Designing user interface for FTSyn

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Problem Statement

- Designing a user interface for Automatic Addition of fault tolerance.

- Fault-Tolerance Synthesizer (FTSyn) which is a framework for adding fault tolerance to parallel/distributed programs.

- Develop a GUI tool for FTSyn that generates FTSyn input file from UML diagram file.

FTSyn

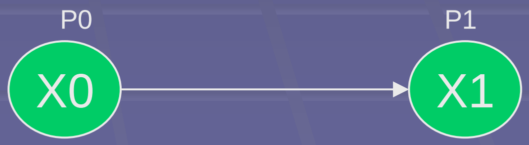
- Developed to allow users to automatically add fault-tolerance.
- The input consist of:
  - Fault-intolerant program
  - Invariant
  - Safety specification
  - Initial state
  - Class of faults

FTSync

- Dijkstra's guarded commands are used for input fault-intolerant program.
  - *g* → *st*
  - *g*: state predicate *st*: statement

- Example:

```
process  P1
begin
        (X0 != 0) ⟶ (X1= X0 % 2);
read  X0, X1;
write  X1;
end
```



FTSync

- Faults are modeled as a set of guarded commands.

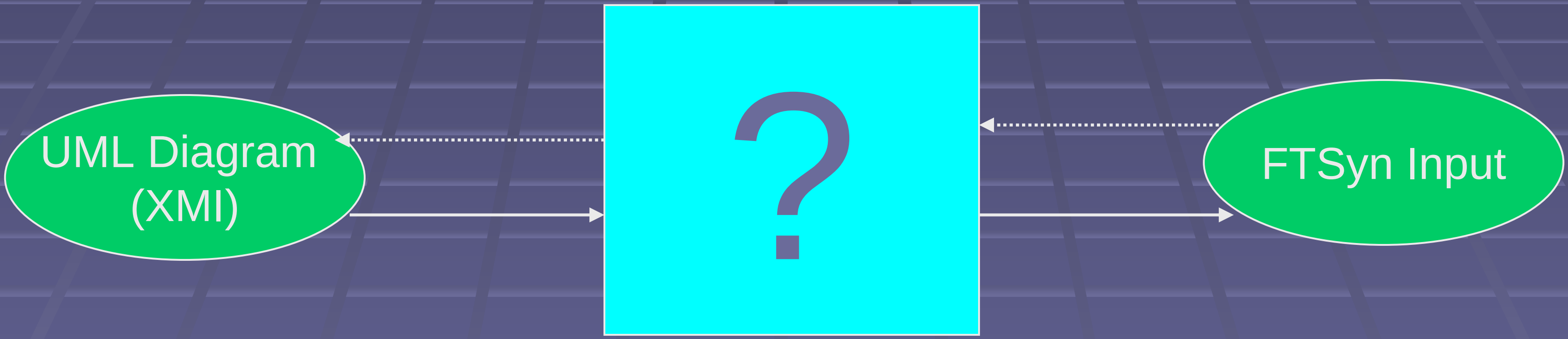
```
fault  process_corruption
begin
        (X1 > 10) ⟶ (X1 = -1)
end
```

- Safety-specifications and invariant are represented as boolean expression.

- Initial states:

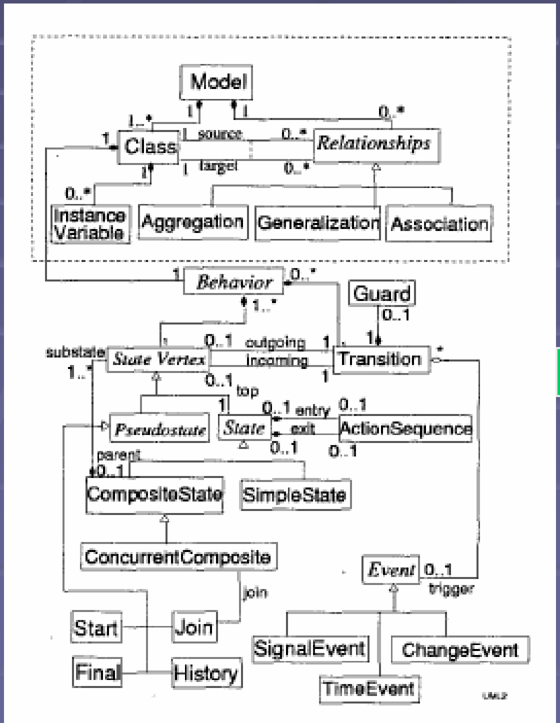
```
init
state X0=1, X1=1;
state X0=2, X1=1;
```

