Object Oriented System Design
From Design to Code

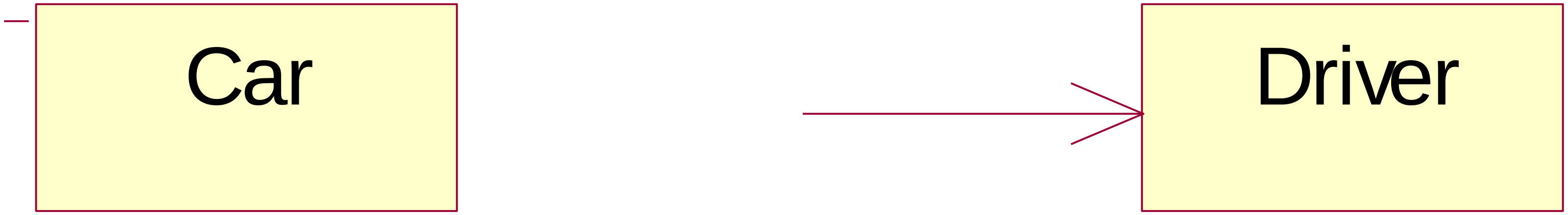
- Marc Conrad
  - D104 (Park Square Building)
  - Email: Marc.Conrad@beds.ac.uk
  - WWW: http://perisic.com/marc
- This week new:
  - Implementation Issues

- Or: How to get the things running

Read more:
http://perisic.com/oosd

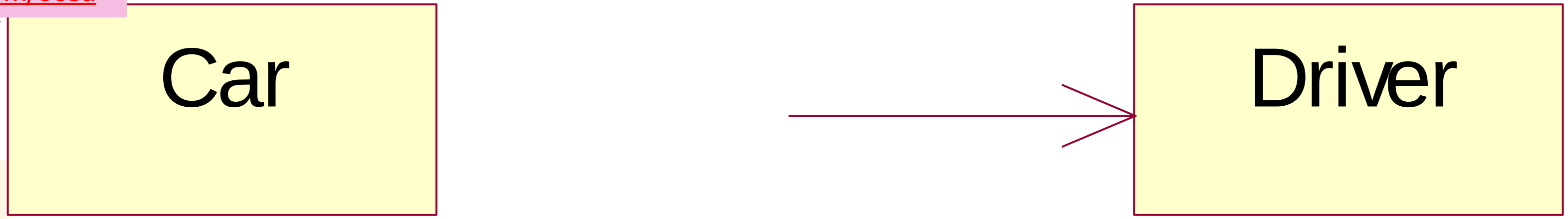
Automatic Code Generation

- Modelling Tools can be used to generate code automatically (and vice versa).
- Example:



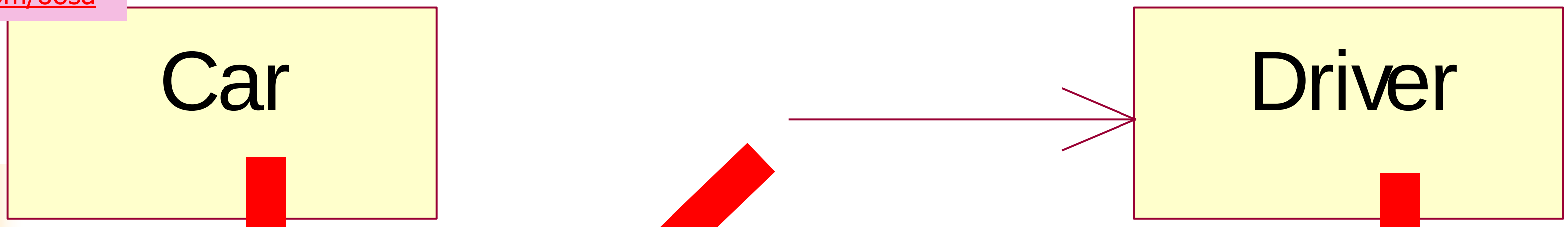
Rational Rose produces the following Java code …

Read more:
http://perisic.com/oosd



```
public class Car
{
   public Driver theDriver;
   /**
    * @roseuid 3EAFF17E035B
    */
   public Car()
   {

   }
}
```

