Design Guidelines: Windows

- Computer users need to consult multiple sources rapidly.

- They require the adoption of multiple-window display strategy.

Design Challenge for Multiple-Window Strategy

- Offer users sufficient information and flexibility to accomplish tasks.

- Minimize disruption by reducing
  - Window housekeeping actions.
  - Distracting clutter.
  - Eye-head movement.

Window Housekeeping

- Manipulation of windows
  - Window opening and closing
  - Changing size of window
- Arrangement of the information on the multiple windows.
- Scrolling activity to bring necessary information into view.

Window vs Full-Screen System

- Window housekeeping activities
  - Relate to the interface only.
  - Are not directly related to the user's task.
- Task-completion times.
  - Longer for windowed system if time for housekeeping activities are included.
  - Shorter if the time is not included.
- Fewer errors are made in window systems.

Direct Manipulation of Windows

- Direct manipulation strategy is applied to window due to its visual nature.
- Direct manipulation actions on windows
  - Stretching.
  - Moving.
  - Scrolling
  - Minimizing (Maximizing)

Definition of Windows

- A rectangular area containing a software application or a document file.

- Multiple windows can be opened at the same time on the desktop.

- Actions on windows
  - Opening and closing.
  - Moving and resizing.
  - Shrinking to icons and enlarging to fill the entire desktop.

Individual Window Design (Appearance)

- Essential features on windows
  - Titles
  - Borders or frames
  - Scroll bars

Individual Window Design: Titles

- Window title usually appears at top center or top left.

- Change of shading or color of title bars is used to highlight the current active window.

- When a window is minimized, its title is usually shown on the right or below the icon.

Individual Window Design: Borders or Frames

- May be one or more pixels thick.
- Functions
  - To accommodate selection for resizing.
  - To distinguish windows from the background.
- Border thickness should be a compromise between
  - Functionalities included on borders.
  - Pixels it takes up which can otherwise be assigned to window contents

Individual Window Design: Scroll Bars

- A window is small compared to its contents.

- Method is required to move contents over window.

- Basic operations of scroll bar
    - Move up or down and left or right.

- Require support for incremental and destination actions.

Individual Window Design: Scroll Bars (cont'd)

- Incremental action
  - Up and down arrows to produce a small motion.
  - Important to permit smooth scrolling when arrow is selected continuously.
  - Permit finer control compared with direct dragging of scroll box or repeated clicking.

Individual Window Design: Scroll Bars

- Destination action.
  - Direct dragging of scroll box to the desired destination.
  - Clicking above or below the scroll box.
  - Clicking on the double arrows for page turning.

Individual Window Design: Scroll Bars (cont'd)

- Proposed design for scroll bars
  - Page number display on scroll box
  - Fixed markers on scroll bar to show document section boundaries.
  - User selected marker on scroll bar to allow direct jump to specified locations.

Individual Window Design (Actions)

- Window interface actions include
  - Open action
  - Open place and size
  - Close action
  - Resize action
  - Move action
  - Bring forward or activation

Individual Window Design: Open Action

- Windows can be opened in a number of ways
  - Double click on icon
  - Single click on taskbar button
  - Typed command
  - Menu selection
  - Voice command

Individual Window Design: Open Action (cont'd)

- Open action is accompanied by various different types of feedback.
  - Simply having the window appear.
  - Animated series of growing boxes emanating from icon.
  - Zoom lines going to the corners of the window.
  - 3-D flips or spins from icon to full window.

Individual Window Design: Open Place and Size

- Important to choose the initial position for window opening.

- Adopt the most-recently-used place and size approach.

- Choose initial window position which is
  - Close to the current focus to limit eye motion.
  - Far enough away to avoid obscuring the current focus.

Individual Window Design: Close Action

- Windows are closed by clicking on a specific icon on the title bar.

- Closing animation is symmetric with the open action
  - No animation.
  - Animated series of shrinking boxes moving toward icon.
  - 3-D spins and flips of windows as it shrinks to an icon.

