

Prof. Clara Kanmani A*, Dr. S. Mohan Kumar, Abhishek Y S SSenior Assistant Professor, Department of Computer Science and Engineering, New Horizon College of
Engineering, Bangalore, Karnataka, India.Associate Professor, Department of Computer Science and Engineering, New Horizon College of Engineering,
Bangalore, Karnataka, India

Final year BE-CSE student New Horizon College of Engineering, Bangalore, Karnataka, India.

ABSTRACT

An object in computer language represents a real globe object by revealing details about it such as the properties of that object and the functions performed by that object. Object orientation is utmost important and so much in demand, it is essential to observe and understand the interrelated research works and importance of object oriented analysis and modeling. The use of the concept of the object in the analysis and design of an application or software would prove beneficial in terms of cost, energy and time. By representing each component incorporated in the application as an object, allotting the tasks to those objects and defining their properties and understanding the interaction between these objects, we may achieve Object Oriented analysis and design/modeling. Since we will be able to understand the basics to advanced components in the process steps, we can analyze and find any shortcomings and rectify the same in all the project phase itself which will be a frugal approach, rather than finding the issue and rectifying it in the final stage. By implementing the concept of Objects the application and software development will be made much simpler and easier to implement also in this paper, we are discussing the related research works based on the object orientation to understand the present scenario.

KEYWORDS: OOA, OOSE, OOD, OOP, OOS, UML, SDLC, OOM, OOFM.

INTRODUCTION**Software Development Life-cycle**

Software Development Lifecycle consists of a series of steps or stages that are followed in order to design software. It usually consists of the following stages

- Requirements- In this stage we obtain the requirements that are expected of the software to be developed.
- Design- In this stage we design the software on the basis of requirements so that they are met in the most efficient manner.
- Implementation- Once the design has been developed we use it to implement the product in real life.
- Verification- We test the developed product if it is able to meet the requirements and there are no potential errors in the software.
- Maintenance- Once the software is complete, and delivered to the client, its regular maintenance has to be done to keep its performance up to the mark.

There are generally two popular models that are used in software development lifecycle

- Waterfall Model- The steps are done in a sequential manner
- Iterative Model- The steps are performed in such a manner that each step provides a feedback to the previous steps if there is a modification required.

Procedural Programming Vs Object Oriented

The advantages of Object Oriented concepts we can compare it in the field where it has been widely used, programming.

In Procedural Programming we build on the basis of procedures i.e. functions where each function has its own set of instructions which inform or instruct what the steps to be performed are. In object oriented programming we define objects as just we see them in real world by giving them their properties and their functions. So essentially the functions used in procedural programming is a part of the object oriented programming.

▪ Code Reuse	We can make use of the code once written instead of rewriting it again by using the object.
▪ Inheritance	Properties of one object can be derived in another, therefore we don't have to start from scratch for each object
▪ Data Encapsulation	Bind the functions and the properties of the object together, so we have a bundle that we can make use of them.
▪ Data Security	Define the accessibility of each variable and limit it to certain areas as needed

Achievement of objects in software design and development

We will now learn how to implement the concept of objects in software development lifecycle.

When we design a software or an application, we start conceptualizing the design with objects representing the real world components of the software. Let us consider the example of software used for hospital management. We have different actors like patient, doctor, pharmacist, clerk, etc. And we have different objects like patient records, medical equipment like X-Ray Machine, MRI Scanner, etc., which needs an appointment to be used, etc. For developing such kind of software we consider each equipment, record as an object while designing the software which will help us to relate the realistic aspect of the objects and enable us to implement all the possible functions performed and the properties of the equipment.

METHODS OF IMPLEMENTING UNIFIED MODELLING LANGUAGE (UML) DIAGRAMS

To design a software we use what is known as a UML diagram that shows the different components of the software and their interaction in a graphical form. But to construct these UML diagrams we use certain methodologies that instruct us how to make the UML diagram for a particular software we are aiming to build. Every methodology we use will give us a different UML Diagram that is unique to that methodology only. The different methodologies/diagrams we can use: Class diagram, Activity diagram, Use case diagram, State Diagram, Sequence diagram, collaboration diagram, component diagram, package diagram.

