CSE 403
Lecture 6

User Interface Prototyping

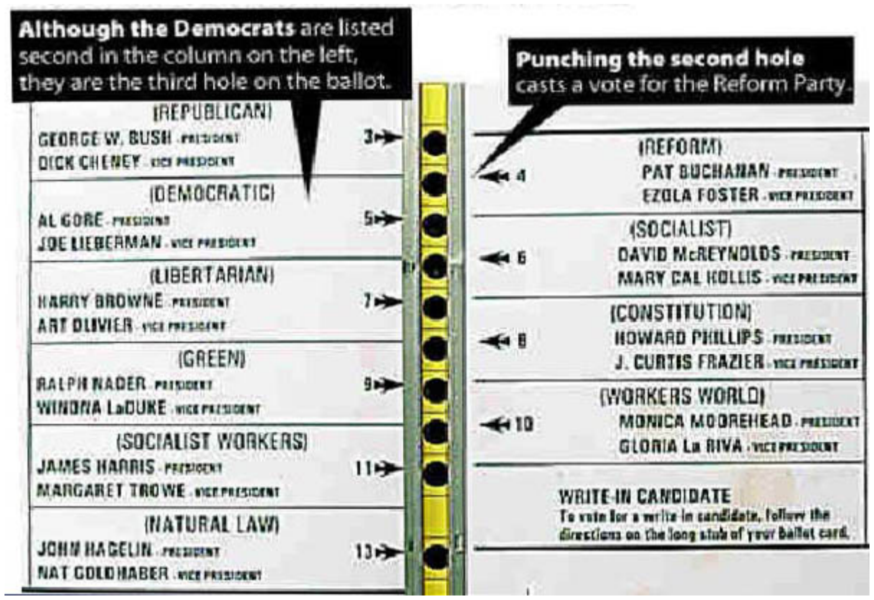
Thanks to Marty Stepp, Michael Ernst, and other past instructors of CSE 403
http://www.cs.washington.edu/403/

Big questions

- What's the point of prototyping? Should I do it?
  - If so, when in the overall process or "lifecycle" should I?
- Should I make my prototype on paper or digitally?
- How do I know whether my UI is good or bad?
  - What are the ways in which a UI's "quality" can be quantified?
  - What are some examples of software you use that have especially good/bad UIs? What do you think makes them good/bad?

Usability and SW design

- **usability**: The effectiveness with which users can achieve tasks in a software environment.
  - studying and improving usability is part of Human-Computer Interaction (HCI)
  - usability and good UI design are closely related
  - a bad UI can have unfortunate results...


Although the Democrats are listed second in the column on the left, they are the third hole on the ballot.
Punching the second hole casts a vote for the Reform Party.
(REPUBLICAN) GEORGE W. BUSH - PRESIDENT DICK CHENEY - VICE PRESIDENT 3
(DEMOCRATIC) AL GORE - PRESIDENT JOE LIEBERMAN - VICE PRESIDENT 5
(LIBERTARIAN) HARRY BROWNE - PRESIDENT ART OLIVIER - VICE PRESIDENT 7
(GREEN) RALPH NADER - PRESIDENT WINONA LaDUKE - VICE PRESIDENT 9
(SOCIALIST WORKERS) JAMES HARRIS - PRESIDENT MARGARET TROWE - VICE PRESIDENT 11
(NATURAL LAW) JOHN HAGELIN - PRESIDENT NAT GOLDHABER - VICE PRESIDENT 13
4 (REFORM) PAT BUCHANAN - PRESIDENT EZOLA FOSTER - VICE PRESIDENT
6 (SOCIALIST) DAVID McREYNOLDS - PRESIDENT MARY CAL HOLLIS - VICE PRESIDENT
8 (CONSTITUTION) HOWARD PHILLIPS - PRESIDENT J. CURTIS FRAZIER - VICE PRESIDENT
10 (WORKERS WORLD) MONICA MOOREHEAD - PRESIDENT GLORIA La RIVA - VICE PRESIDENT
WRITE-IN CANDIDATE To vote for a write-in candidate, follow the directions on the long stub of your ballot card.

Achieving usability

- some methods to achieve good usability:
  - user testing / field studies
    - having users use the product and gathering data
  - evaluations and reviews by UI experts
  - card sorting
    - Show users various UI menus and ask them to group the ones that are similar, to see what UI tasks are seen as being related by users.
  - prototyping
    - paper prototyping
    - code prototyping
- Good UI design focuses on the *user*, not developer or system.

Prototyping

- **prototyping**: Creating a scaled-down or incomplete version of a system to demonstrate or test aspects of it.

- What are some possible benefits of prototyping?
  - aids UI design
  - help discover requirements
  - help discover test cases and provide a basis for testing
  - allows interaction with user and customer to ensure satisfaction
  - team-building

Some prototyping methods

- UI builders (Visual Studio, etc.)
  - draw a GUI visually by dragging/dropping UI controls on screen

- implementation by hand
  - writing a "rough" version of your code

- **paper prototyping**: a paper version of a UI

  Question: Why not just code up a working code prototype?
  - paper prototype much faster to create than code
  - can change faster than code
  - more visual bandwidth (can see more at once)
  - more conducive to working in teams
  - can be done by non-technical people

Where does it fit in?

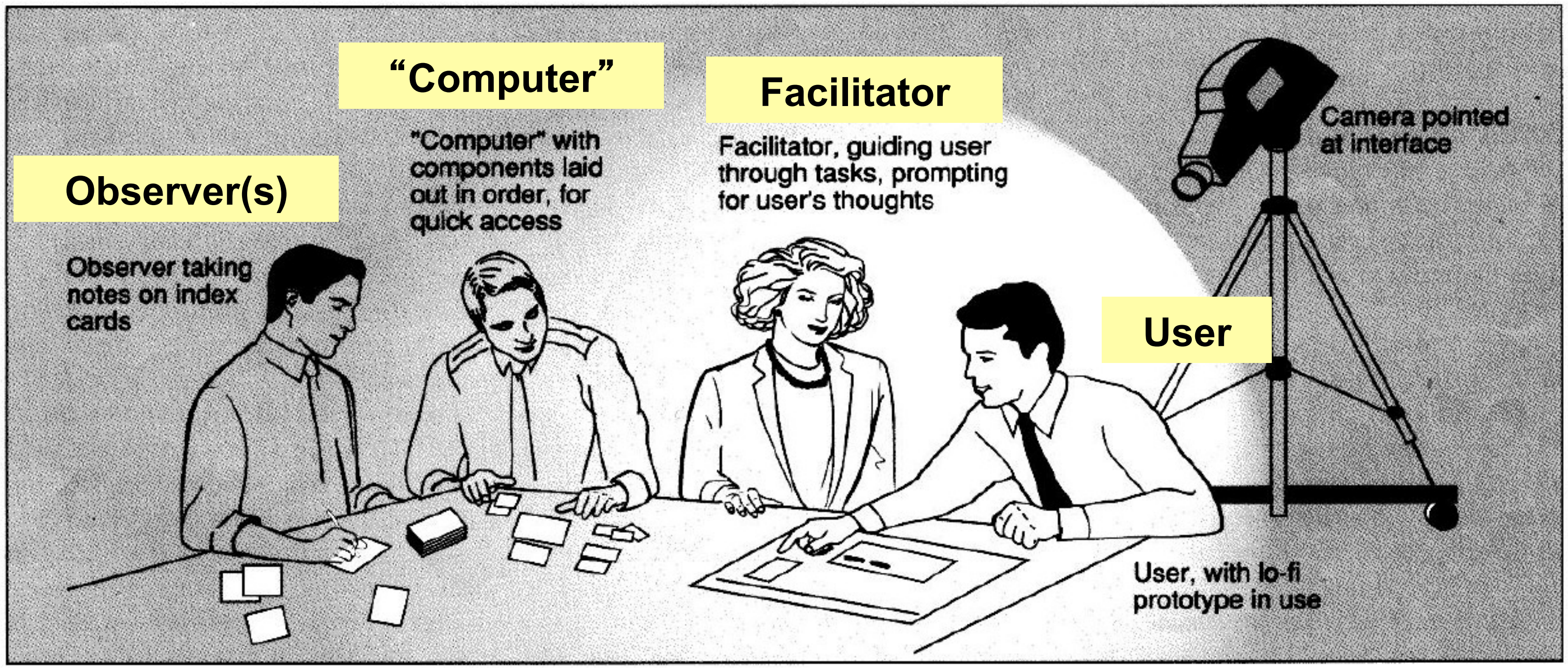
- At what point in the software lifecycle should we do (paper) prototyping? When would it be most useful to do it? Why?

- We talk about requirements being about "what" and design being about "how." Which is paper prototyping?

