Human-Computer Interaction IS4300

1

Ethnography Homework I3

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Team Projects T2

- User analysis.
  - Identify stakeholders (primary, secondary, tertiary, facilitating)
  - For Primary Stakeholders
    - Demographics
    - Persona(s)
- Task analysis
  - 6+ representative tasks
  - For each
    - Task scenario
    - Hierarchical Task Analysis

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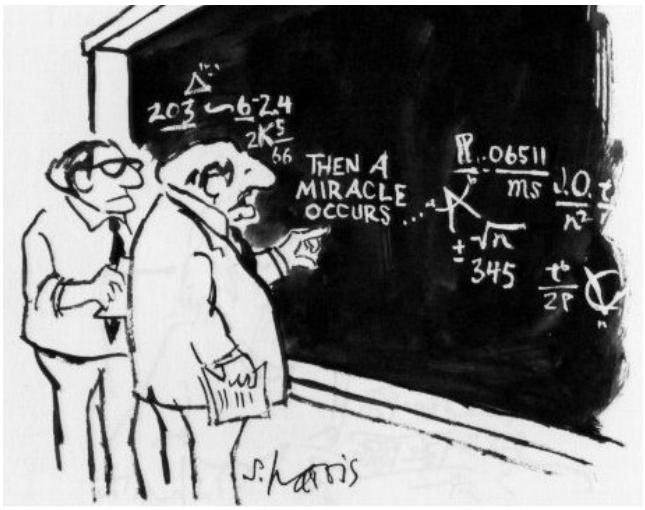
Design



Conceptual Design

- Working through the Task Hierarchies and making adjustments
  - Especially important if automating an existing manual task
- Still without thinking about the visual design of the UI
  - Focus on what the system will do.
- Task allocation: what the system vs. the user does at each step

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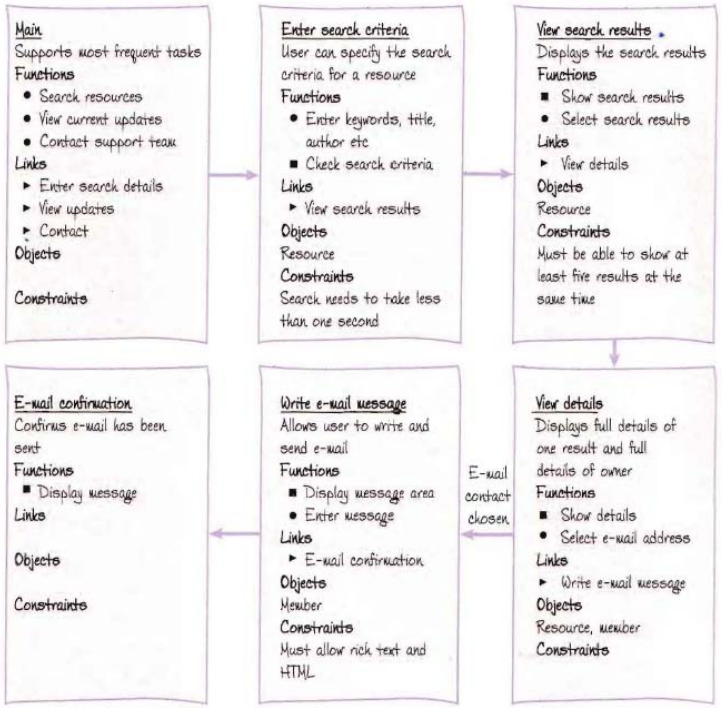

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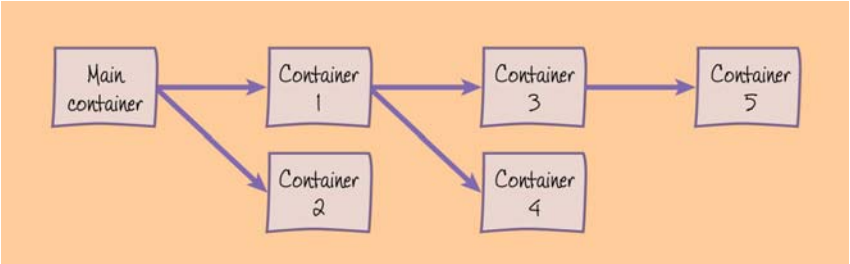
Conceptual Design

- The process of establishing the underlying organization and structure of a UI

  Content diagram – low fidelity prototype that represents the organization and structure of the user interface from the designer's perspective.



