Modeling-Notation Source: AOR

Version 03-03-01 15:30EST
Document author- James Odell

1 Introduction

In [Wagner 2002], an agent-oriented modeling language was proposed for the analysis and design of organizational information systems, called Agent-Object-Relationship modeling language (AORML) . In the AORML, an entity is either an agent, an event, an action, a claim, a commitment, or an ordinary object. Special relationships between agents and events, actions, claims and commitments supplement the fundamental association, generalization and aggregation relationships of UML class models. AORML can be viewed as an extension of the Unified Modeling Language (UML). They author believes that AORML, by virtue of its agent-oriented categorization of different classes, allows more adequate models of organizations and organizational information systems than plain UML.

In [Wagner 2003], Gerd Wagner presents a UML profile for an agent-oriented modeling approach called an Agent-Object-Relationship (AOR). [Wagner, 1999]. Casting the AOR metamodel as a UML profile allows AOR models to be notated using standard UML notation.

2 Notation Overview

There are two basic types of AOR models: external and internal ones. The external AOR model adopts the perspective of an external observer who is observing one or more (prototypical) agents and their interactions in the problem domain under consideration. The internal models the way in which an individual agent views its world.

2.1 Core external AOR elements

In the external-observer-view adopted in external AOR models, the world (i.e. the application domain) consists of various types of modeling elements, as depicted in Fig 1(a). In the view of an external observer, actions are also events, and commitments are also claims, exactly like two sides of the same coin. Therefore, an external AOR model contains, besides the agent and object types of interest, the action event classes and commitment/claim classes that are needed to describe the interaction between the focus agent(s) and the other types of agents.

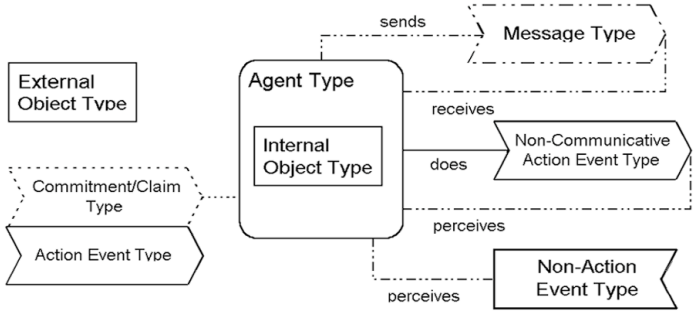

Figure 1: Core external elements of AOR modeling.

Object types, in an external AOR model, belong to one or several agents (or agent types). They define containers for beliefs. If an object class belongs exclusively to one agent or agent class (in the sense of a private belief type), the corresponding rectangle is drawn inside this agent (type) rectangle. If an object class represents beliefs that are shared among two or more agents (or agent types), the object class rectangle is drawn outside the respective agent (type) rectangles.

An external AOR model does not include any software artifacts. It rather represents a conceptual analysis view of the problem domain and may also contain elements that are merely descriptive and not executable by a computer program (as required for enterprise modeling).

2.2 External AOR diagram types

An external AOR model may comprise one or more of the following diagrams:

- **Agent Diagrams** depicting the agent types of the domain, certain relevant object types, and their relationships (Fig. 2(a)).
- **Interaction Frame Diagrams** depicting the action event classes and commitment/claim classes that determine the possible interactions between two agent types (or instances) (Fig. 2).
- **Interaction Sequence Diagrams** depicting proto-typical instances of interaction processes (Fig. 3).
- **Interaction Pattern Diagrams** focusing on general interaction patterns expressed by means of a set of reaction rules defining an interaction process type (Fig. 4). (See Fig. 5 for rule modeling.)

