Comp-304 : Quality of Design
Lecture 16

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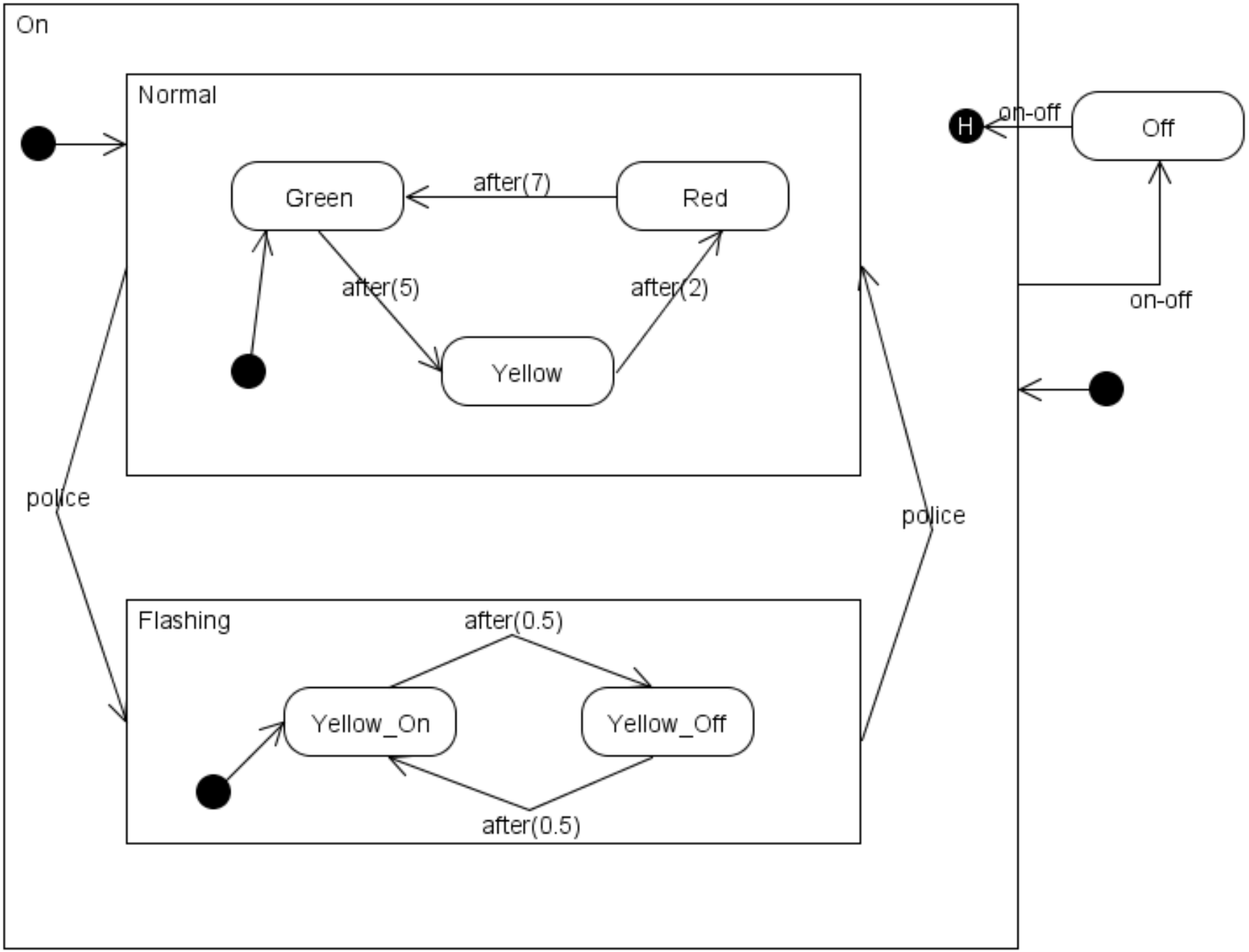
But first, Traffic Light

- A traffic light has a green, a yellow and a red light.
  - Lights can be on and off
- The traffic light has a normal mode of operation.
  - At first, the green light it on.
  - After 0.5 sec, the green light turns off and the yellow light turns on
  - After 0.2 sec, the yellow light turns off and the red light turns on
  - After 0.7 sec, the red light turns off and the green light turns on
- A police offer can switch the traffic light into and out of emergency mode.
  - In emergency mode, the yellow light blinks every 0.5 seconds.
  - When exiting emergency mode, the light goes back to it's normal operation.
- The traffic light can be turned off and turn on again.
  - When turned back on, the traffic light resumes the previous mode of operation.

Traffic Light



Quality of Design

- What is a good object-oriented design?
- How do I determine if design X is good?
- Are there characteristics?
- Are there metrics?

