Application Design
To effectively design for the user you must:

• Understand the users **abilities**
• Understand the users **goals**
• Understand the **tasks** the user does to achieve those goals
• Understand the **frequency** of expected **use** by the user
• What are the users previous **experience and training**
• What are the users **expectations**
• **Involve the user** at various stages in the design process
User’s Abilities

- Their experience with computer interfaces
- Novice, Practitioner, Expert or Guru in the business domain the software will serve and with the software
- With the use of any UI frequently enough the user will become more adept at the UI and need different features that they did as a beginner with the UI.
Users

• Understand who the users are
  – Type – Novice, Practicianer, Expert, Guru
  – Frequency of use – continual, frequent, occasional, once, ?
  – Tolerance of a learning curve – none, a little, expected

• Understand user’s goals

• Understand what tasks achieve those goals
Determine the application flavor

- Sovereign, Transient, Parasitic, Daemonic or Kiosk (S,T, P,D, or K)
- A single application may support multiple execution flavors
  - ex: a sovereign application like word that can run as a transient app to enable printing a document from windows explorer
- Focus on one flavor at a time. Possibly have multiple separate teams that target the needs of one flavor. Later reconcile them together.
The Model

- Determine what a user’s mental model **SHOULD** be.
- Keep that in mind while designing the UI mockups and prototypes.
- The implementation model should be delayed until later in the design, avoid having the implementation dictate the UI (and the mental model of the User).
The Model

- Different **user types** may have different mental models and different goals.
- Different **aspects** of the UI may target different user **types** i.e. rich menus for novices, toolbars for experts and a command line feature for gurus.
- Don’t try to build a single UI for all possible users. Target the **80%** of all users (or those that will pay the most for the software, maybe).
SDI vs. MDI

- **SDI - Single Document Interface**
  - Most applications are SDI now.
- **MDI – Multiple Document Interface**
  - Originally championed by Windows but now out of favor.
  - Had an advantage on mem and real estate constrained systems.
  - More expert oriented software may use MDI
SDI

- Each instance running has its own set of menus and tools. To switch between the documents you use the taskbar to switch executing instances or via the Window menu.
- A single primary window
- Data Centered, Less Confusing
- Ex: Word, Excel, PowerPoint
Even SDI is some MDI

- Click to add text
PowerPoint acting as a SDI app

Application “Flavors” (Types)

- Sovereign
- Transient
- Parasitic
- Daemonic
- Kiosk
PowerPoint acting as a MDI app
MDI

• A parent window with children (undocked and floating) within the main window canvas
• NetBeans is SDI + MDI.
• Powerful but confusing to novices (and some experts)
• Child windows share the menus of the parent window.
• Used to present multiple views of the same object. Ex: java code and swing visual editor of NetBeans
• Used to allow comparing two different objects (docs) and/or moving data between them via drag and drop (or cut/paste)
MDI – two windows showing different views of the same object
MDI Example – different objects
Workbooks

- Multiple windows in the same application but accessed via **tabs** like a workbook
- Child windows don’t exist
- Used to manage a set of **views** of an object
- Quick navigation
- Can be used shows **order** of windows by order of tabs
- **Can’t** present **simultaneous** views
• Questions
• Comments

• 7.5
Workbook example
Workbook

• Selected (and visible Tab) is the one that the menus are acting on if document or smaller focus of action.

• Can be used as part of a SDI application – ex: Excel
Project

• A **single main window** that coordinates and controls multiple child / peer windows. These windows are not constrained within the parent window but may be anywhere on the desktop / maximized / minimized / overlapped.

• Ex: Video Editing Software, Music Players, Integrated Development and Testing Environments
Example Project Application
• Questions
• Comments

• 7.75
Sovereign Application Example

Wordprocessor
Goals

• Create and Print a Document
• Change and Existing Document
• Read a Document
Tasks

- Create a blank document
- Open an existing document
- Enter text into a document
- Enter images into a document
- Enter charts into a document
- Combine parts of one document with another
- Proof the document for spelling and grammar
- Format and Print an existing document
Activities (within one or more task)

• Enter and manipulate text position
  – Editing text – cut, copy, paste, move, delete

• Change text size, color, typeface, style, …
  – Formatting text

• Change layout of the document paragraphs, tabs, spacing, …
  – Formatting the document
Design aspects