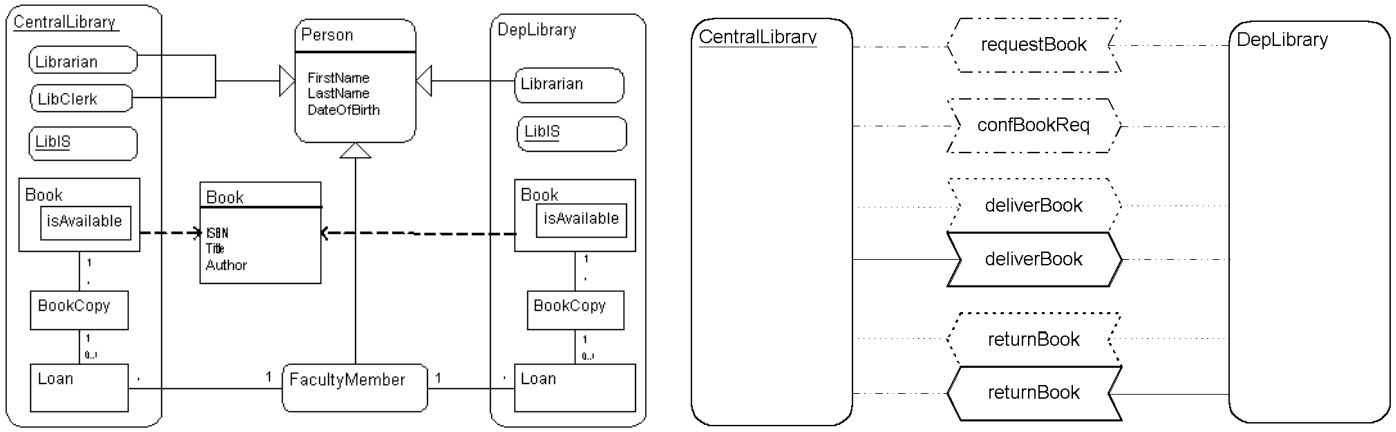

Figure 2: Examples of the AOR Agent Diagram and the AOR Interaction Frame Diagram.

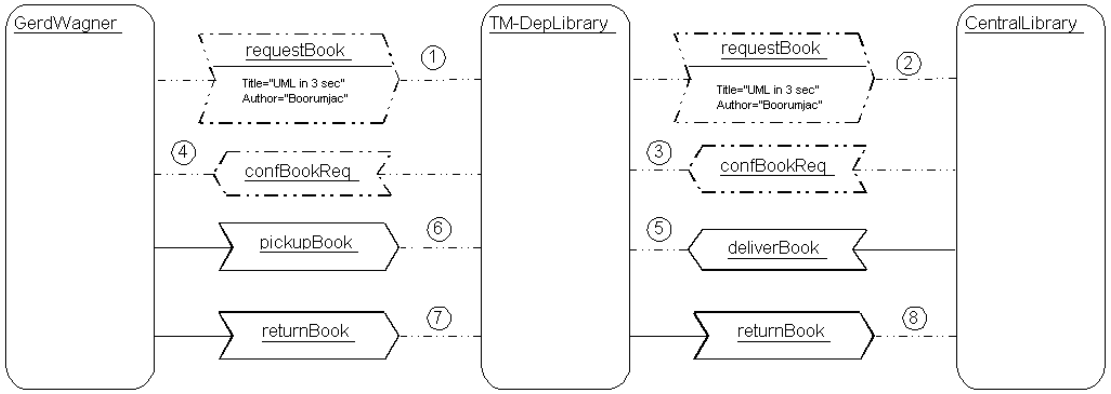

Figure 3: Example of an AOR Interaction Sequence Diagram

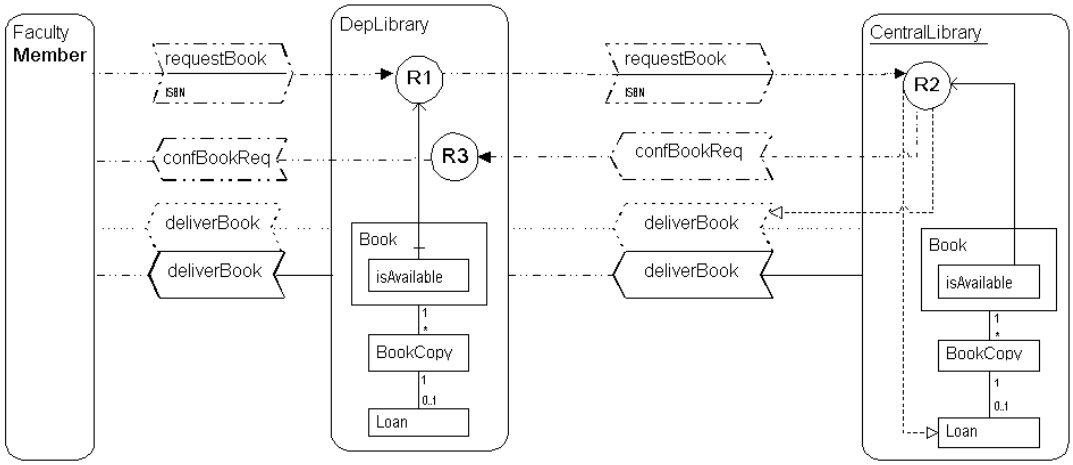

Figure 4: Example of an AOR Interaction Pattern Diagram

2.3 Advanced constructs

The actions depicted as circles in Fig. 4 can be elaborated further, as depicted in Fig. 5.

