CSSE 220 Day 20

Object-Oriented Design Recap, Vector Graphics Assignment

No SVN checkout today

Questions?

Object-Oriented Design

- A practical technique

Key Steps in Our Design Process

1. **Discover classes** based on requirements
2. **Determine responsibilities** of each class
3. **Describe relationships** between classes

Discover Classes Based on Requirements

- Brainstorm a list of possible classes
  - Anything that might work
  - No squashing
- Prompts:
  - Look for **nouns**
  - Multiple objects are often created from each class → so look for **plural concepts**
  - Consider how much detail a concept requires:
    - A lot? Probably a class
    - Not much? Perhaps a primitive type
- Don't expect to find them all → add as needed

Tired of hearing this yet?

CRC Card Technique

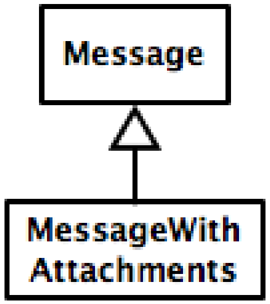
1. Pick a responsibility of the program
2. Pick a class to carry out that responsibility
    - Add that responsibility to the class's card
3. Can that class carry out the responsibility by itself?
    - Yes → Return to step 1
    - No →
        - Decide which classes should help
        - List them as collaborators on the first card
        - Add additional responsibilities to the collaborators' cards

CRC Card Tips

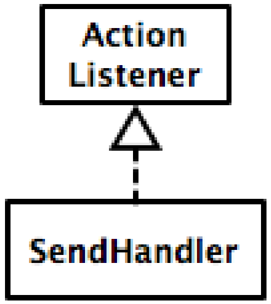
- Spread the cards out on a table
  - Or sticky notes on a whiteboard instead of cards
- Use a “token” to keep your place
  - A quarter or a magnet
- Focus on high-level responsibilities
  - Some say < 3 per card
- Keep it informal
  - Rewrite cards if they get to sloppy
  - Tear up mistakes
  - Shuffle cards around to keep “friends” together

Showing Relationship on UML Class Diagrams

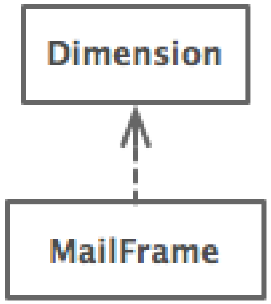
Inheritance (is a)



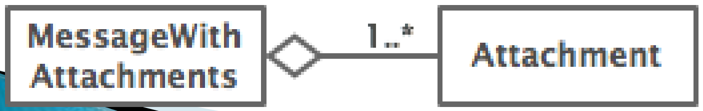
Interface Implementation (is a)



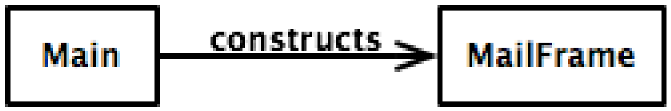
Dependency (depends on)



Aggregation (has a)



Association



Vector Graphics Assignment

- A team project to create a scalable graphics program.

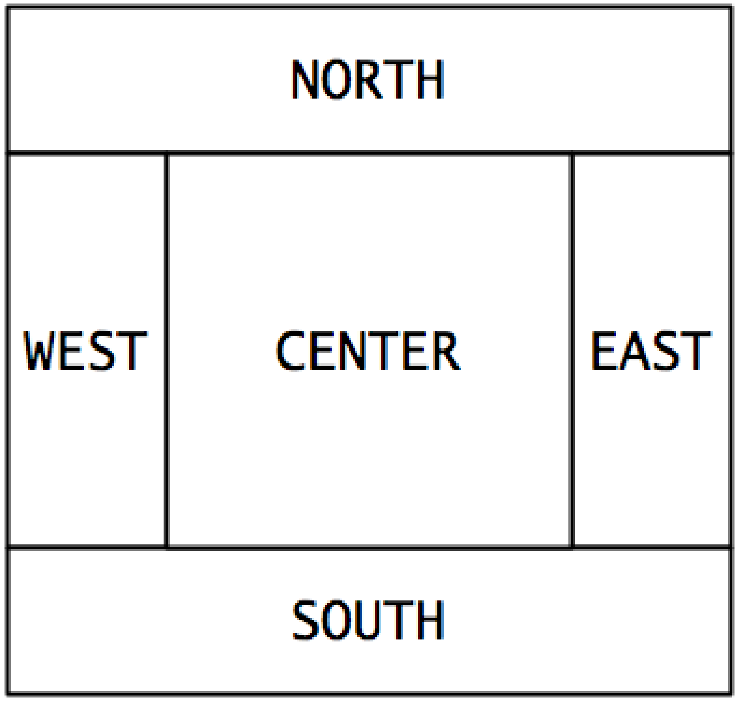
Some Notes on Layout Managers

- When JFrame’s and JPanel’s defaults just don’t cut it.