Individual Window Design: Resize Action

- Different approaches in resizing windows
    - Sizing from a size box at window corner (Macintosh)
    - Sizing by all four corners and by each of the four sides (Windows)
- Need to define the lower and upper bounds of window size.

Individual Window Design: Resize Action (cont'd)

- Important questions to consider when resizing windows.
  - Reformatting of text by changing font size.
  - Reformatting of graphics to ensure that the whole object is visible.
  - Reformatting of icons to ensure that all icons are visible.

Individual Window Design: Move Action

- Use title bar as handle for move action.
- An outline of the window is dragged until user is satisfied with the placement.
- Systems with fast display rates can show the full window as it is dragged.
- Some systems permit portions of a window to be moved beyond the screen border.

Individual Window Design: Bring Forward or Activation

- To bring forward and activate a totally or partially obscured window.

- Approaches include
    - Clicking any part of window.
    - Clicking the window title bar.
    - Simply moving the cursor into a window.
    - Select one from a list of open windows.

Individual Window Design: Bring Forward or Activation (cont'd)

- Activation may be shown as
  - Changes in color or thickness of title bar.
  - Changes in color of window title.
  - Changes in text brightness.

Multiple Window Design

- Approaches to provide multiple sources of information
  - Multiple monitors.
  - Rapid display flipping
  - Split displays.
  - Tiled windows.
  - Overlapped windows
  - Cascaded windows

Multiple Window Design: Multiple Monitors

- Used when windows on a single display cannot accommodate all required information.

- Small number of monitors with multiple windows is preferred to prevent distraction of eye movement across the gaps.

Multiple Window Design: Rapid Display Flipping

- Flipping among displays can be controlled automatically or by users.
- Useful in public access information systems
  - Display of arrival and departure information in airports.

Multiple Window Design: Split Displays

- Windows are split into two or more parts to display related information.
- The splitting could be made horizontally or vertically.
- The only way to display multiple sources of information for early full-screen OS.

Multiple Window Design: Split Displays

Multiple Window Design: Tiled Windows.

- No overlapping between the multiple windows.
- Used in early window systems to avoid keeping track of window redrawing.
- All windows are visible at the same time.
- Position and size of windows are restricted.

Multiple Window Design: Tiled Windows.

Multiple Window Design: Tiled Windows.

Multiple Window Design: Overlapped Windows.

- Allows windows to be partially overlapped in arbitrary ways.
- No restriction on position and size of windows.
- Also refer to as 2½-D programming.
- May obscure relevant material and increase housekeeping load.

