

Unified Modeling Language

Composite Structures

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Composite Structures

- **Common mechanisms used for modeling internal structures of classifiers, interaction points isolating classifiers from their environments, classifier interfaces and collaborations.**
- The term “structure” refers to a composition of interconnected elements, representing run-time instances collaborating over communications links to achieve some common objectives.

Applied for:

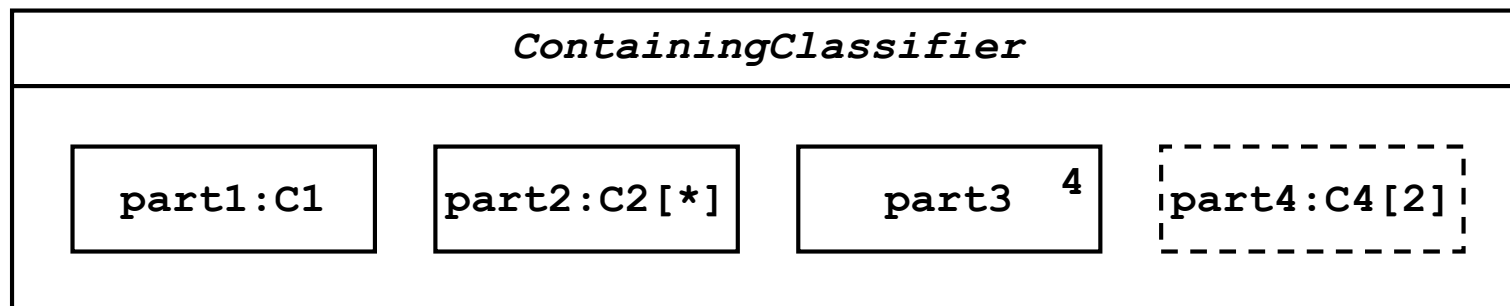
- Classes.
- Components.
- Collaborations.
- Nodes.

Diagrams:

