Lecture 14: Robustness Analysis

Good Object Oriented Design

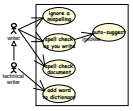
Robustness Analysis

Allocating Behaviour

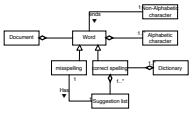
Starting Point

You've done the Requirements Analysis

You have:



A set of Use Cases
(explaining how users will use the system)



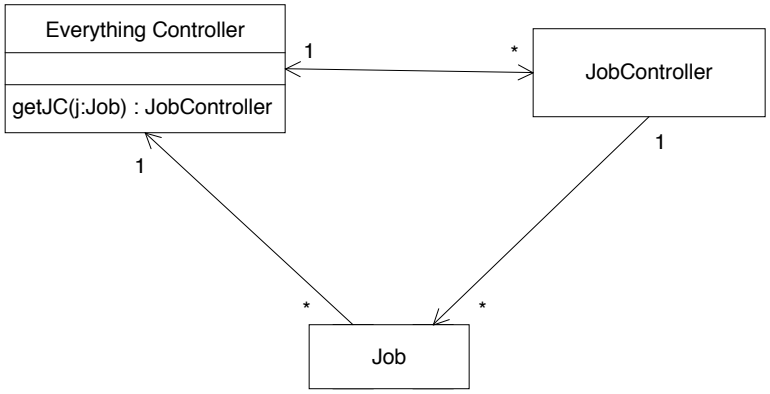
A Domain Model
(to keep track of key domain concepts)

Stakeholder Goal Models
(explaining how the use cases will meet the stakeholders' real needs)

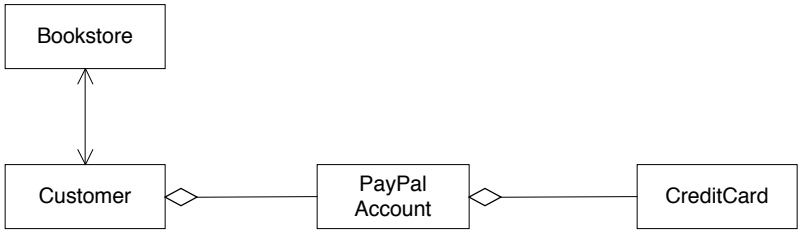
Challenge:

Allocate responsibility for the use cases to classes in the system

Diversion: What's wrong with this?



Or this?




```
class Bookstore {
  …

void settlebill (int total) {
  …
  Customer.PayPalAccount.CreditCard.subtract(total)
  …
  }
}
```

the Law of Demeter

Basically:

"Only talk to your friends"

More specifically:

A method, m, of an object, O, can only call methods of:

1. O itself
2. m's parameters
3. any object created by m
4. O's direct component objects

[m cannot call methods of an object returned by another method call]

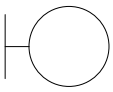
Programmer's rule of thumb:

"use only one dot"

e.g. instead of: Customer.PayPalAccount.CreditCard.subtract(total)

use: Customer.GetPayment(total)

Robustness Analysis



Boundary Objects

Used by actors when communicating with the system
Only these can initiate events
(usually widgets on the UI)

Entity Objects

Usually objects from the domain model
Things we need to keep track of

Control Objects

The "glue" between boundary objects & entity objects
Capture business rules and policies
(note: often implemented as methods of other objects)

Why do Robustness Analysis?

Bridges the gap between Requirements and Design

Sanity Check

- Tests the language in the Use Case description
- Nouns from the Use Case get mapped onto objects
- Verbs from the Use Case get mapped onto actions

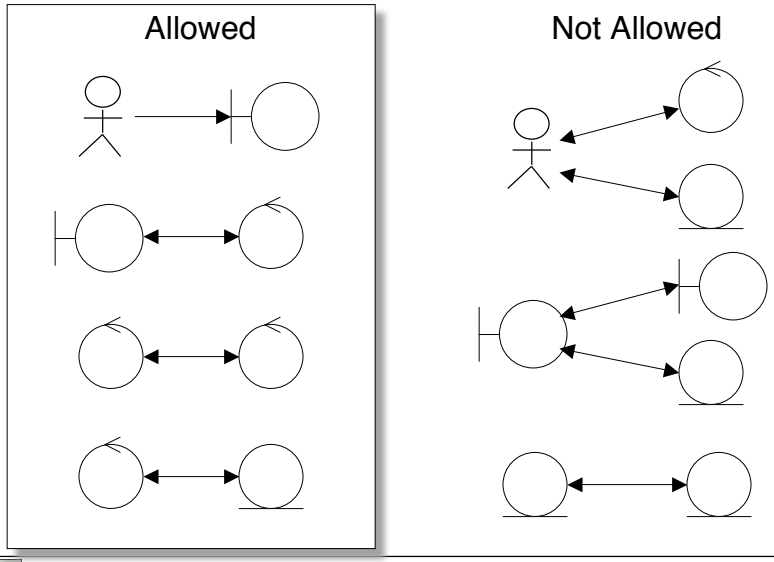
Completeness Check

- Discover the objects you need to implement the use cases
- Identify alternative courses of action