Multiple Window Design: Overlapped Windows.
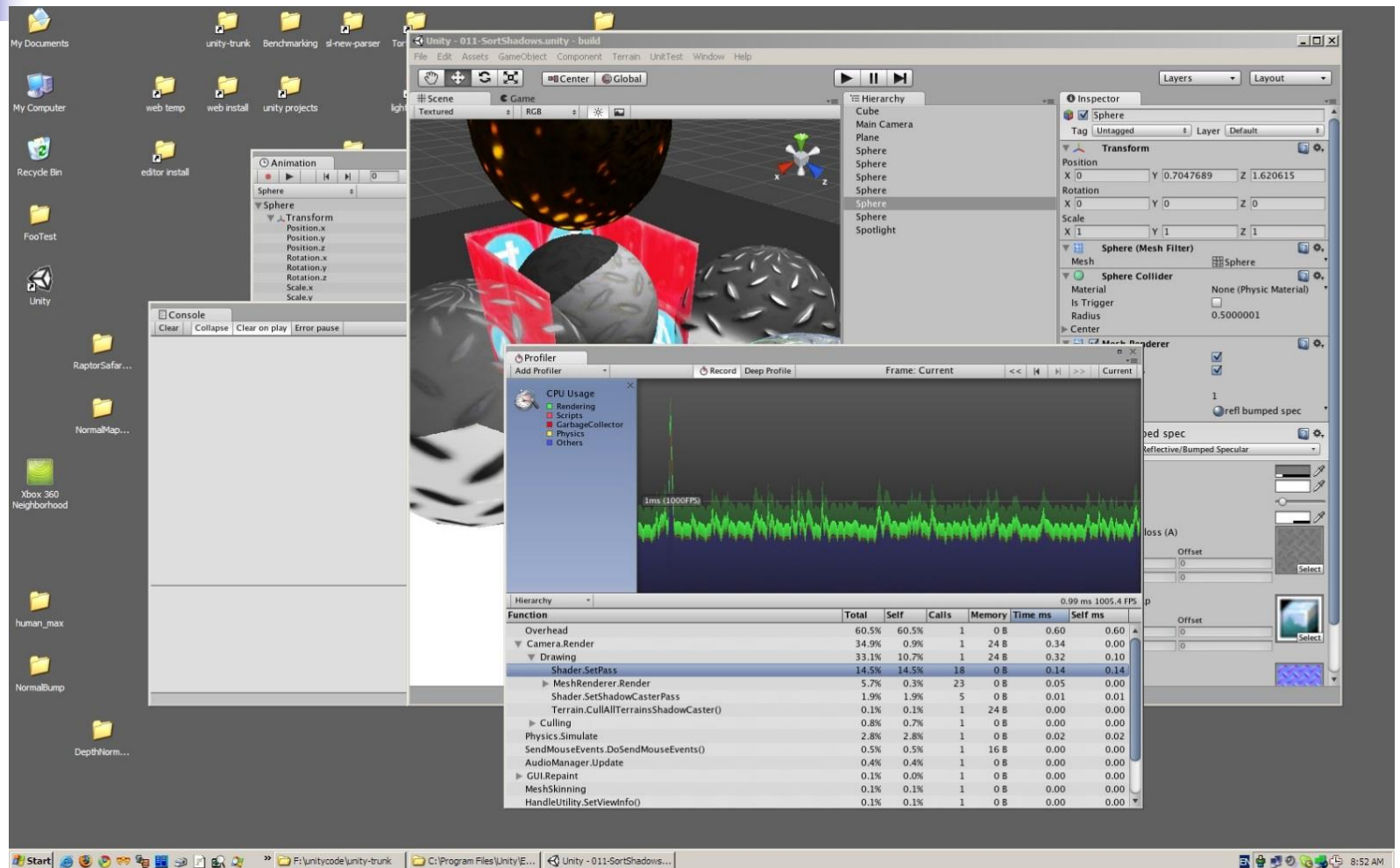
Multiple Window Design: Cascaded Windows

- Adopt the familiar deck-of-cards metaphor.

- Position windows from upper left down to lower right.

- All window titles are visible at the same time.