Content Diagram

- To make one:
  - Start with concrete use cases (hierarchical task analyses)
  - Identify primary task objects, attributes, actions
  - Identify the containers and the task objects in each one
  - Link containers to show navigation flow.

Content Diagram

A Container is an abstract representation of part of the user's work and the functions that are required to do that part of the work.

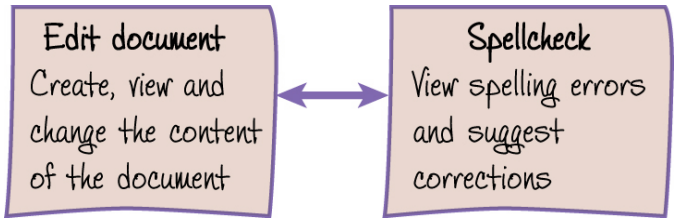
Template for Containers

Name
Purpose
Functions
- {performed by the user}
- {performed by the computer system}

Links
- {single link}
- {double link}

Objects
Constraints

Content Diagram



Double Link

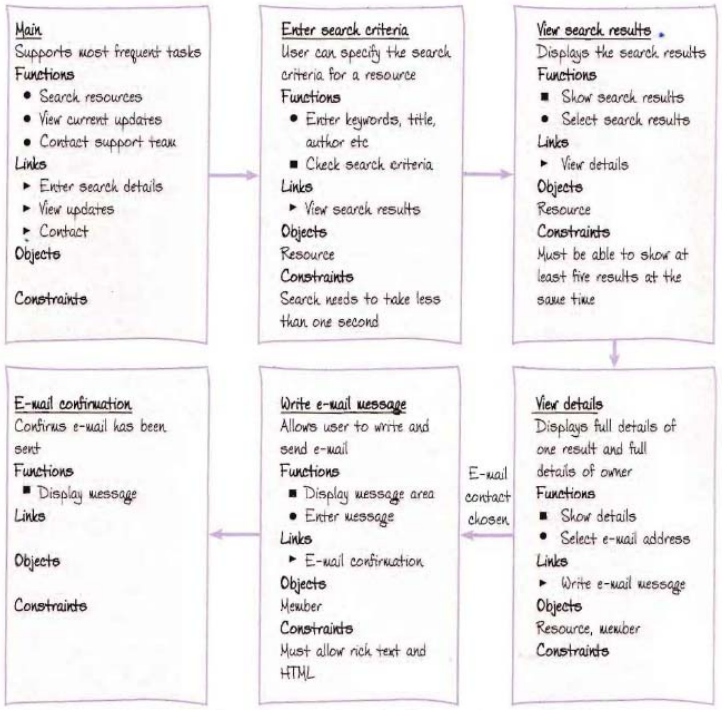
Task Objects, Attributes, Actions

- Task Objects
  - units of information or data with which the users interact to carry out their tasks.
- Attributes
  - task object components / properties / child objects
- Actions
  - actions performed on task objects

Marking up Concrete Use Cases / Task Scenarios / HTNs

- Identify objects & attributes
  - Task objects – single underline
  - Attributes of objects – double underline

User action	System response
Academic enters one or more of the search parameters for the CD-ROM: title, year and platform	The system displays the search results
The academic selects a search result	The system displays the full details of the CD-ROM and the contact details for its owner, who is a research student
The academic chooses the e-mail address	The system displays a message area
The academic writes and sends the e-mail request	The system confirms the sending of the request



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Exercise

- Specify container diagram for optometrist web site
- Representative Tasks:
  - T3. Order 3 red, 3 green of these: given the following payment info …

