CS230 Tutorial 3

This week we will look at classes, interfaces and abstraction in more detail. We'll use UML to understand and answer questions about a system and then use ArgoUML to model a case study.

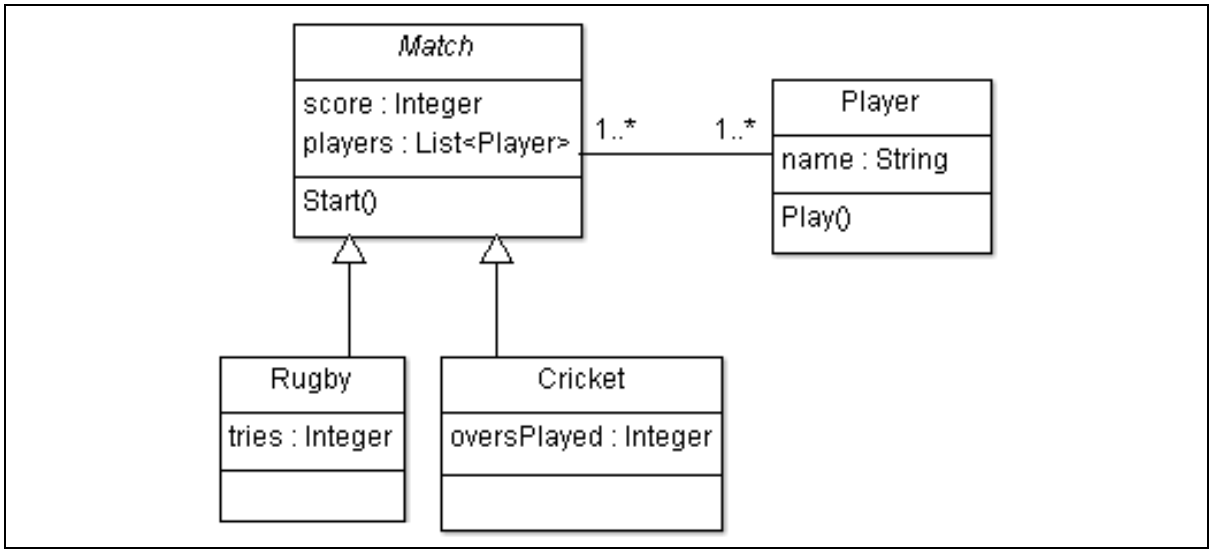
Quiz dates:

- **Quiz 2**, available from 9am Friday 3 Apr to 11:30pm Monday 6 Apr
- **Quiz 3**, available from 9am Friday 8 May to 11:30pm Monday 11 May
- **Quiz 4**, available from 9am Friday 29 May to 11:30pm Tuesday 2 Jun.

Review

Last week we looked at designing UML diagrams with ArgoUML. Test your understanding by answering the following question.

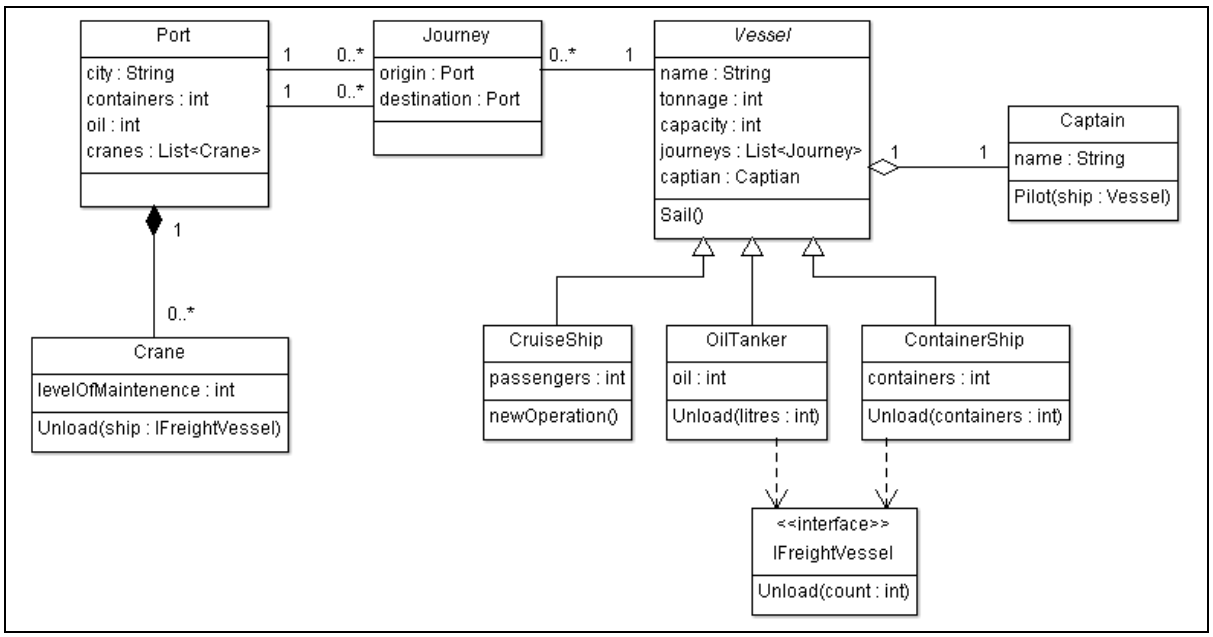
Question 1: Examine the following simple relationship in the following diagram:



a. What type of diagram is this?	
b. What is the relationship between *Rugby* and *Match*?	
c. What is the multiplicity between *Match* and *Player*?	
d. What *type* of class do you think Match is likely to be?	

Part A – Expressive Relationships in UML

The following UML class diagram describes a way to model sea ports and large ships. We'll be examining this example in detail as it includes the association, aggregation, composition and interface relationships.



Question 2: Name two classes that have an *Association* relationship

Question 3: Name two classes that have an *Aggregation* relationship

Question 4: Name two classes that have a *Composition* relationship

Question 5: Name a class that *Implements* an interface

Refer to the class diagram on page 2 for the following questions.

Question 6: Name a class that *extends* another class (i.e. name a subclass)

Question 7: Identify one abstract class

Question 8: List all Attributes of the OilTanker class (including inherited ones)

Question 8: Reference types are the different variable types that can be used to refer to an object and are related to polymorphism. What reference types can be used to refer to a *ContainerShip* object?

Part B – Modelling a Domain

You have been hired by a restaurant to build them a point of sales system. The restaurant makes both food and drink by using local ingredients. Your manager tells you they want to keep track of all the different food and drink items they sell on their menu, as well as the ingredients required for each item. Both food and drink should have dietary notes (such as "may contain traces of nuts") as well as a price. Drinks carry an extra service charge which must be captured separately. Food needs to have a course (entrée, main, dessert). The menu changes periodically and the system you design will need to keep track of this. You will also need to keep track of stock levels for ingredients. An ingredient could be used for either a drink or food.

Next, your boss asks if you can extend the system to handle reservations. They don't care too much about who has made the booking apart from their phone number. They want to keep track of the table number for the reservation. At the end of the meal, your boss needs to be able to calculate the bill for the table, based on what the customer ordered.

Question 9: Solution UML Class Diagram