Multiple Window Design: Cascaded Windows
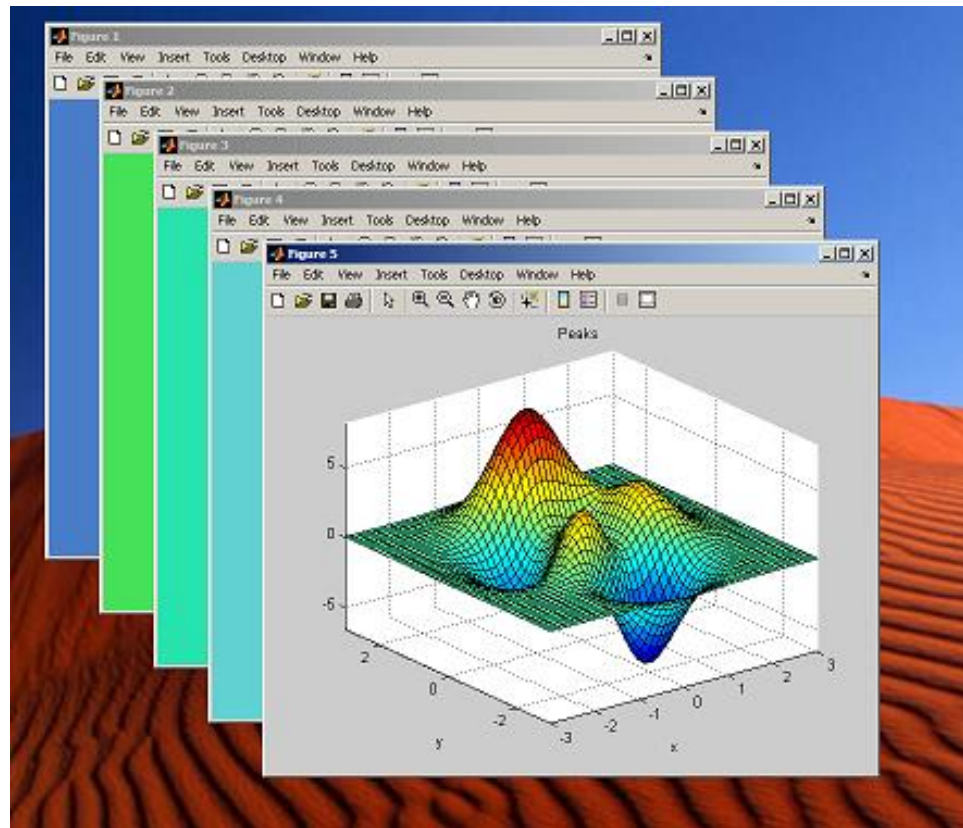
Coordination by Tightly-Coupled Windows

- Synchronized scrolling
- Hierarchical browsing
- Secondary windows
  - Dialog boxes
  - Property sheets
  - Message boxes
  - Pop-up windows
- Multiple document interface (MDI)

Synchronized Scrolling

- Scroll bar of different windows are tightly coupled to each other.

- Action on one scroll bar causes the other to move in a similar way.

- Useful for comparing two versions of a program or document.

Synchronized Scrolling

Hierarchical Browsing

- Usually used in split windows.

- One display shows the hierarchical structure of a set of files or documents.

- Clicking on any nodes of the structure will lead to the display of the corresponding document/file in another display.

Hierarchical Browsing (cont'd)

Hierarchical Browsing (cont'd)

Secondary Windows

- Useful for supporting a user's activity in the primary window.

- Size of secondary windows are usually smaller than that of primary window.

- Examples include dialog boxes, property sheets, message boxes and pop-up windows.

Dialog Boxes

- Provides an exchange of information or dialog between users and application.

- Usually used to obtain additional information from user to complete a task.

- Dialog boxes are invoked in most cases as a result of selecting a menu item
  - Define title text of dialog box to be the same as the selected menu item.

