

UML Diagrams Overview

Structural Diagrams

<b>Class Diagram:</b> Represents the static structure of a system, showing classes, attributes, operations, and relationships.
<b>Object Diagram:</b> Shows instances of classes and their relationships at a specific point in time.
<b>Component Diagram:</b> Illustrates the organization and relationships of software components.
<b>Deployment Diagram:</b> Depicts the physical deployment of software components to hardware nodes.
<b>Package Diagram:</b> Organizes model elements into packages to manage complexity.
<b>Profile Diagram:</b> Allows defining custom stereotypes, tagged values, and constraints to extend UML for specific domains.

Class Diagram Elements

Classes

<b>Notation:</b>	Represented as a rectangle divided into three sections: class name, attributes, and operations.
<b>Attributes:</b>	Characteristics or properties of a class. Indicated by name, type, and visibility (e.g., <code>+name: String</code> ).
<b>Operations:</b>	Actions or functions that a class can perform. Indicated by name, parameters, and return type (e.g., <code>+getName(): String</code> ).
<b>Visibility:</b>	<code>+</code> Public, <code>-</code> Private, <code>#</code> Protected, <code>~</code> Package.

Use Case Diagram Elements

Actors

Represented as stick figures. Actors interact with the system but are external to it. Can be human users, external systems, or hardware devices.
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Use Cases

Represented as ovals. Use cases are high-level descriptions of what a system should do from the actor's perspective.
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Behavioral Diagrams

<b>Use Case Diagram:</b> Captures the functional requirements of a system from the user's perspective.
<b>Activity Diagram:</b> Models the flow of activities within a system or business process.
<b>State Machine Diagram:</b> Describes the states an object can be in and the transitions between those states in response to events.
<b>Sequence Diagram:</b> Illustrates interactions between objects in a time-ordered sequence.
<b>Communication Diagram:</b> Similar to sequence diagrams, but focuses on object relationships rather than time sequence. Also known as collaboration diagram.
<b>Interaction Overview Diagram:</b> Provides a high-level view of the interactions within a system, combining aspects of activity and sequence diagrams.
<b>Timing Diagram:</b> Shows the change in state or value of one or more objects over time.

Relationships

<b>Association:</b>	A general relationship between classes, indicated by a solid line. Can be unidirectional or bidirectional.
<b>Aggregation:</b>	A 'has-a' relationship representing a whole-part hierarchy, where the part can exist independently of the whole. Represented by a line with an open diamond at the whole end.
<b>Composition:</b>	A strong 'has-a' relationship where the part cannot exist independently of the whole. Represented by a line with a filled diamond at the whole end.
<b>Generalization (Inheritance):</b>	An 'is-a' relationship where one class inherits from another. Represented by a line with an open triangle at the parent class end.
<b>Realization:</b>	A relationship between an interface and a class that implements it. Represented by a dashed line with an open triangle at the interface end.
<b>Dependency:</b>	A weaker form of relationship indicating that one class uses or depends on another. Represented by a dashed line.

Relationships

<b>Association:</b>	Represents interaction between an actor and a use case. A solid line connects the actor to the use case.
<b>Include:</b>	Indicates that one use case includes the functionality of another. Represented by a dashed line with an arrow pointing to the included use case and labeled <code>&lt;&lt;include&gt;&gt;</code> .
<b>Extend:</b>	Indicates that one use case extends the functionality of another. Represented by a dashed line with an arrow pointing to the extended use case and labeled <code>&lt;&lt;extend&gt;&gt;</code> .
<b>Generalization:</b>	An 'is-a' relationship between use cases, indicating that one use case inherits the behavior of another. Represented by a solid line with an open triangle pointing to the parent use case.

System Boundary

A rectangle that encloses the use cases, representing the boundary of the system.
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Activity & Sequence Diagrams

Activity Diagram Elements

<b>Initial Node:</b>	Represents the starting point of the activity. Shown as a filled circle.
<b>Activity:</b>	Represents a task or action performed. Shown as a rounded rectangle.
<b>Decision Node:</b>	Represents a branching point in the activity flow. Shown as a diamond.
<b>Merge Node:</b>	Represents a point where multiple flows converge into one. Shown as a diamond.
<b>Fork Node:</b>	Splits a single flow of control into multiple concurrent flows. Shown as a bar.
<b>Join Node:</b>	Synchronizes multiple concurrent flows into a single flow. Shown as a bar.
<b>Final Node:</b>	Represents the end of the activity. Shown as a bullseye.

Sequence Diagram Elements

<b>Lifeline:</b>	Represents the existence of an object over time. Shown as a vertical dashed line.
<b>Activation Box:</b>	Indicates when an object is performing an action. Shown as a thin rectangle on the lifeline.
<b>Message:</b>	Represents communication between objects. Shown as an arrow from one lifeline to another.
<b>Synchronous Message:</b>	The sender waits for a response. Shown as a solid arrow.
<b>Asynchronous Message:</b>	The sender does not wait for a response. Shown as an open arrow.
<b>Return Message:</b>	Represents the response to a synchronous message. Shown as a dashed arrow.