Window Systems and Interface Components
IAT 351

Week 3 Lecture 2

19.09.2012

Lyn Bartram

lyn@sfu.ca

SFU

SCHOOL OF INTERACTIVE ARTS + TECHNOLOGY

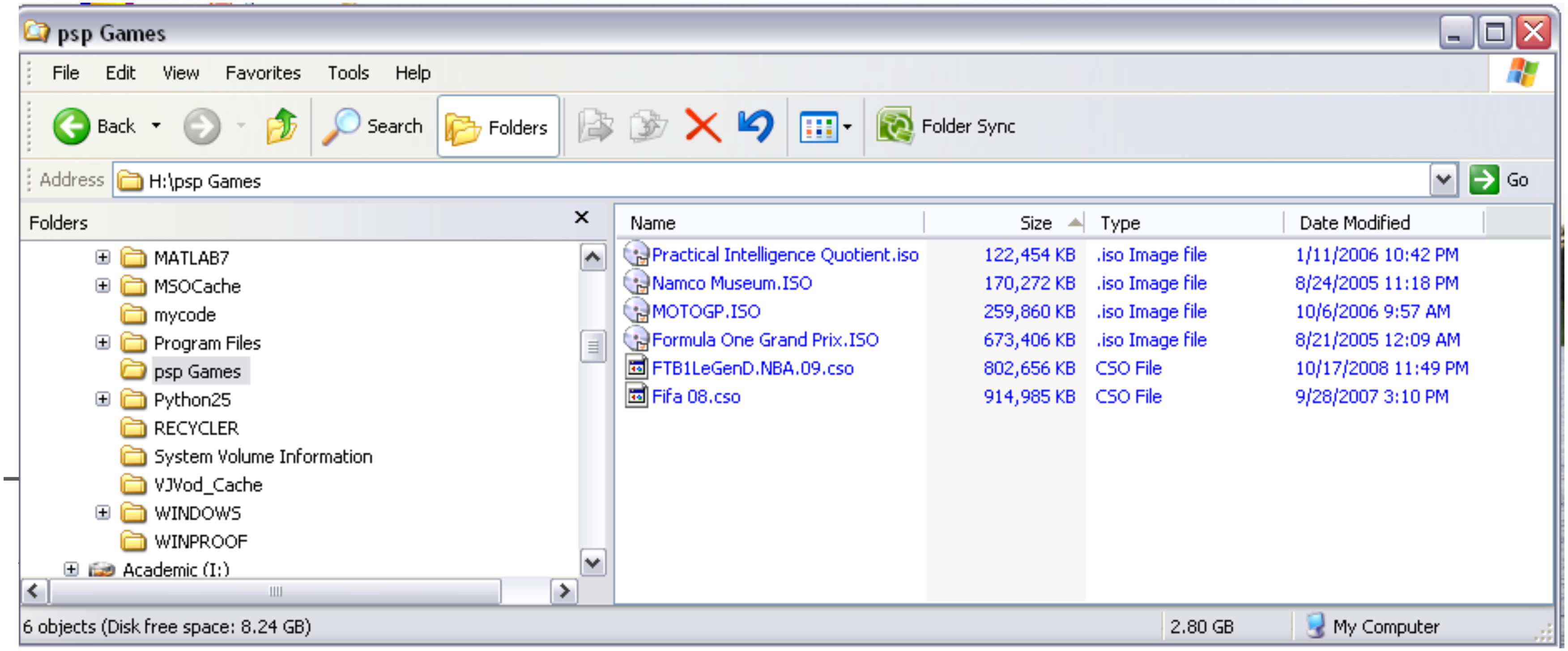
Administrivia

- Assignment 1

- List your pair on the assignment 1 page of the wiki
- Make a page for your pair
- upload your assignment 1 in .zip format to wiki

Windows

- (Most) 2D GUIs are windowing interfaces:
  - they use rectangular boxes called windows to present the components of an application or the contents of a folder
- Windowing was first demonstrated by the Xerox Alto and later incorporated into the Apple operating system and Microsoft Windows



Name	Size	Type	Date Modified
Practical Intelligence Quotient.iso	122,454 KB	.iso Image file	1/11/2006 10:42 PM
Namco Museum.ISO	170,272 KB	.iso Image file	8/24/2005 11:18 PM
MOTOGP.ISO	259,860 KB	.iso Image file	10/6/2006 9:57 AM
Formula One Grand Prix.ISO	673,406 KB	.iso Image file	8/21/2005 12:09 AM
FTB1LeGenD.NBA.09.cso	802,656 KB	CSO File	10/17/2008 11:49 PM
Fifa 08.cso	914,985 KB	CSO File	9/28/2007 3:10 PM

6 objects (Disk free space: 8.24 GB) 2.80 GB My Computer

WIMP and Widgets

- Main
  - Windows
  - Icons
  - Menus
  - Pointers

- Other Components
  - Lists
  - Controls
  - Display Components
  - Text Entry Components
  - Tool Containers

Widgets =
Windows + Ga**dgets**

Windows

MAXIM

Multiple windows can pose management difficulties

- Studies have shown that the advantages offered by windowing systems can be negated by excess window manipulation requirements

Windows – *Window States*

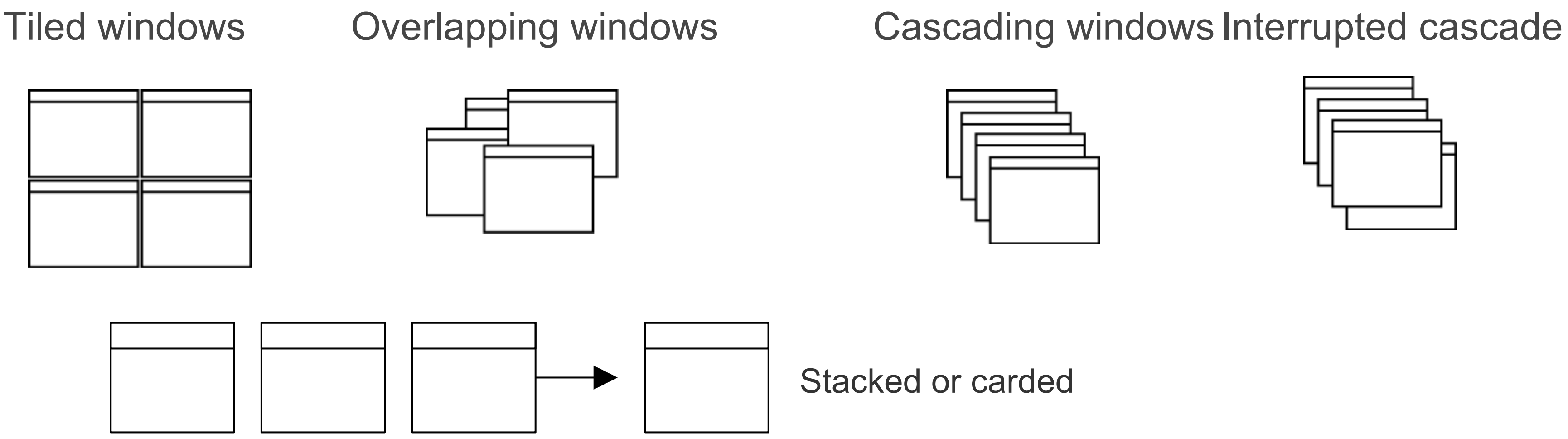
- There are two types of window managers:
  - The operating system software
  - The user who must minimize, maximize, resize, access, and organize windows

Windows – *Window States*

- Window States
  - Maximized—The window occupies the whole screen
  - Minimized—The window is reduced to a button or icon

Windows – *Window States*

- Window States
  - Restored—The window returns to the previous dimensions. The window also becomes resizable and can overlap other windows



Tiled windows

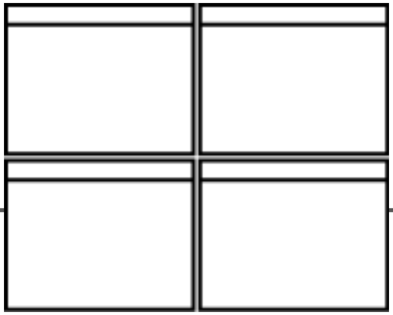
Overlapping windows

Cascading windows

Interrupted cascade

Stacked or carded

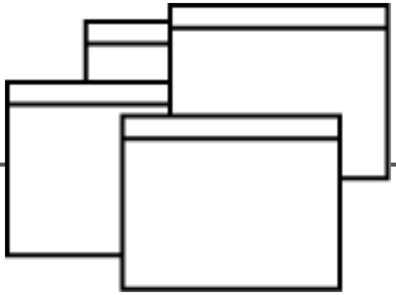
Tiled Windows



Tiled Windows

- Collectively occupy the entire screen
- Resized windows allow all program visible
- Window manager positions all windows
- Each window retains its title and tool bars
- Windows become small, restricting visual content
- Allows drag and drop objects between windows

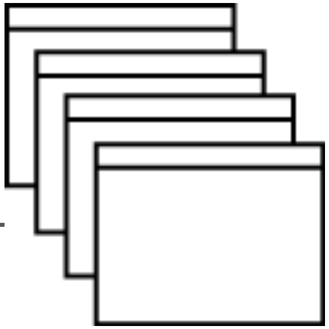
Overlapping Windows



Overlapping windows

- Positioned and sized by the user
- Each window maintains its size until altered by the user
- Active window overlaps all other windows
- A window becomes active when it is clicked
- Can see other windows partially

Cascading Windows



Cascading windows

- A special type of overlapping presentation style
- Windows are placed by the system manager
- Efficient use of screen real estate
- Takes away positioning and sizing option from the user
- A window becomes active when it is clicked, and bringing it to the top

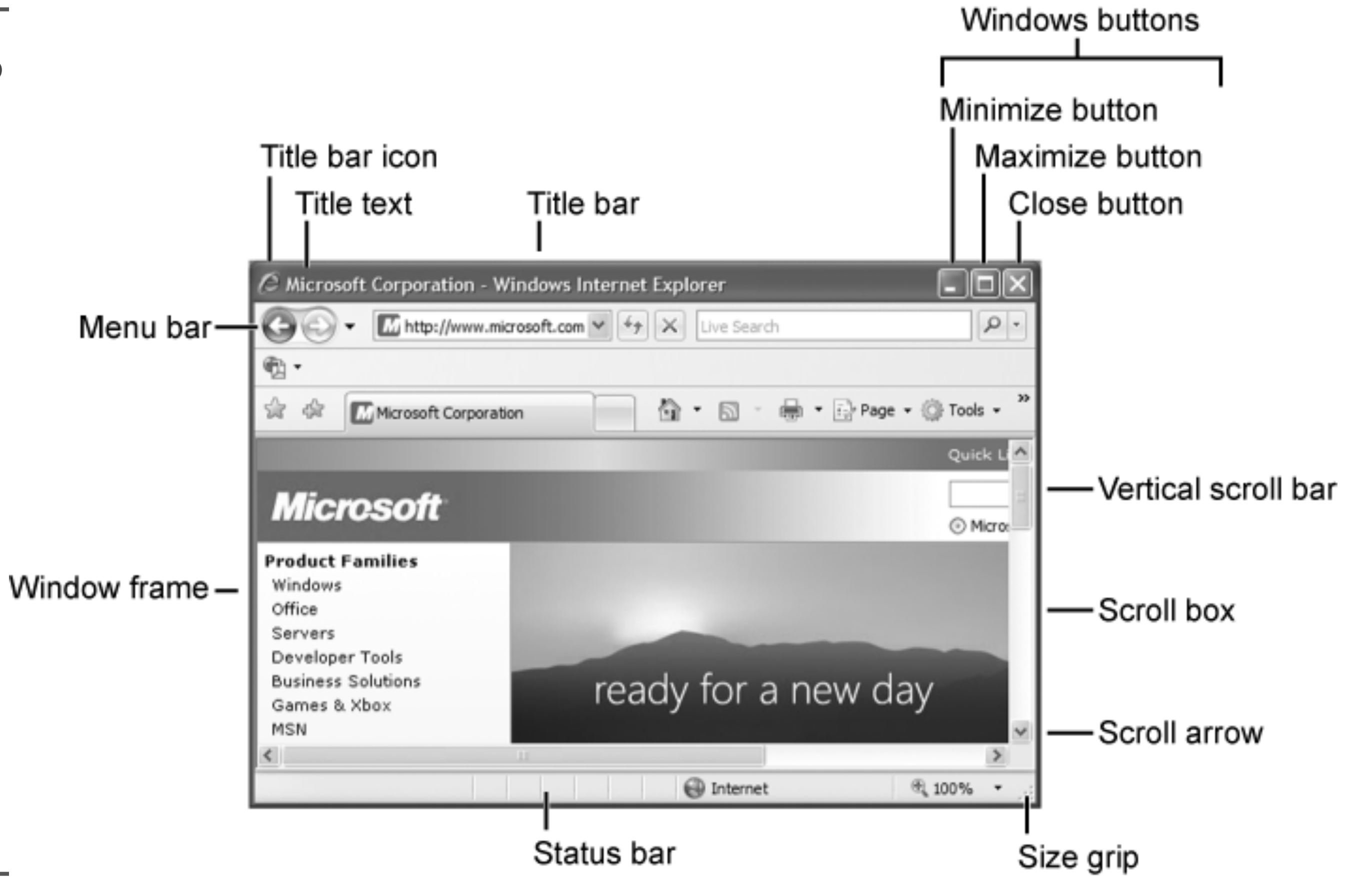
Windows – *Window States*

MAXIM

- Tiled windows afford drag-and-drop methods.
- Overlapping windows use screen real estate efficiently, but they can become overwhelming
- Cascading windows use screen real estate efficiently and can be used to create visual organization
- Maximized windows are visually less complex, but they require easy navigation methods to get from window to window
- Stacked/carded systems require serial presentation methods