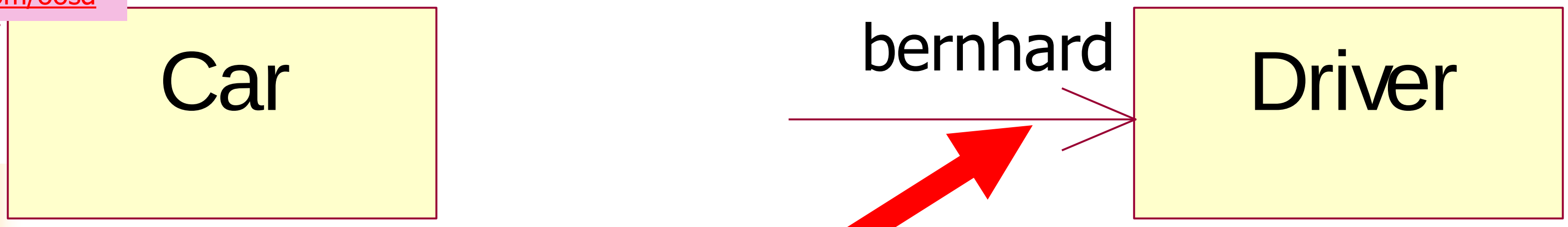
```
public class Driver
{

   /**
    * @roseuid 3EAFF53F02FD
    */
   public Driver()
   {

   }
}
```



```
public class Car
{
   public Driver theDriver;
   /**
    * @roseuid 3EAFF17E035B
    */
   publi
   {

   }
}
```

```
public class Driver
{

   /**
    * @roseuid 3EAFF53F02FD
```

- Associations are implemented as reference attributes.
- As there is no explicit role name defined in the class, Rational Rose adds automatically a role name to the code: *theDriver*

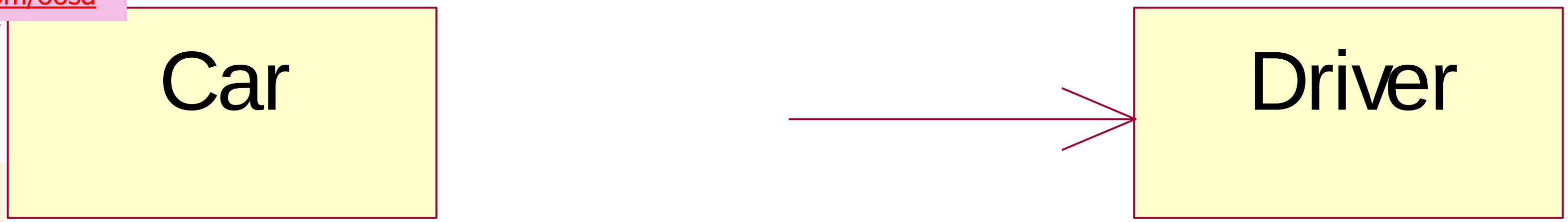


```
public class Car
{
   public Driver bernhard;
   /**
    * @roseuid 3EAFF17E035B
    */
   public Car()
   {

   }
}
```

```
public class Driver
{

   /**
    * @roseuid 3EAFF53F02FD
    */
```

- Associations are implemented as reference attributes.
- An explicite role name already gives the name of the variable of type Driver.

Read more: http://perisic.com/oosd



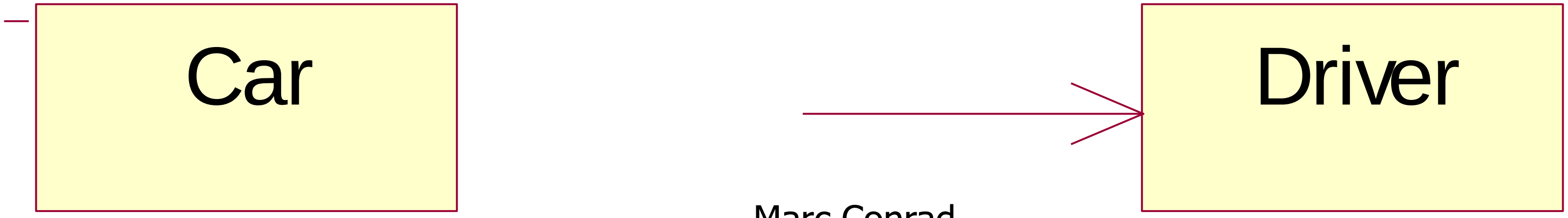
- Templates for the default constructors are provided.
- (Similar for methods when given in the class diagram.)

```
public class Car
{
   public Driver theDriver;
   /**
    * @roseuid 3EAFF17E035D
    */
   public Car()
   {

   }
}
```

```
    * @roseuid 3EAFF53F02FD
    */
   public Driver()
   {

   }
}
```