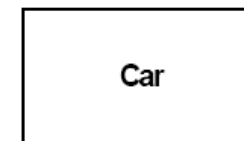
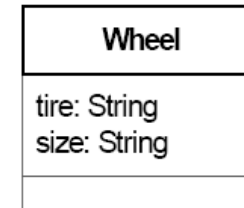
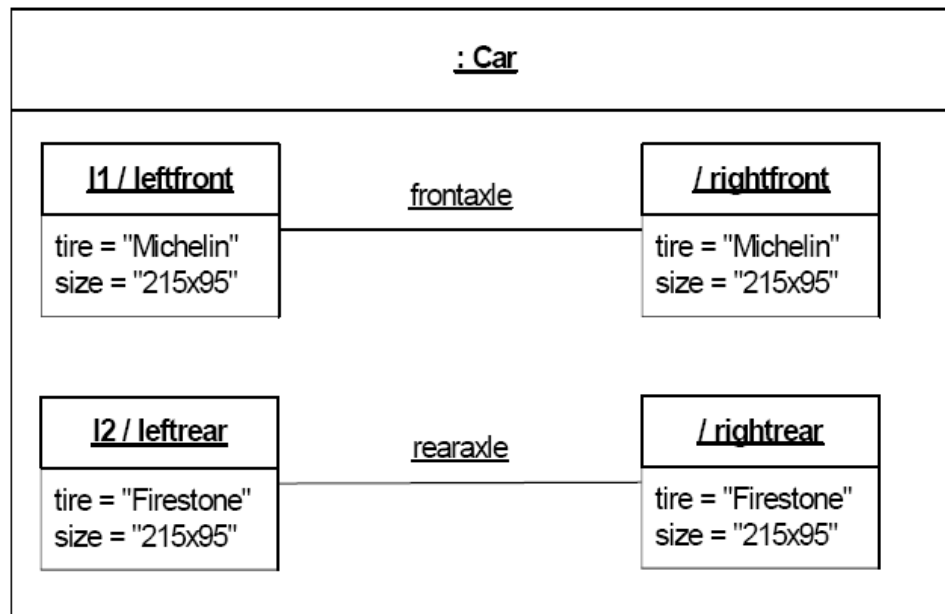
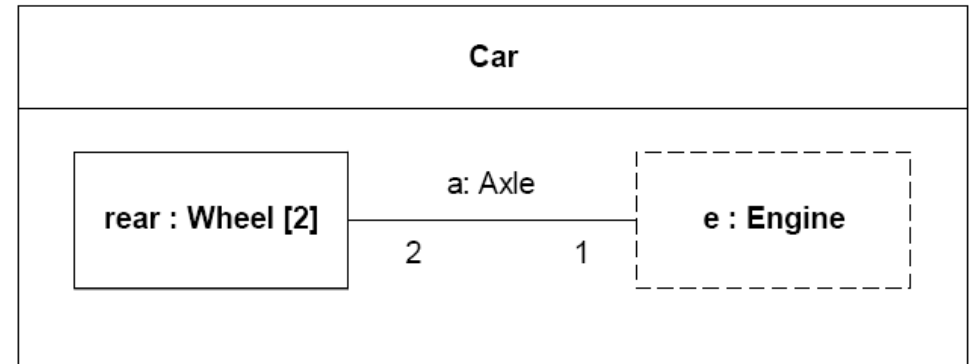
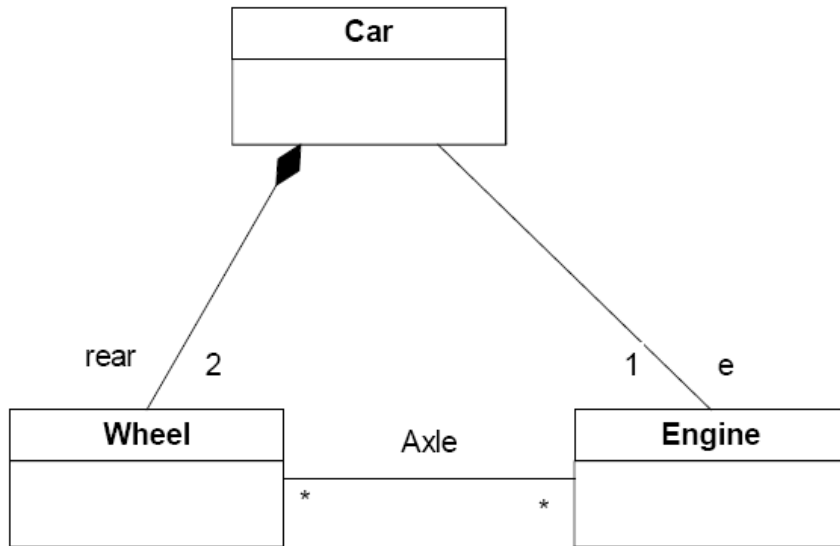
- Composite structure diagram.
- All composite structures can also be shown on other structure diagrams.

Property Owned as a Part

- Represents a set of instances that are owned by a containing classifier (called *structured classifier*) instance.
- Containment by composition.
- When an instance of the containing classifier is created, a set of instances corresponding to its properties may be created either immediately or later.
- All such instances are destroyed when the containing classifier instance is destroyed.
- Format: $\{name ['/' rolename] | '/' rolename\}$
 $[':' classifiername [',' classifiername]^*]$
- A specialized *connectable element*.