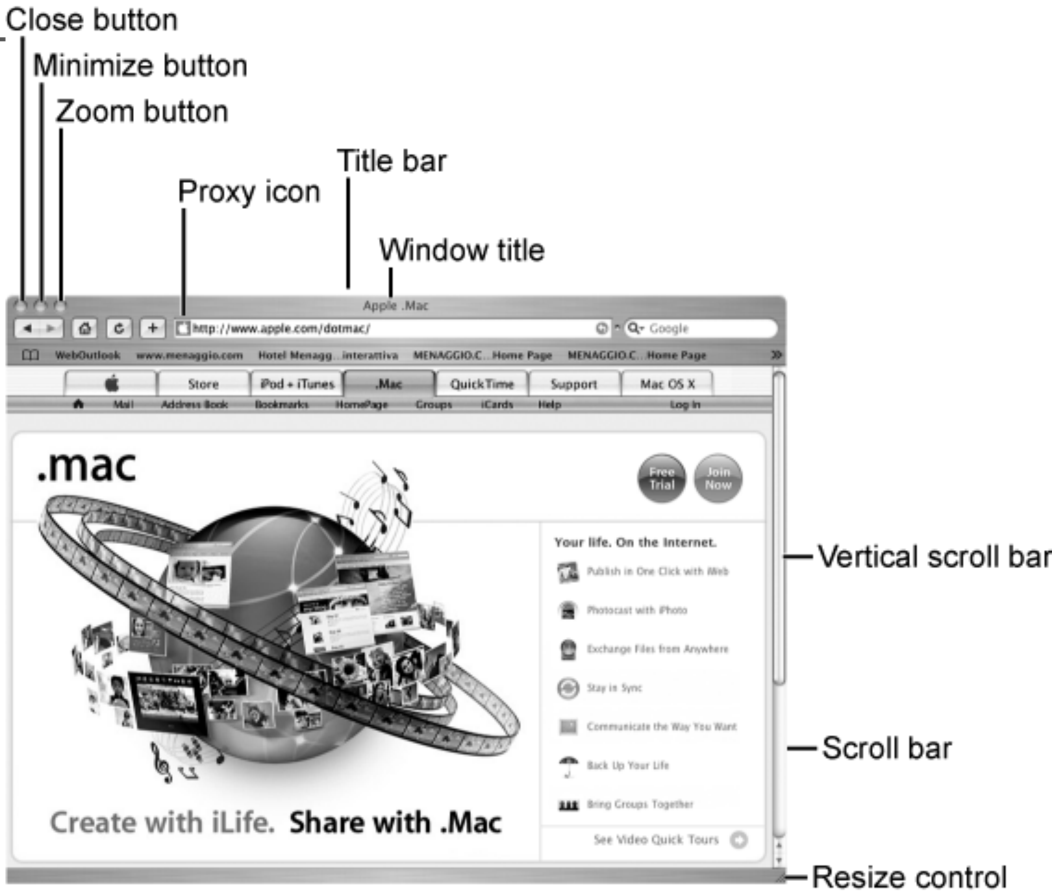
Windows - *Components*

- Windows XP Window Components



Windows - *Components*

- Mac OS X Window Components



Windows – *Window Interfaces*

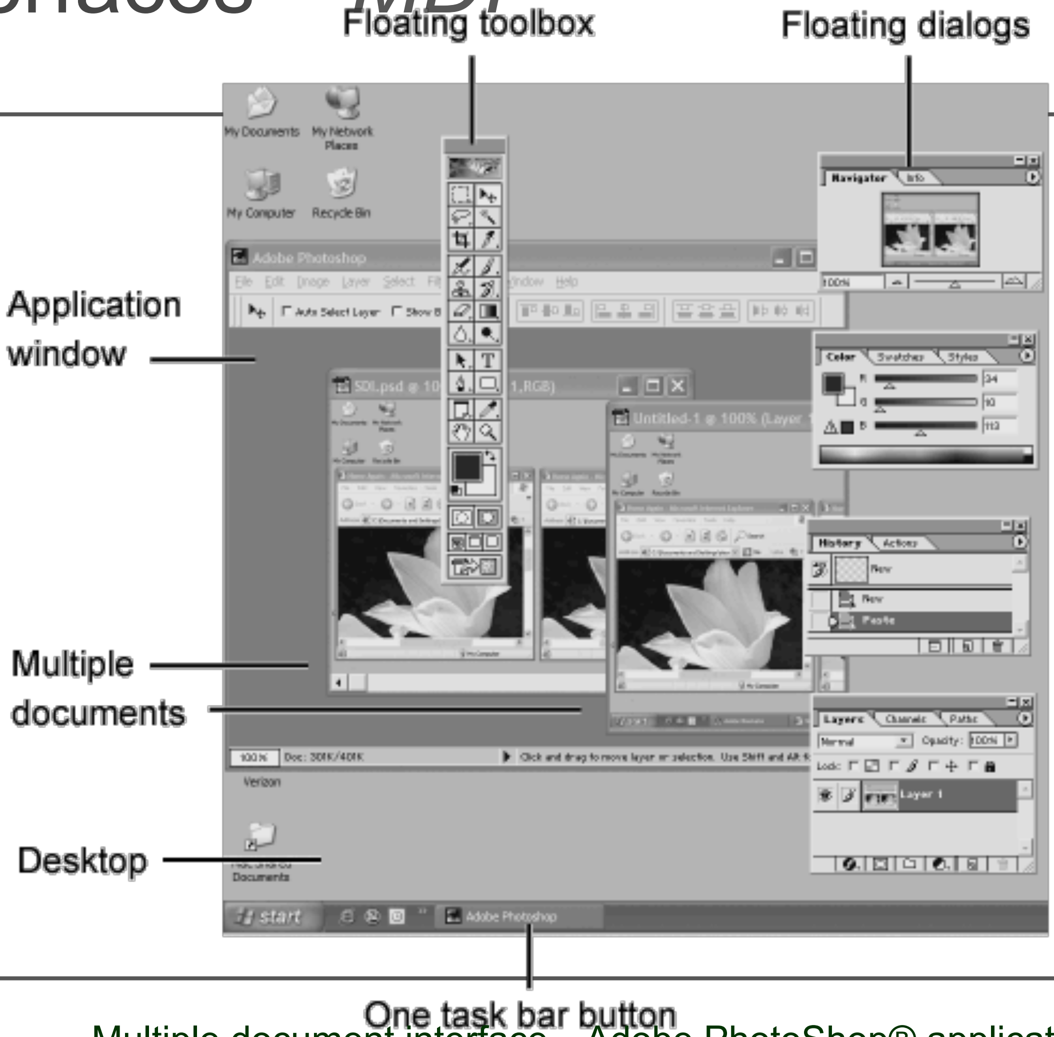
- Multiple Document Interface
- Single Document Interface
  - Controlled Single Document Interface
- Tabbed Interface
  - Detachable Tabbed Interface

Window Interfaces – *MDI*

- Multiple Document Interface
  - The multiple document interface (MDI) is **application-centric**.
  - An MDI application launches a primary window that serves as the work space for all open documents
- Adobe Creative Suite™, media editing

Window Interfaces – *MDI*

Multiple Document Interface



Multiple document interface—Adobe PhotoShop® application.

Window Interfaces – *MDI*

- Advantages of MDIs:
  - They conserve system resources
  - They create minimal visual clutter
  - They provide a coordinated work space
  - They allow multiple documents to be simultaneously visible

Window Interfaces – *MDI*

- Disadvantages associated with MDIs:
  - Menus change according to the state of the active document
  - Document windows must remain within the MDI primary window
    - NOTE: This is no longer always true!
    - Floating palettes
  - Child windows can be minimized within the parent window—This increases the visual complexity of the screen, which may have other open parent windows

Window Interfaces – *SDI*

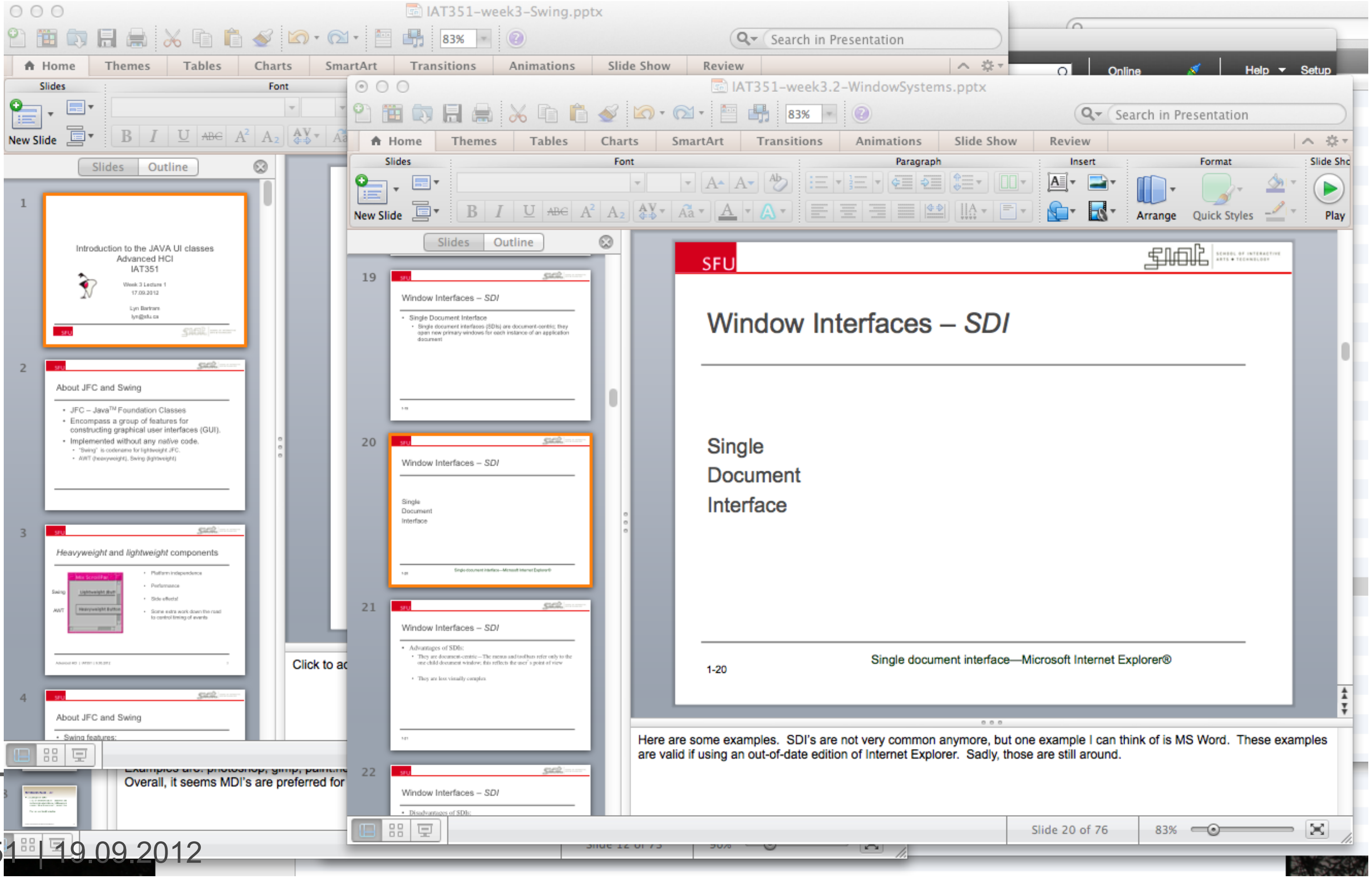
- Single Document Interface
  - Single document interfaces (SDIs) are **document-centric**;
  - they open new primary windows for each instance of an application document

