

Introduction to Object Modelling Technique

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INTRODUCTION

- Object modeling technique is a method for **analysis, design** and **implementation** by an object oriented technique.
- Fast and intuitive approach for identifying and modeling all objects making up a system.
- Class attributes, methods, inheritance and association can be expressed easily.
- Dynamic behavior of the objects can be described by using the OMT dynamic model.
- Detailed specification of state transitions and their descriptions within a system.

OMT Methodology

Four **phases** of OMT (can be performed iteratively)

- ***Analysis***: Objects, dynamic and functional models
- ***System Design***: Basic architecture of the system.
- ***Object Design***: Static, dynamic and functional models of objects.
- ***Implementation***: Reusable, extendible and robust code.

Three different parts of OMT Modeling

Object model

- Represents the static, structural, 'data' aspects of a system

Dynamic model

- Represents the temporal, behavioural, 'control' aspects of a system

Functional model

- Represents the transformational, 'functional' aspects of a system

OBJECT MODEL

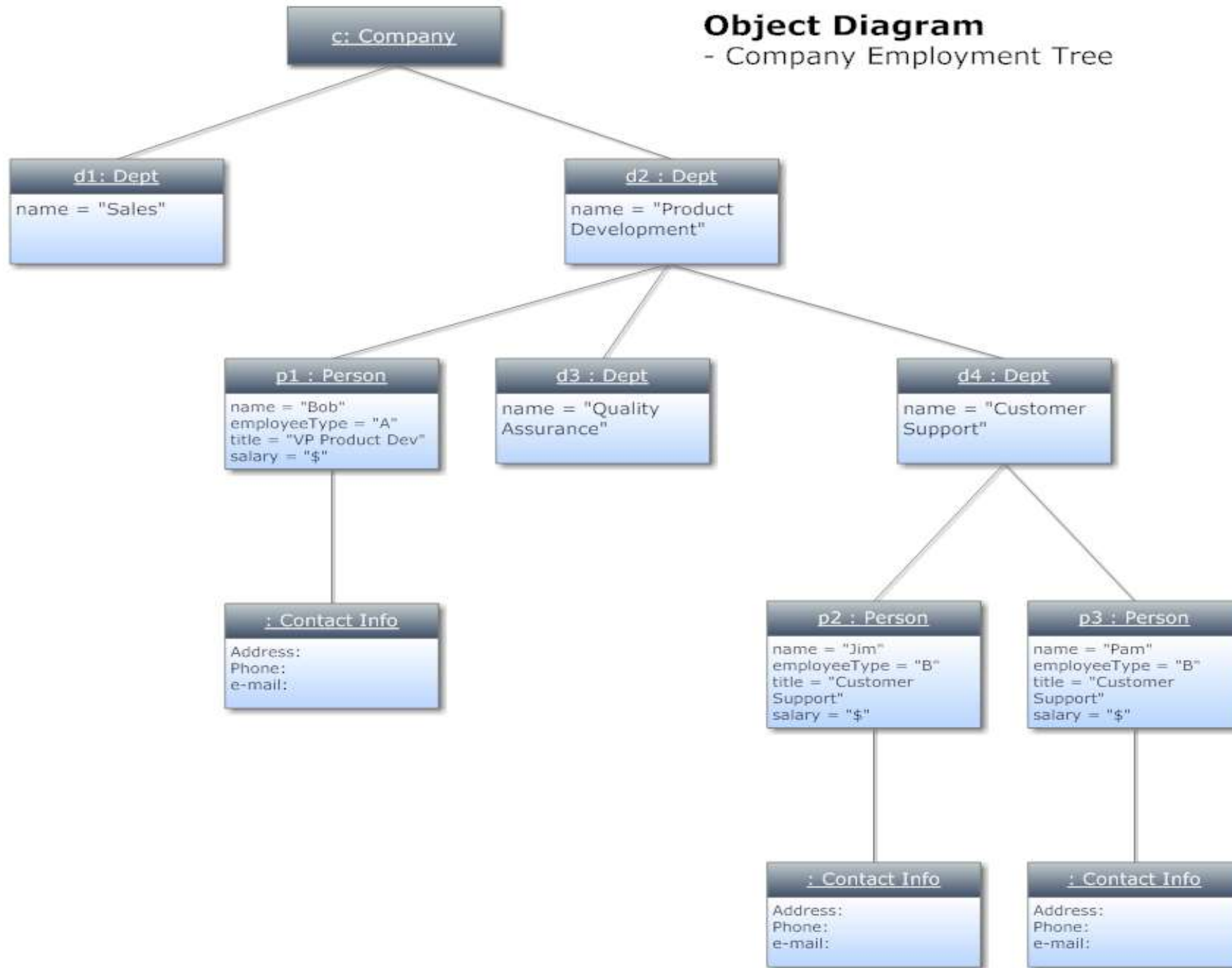
- The object model describes:
 - the structure of the object
 - the relationship of one object with other objects
 - attributes and operations of the objects.
- Captures the concepts from the real world that are useful for the application.
- Represented by **class diagram** and **object diagram**.

