

CSE347

Information System Analysis and Design

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Topic: 11

Effective Input Output Design

Input Design Objectives

- The quality of system input determines the quality of system output.
- Well-designed input objectives:
 - Effectiveness.
 - Accuracy.
 - Ease of use.
 - Consistency.
 - Simplicity.
 - Attractiveness.

Form Design

Guidelines for good form design:

- Make forms easy to fill out.
- Ensure that forms meet the purpose for which they are designed.
- Design forms to assure accurate completion.
- Keep forms attractive.

Form Completion

To make forms easy to fill out, the following techniques are used:

- First, design forms with proper flow, from left to right and top to bottom.
- Second, group information logically using the seven sections of a form.
- Third, provide people with clear captions.
 - Captions tell the person completing the form what to put on a blank line, space, or box.

Bad Flow in a Form

Bad Entry Layout

Applicant Information:

Social Security #: Salutation: Current Date:

First Name: Last Name: State:

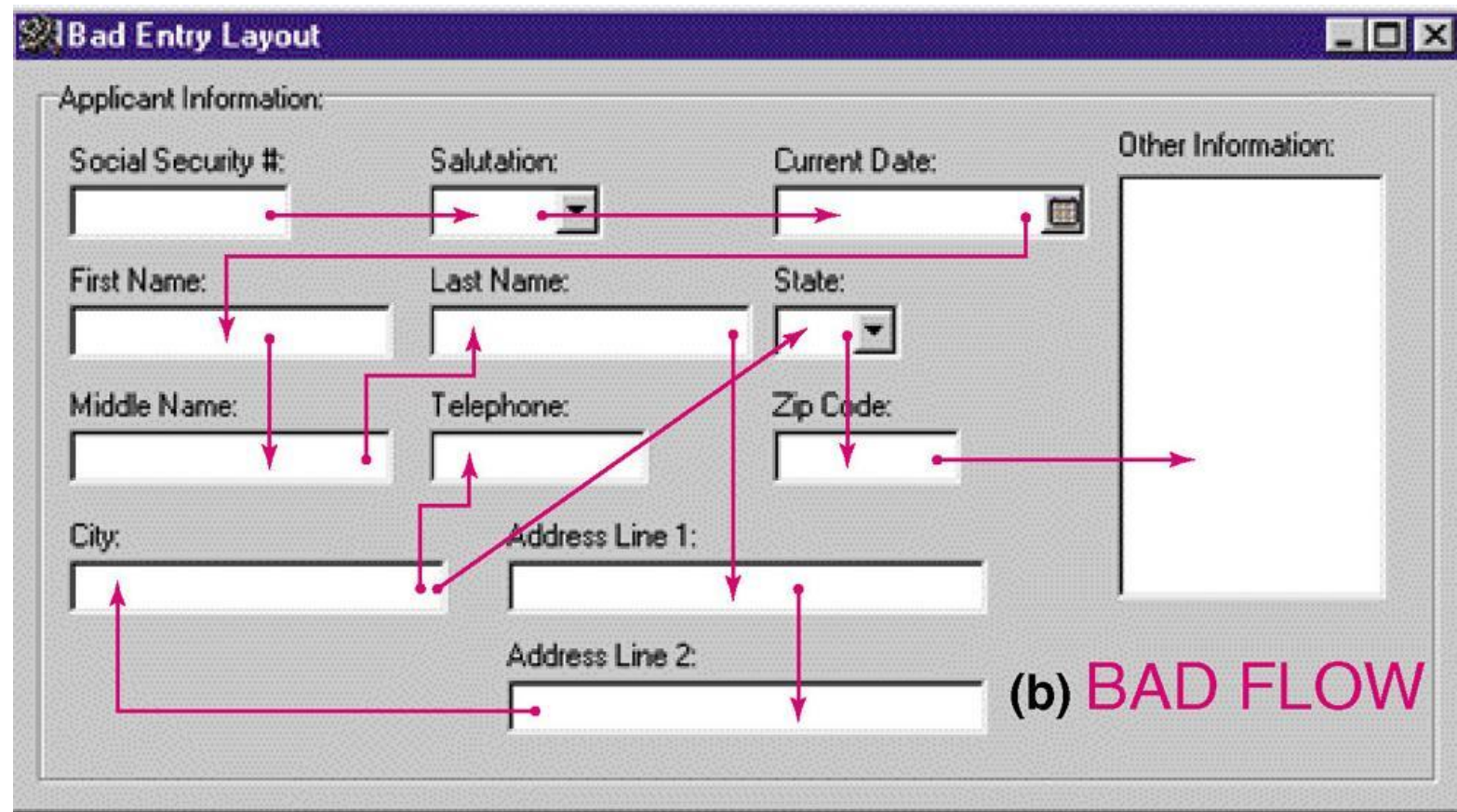
Middle Name: Telephone: Zip Code:

City: Address Line 1:

Address Line 2:

Other Information:

(b) BAD FLOW



The diagram illustrates a form titled "Bad Entry Layout" with a section for "Applicant Information". The form contains several input fields: Social Security #, Salutation, Current Date, First Name, Last Name, State, Middle Name, Telephone, Zip Code, City, Address Line 1, Address Line 2, and a large "Other Information" text area. Red arrows indicate the flow of data entry. The flow starts at Social Security #, goes to Salutation, then to Current Date. From Current Date, it goes to First Name, then to Last Name, then to State. From State, it goes to Middle Name, then to Telephone, then to Zip Code. From Zip Code, it goes to City, then to Address Line 1, then to Address Line 2. Finally, it goes to the "Other Information" text area. This flow is considered "BAD FLOW" because it does not follow a logical sequence of data entry, such as filling out the entire "Applicant Information" section before moving to the "Other Information" section.

Good Flow in a Form

Good Entry Layout

Applicant Information:

Social Security #: Salutation: Current Date:

First Name: Middle Name: Last Name:

Address Line 1: Telephone: Other Information:

Address Line 2:

City: State: Zip Code:

(a) GOOD FLOW

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graph LR; SS[Social Security #] --> S[Salutation]; S --> CD[Current Date]; CD --> FN[First Name]; FN --> MN[Middle Name]; MN --> LN[Last Name]; LN --> AL1[Address Line 1]; AL1 --> TEL[Telephone]; TEL --> AL2[Address Line 2]; AL2 --> C[City]; C --> ST[State]; ST --> ZC[Zip Code]; ZC --> OI[Other Information];
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Seven Sections of a Form

The seven sections of a form are:

- Heading.
- Identification and access.
- Instructions.
- Body.
- Signature and verification.
- Totals.
- Comments.

Caption Types

Captions may be one of the following:

- Line caption, putting the caption on the same line or below the line.
- Boxed caption, providing a box for data instead of a line.
- Vertical check off, lining up choices or alternatives vertically.
- Horizontal check off, lining up choices or alternatives horizontally.

The image displays several forms and checklists with yellow sticky notes and blue arrows indicating different types of captions:

- Form 1 (Top):** Fields for First Name, Last Name, Title, and Telephone. A sticky note labeled "Line caption" points to the Last Name field.
- Form 2 (Middle):** Fields for First Name, Last Name, Title, and Telephone. A sticky note labeled "Below-line caption" points to the First Name field. Another sticky note labeled "Boxed caption" points to the Last Name field.
- Form 3 (Bottom):** Fields for First Name, Last Name, Title, and Telephone. A sticky note labeled "Boxed caption" points to the Last Name field.
- Checklist 1:** "Check off method of travel:" with options: ☐ Airplane, ☐ Train, ☐ Company Car, ☐ Personal Car. A sticky note labeled "Vertical checklist" points to the list.
- Checklist 2:** "Photo Lab ☐ Printing Department ☐ Maintenance ☐ Supplies ☐". A sticky note labeled "Horizontal checklist" points to the list.
- Table:** A table with columns: Quantity, Unit, Item Description, User Cost, and Expanded Cost. A sticky note labeled "Table caption" points to the first row.

The diagram shows a table with five columns: Quantity, Unit, Item Description, User Cost, and Expanded Cost. A yellow sticky note with the text "Table caption" is placed below the first three columns. A blue arrow points from the sticky note to the "Quantity" header cell.

Quantity	Unit	Item Description	User Cost	Expanded Cost
			Subtotal	
			Sales Tax	
			Total	

Meeting the Intended Purpose

- Systems analysts may use different types of specialty forms for different purposes.
- Specialty forms can also mean forms prepared by a stationer.

Ensuring Accurate Completion

- To reduce error rates associated with data collection, forms should be designed to assure accurate completion.
- Design forms to make people do the right thing with the form.
- To encourage people to complete forms, systems analysts should keep forms attractive.

Attractive Forms

- To be more attractive, forms should look **uncluttered**, and **elicit** information in the expected order.
- Aesthetic forms or usage of different fonts and line weights within the same form can help make it more attractive.