Window Interfaces – *SDI*

Multiple primary windows

Individual task bar buttons

Single
Document
Interface



1 Introduction to the JAVA UI classes
Advanced HCI
IAT351
Week 3 Lecture 1
17.09.2012
Lyn Bartram
lyn@sfu.ca

2 About JFC and Swing
- JFC – Java™ Foundation Classes
- Encompass a group of features for constructing graphical user interfaces (GUI).
- Implemented without any native code.
  - "Swing" is codename for lightweight JFC.
  - AWT (heavyweight), Swing (lightweight)

3 *Heavyweight* and *lightweight* components
- Platform independence
- Performance
- Side effects!
- Some extra work down the road to control timing of events

4 About JFC and Swing
- Swing features:

Click to ad

Examples are: photoshop, gimp, paint.n
Overall, it seems MDI's are preferred for

19 Window Interfaces – *SDI*
- Single Document Interface
  - Single document interfaces (SDIs) are document-centric; they open new primary windows for each instance of an application document

20 Window Interfaces – *SDI*
Single
Document
Interface

21 Window Interfaces – *SDI*
- Advantages of SDIs:
  - They are document-centric – The menus and toolbars refer only to the one child document window; this reflects the user's point of view
  - They are less visually complex

22 Window Interfaces – *SDI*
- Disadvantages of SDIs:

Window Interfaces – *SDI*

Single
Document
Interface

1-20

Single document interface—Microsoft Internet Explorer®

Here are some examples. SDI's are not very common anymore, but one example I can think of is MS Word. These examples are valid if using an out-of-date edition of Internet Explorer. Sadly, those are still around.

Window Interfaces – *SDI*

- Advantages of SDIs:
  - They are document-centric—The menus and toolbars refer only to the one child document window; this reflects the user’s point of view
  - They are less visually complex

Window Interfaces – *SDI*

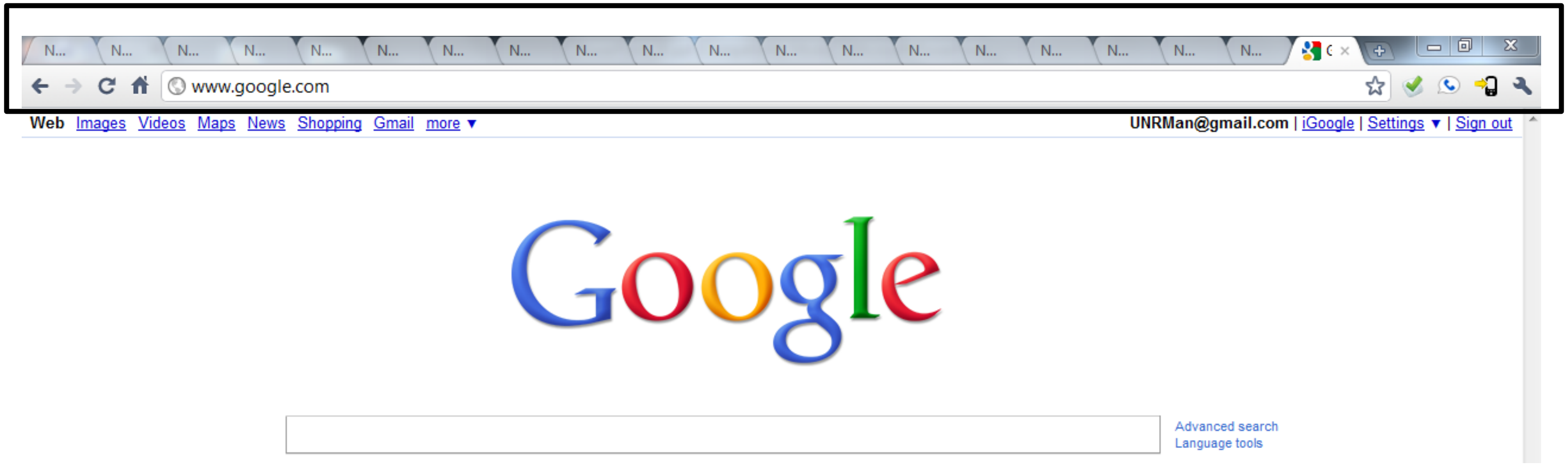
- Disadvantages of SDIs:
  - They do not provide a way to group diverse but related document windows
  - Related documents cannot be separated from other documents of the same file type
  - The task bar can become full when too many documents are open
  - Cycling between windows can become difficult
- Windows 7 and Mac OS X Uis accommodate these issues

Window Interfaces – *TDI*

- Tabbed Document Interface
  - Incorporates the use of tabs to switch between documents/ windows
  - Some TDIs fix all document windows in a maximized state, and, therefore, no tiling or overlapping is possible
  - Others allow documents to be resized and minimized, which removes the tabs (becomes MDI)

Window Interfaces – *TDI*

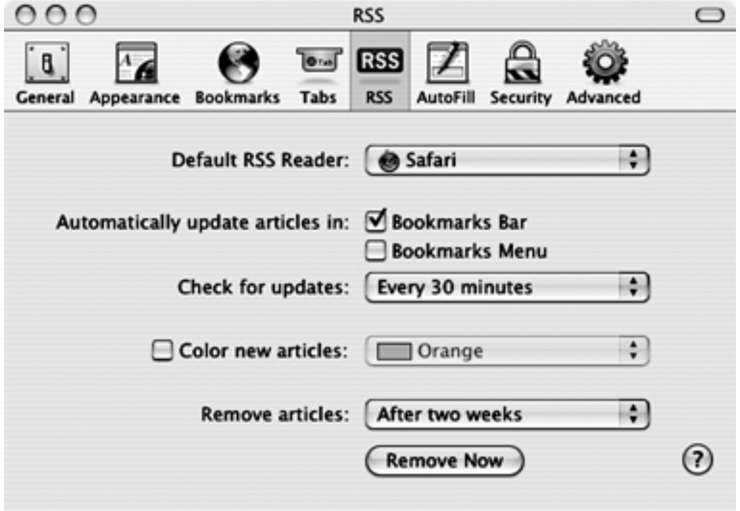
Tabbed Document Interface



Dialog Boxes

Maxim

Dialogue boxes provide a container for related, secondary functionality



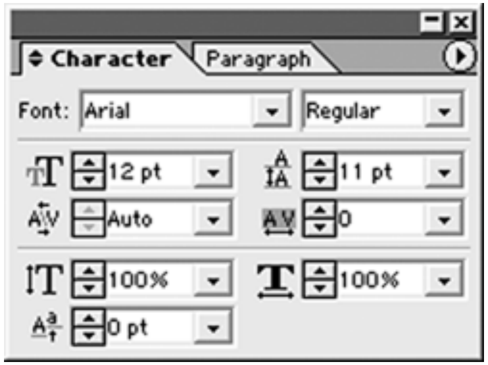
Default RSS Reader: Safari

Automatically update articles in: ☑ Bookmarks Bar
□ Bookmarks Menu

Check for updates: Every 30 minutes

□ Color new articles: Orange

Remove articles: After two weeks



Font: Arial Regular

12 pt 11 pt
Auto 0
100% 100%
0 pt

Text formatting dialogue—Windows XP. (b) Preferences dialogue—Mac OS X.

Dialog Boxes – *Modal/Modeless*

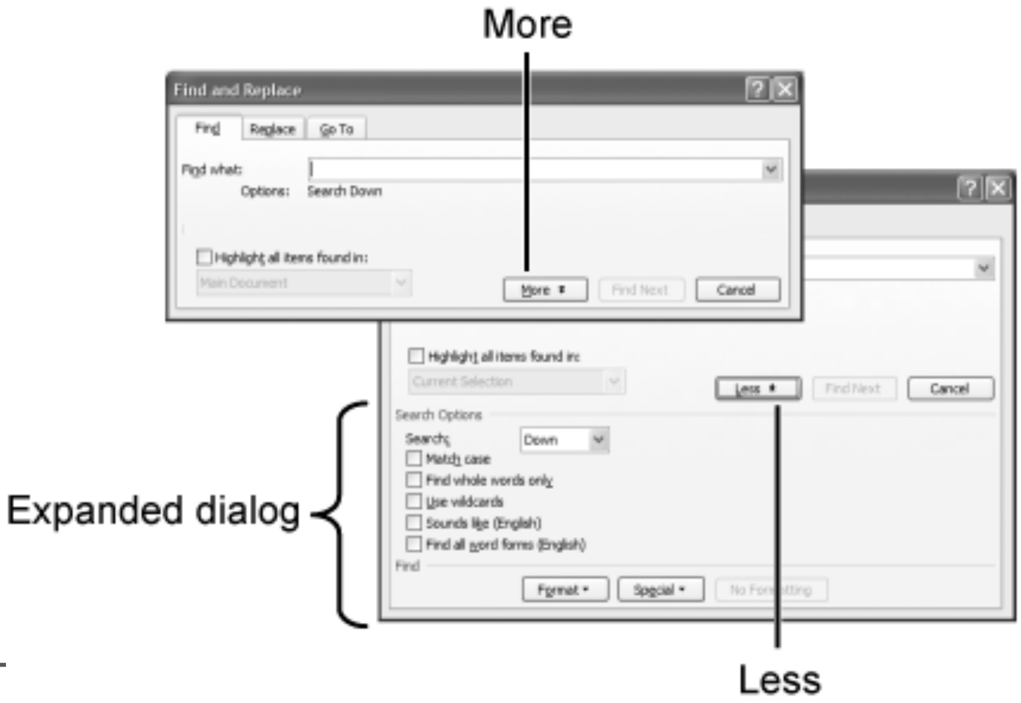
- Modal dialogues prohibit the user from doing anything until the issues raised by the dialogue are addressed
- Modeless dialogues allow the user to access all program functionality when the dialogue is visible

Dialog Boxes

- Dialogues can be used for:
  - Setting and altering the properties of an object
  - Executing a function such as Save
  - Carrying out a process such as Copy
  - Confirming actions
  - Alerting the user about errors

Dialog Boxes – *Expanding Dialogues*

- Expanding dialogues give experienced users access to advanced functionality



Find what:

Options: Search Down

Search: Down

Panes, Frames, and Tabs

MAXIM

Panes provide visual grouping for related functionality

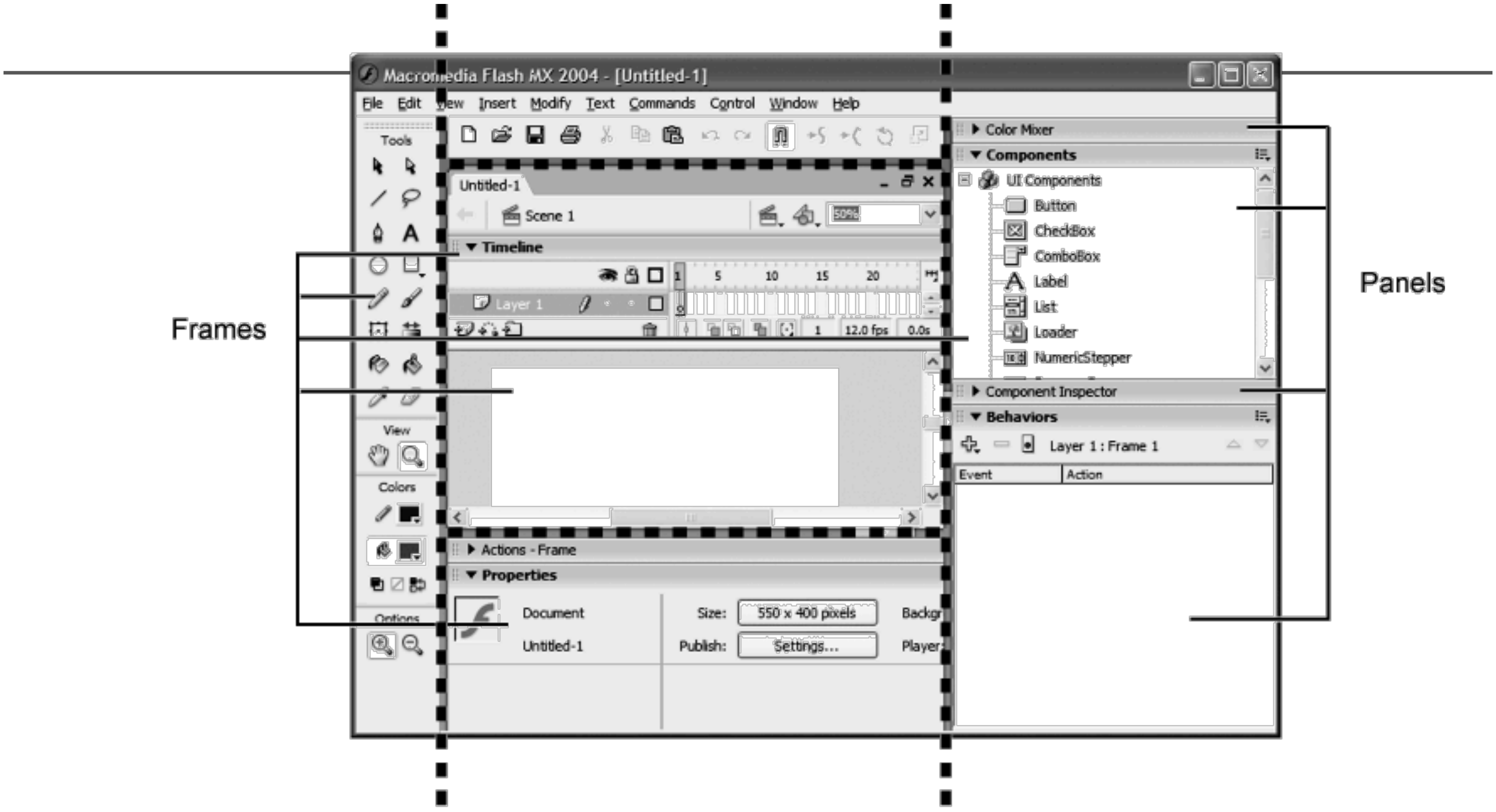
- Panes are an efficient way to provide functionality without forcing the user to navigate menus
- Panes can be used to group related functionality, thereby providing a memory aid for the user
  - May impose extra management of grouping