Dialog Boxes (cont'd)
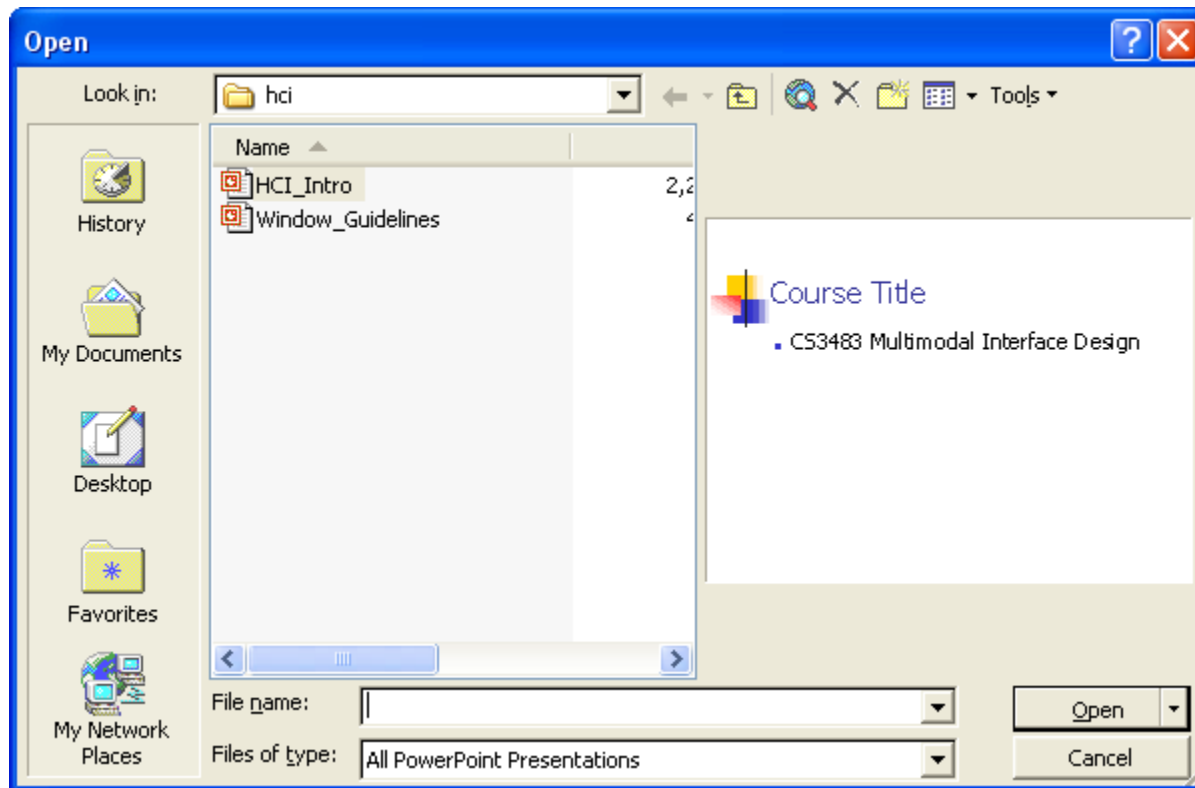
Property Sheets

- A property sheet displays the attributes of an object.

- Use tabbed property pages to group and categorize properties.

- If there are too many categories, use other controls (e.g. a drop-down list) to switch between groups of tabbed pages.

Property Sheets (cont'd)
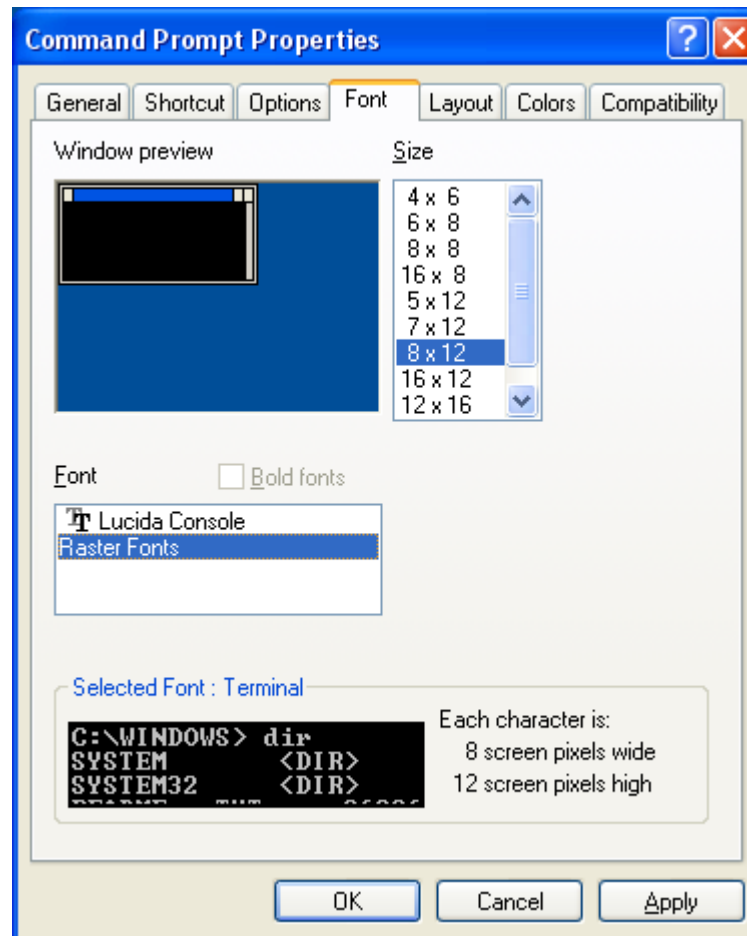
Message Boxes

- Displays a message about a particular condition.