Computer Form Design Software

- Numerous microcomputer form design software is available.
- Features of electronic form design software:
 - Ability to design paper, electronic, or Web- based forms.
 - Form design using templates.
 - Form design by cutting and pasting familiar shapes and objects.
- Features of the electronic form design software
 - Facilitates completion through the use of software.
 - Permits customized menus, toolbars, keyboards, and macros.
 - Supports popular databases.
 - Enables broadcasting of electronic forms.
 - Permits sequential routing of forms.
 - Assists form tracking.
 - Encourages automatic delivery and processing.
 - Establishes security for electronic forms.

Controlling Business Forms

- Controlling forms include:
 - Making sure that each form in use fulfills its specific purpose.
 - Making sure that the specified purpose is integral to organizational functioning.
 - Preventing duplication of information collected and the forms that collect it.
 - Designing effective forms.
 - Deciding on reproduce forms in the most economical way
 - Establishing stock control and inventory procedures that make forms available when needed, at the lowest possible cost

Display Design Guidelines

Guidelines for good display design:

- First, keep the display simple.
- Second, keep the display presentation consistent.
- Third, facilitate user movement among display screens.
- Finally, create an attractive display.

Three Screen Sections

To keep the screen simple, it is divided into three sections:

- Heading.
- Body.
- Comments and instructions.

Display Design Concepts for Simplicity

- Displaying a few necessary basic commands using windows or hyperlinks is another way to keep screens simple.
- For the occasional user, only 50 percent of the screen should contain useful information.
- Simplistic design includes maximizing or minimizing the window size as needed.
- Use context-sensitive help and other pop-up menus.
- Consistency is achieved by displaying information in the same area or by grouping information logically.

Facilitating Movement

Guidelines for facilitating movement from one page to another:

- Clicking--the three clicks rule says that users should be able to get to the screens they need within three mouse or keyboard clicks.
- Scrolling--using arrows or PgDn keys.
- Using context-sensitive pop-up windows.
- Using onscreen dialogue .

Designing an Attractive Screen

To make the screen attractive use:

- Different thickness of separation lines between subcategories.
- Inverse video and blinking cursors.
- Different combinations of colors.
- Different type fonts.

Using Icons in Screen Design

- Icons are used in graphical screens to run programs and execute commands.
- Graphical User Interface (GUI) are used in conjunction with a mouse, keyboard, lightpen, or joystick for making selections and entering data.

Graphical User Interface (GUI) Controls

GUI controls or fields:

- Text boxes.
- Check boxes.
- Option or radio buttons.
- List and drop-down list boxes.
- Sliders and spin buttons.
- Image maps.
- Text area.
- Message boxes.

The screenshot displays a Microsoft Access form titled "Add Customer Order". The form is in "Form View" and contains the following elements:

- Title Bar:** Microsoft Access - [Add Customer Order]
- Menu Bar:** File, Edit, View, Insert, Format, Records, Tools, Window, Help
- Form Header:**
 - Add Customer Order
 - Date and Time: 3/12/01 12:33 PM
- Form Body:**
 - Customer Information:**
 - Customer Number: 02122
 - Customer Name: Carolyn Riter
 - Street 1: 123 Oak Street
 - Apartment: (empty)
 - City: Arlington
 - State: MA
 - Zip: 02174
 - Telephone: (715) 222-1234
 - Country: United States (drop-down)
 - Email Address: critter@totalmail.com
 - Financial Information:**
 - Current Balance: \$2,123.45
 - Credit Limit: \$2,000.00
 - Payment Type: Corporate Charge (drop-down)
 - Customer Type:**
 - Individual (selected radio button)
 - Corporate Customer
 - Non-Profit Organization
 - Federal Government
 - Local or State Government
 - Educational Institution
 - Discounts:**
 - High Volume Discount: ☒
 - First Time Purchase: ☐
- Form Footer:**
 - Navigation buttons: Back, Forward, Find, Add, Print, Help
 - Button: Add Order Details

Text Boxes

- Text boxes should be large enough to accommodate all the field characters.
- Captions should be to the left of the text box.
- Character data should be left aligned within the box.
- Numeric data right aligned.

