Indian Institute of Information Technology, Allahabad

Software Engineering

Design Level Diagrams

Group Members

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Class Diagram

What is a Class Diagram ?

In Software Engineering a Class Diagram in UML i.e Unified Modelling Language is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, their methods and relationships among the classes.

How a Class Diagram is useful and used in software projects?

1. Class Diagram shows static structure of classifiers in a system.
2. Diagram provides a basic notation for other structure diagrams prescribed by UML
3. It is helpful for developers and other team members too.
4. Business Analysts can use class diagrams to model systems from a business perspective.

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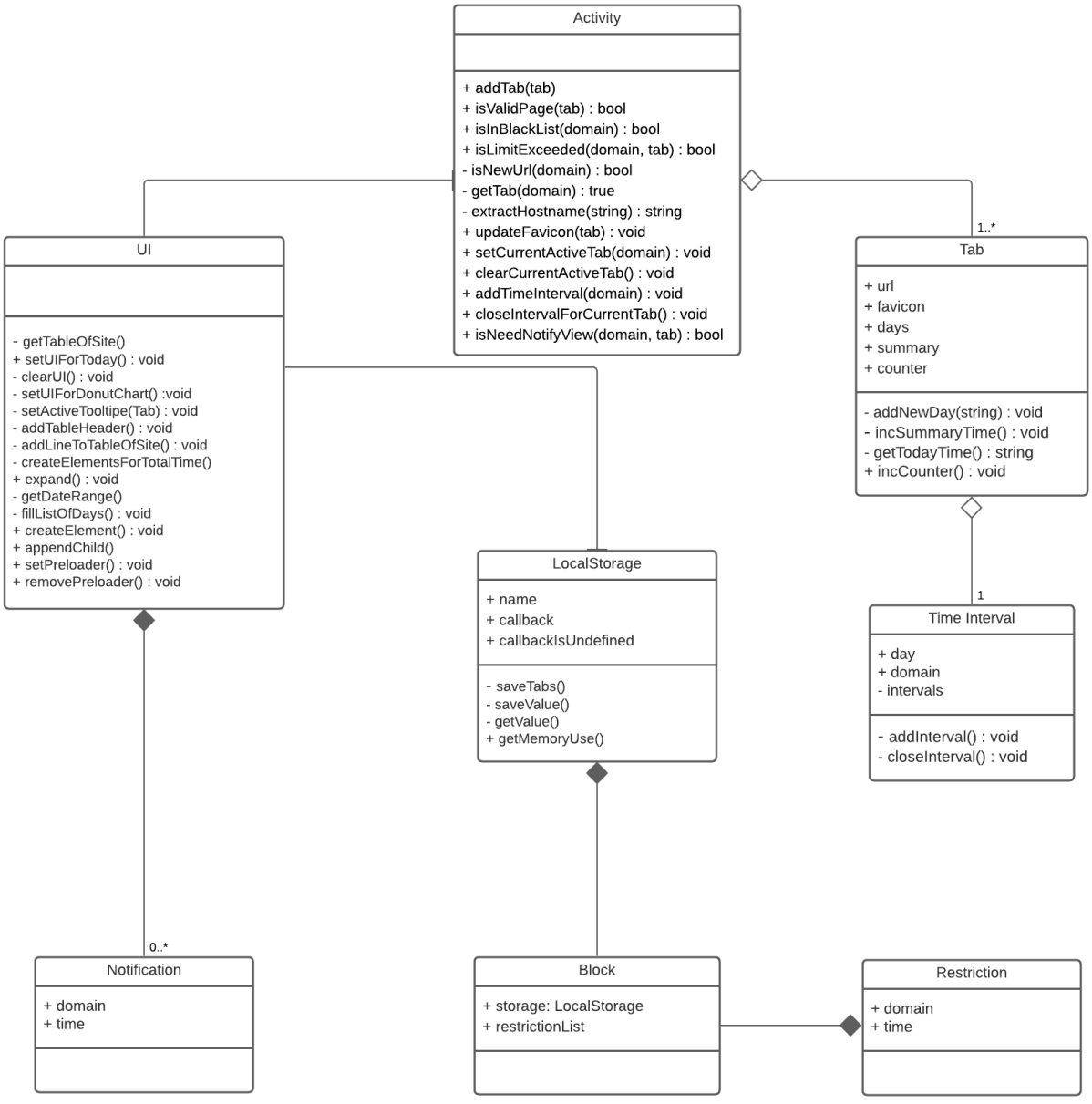
Class Diagram
Software Eng.



Sequence Diagram

A **sequence diagram** is the most commonly used **interaction** diagram.

A sequence diagram simply depicts interaction between objects in a sequential order i.e. the order in which these interactions take place.

We can also call it an event diagram, since it depicts how the system actually works along with highlighting all its major components.

Sequence Diagram Notations :-

1. **Actors :** An actor in a UML diagram represents a type of role where it interacts with the system and its objects. It is out of the system .

