

# A Framework for Model Recommenders

Requirements, Architecture and Tool Support

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# If You Take One Thing ...

```

classDiagram
    class CPU
    class Storage
    class Computer
    class Person
    class Party
    class Cocktail
    class Ingredient
    class Machine
    class Platform

    CPU "1" -- "*" Storage : cpus
    CPU "1" -- "*" Storage : storages..*
    Computer <|-- Person
    Computer <|-- Party
    Computer <|-- Machine
    Person --> Party : 0..* guests
    Party --> Person : 0..1 host
    Party --> Party : 1 party
    Cocktail --> Cocktail : 2..* ingredients
    Cocktail --> Ingredient : 0..* ingredients
    Platform --> Computer : 0..* computers
    
```

## Computer System

Description of the purpose of this model...

★★★★★ (306 customer reviews) | Like (362)

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**In Stock**

Ships from and sold by Amazon.com. Gift-wrap available.

**Want it delivered Friday, September 7?** Order it in the next 11 hours and 10 minutes, and choose **One Day Shipping** at checkout. [Details](#)

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### Cocktail

Cocktail  
Cockroach  
Cockapoo

Type: model

Page 1 of 20

**Customers Who Bought This Item Also Bought**

- NumberCrunsher
- SuperCrunsher
- MacCa Models Recommendations: 3

Quantity: 1

**Buy New**

Yes, I want **FREE Two-Day Shipping** with Amazon Prime

**Add to Cart**

or

[Sign in](#) to turn on 1-Click ordering.

**Add to Wish List**



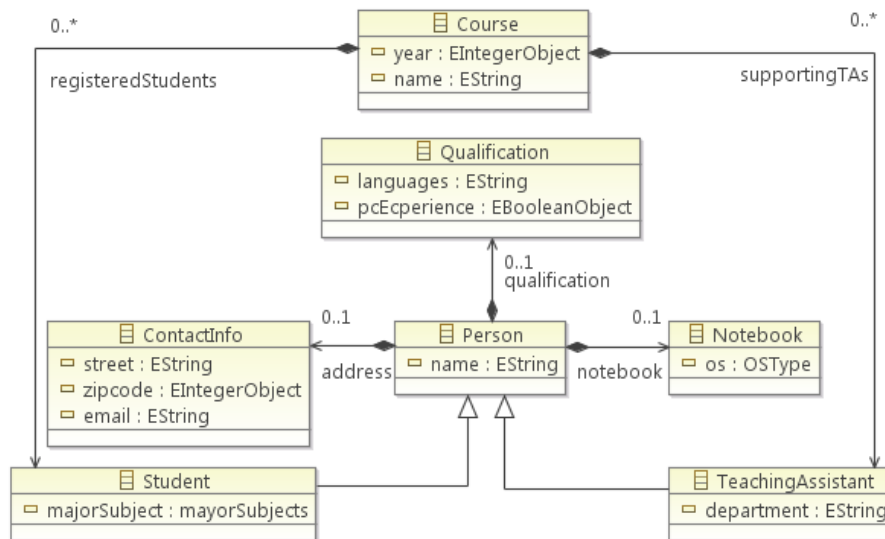
## Why should I care ...?

# Setting the Scene

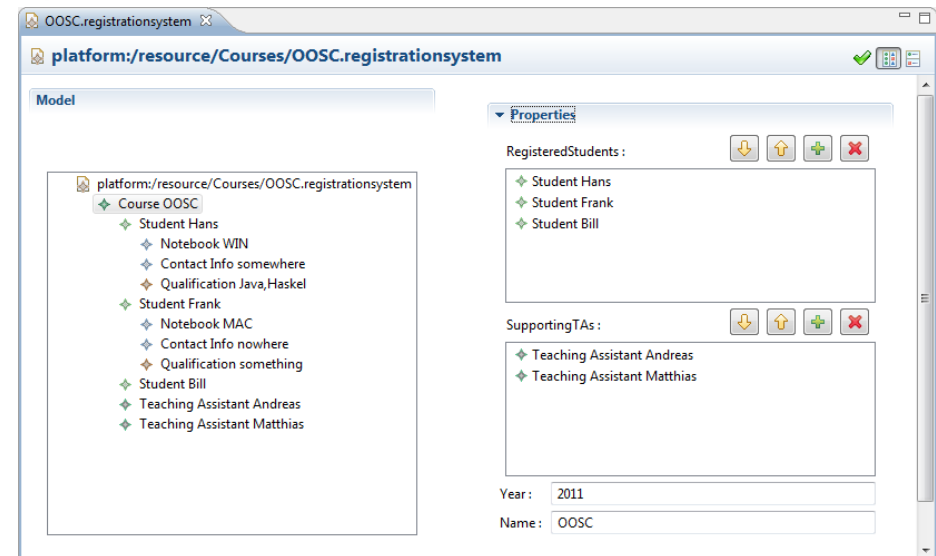
A lecture registration system (EMF/EEF)



## Domain Model



## Generated Editor (EEF)



How could we aid this ...?