Goal



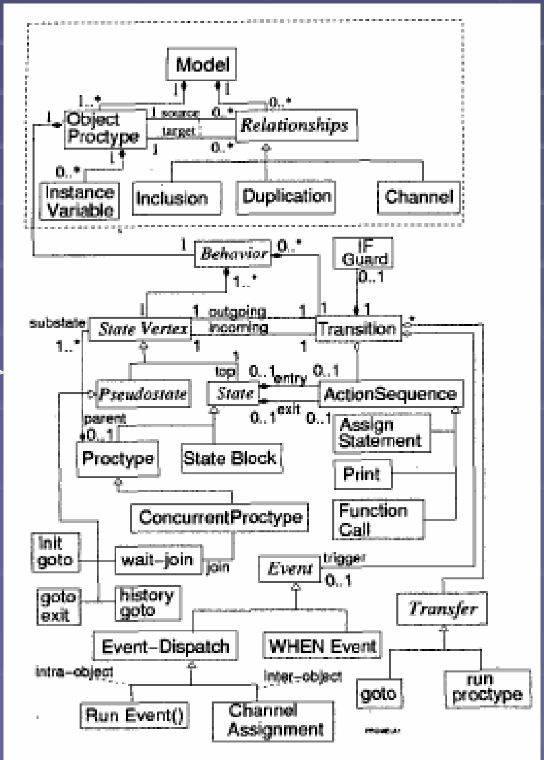
Mapping

- *General Framework for Fromalizing UML with Formal Languages* (Authors: William Mcumber and H.C. Cheng)



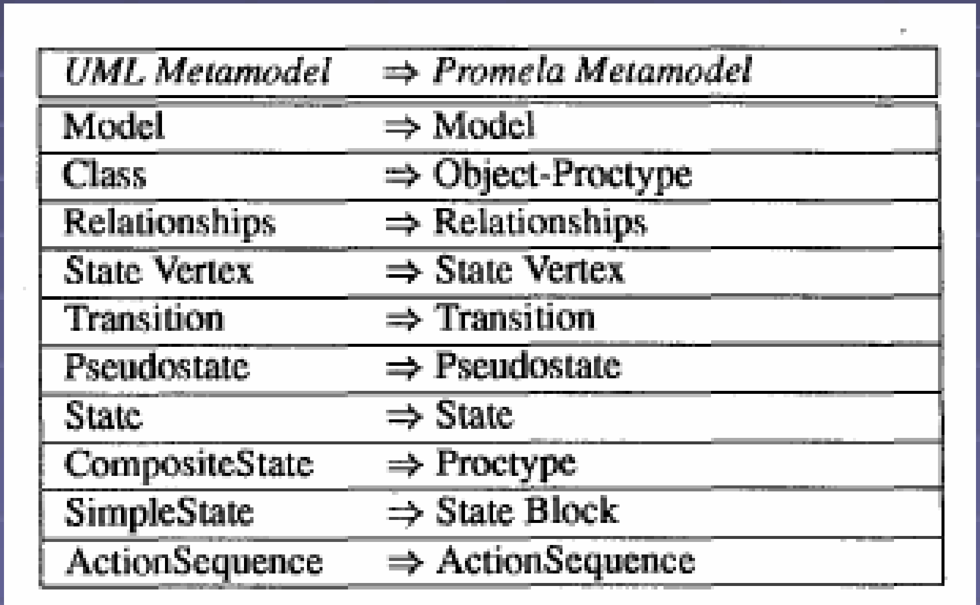
UML Metamodel

Homorphic Mapping



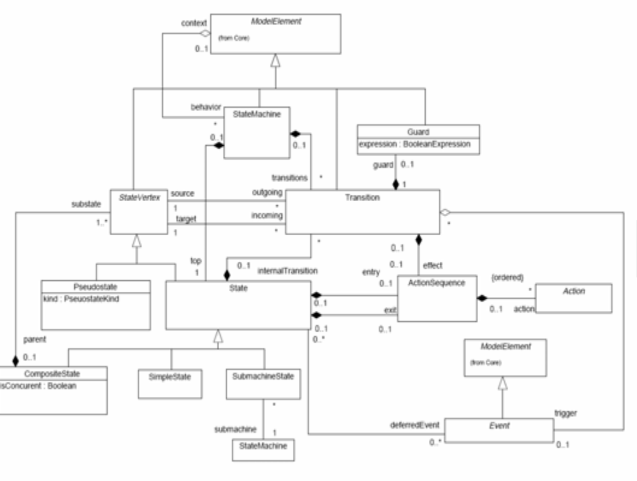
SPIN/Promela Metamodel

Mapping



UML Metamodel	⇒	*Promela Metamodel*
Model	⇒	Model
Class	⇒	Object-Proctype
Relationships	⇒	Relationships
State Vertex	⇒	State Vertex
Transition	⇒	Transition
Pseudostate	⇒	Pseudostate
State	⇒	State
CompositeState	⇒	Proctype
SimpleState	⇒	State Block
ActionSequence	⇒	ActionSequence