Analysis of Design

- Domains
  - Domains of classes
  - Reusability & Sophistication
- Encumbrance
  - What is it? and example
  - It's use, Law of Demeter
- Class cohesion
  - Mixed – instance/domain/role

Classes in an HR System

- Employee
- Date / Time
- Salary
- Performance Review
- Job Position
- Job Offer
- Recruit
- Currency
- Bonus
- Location/Office

Classes in an Inventory System

- Equipment
- Bar code
- Loan History
- Date/Time
- Employee
- Location/Office
- Repair Order
- Repair History
- Purchase Order
- Currency

Classes in an Accounting System

- Client
- Account
- Invoice
- Date / Time
- Currency
- Employee
- Bar code
- Delivery
- Pickup

Similarities

HR

- Employee
- Date / Time
- Salary
- Performance Review
- Job Position
- Recruit
- Currency
- Location/Office

Inventory

- Equipment
- Bar code
- Loan History
- Date/Time
- Employee
- Location/Office
- Repair Order
- Purchase Order
- Currency

Accounting

- Client
- Account
- Invoice
- Date / Time
- Currency
- Employee
- Bar code
- Delivery
- Pickup

Domains of Classes

- Application Domain
  - classes valuable for one application

    Edit Salary, New Loan History, Delete Purchase Order
- Business Domain
  - classes valuable for an industry

    Employee, Location
- Architecture Domain
  - classes valuable for an implementation architecture

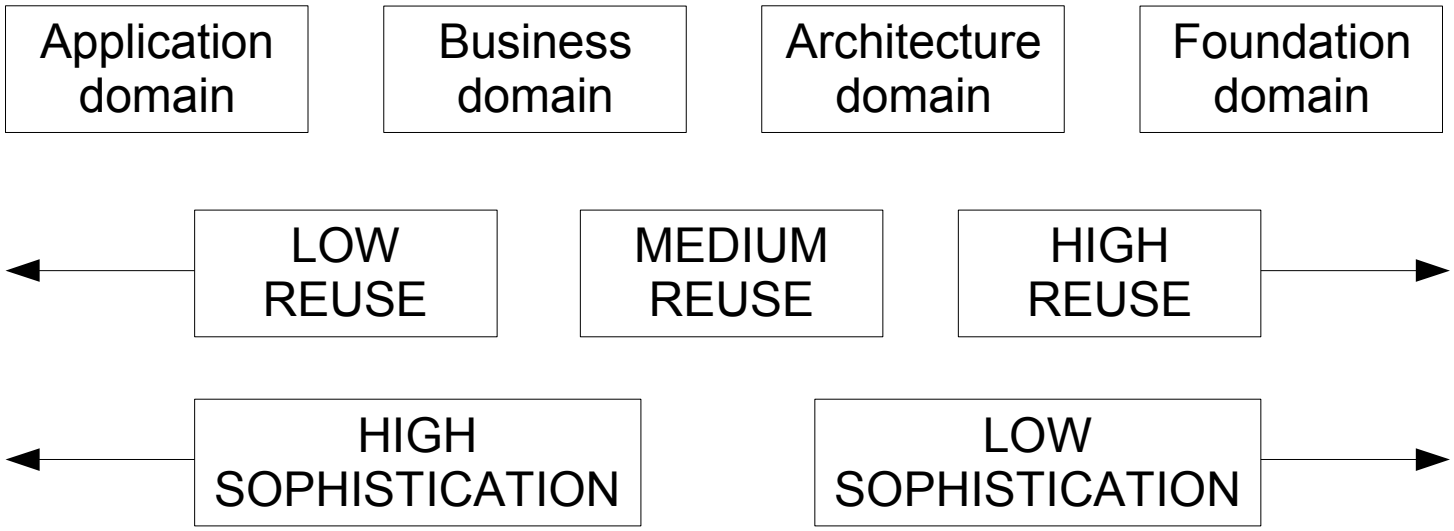
    Currency
- Foundation Domain
  - classes valuable for all businesses and architectures

    Date / Time

More Examples

- Application Domain
  - Event recognizer class
- Business Domain
  - Role class, relationship class
- Architecture Domain
  - Human interface class
- Foundation Domain
  - Fundamental class, structural class

Reusability & Sophistication



Encumbrance

- Quantitative measure of how far a class is from the foundation domain (i.e. it's sophistication)
- Encumbrance : If we take a class c1 and measure the number of classes c1 depends on and measure the number of classes that those classes depend on and so on...
- This may be very large, so we talk about direct and indirect class reference sets

Direct and Indirect

- Direct class reference set refers to the set of classes that a given class c1 directly refers to (via inheritance, association, ...), call these c2, c3, c4, ...
- Indirect class reference set of c1 is the union of its direct class reference set (c2, c3, c4, ...) and the indirect class reference sets of c2, c3, c4, ...
- This leads to direct and indirect encumbrance, which is just the size of the respective class reference set

Recursive

- This is a recursive definition...so when does it stop?
- We say that the direct class reference set of classes of the foundation domain is the empty set.

Simple Example