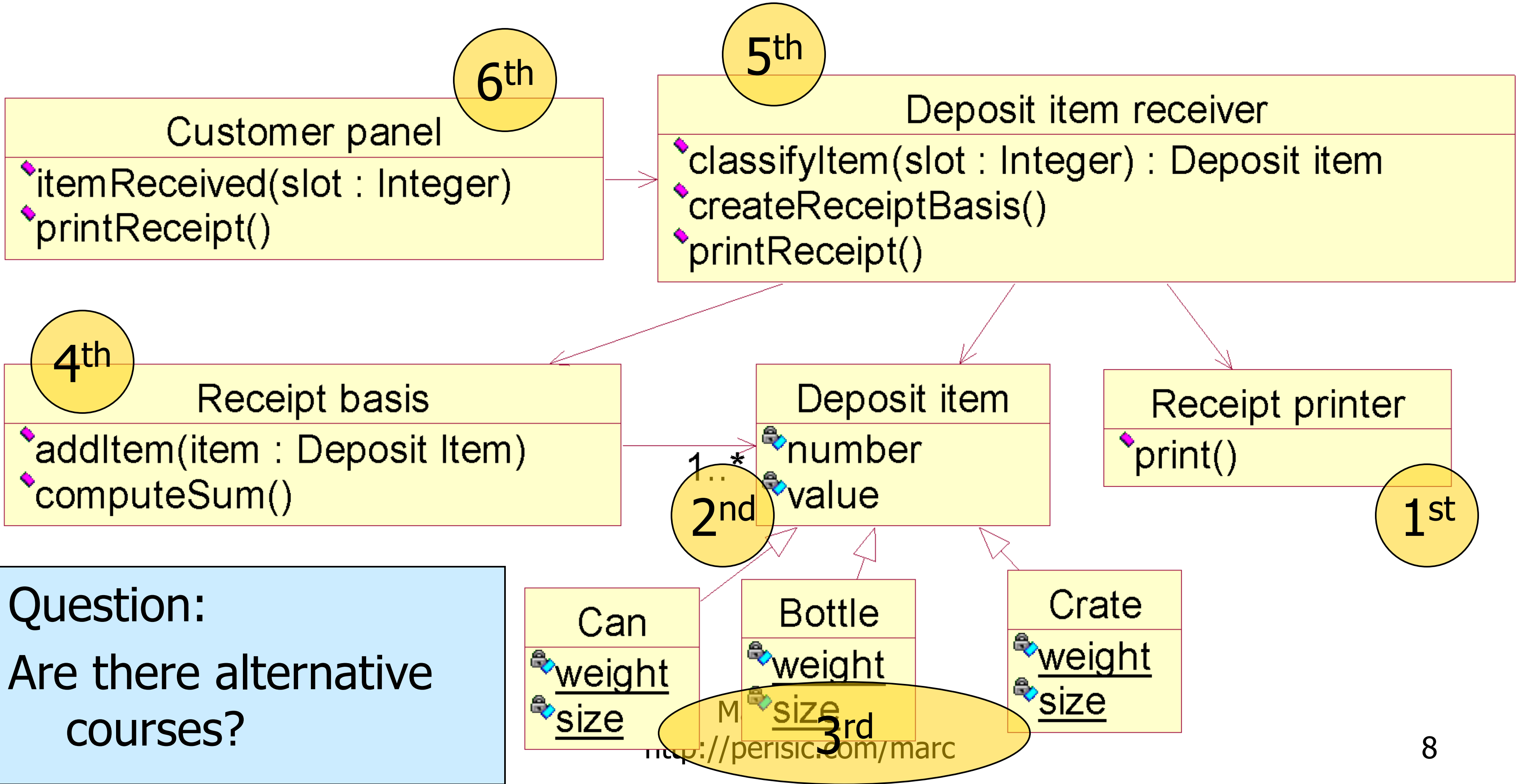
Order of Implementation and Testing.

- When an association or dependency is implemented the class where the arrow points to should be implemented first (here the Driver class).
- Note that the Driver class can be tested without having the Car class.



