Observer Pattern

Observer Pattern

The observer pattern allows for an object to notify other objects of state change.

Players

- Subject
- Observer
  - Concrete Observers

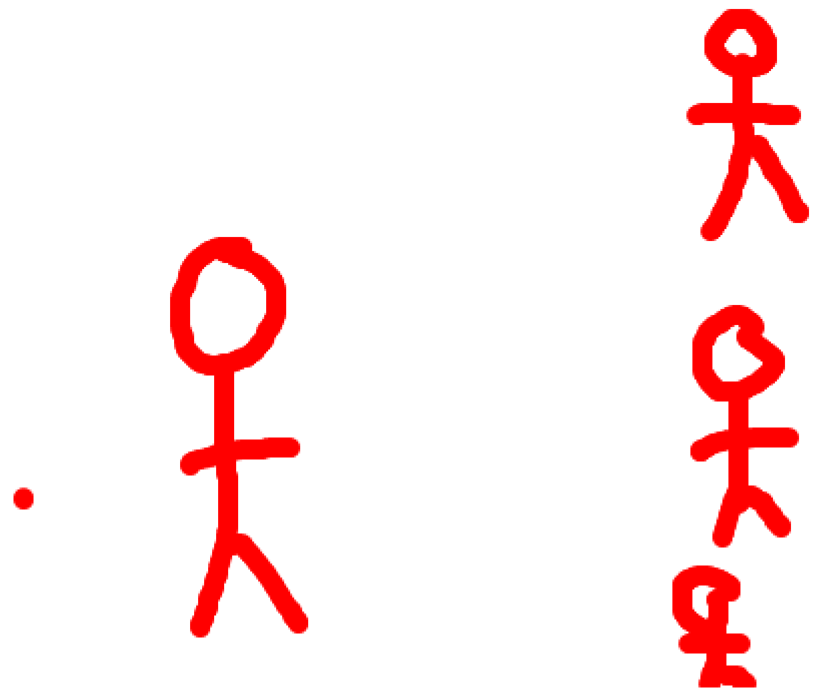
Gamma, et al. Pg 293

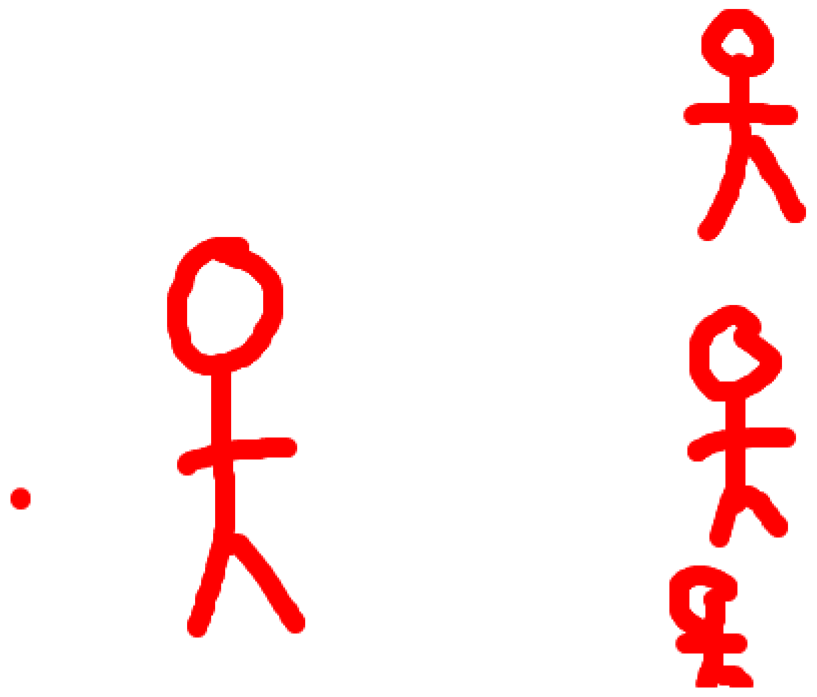
Observer Pattern

Players

- Subject
  - Manages State – Part of Model

- Observer
  - Wants notification of state change from subject
  - Model / View / Controller
  - Concrete Observers

