Object Oriented Software Engineering
Tutorial 1: Problems

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Domain Modelling

Exercise 1

Generating a Class Diagram from the following narrative:

- The customer enters the store to buy a toy. It has to be a toy that his daughter likes and it must cost less than 50 Euro. He tries a videogame, which uses a data glove and a head-mounted display. He likes it.
- An assistant helps him. The suitability of the game depends on the age of the child. His daughter is only 3 years old. The assistant recommends another type of toy, namely a boardgame. The customer buy the game and leaves the store.

Exercise 2

Draw the UML class diagram the following association:

a) A company has many employees, but the employer can only work for one company.

Exercise 2

Draw the UML class diagram the following association:

a) A company has many employees, but the employer can only work for one company.
   + Should an employee retire, then the company recruits another employee

Exercise 2

Draw the UML class diagram the following association:

a) A company has many employees, but the employer can only work for one company.

   + Should an employee retire, then the company folds up

Exercise 2

Draw the UML class diagram the following association:

a) A company has many employees, but the employer can only work for one company.

   + Should a company be liquidated, then all employees loose their job

Exercise 2

Draw the UML class diagram the following association:

a) A company has many employees, but the employer can only work for one company.
   + Should a company be liquidated, then all employees move to another company

Exercise 2

Draw the UML class diagram the following association:

b) An administrative assistant can work for many managers, and a manager can have many administrative assistants.

Exercise 2

Draw the UML class diagram the following association:

c) For each company, there is exactly one board of directors, also a board is the board of only one company.

Exercise 2

Draw the UML class diagram the following association:

d) For each booking, there must be exactly one Passenger, but each Passenger can have any number of Bookings (e.g. on different flights and dates). Similarly, for each Booking there must always be exactly one specific flight, but each specific flight can have any number of bookings (up to the capacity of the aircraft).

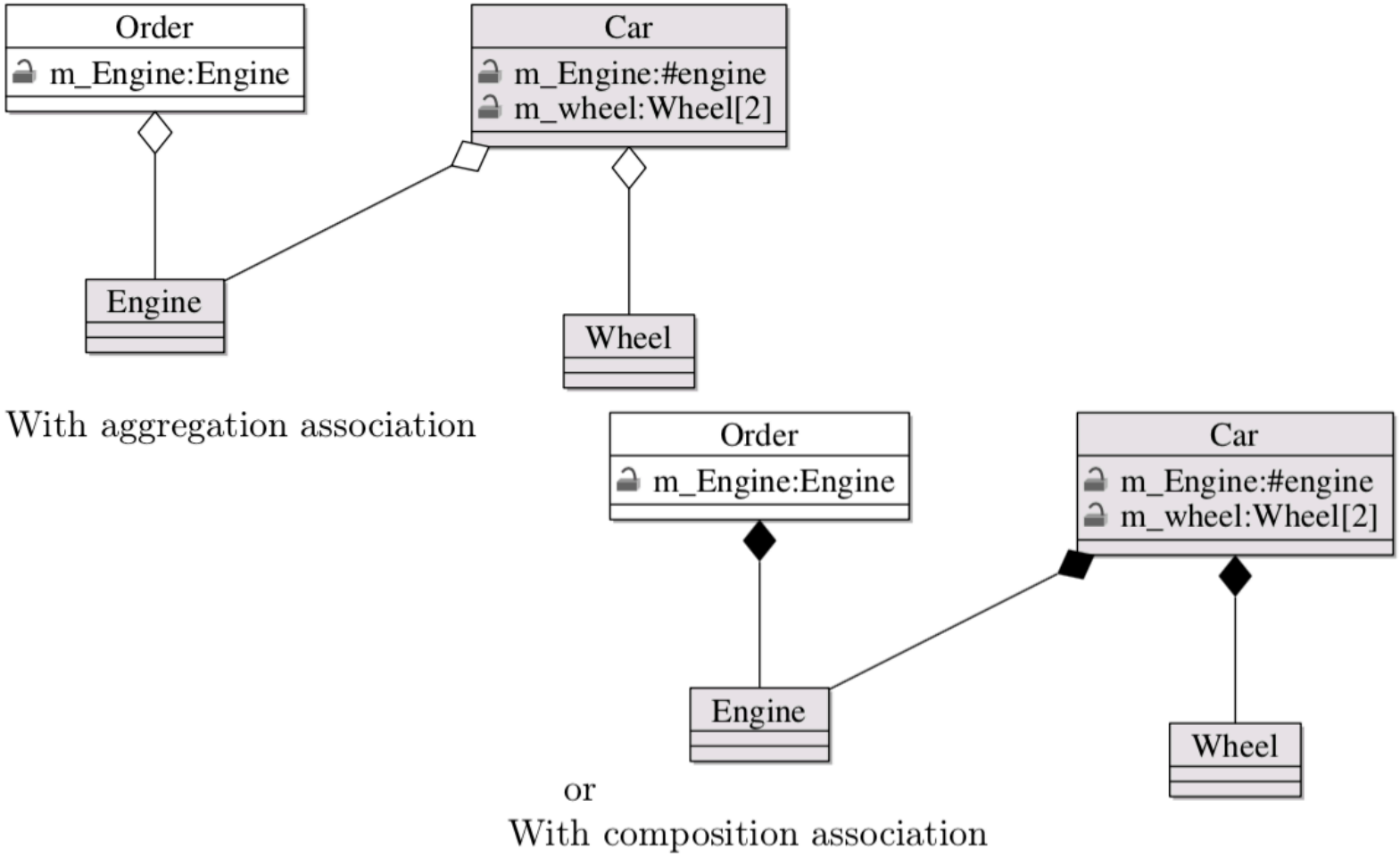
Exercise 2

Draw the UML class diagram the following association:

e) A student can register in any number of course sections, and a course section can have any number of students.

Exercise 3

- Which of the following two designs is correct:



Control Flow Graphs

Exercise 1

- What is the cyclomatic complexity of the constructor below:

```
public ClassMethodCallLeak(String nodeId, String className,
                           String handlerType, String methodName,
                           String methodReturnType, String leakLine) {
        this.setNodeId(nodeId);
        this.className = className;
        this.handlerType = handlerType;
        this.methodName = methodName;
        this.setMethodReturnType(methodReturnType);
        this.setLeakLine(leakLine);
}
```

Exercise 2

- Draw the control flow graph for the function below:
- What is the cyclomatic complexity?

```
public static void main(String args[]) {
    int a = args.length;
    int b = 3;
    int c =0;

    if(a>b) {
       c =b;
    }
    else {
       c= a;
    }
}
```

Exercise 3

- Draw the control flow graph for the function below:
- What is the cyclomatic complexity?

```
public static void main(String args[]) {
   int a = args.length;
   int b = 3;
   int c =0;
   boolean tick = true;

   while(tick) {
     if(a>b) {
       c =b;
     }
     else {
       c= a;
       tick =false;
     }
   }
}
```

Exercise 4

- Draw the control flow graph for the outer function below:
- What is the cyclomatic complexity?

```
public static void main(String args[]) {
  JButton button1 = new JButton("PressME");
  button1.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
       int a = args.length;
       int b = 3;
       int c =0;
       if(a>b) {
         c =b;
       }
       else {
         c= a;
       }
    }
  });
}
```

Exercise 5

- Draw one control flow graph for both functions below:
- What is the cyclomatic complexity?

```
public static void main(String args[]) {
  JButton button1 = new JButton("PressME");
  button1.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
       int a = args.length;
       int b = 3;
       int c =0;
       if(a>b) {
         c =b;
       }
       else {
         c= a;
       }
    }
  });
}
```