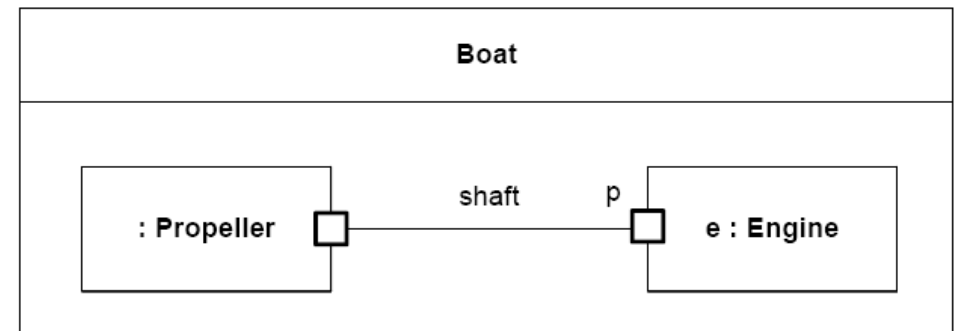
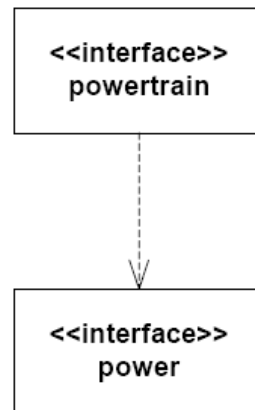
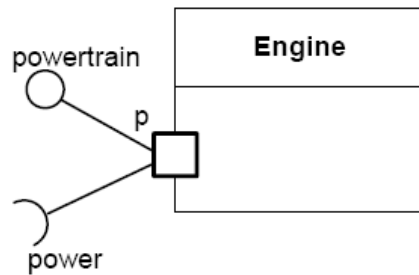
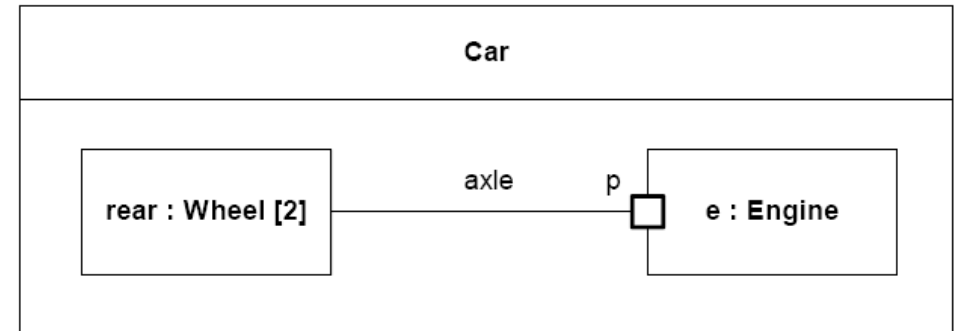
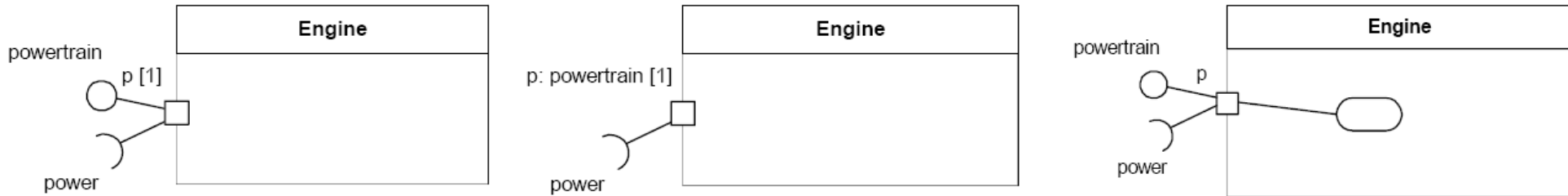
Examples of Parts



Port

- A property of a classifier (called *encapsulated classifier*) that specifies a distinct *interaction point* between that classifier and its environment or between the (behavior of the) classifier and its internal parts.
- Ports are connected to properties of the classifier by connectors through which requests can be made to invoke the behavioral features of a classifier.
- A port may specify the services (as associated interfaces) a classifier *provides* to its environment as well as the services that a classifier *expects* of its environment.
 - The required interfaces characterize the requests that may be made from the classifier to its environment through this port.
 - The provided interfaces characterize requests to the classifier that its environment may make through this port.
- Type of a port must realize provided interfaces.
- A port by default has public visibility.
- A specialized *property* (and therefore also *connectable element*).