Recall: How many components can a JFrame show by default?

- Answer: 5
- We use the two-argument version of **add**:
- `JPanel p = new JPanel();`
  `frame.add(p, BorderLayout.SOUTH);`

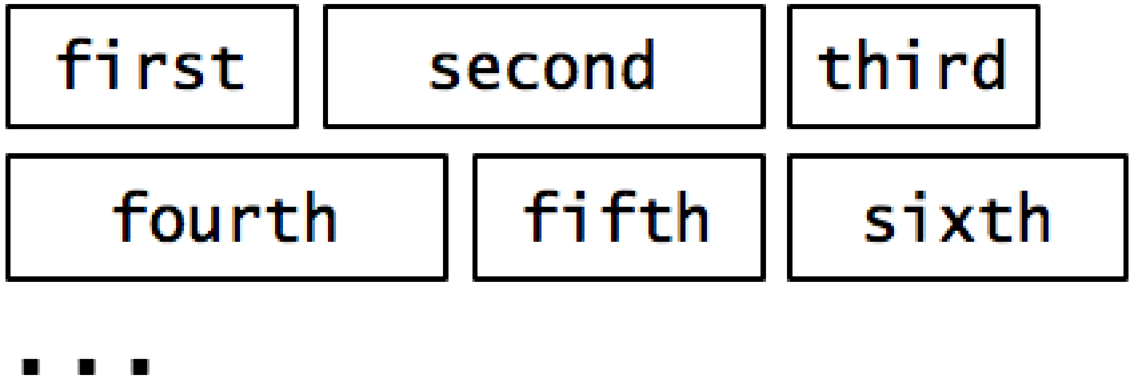
- **JFrame**'s default **LayoutManager** is a **BorderLayout**
- **LayoutManager** instances tell the Java library how to arrange components
- **BorderLayout** uses up to five components



Recall: How many components can a JPanel show by default?

- Answer: arbitrarily many
- Additional components are added in a line

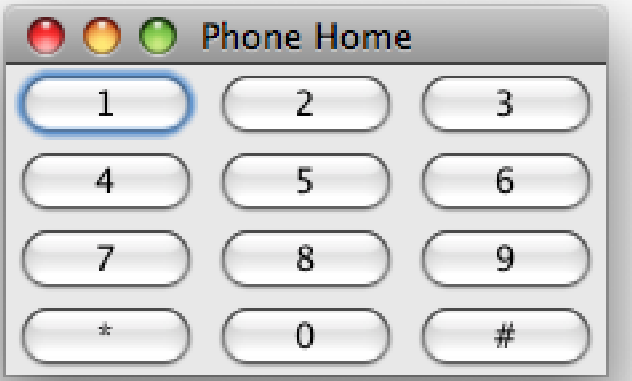
- **`JPanel`**'s default **`LayoutManager`** is a **`FlowLayout`**



Setting the Layout Manager

- We can set the layout manager of a JPanel manually if we don't like the default:

```
JPanel panel = new JPanel();
panel.setLayout(new GridLayout(4,3));
panel.add(new JButton("1"));
panel.add(new JButton("2"));
panel.add(new JButton("3"));
panel.add(new JButton("4"));
// ...
panel.add(new JButton("0"));
panel.add(new JButton("#"));
frame.add(panel);
```



Lots of Layout Managers

- A `LayoutManager` determines how components are laid out within a container
  - `BorderLayout`. When adding a component, you specify center, north, south, east, or west for its location. (Default for a JFrame.)
  - `FlowLayout`: Components are placed left to right. When a row is filled, start a new one. (Default for a JPanel.)
  - `GridLayout`. All components same size, placed into a 2D grid.
  - Many others are available, including `BoxLayout`, `CardLayout`, `GridBagLayout`, `GroupLayout`
  - If you use the `null` for the **`LayoutManager`**, then you must specify every location using coordinates
    - More control, but it doesn't resize automatically

Additional Resources on Layout Managers

- Chapter 18 of Big Java

- Swing Tutorial
  - **http://java.sun.com/docs/books/tutorial/ui/index.html**
  - Also linked from schedule

Vector Graphics Teams

team11	team12
Gardner	Alice
Joe	Cory
Steve	Sam

Note your team number; you'll need it for SVN

- Next steps:
  - Verify SVN repository, check-out project
  - Exchange contact information
  - Start work on first milestone