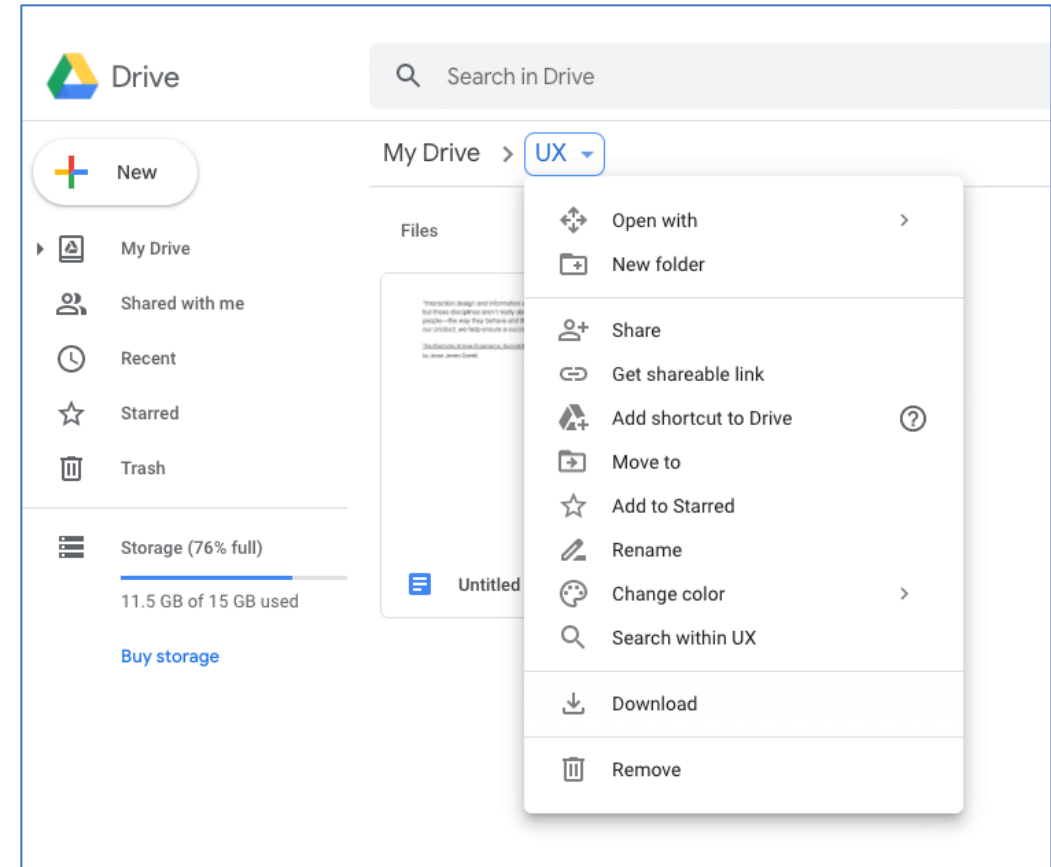
Check Boxes

- Check boxes are used for nonexclusive choices.
- Check box text or label is placed to the right of the check box.
- If there are more than 10 check boxes, group in a bordered box.

Radio Types	Checkbox Types
Radios	Checkboxes
<input type="radio"/> Option one	<input type="checkbox"/> Option one
<input checked="" type="radio"/> Option two checked	<input checked="" type="checkbox"/> Option two checked
<input data-bbox="1268 672 1309 695" disabled="" type="radio"/> Option three checked and disabled	<input checked="" data-bbox="1893 672 1933 695" disabled="" type="checkbox"/> Option three checked and disabled
<input data-bbox="1268 739 1309 762" disabled="" type="radio"/> Option four disabled	<input data-bbox="1893 739 1933 762" disabled="" type="checkbox"/> Option four disabled
Inline Radios	Inline Checkboxes
<input type="radio"/> a <input type="radio"/> b <input checked="" type="radio"/> c	<input checked="" type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c
Squared Radios	Rounded Checkboxes
<input checked="" type="checkbox"/> Checked <input type="checkbox"/> Unchecked	<input checked="" type="checkbox"/> Checked <input type="checkbox"/> Unchecked

