

Object Oriented Systems Analysis And Design Using UML

Object-oriented analysis and design

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Object-oriented analysis and design (OOAD) is an approach to analyzing and designing a computer-based system by applying an object-oriented mindset and using visual modeling throughout the software development process. It consists of object-oriented analysis (OOA) and object-oriented design (OOD) – each producing a model of the system via object-oriented modeling (OOM). Proponents contend that the models should be continuously refined and evolved, in an iterative process, driven by key factors like risk and business value.

OOAD is a method of analysis and design that leverages object-oriented principals of decomposition and of notations for depicting logical, physical, state-based and dynamic models of a system. As part of the software development life cycle OOAD pertains to two early stages...

Object-oriented modeling

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Object-oriented modeling (OOM) is an approach to modeling a system as objects. It is primarily used for developing software, but can be and is used for other types of systems such as business process. Unified Modeling Language (UML) and SysML are two popular international standard languages used for OOM.

For software development, OOM is used for analysis and design and is a key practice of object-oriented analysis and design (OOAD). The practice is primarily performed during the early stages of the development process although can continue for the life of a system. The practice can be divided into two aspects: the modeling of dynamic behavior like use cases and the modeling of static structures like classes and components; generally as visual modeling diagrams.

The benefits of using OOM include...

GRASP (object-oriented design)

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General Responsibility Assignment Software Patterns (or Principles), abbreviated GRASP, is a set of "nine fundamental principles in object design and responsibility assignment" first published by Craig Larman in his 1997 book *Applying UML and Patterns*.

The different patterns and principles used in GRASP are controller, creator, indirection, information expert, low coupling, high cohesion, polymorphism, protected variations, and pure fabrication. All these patterns solve some software problems common to many software development projects. These techniques have not been invented to create new ways of working, but to better document and standardize old, tried-and-tested programming principles in object-oriented design.

Larman states that "the critical design tool for software development is a...

Object-oriented programming

Object-oriented analysis and design Object-oriented modeling Object-oriented ontology UML “Dr. Alan Kay on the Meaning of “Object-Oriented Programming”"“. 2003

Object-oriented programming (OOP) is a programming paradigm based on the object – a software entity that encapsulates data and function(s). An OOP computer program consists of objects that interact with one another. A programming language that provides OOP features is classified as an OOP language but as the set of features that contribute to OOP is contended, classifying a language as OOP and the degree to which it supports or is OOP, are debatable. As paradigms are not mutually exclusive, a language can be multi-paradigm; can be categorized as more than only OOP.

Sometimes, objects represent real-world things and processes in digital form. For example, a graphics program may have objects such as circle, square, and menu. An online shopping system might have objects such as shopping cart,...

Shlaer-Mellor method

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The Shlaer-Mellor method, also known as object-oriented systems analysis (OOSA) or object-oriented analysis (OOA) is an object-oriented software development methodology introduced by Sally Shlaer and Stephen Mellor in 1988. The method makes the documented analysis so precise that it is possible to implement the analysis model directly by translation to the target architecture, rather than by elaborating model changes through a series of more platform-specific models. In the new millennium the Shlaer-Mellor method has migrated to the UML notation, becoming Executable UML.

Unified Modeling Language

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The Unified Modeling Language (UML) is a general-purpose, object-oriented, visual modeling language that provides a way to visualize the architecture and design of a system; like a blueprint. UML defines notation for many types of diagrams which focus on aspects such as behavior, interaction, and structure.

UML is both a formal metamodel and a collection of graphical templates. The metamodel defines the elements in an object-oriented model such as classes and properties. It is essentially the same thing as the metamodel in object-oriented programming (OOP), however for OOP, the metamodel is primarily used at run time to dynamically inspect and modify an application object model. The UML metamodel provides a mathematical, formal foundation for the graphic views used in the modeling language...

Object Modeling in Color

UI Design from a UML Color Model Stephen R. Palmer (2009). "Peter Coad's Object Modelling in Colour". Retrieved 2009-01-23. Object-oriented analysis with

UML color standards are a set of four colors associated with Unified Modeling Language (UML) diagrams. The coloring system indicates which of several archetypes apply to the UML object. UML typically identifies a stereotype with a bracketed comment for each object identifying whether it is a class, interface, etc.

These colors were first suggested by Peter Coad, Eric Lefebvre, and Jeff De Luca in a series of articles in The Coad Letter,[1][2] and later published in their book Java Modeling In Color With UML.[3]

Over hundreds of domain models, it became clear that four major "types" of classes appeared again and again, though they had different names in different domains. After much discussion, these were termed archetypes, which is meant to convey that the classes of a given archetype follow...

Object-role modeling

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Object-role modeling (ORM) is used to model the semantics of a universe of discourse. ORM is often used for data modeling and software engineering.

An object-role model uses graphical symbols that are based on first order predicate logic and set theory to enable the modeler to create an unambiguous definition of an arbitrary universe of discourse. Attribute free, the predicates of an ORM Model lend themselves to the analysis and design of graph database models in as much as ORM was originally conceived to benefit relational database design.

The term "object-role model" was coined in the 1970s and ORM based tools have been used for more than 30 years – principally for data modeling. More recently ORM has been used to model business rules, XML-Schemas, data warehouses, requirements engineering...

Object composition

of Demeter Object-oriented analysis and design Virtual inheritance Yaiser, Michelle. "Object-oriented programming concepts: Composition and aggregation"

In computer science, object composition and object aggregation are closely related ways to combine objects or data types into more complex ones. In conversation, the distinction between composition and aggregation is often ignored. Common kinds of compositions are objects used in object-oriented programming, tagged unions, sets, sequences, and various graph structures. Object compositions relate to, but are not the same as, data structures.

Object composition refers to the logical or conceptual structure of the information, not the implementation or physical data structure used to represent it. For example, a sequence differs from a set because (among other things) the order of the composed items matters for the former but not the latter. Data structures such as arrays, linked lists, hash...

Use case diagram

(1992). Object-Oriented Software Engineering

A Use Case Driven Approach, Addison-Wesley. Kawabata, R., Kasah, K. (2007). "Systems Analysis for Collaborative - A use case diagram

is a graphical depiction of a user's possible interactions with a system.

A use case diagram shows various use cases and different types of users the system has and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses. The actors are often shown as stick figures.

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