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Stone Ch 10

- Interaction Models (per Norman)
- Interaction Metaphors

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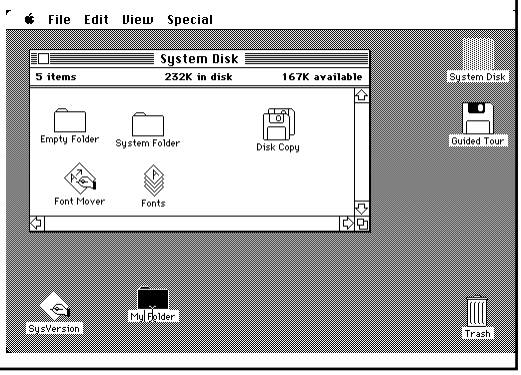
Interaction metaphors

- Making the interaction seem like something the user is already familiar with
  - Desktop, Trash can, etc.
  - Shopping Mall
  - Direct Manipulation



Interaction metaphors

- Interface metaphors evoke an *initial* mental model in users of the system's structure and operation.
- Metaphors should relate to users' past experiences and should be consistent.
- Q: What dimension of usability do metaphors most help with?

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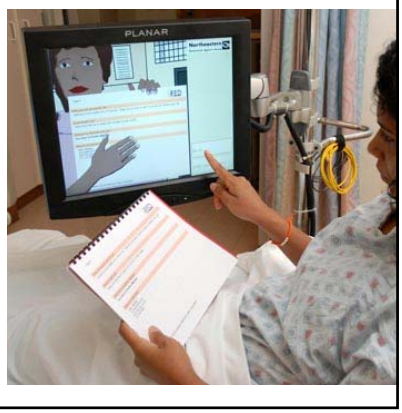
VSF Activity	Real-World Metaphor	Implications for VSF Activities
Constructing an exhibit is like writing a . . .	Lab journal	Informal and personal notes, raw data, work in progress
	Documentary	Carefully constructed "story" of how the project happened
Coaching a student is like being a . . .	Peer (colleague)	Social support, reactions to ideas, suggestions
	Director	Specific directions about exhibit content or layout
Visiting the fair is like going to a . . .	Study room	Quiet and focused attention to pieces of information
	Public lecture	Receiving preorganized information as part of a group
	Cocktail party	Informal discussions, moving from one group to another
Judging exhibits is like making a . . .	Balance sheet	Mathematical model of data, equations, results
	Discussion	Extended conversations about reactions, values, criteria
Summarizing the fair is like creating a . . .	Report card	Assessment on well-established categories of achievement
	Guided tour	Interactive visit of best sites with helpful commentary
	Thank-you note	Personal recognition of participants, mentors, judges, etc.

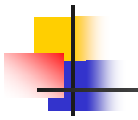
Agent Metaphor

- A natural UI metaphor for an intelligent agent may be an anthropomorphic character
- Advantages?
- Are there downsides to this?



Metaphors

- Multiple metaphors can be mixed (e.g., windows and desktops)
- One metaphor is better than another if it leads to more correct predictions about a system's behavior.
- You don't *have* to use metaphors.



Choosing the right metaphor

- Understand how the system works / is supposed to work.
- Figure out what kinds of problems users have.
  (watch them use similar systems)
  (create prototypes and watch users)
- Generate metaphors and examine their properties.
- Key question: will users "get it"? How do you tell?

Problems with metaphors

- Sometimes they break conventional and cultural rules
  - e.g. recycle bin placed on desktop
- Can overly constrain designers in the way they conceptualize a problem space
- Forces users to understand the system in terms of the metaphor
- Use of metaphor – as with any aspect of design – should be tentative and subject to change if it tests poorly.

Exercise

- List some metaphors for the optometrist web site.
  - Representative Tasks:
    - T1. Find the cost of these:
    - T2. Find the standard warranty on Ray Ban frames.
    - T3. Order 3 red, 3 green of these: given the following payment info …

T3 – Conceptual Design (1 wk)