- Messages should be as specific as possible.

- Instead of just stating the problem, a message box should also describe its possible cause and offer solutions.

Message Boxes (cont'd)

- Three main types of message boxes
  - Information: provides information about the results of a command.
  - Warning: alerts user to a condition that requires a decision.
  - Critical: informs the user of a serious problem that requires intervention.

Message Boxes (cont'd)

- Command buttons in message boxes
  - If message requires acknowledgment only, just includes the OK button.
  - If message requires user's decision, include a button for each option.

Message Boxes (cont'd)
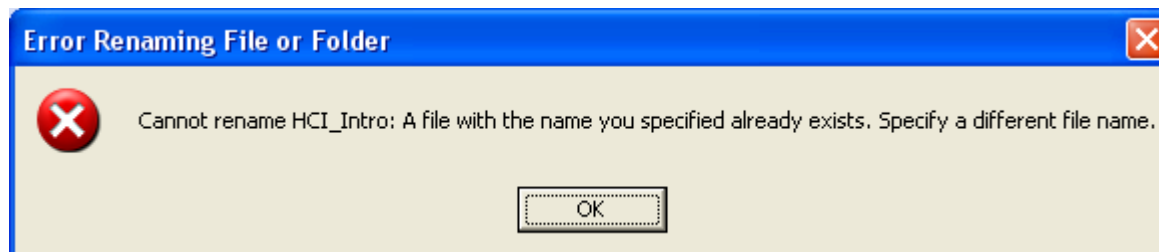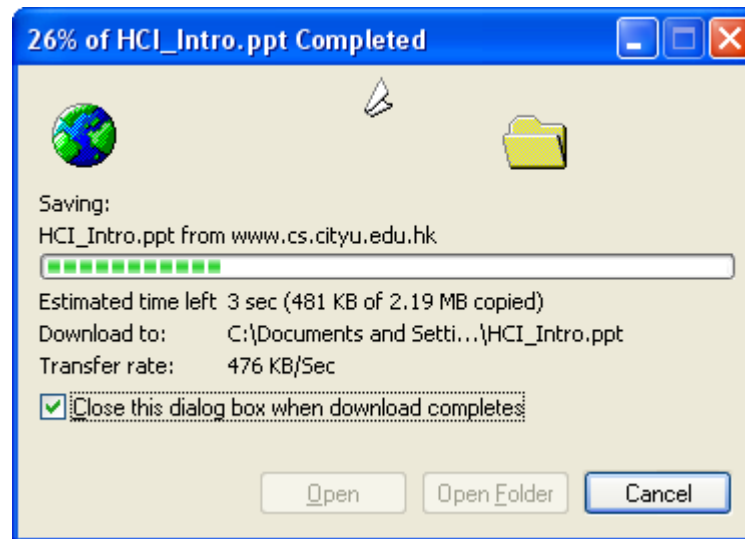
Pop-up Windows

- A secondary window which is activated automatically or by a mouseover.
- Examples
 - Pop-up advertisement windows in certain web sites.
  - Tool tips and balloon tips to provide context-sensitive help information.

Multiple Document Interface (MDI)

- MDI uses a parent window to contain a set of documents in child windows.

- Child windows are constrained to appear within the parent window.

- Child windows share parts of the parent's interface such as menu bar and tool bar.