Read more:
http://perisic.com/oosd

The Order of Implementation:
Start with the least coupled object!

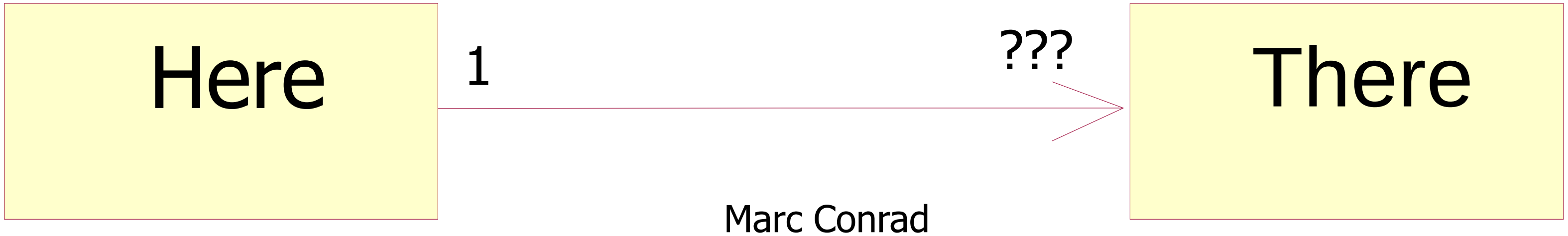


Question:

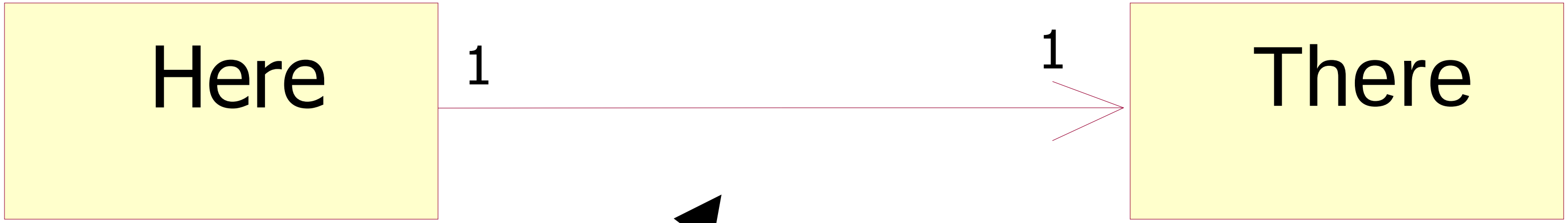
Are there alternative courses?

Implementing an Association

- The class where the arrow starts has a reference implemented to an object where the arrow points to.
- The reference can be
  - a (reference) variable of type *There,*
  - an array of *There* objects,
  - other possibilities depending on the language.

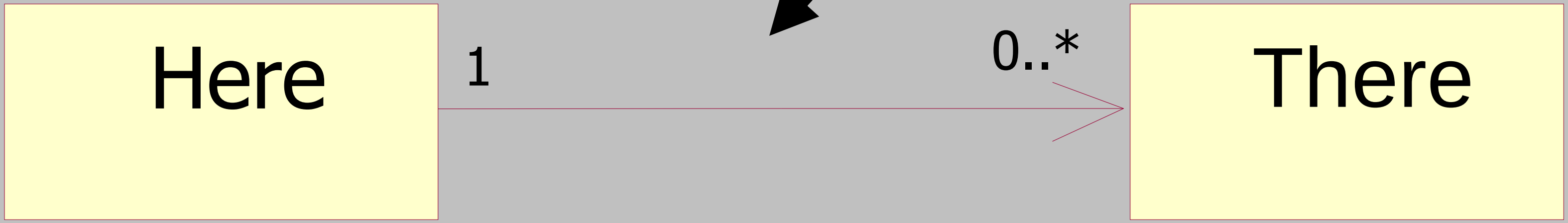


Code Generation and Testing. Example: Java



```
public class Here
{
   public There theThere;
 /*   ... */
}
```

```
public class Here
{
   public There [] theThere;
 /*   ... */
}
```



Implementation issues - summary

- Modelling tools have automatic code generation.
- It is also possible to produce diagrams from code (reverse engineering).
- The least coupled class should be implemented and tested first.
- One-to-One relationships are implemented as (reference) attributes.
- One-to-Many relationships are implemented as arrays.

Read more: http://perisic.com/oosd