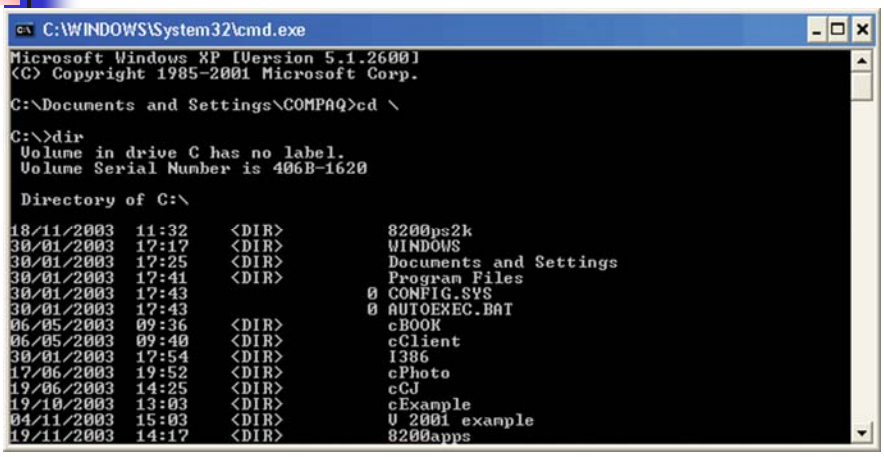
- Convert task scenarios and hierarchical task analyses into a conceptual design.
- Metaphors.
  - Make a list of possible interaction metaphors for your interface (per the examples in class). For each of your task scenarios list at least two options for interaction metaphors and some of the implications of your choice.
- Concrete Use Cases.
  - Expand each of your Essential Use Cases from T2 into a Concrete Use Case (per Stone Fig. 8.18 pg. 163), including functions, links, objects, and constraints. Abstract these into a Content Diagram (per Stone Fig. 8.19 pg. 163).
- At this stage you should still be focused on the abstract steps of each task, including user input and system output actions, but should not be thinking about the details of your interface's appearance yet.
- What to Post. Your report should include your list of possible interaction metaphors (at least 2x6), Concrete Use Cases and a Container Diagram

Interaction Styles (Stone Ch 11)

- Command Line
- Menu Selection
- Form-Fill
- Direct Manipulation
- Anthropomorphic

Command Line

Pros / Cons?

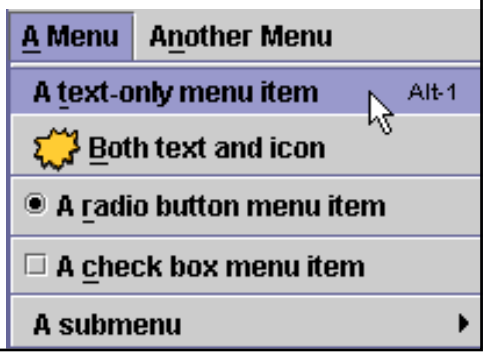


Command Line

- Powerful – access to system functionality
- Flexible – options and parameters
- Limitations
  - Commands must be remembered
  - Commands are obscure and cryptic
- Better for experts to use
- Error rates are high

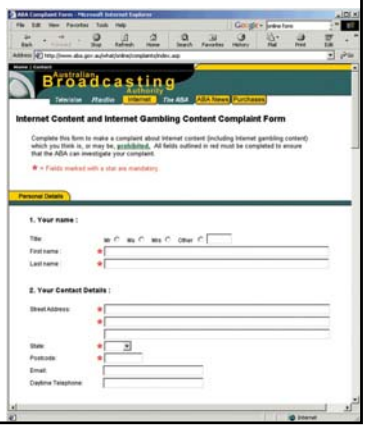
Menu Selection
Pros / Cons?

- A set of options from which the user must choose
- Offer cues for user recognition
- Breaks the complex into small steps



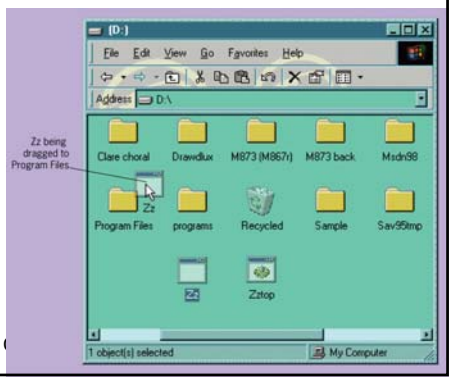
Form Fill

- Capture user information
- Easy movement around the form
- Provide for error correction
- Indicate required fields
- Provide explanatory messages for fields