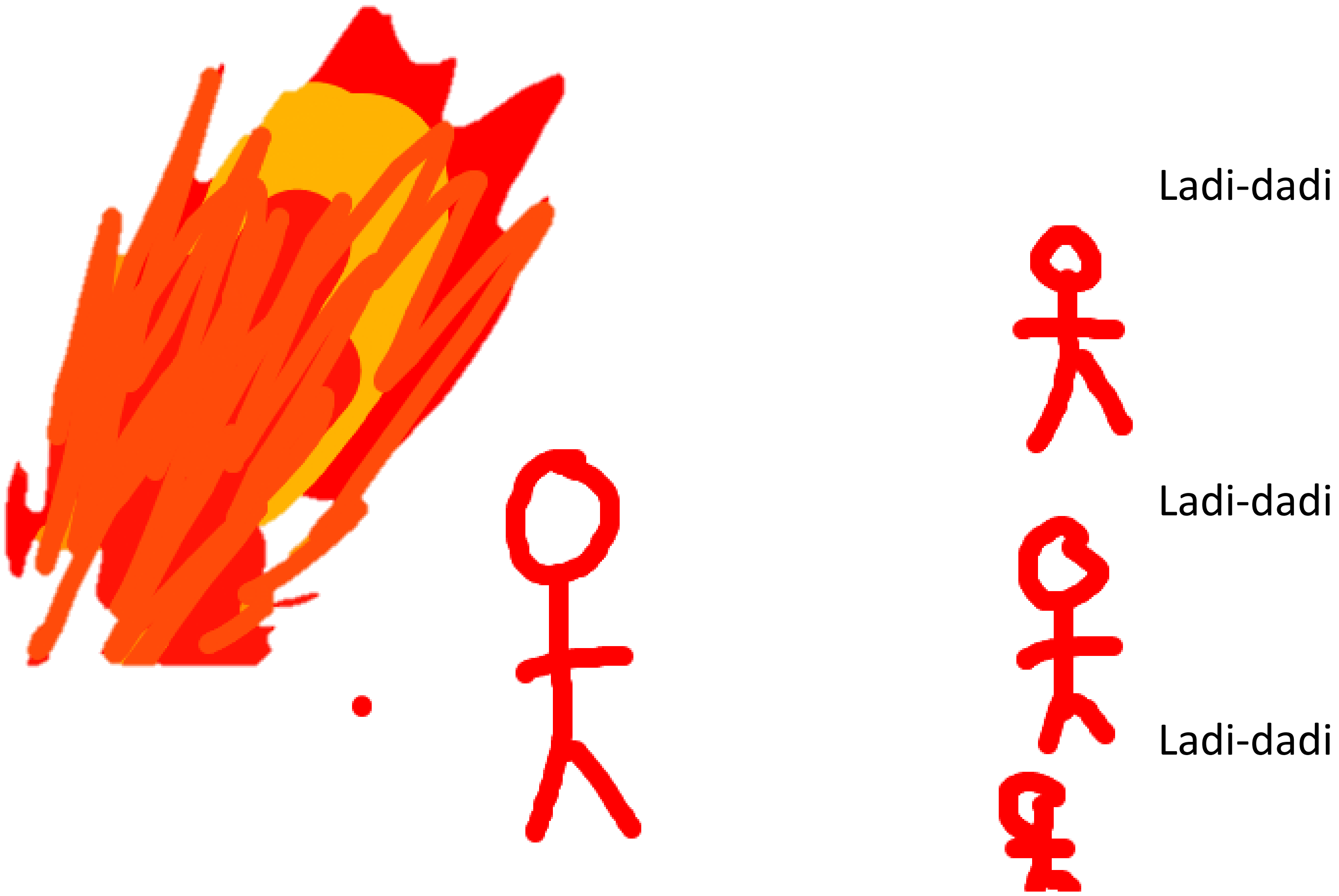


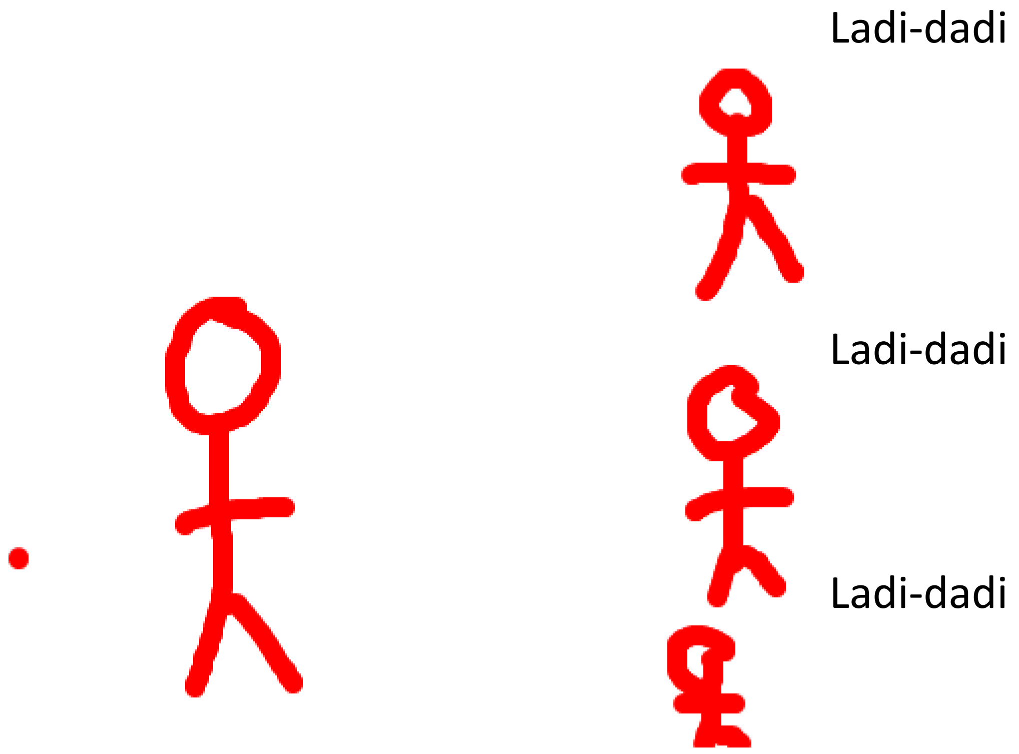


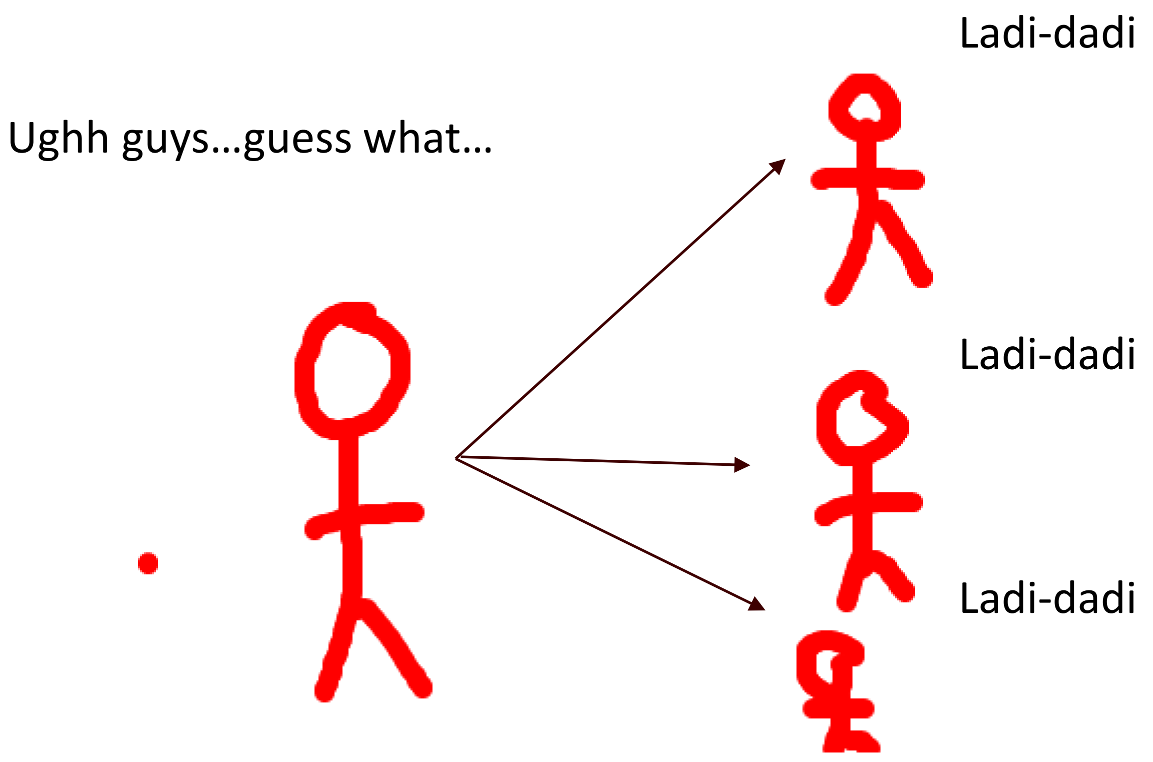
Ladi-dadi

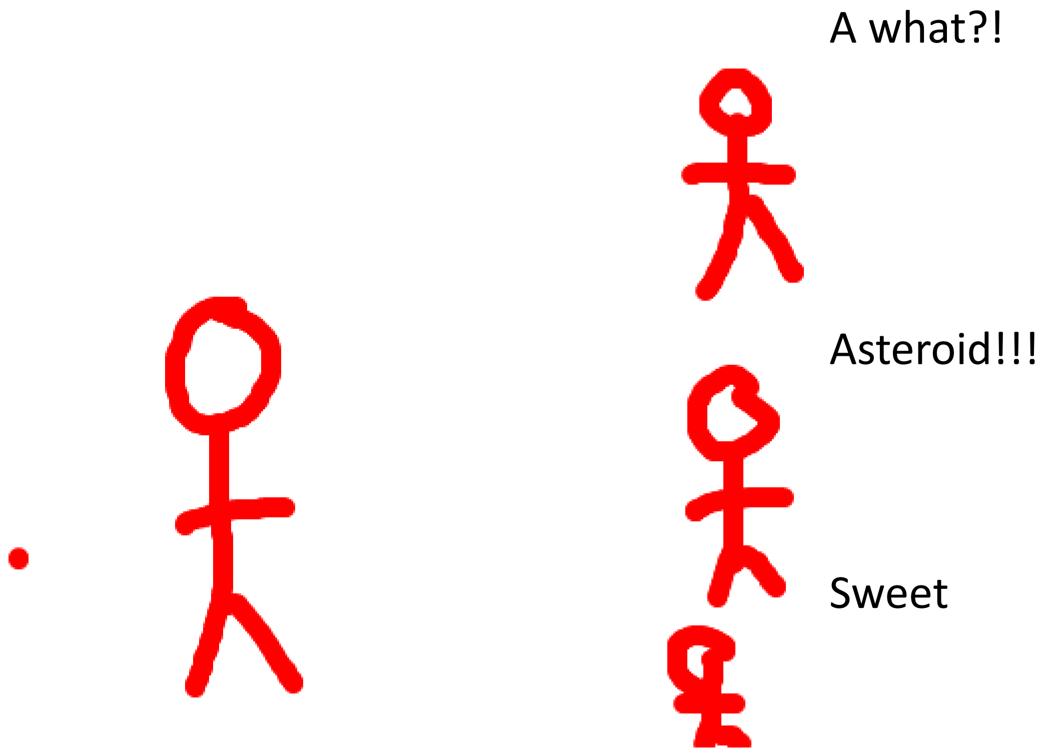
Ladi-dadi

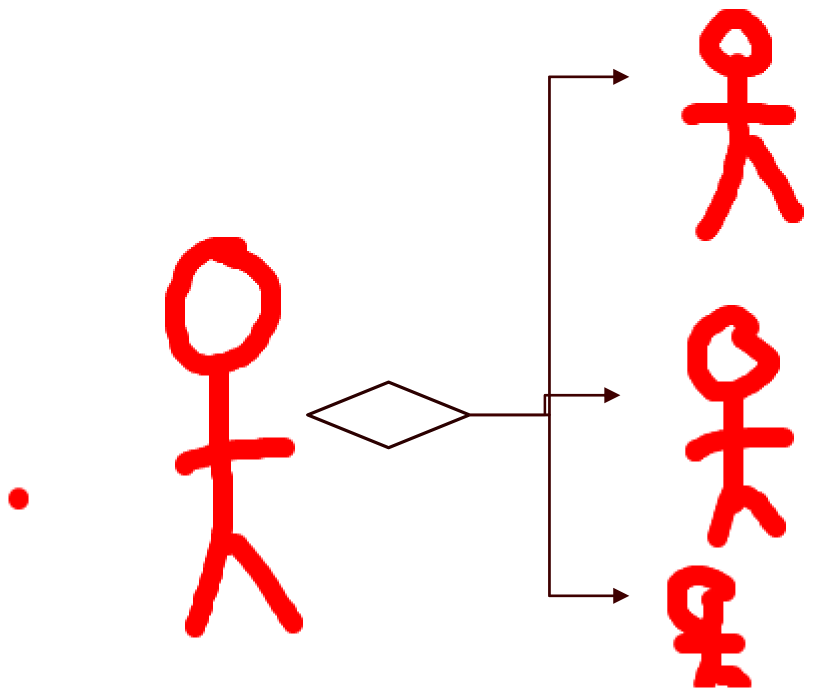
Ladi-dadi

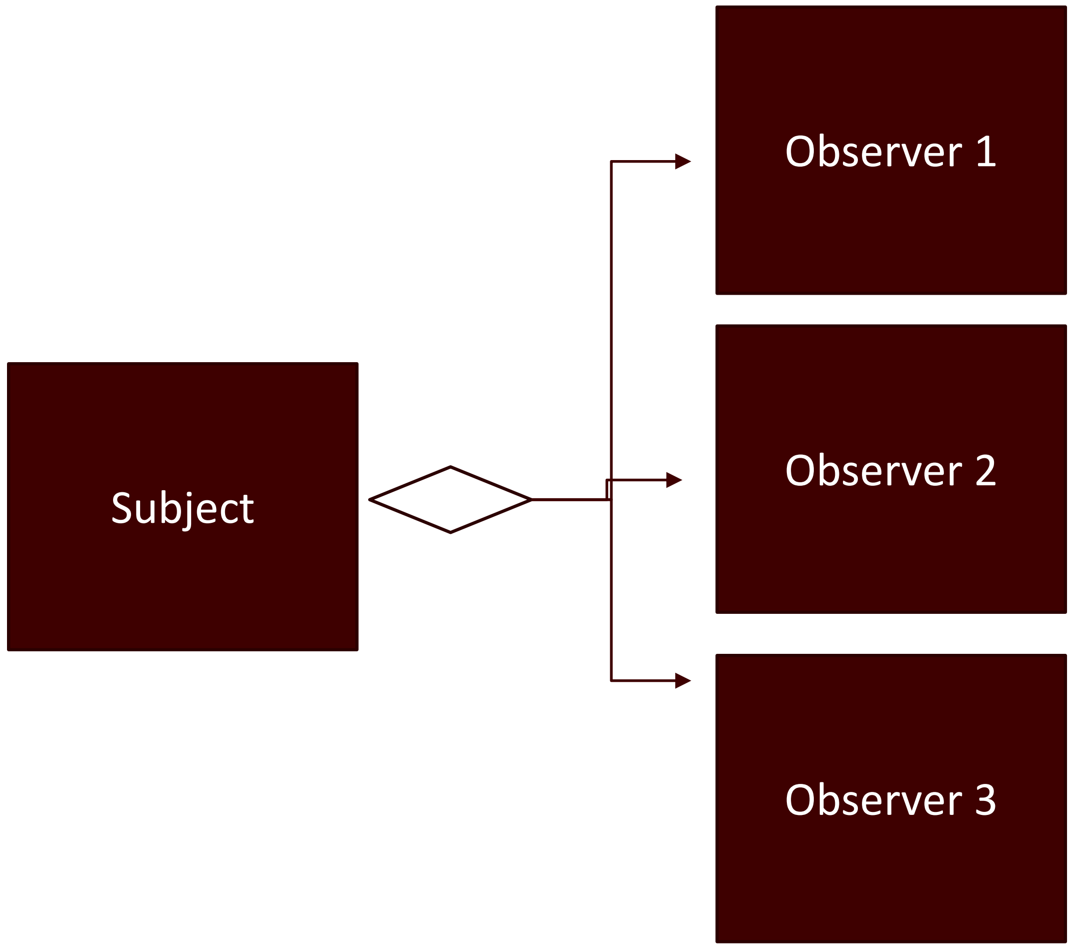

Ladi-dadi
Ladi-dadi
Ladi-dadi


Ladi-dadi
Ladi-dadi
Ladi-dadi

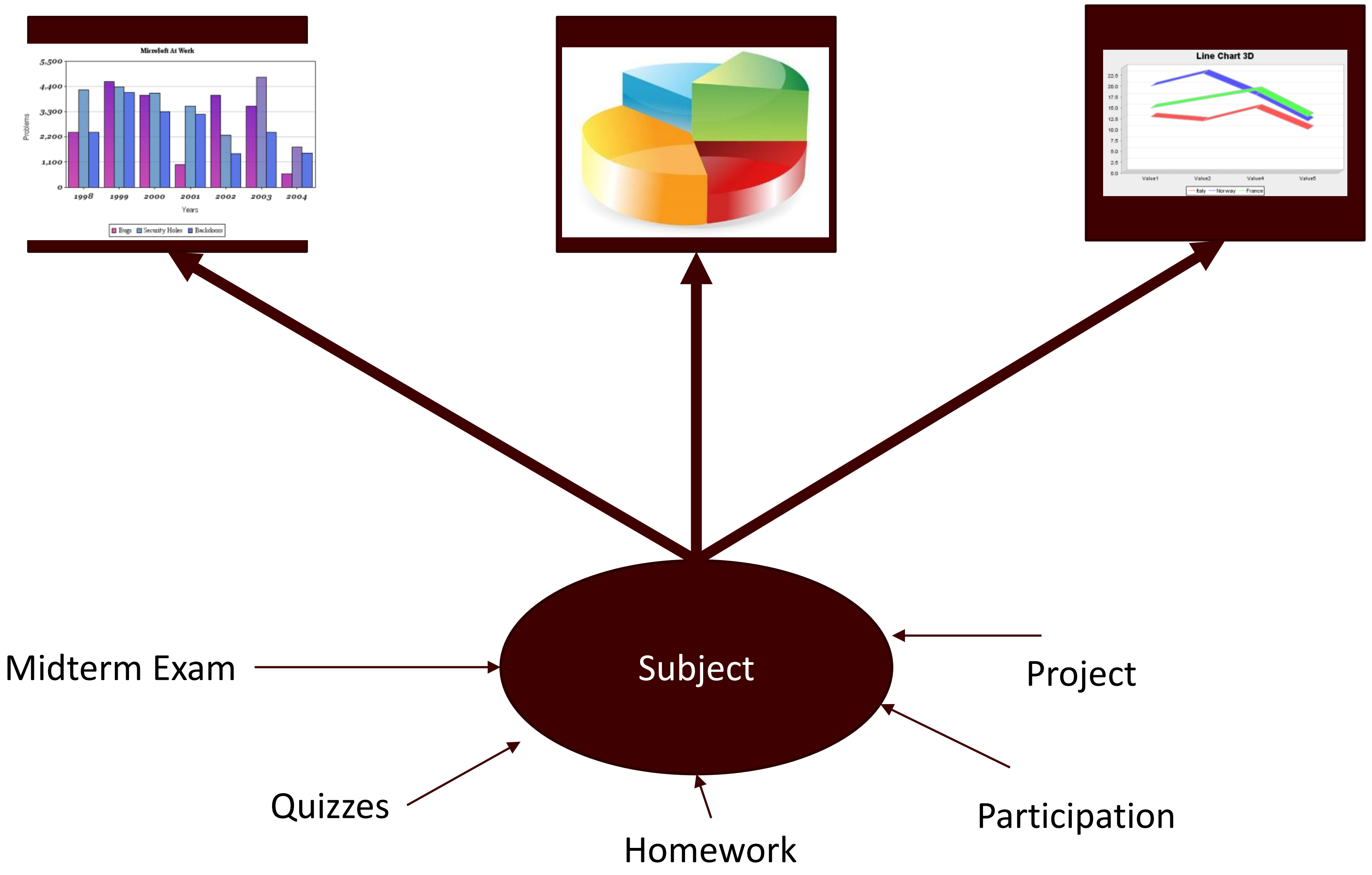

Ughh guys…guess what…
Ladi-dadi
Ladi-dadi
Ladi-dadi

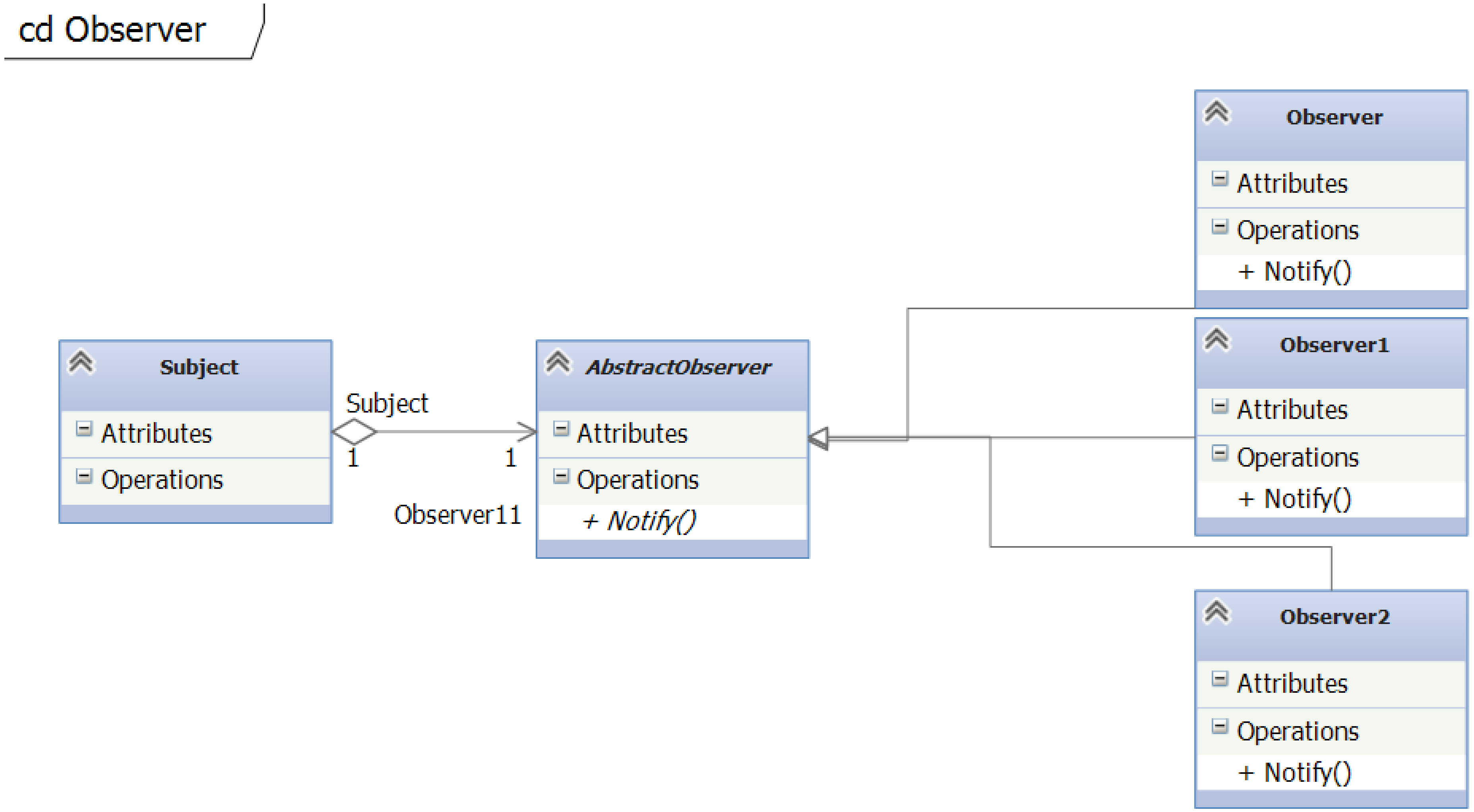

A what?!
Asteroid!!!
Sweet

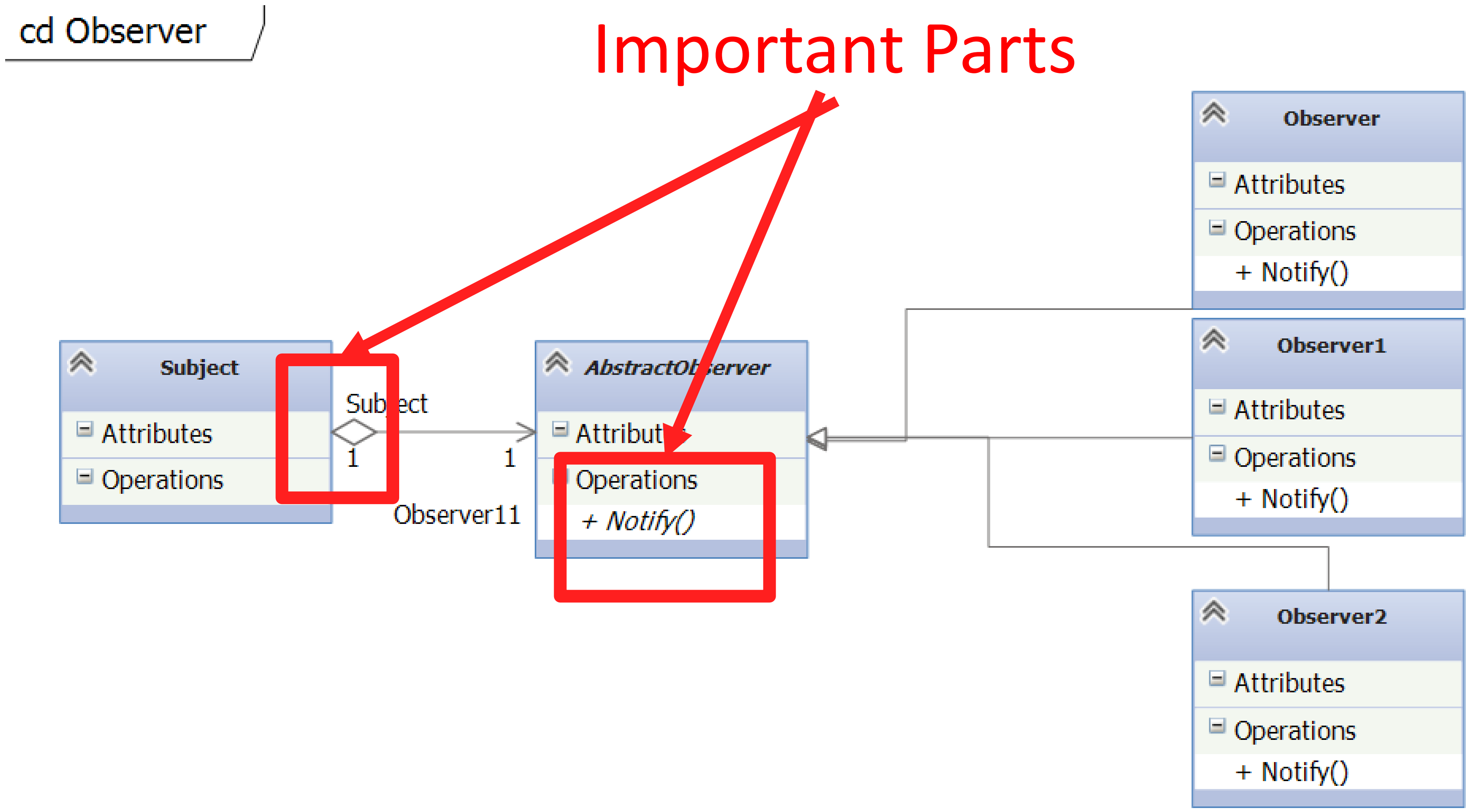