Multiple Document Interface (MDI)
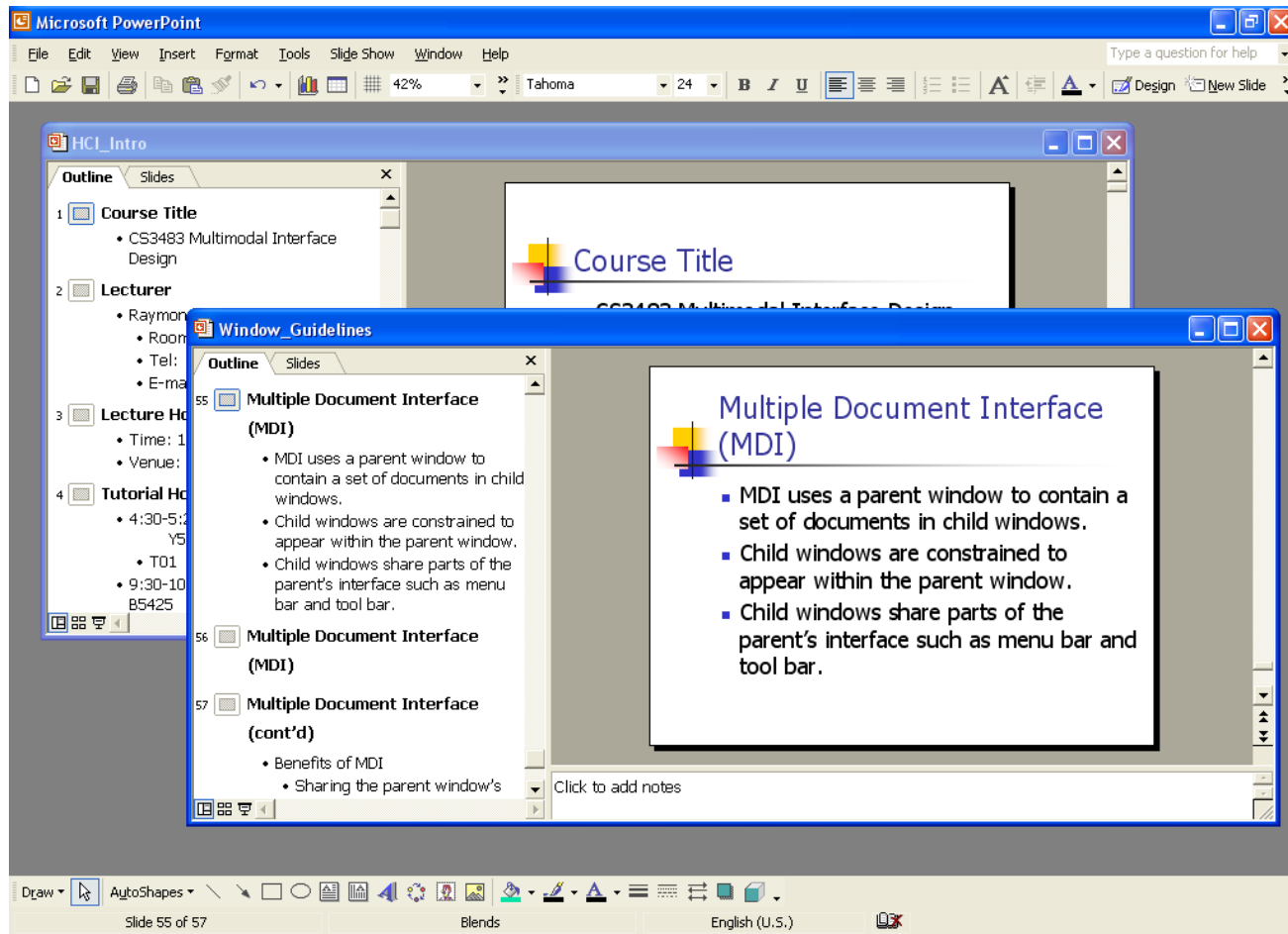
Multiple Document Interface (cont'd)

- Benefits of MDI
  - Sharing the parent window's interface components make the application space-efficient.
  - Provide logical separation from other application windows.