

# Implementation of Role Based Model

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## Abstract

Software engineering is defined in the IEEE standard 610.12 as “the application of a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software”. This paper is based on approach which can be used for applying the reverse engineering to improve the quality of software system. The dynamic structure of a system plays an important role for providing high level abstraction. Analysis of a dynamic structure of a system is one of the areas of research for both structural and behavioral perspective. Role based approach explains the analysis of the dynamic structure of a complex system.

Dynamic structure refers to change that occur to a system structure while it is running. Cost effective development of a large integrated system can be realized through systematic reuse of development into a development process of a software system. Happens that only documentation available for maintain is the source code itself. Under this environment, maintains the source code can be extremely difficult. One way of handling this problem to start with the source code and attempt to recreate the design documents or we have a dynamic structure of a system. Role is a particular set of properties associated with objects or groups of objects in a particular context. A role model describes the essential aspects of a pattern in terms of highly abstract state and behavior elements.

**Keywords:** *role based model, Architecture, collaboration time.*

## 1. Introduction

Today, there are large number of software companies are concentrated the quality of product and product life cycle. The products have facilities to extending the functionality or deleting according to customer's requirements. A lot of architecture is present for organizing the elements of system. The objects are like a black box components that provide interface through which other object may state information that is maintains. The output is cooperatives effort between the objects to accomplish a set of objectives called role [1]. A

collaboration group represents a reusable architecture abstraction above the level of individual object that are essential for understating designing and reuse object oriented system. For constructive material of a system class and inheritance are most important into an object oriented.

## 2 Existing modeling Technique

System design and are more like construction material then operational components. But must organized such that the architecture view can be achieved. The Ronald S Casslman is use role based for Smalltalk programming language scenario. As we know that reverse engineering is a process of extracting system abstractions and design information out of existing software systems. How we best model the system role based so that a player can change roles or handle a multiple roles[2].

This paper is organized, first work down related to role based concept and then analysis of a role based modeling and implement into a small system and result.

To develop software of lasting quality, you have to craft a solid architecture foundation that's resilient to change. Modeling is a central part of all the activities that lead upto deployment of good software and help to maintain the quality. Modeling language is a graphical language for visualizing, specifying, constructing and documenting the artifacts of a software intensive system.

Through the modeling we achieve following aims.

- Visualize a system as it is or as we want it to be.
- Permit us to specifying the structure or behavior of a system.
- Gives us templates that guide us in constructing a system
- Document the decision we have made

In software there are several ways to approach a model .the principal of modeling technique

- The choice of what models to create has a profound influence on how a problem is attached and how a solution is shaped.
- Every model may be expressed are different levels of precision

- The best model are connected to reality
- No signal is sufficient. Every nontrivial system is best approached through a small set of nearly independent models.

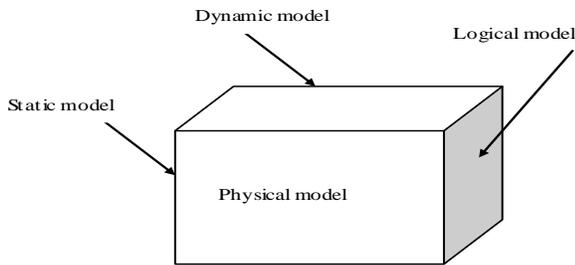


Figure 1: Software system

### 1.1 3. Different Model architecture used for developing Software Architecture

The basic issues in role based collaboration like role assignment, role transition, role based coordination, role based interfaces design, role based conflict & resolution and roles based information sharing. There are two basic things

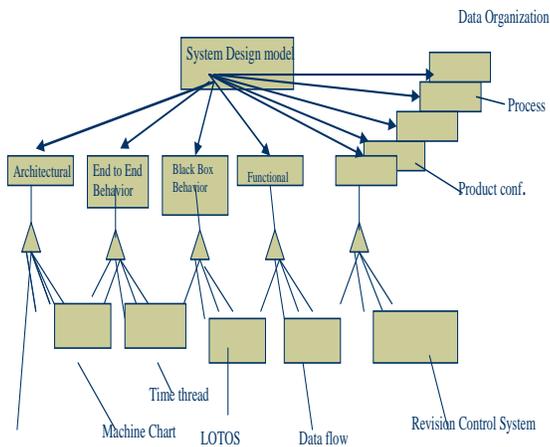


Figure 2: Model Architecture

An architectural view of object oriented system is concerned with the structure and behavior of a system in operation. Object oriented frameworks offer large scale reuse because they embody interaction patterns between objects and collaboration groups which are implicitly reused when available. Most object oriented modeling techniques use a combination of ER diagram and State machine and do not easily express behavior and dynamic structure.