- Paper prototyping
  - helps uncover requirements and also upcoming design issues
  - can do it during or after requirements; before design
  - "what" vs. "how": it shows us "what" is in the UI, but it also shows us details of "how" the user can achieve goals in the UI

P.P. usability session

- user is given tasks to perform using paper prototype
- session can be observed by people or camera
- one developer can "play computer"

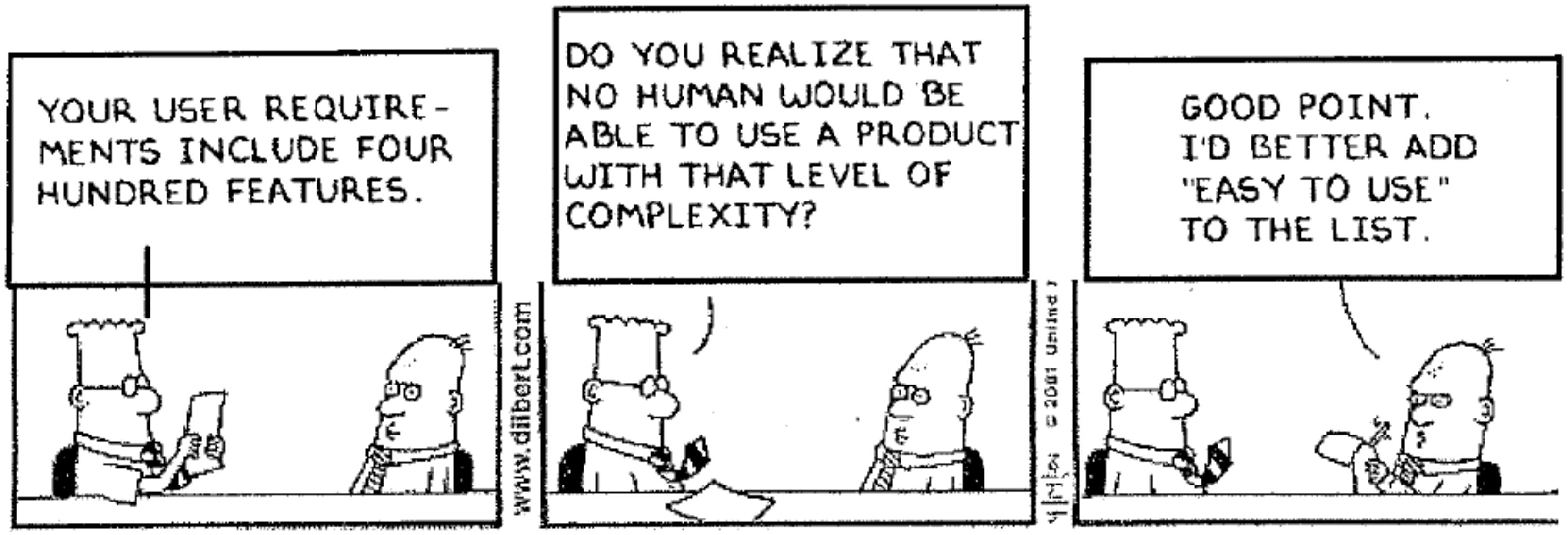

"Computer"
Facilitator
Observer(s)
"Computer" with components laid out in order, for quick access
Facilitator, guiding user through tasks, prompting for user's thoughts
Camera pointed at interface
Observer taking notes on index cards
User
User, with lo-fi prototype in use

How to watch users

- Brief the user first (being a test user is stressful)
  - “I’m testing the system, not testing you”
  - “If you have trouble, it’s the system’s fault”
  - “Feel free to quit at any time”
  - Ethical issues: informed consent
- Ask user to think aloud
- Be quiet!
  - Don’t help, don’t explain, don’t point out mistakes
  - Sit on your hands if it helps
  - Two exceptions: prod user to think aloud (“what are you thinking now?”), and move on to next task when stuck
- Take lots of notes

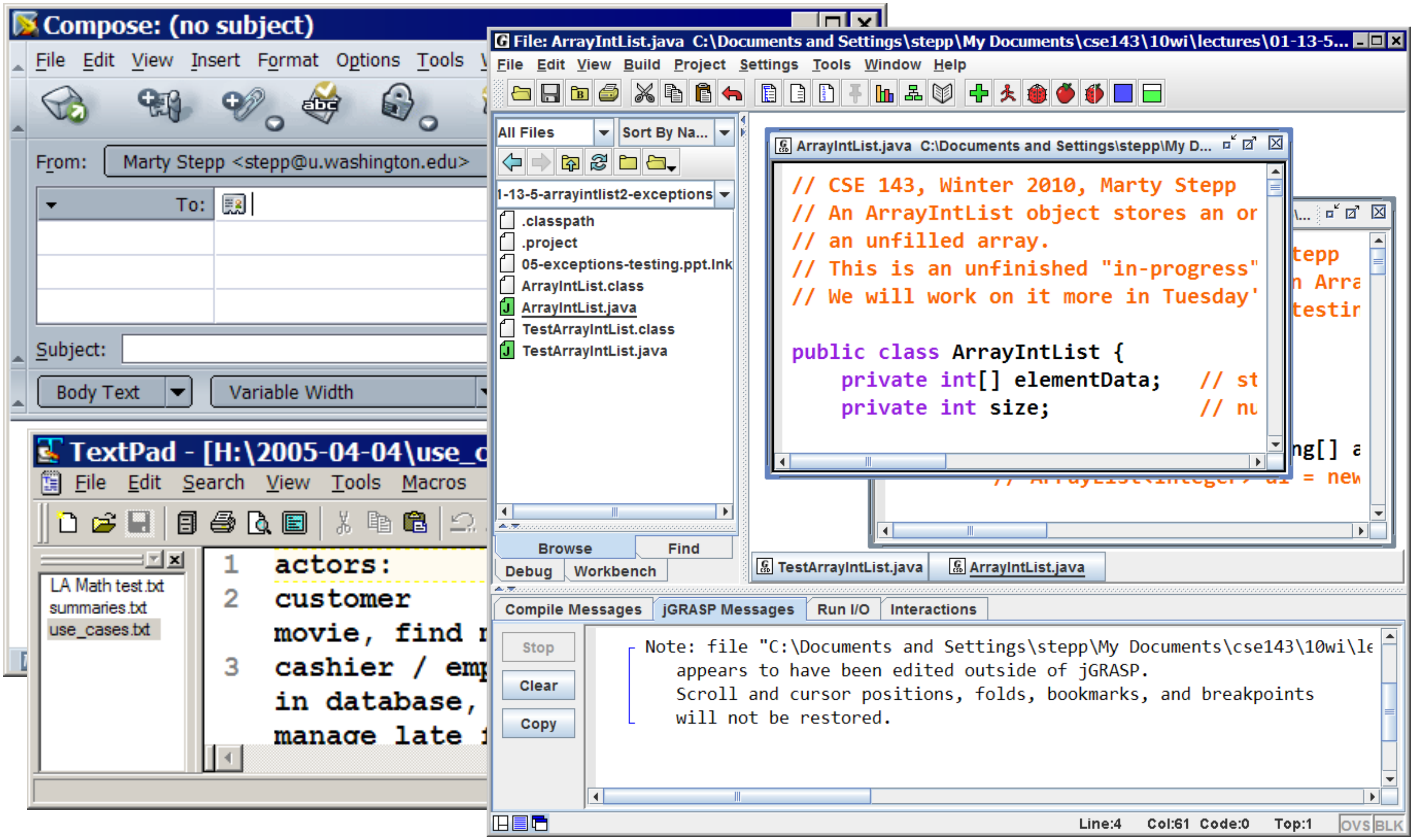
Schneiderman's 8 Golden Rules

- Strive for consistency.
- Give shortcuts to the user.
- Offer informative feedback.
- Make each interaction with the user yield a result.
- Offer simple error handling.
- Permit easy undo of actions.
- Let the user be in control.
- Reduce short-term memory load on the user.


YOUR USER REQUIREMENTS INCLUDE FOUR HUNDRED FEATURES.
DO YOU REALIZE THAT NO HUMAN WOULD BE ABLE TO USE A PRODUCT WITH THAT LEVEL OF COMPLEXITY?
GOOD POINT. I'D BETTER ADD "EASY TO USE" TO THE LIST.
www.dilbert.com
© 2001 United

(from Designing the User Interface, by Ben Schneiderman of UMD, HCI/UI expert)

UI design examples


Compose: (no subject)
File Edit View Insert Format Options Tools
From: Marty Stepp <stepp@u.washington.edu>
To:
Subject:
Body Text
Variable Width
TextPad - [H:\2005-04-04\use_c
File Edit Search View Tools Macros
LA Math test.txt
summaries.txt
use_cases.txt
File: ArrayIntList.java C:\Documents and Settings\stepp\My Documents\cse143\10wi\lectures\01-13-5...
File Edit View Build Project Settings Tools Window Help
All Files
Sort By Na...
1-13-5-arrayintlist2-exceptions
.classpath
.project
05-exceptions-testing.ppt.lnk
ArrayIntList.class
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TestArrayIntList.class
TestArrayIntList.java
Browse
Find
Debug
Workbench
ArrayIntList.java C:\Documents and Settings\stepp\My D...
TestArrayIntList.java
ArrayIntList.java
Compile Messages
jGRASP Messages
Run I/O
Interactions
Stop
Clear
Copy
Line:4 Col:61 Code:0 Top:1 OVS BLK