2. Lifelines : A lifeline is a named element which depicts an individual participant in a sequence diagram. So basically each instance in a sequence diagram is represented by a lifeline.It is represented by dotted straight line.

3. Messages : Communication between objects is depicted using messages. The messages appear in a sequential order on the lifeline. We represent messages using arrows.

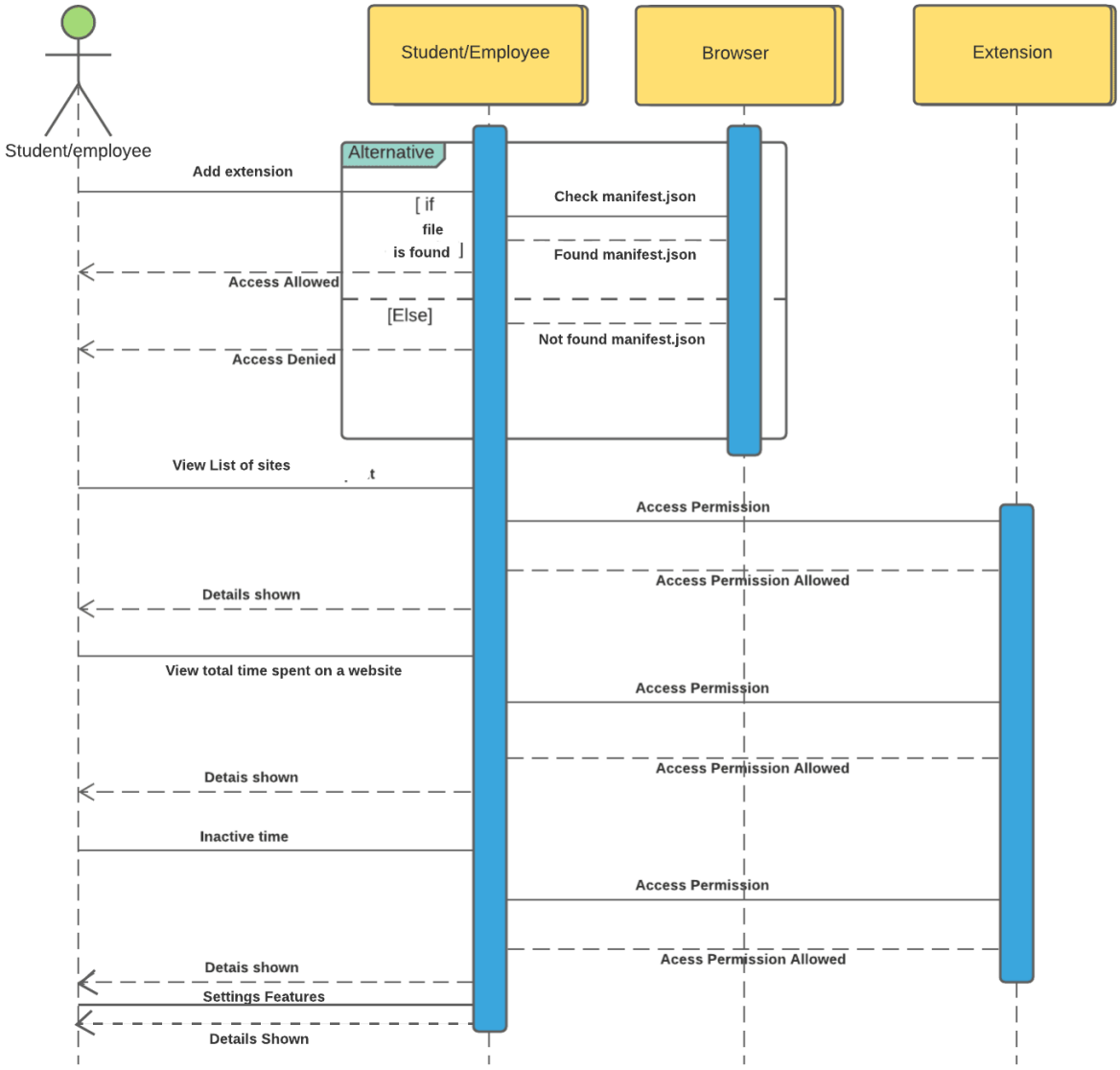
A request message is shown by a solid arrow while a reply message is shown by a dotted arrow.

4. Activations :

- A thin rectangle on a lifeline) represents the period during which an element is performing an operation.

❑ The top and the bottom of the rectangle are aligned with the initiation and the completion time respectively.