Panes, Frames, and Tabs

- Frames can be:
  - resized by dragging the splitters at their edges
  - minimized by clicking on their title bar

- Frames are often used in Web pages to create separate navigation areas

Panes, Frames, and Tabs



Frames

Panels

Document: Untitled-1

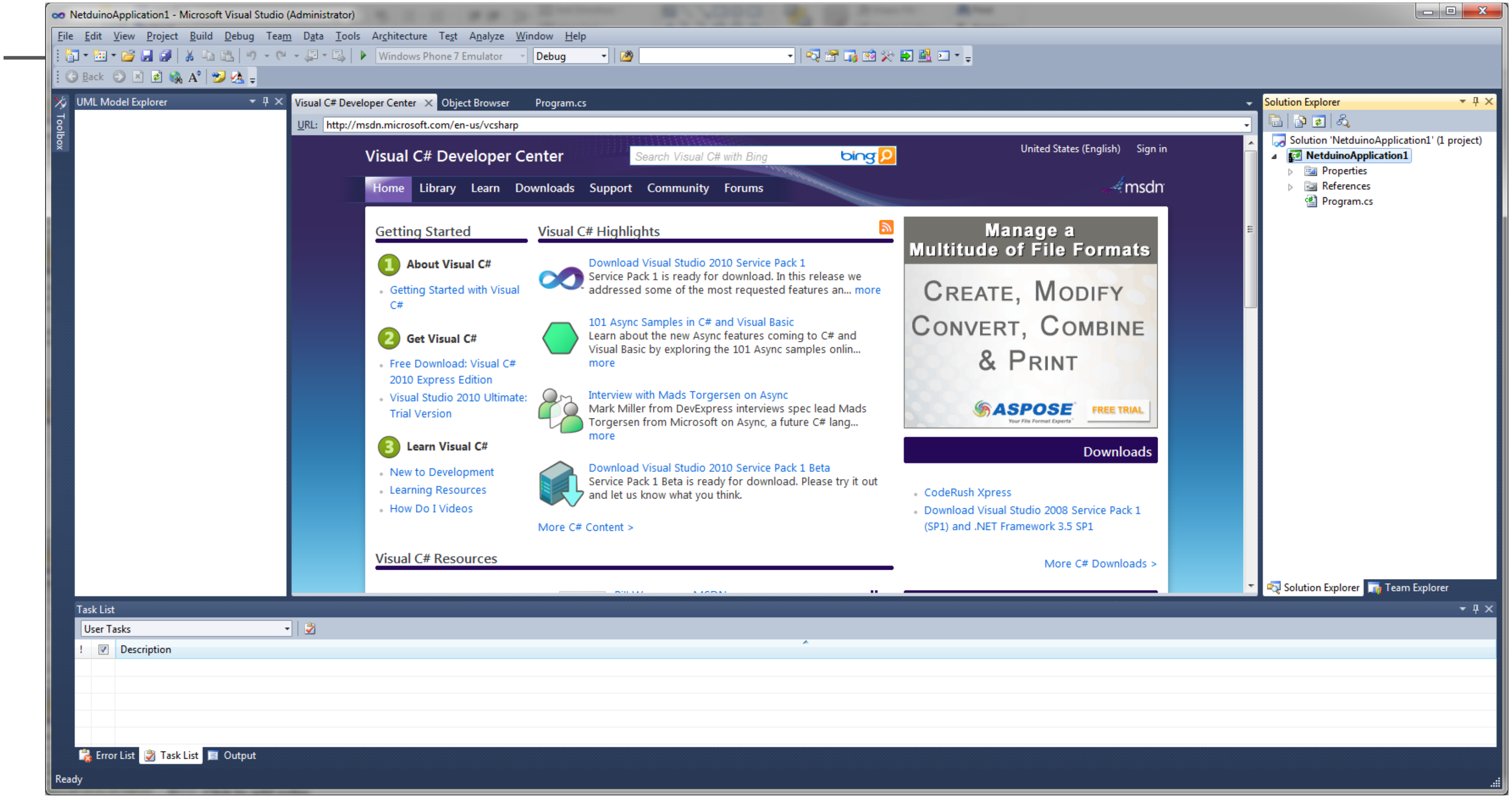
Size: 550 x 400 pixels

Publish: Settings...

Layer 1 : Frame 1

Panes and frames, Adobe Flash®.

Panes, Frames, and Tabs



URL: http://msdn.microsoft.com/en-us/vcsharp

Visual C# Developer Center

Search Visual C# with Bing

United States (English)   Sign in

Home   Library   Learn   Downloads   Support   Community   Forums   msdn

Getting Started

1 About Visual C#
- Getting Started with Visual C#

2 Get Visual C#
- Free Download: Visual C# 2010 Express Edition
- Visual Studio 2010 Ultimate: Trial Version

3 Learn Visual C#
- New to Development
- Learning Resources
- How Do I Videos

Visual C# Highlights

Download Visual Studio 2010 Service Pack 1
Service Pack 1 is ready for download. In this release we addressed some of the most requested features an... more

101 Async Samples in C# and Visual Basic
Learn about the new Async features coming to C# and Visual Basic by exploring the 101 Async samples onlin... more

Interview with Mads Torgersen on Async
Mark Miller from DevExpress interviews spec lead Mads Torgersen from Microsoft on Async, a future C# lang... more

Download Visual Studio 2010 Service Pack 1 Beta
Service Pack 1 Beta is ready for download. Please try it out and let us know what you think.

More C# Content >

Manage a Multitude of File Formats
CREATE, MODIFY CONVERT, COMBINE & PRINT
ASPOSE Your File Format Experts   FREE TRIAL

Downloads
- CodeRush Xpress
- Download Visual Studio 2008 Service Pack 1 (SP1) and .NET Framework 3.5 SP1

More C# Downloads >

Visual C# Resources

Solution 'NetduinoApplication1' (1 project)
- NetduinoApplication1
  - Properties
  - References
  - Program.cs

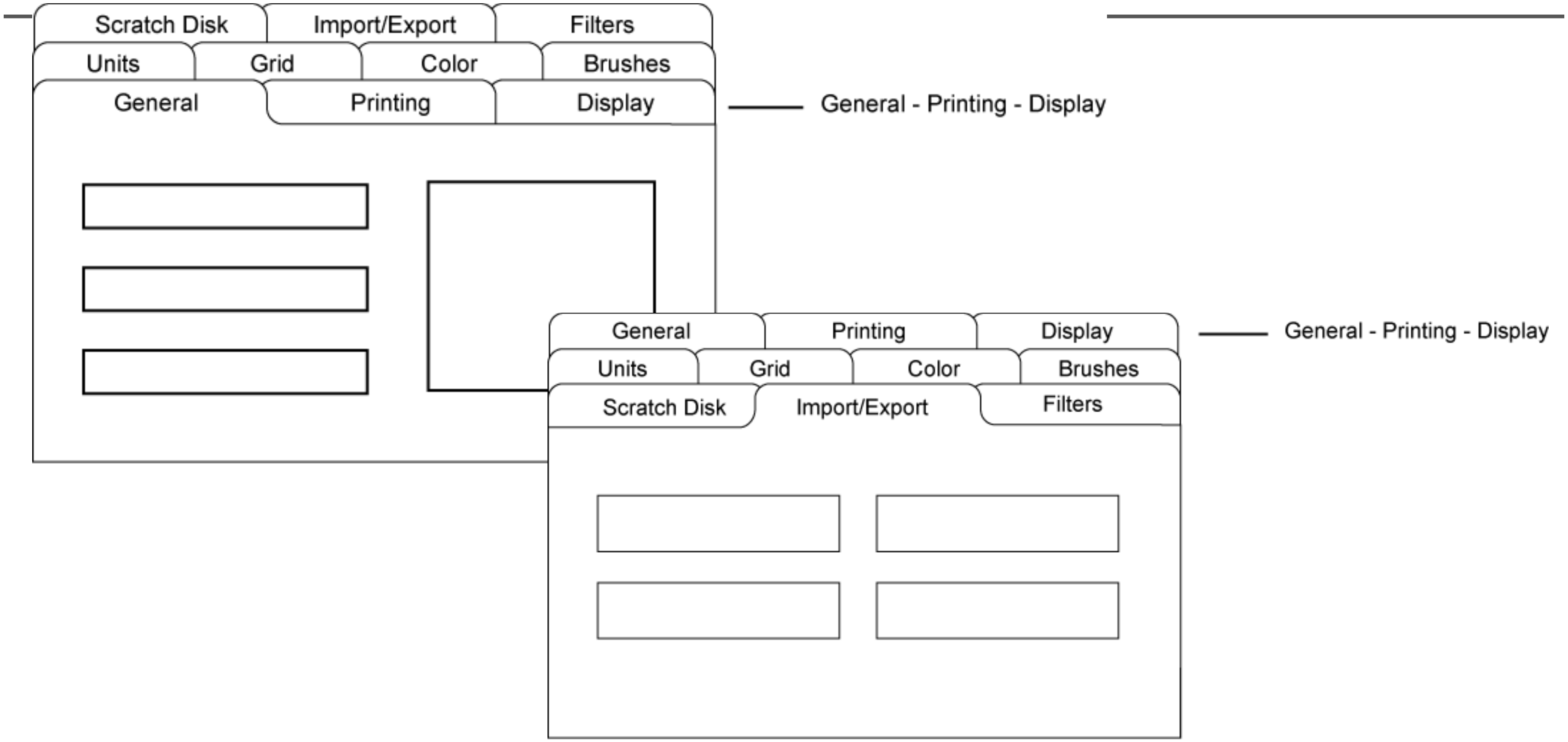
Visual Studio 2010

Panes, Frames and Tabs

- Tabs increase the size of the dialogue by stacking layers on top of each other and allow more elements to be accessed from one dialogue

- *Stacked* tabs move around to accommodate the different levels and they destroy location consistency

