

Subject: Software engineering

Topic: Composit structure diagram

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Academic year: 2020-2021



Composite Structure Diagram

Composite Structure Diagram is used to explore run time instances collaborating over communication links. In other words Composite Structure diagram allows the users to peek inside an object and see what it is composed of. Composite structure diagram provides a high level abstraction of the system which helps modelers and engineers to better explain the system to others. Its focus to explore the *collaboration between entities* and *run time grouping* of instances. To be honest composite structure diagram is not much of use, there is no clear boundary defined for using collaborations in composite structure diagram. Examples what I have seen so far uses collaboration elements in composite structure diagrams. In my opinion it is better to choose diagrams like sequence diagrams whose syntax is known by most of the engineers than to go for different type of diagrams.

Elements of an Composite Structure Diagram

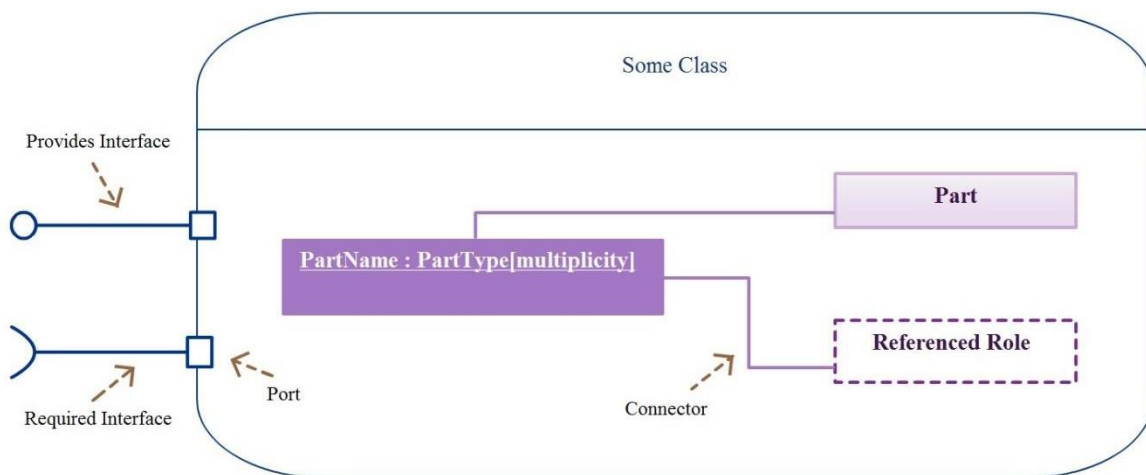


Figure 1: Composite Structure Diagram Elements

Part

Part refers to one or two object instances that is owned by the class. Part is represented as a rectangular box inside the classifier. Syntax for Part notation is as follows. All the three (Part name, Part Type and multiplicity) are optional but should contain at least one of them.

Part name: Part Type [multiplicity]

Referenced Part

Part which are associated with other classifier are represented by dotted rectangle. Role names of the collaboration are included to indicate which object it is collaborating with.

Port

Ports are the interaction points that are used by classifiers to connect with parts and with the external environment. Ports that are visible to the environment are represented on the boundary of the classifier, while that are protected to the environment is shown inside the boundary. Multiplicity could also be associated with Port. There are two types of ports – Service Port and Behavior Port

Service Port - Ports can be used to expose the services provided by the classifier to its environment. Ports are service ports by default. In the below example Library Service is a service class which provides library related services. Search Port is an explicit window for other objects to interact with this encapsulated component.

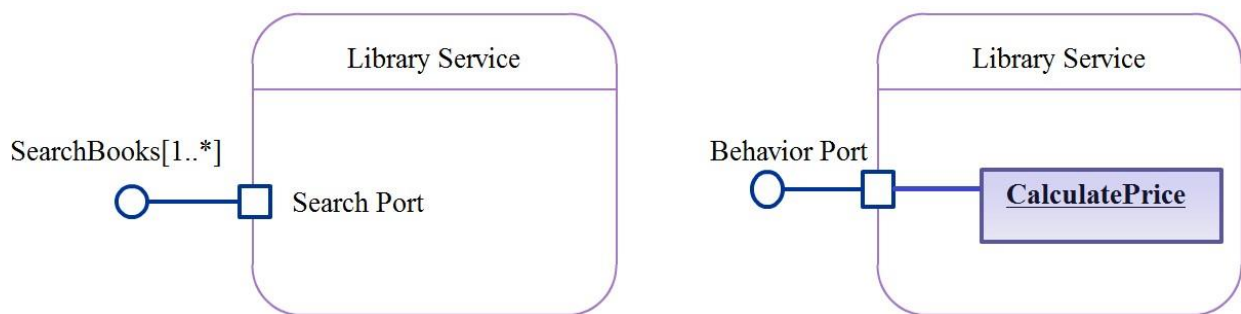


Figure 2: Service & Behavior Port

Behavior Port – Port that helps its environment to access the behavior of the classifier. In simple words -Calling a method of a member object by the containing object.

