Clafer
Lightweight Modeling Language

Designed with usability in mind
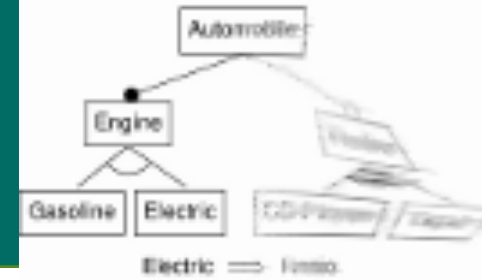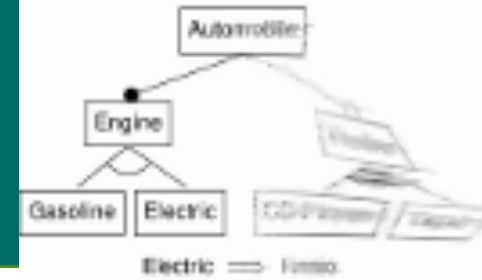
Presenter: Athanasios Koutoulas

Model Driven Engineering Academic Year 2013 - 2014
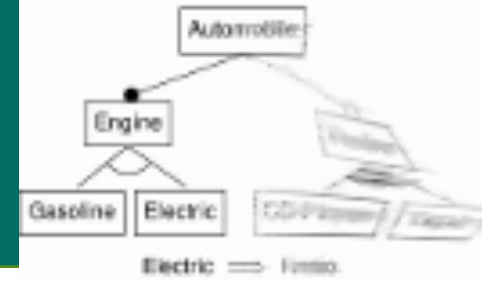
WHAT IS CLAFER

- <u>cla</u>ss, <u>fe</u>ature, <u>r</u>eference

- Textual language for concept modeling

- Uniform syntax and semantics to class and feature models

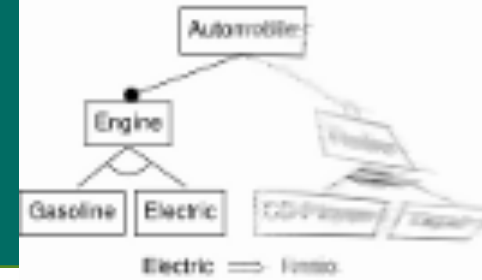- Lightweight modeling language

CLASS AND FEATURE MODELING

- **Class modeling with first-class support for feature modeling**

- **Notation for class modeling**

- **Notation for feature modeling**

- **Mixing feature and class models**

- **Syntactically and semantically unified concepts**

WHAT CAN WE DO WITH CLAFER
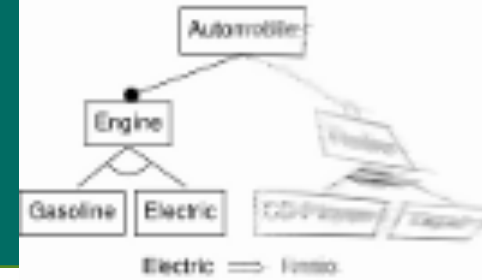
- Domain and structural modeling

- Model verification and validation

- Model completion

- Debugging

- Clafers (abstract, concrete) and constraints

- Hierarchy/Nesting

- Cardinalities

- Group Cardinalities

- Inheritance

- Reference

```
abstract Vehicle
    serialNo : int

Automobile : Vehicle
    xor Engine
            Gasoline
            Electric
    or Radio ?
            CDPlayer
            Tape

[Electric ⟹ Radio]

numOfAutomobiles : int
[numOfAutomobiles = #Vehicle]
```
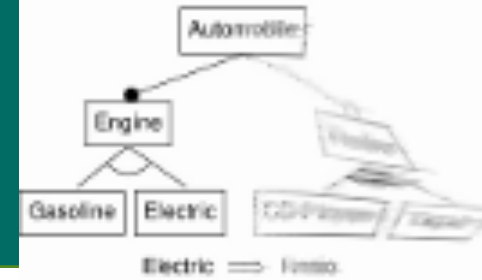
- indentation

- xor : exactly one of (1..1)

- or : at least one of (1..*)

- ?: 0..1

- [ ]: constraints

- => : implication

Clafer

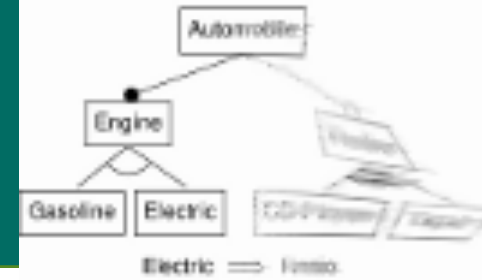# CLAFER-TO-ALLOY TRANSLATOR

- **Clafer model to Alloy model**

    - Performing semantic analysis

    - Establishing a mapping to Alloy

- **Lexer and Parser**

- **Layout Resolver**

- **Desugarer**

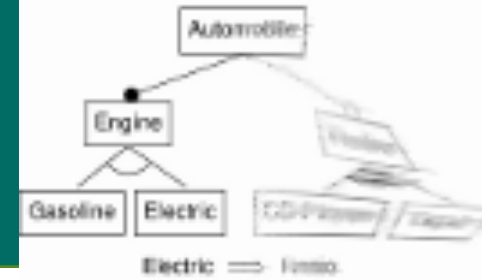- **Semantic Analyzer**

- **Code Generator**

CLAFER DESUGARER

```
abstract A                abstract 0..* c1_A : clafer 0..* {
    B : string                0..* c2_B : string 1..1 {    }
    C -> A ?                  0..* c3_C -> c1_A 0..1 {    }
    D *                       0..* c4_D : clafer 0..* {    }
    E +                       0..* c5_E : clafer 1..* {    }
    xor F                     1..1 c6_F : clafer 1..1 {
        G                         0..* c7_G : clafer 0..1 {    }
        H                         0..* c8_H : clafer 0..1 {    }
                              }
    or I ?                    1..* c9_I : clafer 0..1 {
        J                         0..* c10_J : clafer 0..1 {    }
                              }
```
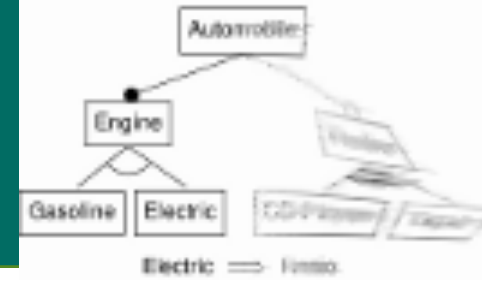
CLAFER TOOL

- Clafer compiler/translator

- Clafer Instance Generator

- Configurator

- Multi-objective optimizer

- MOO visualizer and explorer

- Wiki

PROJECT PROPOSAL

- Model the different variants of mortgage loans offered by the ING bank by using Clafer

- Check the consistency of the models and the correctness of instances by using the Alloy Analyzer

Thank you for your attention!

Questions?