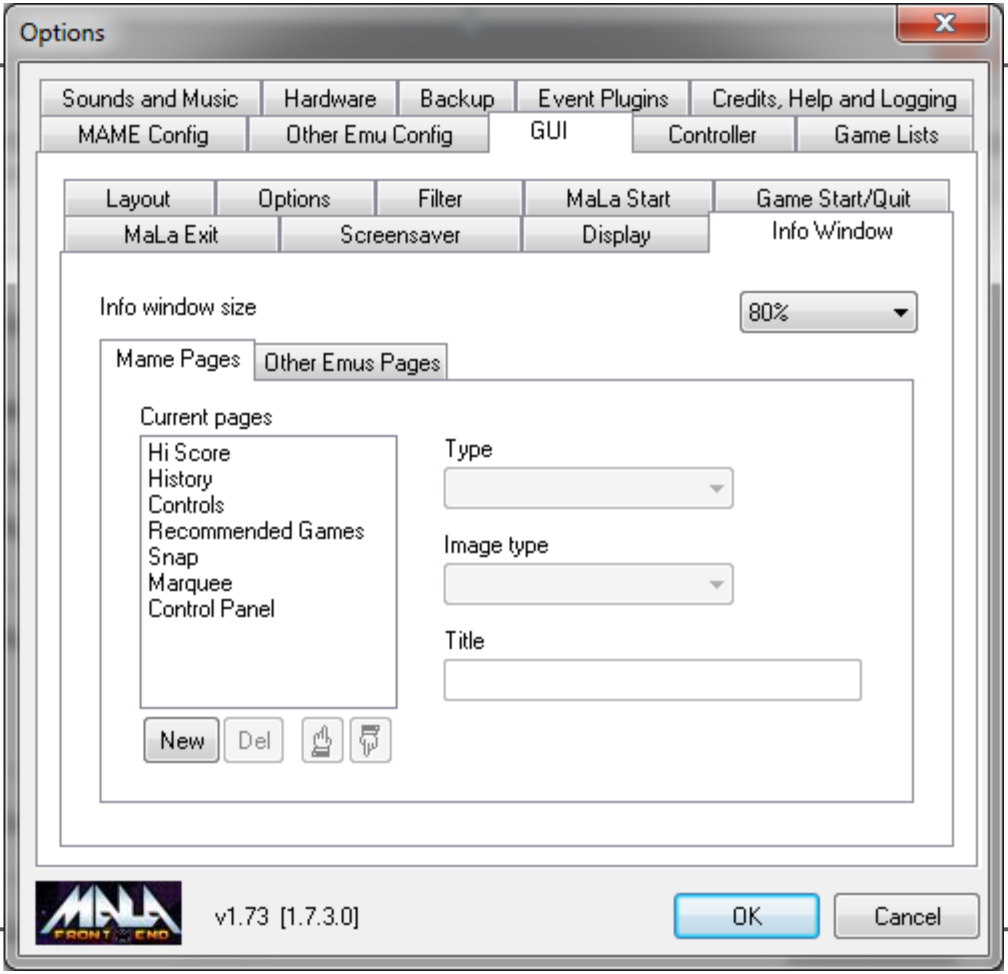
Panes, Frames, and Tabs



General - Printing - Display

General - Printing - Display

Panes, Frames, and Tabs



Info window size 80%

Current pages

- Hi Score
- History
- Controls
- Recommended Games
- Snap
- Marquee
- Control Panel

Type

Image type

Title

v1.73 [1.7.3.0]

Window Rationale

- Designers need to:
  - Decide which type of interface to use
    - (MDI, SDI, or TDI)
  - Make sure that the window components are sufficiently related
  - Find the proper balance between having:
    - too many windows (each with only a few components and functions) and
    - too few windows (each with an overwhelming amount of components and functions)

Window Rationale

MAXIM

Secondary windows must address a discernible need

- Unnecessary windows can cause confusion and can add cumbersome window manipulation tasks

- However, crowded windows can also be confusing

Window Rationale

- Avoid window clutter
- Windows should be created because of a need that cannot otherwise be filled
- Window components must be related
- Too many components in one window can be inefficient and confusing
- Too many windows with little functionality can create needless window manipulation tasks

Window Rationale

- Tabs and/or panes can be used to organize window functionality
- Frequently used components must be readily available
- Less frequently used components can be placed in a secondary window
- Windows must visually indicate activation state

Icons

- Icons are *signs* and represent a significant degree of cognitive complexity
  - If they are designed properly they can enhance the user’ s experience
  - They can also run the risk of being obscure and ambiguous
  - Create confusion and frustration

- Critically important in mobile interfaces
- Very vulnerable to perceptual artifacts and memory

Menus

- Advantages
  - Low memory requirements
  - Self-explanatory
  - Easy to undo errors
  - Appropriate for beginners
- Disadvantages
  - Rigid and inflexible navigation
  - Inefficient for large menu navigation
  - Inefficient use of screen real estate
  - Slow for expert users

Menus

- basically lists of options
- option lists can consist of any type of data but text usually works best
- Options are generally indented in relation to the title
- Frequently used items should be placed at the top
- Ordered lists can have a separate section at the top for frequently used items that might normally appear near the bottom
- These lists can be ordered or unordered

Menus

- Structure
  - Menus should have at least two options; otherwise they should be combined with another menu
  - Menu options can be grouped using visual separators such as lines or backgrounds
  - Options that cause destructive actions should be **isolated** from other options

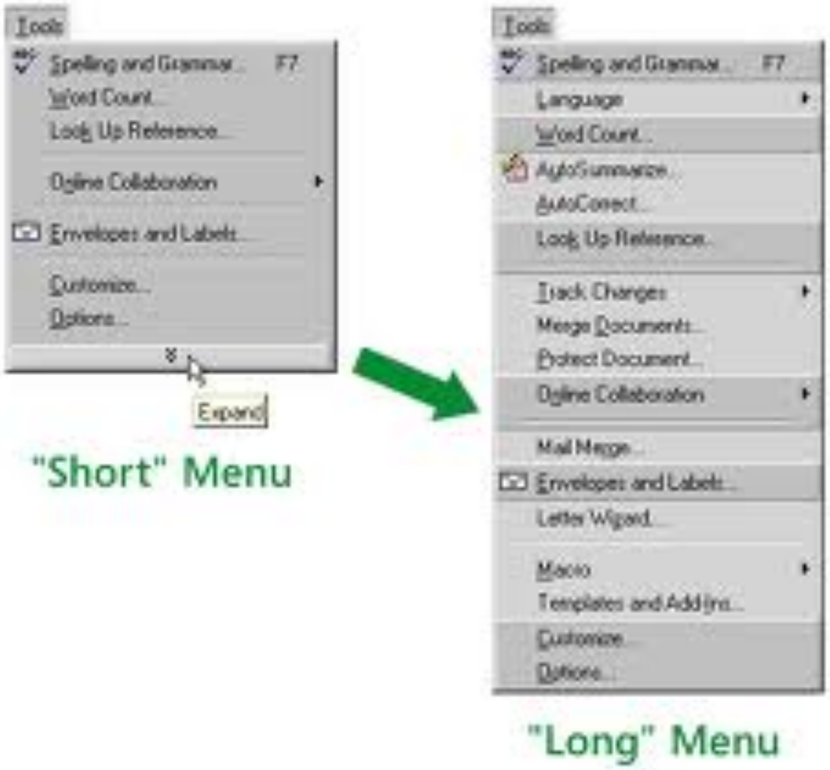
Menus: Presentation

- Consistency in placement, order, wording, highlighting etc. should be maintained
- Titles and options must be unambiguous
  - (Apple™) Use standard menu titles and options because they are visually familiar and are used like icons.
- Options should visually include indications of function keys and keyboard accelerators
- Options that cause destructive actions should be **isolated** from other options

Menus: Behaviour

- Options should be highlighted when the pointer passes over them
- Activated options should have a visual indication such as a check mark
- If an option is not available, it should be made inaccessible and visually "grayed out"
  - Inaccessible (grayed out) options should remain on the menu in their usual location

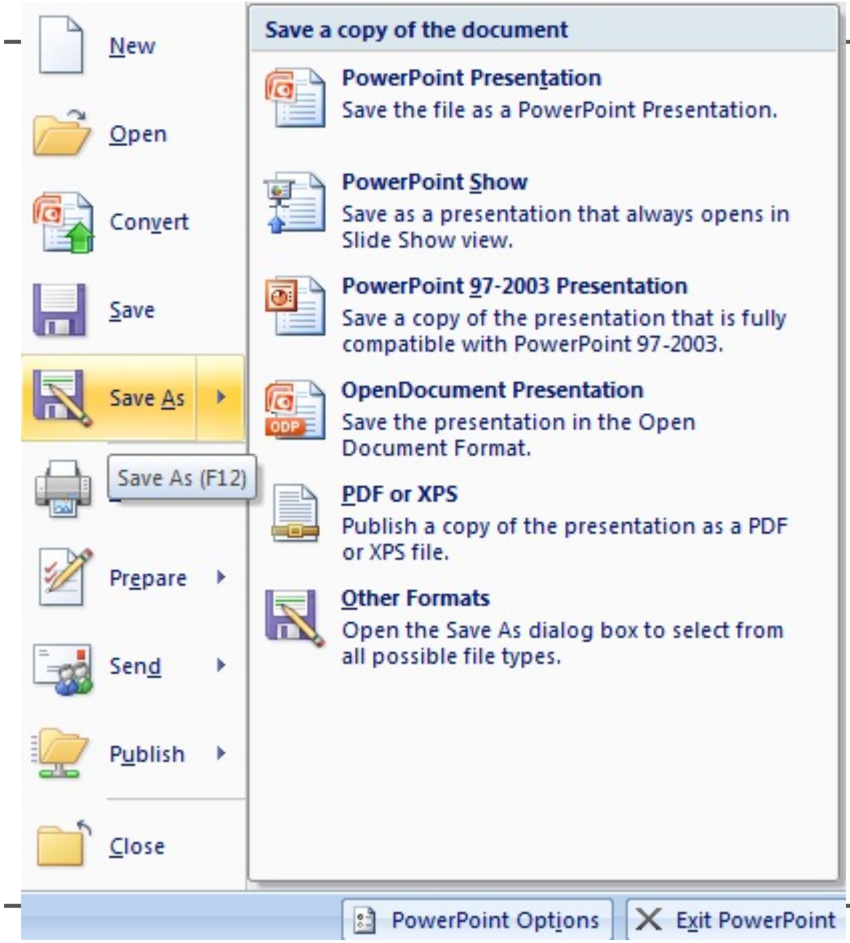
- What breaks these rules??‘



Secondary menus

- Use secondary, cascading menus to group related options
  - This simplifies decisions by limiting possible choices
- Options that lead to secondary menus should have visual indicators
  - should have a visual indication such as an arrow
  - should use an ellipsis
- Menus can be detached and free floating or docked on the sides or bottom of the window

Menu accelerators



Save a copy of the document

PowerPoint Presentation
Save the file as a PowerPoint Presentation.

PowerPoint Show
Save as a presentation that always opens in Slide Show view.

PowerPoint 97-2003 Presentation
Save a copy of the presentation that is fully compatible with PowerPoint 97-2003.

OpenDocument Presentation
Save the presentation in the Open Document Format.

PDF or XPS
Publish a copy of the presentation as a PDF or XPS file.

Other Formats
Open the Save As dialog box to select from all possible file types.

- Menus are geared to novice users
- Accelerators accommodate power users
- Scheme needs to be internally and externally consistent
- Mixing schema is confusing!

Menu titles

MAXIM

Menu titles must convey all the necessary information needed for a user to select one menu over another

- The two most important characteristics of menu titles and options:
  - Descriptiveness
  - Consistency

The WIMP Interface - *Menus*

MAXIM

Menus are geared to novice users

Menu titles should be unambiguously descriptive of the task

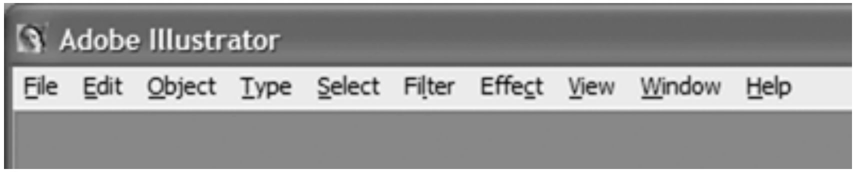
Use standard menu titles; they are recognized as icons, not words

Parallel construction can reduce cognitive load

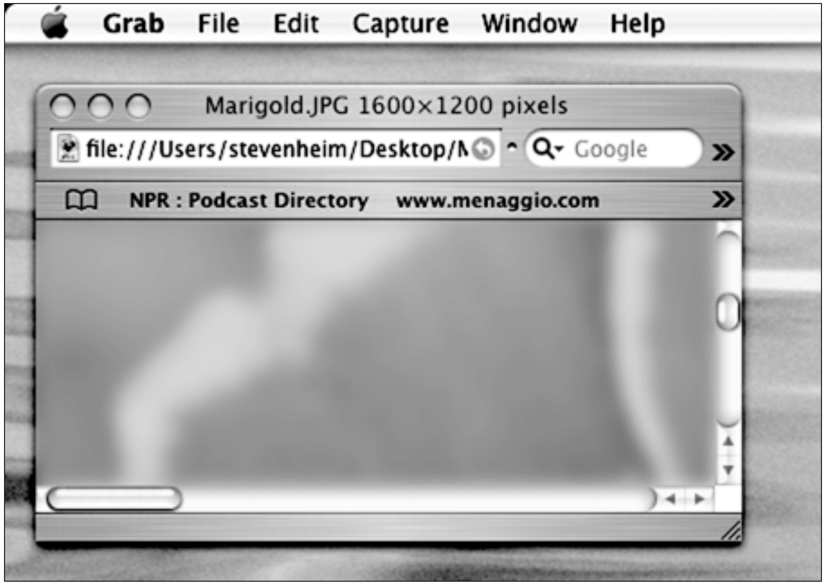
Use industry standards, when available, for keyboard accelerators