Direct Manipulation

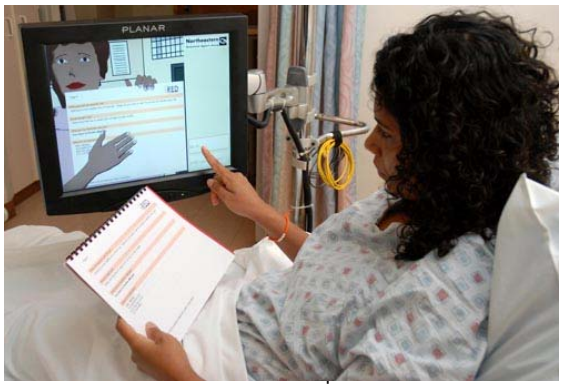
- Allows direct interaction with the UI
  - Visible and continuous representation of task objects
  - Requires physical actions to manipulate
  - Operations are rapid, incremental, reversible
  - Users "feel" directly involved
  - Easy to learn



UIDE (

Anthropomorphic

- Natural language interface



Possible Implications of Aging for Interface Designers

Hawthorn, D. (2000). Possible implications of aging for interface designers. *Interacting with Computers, 12(5), 507-528.*

Methodological Issues

- Studies of age as independent variable
  - Cross-sectional vs.
  - Longitudinal
  - *Flynn effect (elders today ≠ elders in 40 yrs)*
- Decline is non-linear

Vision & Aging

- Issues
  - Progressive impairment very common
  - Peripheral stimuli must be stronger
  - Slower processing
  - Wide variability
    - 10% of 80 yr olds are legally blind
    - 10% of 80 yr olds have 20/20 vision
- HCI impacts
  - Need to assist in maintaining focus & attention
  - Text: avoid colors, use large standard fonts, left justified
  - Use simple, relevant graphics
  - Keep screen objects together that must be compared

Speech/Hearing & Aging

- Issues
  - Hearing declines with age
    - 20% 45-54 => 75% 75-79
  - Particular problems with high frequencies
  - Difficulty with background noise
  - Speak less fluently
- HCI impacts
  - Need to use lower frequency alert sounds
  - Use lower frequency human speech for output
  - TTS may be less understandable
  - ASR less reliable

Psychomotor ability & Aging

- Issues
  - Longer response times for some tasks
  - Less control of fine movement & force
- HCI Impacts
  - Problems with mouse
    - Require less speed, larger targets

Attention & Aging

- Issues
  - Problems maintaining attention over long periods of time.
  - Ability to attend to relevant info in the face of distractors declines.
  - Possible decline in ability to divide attention.
- HCI impacts
  - Minimize distractions

Memory & Learning

- Issues
  - Slight decline in working memory
  - Some decline in episodic & procedural, but not semantic, memory
  - Recognition intact, but recall suffers
  - Decline on spatial memory tasks
- HCI impacts
  - Reduce working memory demands
  - Recognition vs. recall
  - Avoid command line languages
  - Learning new software may take significantly longer and require more practice

Intelligence

- Issues
  - Some decline
  - Individuals decline differently (verbal, reasoning, spatial, numeric, etc)
  - Crystallized vs. Fluid Intelligence
- HCI impacts
  - Reduce complexity
  - Minimize change

Older Adults & HCI Summary

- Variability increases with age
  - Cannot make sweeping generalizations
- Most recommendations are in line with usability principles for *all* users
- Accommodating one user group often has benefits for many others
- Now hundreds of studies that refine Hawthorn