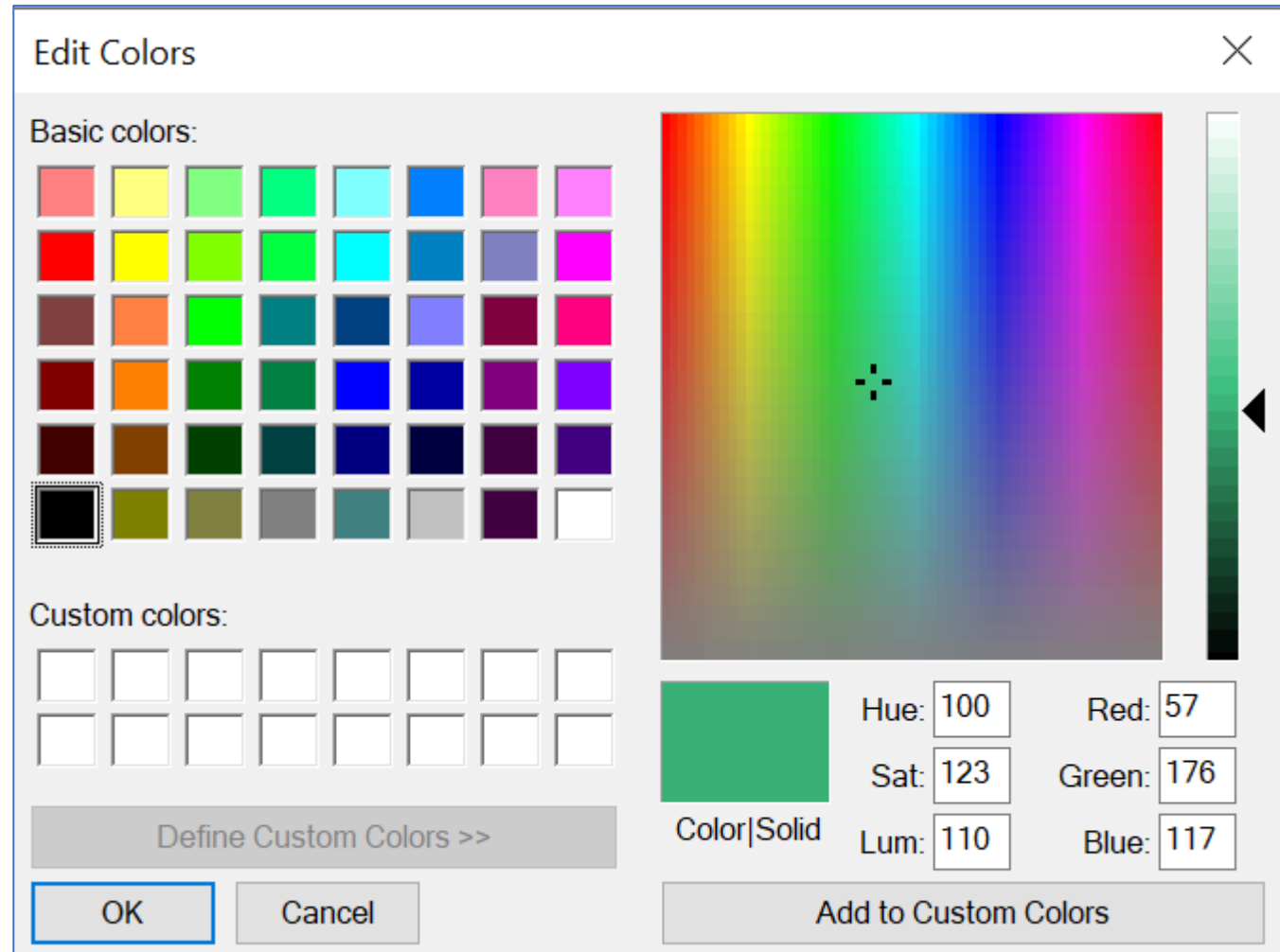
Option Buttons and Drop-down List Boxes

- Option or radio buttons are used for exclusive choices.
- Often they are placed in a rectangle called an option group.
- List and drop-down list boxes are used to select one choice out of many.



Sliders, Spin Buttons, and Image Maps

- Sliders and spin buttons are used to change data that have a continuous range of values.
- Image maps are used to select values within an image.
 - The x and y coordinates are sent to the program.



Text Area

- A text area is used for entering a larger amount of text.
- These areas may have text that wraps when the text reaches the end of the box.
- There are two ways to handle the text:
 - Hard return is used to force new lines.
 - Use word wrap within the text area.

Message Boxes and Command Buttons

- Message boxes are used to display warning and other messages in a rectangular window.
- Command buttons perform an action.