The WIMP Interface – *Menu Bars*

- The menu bar is a menu of pull-down menus



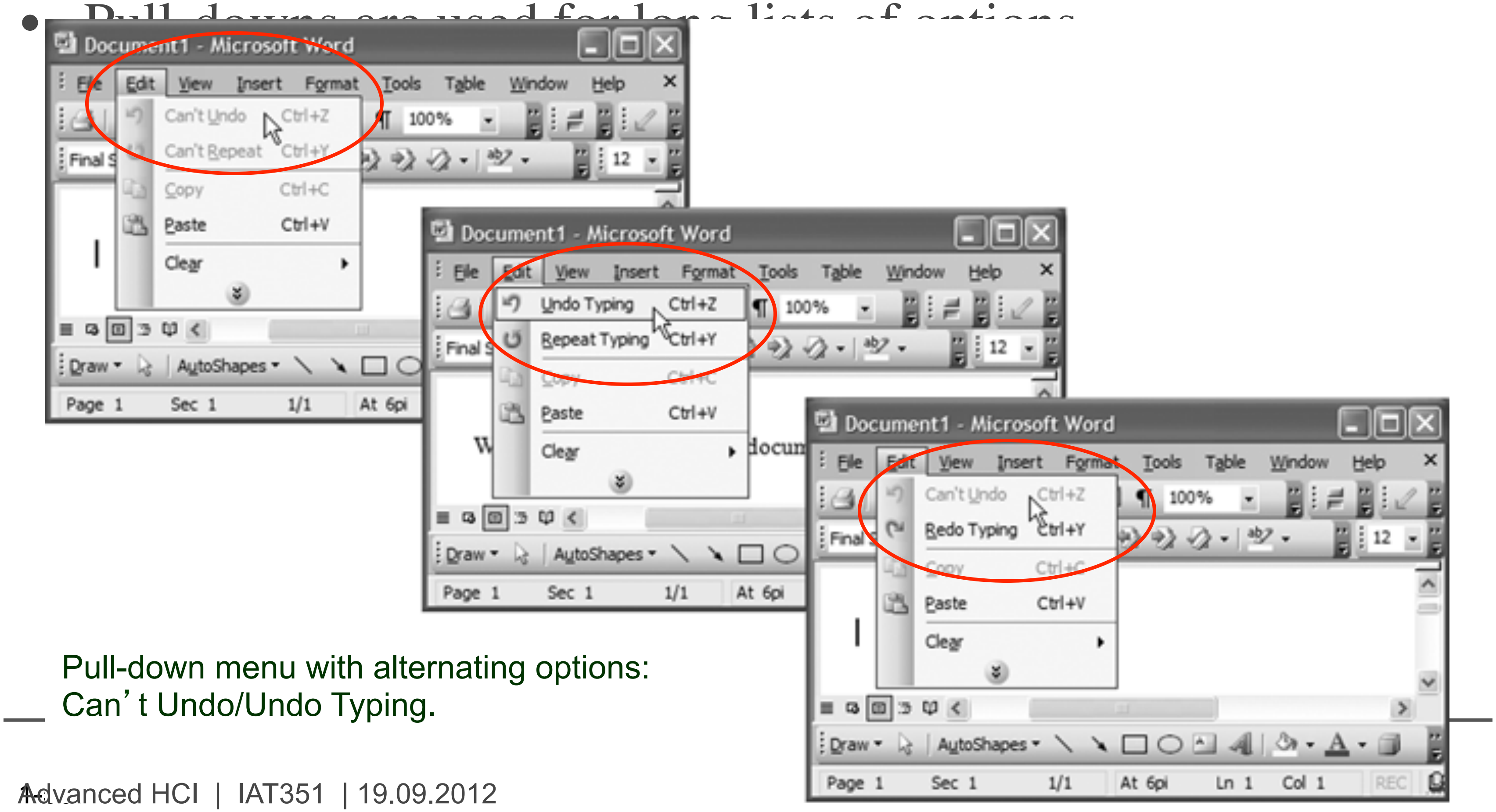
Menu bar—Adobe Illustrator®



Menu bar—Mac OS X.

The WIMP Interface – *Pull-Downs*

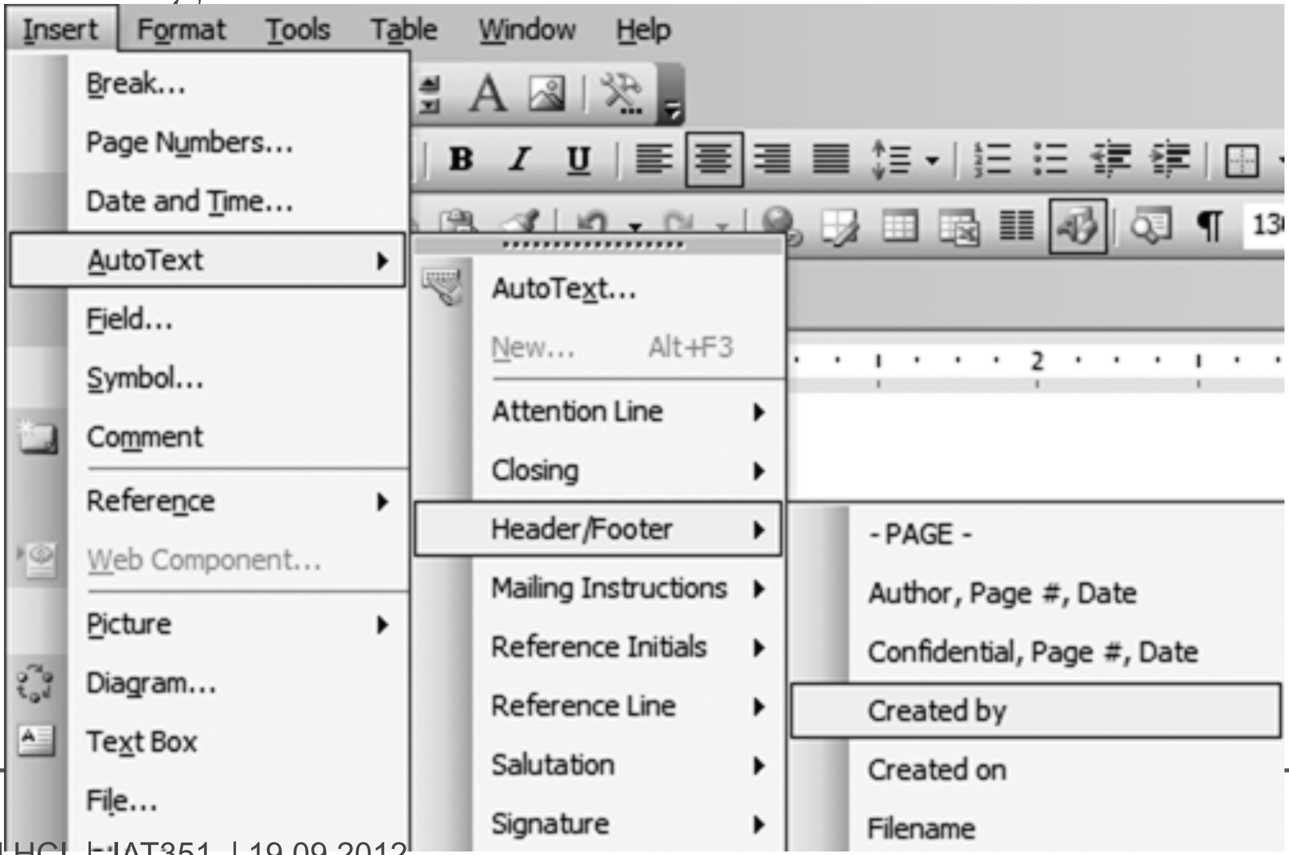
- Pull-downs are used for long lists of options



Pull-down menu with alternating options: Can't Undo/Undo Typing.

The WIMP Interface – *Cascading Menus*

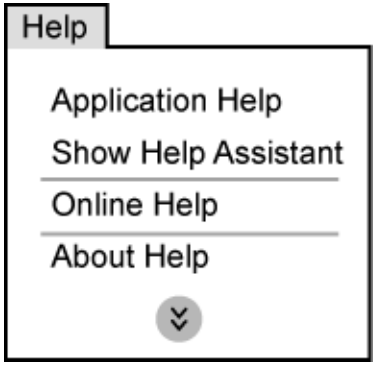
- Cascading Menus



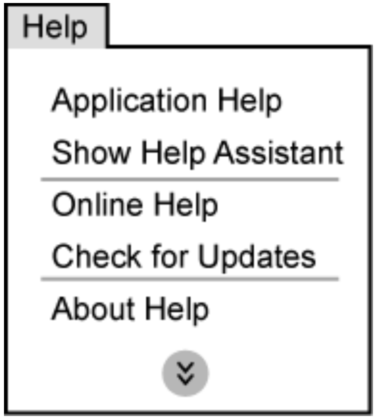
The WIMP Interface – *Cascading Menus*

MAXIM

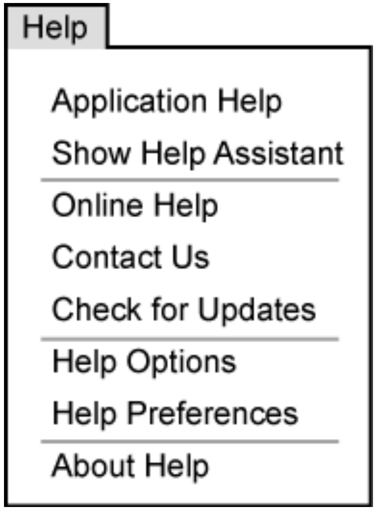
Expanding menus make some information invisible



Default condensed menu



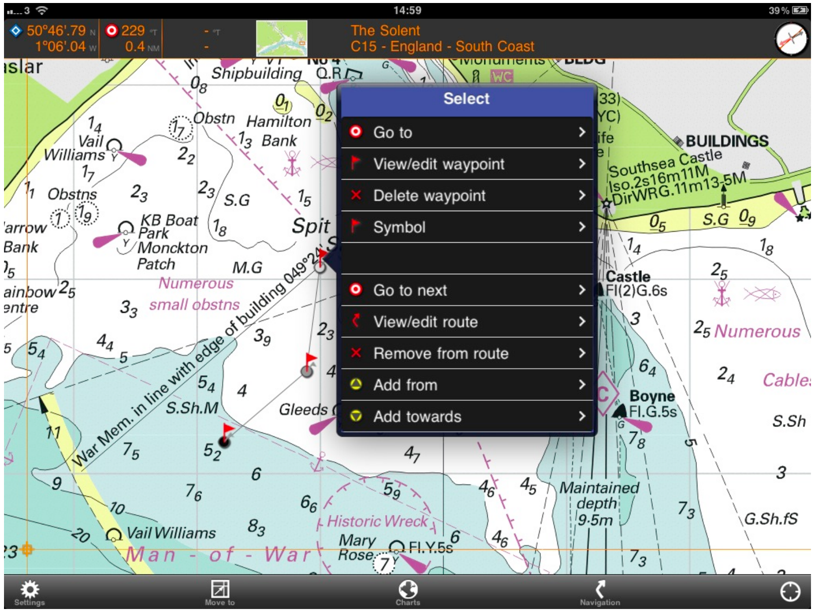
Menu after Check for Updates was selected
(it appears in the second grouping)



Full menu

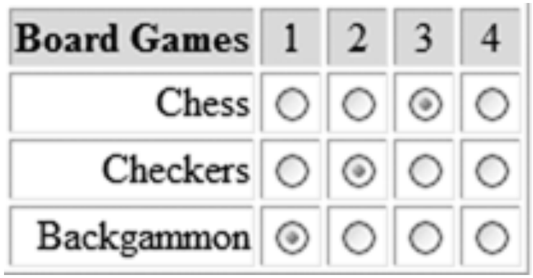
Context sensitive menus

- Pop-ups are used for context-sensitive lists
  - They offer context-sensitive options and are located within the work space
  - They can be automatic(activated when the pointer is over a “hot spot”)
  - Or available/invoked (require a right-click)
    - Cursor may need to indicate



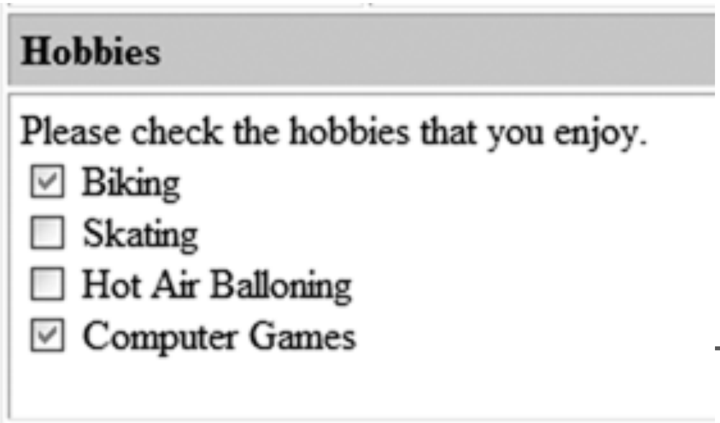
Options

- Radio buttons offer a set of mutually exclusive choices



Board Games	1	2	3	4
Chess	○	○	◉	○
Checkers	○	◉	○	○
Backgammon	◉	○	○	○

- Checkboxes offer a limited set of non–mutually exclusive choices



Hobbies

Please check the hobbies that you enjoy.

