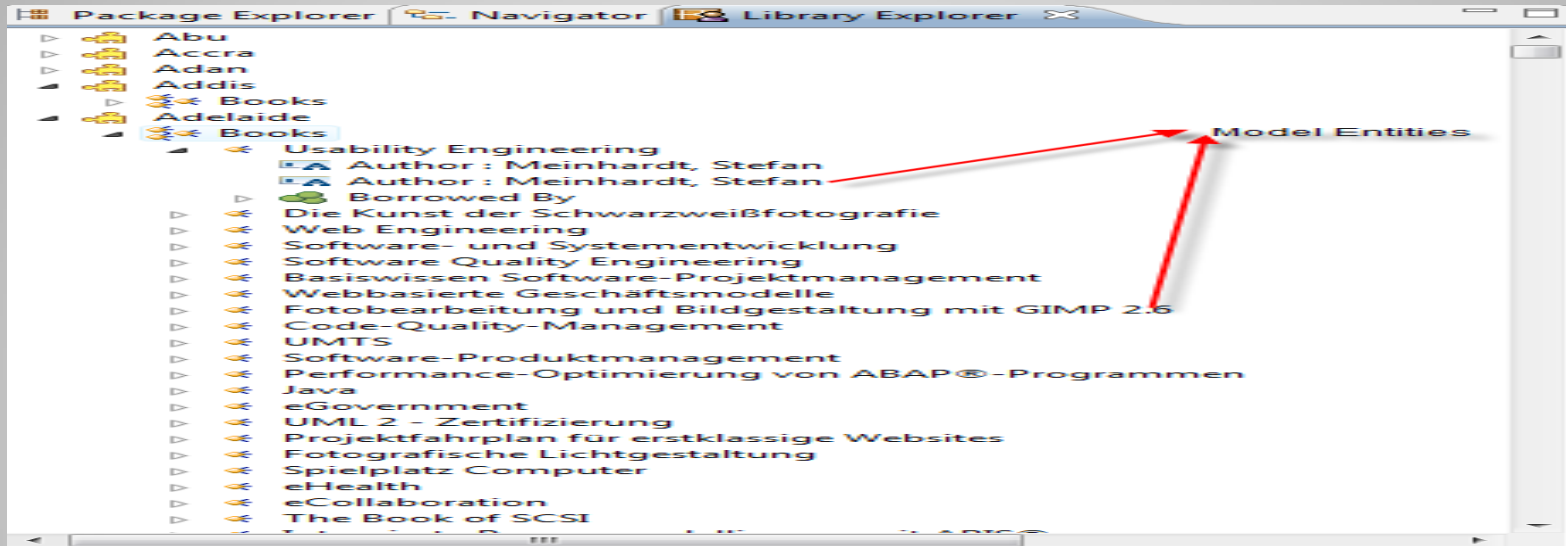
- Refactoring of model elements requires references to be updated.
- Using query2 reference searches can be performed which in turn loads minimal resources and hence fast refactoring can be achieved.

Development tooling and scenarios achieved through Query2- Refactoring



Refactoring of EMF Models using Query2

- Models can be viewed without actually loading the model elements.
- A model explorer was implemented to prove the scenario.



Query2- View Models

```
@Test
public void testLibrary(){
    final ResourceSet rs = new ResourceSetImpl();

    FromType fromRelationship = new FromType("lib",
        EcoreUtil.getURI(LibraryPackage.eINSTANCE.getLibrary()), false);
    FromEntry[] fromEntries = new FromEntry[] { fromRelationship };

    SelectAlias selectMe = new SelectAlias("lib");
    SelectEntry[] selectEntries = new SelectEntry[] { selectMe };

    Query query = new Query(selectEntries, fromEntries);

    ResultSet execute =
        QueryProcessorFactory.getDefault().createQueryProcessor(getDefaultIndexStore())
        .execute(query, getQueryContext(rs));
}
```

AST Based Query Syntax example

- Implementing Query2 Execution in Databases.
- Integration of CDO with Query2.
https://bugs.eclipse.org/bugs/show_bug.cgi?id=329723
- Indexing enhancements like Pluggable Index builder, Indexing APIs.
- Query2 developer utilities like Index View which helps to inspect the indexed resources.

Planned new features

- Update site link

<https://hudson.eclipse.org/hudson/job/tycho-query2-nightly/lastSuccessfulBuild/artifact/targetPlatform/>

- Query2 wiki home

http://wiki.eclipse.org/EMF_Query2Home

- Query2 developer guide

http://wiki.eclipse.org/EMF_Query2Home/EMF_Query2DevGuide

For any questions, suggestions and feedback on Query please mail to saurav.sarkar@sap.com

Useful links and feedback