UML TOOLS

The uses of UML will be effectively implemented through utilizing the UML tools or UML Modeling tools are software which has the support for the notations and semantics of Unified Modeling Language that helps us in the process of OOAD and OOSE.

It has the support for the following functionalities.

- Diagramming - Creation and Editing of UML Diagrams
- Round Trip Engineering-
 - Code Generation - Code is generated from the UML diagrams and model data
 - Reverse Engineering – Using the existing code, model data and UML diagrams are generated.
- Model and Diagram Interchange – XML Model Interchange (XMI), a format of UML model interchange, supports importing of UML diagram from one model to another.
- Model Transformation – To transform from one model to another.

There are several UML tools available in the market with some of them being Open-Source and some of them being Licensed Versions:

- **Rational Rose:** A Licensed UML tool created by IBM. Now this tool has been superseded by IBM Rational Data Architect. It is currently sold with the specifications stating Visual Studio 2005® and Windows Vista™ as compatible environment. It is capable of diagramming and round-trip engineering. It also works on Linux and UNIX platforms.

- **ArgoUML:** Developed by Jason E. Robbins at UC, Irvine, is currently an open source UML tool hosted by Tigris.org. It is platform independent, supports Object Constraint Language, Forward and Reverse Engineering.
- **Papyrus:** It is UML tool based on Eclipse. Can be used as a standalone application or as an Eclipse Plugin. It is easily extensible. Works in Windows and Linux
- **UModel:** A UML tool developed by Altova. It supports all 14 UML2 diagrams. It supports Code Engineering and Model Interchange.

RELATED RESEARCH WORK

We reviewed the related research in the field of Object Orientation; it would help us to understand the advantages of using Object Oriented Approach over a traditional approach and also to effective establishment of the same.

1. Minder Chen et. Al. 1989[10]- The paper presents an object oriented approach to integrating organization and Information System modelling. Characteristics and applications of the OO systems are first reviewed to show the evolution of the application of OO approach from an implementation and programming level to conceptual modelling of organization and information system. MetaPlex, a metasystem implemented in SmallTalk to support high level object oriented modelling is described in detail. Case studies defining Critical Success factors in MetaPlex and creating a Structured Electronic BrainStorming System to support collaborative work are used to demonstrate the use of MetaPlex in integrating organization and information system modelling both at individual and group levels.
2. Olivia R. et. Al. 1992[7]- This paper presents Synthesized Object-Oriented Entity-Relationship (SOOER) model and its associated procedure for coupled KB/DB system design. It has well defined constructs that deal with the various forms of knowledge involved in data processing, knowledge based problem solving, object-oriented reasoning. Because the proposed methodology enforces object -oriented knowledge reasoning by means of control of knowledge constructs specific for searching in object-oriented knowledge base, implementing the knowledge components in such a coupled KB/DB system will require an object-oriented implementation environment.
3. David C Kung et. Al. 1996[8]- An object oriented real time conceptual modelling approach is described, where each object is defined by object type, consisting of super types (inheritance), component types (aggregation), attributes, operations, static constraints and temporal constraints. An object oriented real time conceptual model using object types can be translated into augmented Petri net with timing and temporal constraints. A reachability tree of the permissible system is generated for the augmented Petri nets for verifying whether the conceptual model satisfies desired temporal constraints
4. Mauricio JV Silva et. Al. 1996[4]- Focused on modelling aspects of AOODBS. Presented an integrated approach, AOODBMT(Active Object Oriented Database modelling technique) which integrates and extends object modelling technique for conceptually designing active object oriented database applications A/OODBMT models databases by defining and integrating models, Nested Object Model(NOM), Nested Rule Model(NRM), Behaviour Model (BM) and Nested Event Model(NEM).
5. Jiannong Cao et. Al. 1996[2]- Article Proposed a new framework called Hierarchical Sequences of Events for distributed behaviour modelling. The requirements and issues of modelling the behaviour of object oriented distributed systems are identified. Model can be used to specify and reason the behaviour features of object oriented distributed systems like parallelism, concurrency control synchronous and asynchronous object interactions and distribution.
6. Jun Zhu et. Al. 1999[9]- The paper introduces the concept of design patterns and demonstrates the potential of applying this technique for power system modelling. When properly applied the design pattern can help us solve many of the design problems in OOM power systems. Design patterns captured by experienced object oriented designers; prove to be effective tools for object-oriented modelling of power systems. Some