☑ Biking
□ Skating
□ Hot Air Balloning
☑ Computer Games

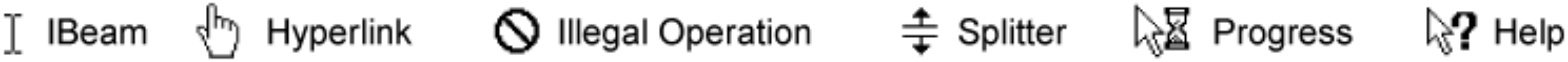
Pointers

- The pointer (cursor) is the visual manifestation of the mouse or pointing device
- It acts as the user' s proxy in the virtual GUI environment
- instigate actions and provide context-sensitive information about processes

Pointers

MAXIM

Cursor hinting can help to inform the user about system states and functionality



MAXIM

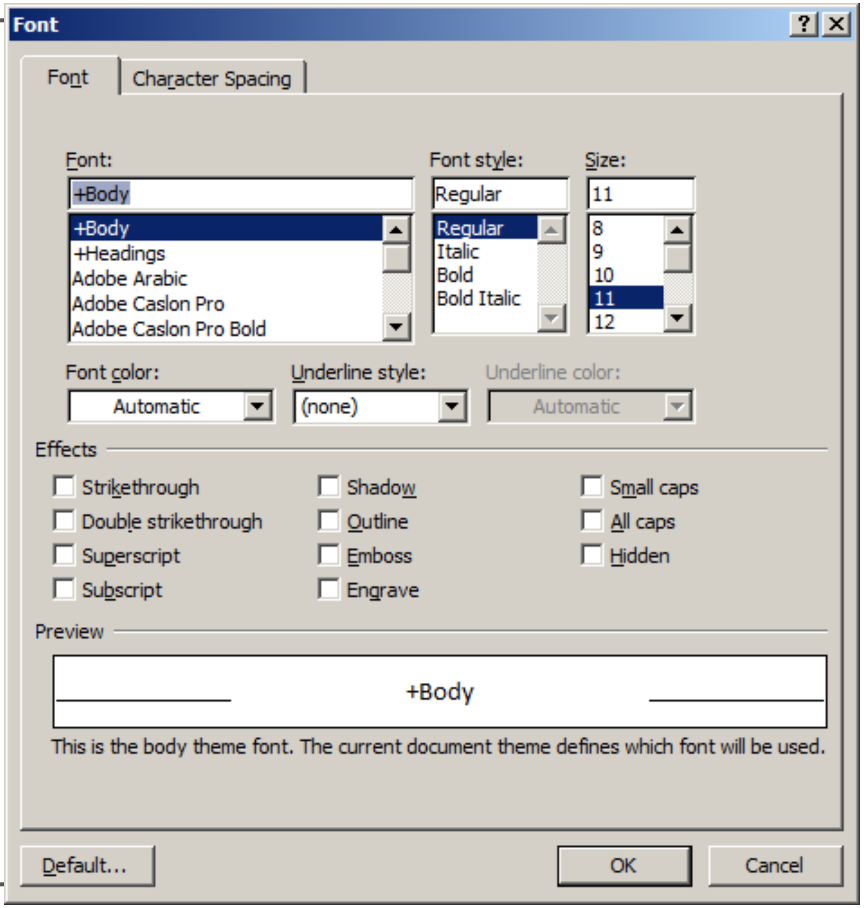
The cursor will often fall within the user’s foveal vision, so precision can be utilised

Other Components

- Lists
- Controls
- Display Components
- Text Entry Components
- Tool Containers

Lists!

- Presents choices of:
  - Options
  - Values
  - Properties
- Considered menus, but are more limited
- Selections from a list affect a selected object



Font

Font | Character Spacing

Font: +Body
- +Body
- +Headings
- Adobe Arabic
- Adobe Caslon Pro
- Adobe Caslon Pro Bold

Font style: Regular
- Regular
- Italic
- Bold
- Bold Italic

Size: 11
- 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

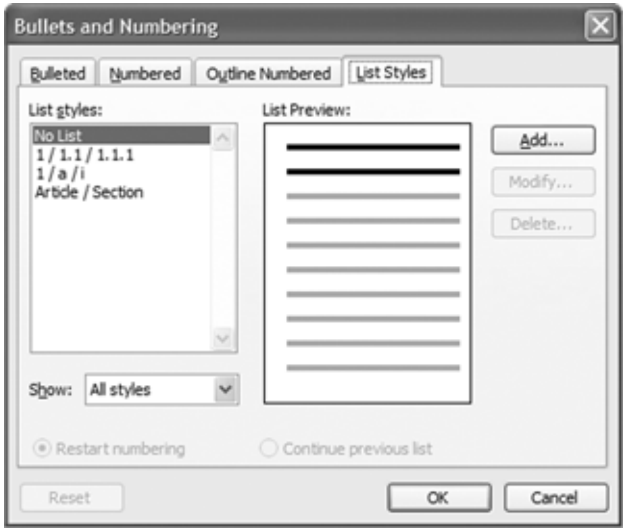
+Body

This is the body theme font. The current document theme defines which font will be used.

Microsoft Word

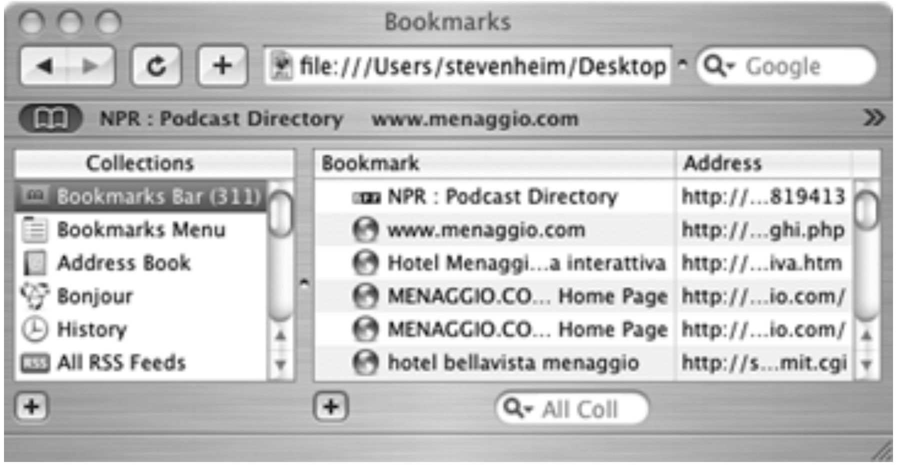
Lists

- A listbox is a single-level dropdown menu with a list of choices that never lead to further options



Show: All styles

Windows XP

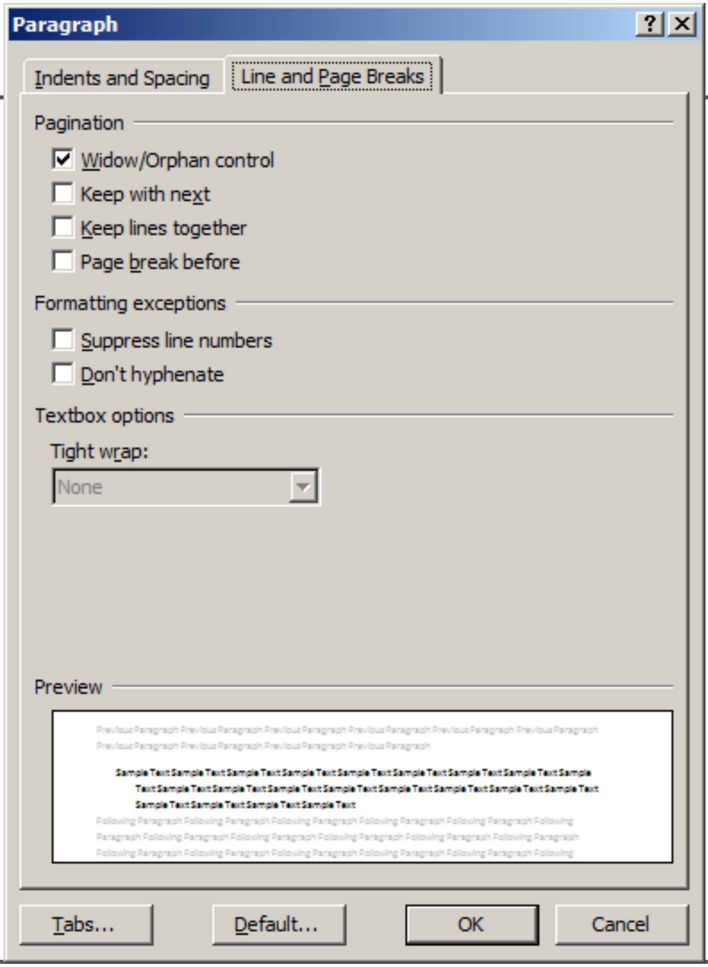


Bookmark	Address
NPR : Podcast Directory	http://...819413
www.menaggio.com	http://...ghi.php
Hotel Menaggi...a interattiva	http://...iva.htm
MENAGGIO.CO... Home Page	http://...io.com/
MENAGGIO.CO... Home Page	http://...io.com/
hotel bellavista menaggio	http://s...mit.cgi

Mac OS X

Listboxes

- Always have visible options
- # of options depends on the size of the box
- May contain checkboxes
- Are compact
  - Good for small screens
- Lists need labels!!!


Paragraph
?
✕
Indents and Spacing
Line and Page Breaks
Preview
Previous Paragraph Previous Paragraph Previous Paragraph Previous Paragraph Previous Paragraph Previous Paragraph
Previous Paragraph Previous Paragraph Previous Paragraph Previous Paragraph
Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample
Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text
Sample Text Sample Text Sample Text Sample Text
Following Paragraph Following Paragraph Following Paragraph Following Paragraph Following Paragraph Following
Paragraph Following Paragraph Following Paragraph Following Paragraph Following Paragraph Following Paragraph
Following Paragraph Following Paragraph Following Paragraph Following Paragraph Following Paragraph Following
Tabs...
Default...
OK
Cancel

Pagination

☑ Widow/Orphan control
□ Keep with next
□ Keep lines together
□ Page break before