• User Types – N, P, E or G?
  – P and E

• App Flavor – S, T, P, D, or K?
  – S or K

• Frequency of use – continual, frequent, occasional, once,
  – C or F

• Tolerance of a learning curve – none, a little, expected
  – E

• SDI, MDI, Project, Workbook, Dialog, Wizard?
  – SDI or MDI
Parts of a document

• Doc
  – 0, 1 or more pages
• Page
  • Paragraphs
    – Sentences
      » Words
        Characters
  • Page Number
• Header
• Footer

• Each part of a document (Doc, Page, Para, …) has the following aspects
  – Character Code (what letter, symbol, or punctuation)
  – Type face and size
  – Typeface Style – normal, italics, Bold, Underline, Super, Sub,
  – Foreground Color
  – Background Color
Sketch the object hierarchy

- Docs
- Pages
- Paragraphs
- Words
- Characters
Sketch the action hierarchy

• Document Related Stuff
  – Create
  – Delete
  – Edit
  – Print
  – Save
  – Rename
  – Email

• Select Part of Document
• Change Part Of Document
• Change the view of the document
• Help with the application
Basic menu design
Sovereign Apps

• Own the desktop
• Expert users (and novices)
• Support multiple tasks generally
What would novices do?

• Create Docs
• Edit Docs – enter text, change font
• Print Docs
What would be on the menus? (based on novices needs)

- **Document**
  - Create (New)
  - Edit (Open)
  - Print
  - Email
- **Select (Edit)**
  - All
  - Paragraph
  - Sentence
  - Word
  - Character
  - Header
  - Footer
- **Manipulate**
  - Cut (to clipboard)
  - Copy (to clipboard)
  - Paste (clip board)
  - Move (??)
  - Print
- **Format (Selected Area)**
  - Typeface & Size
  - Style
  - FG Color
  - BG Color
- **View**
  - Zoom Current
  - Select Which to View
  - Show Multiple Docs
- **Help**
  - Help On
  - About the application
What would practitioners do?

• All that a novice would
• Lots for extra formatting stuff – fonts, typefaces, colors, BG, header, footer, page margins, super, sub, strikethrough, ..
What buttons should be exposed for the practitioners?

- New
- Print
- Format Text
- Cut & Paste
- Spell check & Grammar check
- Create a chart
- Draw objects
What would experts do?

• Cut, Copy, Paste
• Save frequently
• Search for text
• Insert Tables
• Insert Hyperlinks
• Look at help
• Undo
What accelerator keys should be defined for experts?

• Ctrl Keys
  – Ctrl + N – New Doc
  – Ctrl + S – Save
  – Ctrl + O – Open
  – Ctrl + P - Print
  – Ctrl + X – cut
  – Ctrl + V – paste (move)
  – Ctrl + C – copy
  – Ctrl + Z – undo
  – Ctrl + F – Find
  – Ctrl + H – find and replace

• Top level menus as Alt keys
  – Alt + D – Doc
  – Alt + S – Select
  – Alt + M – Manipulate
  – Alt + F – Format
  – Alt + V – View

• Function Keys
  – F1 – Help
  – F7 – Spell Check
An Example Wordprocessor
An Example Wordprocessor 2
An Example Wordprocessor 2
• Questions
• Comments

• 8.25
Transient Application Example

Audio Control Panel
Goals

- Adjust the values for volume and balance for different audio hardware features
- Adjust the recording parameters for the audio
Tasks

• Change the overall volume
• Change the volume for the CD
• Change the volume for the wave devices
• Change the volume for the DVD
• Change the volume for the Line In
• Change the volume for the Microphone
• Change the balance on any of these sources
Activities (within one or more task)

- Open the application
- Change the value
- Close the application
Design aspects

• User Types – N, P, E or G?
  – N or P
• App Flavor – S, T, P, D, or K?
  – T
• Frequency of use – continual, frequent, occasional, once,
  – O
• Tolerance of a learning curve – none, a little, expected
  – N
• SDI, MDI, Project, Workbook, Dialog, Wizard?
  – WB or D or Wiz
Parts of a Sound Source …

• Overall Mix
  – CD
    • Volume
    • Balance
    • Mute
  – Mic
  – DVD
  – Wave
Sketch the object hierarchy

- Overall Mix
  - Sources
    - Volume
    - Balance
    - Mute
Sketch the action hierarchy

- Select Source
- Select Aspect To Change
- Close App
Basic Dialog designs
Actual Example
Menus & Advanced Version
Advanced Control Dialogs

Advanced Controls for Volume Control

These settings can be used to make fine adjustments to your audio.