of the structural design patterns, such as recursive composition, can be used to model electric distribution devices at a proper granularity as well as various hierarchical levels.

7. JM Rossiter et. Al. 2001[3]- Proposed a new approach to object oriented modelling with words based on a new theory of inheritance where memberships object and properties applicability is uncertain. Presents the uncertain object oriented language Fril++ as a tool for object oriented modelling with words. Presented Fril++ as a new and useful approach to object oriented modelling with words. Efficacy of this approach has been demonstrated by the construction of an extendible object oriented data browser.
8. Cristian Seechi et. Al. 2007[11]- A unified object oriented approach for modelling both the logical and the physical part of manufacturing machine has been proposed recently. We discuss about the effectiveness of this modelling framework on an industrial application. The case study consists of the package forming unit of a filling machine for liquid food packaging, developed by Tetra Pak Carton Ambient S.p.A. This paper has described an extension to the modelling language UML that can be adopted to describe complex computer-controlled physical systems.
9. D V Chandra Shekar et. Al. 2009[1]- In article authors presented the requirements we need to understand and implement using an object oriented modelling language. They also presented a framework to investigate and compare graphical and object oriented modeling languages. Paper proposes a new framework and criteria set for evaluation, classification and comparison. The utilized criterion set can also be used as requirement set for new object oriented modelling languages.
10. Victor T. Sarinho et. Al. 2010[6]- This paper defines OOFM (Object Oriented Feature Modelling), that's a combination of Feature modelling and Object Oriented concepts that allows the declaration of feature classes and its derivation methods, along with the instantiation of feature objects with their encapsulated data. So the implementation and production of multiple product lines, by the definition of feature frameworks, combining distinct feature classes according to the domain interest, can be applied, OOFM allows production of multiple and distinct feature models using distinct feature models as reference.
11. Fan Zhang et. Al. 2013[5]-- Presented CASAT based on HOOMT which provides facilities for structured object oriented analysis by integrating structured analysis and object oriented analysis. It contains a GUI for HOOMT based modelling, supports modeling information management and provides functionalities for developing three component sub models: High Order Object Model (HOOM), Hierarchical Object Information Flow Model (HOIFM) and Hierarchical State Transition Model (HSTM). Supports Structured decomposition of high-order objects, processes and states.
12. Lee, NamKyung ; Lee, Hyungkeuk ; Lee, HyunWoo ; Ryu, Won. 2015 [12] –This paper proposes web of object architecture with IoT objectifies and virtualizes things for smart home service. The things in the web of objects are embedded with web protocol and provided by web services. And it can generate and provide new convergence services with mashup of objectified things with user experience.
13. Patil, R.V.; Joshi, S.D.; Shinde, S.V.; Khanna, V. (2015) The existing software tools have some restrictions to detect perfect code clone, Each software developer may think in different way for the implementation of the same problem. The methodology explained in this paper is to specify an efficient way to detect code clone which is a hybrid model that covers maximum coding performance and classes of clones. Along with similarity check, the paper describes the importance of dissimilarity detection.

CONCLUSION

In this paper we have explored the basics and also advancement of Object Oriented Approach and how we are utilizing and implementing it in the process of OO Analysis, OOM, OOP and OOS. We also explored how UML diagrams are implemented and what are the latest and important tools used for it. And finally we have seen the related research works which expresses latest research work, along with various other fields have led to additional functionalities and better results.

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