Mapping



UML Metamodel

Homorphic Mapping

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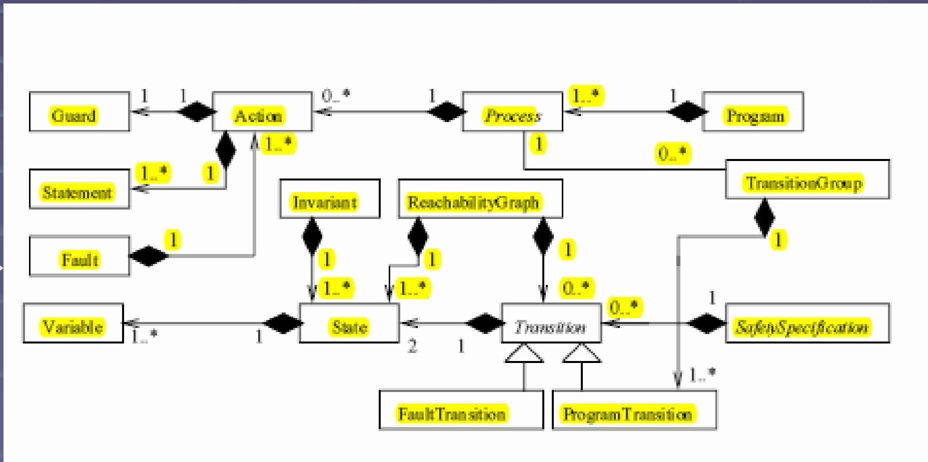
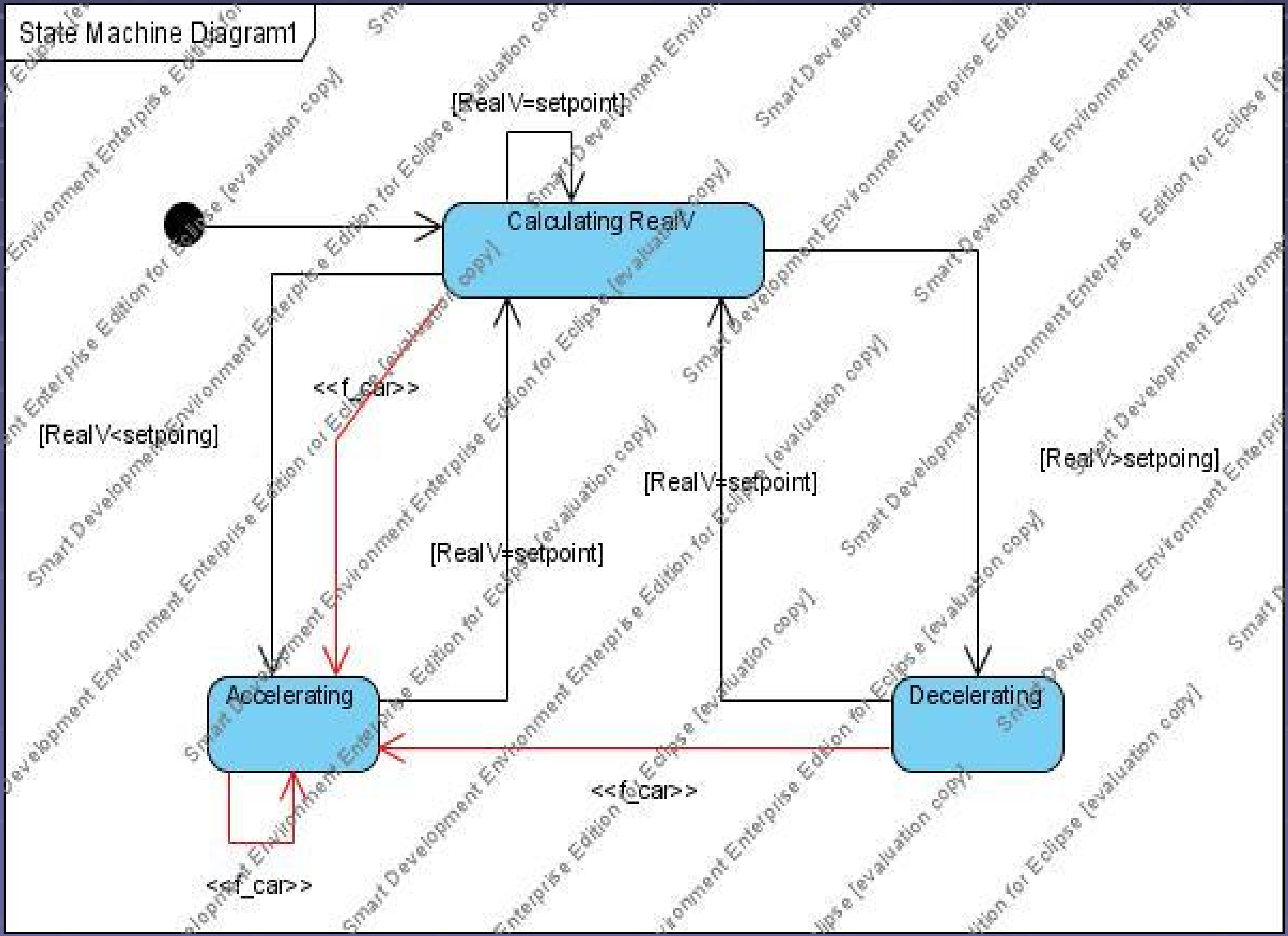