**Tone Controls**

These settings control how the tone of your audio sounds.

- **Bass:**
  - Low
  - High

- **Treble:**
  - Low
  - High

**Other Controls**

These settings make other changes to how your audio sounds. See your hardware documentation for details.

- **Enable S/PDIF**

Close

Advanced Controls for Microphone

These settings can be used to make fine adjustments to your audio.

**Tone Controls**

These settings control how the tone of your audio sounds.

- **Bass:**
  - Low
  - High

- **Treble:**
  - Low
  - High

**Other Controls**

These settings make other changes to how your audio sounds. See your hardware documentation for details.

- **-30dB Gain**

Close
Dialog Apps

- Limited to a single or small subset of tasks
- Novice and Practitioners
- Limited real estate needs
- Close when done using it
What would novices do?

• Adjust the values of overall volume and balance
What would be on the dialog? (based on novices needs)

- Overall Volume
- Overall Balance
What would practitioners do?

• Adjust volume on other devices
What buttons should be exposed for the practitioners?

- Buttons to select the device
- Controls to adjust the device settings
What would experts do?

• Adjust advanced features
What accelerator keys should be defined for experts?

• ?
Novice Dialog designs
Practicianers Dialog designs

![Diagram of audio settings for different devices like CD, VWave, DVD, and Microphone, with volume, balance, and mute controls.](image-url)
Experts Version
• Questions
• Comments

• 8.5
What if it is implemented as …

- Menu based app
- Workbook
- Wizard
- Project
What about a physical UI for the sound hardware?

• What would it look like?
• Questions
• Comments

• 8.75
Midterm

- 30% of the grade
- March 28, 2005
- WWH109
- 7PM EST – 9PM EST
- No NOTES, No Books, No Computers – Closed Everything
- 50-60 questions
  - Multiple Choice
  - Short Answer
  - Draw a UI
    - bring a sharp pencil
    - a short ruler/straight edge, if you need one
- Covers all material including this lecture
  - Book Readings, Lectures, In Class Activities, Team Activities, Homework, Class Discussions
HW #3

• **Assigned:** Mar 21
  **Due:** April 4 PM EST
  **Description:** BigBuck$$ Coffee Shop Of the Future Design Prototype
• 60 points total

• Design and Implement a UI Prototype (in Swing) for the BigBuck$$ Coffee Emporium, Inc. Coffee Shop of the Future POS and COS
  – Point of Sales (POS) terminal and Coffeesta Order System (COS)
• See the complete artifact set [here](#)
• What you should do:
  – Review the artifacts FIRST.
  – The POS and COS are DIFFERENT APPLICATIONS. You need to design them separately.
  – For this assignment you may go to any number of national coffee shop chains and observe what they do, to help understand the assignment, if you need to. This is NOT required but may help. You are NOT to duplicate what they have but instead design based on the use cases and other artifacts you are provided.
HW #3

- HW#3
- 60 points
- Due April 4, 2005 5PM EST
- 1) **Design** (Using Paper, Pencil or Drawing Program): - **20 points**
  - Overall POS and COS application look Sample screens and Navigation for all the use cases assigned. Describe the additional hardware devices for input and output required by the system Include a sketch of what the physical POS and COS would look like including any additional peripherals you suggest. Submit as paper or JPG scans of the paper or drawn JPG files
- 2) **Implement Prototypes:** - **20 points**
  - Use Swing The navigational structure required by the use cases, enough to show you understood the use cases The screens in your Design sketches This should be a prototype NOT a completely working application. You shouldn’t write ANY java to make this work. The GUI tools provided by NetBeans should give you what is required to build the prototypes. Submit as Swing apps called BBCE_POS and BBCE_COS
- 3) **Discuss** - **20 points**
  - Discuss your design and prototype
  - In one to three pages of text, MAX! Submit a RTF doc discussing: Why you chose the application style(s) you chose Why you chose the widgets and arrangements you chose What questions came up during your design that you made guesses about What questions you could not answer Why you chose the hardware peripherals you did/didn’t What other technology besides Swing might you have used for these apps and why? Any other relevant questions, comments, decisions you made.