DIAGRAMS

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The Complete Guide to UML Diagram Types with Examples

An article by Nishadha   62 Comments

UML stands for Unified Modeling Language which is used in object oriented software engineering. Although typically used in software engineering it is a rich language that can be used to model an application structures, behavior and even business processes. There are **14 UML diagram types** to help you model these behavior. They can be divided into two main categories structure diagrams and behavioral diagrams. All 14 UML diagram types are listed below with examples, brief introduction to them and also how they are used when modeling applications.

You can draw UML diagrams online using our software, or check out some UML diagram examples at our diagramming community.

List of UML Diagram Types

Types of UML diagrams with structure diagrams coming first and behavioral diagrams starting from position 8. Click on any diagram type to visit that specific diagram types description.

1. Class Diagram
2. Component Diagram
3. Deployment Diagram
4. Object Diagram
5. Package Diagram
6. Profile Diagram
7. Composite Structure Diagram
8. Use Case Diagram
9. Activity Diagram
10. State Machine Diagram
11. Sequence Diagram
12. Communication Diagram
13. Interaction Overview Diagram
14. Timing Diagram

UML Diagram Types

Structure diagrams show the things in a system being modeled. In a more technical term they show different objects in a system. **Behavioral diagrams** shows what should happen in a system. They describe how the objects interact with each other to create a functioning system.

Class Diagram

Class diagrams are arguably the most used UML diagram type. It is the main building block of any object oriented solution. It shows the classes in a system, attributes and operations of each class and the relationship between each class. In most modeling tools a class has three parts, name at
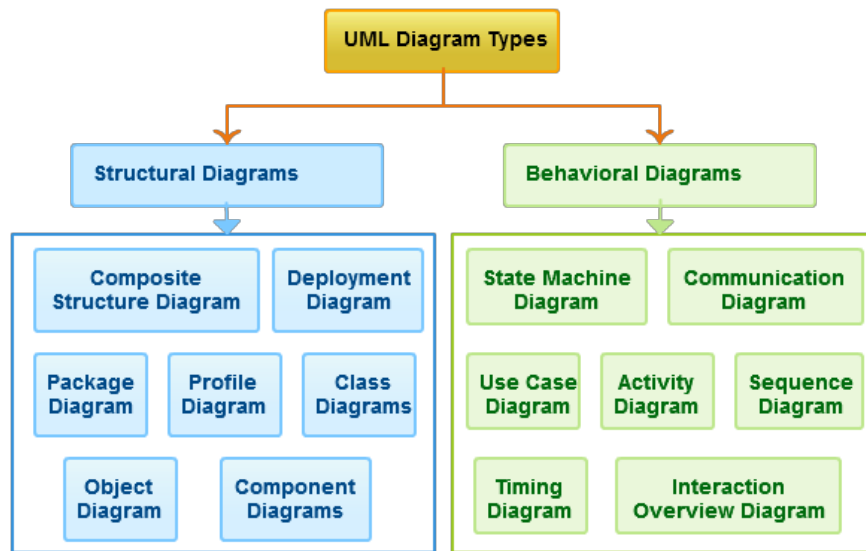
the top, attributes in the middle and operations or methods at the bottom. In large systems with many classes related classes are grouped together to to create class diagrams. Different relationships between diagrams are show by different types of Arrows. Below is a image of a class diagram. Follow the link for more class diagram examples.
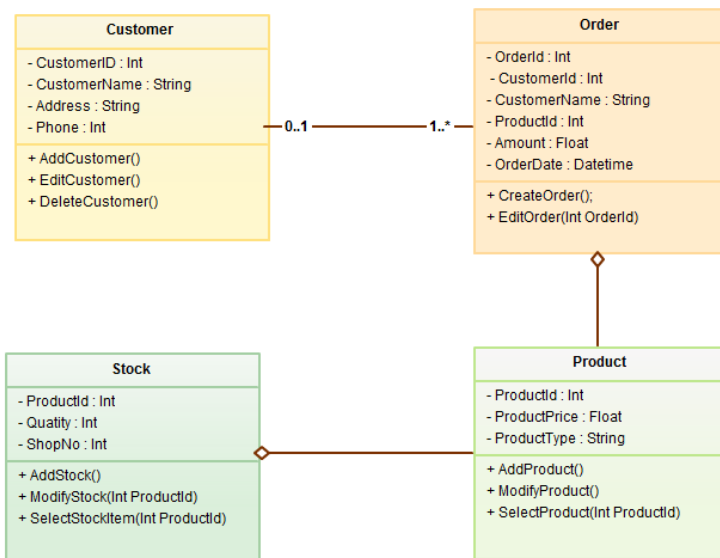
UML Class Diagram with Relationships

Component Diagram

A component diagram displays the structural relationship of components of a software system. These are mostly used when working with complex systems that has many components. Components communicate with each other using interfaces. The interfaces are linked using connectors. Below images shows a component diagram.

