Object Oriented and Net Based Modeling of Business Processes

Angela Mölders, Rainer Burkhardt
OWiS Software GmbH, Ilmenau, Germany

Martin Wolf, Wolfgang Fengler
Thorsten Hummel
Technical University of Ilmenau, Germany
Topics

1. Introduction
2. UML as standard for OO Modeling
3. The Object Process Net
4. Creating a business process model
5. Tool support
6. Summary and further works
Motivation

Strategic business objectives

Impulses for research

Computerscience

Cognitions of the organisation science

Abstraction methods

Lack of understanding

Preparation of Tools

Economic Science

Cognitions of the organisation science

Abstraction methods

Lack of understanding

Preparation of Tools
Unified Modeling Language

- Unification and development of several modeling methods (Booch, Rumbaugh and Jacobson)
- Language for visualization, specification, construction and documentation
- Family of diagrams with common graphical notation
- Diagrams represent different views to the model
- Given elements can be adapted by stereotypes
- Accepted as standard by the OMG

- Software engineering process is missing
- Static aspects are preferred
- Few simulation possibilities
Use Case Diagram

Use Case

Delivery of furniture

Supplier

Interaction

Actor

Customer
Class Structure Diagram

Static and structural aspects of a system
Activity Diagrams

- Models dynamic behaviour
- Special kind of state chart
- Parallelisms and splits can be represented
- Basic structures of business processes defined by can be captured
Petri Net Based Method for OO Modeling of Processes

Object oriented Paradigma

Object - Process - Net

Petri Net Theory

- Inheritance
- Re-Use
- Polymorphism

Description of the dynamic aspects of a system

- Simulation
- Formalism
- Verification
Object Process Net

Abstract object (class)

Process method of the related class

Class

<Instances>
<Attribut2>
<Attribut3>
...

Precondition

Postcondition

Class

TimeAttr

Process

Prio

directed arcs

conditions related to the attributes of the object
Refinement of a Process (Example)

Order this <State>
- State != registered && State != dated
  - Order Archive
  - State += archived
  - State += dated

Order Release
- State != dated
- State == dated
  - Order DetermineDate
  - State += scheduled

Order Schedule
- (DateMeetable || DateChanged == yes) && (ResponseCostumer == positiv || DateMeetable)
  - Order AdaptDate

Refinement of process DetermineDate
Creating a Business Process Model

- Use Case Diagram
  - Use Case Typ 1
  - Use Case Typ 2

- Activity Diagram
  - Activity A
  - Activity B
  - Activity C

- Class Structure Diagram
  - Classname
  - Template
  - Objectname
  - Classname

- Object Process Net
  - ClassX
  - ProcessX
  - <inst>, <attr1>, <attr2>
Verification

Modelling Rules

Activity Diagram

Transformation

Place/Transition Net

Inference

Reduction (INA)

Reduced Place/Transition Net
Tool support - OTW®2

- Verification (INA)
- Diagrams of Static View
- Diagrams of Dynamic View
- Diagrams of Architectural View
- Documentation
- Generation Import/Export
- Conversion, Reuse, Reengineering
- Model Checking Tools
- Configuration Management
- Requirements
- Petri Net Tools (Pnecca Chromos)
- Model Information Database / Repository
Modelchecking

- **Evaluation of diagrams**
  Evaluation of diagram clarity using a set of fuzzy rules.

- **Static check of consistency**
  Checking of
  - the consistency of the different diagrams
  - validity of object oriented relations
  - adjustment with other kinds of representation

- **Active modelchecking**
  Simulation of the OPN

- **Passive modelchecking**
  Checking the consistency of the model and the generated application code during the execution of it
Summary and Further Work

- UML as standard for object oriented modeling in an incremental way

- OPN as add-on for dynamic aspects:
  - Description
  - Simulation
  - Verification

- Automatic transformation of OPN into HLPN

- Examinations about reduction rules for activity diagrams