Examples of Ports



Connector

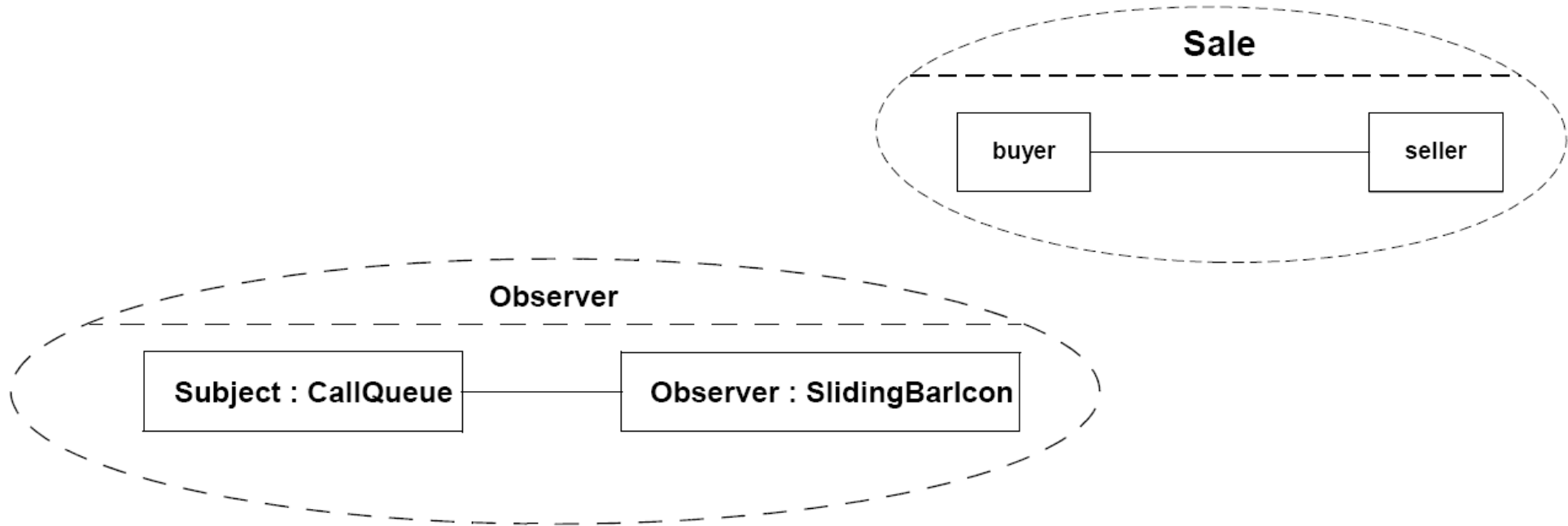
- A link that enables communication between two or more instances represented by connectable elements.
- May be an instance of an association, or a link between parameters, variables, slots, or the same instance.
- May be realized by a “simple” pointer or by something as “complex” as a network connection.
- Syntax: ([*name*] ‘:’ *association*) | *name*
- Two or more connector ends
 - Adornments as for association ends.
 - No multiplicity ⇒ matches the multiplicity of the end it is attached to.

Collaboration

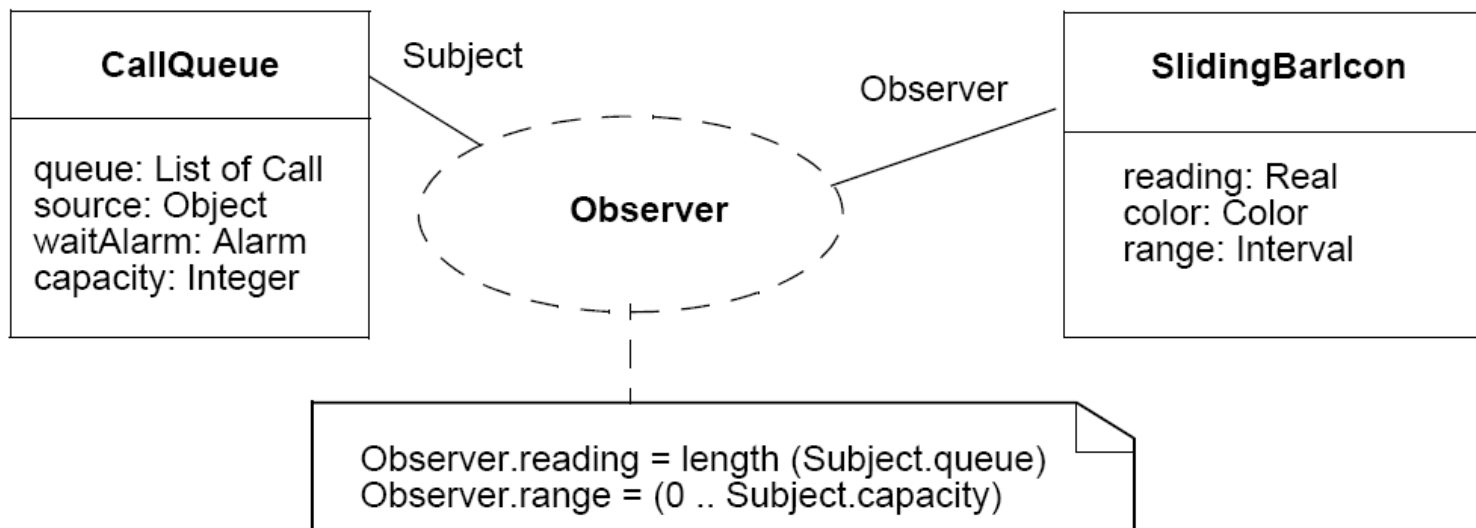
- Description of a structure of collaborating elements (their roles) to be played by instances, each performing a specialized function, which collectively accomplish some desired functionality.
- Cooperating entities are the properties of the collaboration.
- Connectors define communication paths between the participating instances.
- Can own behavior(s), e.g., interaction(s) of roles.
- Incorporates only aspects that are necessary and suppresses everything else, e.g., the precise class of participating instances, or their irrelevant features and links.
- A specialized *structured classifier* and *behaviored classifier*.



