

## Week 6 Tutorial – Class Diagram- example answers

### Question 1: MovieDVD-shop

A movie-shop has the following simple operation. Draw a class diagram to represent its structure.

The system maintain the sale and rent transaction of the movies. The system allows user to browse the catalogue of the movies. The users have to subscribe as a member if he want to rent a movie. Only members are allowed to rent movies.

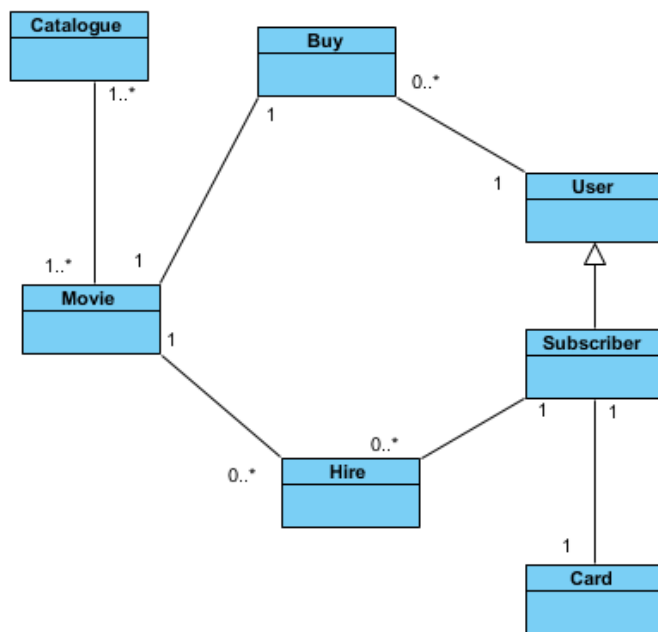
Members and non-members are allow to buy the movies. If the members want to buy or rent a movie, they can pay with their member card which has rechargeable credits. Credit is updated on the card during buy/rent operations. A non-member is allowed to buy movies but not allowed to rent movies. The movie catalogues categorize movies by genre.

### Potential class

1. Movie – Passed
2. Browsing – Failed: not retaining information
3. Catalogue – Passed
4. Shop – Failed: not retaining information
5. User (non-member) – Passed
6. Member – Passed
7. Rent Transaction – Passed
8. Sale Transaction – passed
9. Card – Failed: attribute (Design decision if you want to split the card from its member)
10. Credit – Failed: attribute

### Relationship

1. allows user to browse the catalogue of the movies (We are probably not interested)
2. The users have to subscribe as a member (member is a type of user)
3. rent movies (rent transaction of the movies)
4. buy movies (sales transaction of the movies)
5. member card has rechargeable cards
6. Only members are allowed to rent movies
7. Members and non-members are allow to buy the movies
8. The movie catalogues categorize movies by genre



## Question 2: Banking System

A banking system maintains data on customers (identified by name and address) and their accounts.

Each account has a balance and there are 2 type of accounts: one for savings which offers an interest rate, the other for investments, used to perform transaction on stocks.

Stocks are bought/sold at a certain quantity for a certain price (ticker) and the bank applies commission on each transaction.

### Potential Classes

Bank system: Not retaining information

Data: Referring to customer

Customers

Account

Balance: single attribute

Type: referring to Savings and Investment

Savings

Interest rate: Single attribute

Investment

Transaction

Stock

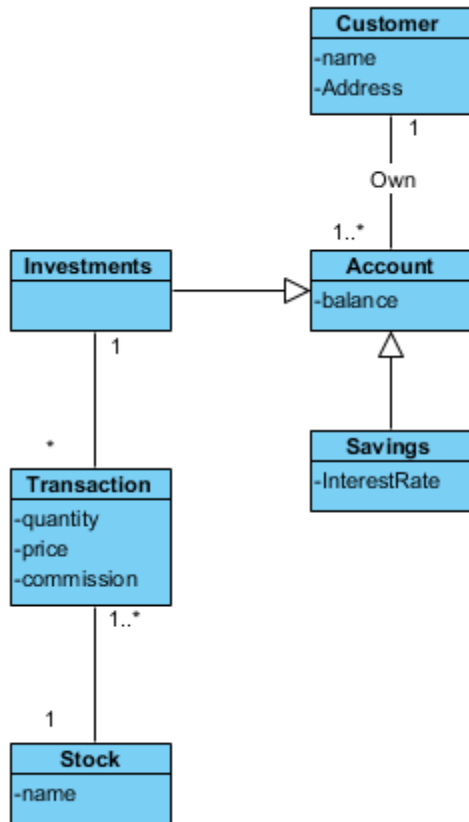
Quantity, Price: single attribute

Commission: single attribute

### Relationship

Customers (identified by name and address) and their accounts.

there are 2 type of accounts: one for savings, the other for investments  
investments, used to perform transaction on stocks.



### Question 3: Flights

We want to model a system for management of flights and pilots.

An airline operates flights. Each airline has an ID, name, address, and etc.

Each flight has an ID, a departure airport, and an arrival airport.

An airport as a unique identifier, name, and etc.

Each flight has a pilot and a co-pilot, and it uses an aircraft of a certain type; a flight has also a departure time and an arrival time.

An airline owns a set of aircrafts of different types.

An aircraft can be in a working state or it can be under repair.

In a particular moment an aircraft can be landed or airborne.

A company has a set of pilots: each pilot has an experience level:

1 is minimum, 3 is maximum.

A type of airplane may need a particular number of pilots, with a different role (e.g.: captain, co-pilot, navigator): there must be at least one captain and one co-pilot, and a captain must have a level 3.

### Potential Classes

Airline:

Flight:

Airport:

Time: Single attribute

Pilot:

Co-pilot:

Aircraft:

Type:

Company: Synonym (Airline)

Airplane: Synonym (Aircraft)

### Relationship

Airline operates flights

Flight depart/arrive from/at Airport

Flight uses an aircraft of a certain type

Flight has pilots

An airline owns a set of aircrafts of different types

A company (airline) has a set of pilots

A type of airplane (aircraft) may need a particular number of pilots