Swing & Netbeans!
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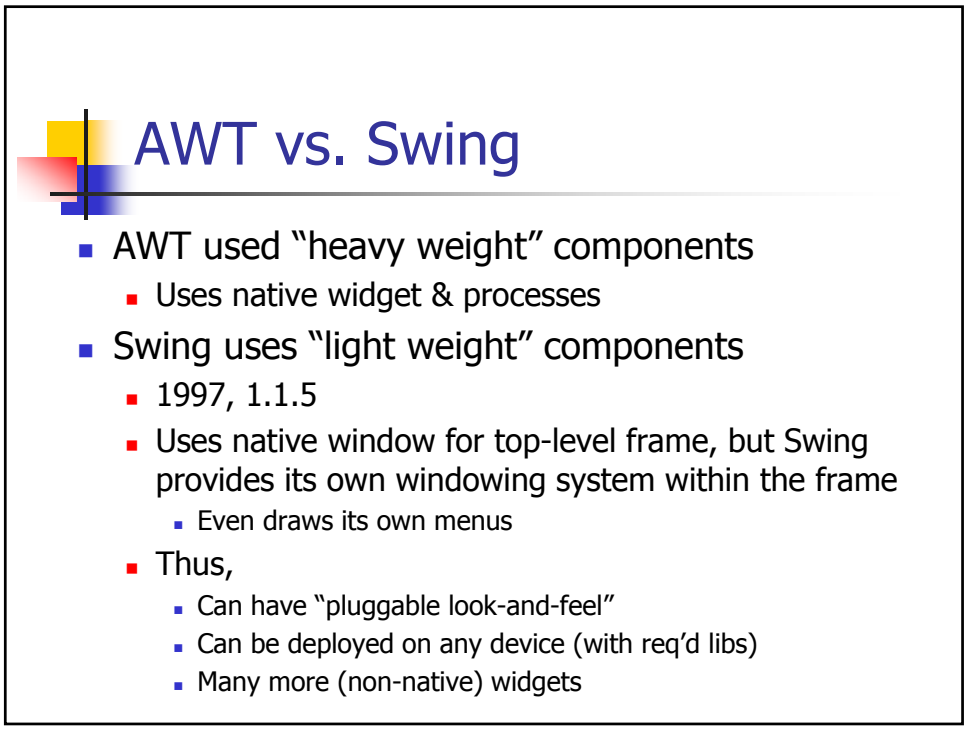
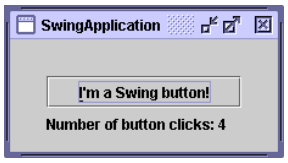
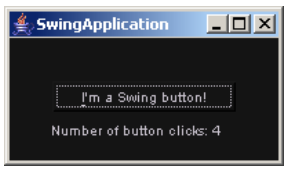

AWT vs. Swing
AWT used "heavy weight" components
Uses native widget & processes
Swing uses "light weight" components
1997, 1.1.5
Uses native window for top-level frame, but Swing provides its own windowing system within the frame
Even draws its own menus
Thus,
Can have "pluggable look-and-feel"
Can be deployed on any device (with req'd libs)
Many more (non-native) widgets

