Various Approaches of Object Oriented Methodologies and Development by using the Unified Modeling Language (U M L) to Design an Effective System

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***Abstract*—** In this paper all the methodologies of effective system development in the field of Computer Science and Engineering are explained. There are different methods which are commonly used to design a system by following the system development process. It is important to understand the usability of system development methodologies. This paper also differentiates the various JSD stage of SDLC.

Keywords*—JSD, SA, DFD, ERD, OOM, graphics symbol, data dictonary, structured methodoligies, object oriented methodoligies.*

I. INTRODUCTION

UML is intentionally **process independent** and could be applied in the context of different processes. Still, it is most suitable for use case driven, iterative and incremental development processes. An example of such process is **Rational Unified Process** (RUP). UML is not complete and it is not completely visual. Given some UML diagram, To understand depicted part or behavior of the system from the diagram alone. Some information could be intentionally omitted from the diagram, some information represented on the diagram could have different interpretations, and some concepts of UML have no graphical notation at all, so there is no way to depict those on diagrams.

II. SYSTEM DEVELOPMENT METHODOLOGIES

Design methodology aims not only to reduce the process of design to sequence of steps[5], but also aims to provide guidelines to aid the designer during the design process. Mainly two design methods that are used are:

- Structured Methodologies
- Object Oriented Methodologies

III. STRUCTURED METHODOLOGIES

Structured development methods are process oriented following top down approach, starting from the most abstract level to the lowest level of detail. It main focuses on modelling the process, or action that captures, stores, manipulate and distribute data as a data flow through a system. The procedure act on data that the program passes

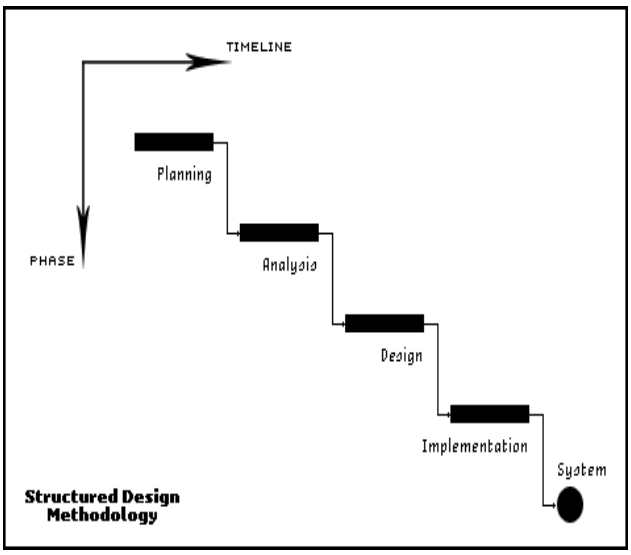

Fig.1: Diagram of structured methodologies -A top down approach

to them. Structured analysis caries out two different categories:

A. Structured Analysis(SA)

Structure analysis is a development method for the analysis of existing system (manual or automated), leading to the development of specification for the new or modified system. We can use this top down approach to define the input, processes and outputs. we can show how information flow through a system using several diagram showing progressively more and more detail at each level. It organises the task associated with requirement determination to provide an accurate and complete understanding of current situation. It focuses on what the system or application is required to do. It does not state how the requirements should be accomplished. It has become synonymous with data flow analysis, because it is essential for documenting an existing system. It is easy to verify when relevant details have been omitted. The identification of requirement will be similar among individual analyst and will include the best solution and strategies for system development opportunities. The workings papers produced to document the existing system and proposed system are effective communication devices. It uses tools for modelling a system. The primary tool of structured analysis is Data Flow Diagram (DFD).

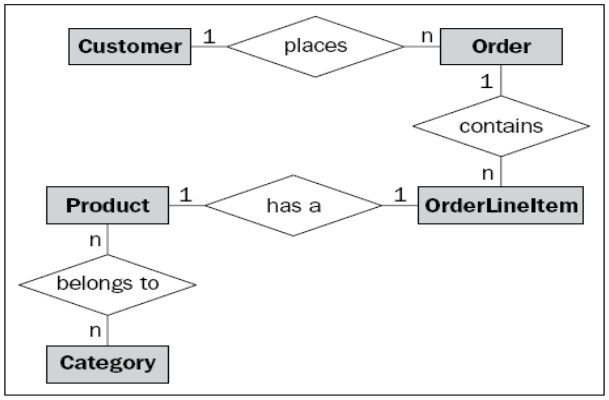

Fig.2: Structure Analysis Diagram

In the above diagram the product belongs to various categories which has a single order line item various order line item contains a single order and customer place many order.

Steps of structured analysis:-

- Draw a context diagram.
- Draw DFD of the existing system.
- Draw DFD of the proposed system and identify the main machine boundary.

Structured Analysis uses the following components:

- Graphics Symbol
- Data Dictionary
- Procedures And Process Description
- Rules

B. Structured Design (SD)

Structured design is another element of structured analysis that utilizes graphical description and focuses on the development of the software specification. It creates the programs consisting of the functionally independent modules that perform relatively independently of one another. The approach not only leads to better programs but will facilitate the program maintenance when the need arises. It is not the comprehensive design method but the program design technique. It does not specify file or data-based design. It does not lead to the specification of the program module that are functionally independent. It aims to convert the output of the structured analysis into structured chart. The fundamental tool of structure design is the structure chart. It represents the various modules making up a system, module dependency and parameters passed in the modules.