Simple Component Diagram with Interfaces

Deployment Diagram

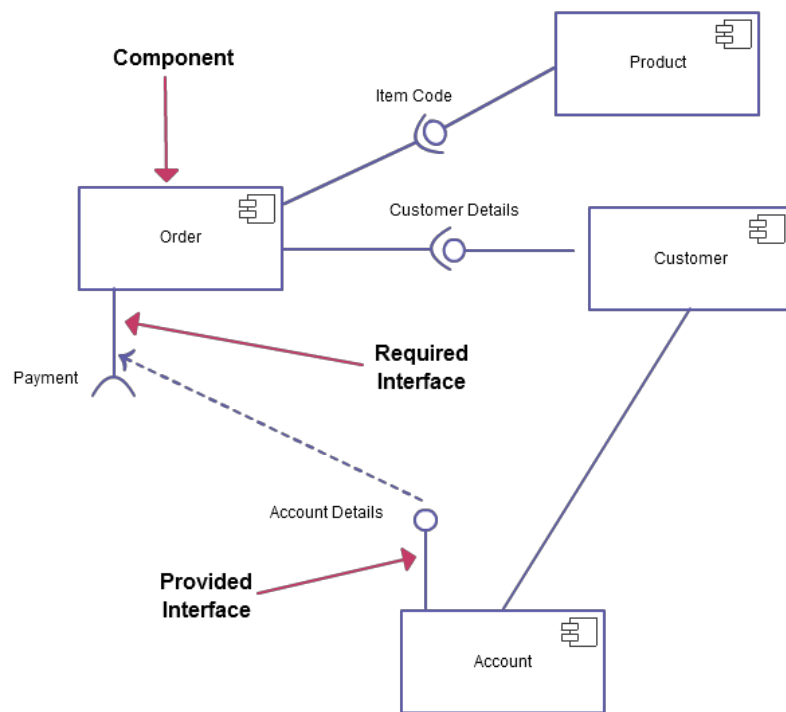A deployment diagrams shows the hardware of your system and the software in those hardware.

Component

Product

Item Code

Order

Customer Details

Customer

Required Interface

Payment

Account Details

Provided Interface
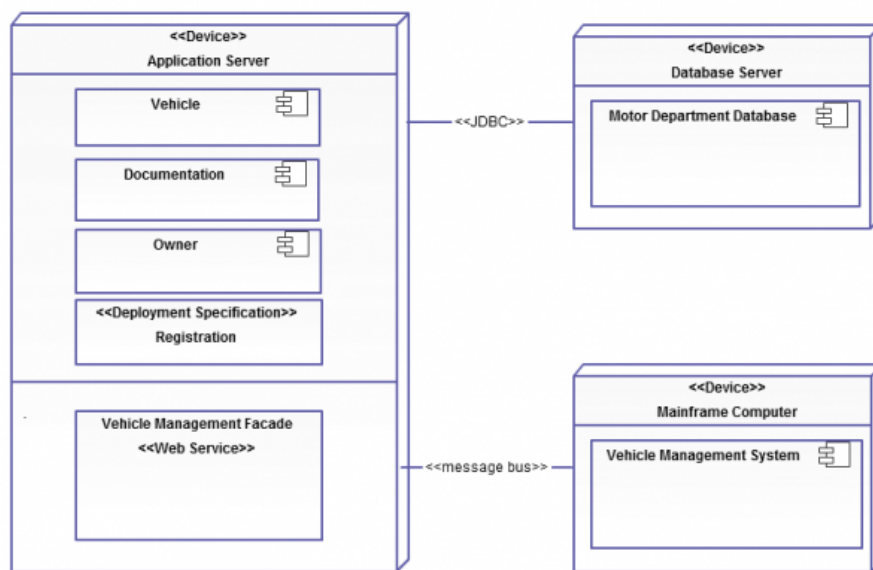
Account

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Deployment diagrams are useful when your software solution is deployed across multiple machines with each having a unique configuration. Below is an example deployment diagram.