Tab Control Dialogue Boxes

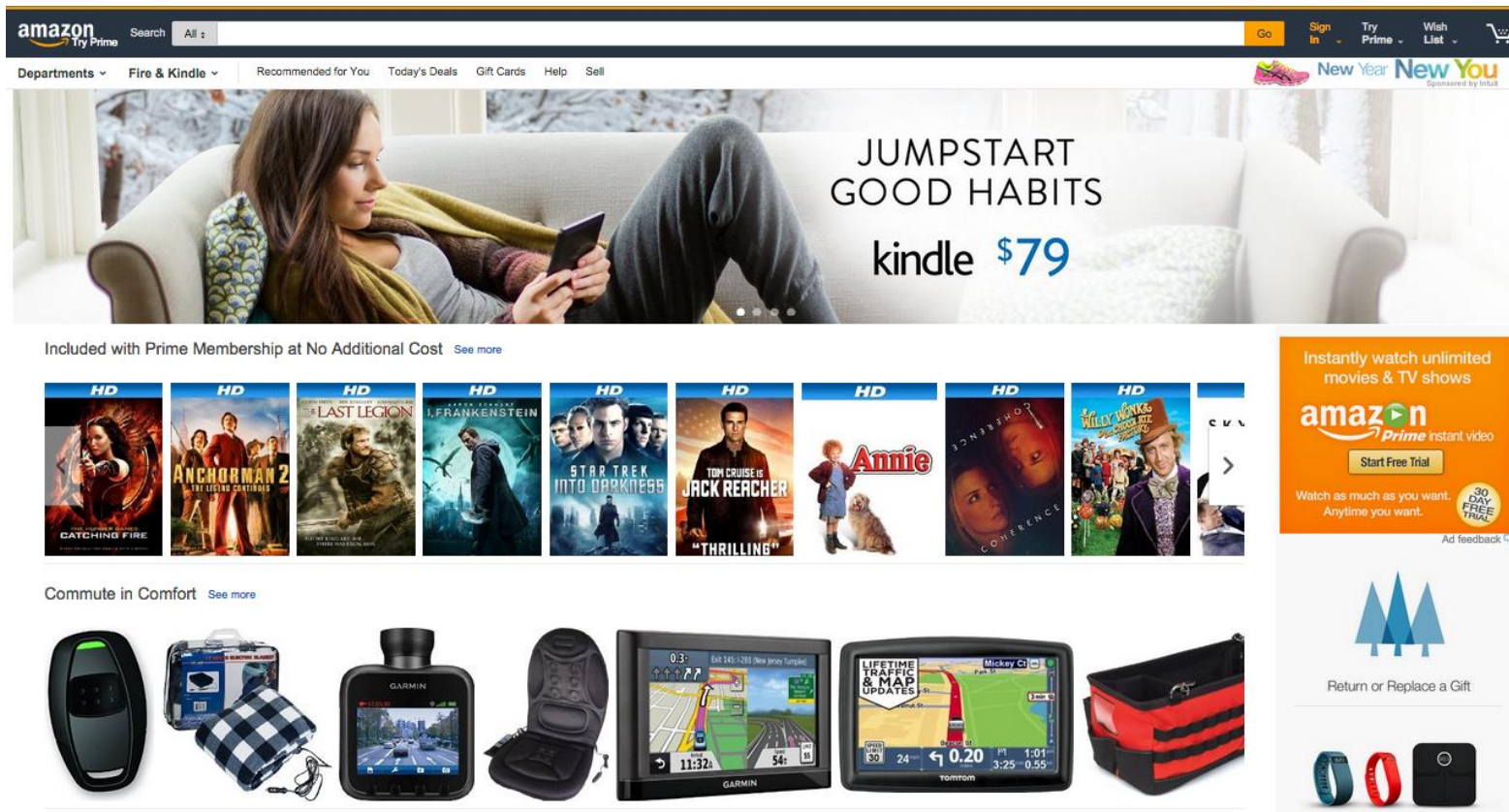
- Tab control dialog boxes help organize GUI features (controls) for users.
- Each tab dialog box should have three basic buttons:
 - OK.
 - Cancel.
 - Help.

Web Page Dialogue Boxes

- A new type of dialogue box has the look and feel of a Web page.
- Buttons are called places and are hyperlinked to items a user would wish to access.

Ecommerce Applications

- Ecommerce applications involve more than just good Web site design.
- Customers need to be confident of the site, including privacy and security.