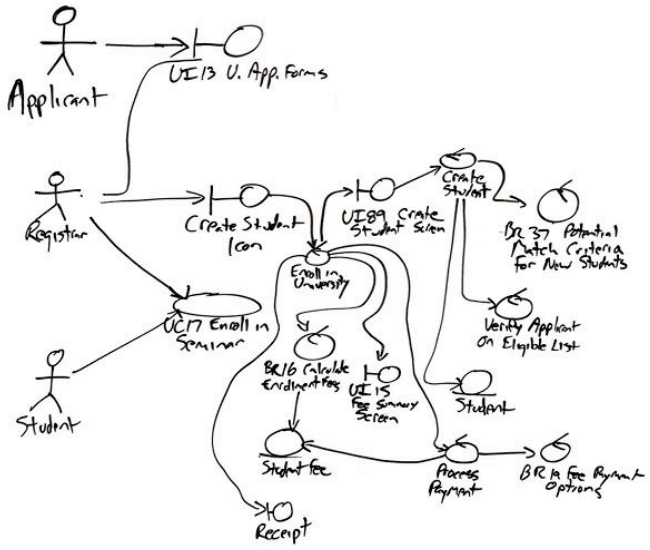
Object Identification

- Decide which methods belong to which objects

Rules for Robustness Diagrams



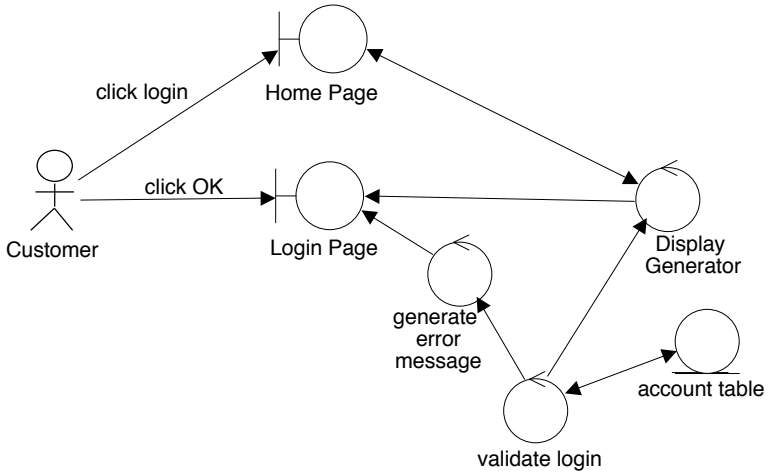
Intended for the whiteboard…



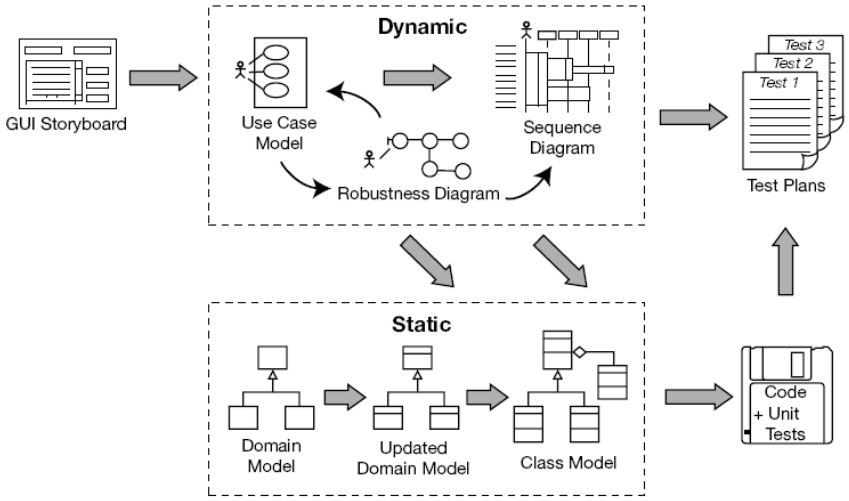
Constructing a Robustness Diagram

- Add a boundary element for each major UI element
- Add a controller to manage each Use Case
- Add a controller for each business rule
- Add a controller for any activity that involves coordination of several other element
- Add an entity for each business concept

Example

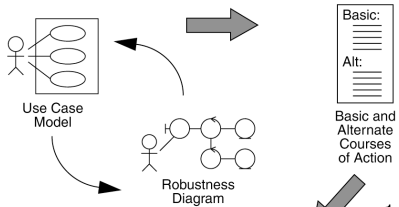


ICONIX process



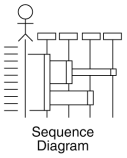
Basic Design Steps

Use case text is refined during robustness analysis and reviewed during the preliminary design review.



1. Copy the use case text to the left margin of the sequence diagram.

2. Add the entity objects.
3. Add the boundary objects.



4. Work through the controllers, one at a time, and figure out how to allocate the behavior among the collaborating objects.

Benefits of Robustness Analysis

1. **Forces a consistent style for use cases**
2. **Forces correct 'voice' for use cases**
3. **Sanity and completeness check for use cases**
4. **Syntax rules for use case descriptions**
   - **e.g. actors only talk to boundary objects**
5. **Quicker and easier to read than sequence diagrams**
6. **Encourages use of Model-View-Controller (MVC) pattern**
7. **Helps build layered architectures**
   - **e.g presentation layer, domain layer, repository layer**
8. **Checks for reusability across use cases before doing detailed design**
9. **Provides traceability between user's view and design view**
10. **Plugs semantic gap between requirements and design**