<<Device>>
Application Server

Vehicle

Documentation

Owner

<<Deployment Specification>>
Registration

Vehicle Management Facade
<<Web Service>>

<<JDBC>>

<<Device>>
Database Server

Motor Department Database

<<Device>>
Mainframe Computer

Vehicle Management System

<<message bus>>

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UML Deployment Diagram (Click on the image to use it as a template)

Object Diagram

Object Diagrams, sometimes referred as Instance diagrams are very similar to class diagrams. As class diagrams they also show the relationship between objects but they use real world examples. They are used to show how a system will look like at a given time. Because there is data available in the objects they are often used to explain complex relationships between objects.
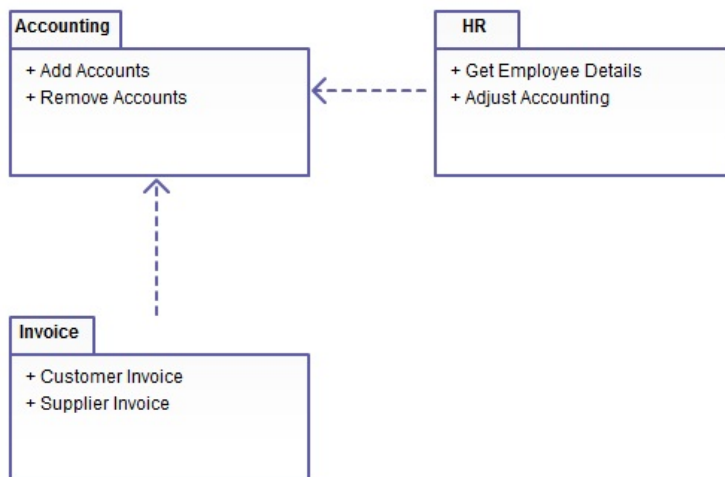
UML Object Diagram Example
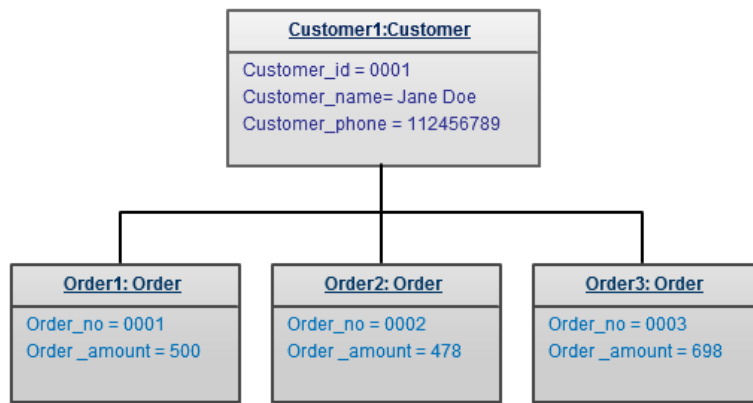
Package Diagram

As the name suggests a package diagrams shows the dependencies between different packages in a system. Check out this wiki article to learn more about the dependencies and elements found in package diagrams.


Package Diagram in UML

Profile Diagram

Profile diagram is a new diagram type introduced in UML 2. This is a diagram type that is very rarely used in any specification. For more detailed technical information about this diagram type check this link.
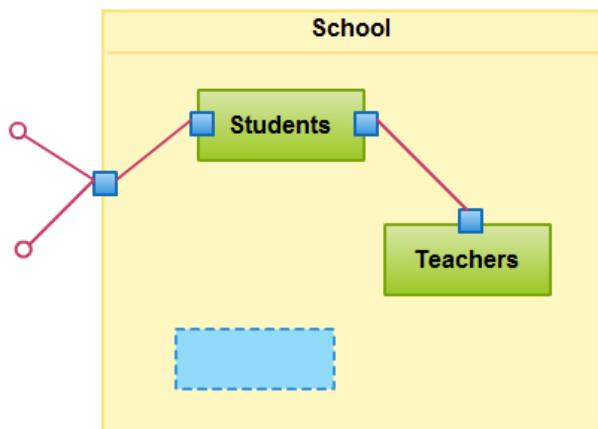
Basic UML Profile Diagram structure