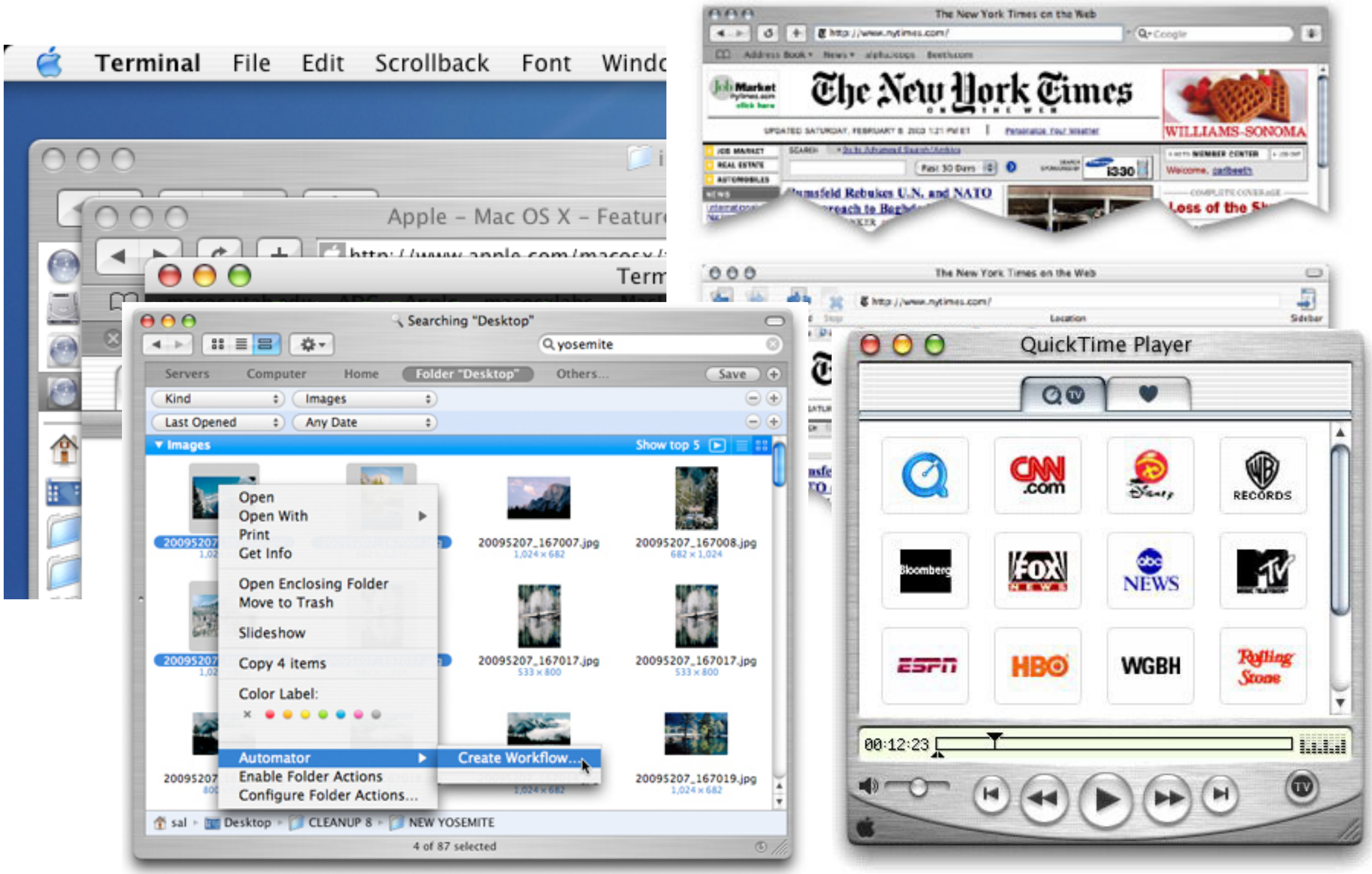
```
1 actors:
2 customer
  movie, find r
3 cashier / emp
  in database,
  manage late f
```

```
// CSE 143, Winter 2010, Marty Stepp
// An ArrayIntList object stores an or
// an unfilled array.
// This is an unfinished "in-progress"
// We will work on it more in Tuesday'

public class ArrayIntList {
    private int[] elementData;    // st
    private int size;             // nu
```

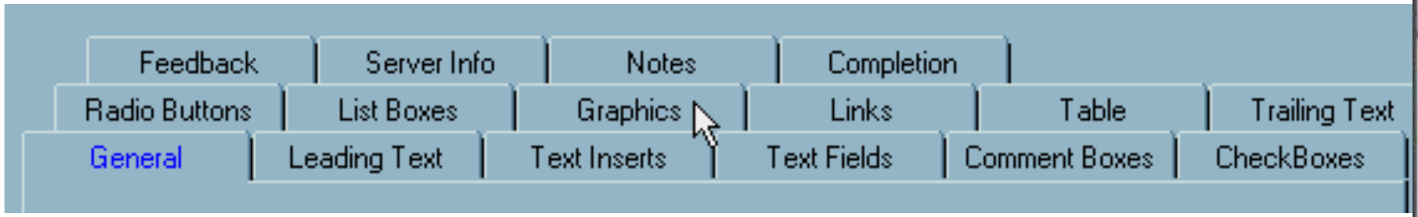
```
Note: file "C:\Documents and Settings\stepp\My Documents\cse143\10wi\le
   appears to have been edited outside of jGRASP.
   Scroll and cursor positions, folds, bookmarks, and breakpoints
   will not be restored.
```

