UNIFIED
MODELING
LANGUAGE

UML Extension for Business Modeling

version 1.1
1 September 1997

Rational Software ■ Microsoft ■ Hewlett-Packard ■ Oracle
Sterling Software ■ MCI Systemhouse ■ Unisys ■ ICON Computing
IntelliCorp ■ i-Logix ■ IBM ■ ObjecTime ■ Platinum Technology ■ Ptech
Taskon ■ Reich Technologies ■ Softeam

ad97-08-07

Contents

1. INTRODUCTION

This document defines the *UML Extension for the Business Modeling*, defined in terms of the UML's extension mechanisms, namely Stereotypes, TaggedValues, and Constraints.

See the *UML Semantics* document for a full description of the UML extension mechanisms.

This section describes stereotypes that can be used to tailor the use of UML for business modeling. All of the UML concepts can be used for business modeling, but providing business stereotypes for some common situations provides a common terminology for this domain. Note that UML can be used to model different kinds of systems: software systems, hardware systems, and real-world organizations. Business modeling models real-world organizations.

This document is not meant to be a complete definition of business modeling concepts and how to apply them, but it serves the purpose of registering this extension, including its icons.

2. SUMMARY OF EXTENSION

2.1 STEREOTYPES

Metamodel Class	Stereotype Name
Model	use case model
Package	use case system
Package	use case package
Model	object model
Subsystem	object system
Subsystem	organization unit
Subsystem	work unit
Class	worker
Class	case worker
Class	internal worker
Class	entity
Collaboration	use case realization
Association	subscribes

2.2 TAGGEDVALUES

This extension does not currently introduce any new TaggedValues.

2.3 CONSTRAINTS

This extension does not currently introduce any new Constraints, other than those associated with the well-formedness semantics of the stereotypes introduced.

2.4 PREREQUISITE EXTENSIONS

This extension requires no other extensions to the UML for its definition.

3. STEREOTYPES AND NOTATION

3.1 MODEL, PACKAGE, AND SUBSYSTEM STEREOTYPES

A business system comprises several different but related models. The models are characterized by being exterior or interior to the business system they represent. Exterior models are use case models and interior models are object models. A large business system may be partitioned into subordinate business systems. The following are the model stereotypes:

3.1.1 Use Case

A *Use Case Model* is a model that describes the business processes of a business and their interactions with extenal parties like customers and partners.

A use case model describes:

- the businesses modeled as use cases.
- parties exterior to the business (e.g. customers and other businesses) modeled as actors..
- the relationships between the external parties and the business processes.

A *Use Case System* is the top-level package in a use case model. A use case system contains use case packages, use cases, actors, and relationships.

A *Use Case Package* is a package containing use cases and actors with relationships. A use case is not partitioned over several use case packages.

3.1.2 Object

An *Object Model* is a model in which the top-level package is an object system. These models describe the things interior to the business system itself.

An *Object System* is the top-level subsystem in an object model. An object system contains organization units, classes (workers, work units, and entities), and relationships.

3.1.3 Organization Unit

Organization Unit is a subsystem corresponding to an organization unit of the actual business. An organization unit subsystem contains organization units, work units, classes (workers and entities), and relationships.

3.1.4 Work Unit

A *Work Unit* is a subsystem that contains one or more entities.

A work unit is a task-oriented set of objeccts that form a recognizable whole to the end user. It may have a facade defining the view of the work units's entities relevant to the task.

3.1.5 Notation

Package stereotypes are indicated with stereotype keywords in guillemets («stereotype name»). There are no special stereotyped icons for packages.

3.2 CLASS STEREOTYPES

Business objects come in the following kinds:

- actor (defined in the UML)
- worker
  - case worker
  - internal worker
- entity

3.2.1 Worker

A *Worker* is a class that represents an abstraction of a human that acts within the system. A worker interacts with other workers and manipulates entities while participating in use case realizations.

3.2.2 Case Worker

A *Case worker* is a worker who interacts directly with actors outside the system.

3.2.3 Internal Worker

An *Internal worker* is a worker that interacts with other workers and entities inside the system.

3.2.4 Entity

An *Entity* is class that is passive; that is, it does not initiate interactions on its own. An entity object may participate in many different use case realizations and usually outlives any single interaction. In business modeling entities represent objects that workers access, inspect, manipulate, produce, and so on. Entity objects provide the basis for sharing among workers participating in different use case realizations.

