

COMP2511

Tute03



Agenda

- Design By Contract
- Domain Modelling
- Wondrous

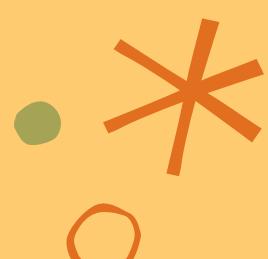
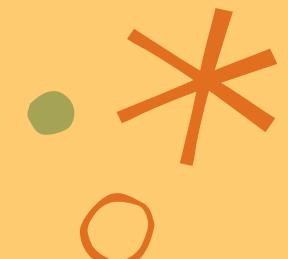




What is Design By Contract?



Design by Contract in Assignment i



Preconditions, Postconditions, Invariants

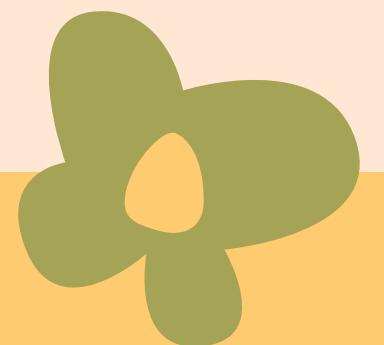
PRECONDITION

What is a
precondition?



POSTCONDITION

What is a
postcondition?



INVARIANT

What is an
invariant?



Preconditions, Postconditions, Invariants

PRECONDITION

Conditions on inputs which guarantee that the postconditions will be true

POSTCONDITION

Guarantees from the actual software on what you can expect from a function

INVARIANT

Guarantees from the software that are always maintained before and after a function call

Liskov Substitution Principle

Objects of a superclass should be replaceable with objects of its subclasses without affecting the correctness of the program.

- Can replace superclass with subclass
- MUST MAINTAIN ALL GUARANTEES!!!



```
public class Bird {  
    private int height = 0;  
  
    /**  
     * Make the bird fly to given height.  
     * @pre height > 5  
     * @param height  
     * @post bird will now be flying at height  
     */  
    public void fly(int height) {  
        this.height = height;  
    }  
  
}  
  
public class Penguin extends Bird {  
    /**  
     * Make the penguin fly to given height.  
     * @pre height = 0  
     * @param height  
     * @post nothing changes  
     */  
    @Override  
    public void fly(int height) {  
        return;  
    }  
}
```

When Penguins Fly?

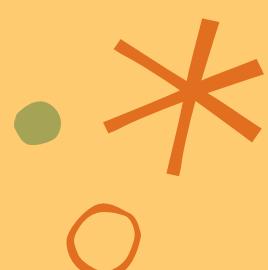
Penguin overrides Bird's fly method:

- strengthening preconditions
($height > 5 \Rightarrow height = 0$)
- weakening postconditions
(make Bird fly \Rightarrow do nothing to Penguin)

Why does this violate good inheritance design?



People & Person.java





Unit Tests & Preconditions?

Do we need to write unit tests for cases where preconditions aren't met?

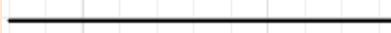
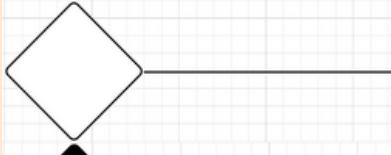
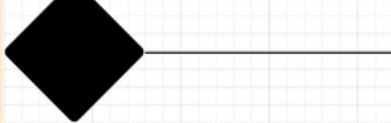
YOU SHALL NOT PASS!!!

Let's try to make our code more defensive by throwing an exception on inputs not satisfying preconditions.

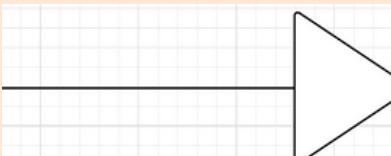
- Are these exceptions considered defined behaviour or not?
- Do we need to account for them in our preconditions?