Composite Structure Diagram

Composite structure diagrams are used to show the internal structure of a class. For a detailed explanation of composite structure diagrams click here.
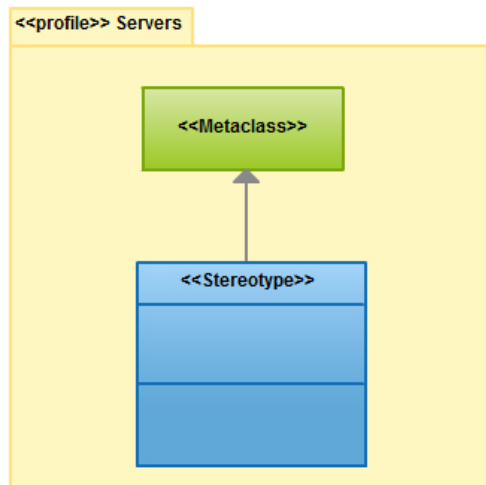
A simple Composite Structure Diagram

Use Case Diagram

Most known diagram type of the behavioral UML diagrams, Use case diagrams gives a graphic overview of the actors involved in a system, different functions needed by those actors and how these different functions are interacted. It's a great starting point for any project discussion because you can easily identify the main actors involved and the main processes of the system. Click through to read more about use case diagram elements and templates.

Use Case diagram showing Actors and main processes

Activity Diagram

Activity diagrams represent workflows in an graphical way. They can be used to describe business workflow or the operational workflow of any component in a system. Sometimes activity diagrams are used as an alternative to State machine diagrams. Check out this wiki article to learn about symbols and usage of activity diagrams.
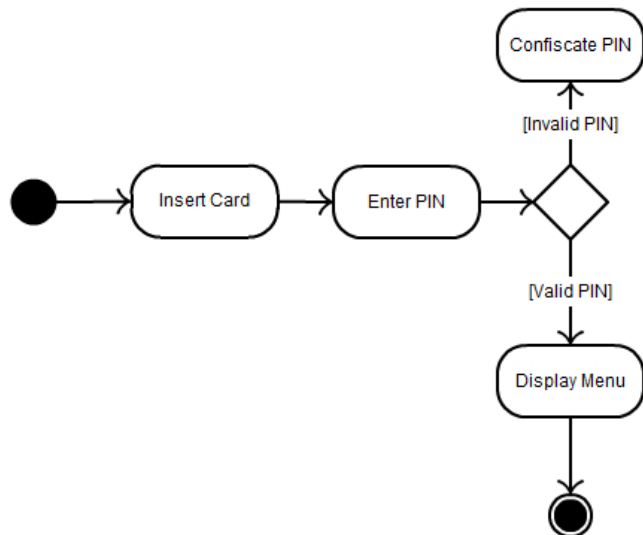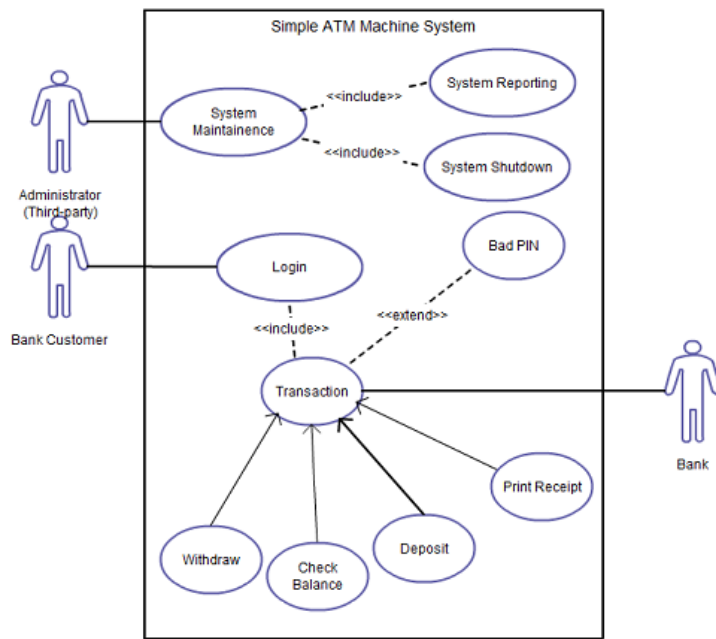
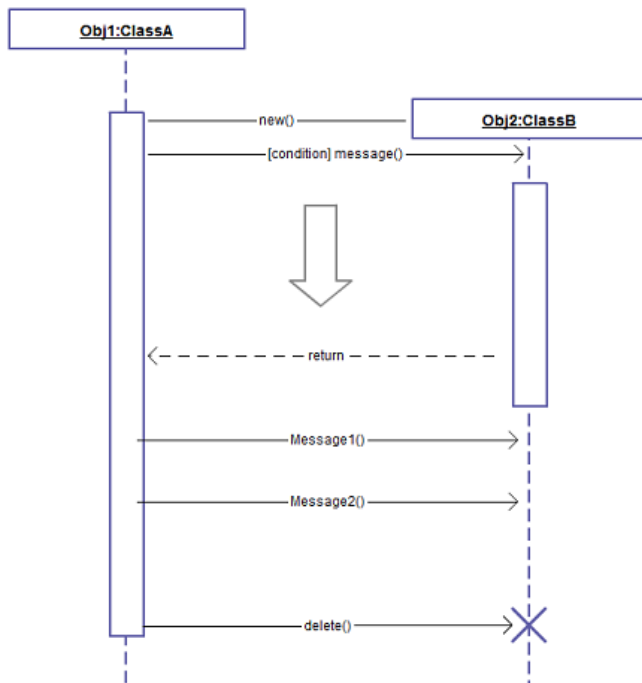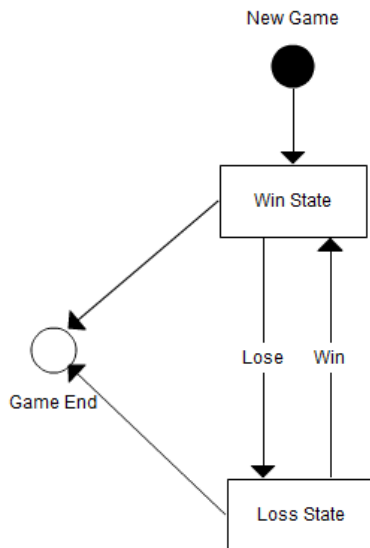Activity Diagrams with start, end, processes and decision points