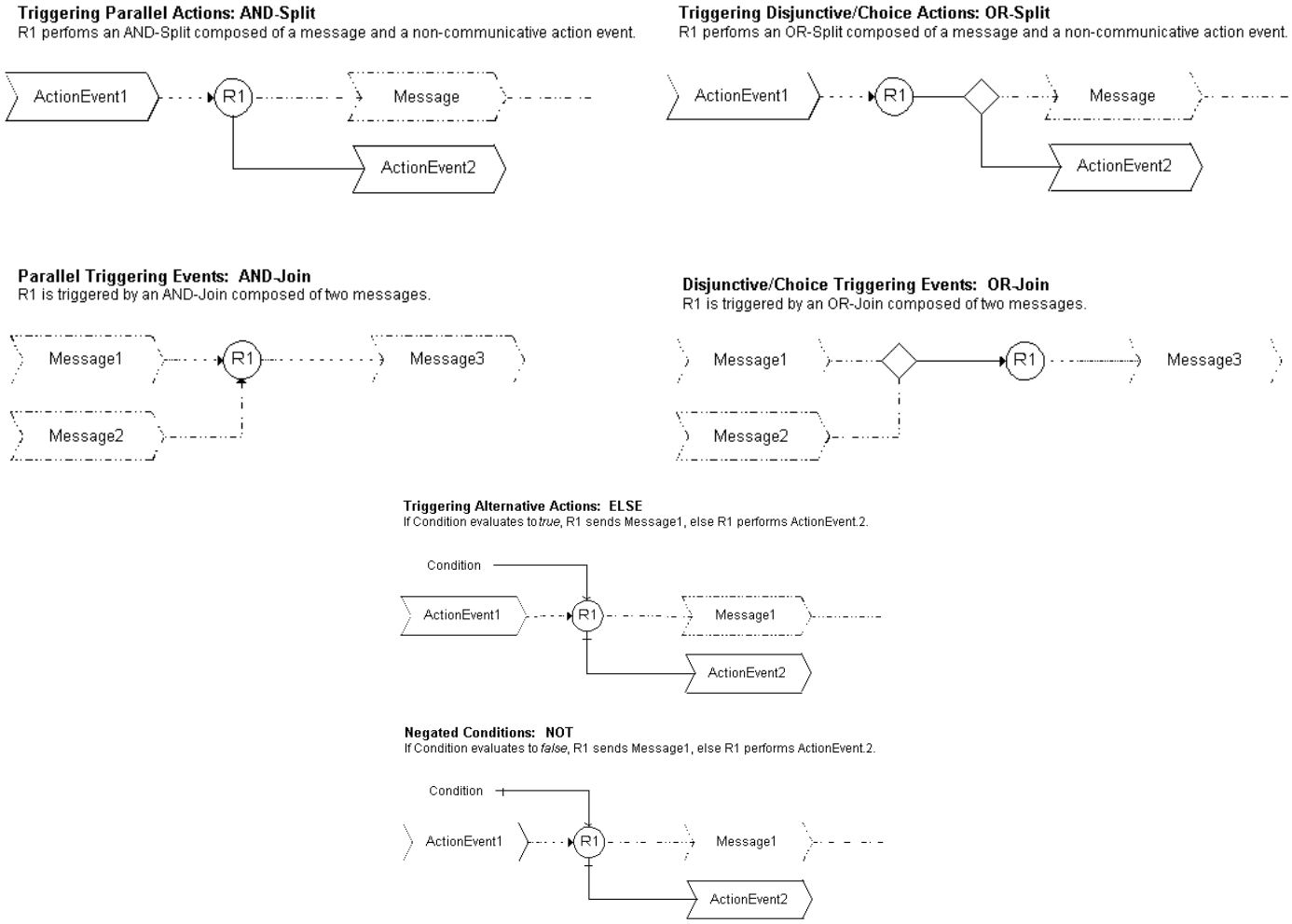

Figure 5: Examples of composite components and Petri net together

3 References

[Wagner 2002] Wagner, G., *The Agent-Object-Relationship Metamodel: Towards a Unified View of State and Behavior*. May 2002, Technical Report, Eindhoven Univ. of Technology, Fac. of Technology Management. Available from http://AOR.rezearch.info. To appear in *Information Systems.*

[Wagner 2003] Wagner, G., "A UML Profile for External AOR Models," in *A UML Profile for External AOR Models*, F. Giunchiglia, J. Odell, and G. Weiss, Eds. 2003, Springer-Verlag, Berlin. Available at http://www.auml.org/auml/working/Wagner-aose02-47.pdf.