2110: GUIS: Graphical User Interfaces

Their mouse had a mean time between failure of ... a week ... it would jam up irreparably, or ... jam up on the table-- ... It had a flimsy cord whose wires would break. Steve Jobs: "... Xerox says it can't be built for < \$400, I want a \$10 mouse that will never fail and can be mass produced, because it's going to be the primary interface of the computer ..."

... Dean Hovey ... came back, "I've got some good and some bad news. Good news: we've got a new project with Apple. Bad news: I told Steve we'd design a mouse for 10 bucks."

... year later ... we ... filed ... and were granted a patent, on the electromechanical-optical mouse of today; ... we ended up ... [making] the mouse as invisible to people as it is today.

Steve Sachs interview on first computer with GUI: Apple Lisa (~\$10K in 1982). http://library.stanford.edu/mac/primary/interviews/sachs/trans.html

GUI (Graphical User Interface)

- · Provides a friendly interface between user and program
- Allows event-driven or reactive programming: The program reacts to events such as button clicks, mouse movement, keyboard input
- Often is multi-threaded: Different threads of execution can be executing simultaneously. We study concurrency and threads in April.

Two aspects to making a GUI:

 1. Placing components (buttons, text, etc.) in it.
 TODAY

 2. Listening/responding to events
 Next Lecture

Lecture notes page of course website, rows for GUI lectures: will contain guiDemo.zip. Filled with short demos of GUI features including demos for today and next lecture. Download it and look at demos in DrJava or Eclipse.

GUI (Graphical User Interface)

There are three GUI packages in Java:

•AWT (Abstract or Awful Window Toolkit) —first one. Some parts are implemented not in Java but in code that depends on the platform. Came with first Java.

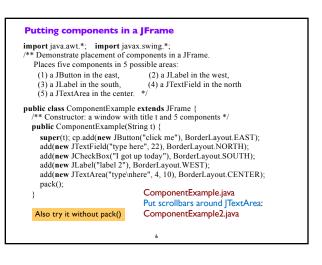
•Swing —a newer one, which builds on AWT as much as possible. It is "lightweight": all code written as Java classes/interfaces. Released in 97-98.

•JavaFX —completely new! Much more functionality, flexibility, but far too complicated to teach in CS2110. (Released first in 2008)

We use Swing (and parts of AWT)

Class JFrame JFrame object: associated with a window on your monitor. Generally, a GUI is a JFrame object with various components placed in it Some methods in a JFrame object hide() show() setVisible(boolean) getX() getY() (coordinates of top-left point) getWidth() getHeight() setLocation(int, int) getTitle() setTitle(String) getLocation() setLocation(int, int) Over 100 methods in a JFrame object!

Placing components in a JFrame Layout manager: Instance controls placement of components. JFrame layout manager default: BorderLayout. BorderLayout layout manager: Can place 5 components: **public** class C **extends** JFrame { North public C() { JButton jb= **new** JButton("Click here"); West Center East JLabel jl= **new** JLabel("west"); South add(jb, BorderLayout.EAST); add(jl, BorderLayout.WEST); add(new JLabel("south"), BorderLayout.SOUTH); add(new JLabel("center"), BorderLayout.CENTER); add(new JLabel("north"), BorderLayout.NORTH); pack(); setVisible(**true**); JFrameDemo.java }



Packages -- Components Packages that contain classes that deal with GUIs: java.awt: Old package. javax.swing: New package. javax.swing has a better way of listening to buttons, Jxxxx: in text fields, etc. Components are more flexible Swing, with xxxx in awt. **Component**: Something that can be placed in a GUI window. They are instances of certain classes, e.g. JButton, Button: Clickable button JLabel Label Line of text JTextField, TextField: Field into which the user can type JTextArea, TextArea: Many-row field into which user can type JPanel, Panel: Used for graphics; to contain other comp Used for graphics; to contain other components ICheckBox⁺ Checkable box with a title Menu of items, one of which can be checked JComboBox: Same functionality as JCheckBox Scrollbars around a JTextArea JRadioButton: JScrollPane: Can contain other components Container: Box. Can contain other components 7