OBJECT DIAGRAM

- Models the **instances of classes** that are present in class diagram.
- Used to model the **static design view** of the system.
- Defines the **attributes and operations** of each object.
- Object diagram contains:
 - Objects
 - Links

Object Diagram

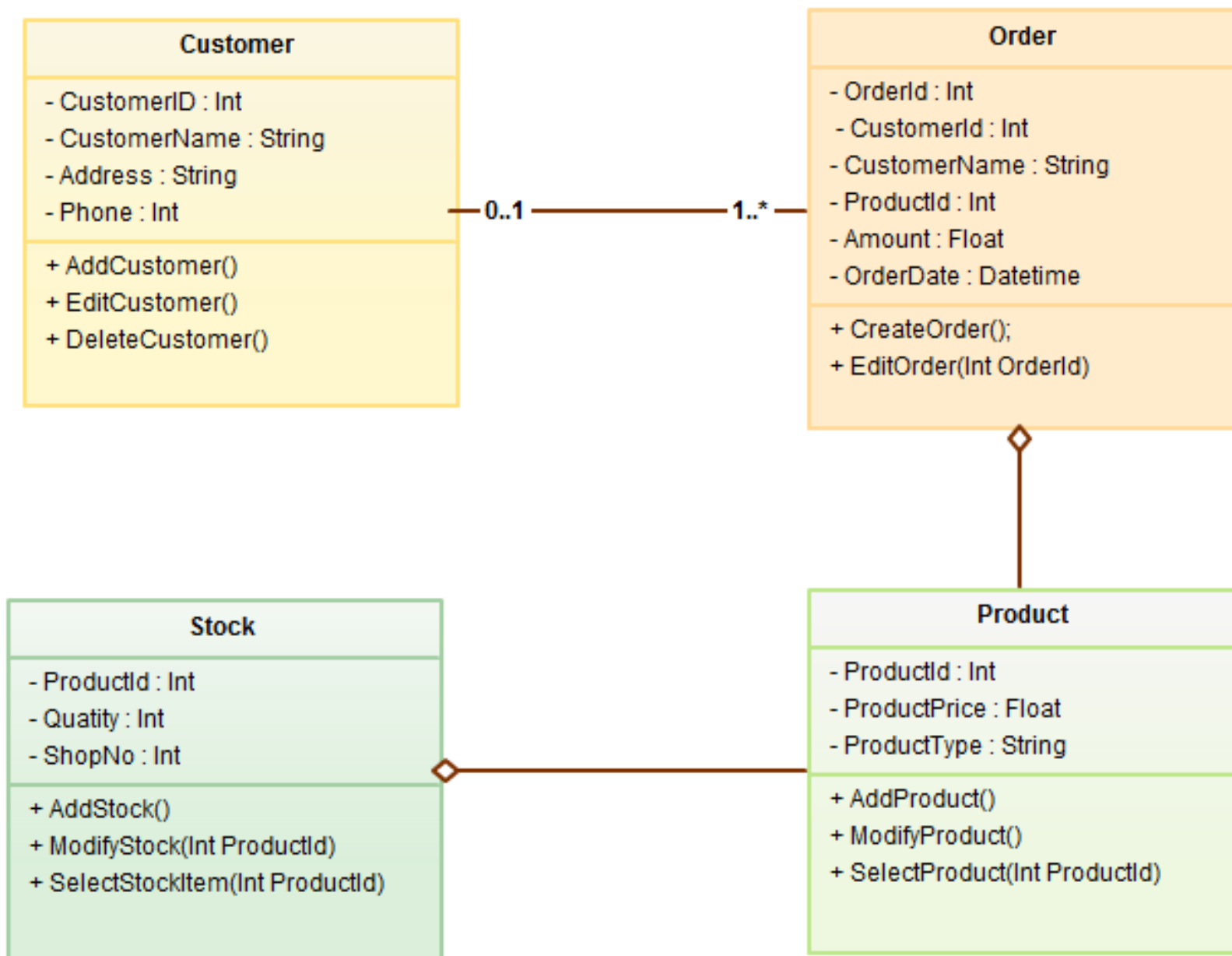
- Company Employment Tree



CLASS DIAGRAM

- A **graphical representation** used for modeling classes and their relationships.
- Describes all possible objects belonging to the classes.
- Used for **abstract modeling** and for implementing actual program
- The class diagram is concise and can be understood easily.
- Classes are interconnected by **association lines**.

Class Diagram for Order Processing System



OMT Dynamic Model

- States, transitions, events and actions.
- Concerned with the **time and sequencing** of the operations of the object.
- Captures **control** aspect of the system.
- Represented by **state transition diagram**.

STATE TRANSITION DIAGRAM(1)

➤ **State:**

Some **behavior** of a system that is **observable** and that lasts for some **period of time**.

➤ A **state** is when a system is:

- **Doing** something – e.g., **heating** oven, **mixing** ingredients, **accelerating** engine,
- **Waiting** for something to happen – **Waiting** for user to enter password, **waiting** for sensor reading.