3.2.5 Notation

Class stereotypes can be shown with keywords in guillemets within the normal class symbol. They can also be shown with the following special icons:
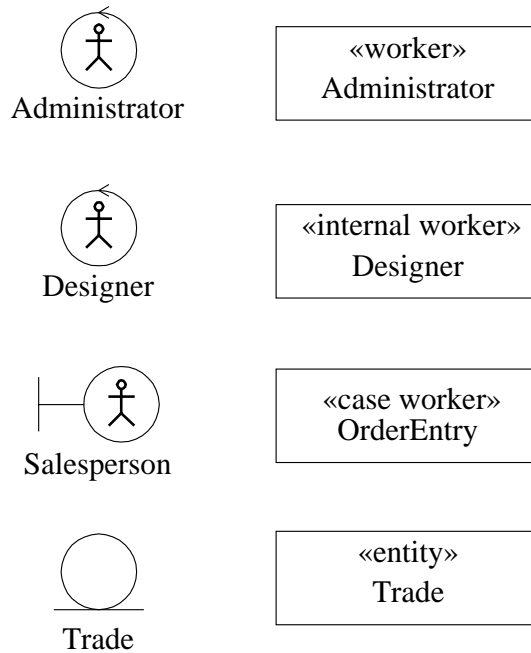
Figure 1. Class stereotypes

The preceding icons represent common concepts useful in most business models.

Example of Alternate Notations

Tools and users are free to add additional icons to represent more specific concepts. Examples of such icons include icons for documents and actions, as shown in Figure 2.

Figure 2. Example of special icons for entities and actions

In this example, "Trade [requested]" and "Trade [traded]" represent an entity in two states, where the Trade is the dominant entity of a Trade Document work unit. Client Trading is an action. The icons are designed to be meaningful in the particular problem domain.

3.3 ASSOCIATION STEREOTYPES

The following are special business modeling associations between classes:

3.3.1 Communicates

Communicates is an association used by two instances to interact. This may be one-way or two-way navigation. The direction of communication is the same as the navigability of the association.

3.3.2 Subscribes

Subscribes is a association whose source is a class (called the subscriber) and whose target s a class (called the publisher). The subscriber specifies a set of events. The subscriber is notified when one of those events occurs in the target.

3.3.3 Notation

Association stereotypes are indicated by keywords in guillemets. There are no special stereotype icons.

4. WELL-FORMEDNESS RULES

Stereotyped model elements are subject to certain constraints in addition to the constraints imposed on all elements of their kind.

4.1 GENERALIZATION

All the modeling elements in a generalization must be of the same stereotype.

4.2 ASSOCIATION

Apart from standard UML combinations the following combinations are allowed for each stereotype:

Table 1. Valid association stereotype combinations

To: From:	actor	case worker	entity	work unit	internal worker
actor		communicates		communicates subscribes	
case worker	communicates	communicates	communicates subscribes	communicates subscribes	communicates
entity			communicates subscribes	communicates	
work unit	communicates	communicates	communicates subscribes	communicates subscribes	communicates
internal worker		communicates	communicates subscribes	communicates subscribes	communicates

Bill Curtis

Dr. Bill Curtis is Co-founder and Chief Scientist at TeraQuest, where he helps set business direction. Using his expertise in software process improvement, organization change, people management, and technology evolution, Dr. Curtis coaches management teams in how to orchestrate change, leads assessments of organization capability, and works with TeraQuest teams to craft appropriate programs for improving clients' organizational maturity.

Dr. Curtis is a former Director of the Software Process Program at the Software Engineering Institute (SEI), where he led the project to produce the Capability Maturity Model^{SM} from the process maturity framework developed by Watts Humphrey. He is also the architect and primary author of the People CMM$^®$, an organization maturity model for attracting, developing, motivating, organizing, and retaining an outstanding workforce. Dr. Curtis is establishing a program to train Lead Assessors for the People CMM under an agreement with the SEI.

Prior to his work at the SEI, Dr. Curtis directed research on advanced computing technologies at MCC, developed software productivity and quality measurement systems at ITT, and evaluated software engineering methods at GE. He has published several books and more than 100 technical articles in the areas of software engineering and management. He is on the editorial boards of six technical journals, and is a frequent and popular keynote speaker at software engineering conferences.

[SM] Capability Maturity Model is a service mark of Carnegie Mellon University.
[®] CMM is registered in the U.S. Patent and Trade Office.