## Setting the Scene

“On Designing Recommenders”

There are a lot of (EMF) editors ...

SOFTWARE CONSTRUCTION **SWC**  
dyck@swc.rwth-aachen.de

Various “contexts”

Conclusion

SOFTWARE CONSTRUCTION **SWC**  
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This is just the beginning ...

SOFTWARE CONSTRUCTION **SWC**  
dyck@swc.rwth-aachen.de

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... let's sum up!

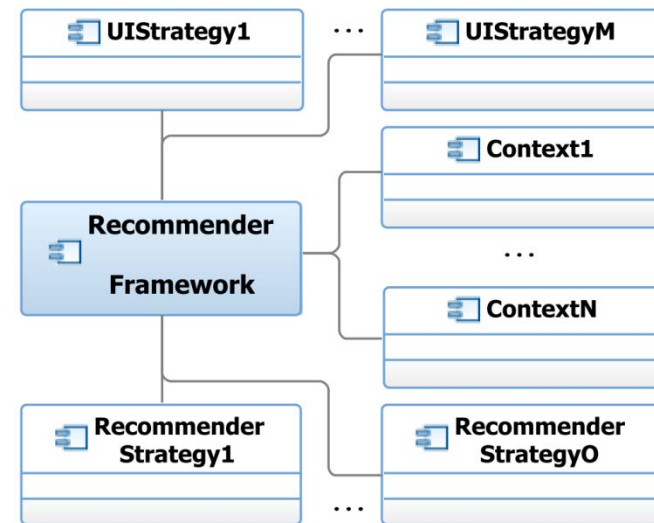


What are the Requirements?

## Recommender Framework

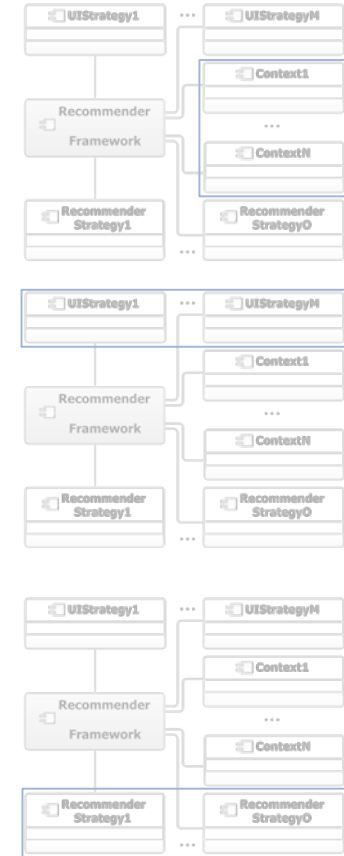
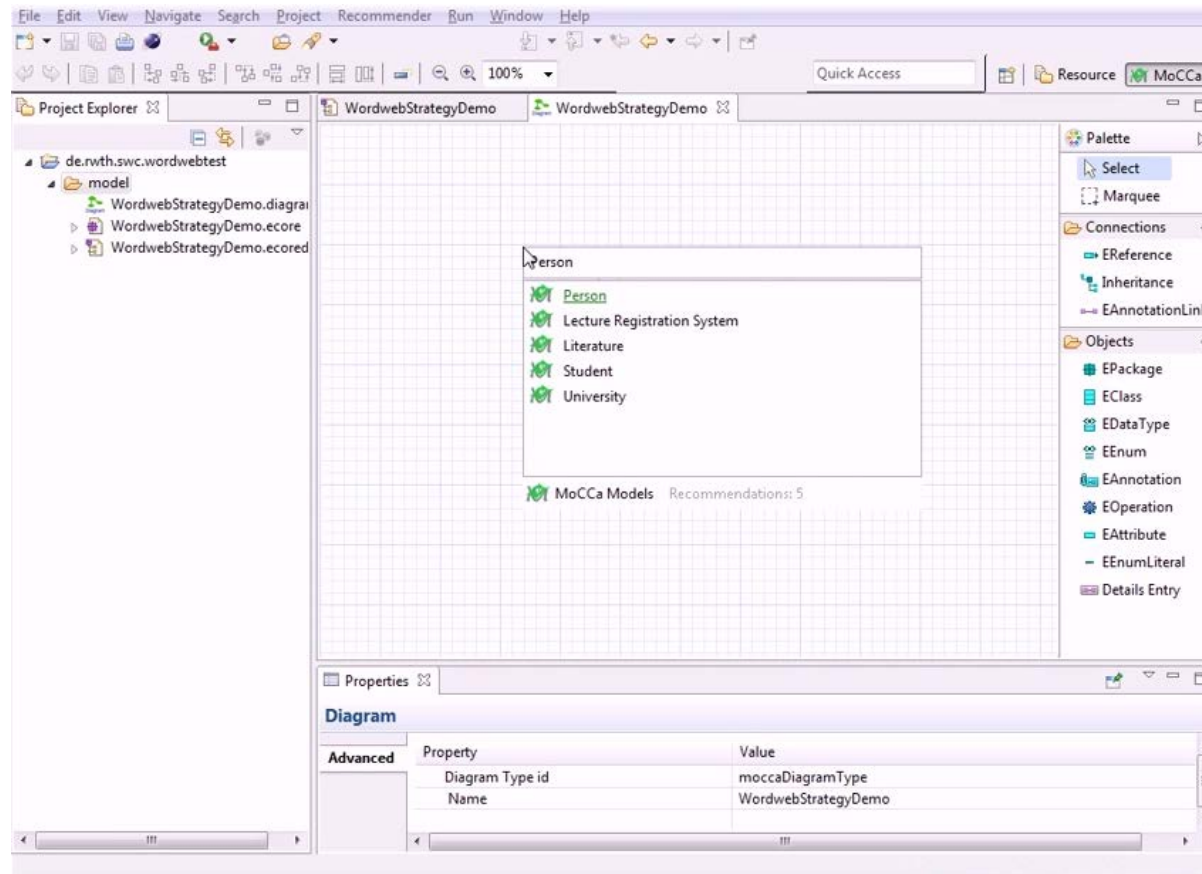
1. Multiple Data Sources
2. Multiple Recommender Algorithm
3. Multiple Editing Environments
4. Multiple User Interfaces
5. Non-Blocking User Interface
6. Decoupled Back-Ends
7. Easy to Use

