

CS160 Discussion Section

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Outline

- Design Patterns
- Model-View-Controller
- Heuristic Evaluation Assignment
- Administrivia

Motivation for Design Patterns

- Most examples from UI literature are critiques
 - Norman, Nielsen, etc.
- Design is about finding solutions
- Unfortunately, designers often reinvent
 - hard to know how things were done before
 - hard to reuse specific solutions
- Design patterns are a solution
 - reuse existing knowledge of what works well



Pattern Format

1. Pattern Title
2. Background Information
3. Problem Statement
4. Solution
5. Solution Sketch
6. Other Patterns to Consider

Home Page Design Rules

- Problem
 - without a compelling home page (H/P), no one will ever go on to the rest of your site
 - surveys show millions of visitors leave after H/P
 - most will never come back -> lost sales, etc.



Six Ways to Make a Good Home Page



- Lure visitors to return
 - with fresh content
 - keep it updated so there is a reason to come back
 - by seducing with text
 - you have only seconds
 - lively, sparkling, precise

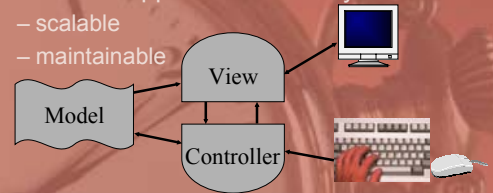
Design Patterns

- Next used in software engineering [Gamma, et. al.]
 - communicate design problems & solutions
- Proxy
 - surrogate for another object to control access to it
- Observer
 - when one object changes state, its dependents are notified

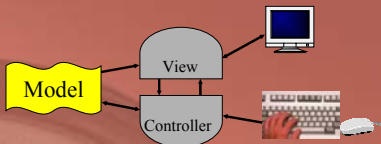


Model-View-Controller

- Architecture for interactive apps
 - introduced by Smalltalk developers at PARC
- Partitions application in a way that is
 - scalable
 - maintainable

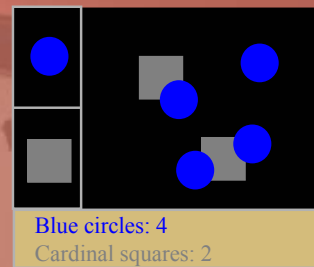


Model



- Information the app is trying to manipulate
- Representation of real world objects
 - circuit for a CAD program
 - logic gates and wires connecting them
 - shapes in a drawing program
 - geometry and color

Example Application



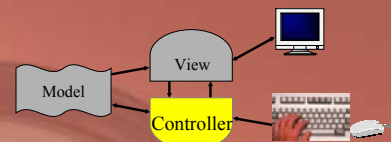
Example Code (Model)

```
class Model {
  class Shape {
    ...
    int type; // 0 - square, 1 - circle
    int x, y;
    Color color;
    Shape(int type, int x, int y, Color c) {...};
  }

  Shape shapes[MAX_SHAPES]; // array of shapes
  View views[MAX_VIEWS]; // array of Views

  void addCircle(Shape circle) {
    shapes.addElement(circle);
    for each view do
      view.refresh();
  }
}
```

Controller



- Receives all input events from the user
- Decides what they mean and what to do
 - communicates with view to determine which objects are being manipulated (e.g., selection)
 - calls model methods to make changes on objects
 - model makes change and notifies views to update

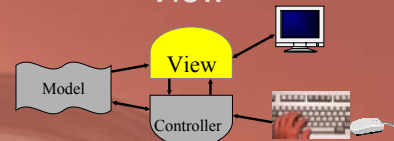
Example Code (Controller)

```
// declaration in corresponding Model
class Shape {
    ...
    int type; // 0 - square, 1 - circle
    int x, y;
    Color color;
    Shape(int type, int x, int y, Color c);
}

// code in corresponding Model
void addCircle(Shape circle) {
    ...
}

// Controller code
void onMouseClick(MouseEvent e) {
    addCircle(
        new Shape(Shape.CIRCLE, e.getX(),
                 e.getY(), Color.BLUE));
}
```

View



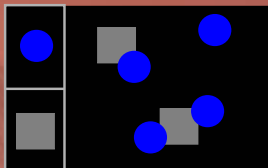
- Implements a visual display of the model
- May have multiple views
 - e.g., shape view and numerical view
- Any time the model is changed, each view must be notified so that it can change *later*
 - e.g., adding a new shape