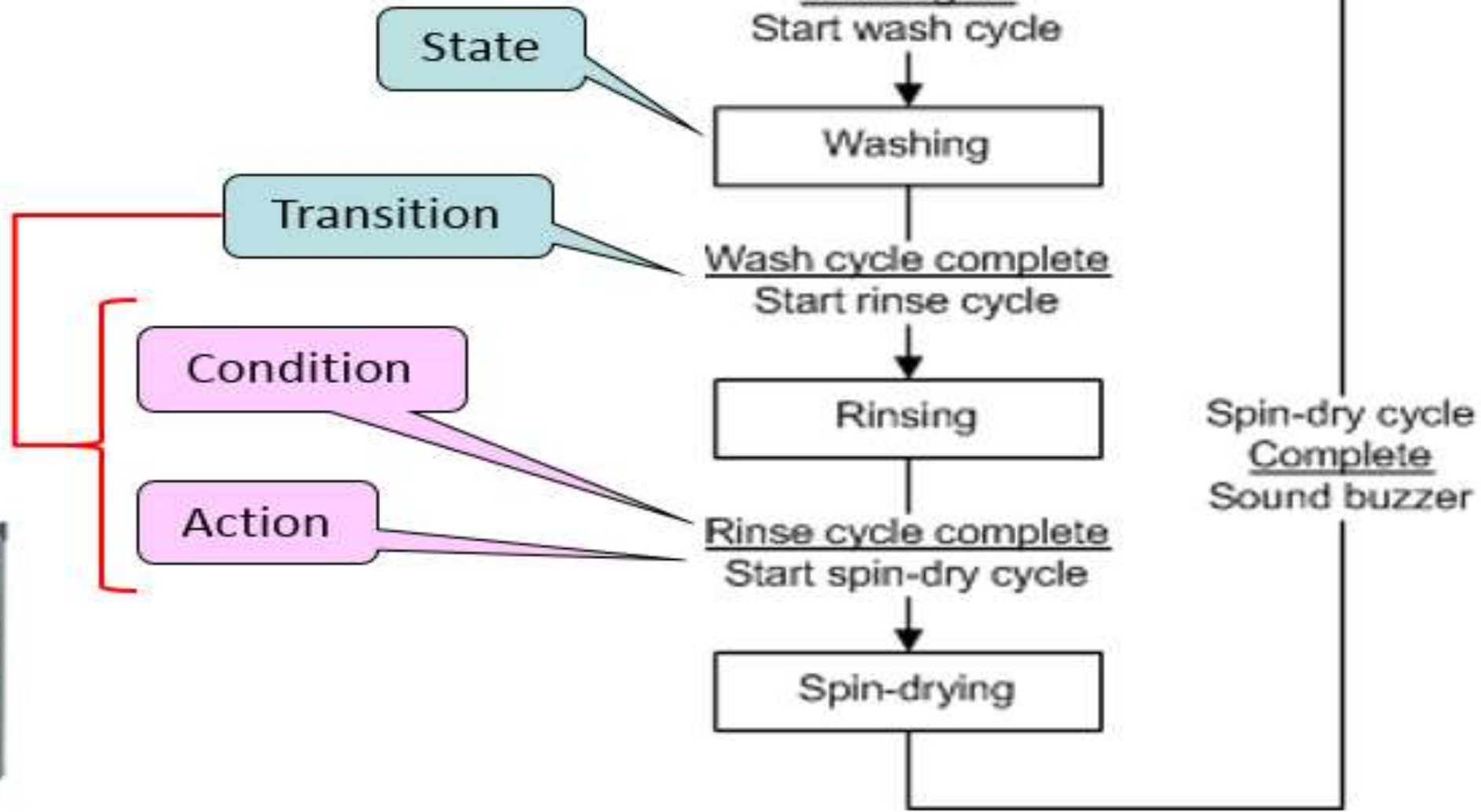
➤ **Transition:**

(Virtually) instantaneous change in state (behavior).

STATE TRANSITION DIAGRAM(2)

- A **condition** is typically some kind of **event**, e.g.:
 - Signal
 - Arrival of an object (data/material)
- An **action** is the appropriate **output** or **response** to the event, e.g.:
 - Signal or message
 - Transfer of an object,
 - Calculation

Here's a **simple** example STD for a washing machine.



FUNCTIONAL MODEL

- It describes how one object collaborates with other in order to achieve behavior of the system.
- Overall behavior of system represented with the help of dynamic and functional model.
- Includes **use case diagram, sequence diagram and activity diagram.**
- Represented by **data flow diagram.**

The functional model includes:

Use case diagram

- Shows how the outsider actors interact with the system to achieve functionality.

Sequence diagram

- Represents the objects that interact and the time sequence of their interaction.

Activity diagram

- Represents flow of control among various objects.

DATA FLOW DIAGRAM

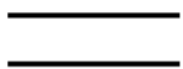
- Shows flow of data between different processes in a business.
- Simple and intuitive method for describing business processes without focusing on the details of computer systems.
- Four primary symbols