## Proposed Solution



How about an Example ...?

## By Examples



What did the Recommender Strategy do?

## An Example

### WordWeb Online

Dictionary and Thesaurus:

**Noun: student** *st(y)oo-d(u)nt*

1. A learner who is enrolled in an educational institution  
- [pupil](#), [educatee](#)
2. A learned person (especially in the humanities); someone who by long study has gained mastery in one or more disciplines  
- [scholar](#), [scholarly person](#), [bookman](#)

**Derived forms:** [students](#)

**Type of:** [enrollee](#), [intellect](#), [intellectual](#)

**Part of:** [teacher-student relation](#)

**Encyclopedia:** [Student](#)

Copyright © WordWeb Software

Student

➔

**student**

- N [scholarly person](#)
- N [bookman](#)
- T [type of enrollee](#)
- T [type of intellect](#)
- T [type of intellectual](#)
- P [part of teacher-student relation](#)
- D [derived form: students](#)

➔

Intellect

⬆

Student

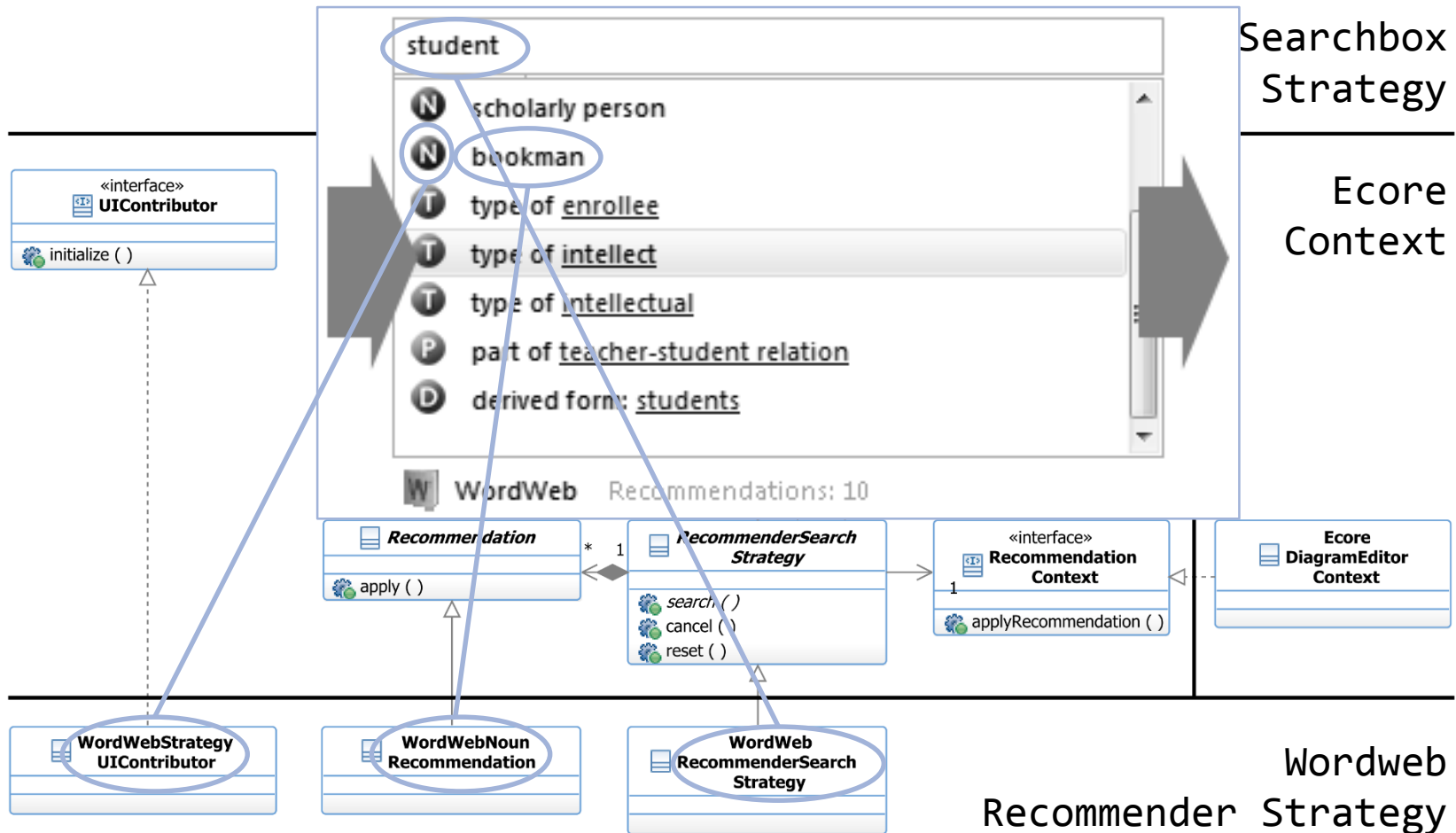
visitCourse()

WordWeb Recommendations: 10

Is it always that simple ...?

# Recommender Framework

Some more “static” details, if you like ...





# ... a Software Prototype

The screenshot displays the MoCCA Evolution software interface. The main window shows a UML class diagram for a "Lecture Registration System". The diagram includes classes such as Lecture, Lecturer, ResearchAssistant, Student, Natural Person, ContactInfo, and Capability, with their attributes and relationships. A "MoCCA Stage Monitor" panel on the right shows a circular diagram with three stages: "vague" (red), "productive" (green), and "elaborating" (yellow). Below this, there are sections for "Model Defects", "Model Smells", "Concerns", "Issues", and "Simple Reviews". At the bottom, there is a "MoCCA Graph UI Search" section with a search input field and radio buttons for "infix", "whole words", "Lucene", and "First Exact Then Infix Search".

Is that all ...?