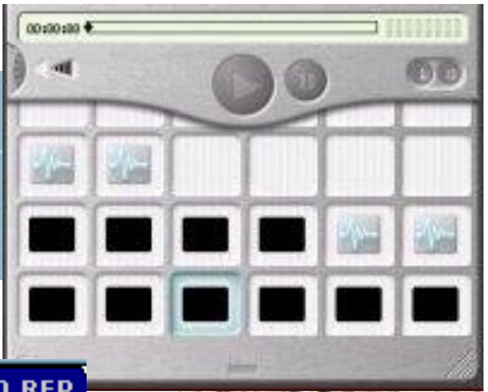
Apple Mac user interfaces

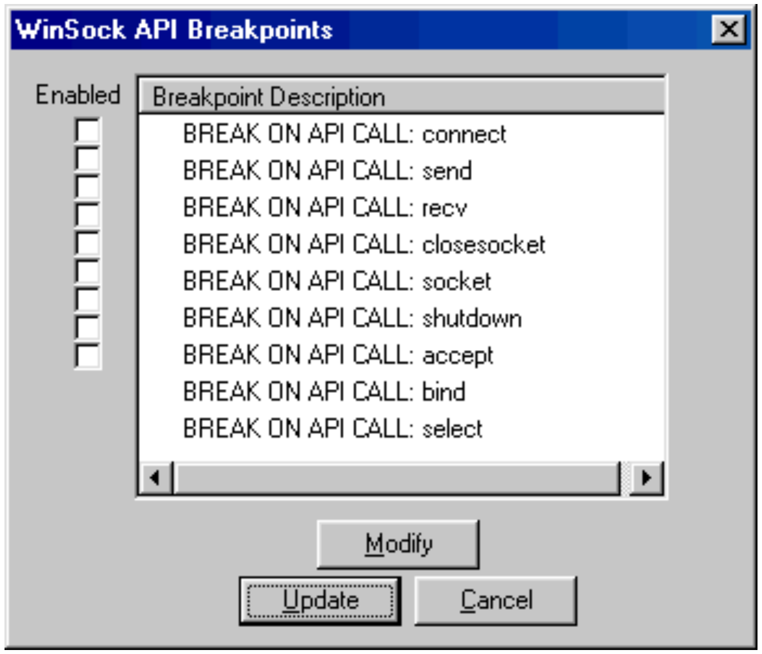


UI Hall of Shame

- http://homepage.mac.com/bradster/iarchitect/shame.htm

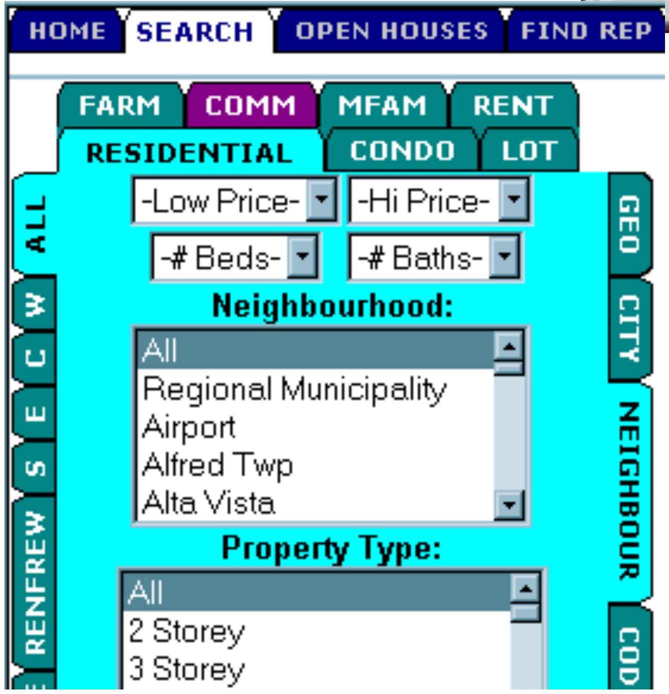


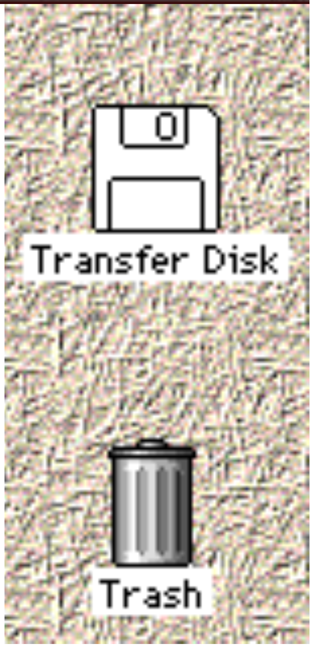




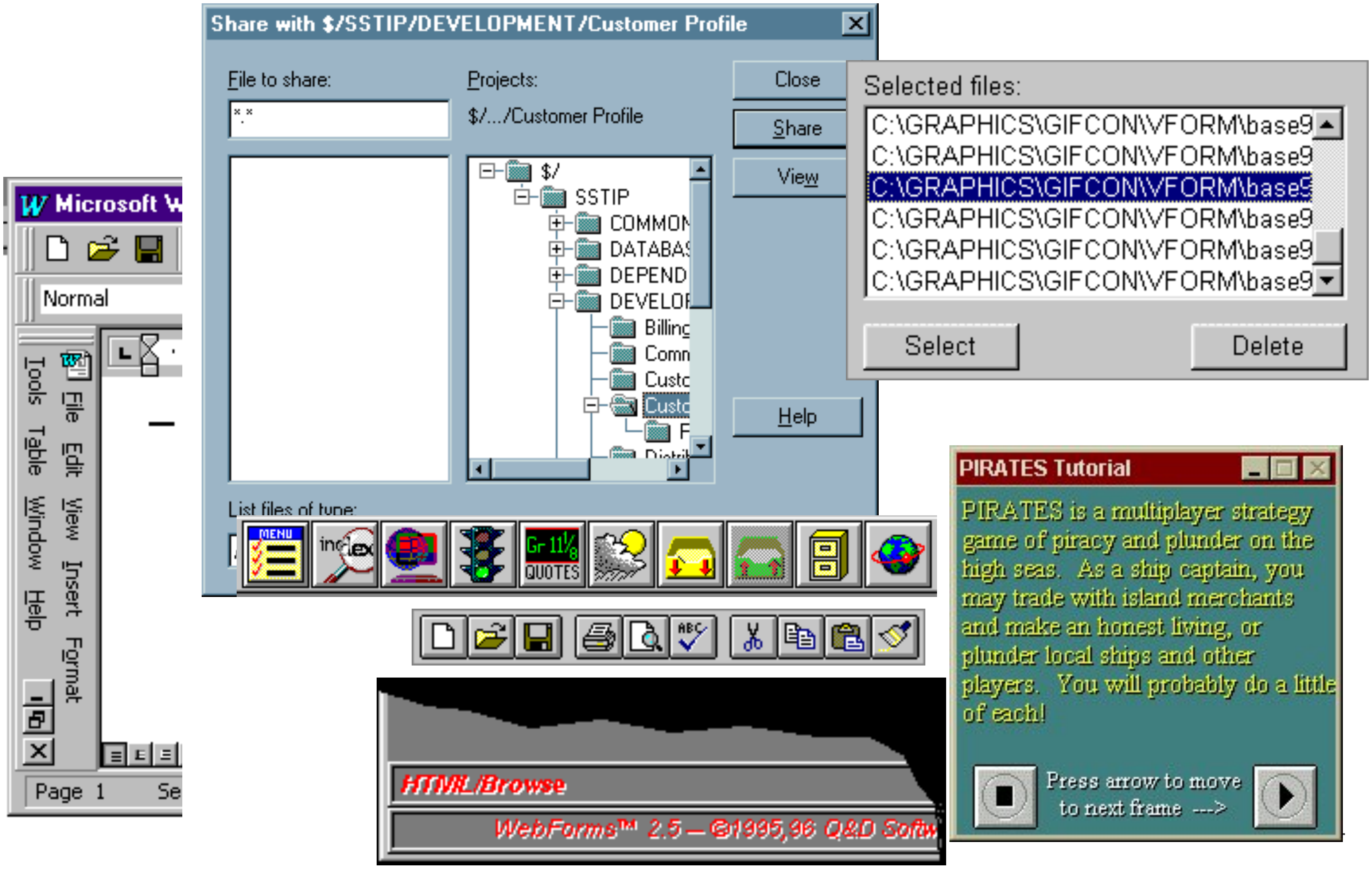
WinSock API Breakpoints

Enabled	Breakpoint Description
☐	BREAK ON API CALL: connect
☐	BREAK ON API CALL: send
☐	BREAK ON API CALL: recv
☐	BREAK ON API CALL: closesocket
☐	BREAK ON API CALL: socket
☐	BREAK ON API CALL: shutdown
☐	BREAK ON API CALL: accept
☐	BREAK ON API CALL: bind
☐	BREAK ON API CALL: select





Layout and color



File to share: *.*

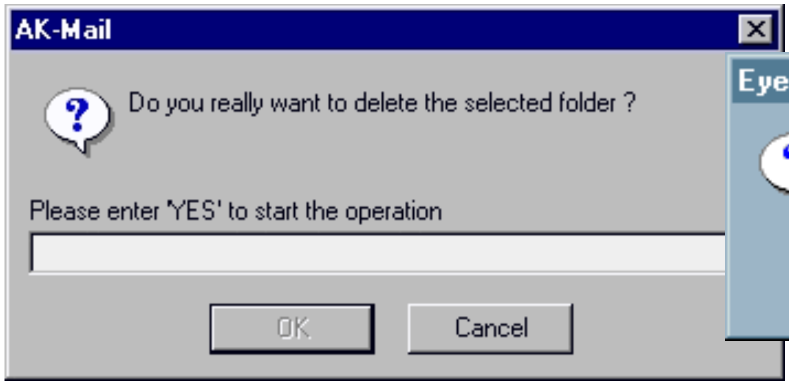
Projects: $/.../Customer Profile

Selected files:

C:\GRAPHICS\GIFCON\VFORM\base9
C:\GRAPHICS\GIFCON\VFORM\base9
C:\GRAPHICS\GIFCON\VFORM\base9
C:\GRAPHICS\GIFCON\VFORM\base9
C:\GRAPHICS\GIFCON\VFORM\base9
C:\GRAPHICS\GIFCON\VFORM\base9

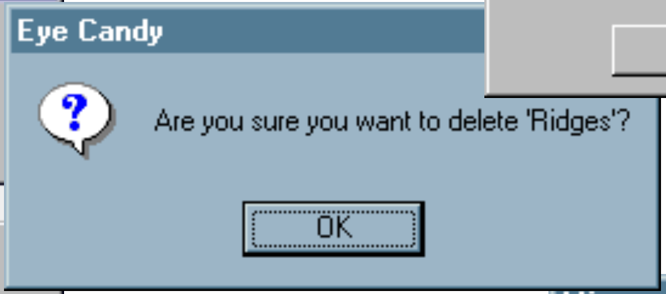
PIRATES is a multiplayer strategy game of piracy and plunder on the high seas. As a ship captain, you may trade with island merchants and make an honest living, or plunder local ships and other players. You will probably do a little of each!

Bad error messages

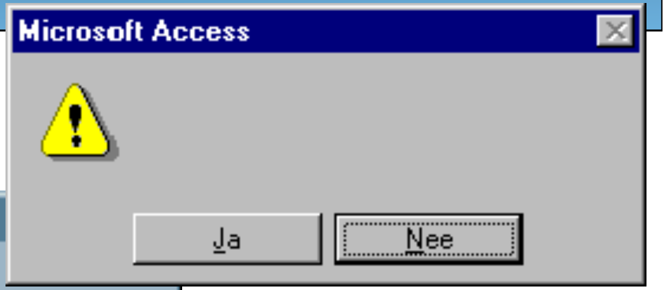

AK-Mail

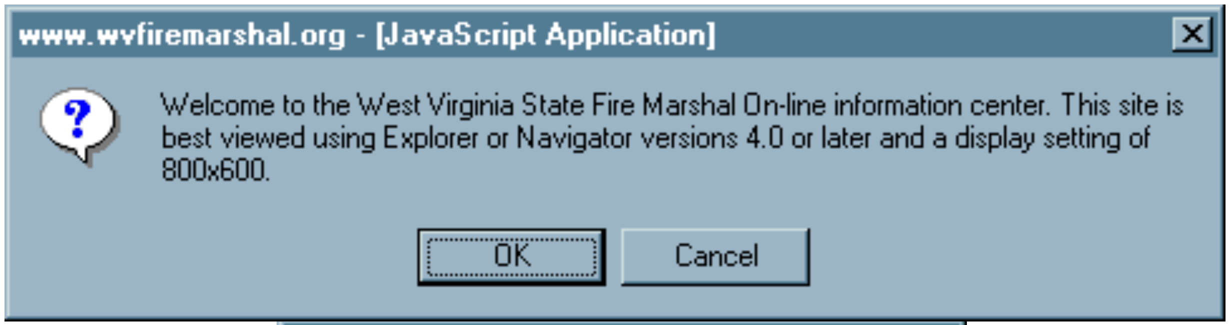
Do you really want to delete the selected folder ?

Please enter 'YES' to start the operation

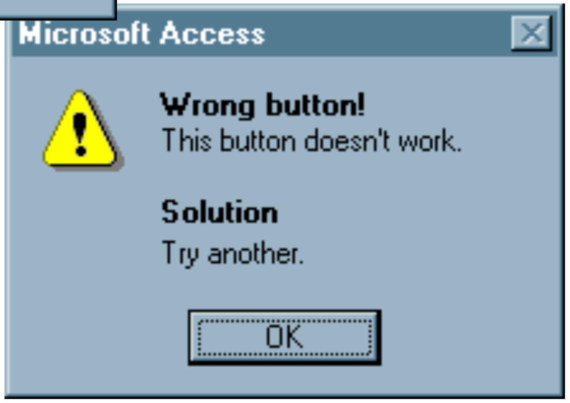

Eye Candy

Are you sure you want to delete 'Ridges'?


Microsoft Access

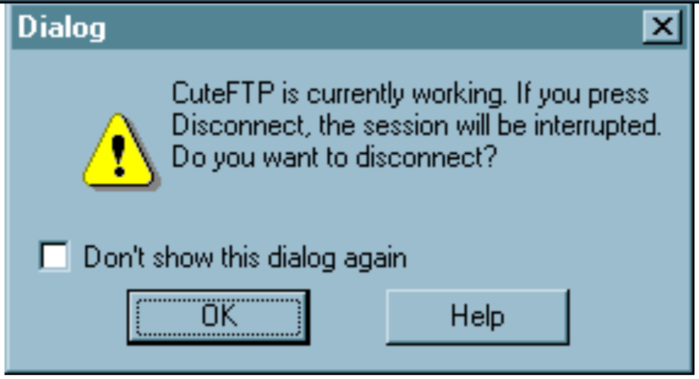

www.wvfiremarshal.org - [JavaScript Application]

Welcome to the West Virginia State Fire Marshal On-line information center. This site is best viewed using Explorer or Navigator versions 4.0 or later and a display setting of 800x600.