Connector

Communication between notations in a composite structure diagram is represented using connectors. Syntax of a connector shown below.

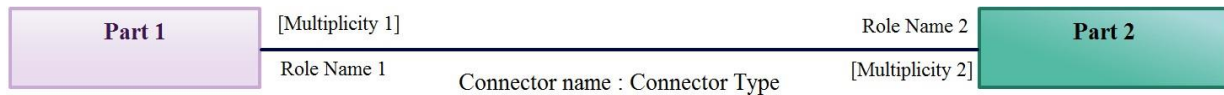


Figure 3: Connector

Constructing Composite Structure Diagram for our Case Study

In our Order Processing system, a lot seem to be happening in Order object. Let us construct our composite structure diagram for our Order classifier.

Step 1: Identify the parts present in the classifier

Order class interacts with the following classifiers

1. Account class for getting the details of our clients registered customer
2. Order details class for getting information for a particular order

Step 2: Is there any reference roles involved?

There are two reference role involved in our Order Processing System.

1. Account Class refers Client Database for getting registered customer information
2. Order Class refers the inventory for getting product details

Step 3: Presence of service port and behavior port?

We have behavior ports here since Order class has to use the member of other objects.

Step 4: How are they associated?

While looking at connectors we have to look out for multiplicity, role names and connector name if available.

Our constructed composite structure diagram of Order class in Order Processing system looks like the figure shown below.

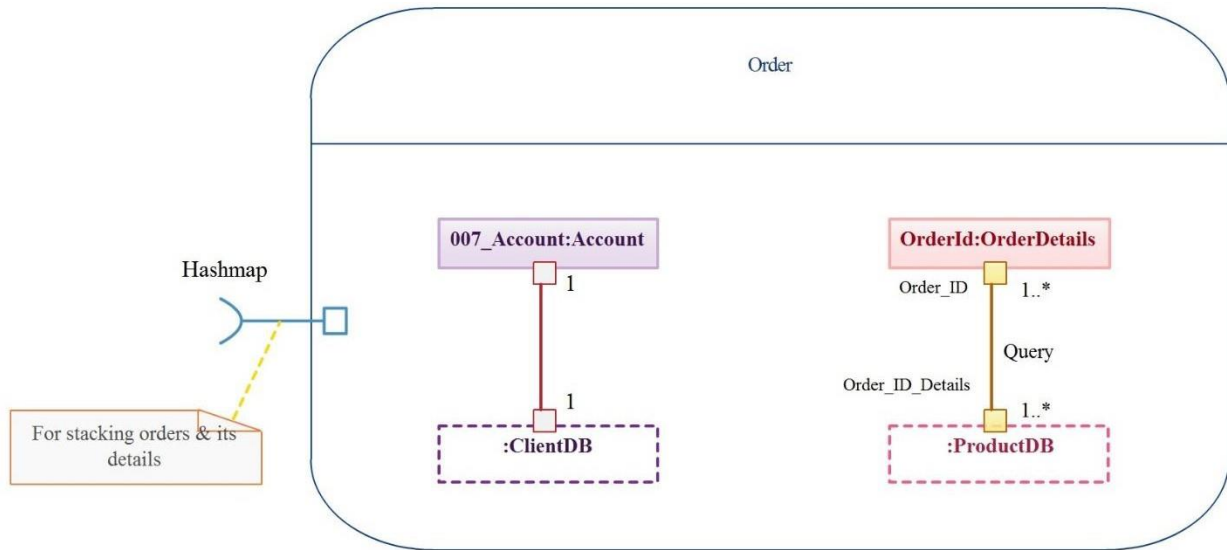


Figure 4: Composite Structure Diagram - Order

Review

- Composite Structure diagram explores run time collaboration over communication links
- Elements of composite structure diagram are – Part, Ports, Connectors

Summary