Sequence Diagram of "Web Activity Tracker" :



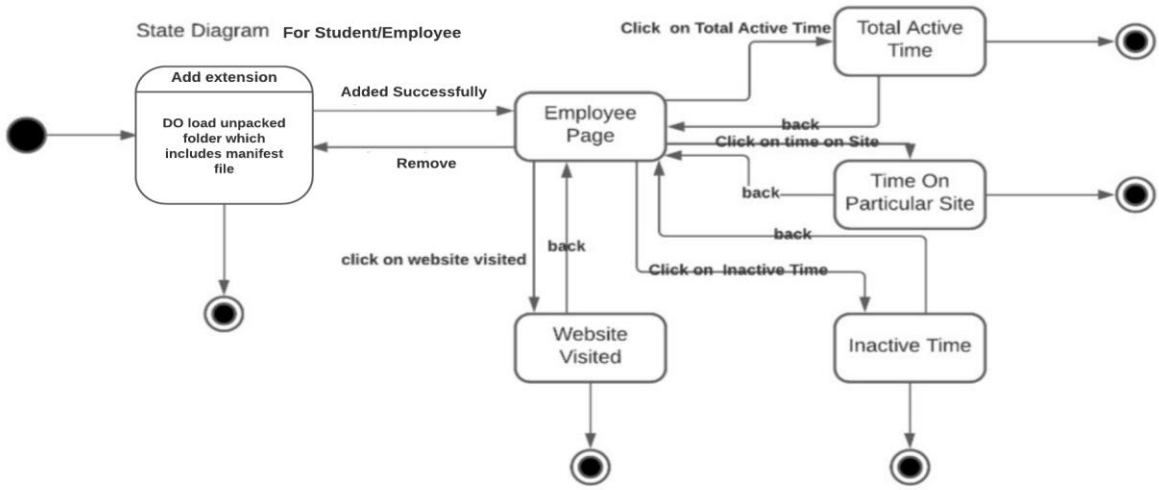
State Diagram

A state diagram is used to represent the condition of the system or part of the system at finite instances of time. It's a behavioral diagram and it represents the behavior using finite state transitions. State diagrams are also referred to as State machines and State-chart Diagrams. These terms are often used interchangeably. So simply, a state diagram is used to model the dynamic behavior of a class in response to time and changing external stimuli.

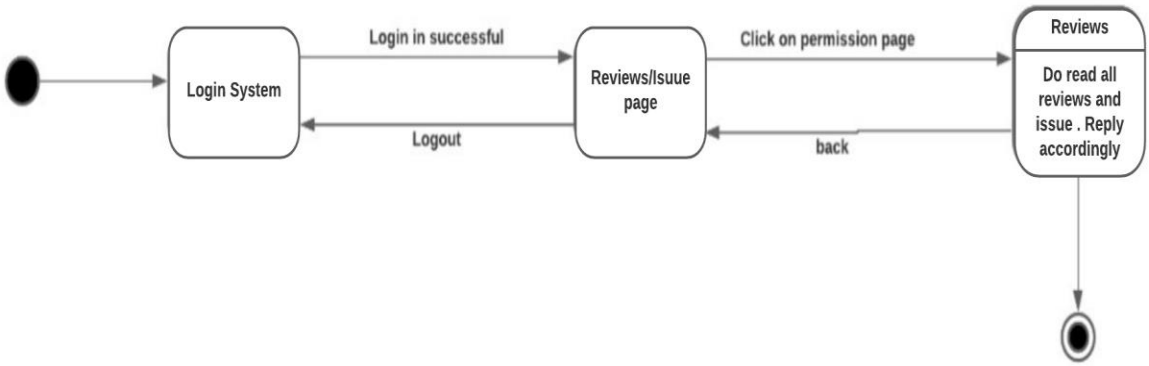
Uses of statechart diagram –

- We use it to state the events responsible for change in state (we do not show what processes cause those events).
- We use it to model the dynamic behavior of the system .
- To understand the reaction of objects/classes to internal or external stimuli.

STATE DIAGRAM Of Student/Employee



STATE DIAGRAM OF Developer



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Entity-Relationship Diagrams

ER-modeling is a data modeling method used in software engineering to produce a conceptual data model of an information system. Diagrams created using this ER-modeling method are called Entity-Relationship Diagrams or ER diagrams or ERDs.

Purpose of ERD

- *The database analyst gains a better understanding of the data to be contained in the database through the step of constructing the ERD.*
- *The ERD serves as a documentation tool.*
- *Finally, the ERD is used to connect the logical structure of the database to users. In particular, the ERD effectively communicates the logic of the database to users.*

Components of an ER Diagrams

1. Entity

An entity can be a real-world object, either animate or inanimate, that can be merely identifiable. An entity is denoted as a rectangle in an ER diagram. For example, in a school database, students, teachers, classes, and courses offered can be treated as entities. All these entities have some attributes or properties that give them their identity.

2. Attributes

Entities are denoted utilizing their properties, known as attributes. All attributes have values. For example, a student entity may have name, class, and age as attributes.

There exists a domain or range of values that can be assigned to attributes. For example, a student's name cannot be a numeric value. It has to be alphabetic. A student's age cannot be negative, etc.

3. Relationships

The association among entities is known as relationship. Relationships are represented by the diamond-shaped box. For example, an employee works_at a department, a student enrolls in a course. Here, Works_at and Enrolls are called relationships.

ER Diagram of "Web Activity Tracker" :