A case study of Object-Oriented-Analysis using CASE

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For a software development, various methodologies are suggested and discussed. One of the largest problem is how to specify the field-related issues and to describe then, specially in upper-state of projects should analysis/designs. Object-oriented is concepts to solve the problem, and generally understood its efficiency. In fact, Object-oriented approach tends to be main concept for development of commercial softwares. Some Object-oriented methodologies are suggested. These development used Object-oriented methodology make software development process more clearly.

There are many CASE tools based on some methodologies and some new environments for supporting software development have been provided. Because it is not enough popular into business practices, in which even usual development style have not been established. To discuss efficiency and problem of methodologies, involving development environment supported by computers, more case studies required.

Object-oriented methodology is an approach in which we consider problems as are required. models organized around real-world concepts. The term *"Object-Oriented"* means a methodology that a software is considered as a collection of discrete objects that incorporates both data structures and behaviors. Recently a number of Object-Oriented methodologies including Shlaer & Mellor's, Coad & Yourdon's, and Rambaugh's OMT are proposed.

This paper introduce a case study of Object-oriented methodology using a CASE tool. It is purpose to efficiency and problem for applying this methodology, and to suggest function which should be realized for CASE tools. In this paper, we adopt Shlaer/Mellor methodology as Object-oriented methodology. Because Shlaer/Mellor methodology is one of a most famous methodology, and there is a CASE tool for support analysis. The

methodology uses four kinds of models for describing the system: *information model, state model, communication model*, and *process model*.
The infomation model describes the objects in the system and their relationship. It contains graphs called *object diagram*, whose nodes are objects and arcs are relationships among objects.
The state model describes the interactions among objects in the system. It contains *state diagram*, whose nodes are states and arcs are transitions between states caused by events.
The process model describes the data transformations of the system. It contains *data flow diagrams*, that represents a computation and graphs whose nodes are processes and arcs are data flows.
In this paper, we used Objectbench as CASE tool, which is a product of SES corporation. Using Objectbench, a team of modelers can graphically capture, simulate,and animate object-oriented analysis(OOA) models. Objectbench supports system analysis using Shlaer-Mellor OOA method, including the generation of work products,and the verification of system dynamic behavior.
We chose Auto Depot system as a target system for this case study. Auto Depot system is a robot control system which transport baggage between carry station and rack automatically. Analysis is performed by the following two stages:

(1) manually analysis.

(2) analysis with the CASE tool.

In (1),information model should be produced. We perceive object from graph consist of system components, and relate an object to other objects. Second, state model has been established. Each moving sequences are shown in extended state model. We perceive shared states and events, so each states and events joined. Third, communication model has been established. Perceived events in state model are divided into two groups: inside events and outside events. Inside events are generated within its own object. Outside events are received from other objects. To define sender and receiver of outside events, communication model is described. Result of manually analysis, We can not check the consistency in those model. In (2),syntax and semantics check on those models. We will simulate all model which describes the system. Models are simulated from the following two points of view:

(a) Sequence of events and state transition.

(b) Behavior of models considering timing factors

In (a), a sequence of outside events which corresponds to the behavior of each robots are given to the system,and confirm whether the proper responses are given. In (b), even in that case , slightly we found the case that some delay happens in its timing. change of the models can avoids this problem. We suggest some idea in function of CASE tools shown in the following five items:

- dividing objects into clustered object groups
- listing up events which may appear on objects.
- showing graphic images for instance to instance relations
- displaying information about actions in state model
- automatically arrange node and arc in each graphic model