Internet and Intranet Design Guidelines

Guidelines for creating intranet and Internet input pages:

- Provide clear instructions.
- Use a logical entry sequence for fill-in forms.
- Use a variety of text boxes, push buttons, radio buttons, drop-down lists, and other GUI features.
- Provide a scrolling text box if you are uncertain how much text will be entered.
- Include two basic buttons: Submit and Clear.
- If the form is lengthy, divide it into several simpler forms on separate pages.
- Create a feedback screen that lists error messages if a form has not correctly been filled out

Designing Output

Output should be designed to:

- Serve the intended purpose.
- Be meaningful to the user.
- Deliver the right quantity of output.
- Deliver it to the right place.
- Provide output on time.
- Choose the right output method.

External and Internal Output

- Internal output is used within the corporation.
- External output is used outside the organization.
- External output differs from internal output in its design and appearance.
- A turnaround document is one that is sent out and then returned.

Output Technologies

- Output can be in the form of:
 - Print.
 - Display screen.
 - Audio.
 - CD-ROM or CD-RW.
 - DVD.
 - Electronic output.
- Output technologies differ in their:
 - Speed.
 - Cost.
 - Portability.
 - Flexibility.
 - Storage and retrieval possibilities.

Video Clips

Video clips are useful for:

- Supplementing static, printed output.
- Distance collaboration.
- Showing how to perform an action.
- Providing brief training episodes.
- Shifting the time of an actual event by recording it for later output.
- Preserving an important occasion for addition to an organization's archives.

Animation

Animation is composed of four elements:

- Elemental symbols.
- Spatial orientation.
- Transition effects.
- Alteration effects.

Push and Pull Technology

- Pull technology allows the user to take formatted data from the Web.
- Push technology sends solicited or unsolicited information to a customer or client.

Factors in Choosing an Output Technology

Factors that must be considered when choosing an output technology are:

- Who will use the output?
- How many people need the output?
- Where is the output needed?
- What is the purpose of the output?
- What is the speed with which output is needed?
- How frequently will the output be accessed?
- How long will the output be stored?
- Under what special regulations is the output produced, stored, and distributed?
- What are the initial and ongoing costs of maintenance and supplies?
- What are the environmental requirements for output technologies?

Output Bias

- Analysts must be aware of sources of output bias and inform users of the possibilities of bias in output.
- Bias is introduced in three main ways:
 - How information is sorted.
 - Setting of acceptable limits.
 - Choice of graphics.

Strategies to Avoid Bias

Strategies to avoid output bias:

- Awareness of the sources of bias.
- Design of output that includes users.
- Working with users so that they are informed of the output's biases.
- Creating output that is flexible and allows users to modify limits and ranges.
- Train users to rely on multiple output for conducting "reality tests" on system output.

Report Design Considerations

- Constant information does not change when the report is printed.
- Variable information changes each time the report is printed.
- Paper quality, type, and size should be specified.

Printed Reports

- Design reports using software.
- Design guidelines for printed reports are:
 - Include functional attributes, such as headings, page numbers, and control breaks.
 - Incorporate stylistic and aesthetic attributes, such as extra blank space and grouping data.

Display Screen Design

Guidelines for display design are:

- Keep the display simple.
- Keep the display presentation consistent.
- Facilitate user movement among displayed output.
- Create an attractive display.

Graphical Output

- Primary considerations for designing graphical output:
 - Output must be accurate, easy to understand and use.
- The analyst must determine:
 - The purpose of the graph.
 - The kind of data to be displayed.
 - The audience.
 - The effects on the audience of different kinds of graphical output.