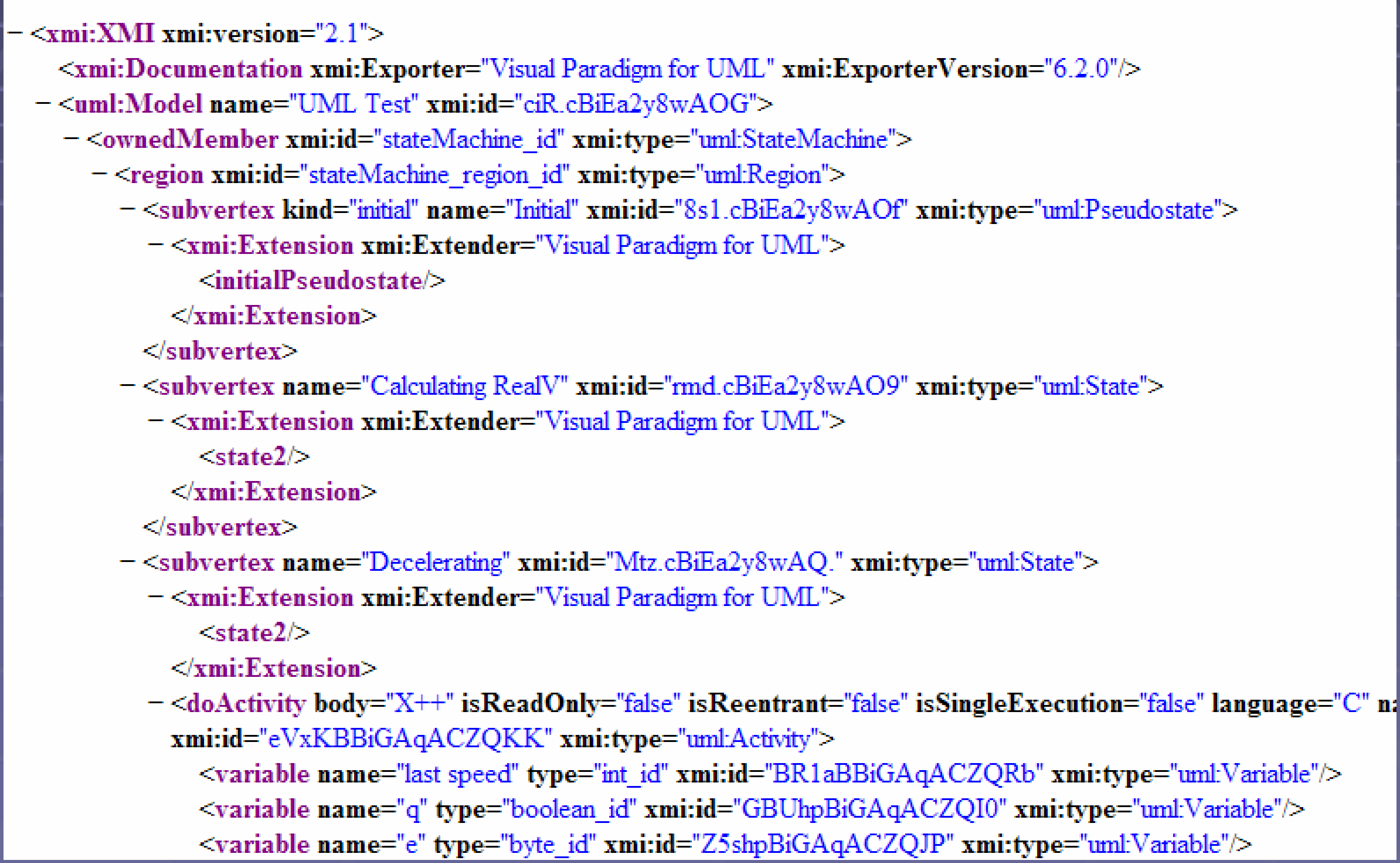


FTSyn Metamodel

Implementation



Implementation



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```

Thank You!