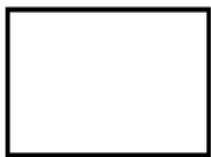
Process- any function being performed



Data Flow- Direction of data element movement

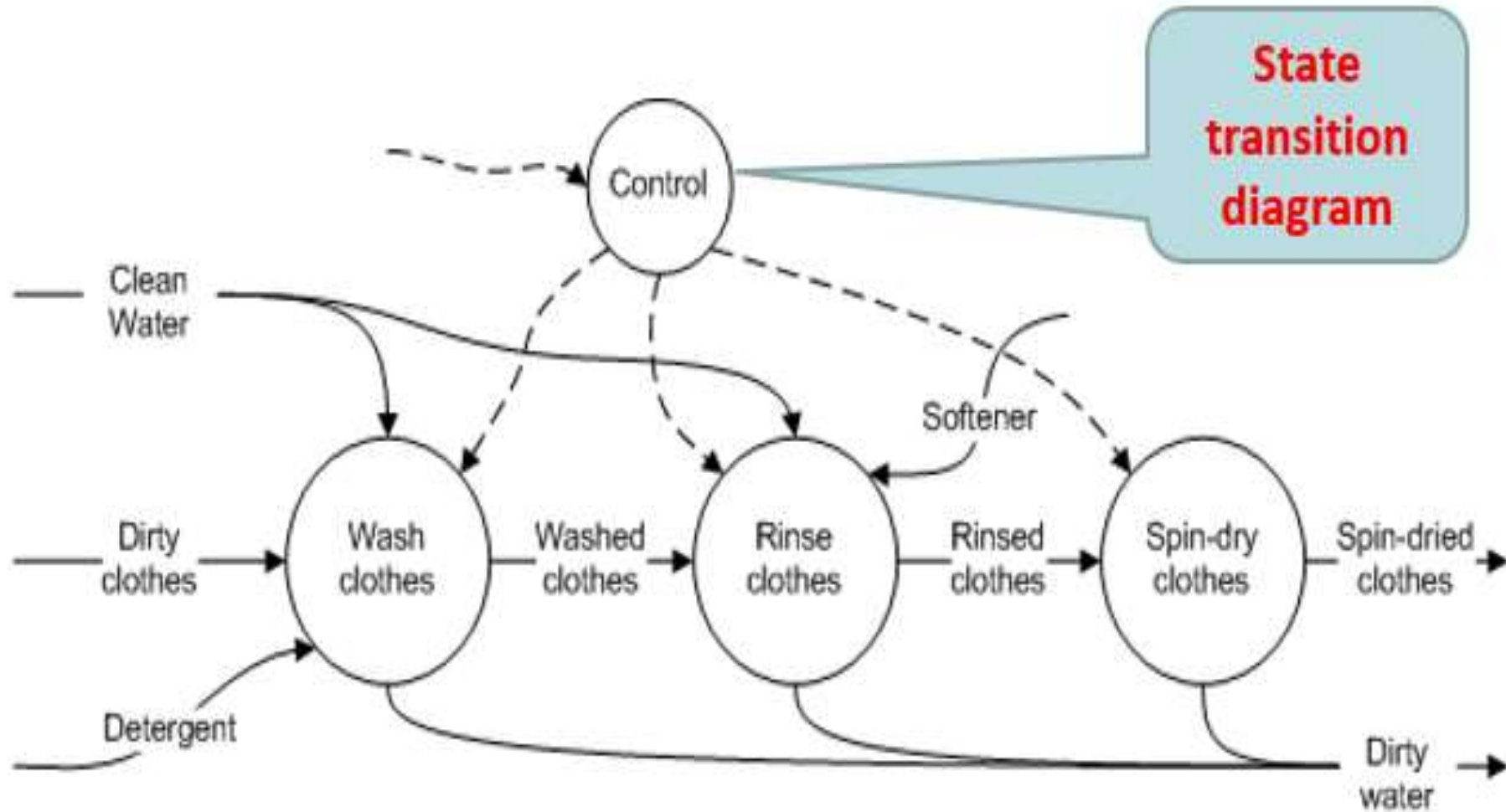


Data Store – Location where data is stored



External Entity-Source or Destination of a data element

Here's a **simplified** data flow diagram for our wash machine, which shows the three primary functions and associated material flows:



Relationship among the Models

- The models are related with each other.
- Every model represents one aspect of the system.
- The **object model** describes the data structures.
- The **dynamic and functional model** represents the operations performed on these data structures.

Object model and dynamic model

- The **dynamic model** describes the control structure of objects.
- The states of the **dynamic model** can be related to classes of attribute and links to values of an object.
- Events and actions can be represented as operations on the **object model**.
- The **object model** concepts of generalization, aggregation and inheritance also apply to the **dynamic model**.

Object and functional model

The **functional model** describes how the objects interact with each other.

All four components of functional model can be related to object model:

- **Processes:** These are the methods implemented in the objects.
- **Actors:** These are the objects in the object model.
- **Data stores:** These are also objects in the object model or attributes of objects.
- **Data flows:** These are values in the object model. Data flows to or from actors represent operations on or by objects. Data flows to or from data stores represent queries or updates.

Dynamic and functional model

- Dynamic model states **when** operations are performed.
- Functional model states **how** they are performed and which arguments
- Actors are **active** objects, the dynamic model has to specify when it acts.
- The data stores are **passive** objects, they only respond to updates and queries, therefore you do not have to specify in the dynamic model when they act.

THANK YOU!

Any queries?