Subject
Observer 1
Observer 2
Observer 3

Or …


Microsoft At Work
Line Chart 3D
Midterm Exam
Subject
Project
Quizzes
Participation
Homework


cd Observer
Subject
Attributes
Operations
Subject
1
1
Observer11
AbstractObserver
Attributes
Operations
+ Notify()
Observer
Attributes
Operations
+ Notify()
Observer1
Attributes
Operations
+ Notify()
Observer2
Attributes
Operations
+ Notify()


cd Observer
Important Parts
Subject
Attributes
Operations
Subject
1
1
Observer11
AbstractObserver
Attributes
Operations
+ Notify()
Observer
Attributes
Operations
+ Notify()
Observer1
Attributes
Operations
+ Notify()
Observer2
Attributes
Operations
+ Notify()

Subject to Notifier

Using an abstract object, the subject, can notify it’s observers through a common interface.

Note, that the abstract notify object can be an interface, realized by multiple observers. This allows the observers to inherit from another source, but accept notifications from the subject.

Other forms of Implementation

Events and Delegates

- Delegates are method signatures, that allow an object to provide a reference to a method to be called via an event.

Essentially, this is loosely coupling the observer from the notifier.

Events

.net has *events*

Events are ways for classes to provide notification to observers

Multi-cast delegate

- Aggregation – multiple objects to notify!

Use:

- Delegate – e.g. function pointer, method signature
- Event Declaration

Delegate

A delegate is just a method signature

```
public delegate void AddAnimal(object sender, Animal animal);
```

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Delegate

