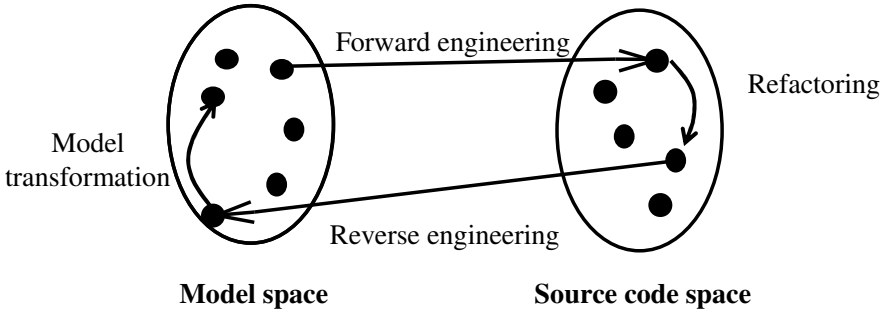
Mapping Models to Code

Mapping Models to Code

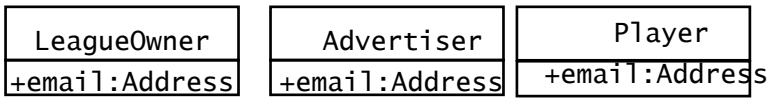
- We will skip most of this chapter
  - It deals with how to go from UML class diagrams to actual code
  - You should already have a pretty good idea how to do this
    - Would be trickier if using a language that doesn't support OOP for example
- Overview
  - Mappings are transformations that aim at improving one aspect of the model while preserving functionality. Activities:
    - Optimization
    - Realizing associations
    - Contracts to exceptions
    - Class models to storage schema

Transformations

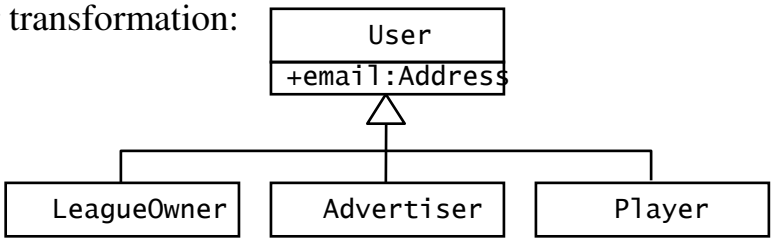


Model Transformation Example

Object design model before transformation



Object design model after transformation:



Refactoring Example: Pull Up Field

```
public class Player {
   private String email;
   //...
}
public class LeagueOwner {
   private String eMail;
   //...
}
public class Advertiser {
   private String
   email_address;
   //...
}
```

```
public class User {
   private String email;
}
public class Player extends
   User {
   //...
}
public class LeagueOwner
   extends User {
   //...
}
public class Advertiser
   extends User {
   //...
}
```

Refactoring Example: Pull Up Constructor Body

```
public class User {
   private String email;
}


public class Player extends User
   {
   public Player(String email) {
        this.email = email;
   }
}
public class LeagueOwner extends
   User{
   public LeagueOwner(String
   email) {
        this.email = email;
   }
}
public class Advertiser
   extendsUser{
   public Advertiser(String
   email) {
        this.email = email;
   }
}
```

```
public class User {
   public User(String email) {
        this.email = email;
   }
}
public class Player extends User {
   public Player(String email) {
        super(email);
   }
}
public class LeagueOwner extends
   User {
   public LeagueOwner(String
   email) {
        super(email);
   }
}
public class Advertiser extends
   User {
   public Advertiser(String email)
   {
        super(email);
   }
}
```

Forward Engineering Example

Object design model before transformation

Source code after transformation

```
public class User {
   private String email;
   public String getEmail() {
        return email;
   }
   public void setEmail(String value){
        email = value;
   }
   public void notify(String msg) {
        // ....
   }
   /* Other methods omitted */
}
```

```
public class LeagueOwner extends
   User {
   private int maxNumLeagues;
   public int getMaxNumLeagues() {
        return maxNumLeagues;
   }
   public void setMaxNumLeagues
               (int value) {
        maxNumLeagues = value;
   }
   /* Other methods omitted */
}
```

Transformation Principles

- Each transformation must address a single criteria
  - Transformation should focus on a single design goal and not try to optimize multiple criteria (can lead to errors)
- Each transformation must be local
  - A transformation should change only a few methods or classes at once
  - If an interface changes then the client classes should be changed now too (keep older method around for background compatibility testing)
  - If you are changing many subsystems at once you are performing an architectural change

Transformation Principles

- Each transformation must be applied in isolation to other changes
  - To localize changes transformations should be applied one at a time
  - E.g. if improving performance of a method, don't add new functionality at the same time
- Each transformation must be followed by a validation step
  - Validate the changes for errors
  - Update appropriate UML diagrams
  - Write new test cases to exercise new source code