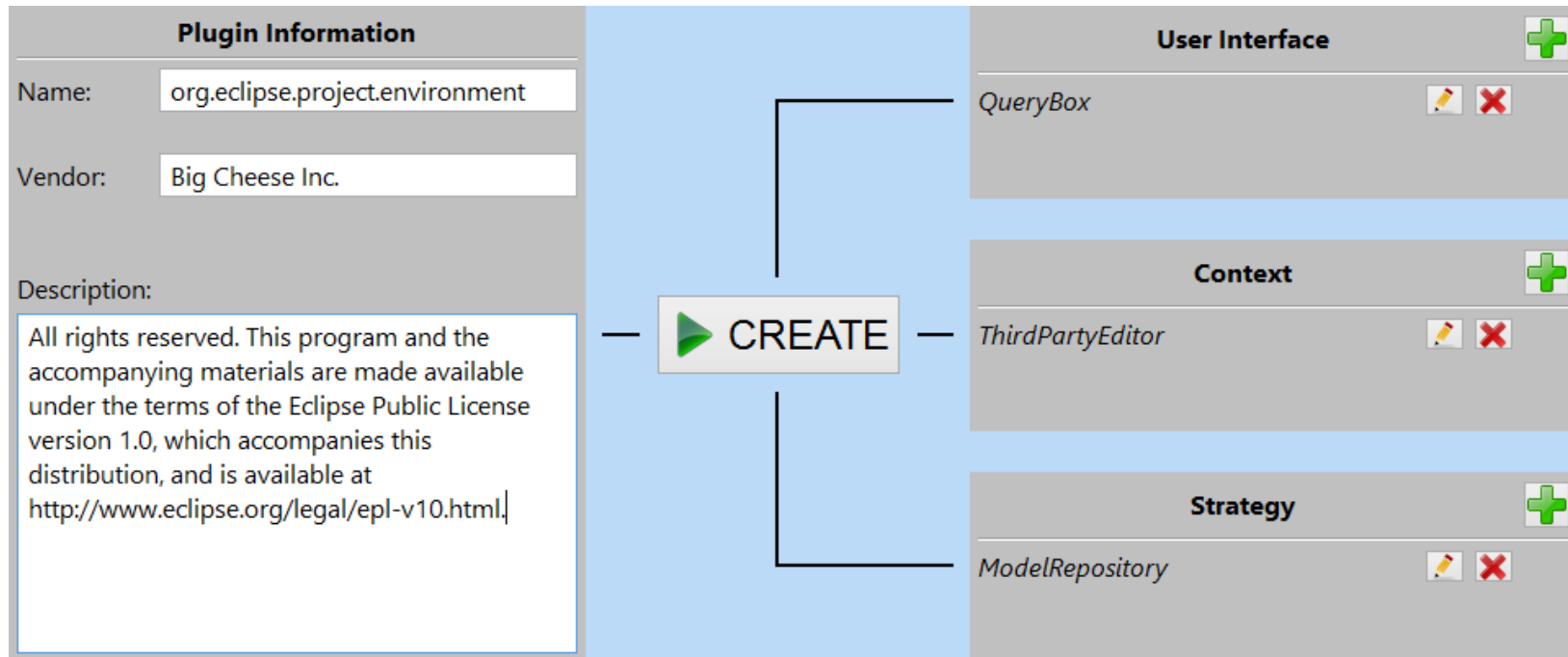
## Simulation Environment

```

hermes.product [Eclipse Application] C:\Program Files\Java\jre7\bin\javaw.exe (06.01.2014 18:41:06)
[recommender] Job Hermes MRF RecommenderSearch Job (WordWeb) reset.
[recommender] Scheduled job Hermes MRF RecommenderSearch Job (WordWeb).
[recommender] Running job Hermes MRF RecommenderSearch Job (WordWeb).
[recommender] Job Hermes MRF RecommenderSearch Job (WordWeb) was canceled.
[recommender] Job Hermes MRF RecommenderSearch Job (WordWeb) reset.
[recommender] Scheduled job Hermes MRF RecommenderSearch Job (WordWeb).
[recommender] Running job Hermes MRF RecommenderSearch Job (WordWeb).
[recommender] Job Hermes MRF RecommenderSearch Job (WordWeb) was successful.
    
```

Date	Level	Thread
2014-01-06 18:46:37,939	INFO	Worker-2
2014-01-06 18:46:39,099	INFO	Worker-2
2014-01-06 18:46:39,099	INFO	Worker-2
2014-01-06 18:46:39,101	INFO	Worker-2
2014-01-06 18:46:39,251	INFO	Worker-6
2014-01-06 18:46:39,736	INFO	Worker-6

A Dashboard to Ease the Pain ...



# Some References



What else is going on ...?

## The HERMES Project

# HERMES

HARVEST

EVOLVE

REUSE



MODELS EASILY AND SEAMLESSLY

## References

A. Ganser, H. Lichter, Engineering Model Recommender Foundations – From Class Completion to Model Recommendations, (Modelsward 2013, Spain)

A. Ganser, T. N. Viet, H. Lichter, Multi Back-Ends for a Model Library Abstraction Layer, (ICCSA 2013, Vietnam)

A. Roth, A. Ganser, H. Lichter, B. Rumpe Staged Evolution with Quality Gates for Model Libraries, (DChanges 2013, Italy)

A. Ganser, H. Lichter, A. Roth, B. Rumpe, Proactive Quality Guidance for Model Evolution in Model Libraries, (MoDELS ME 2013, US)

A. Dyck, A. Ganser, H. Lichter, Model Recommenders for Command-Enabled Editors, (MoDELS MDEBE 2013, US)

A. Dyck, A. Ganser, H. Lichter, On Designing Recommenders for Graphical Domain Modeling Environments, (Modelsward 2014, Portugal)

*and more to come on*

Harvesting Models and Related Algorithm

Context Management and Related Datastructures

Recommendation Strategies and Related Algorithm