Structured Design uses the following components:

- DFD
- Data Dictionary
- Structure Chart

C. Role of Structured Methodology

The Structured Analysis activity transforms the SRS document into a graphical model called DFD. During structured analysis, functional decomposition of the system is achieved. That is, each function that the system needs to perform is analyzed and hierarchically decomposed into the more detail functions. On the other hand, during structured design, all functions identified during structural analysis are mapped to a module structure. This is also called as high level design. It is followed by the detailed design state. In this state the algorithms and data structures for the individual modules are designed. The user can, therefore, even review the result of the structured analysis to ensure that it captures all his requirement.

IV. OBJECT ORIENTED METHODOLOGY

OOM (Object Oriented Methodology) is a new system development approach encouraging and facilitating re-use of software components. OOM is a new system development approach encouraging and facilitating re-use of software components [3]. With this methodology, a computer system can be developed on a component basis which enables the effective re-use of existing components and facilitates the sharing of its components by other systems. Through the adoption of OOM, higher productivity, lower maintenance cost and better quality can be achieved. With this methodology, a computer system can be developed on a component basis which enables the effective re-use of existing components and facilitates the sharing of its components by other systems.

Object-Oriented Development uses the object as the basic unit of system analysis and design [2]. An object combines data and the specific processes that operate on that data. Data encapsulation inn an object can be accessed and modified only by the operations, or methods, associated with that object [7]. Instead of passing data, program sends a message for an object to perform a specific function. The system is modeled as a collection of object and relationship among them.

The OOM life cycle consists of six stages. These stages are the business planning stage, the business architecture definition stage, the technical architecture definition stage, the incremental delivery planning stage, the incremental design and build stage, and the deployment stage.

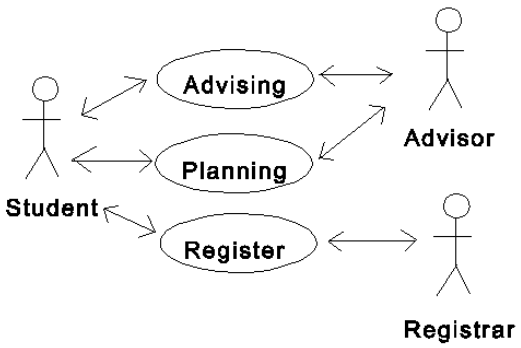

Fig.3: Diagram of object oriented methodologies

The above diagram shows the various notations, processes and tools of objects.

Various methods have been proposed for object oriented software development. A methodology usually includes:

- Notation: it is graphical representation of classes and their relationship.
- Process: it is set of steps to carry out the transforming requirement into a working system.
- Tool: Tools are the software used for drawing and documentation purpose.

The main components of object oriented design are:

- Objects
- Messages
- Methods
- Classes

V. JACKSON STRUCTURED DEVELOPMENT

Jackson System Development (JSD) is a method of system development that covers the software life cycle either directly or, by providing a framework into which more specialized techniques can fit. JSD is a method for specifying and designing systems whose application domain has a strong temporal flavor and contains objects whose behavior is describable in terms of sequences of events. Many program and system development problems thus fall within the scope of JSP and JSD[1], and the methods have been used to develop data processing systems, control systems, systems software, embedded systems, and even a music synthesizer. Jackson System Development can start from the stage in a project when there is only a general statement of requirements. However, many projects that have used Jackson System Development actually started slightly later in the life cycle, doing the first steps largely from existing documents rather than directly with the users. The later steps of JSD produce the code of the final system. Jackson's first method, Jackson Structured Programming (JSP), is used to produce the final code. The output of the earlier steps of JSD is a set of program design problems, the design of which is the subject matter of JSP. Maintenance is also addressed by reworking whichever of the earlier steps are appropriate.

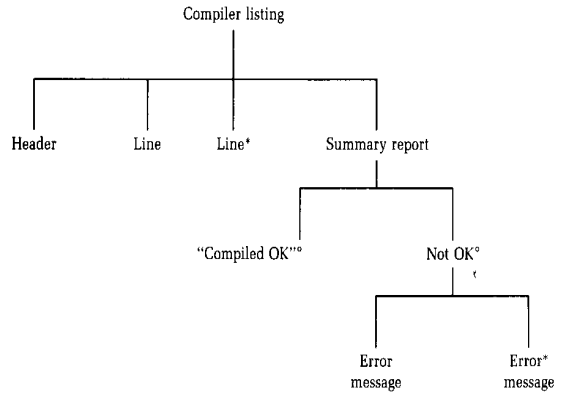

Fig.4: Diagram of JSD

The above diagram shows the internal working of Jackson Structured Development model in an hierarchal order. The various Phases of JSD are:

- Modeling Phase: It identifies real world events. JSD modeling begins by identifying the real world events (also called actions). For each event type a name is chosen, an informal description is written by which occurrences of the event type in the real world may be recognized, and the attributes of the event are listed. Each event is something that happens in the real world, not in the computer system itself and it is considered to happen instantaneously.
- Network Phase: This phase shows the System Specification Diagram. The description of the real world that has been made in the Modeling Phase
- allows a very direct simulation by sequential processes within the system[4].
- Implementation Phase: The usual techniques of data base design are likely to demand a reorganization of the process state vectors. Networks containing cycles will require buffering of data streams between processes. The transaction files in systems with batch processing components can be viewed as buffered data streams

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