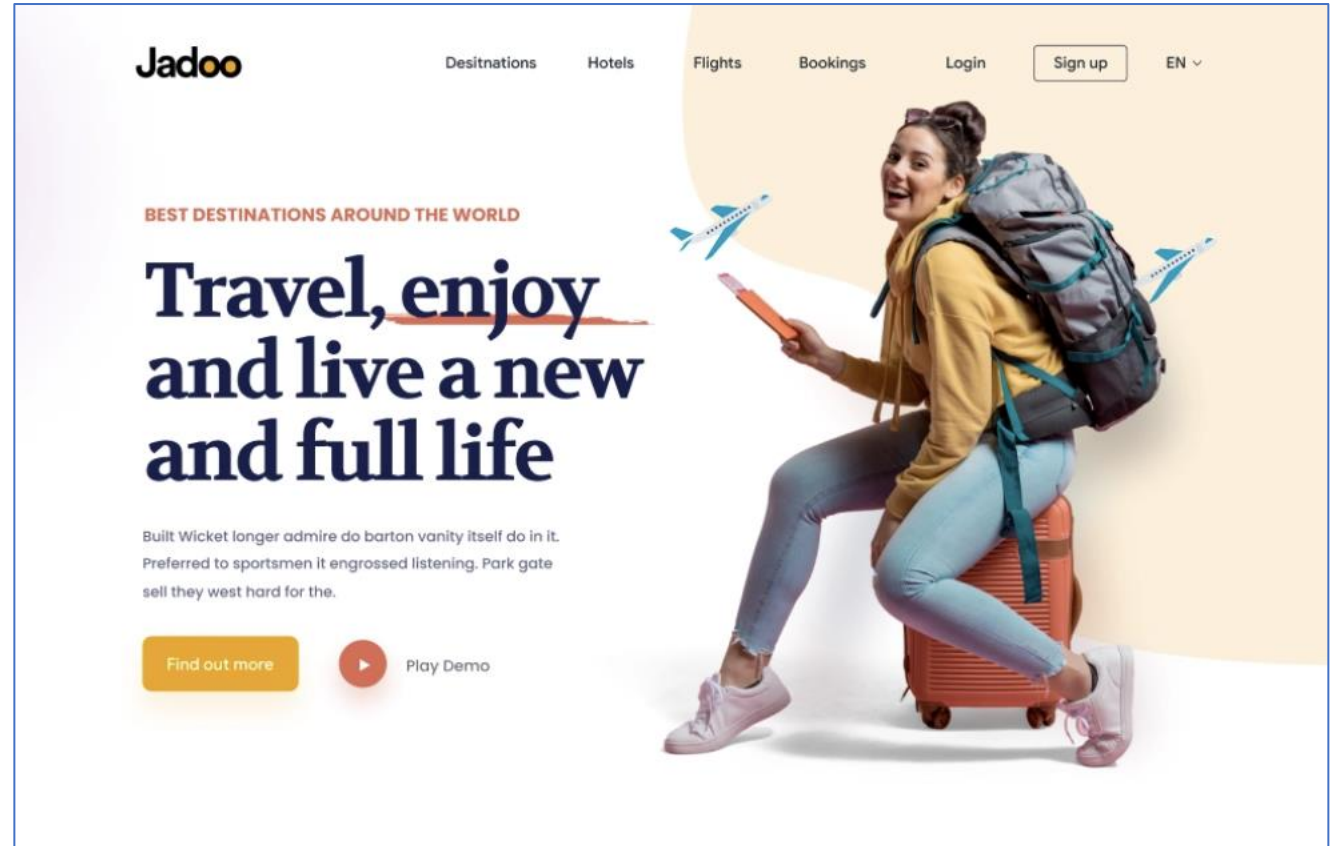
Web Site Design

- Design principles must be used when designing Web sites.
- These include:
 - Using professional tools.
 - Studying other sites.
 - Using Web resources.
 - Examining the sites of professional Web site designers.
- Further principles:
 - Using tools that you are familiar with.
 - Consulting books.
 - Examining of poorly designed pages.
 - Creating Web templates. Style sheets allow you to format all Web pages in a site consistently.
 - Using plug-ins, audio, and video sparingly.

Plan Ahead

Pay attention to:

- Structure.
- Content.
- Text.
- Graphics.
- Presentations style.
- Navigation.
- Promotion.



Web Graphics

Guidelines for using graphics when designing Web sites are:

- Use either JPEG or GIF formats.
- Keep the background simple and readable.
- Create a few professional-looking graphics for use on your page.
- Reuse bullet or navigational buttons.
- Examine your Web site on a variety of monitors and graphics resolutions.

Presentation Style

Guidelines for entry displays for Web sites:

- Provide an entry screen or home page.
- Keep the number of graphics to a reasonable minimum.
- Use large and colorful fonts for headings.
- Use interesting images and buttons for links.
- Use tables to enhance the layout.
- Use the same graphics image on several Web pages.
- Avoid overusing animation, sound, and other “busy” elements.

Navigation

Navigation guidelines:

- Use the three-clicks rule.
- Promote the Web site.
- Encourage your viewers to bookmark your site.

Output Production and XML

- An XML document may be transformed into different media types.
- There are two methods:
 - Using cascading style sheets (CSS).
 - Using Extensible Style Language Transformations (XSLT).

Cascading Style Sheets (CSS)

- CSS allows you to specify the font family, color, size, and so on.
- Styles may be set up for different media, such as display, print, or handheld devices.
- Styles do not allow you to select or sort XML elements.

Extensible Style Language Transformations (XSLT)

XSLT allows you to:

- Select XML elements.
- Sort.
- Select data to be output.