Example Code (View)

```
// code in corresponding model
void addCircle(Shape circle) {
    shapes.addElement(circle);
    for each view do
        view.refresh();
}

// for graphical View
void refresh() {
    for each shape do
        shape.repaint();
}

// for text View
void refresh() {
    print("Blue circles:" + shapes.count(Shape.CIRCLE);
    print("Cardinal squares:" + shapes.count(Shape.SQUARE);
}
```

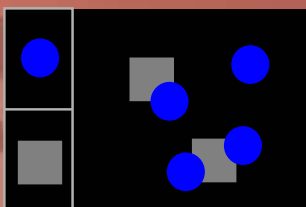


Blue circles: 4
Cardinal squares: 2

Why MVC?

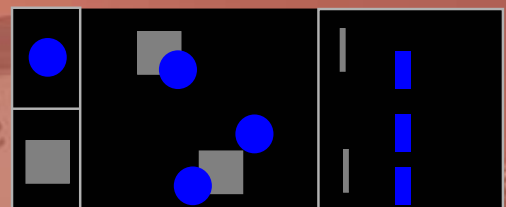
- Combining MVC into one class or using global variables will not scale
 - model may have more than one view
 - each is different and needs update when model changes
- Separation eases maintenance
 - easy to add a new view later
 - new model info may be needed, but old views still work
 - can change a view later, e.g., draw shapes in 3-d (recall, view handles selection)

Multiple Views



Blue circles: 4
Cardinal squares: 2

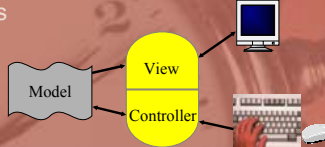
Adding Views Later



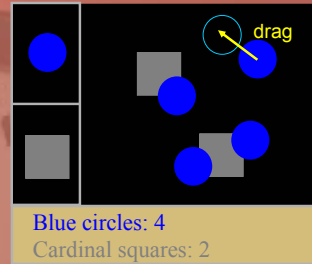
Blue circles: 4
Cardinal squares: 2

Combining View & Controller

- View and controller are tightly intertwined
 - lots of communication between the two
- Almost always occur in pairs
 - i.e., for each view, need a separate controller
- Many architectures combine into a single class

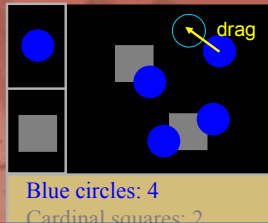


Combining V-C for Efficiency



Example Code

```
void onMouseDragged(MouseEvent e) {  
    if (view1.inDraggedMode() {  
        view1.getDraggedObject.setX(e.getX());  
        view1.getDraggedObject.setY(e.getY());  
        view1.refresh();  
    }  
}
```



Back to Patterns

- What are the problems that MVC attempts to solve?
- What is the overall solution in the MVC approach?

HE Assignment

- Report outline
 - Problem (one sentence)
 - Violations found (as needed)
 - Summary of violations (¼ page)
 - Total # of violations in user interface
 - # of violations for each heuristic
 - # of violations for each severity rating
 - Overall recommendations (¼ page)

Grading Criteria

- Completeness
 - Does HE cover entire interface?
 - Indicate clearly if no violation found on particular screens
 - HE must include unimplemented portions
 - Indicate clearly if no sketches given for unimplemented portions
 - Explain if unimplemented portions could not be evaluated
 - Were there *major* violations that were not found?
 - That's why HE needs 3-5 evaluators

Grading Criteria (Cont'd)

- Clarity of violation descriptions
 - Are the stated violations valid?
 - Limit to 30 *major* violations if >30 found
 - Report multiple instances as single violation
- Quality of recommendations
 - Usually, one recommendation per heuristic
 - Unless each heuristic's violation fall under >1 category
 - For each heuristic, give recommendation for violation with highest severity

Administrivia

- Heuristic evaluation assignment due Apr 9, 2003 (this Wed) in lecture
 - Turn in two copies
 - Post online on Swiki for respective groups to start making hi-fi changes

Administrivia

- Scribe notes from HCI Panel posted on section homepage under "Announcements"
 - Skills needed for HCI careers
 - Career opportunities in HCI
 - Workplace-related issues
- Ethics involving human subjects
 - Anonymize online reports if haven't already done so