State Machine Diagram

State machine diagrams are similar to activity diagrams although notations and usage changes a bit. They are sometime known as state diagrams or start chart diagrams as well. These are very useful to describe the behavior of objects that act different according to the state they are at the moment. Below State machine diagram show the basic states and actions.

State Machine diagram in UML, sometime
referred to as State or State chart diagram

Sequence Diagram

Sequence diagrams in UML shows how object interact with each other and the order those interactions occur. It's important to note that they show the interactions for a particular scenario. The processes are represented vertically and interactions are show as arrows. This article explains the purpose and the basics of Sequence diagrams.

New Game

Win State

Lose   Win

Game End

Loss State

Obj1:ClassA

new()

[condition] message()

Obj2:ClassB

return

Message1()

Message2()

delete()

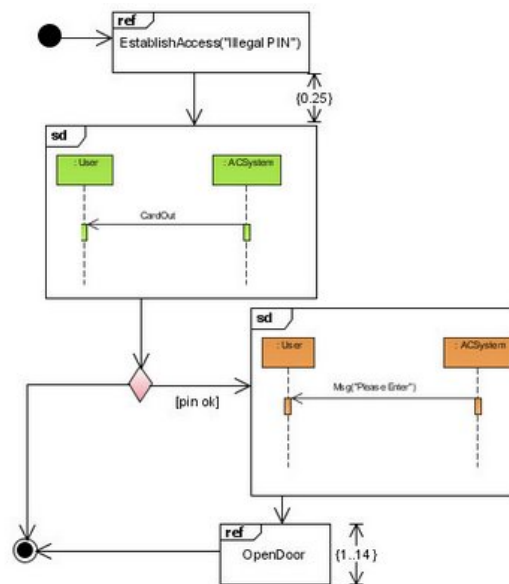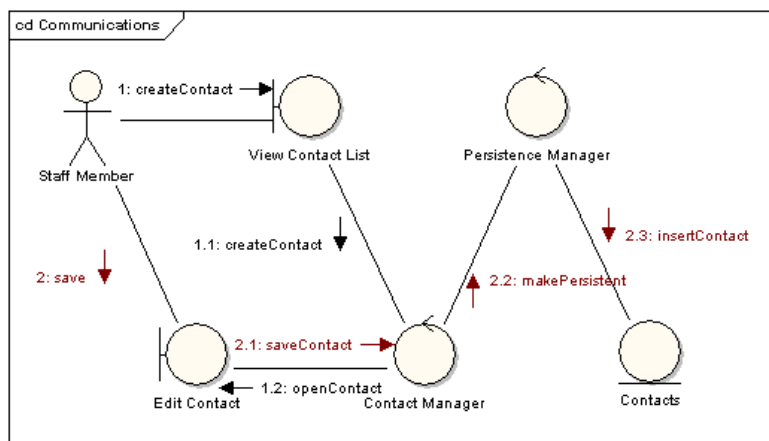Sequence Diagrams in UML shows the interaction between two processes

Communication Diagram

Communication diagram was called collaboration diagram in UML 1. It is similar to sequence diagrams but the focus is on messages passed between objects. The same information can be represented using a sequence diagram and different objects. Click here to understand the differences using an example.