Microsoft Access

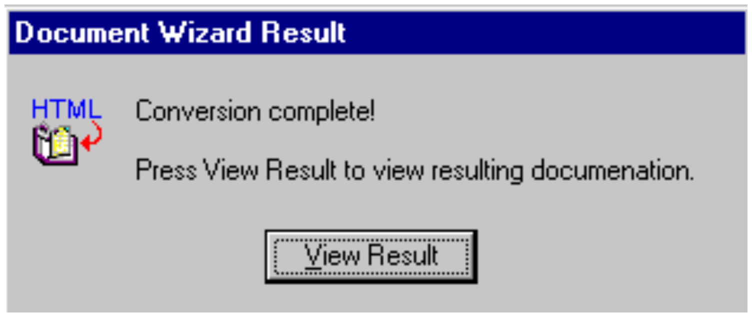
Wrong button!
This button doesn't work.

Solution
Try another.


Dialog

CuteFTP is currently working. If you press Disconnect, the session will be interrupted. Do you want to disconnect?

☐ Don't show this dialog again

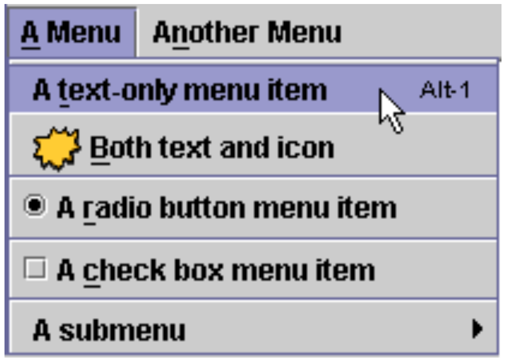

Document Wizard Result

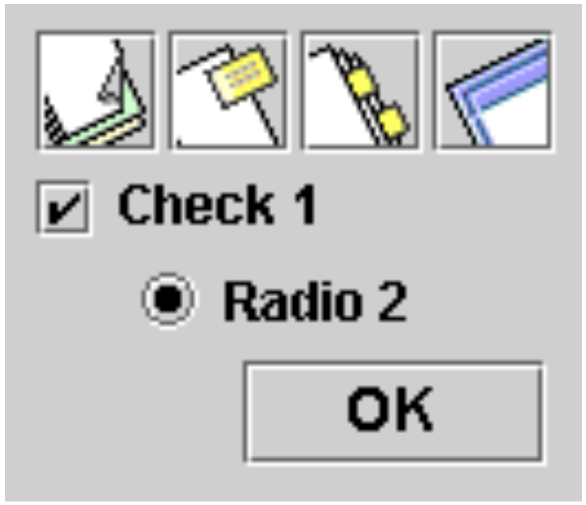
Conversion complete!

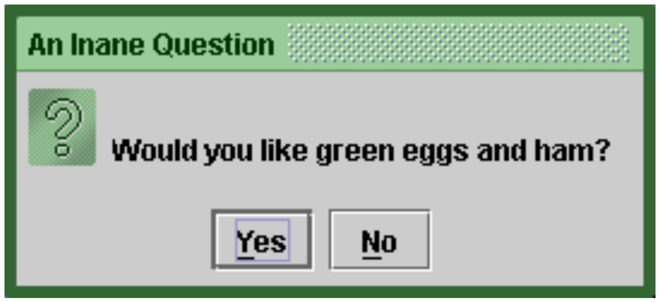
Press View Result to view resulting documenation.

UI design and components

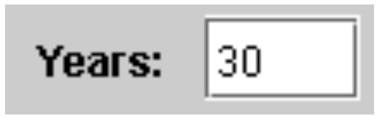
- When should we use:
  - A button?
  - A check box?
  - A radio button?
  - A text field?
  - A list?
  - A combo box?
  - A menu?
  - A dialog box?
  - Other..?

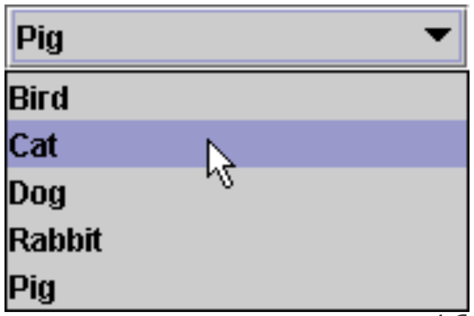


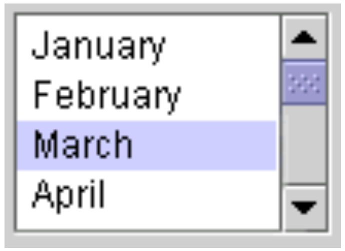


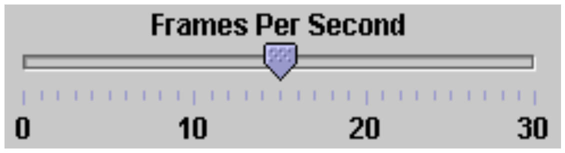


Would you like green eggs and ham?







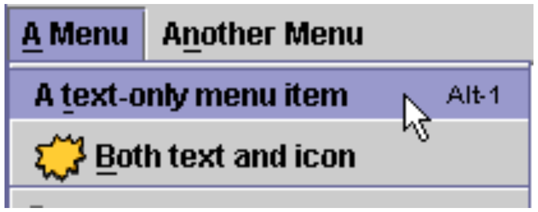


UI design - buttons, menus

- Use **buttons** for single independent actions that are relevant to the current screen.
  - Try to use button text with verb phrases such as "Save" or "Cancel", not generic: "OK", "Yes", "No"
  - use <u>M</u>nemonics or Accelerators (Ctrl-S)
  - tool tips are helpful, but don't rely on them (many users don't know to hover to find them)

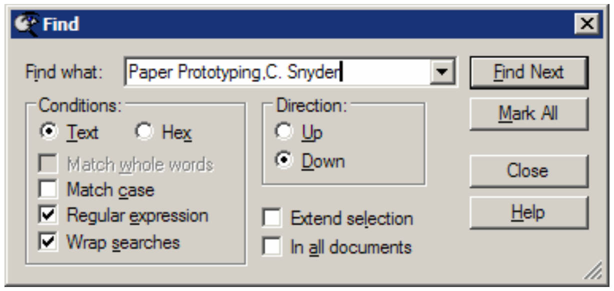
- Use **toolbars** for common actions.

- Use **menus** for infrequent actions applicable to many screens.
  - *Users don't like menus!* Try not to rely too much on menus. Provide another way to access the same functionality (toolbar, hotkey, etc)



Checkboxes, radio buttons

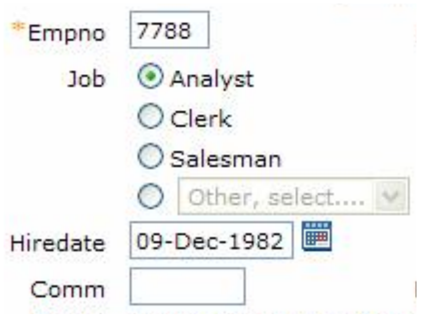
- Use **check boxes** for independent on/off switches (boolean)
- Use **radio buttons** for a small number of related choices, when only one can be activated at a time (enum / constants)

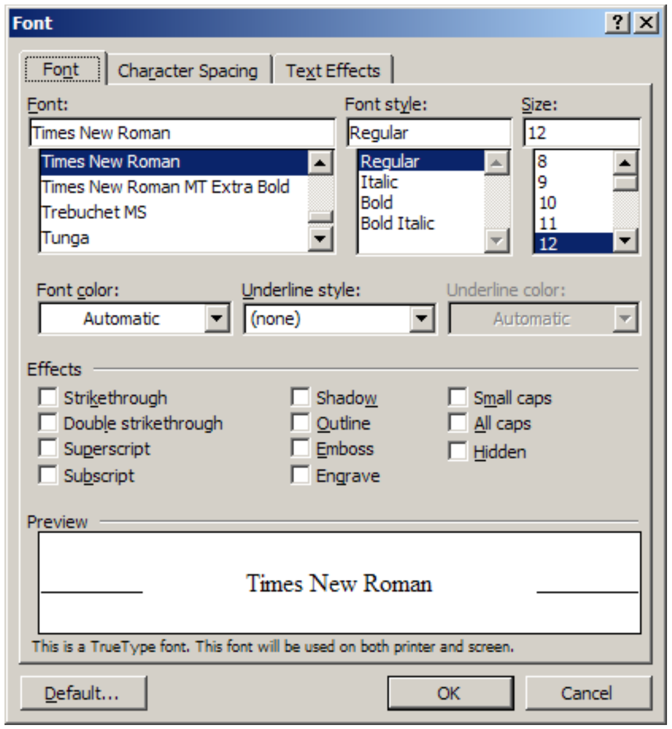

Find

Find what: Paper Prototyping,C. Snyder

Conditions: [✓ Text] Hex
- [ ] Match whole words
- [ ] Match case
- [✓] Regular expression
- [✓] Wrap searches

Direction: Up [✓ Down]
- [ ] Extend selection
- [ ] In all documents


*Empno	7788
Job	[✓ Analyst] Clerk Salesman Other, select....
Hiredate	09-Dec-1982
Comm	


Font

Font: Times New Roman (Times New Roman, Times New Roman MT Extra Bold, Trebuchet MS, Tunga)

Font style: Regular (Regular, Italic, Bold, Bold Italic)

Size: 12 (8, 9, 10, 11, 12)

Font color: Automatic

Underline style: (none)

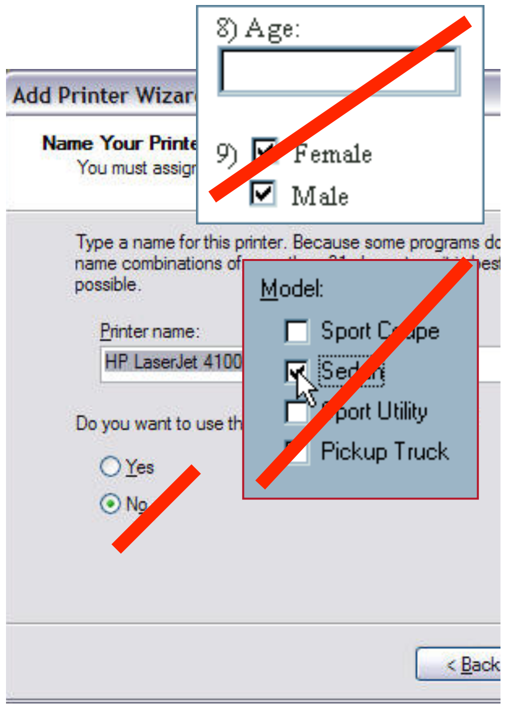
Underline color: Automatic

Effects
- [ ] Strikethrough
- [ ] Double strikethrough
- [ ] Superscript
- [ ] Subscript
- [ ] Shadow
- [ ] Outline
- [ ] Emboss
- [ ] Engrave
- [ ] Small caps
- [ ] All caps
- [ ] Hidden

Preview

Times New Roman

This is a TrueType font. This font will be used on both printer and screen.