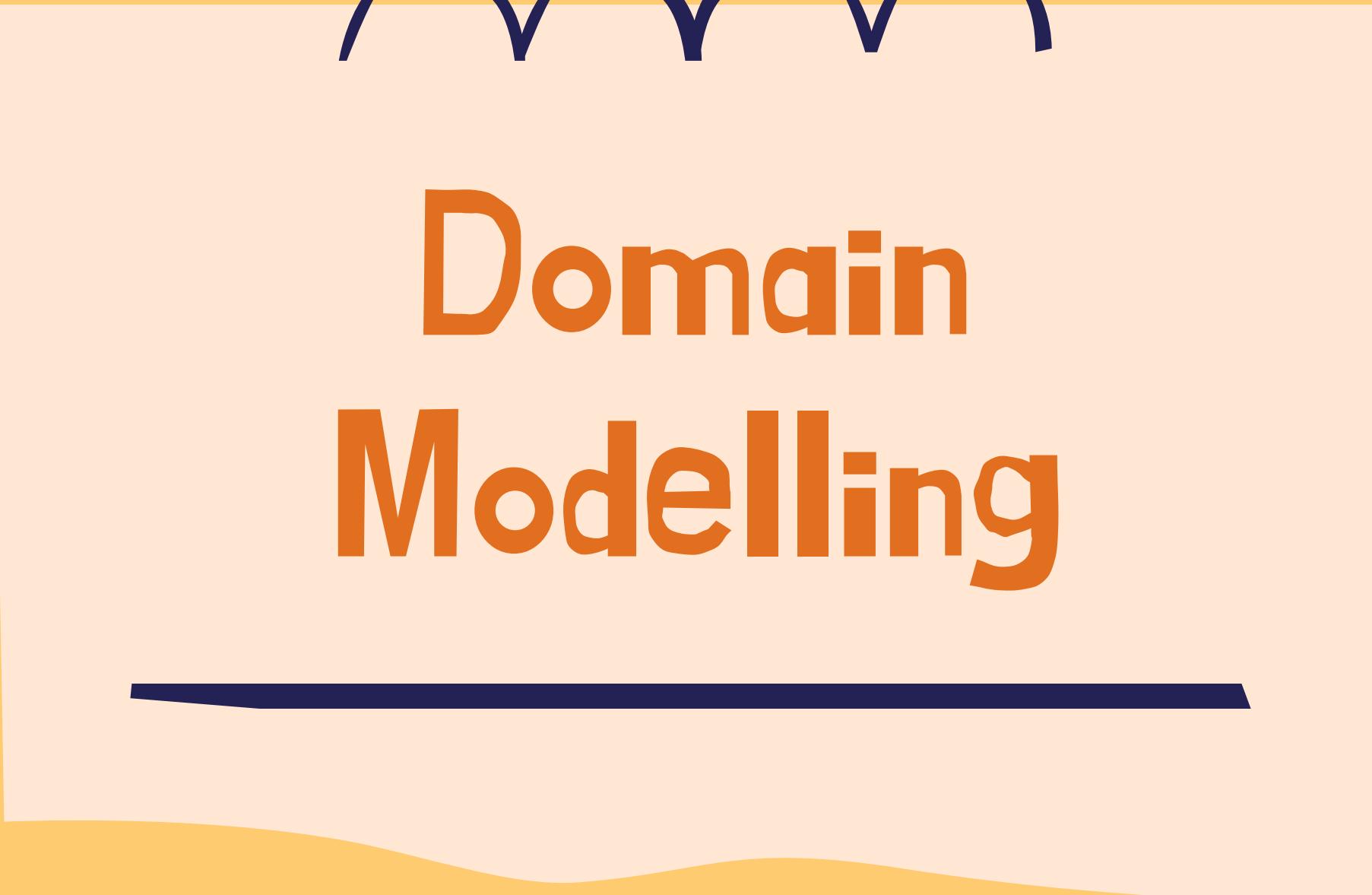


UML 101

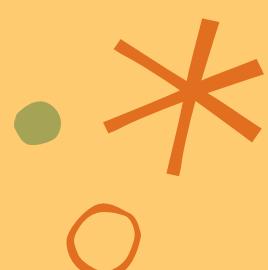
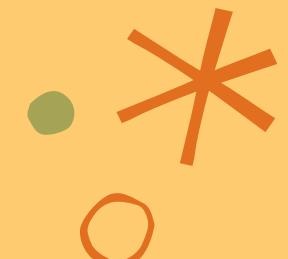
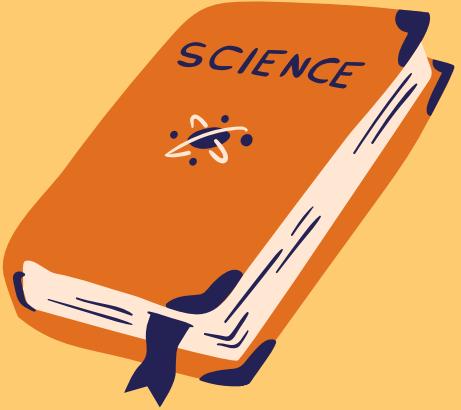
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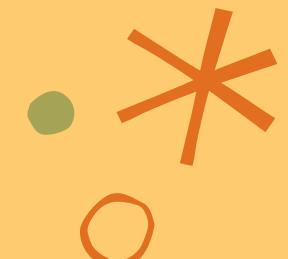
Dependency: source class depends on target
Association: source class uses target
Aggregation: source class contains target
Composition: target cannot exist outside of source class - examples?

-  Inheritance: source class is subclass of target
- <<Interface>>
- ***Abstract Method or Abstract Class***



Domain Modelling





Wondrous





IllegalArgumentException Exception?

Why don't we need to
update the method
signature and existing
tests?