Formatting exceptions

□ Suppress line numbers
□ Don't hyphenate

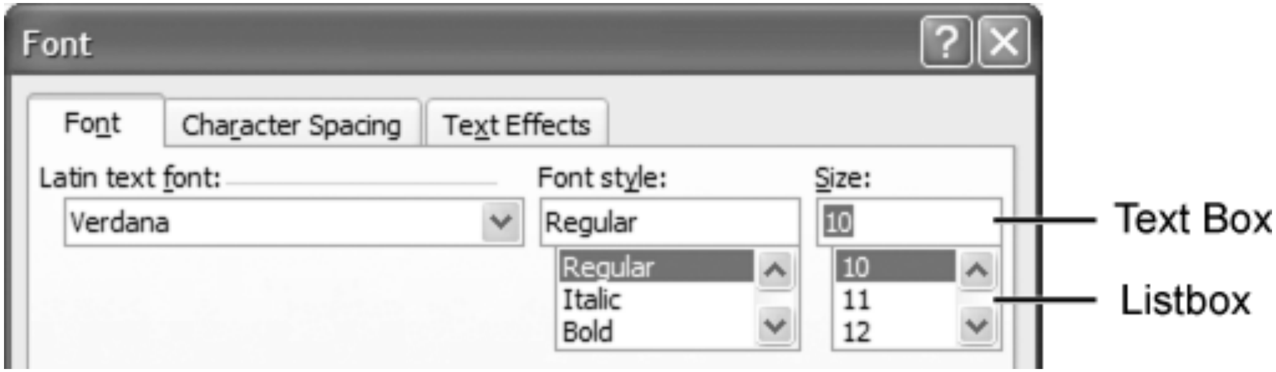
Textbox options

Tight wrap: None

Microsoft Word

Lists: Comboboxes

- **Comboboxes** are useful for long lists that may be cumbersome for scrolling



Font

Latin text font: Verdana

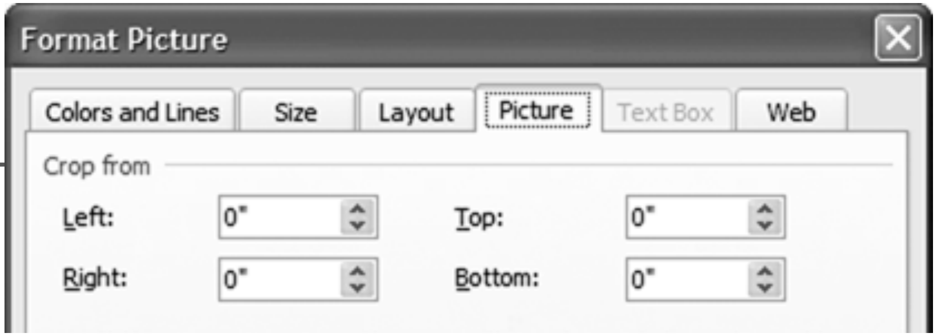
Font style: Regular

Size: 10

Users can start

- typing if they know what they want (fast)
- scroll through a list if they do not (helpful)

Lists: Spinners



Crop from

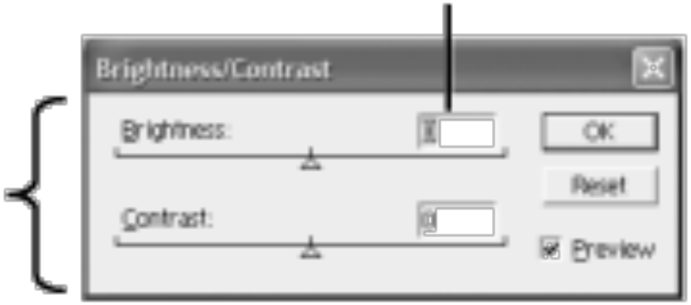
Left: 0"
Top: 0"
Right: 0"
Bottom: 0"

- The **spinner** contains a limited list of values that can be incremented or decremented using two arrows
- User can type into the text box
- Has default values displayed
- Good for short, finite choices
- Bad when users need to know the ordering system or incremental value before use

Lists: Sliders

- A **slider** is a calibrated tool, such as a thermometer, that displays a continuum of values
- A text box will display what the arm is on
- Show range
- Show incremental value
- Must fit on screen

Text Box controls



Sliders

Lists - Summary

MAXIM

Use lists for multiple options that do not fit on the normal screen

Calibration values used in lists should be alterable

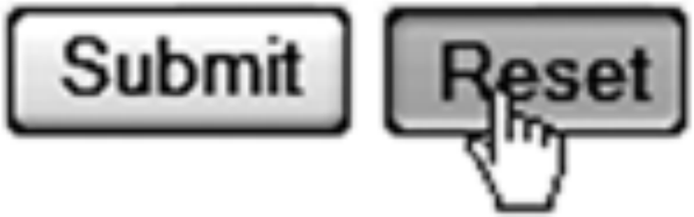
- Lists use fixed set of options
- Should be able to change
    - i.e. Fahrenheit to Celsius, miles to kilometers

Lists are suitable for groups with a limited number of options

- Must fit on a small screen

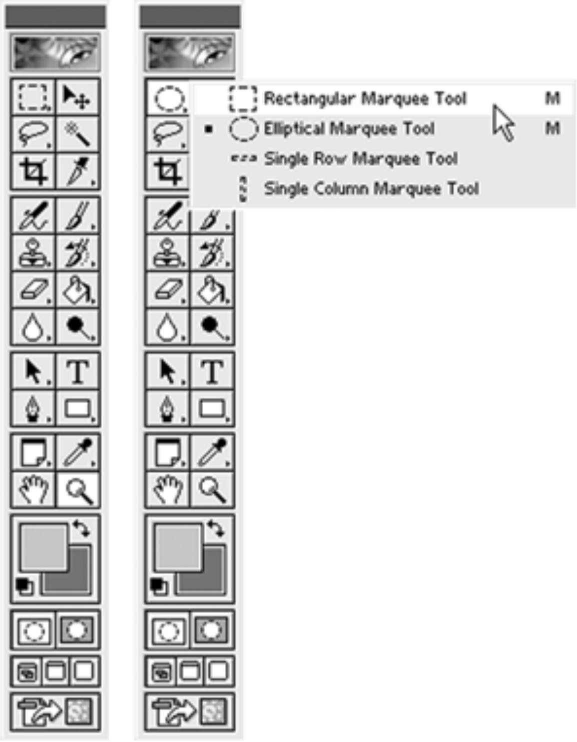
Controls

- Control components execute functions immediately
  - **Command Buttons**: Command buttons have short labels and a 3D appearance.
  - Achieved by shading
  - Should look like light is coming over user’s left shoulder



Controls

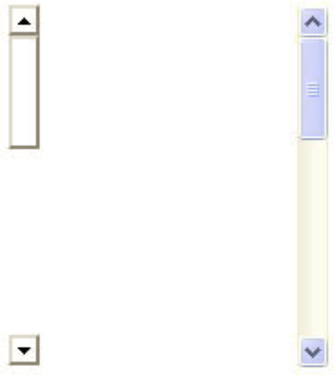
- **Toolbar/Palette Buttons**: Toolbar/Palette buttons function like command buttons, but they have icons instead of labels and often do not have a 3D appearance
- Icon could have a drop-down toolbar with more options
- Icon would have small arrow on bottom right corner to indicate extra toolbar
- Disadvantage - pictures need memorizing


Rectangular Marquee Tool M
Elliptical Marquee Tool M
Single Row Marquee Tool
Single Column Marquee Tool

Toolbar/Pallet buttons—Adobe PhotoShop®

Display Components

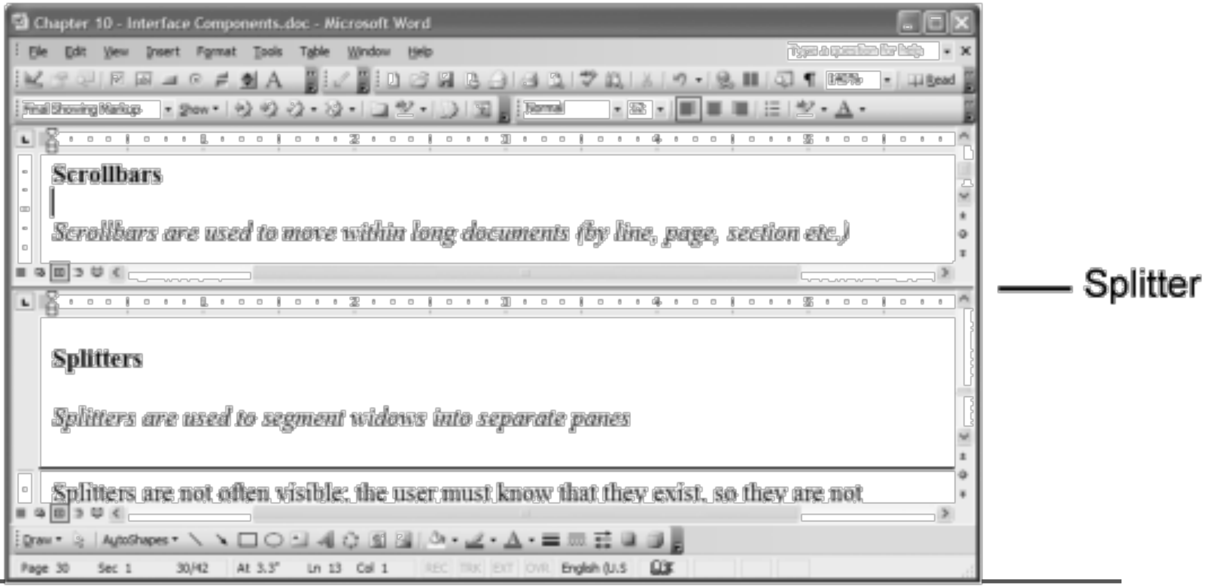
- Scrollbars are used to move within long documents (line, page, section)
- Better for fine-scale navigation than arrow keys
- Composed of a *track* and a *thumb*
- Thumb's position is relative to where the user is
- Thumb's size is relative to size of the document
- Needs mouse interaction
  - Interrupts workflow
- Can be tedious
- Horizontal scrollbars inefficient



Splitters

- Splitters are used to segment widows into separate panes
- User must know they exist
- Not for

  beginners!



Chapter 10 - Interface Components.doc - Microsoft Word

Scrollbars

Scrollbars are used to move within long documents (by line, page, section etc.)

Splitters

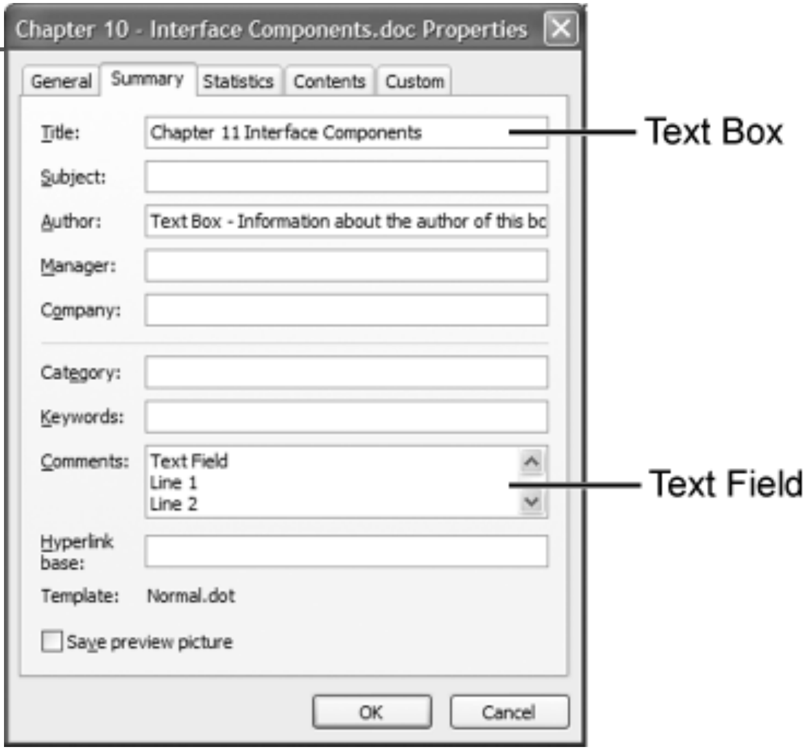
Splitters are used to segment widows into separate panes

Splitters are not often visible; the user must know that they exist, so they are not

Other Components – *Text Entry Components*

- A **text box** should be used when there is a need to gather small, discrete amounts of information

- **Text fields** are multiline text boxes and are used to collect paragraph-length text



Chapter 10 - Interface Components.doc Properties

Title: Chapter 11 Interface Components
Subject:
Author: Text Box - Information about the author of this bc
Manager:
Company:
Category:
Keywords:
Comments: Text Field
Line 1
Line 2
Hyperlink base:
Template: Normal.dot
□ Save preview picture

Text Box

Text Field

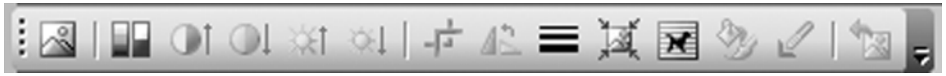
Other Components – *Text Entry Components*

Text entry concerns:

- Need labels so users know what to put
  - Could hint (mm/dd/yyyy)
- Need to restrict users from entering invalid information
  - Example: No more than 5 digit input for a zip accepted
  - Do not let user continue until provided correct info
    - Error messages

Other Components – *Tool Containers*

- Toolbars contain buttons or icons for an application's common functions and are generally found at the top or bottom of the primary window



- Tool palettes also contain tools for the most common application functions
- Difference: Toolbars change shape when docked, tool palettes do not