8) Age:

9) [✓] Female [✓] Male

Add Printer Wizar

Name Your Printe

You must assigr

Type a name for this printer. Because some programs do name combinations of ... possible.

Printer name: HP LaserJet 4100

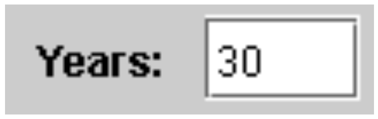
Do you want to use th

Yes [✓ No]

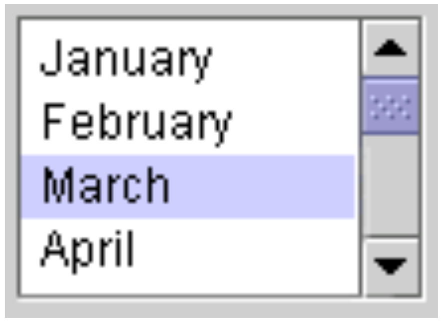
Model:
- [ ] Sport Coupe
- [✓] Sedan
- [ ] Sport Utility
- [ ] Pickup Truck

Lists, combo boxes, etc.

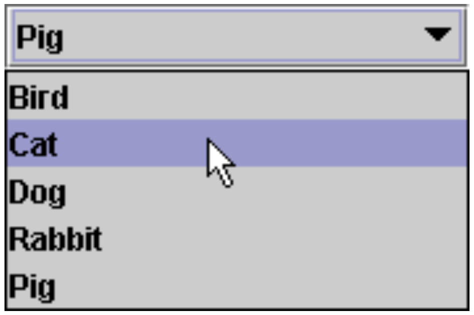
- use **text fields** (usually with a label) when the user may type in anything they want
  - you will usually have to **validate** the input



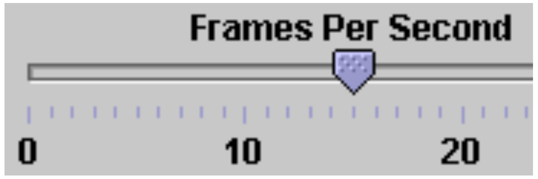
- use **lists** when there are many fixed choices (too many for radio buttons to be practical) and you want *all* choices visible at once

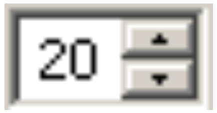


- use **combo boxes** when there are many fixed choices, but you don't want to take up screen space by showing them all at once



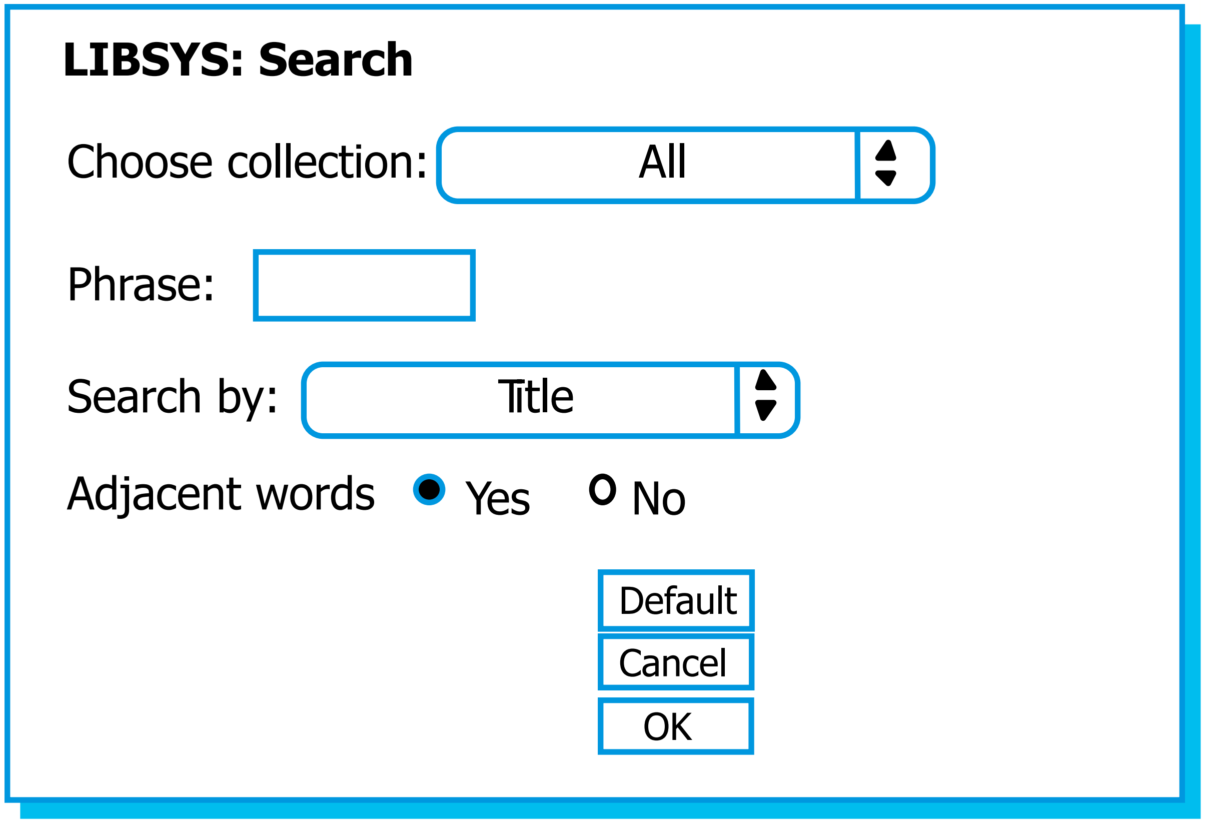
- use a **slider** or **spinner** for a numeric value with fixed range





An example UI

- Did the designer of this UI choose the right components?
  - assume there are 30 collections and 3 ways to search (by title, author, relevancy)



LIBSYS: Search

Choose collection: All

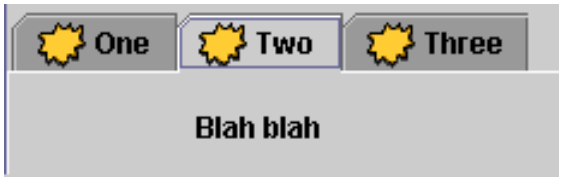
Phrase:

Search by: Title

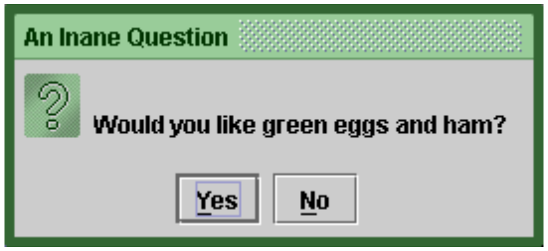
Adjacent words [✓ Yes] No

UI design - multiple screens

- you can use a **tabbed pane** when there are many screens that the user may want to switch between at any moment
  - or multiple pages, if it's a web site



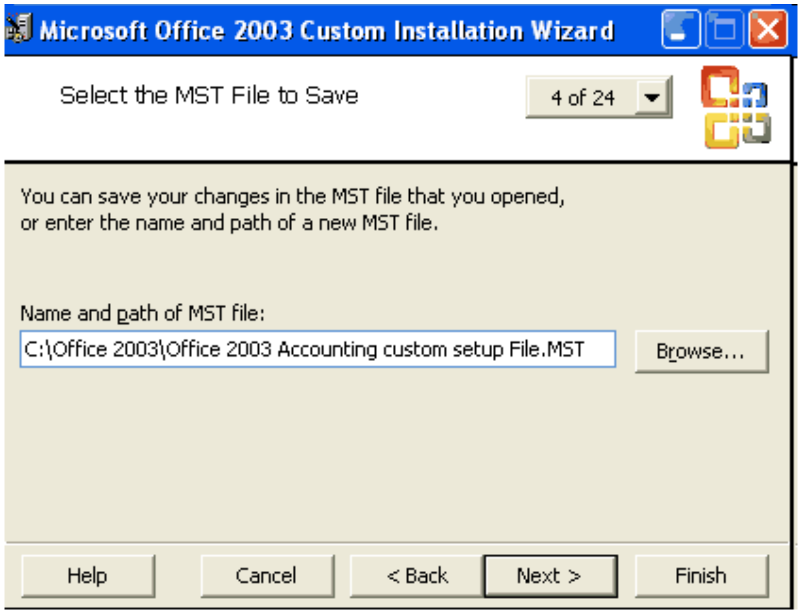
- use **dialog boxes** or **option panes** to present temporary screens or options
  - users *hate* popup dialogs; use them very rarely
  - don't prompt for lots of user input by popping up dialogs
    - instead, put the choices on the existing window as buttons, etc.