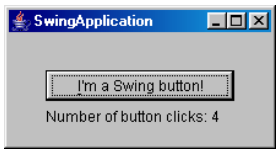
Pluggable Look-and-Feel



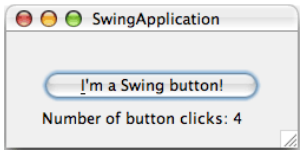
Java



GTK+

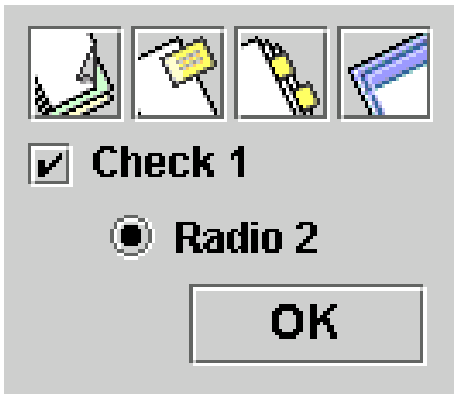


Windows

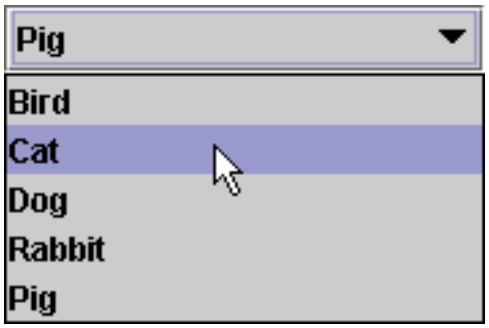


Mac

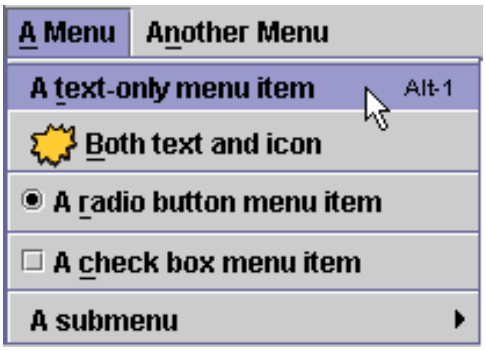
Buttons



Combo Box



Menus

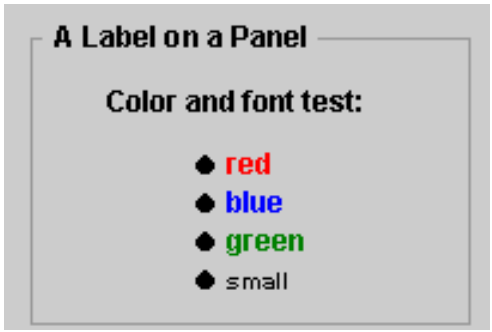


Text Field

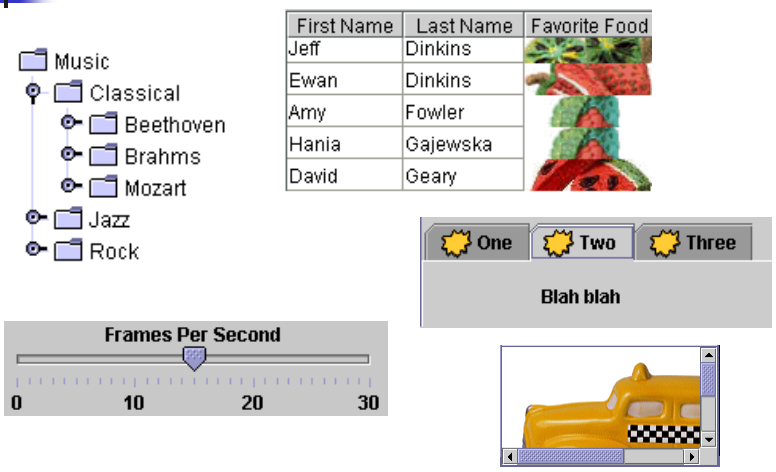
Labels

Tool tips

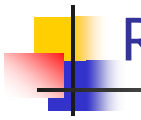
Embedded Panels



Advanced (not this homework)



Live Demo of NetBeans for Applet Building



Swing Homework – Create a Restaurant Ordering Applet

- Two JLabels, one with an icon.
- Two JButtons, one with an icon.
- One JButtonGroup with at least 3 JRadioButton options (with toggling between buttons functional).
- Two JCheckBoxes.
- One JComboBox with at least two items.
- One JTextField
- One JPanel with a titled border enclosing at least one other component.
- One tool tip on one component.
- One Menu with at least two options.

I4 – Swing!

- Implement a Java applet to provide online ordering for your favorite restaurant. The interface need not be functional, but the controls should be laid out on the page in such a way that it could actually work if completely implemented.
- Minimum requirements. Your interface need not implement the entire menu, but must contain at least the following:
  - Two JLabels, one with an icon.
  - Two JButtons, one with an icon.
  - One JButtonGroup with at least 3 JRadioButton options (with toggling functional).
  - Two JCheckBoxes.
  - One JComboBox with at least two items.
  - One JTextField
  - One JPanel with a titled border enclosing at least one other component.
  - One tool tip on one component.
  - One Menu with at least two options.

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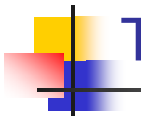

To Do

- Read
  - GUI Software Components (Stone Ch 13).
  - UI Design Layout (Stone Ch 14-15).
  - Swing events, read all except
    - *Implementing Listeners for Commonly Handled Events*
      - Only need to read *How to Write an Action Listener*
- Project
  - T3 – Conceptual design – due in 1 week
- Homework
  - I4 – Swing restaurant UI applet – DUE NEXT CLASS

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