Examples of Collaborations

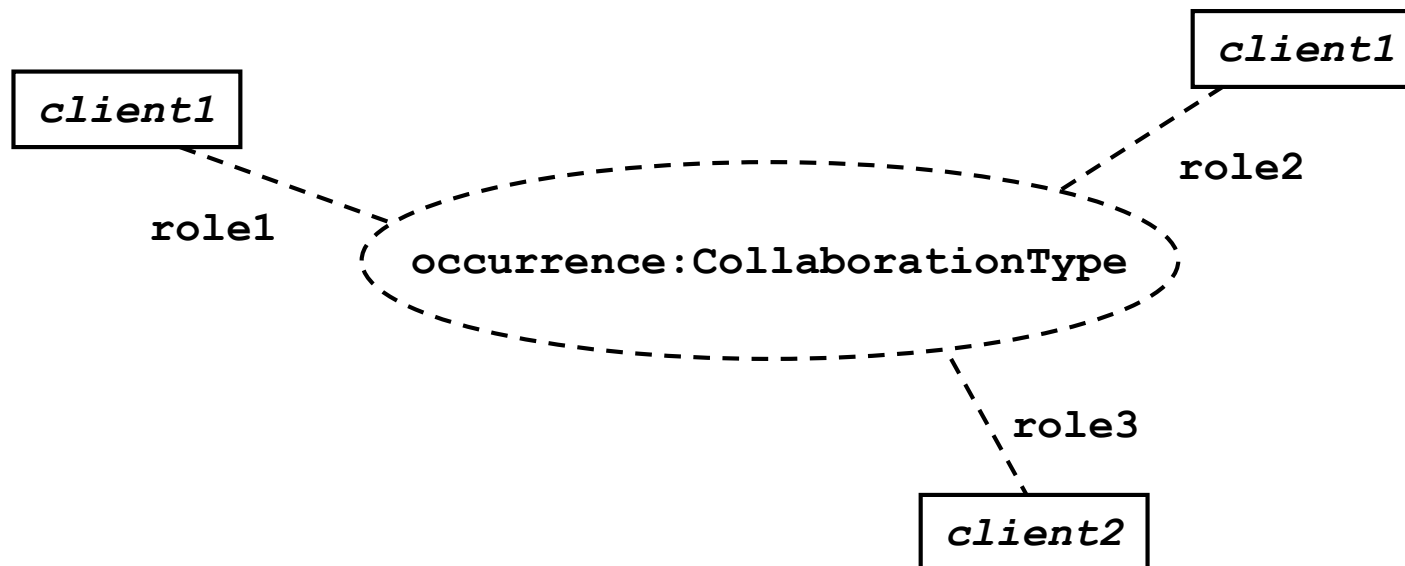


alternative notation:



Collaboration Use

- The application of the pattern described by a collaboration to a specific situation involving specific classes or instances playing the roles of the collaboration.
- A collaboration use relates a feature in its collaboration type to a connectable element in the classifier or operation that owns the collaboration use.
- Any behavior attached to the collaboration type applies to the set of roles and connectors bound within a given collaboration use.



Example of Collaboration Use