Existing techniques for modeling collaboration groups fail to address how a complete system may be composed of groups, how the objects participate in multiple groups, and how the end-to-end behavior of a system may be expressed in terms of the collaboration groups.

### 3.1 Architecture views:

“Emphasizes the operational components that form a designer’s conceptual model of a system in execution and how they interact .i.e. how the system looks and works as a running system “

Example: object, process, Subsystem. Role and role team etc.

The state of an object is contained in instance variables which may reference other objects to create a directed graph of objects. Methods may also be categorized by using constructive views and object references are viewed as a mechanism for achieving communication pathways. Message passing is only a way to interact with another.

### 3.2 Constructive views

“Emphasizes how the operational components are achieved via the building material of object oriented technology”

Example: Inheritance hierarchies, classes etc.

Design goals like reusability, extensibility and flexibility (by Rumbaugh, Grady Booch and Ivar Jacobson, )

#### “Hogg” Statement

Observe that the complexity introduced by aliasing can make understanding object oriented systems difficult and he presents language features to manage the problem.

“Role based modeling can make potential aliasing explicit during design by describing an object in terms of the roles it plays in relation to other objects”

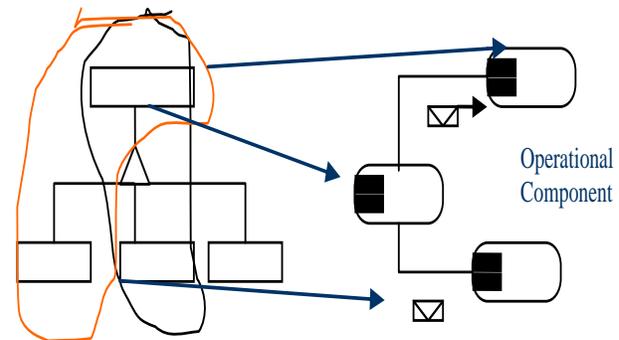


Figure 3; Constructive & Architecture view

### 3.2.1 E R Modeling

An approach taken by many OOAD methods is to extend inheritance diagram with concept from ER models. Classes like entities and aggregation (part of). ER modeling capture the static structure of a system by showing the classes in the system, relationships between the classes and the attribute and operations that each class supports.[3]

The model typically simulates the entities and entity relationships that can be derived from the problem statements & domain problem. ER modeling is often advocate because it offers a constants paradigm from requirement analysis to implementation dual purpose of ER modeling . Example is shown in figure below

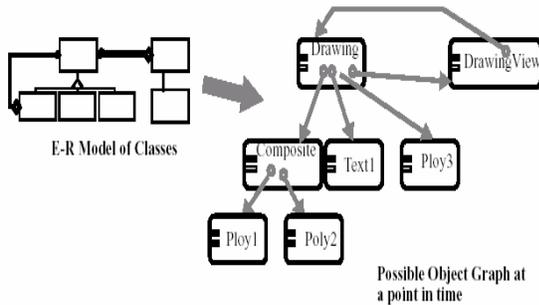


Figure 4: ER diagram

It also defines the recursive aggregation relationship. The class of ER diagram represents construction templates for object and relationships between classes represent potential runtime relationship between instances. For example aggregation is described as a relationship between classes this does not mean that classes are composed of others The ER model is used for a dual purpose, one of the “Is -a “relationship between classes is a constructive relationship that describe how object are built from classes. And another role having Architecture implementation because they describe the organization of a system in term of object (operational) components .which is shown in figure.

#### Benefit of using the ER model concept

- High level Consistent paradigm that maps well to object oriented language
- It helps in terms of the relationships between object and its responsibility.
- Descriptor of topology is run time behavior of object instance

### 3.2.2 State Machine Modeling

Several authors have added a complimentary behavioral view to the ER Modeling .the most common technique uses state machines to model the internal behavioral of the object instances.

Rumbaugh’s OMT method, Jacobson’s structured design uses a graphic representation of regular expression called tree diagram.

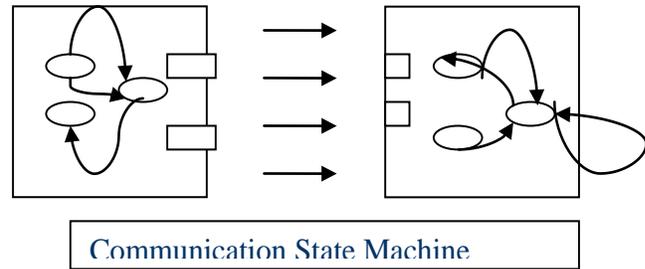


Figure 5: Communication State Machine

Event generated in Rumbaugh’s model can be directed to a specific object or to any object and all object that accept event :however the semantics of the comm. Primitives(Ex. Syn., Asyn.) are not defined. Rumbaugh used structured text that is linked by naming convention to the operations supported by classes in an ER model.