A delegate is just a method signature

```
public delegate void AddAnimal(object sender, Animal animal);
public event AddAnimal AddedDog;
```

Event Definition

```
public delegate void AddAnimal(object sender, Animal animal);
```

```
public event AddAnimal AddedDog;
```

Event Tutorial: http://msdn.microsoft.com/en-us/library/aa645739(v=vs.71).aspx

```
public event AddAnimal AddedDog;
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Event Definition

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```
public event AddAnimal AddedDog;
```

Event Definition

```
public delegate void AddAnimal(object sender, Animal animal);


public event AddAnimal AddedDog;
```

Event Subscription

```
m_manager.AddedCat += m_manager_AddedCat;
```

Event Subscription

```
m_manager.AddedCat += m_manager_AddedCat;
```

Example…

Zoo – using events

- Windows Forms

Translators - using interfaces

Caveats

Great for broadcasting (multi-casting) data

Flexible and scalable.

- Although if broadcasts are periodic, the system performance can degrade with large numbers of observers.

Message updates may not be deterministic.

- Clients (observers) may not suspect state change.

Now you go!

Implement the observer pattern using the event and delegate structure in .net

Create an example program that reads a target INI file, and displays the targets in a list. When a target list is read, it should add the target to a target manager. When a new target is added (or list of targets) the TM should notify a form and an object that logs to a file that new targets were aded