Would you like green eggs and ham?

"Wizards"

- **wizard**: series of dialog boxes to progress through a task
- In the mid-1990s, Microsoft changed most of its Windows apps to use "wizards" for installation and settings.
  - Why did they do this?
  - What are the pros and cons of a "wizard" UI?

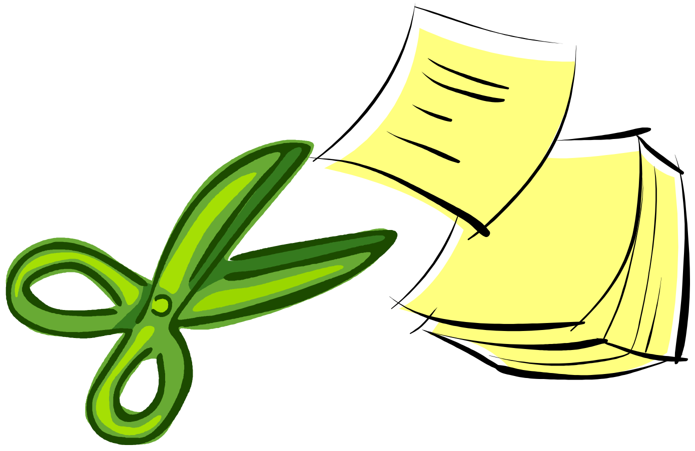

Microsoft Office 2003 Custom Installation Wizard
Select the MST File to Save
4 of 24
Browse...
Help
Cancel
< Back
Next >
Finish

You can save your changes in the MST file that you opened, or enter the name and path of a new MST file.

Name and path of MST file:
C:\Office 2003\Office 2003 Accounting custom setup File.MST

Creating a paper prototype

- gather materials
  - paper, pencils/pens
  - tape, scissors
  - highlighters, transparencies

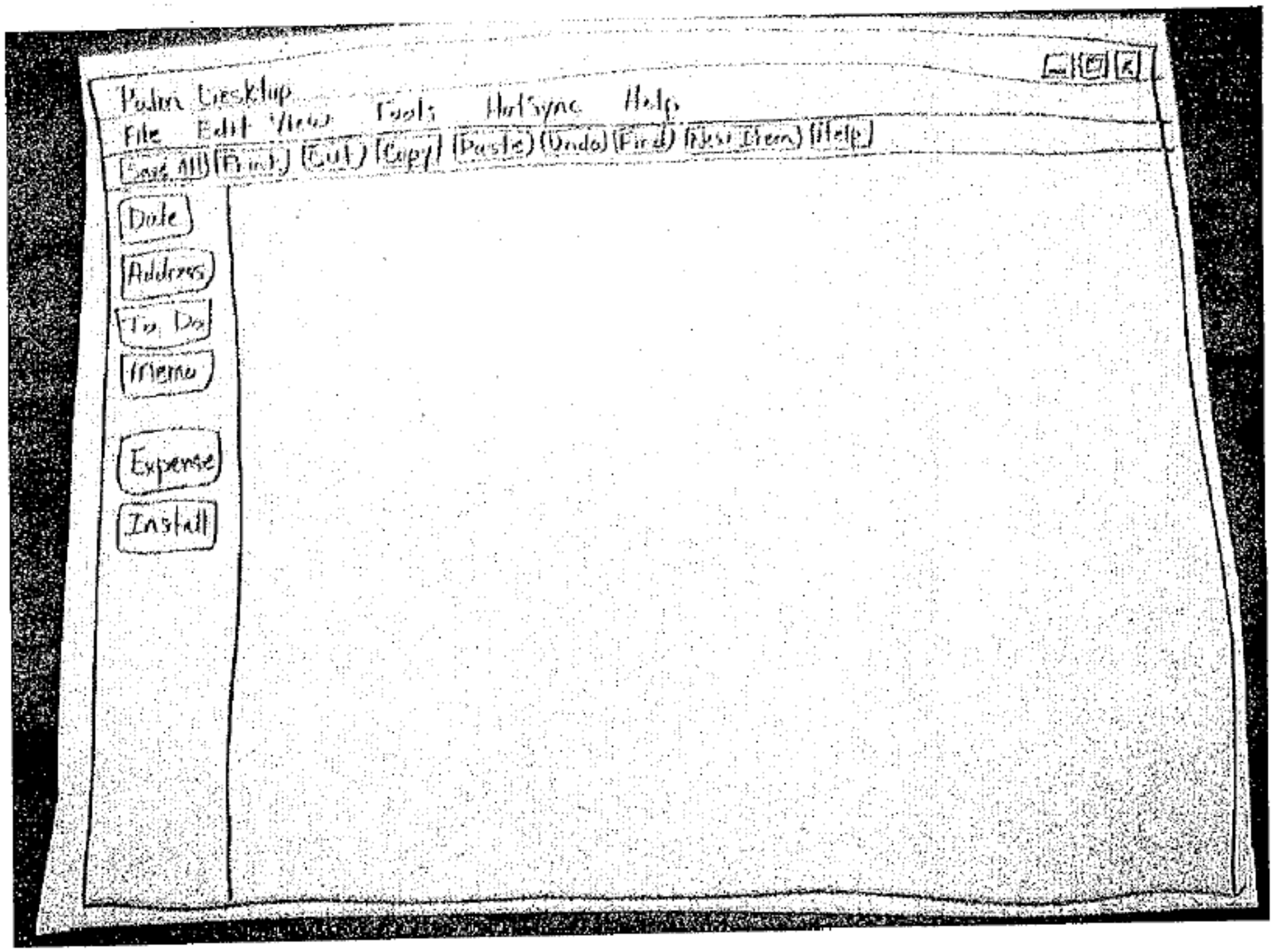


- identify the screens in your UI
  - consider use cases, inputs and outputs to user

- think about how to get from one screen to next
  - this will help choose between tabs, dialogs, etc.

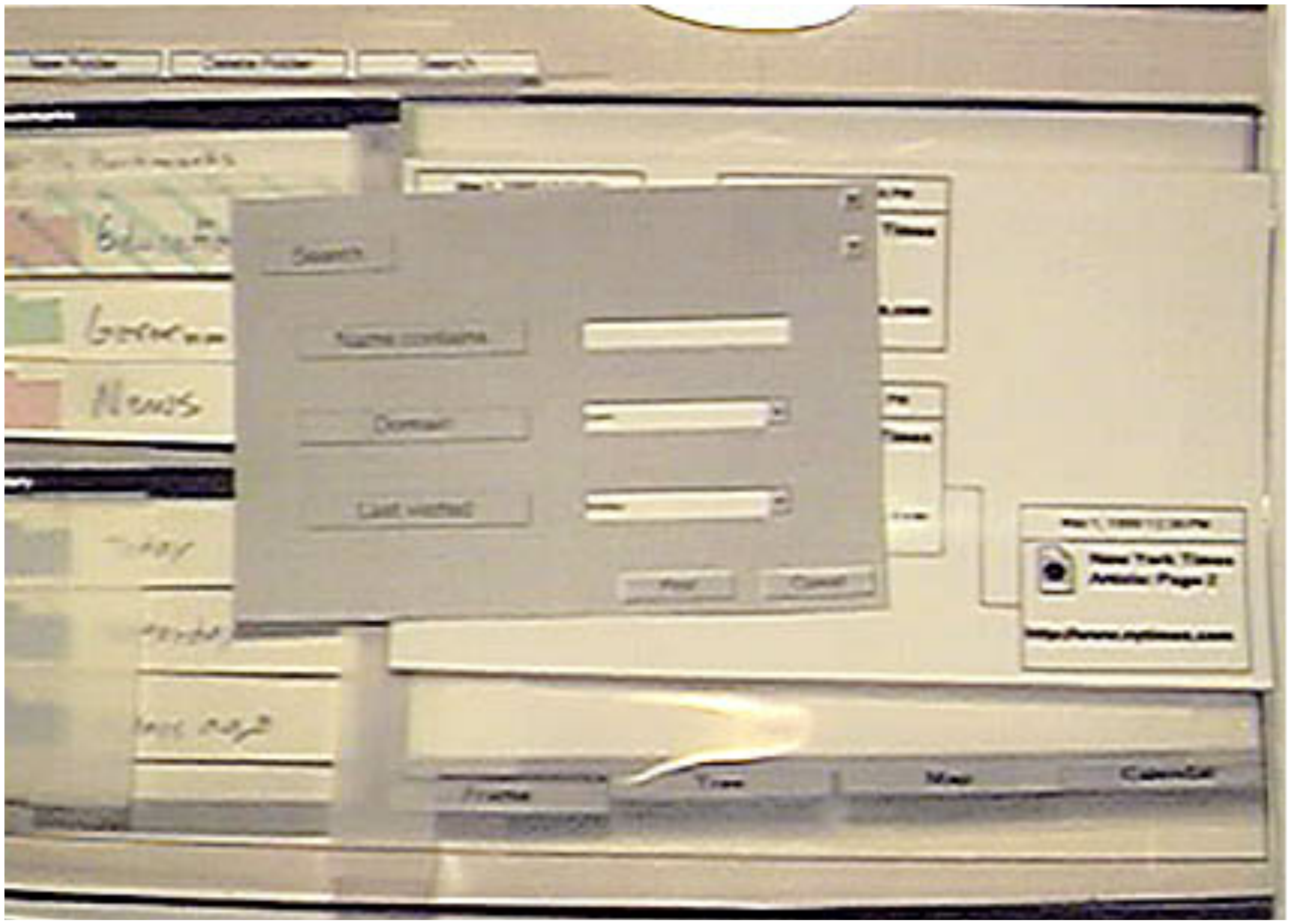
Application backgrounds

- draw the app background (the parts that matter for the prototyping) on its own, then lay the various subscreens on top