#### Critique

Overall system behavior can’t be deduced from the behavior of individual object. And also the every object has a SM. Concern the detailed closed from nature of state machines and its effect on system modeling need enough detail at initial stage.

### 4 Models for collaboration groups

Basic constructive view suffered from its lack of behavioral characteristics, but the basic object architecture is perhaps too dynamic and low level to be useful as a modeling tool. Building on the basic architectural view, it is possible to add new abstractions, both structure and behavioral, to deal with these problems.

#### Approach

Introduce large grained structures by grouping related object. From the architectural perspective, a subsystem is a collection of logically related object, that are participated to provide the service required of a major functional division of a system.

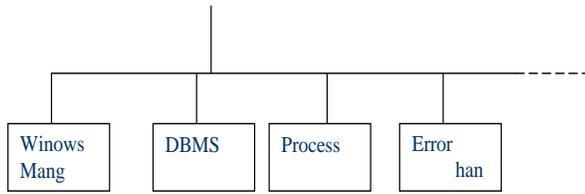


Figure 6: Different Approach

Related theory present by G. Booch, Helm, Arpis, Jacobson and each one are describe its own way of model[4,5,6]

- **“G. Booch”**

A mechanism as any structure where by objects work together to provide some behavior that satisfied a requirement of a problem. G.Booch has developed a graphical notation called “Object diagram” for specifying the structure of mechanism. The elements of the notation include object and their interconnection.

Ex.. Object A may have instance variable reference to object B, Or A may be given the Identifier of B as a parameter of a message sends. Object references may be further categorized based on how they are used Example: object A may use the reference to B in its public methods or A may use the references to B in its private method.

- **“Helm et.al”**

Organize an OOS into groups of interacting objects called “Contracts and Provide a textual formalism” for specifying individual contract. A contract is a specification of how the groups of interdependent objects participate to accomplish the contract and specification of how the contract is instantiated.

- **Apris**

It present a model of object behavior & object co-operated based on objects, messages & roles. A composite context is composed of a collection of component constraints. A composite context defines the cooperation among a set of components as an interleaving of roles that are played by the component as a group.

- **Jacobson**

Used structure approach to document frameworks for the users of them

#### 4.1 Modeling for collaboration Groups

- ♦ G.Booch uses timing diagram to describe the flow of control with in a mechanism ex. Let ABCD are

object type component and send the message to figure.

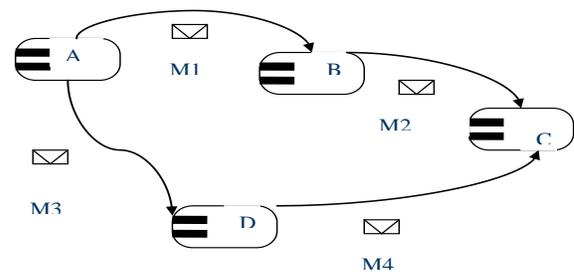


Figure 7: Component Based Object

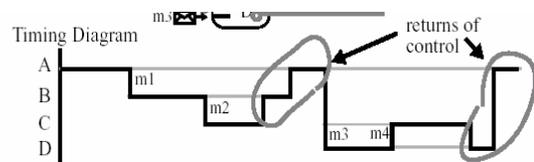


Figure 8: Timing diagram

- ♦ In a message sequence diagram describe the sequencing of message between objects .It has variation called interaction diagram that describe the mapping of a use case to the system’s internal components. It is shown in figure below

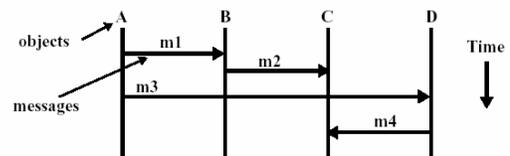


Figure 9 : Sequence diagram

Buhr’s introduce timethreads as a large scale behavior technique for causality flow. Causality flow is a time ordered sequence of causality connected activities performed by a system in relation to its architecture.[7]