Communication Diagram in UML

Interaction Overview Diagram

Interaction overview diagrams are very similar to activity diagrams. While activity diagrams shows a sequence of processes Interaction overview diagrams shows a sequence of interaction diagrams. In simple term they can be called a collection of interaction diagrams and the order they happen. As mentioned before there are seven types of interaction diagrams, so any one of them can be a node in an interaction overview diagram. (img – http://www.sa-depot.com/?page_id=645)

Interaction overview diagram in UML
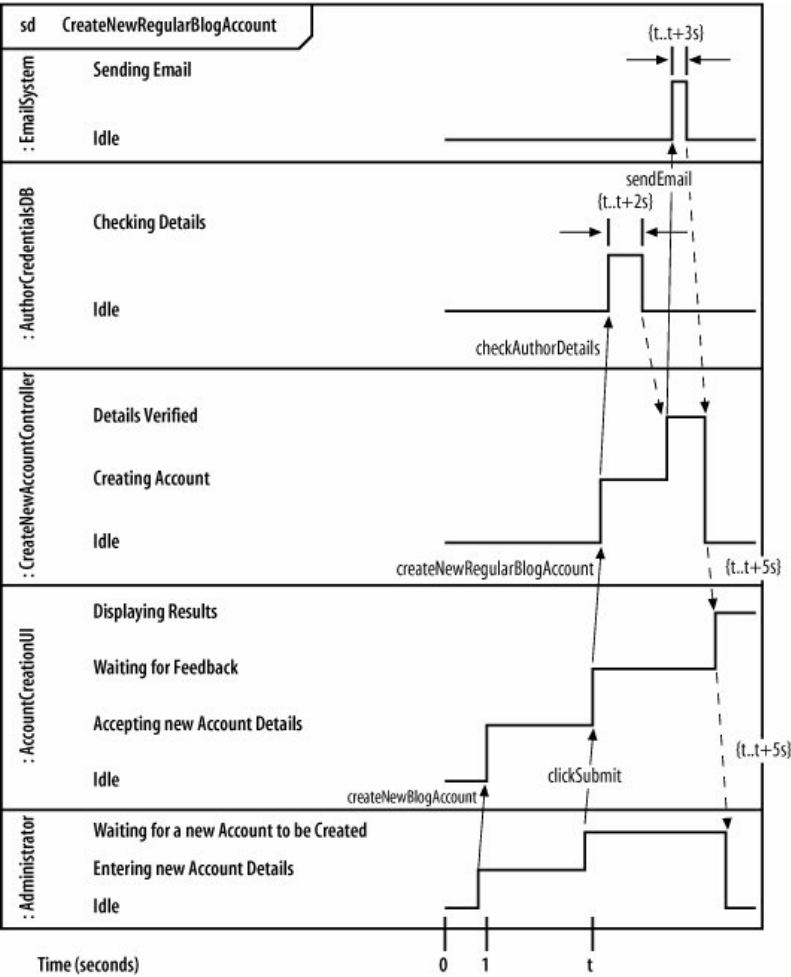
Timing Diagram

Timing diagrams are very similar to sequence diagrams. They represent the behavior of objects in a given time frame. If its only one object the diagram is straight forward but if more then one objects are involved they can be used to show interactions of objects during that time frame as well. (img – http://blog.tangcs.com/2008/01/10/uml-2-diagrams/)

Timing Diagram in UML

Mentioned above are all the UML diagram types. The links given in each section explains the diagrams in more detail and covers the usage, symbols etc. UML offers many diagram types and sometimes two diagram can explain the same thing using different notations.Check this blog post to learn which UML diagram best suits you.If you have any questions or suggestions feel free to leave a comment.

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Tags: UML 2 diagram types, UML behavioral diagrams, UML diagram types, UML interaction diagrams

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62 Comments   +ADD COMMENT

Thomas 18 April 2012 at 4:32 am

Very Helpful Thanks……

Class Diagram Relationships UML 24 April 2012 at 3:33 pm

[...] particular system using the conventions set by the Unified Modeling Language (UML). Out of all the UML diagram types it is one of the most used ones. System designers use