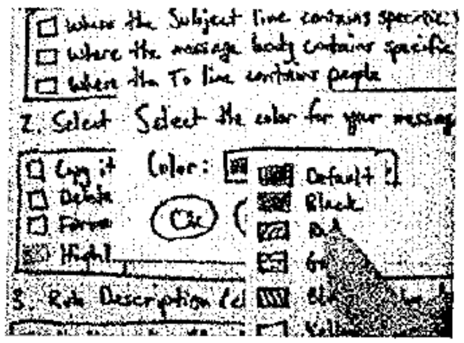
Representing a changing UI

- layers of UI can be placed on top of background as user clicks various options



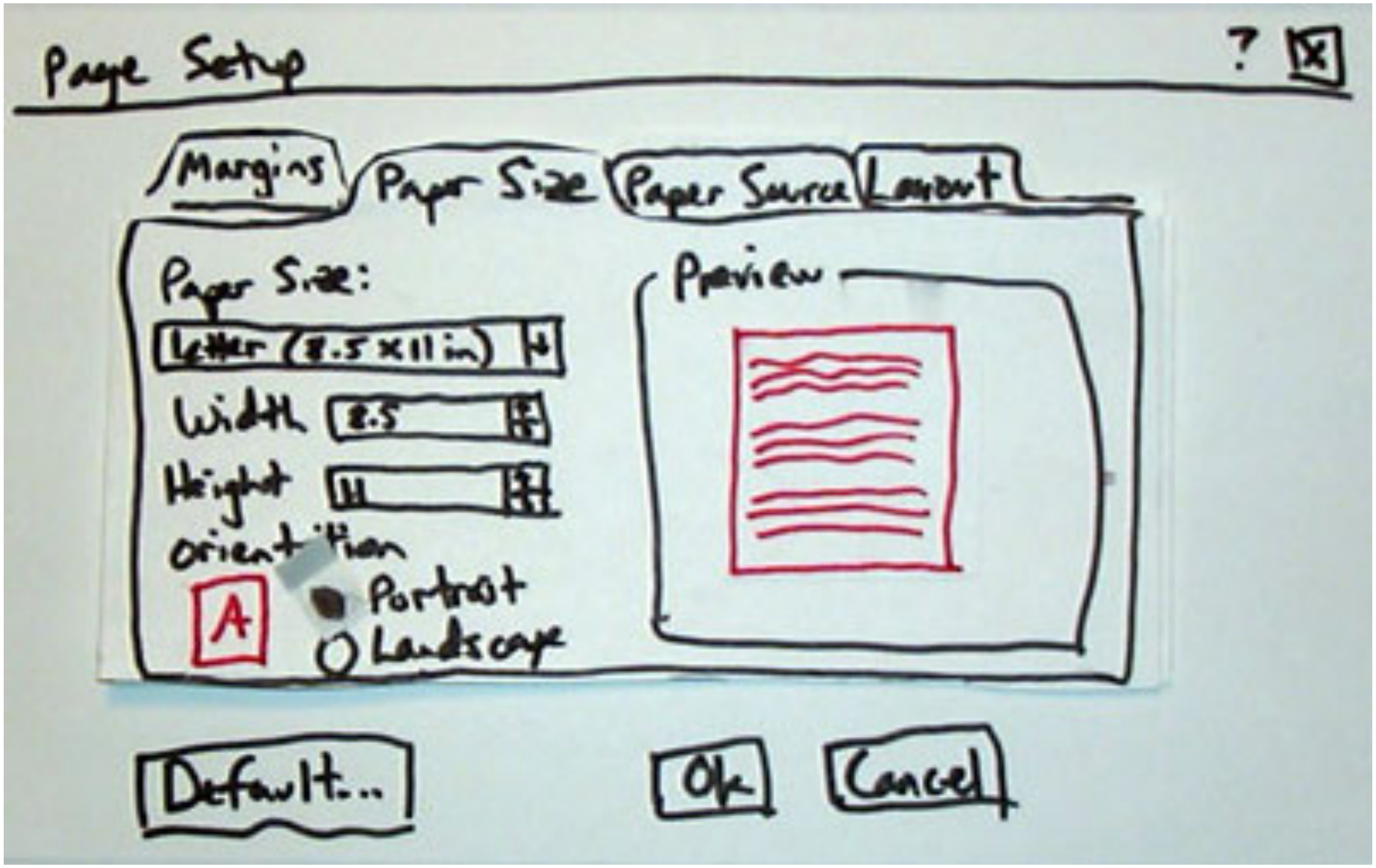
Representing interactive widgets

widget	how to simulate it
buttons or check boxes	tape
tabs and dialog boxes	index cards or small papers
text fields	removable tape
combo boxes	put the expanded choices on a separate paper / Post-It
selections	highlighted piece of tape
a disabled widget	cut out a separate gray version that can be placed on top of the normal one

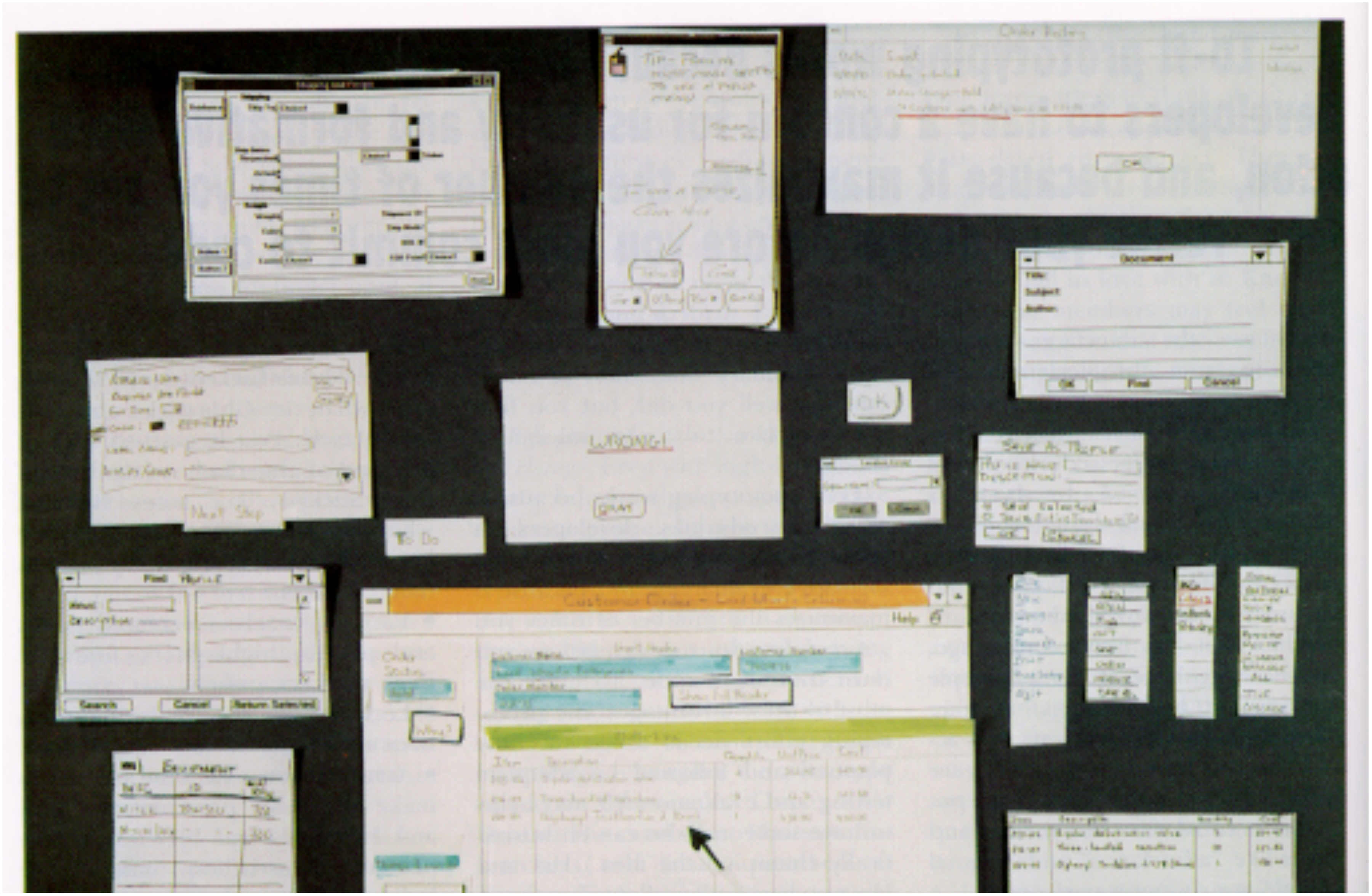


Where the Subject line contains specific
Where the message body contains specific
Where the To line contains people
2. Select
Select the color for your message
Copy it
Delete
Forward
Highlight
Color:
Default
Black
Ok
3. Rule Description

Example paper prot. screen



Example paper prototype



Prototyping exercise

- Let's draw a prototype for a music player (e.g. iTunes).
  - Assume that the program lets you store, organize, and play songs and music videos.
  - Draw the main player UI and whatever widgets are required to do a **search for a song or video**.
  - After the prototypes are done, we'll try walking through each UI.

- Things to think about:
  - How many clicks are needed? What controls to use?
  - Could your parents figure it out without guidance?