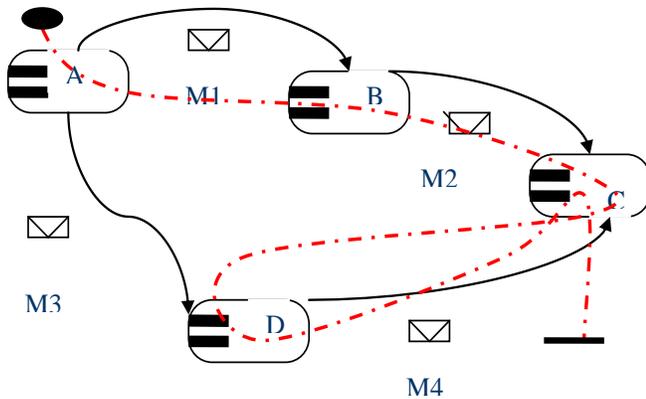


Figure 10: Object, Message & Time Thread Representation

Time diagram are an intermediate behavior description technique that lies between Jacobson

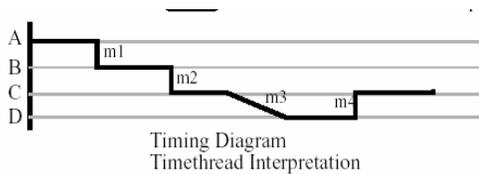


Figure 11 Conflicts between Messages

## 5 Meta Model Definitions

Describe the rules and relation and relationships that govern a set of basic architectural concept like a framework. The Meta model is an abstract description that may be specified through extensions. A model has a notation with semantic properties and is a means of capturing the elements of a view.

The result is that system models often have elements in common elements are either expressed differently or different view.

### 3.2 Dynamic Structure

It refers to changes that occur to system's structure while it is running components may be created, the composition relationships between the components may change through time, and the comm. Path among components may be created, destroyed, or rerouted. Dynamic structure of a collaboration group includes when participants of a group play their roles relative to the other participants & to the group as a whole.

### Structure of collaboration groups

- ♦ The composition of individual group's i.e. the identification of a group's participants and subgroups.
- ♦ The composition relationship among many groups i.e. the comm. Pathways among groups and how participants are shared across group

### Behavior of collaboration groups

- ♦ The causal flow patterns among the participants of an individual group necessary for the group to fulfill its objectives.
- ♦ The causal flow pattern across many groups necessary for the system to fulfill its end to end objective.

The role-based model is developed by extending the concept of a more general Meta model. Under work, consider security design points make more reliable system. The problems which motivates towards it that the object oriented architecture and change of the technologies. The problem Aspect of an object oriented System and Architecture is the architecture of individual collaboration groups or the architecture of a system as composed of group and How the participants play their roles in multiple group. And also The flow pattern through the system and dynamic structure. Factor influence the object are No. of objects, No. of dependency Time duration Scheduling, Role Mapping, Limitation /constraints, Performance and Groups

## 6 Role based Model

Further role define the properties of object that participate in them. The aggregate properties of an object may be determined by examining all the roles it plays. Roles may be seen similar to classes, except that a role define only those properties that are required of an object in the context of a role team. a role is different from class because many objects from different classes may satisfied a role and single object may satisfied many roles. Operational Because When and role team are considered to be components of a system's architecture. For ex when a scenario is played, perhaps by tracing causal flow paths through the role team organization, the role teams are acting as instances of collaboration groups and role as instances of objects. (it work life CRC concept).

### 6.1 Element of Role Architecture

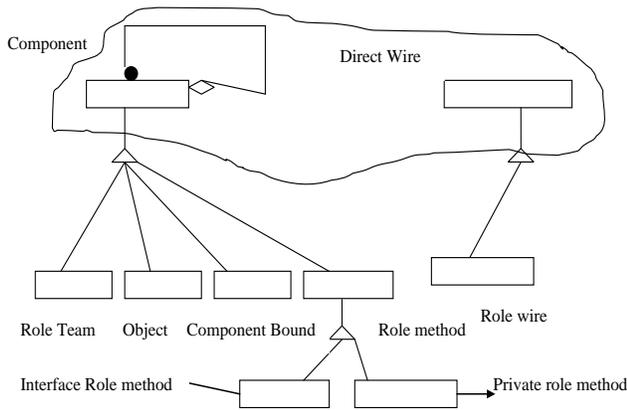


Figure 12 Role Based Arch.

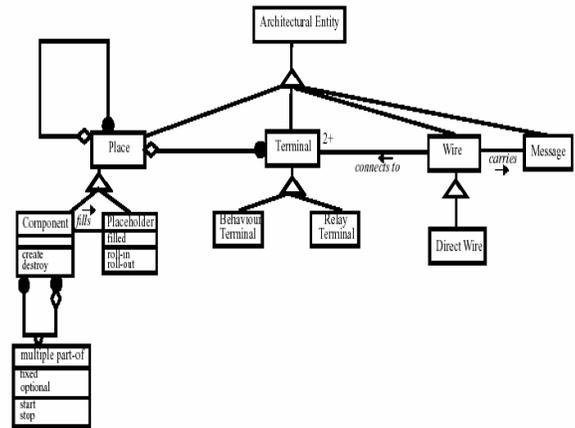


Figure 14 Dynamic Architecture View

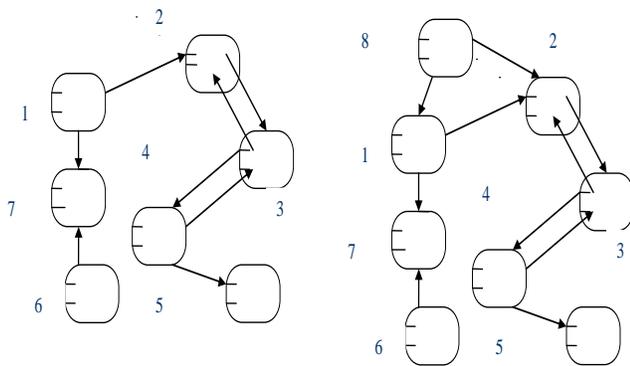


Figure 13. Object with different Role

In general, the system consists of an ever changing set of object & object references over time. The object References are established through the exchange of object identifiers. When a new object is added new references are needed so that the new references are needed so that the new object may communicate with exiting objects.

In figure more proper way in role based language design A role based model serves a dual purpose during system development. It can have either a definitional purpose or an operational purpose. Definitional because it act as template for many runtime environment role teams are templates for collaboration grouped and roles are template for objects that play roles

### 6.1 Dynamic changing collaboration time

In a figure that the collaboration group have temporal properties. The same group can exit at different times with different object e.g. B object might occupy different times with different role in diff. occurrences of a group. Viewing OOS in terms of Ever changing object, object references and collaboration groups lacks generality because there may be no apparent pattern in the coming & going of object & collaboration groups for that need more general & fixed model.

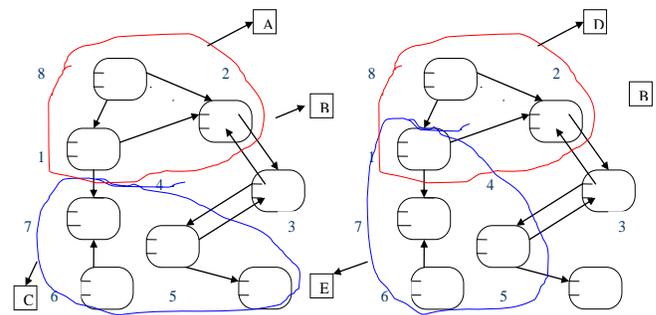


Figure 15 Object with Role of different group

For example another aspect of a component is that it should be able to communicate with other objects or beans. Java beans accomplish this by firing events and listening for them. A bean that is interested in what happens to an object external to itself can register itself as a listener for various events in the object

Example of dependency mechanism :three object  
:1.Controller(TextField) , 2. InVectorModel 3. Listview  
(TextArea) 3. AvgView(Text Field)

Problem : Enter a number into a text Field and output into  
other view , one is show the list element and other is  
avgview of number.

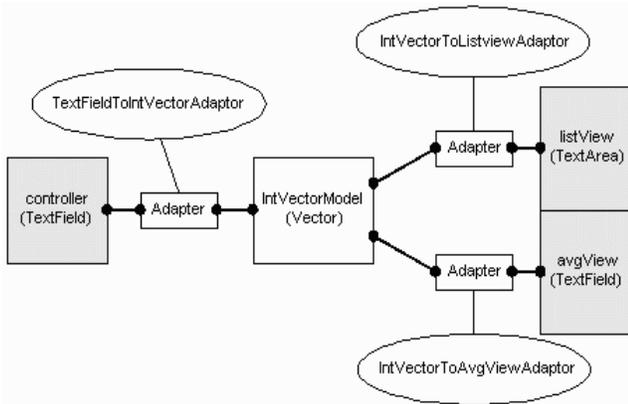


Figure 16 Example of Role Based Arch.

## 7 Conclusion & Discussion

This paper describes an approach to an education research program referred to as “System analysis and design” that unites cognitive research and concurrent design of learning technologies.

The paper describes the architecture and implementation of the role based model in current technology and framework. The purpose of role-based system is to separate the architecture of a software system into parts that any be considered independently and view as elements of a larger whole. A role team consists of nested role team and role, which describes the properties, required of object to participate in the role teams. An object is represented in the system by the role or roles.

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