

# Tikrit University Computer Science Dept. Master Degree Lecture 2

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#### Multimedia

#### • User Interface Definition

The user interface is a device or a program (application program) that facilitates the user to communicate with the computer to convey what they want to do or what they want from the computer. The user interface is what the users see when they use the computer. As in the image below in Figure 1, you see an example of user interface on the computer screen. The user interface can be categorized into three types those are:

- 1. Command-line Interface
- 2. Menu-Based Interface.
- 3. Graphical User Interface



Figure 1: Example of User Interface

## **1. Command Line Interface**

The command-line interface was the only mode of interaction with the computer in the starting days of computing. Here, the user communicates with the computer using textual instructions or commands. For example, if one needs to delete a file from the system, the command would be:

*del c:\file.txt* 

But, this kind of user interface is not user-friendly as it is hard to learn such commands. The commands can even be error-prone and unforgiving. Such interfaces may be irritating. So, the command line interface is not for the casual user, but the experienced users generally prefer the command-line interface.

# 2. Menu Based Interface

It is somewhat easier than the command line interface as users interacting with the menu-based interface 'do not have to learn the command name', nor do they have to put effort into writing the commands. Here, the user does not have to type the commands; thus, the syntax error is automatically avoided. A very popular example of a menu-based interface is ATM.

# **3. Graphical User Interface (GUI)**

Over a period of time, there has been a tremendous evolution in the computer's user interface. Today's computer has a high-resolution screen with pointing devices (mouse). The modern-day computer's interface has windows, scroll bars, text boxes, buttons, icons, and menus. To pick and point out the elements of GUI, we have a mouse. Graphical user interfaces are easy to learn as compared to the command-line interface. GUI provides multiple windows to the user simultaneously to interact with the system, and it even allows the user to switch between the windows.

# • User Interface Design

User interface design is a process of designing or fabricating the interfaces through which the user can **communicate** with the computer. The software engineer accomplishes the task of designing the user interface, and they ensure that the user interface is easy to understand, achieves goals, and is suitable, encouraging, and forgiving.

## • User Interface Design Principles and Guidelines

Overall, there are three **principles** for a user interface design:

- 1. Learnability: The interface must be easy to learn and understand.
- 2. Flexibility: The interface must support a variety of interaction mechanisms.
- 3. **Robustness**: The interface must provide proper feedback to let the user understand what is going on in the system.

## • User Interface Design Steps

Designing the user interface is an iterative process defined with the help of a **spiral model**. The designing of an interface starts from the mid of the spiral. The spiral model which is shown in Figure 2 below encompasses four different frameworks those are:

- 1. Interface Analysis and Modelling
- 2. Design
- 3. Construction
- 4. Validation



Figure 2: Spiral Model

# 1. Interface Analysis and Modelling

Before designing any solution, you need to know what actually you have to design. In this framework, you have to study the user's profile who will use this interface. In this phase, the designer must understand the people who will interact with the system using the interface. What type of task the user has to perform to achieve the goal? Further, the designer must investigate the content that has to present as a part of the interface. The designer must also analyze the environment where the user will interact with the system via an interface.

## 2. Interface Design

After completing the interface analysis, the designer identifies the task that the end-user requires. Interface designing is also an iterative process. The designer first identifies the **objects** and the **operations** performed on those objects. The designer also has to define the **events** that would change the state of the user interface. Further, the designer has to **outline** each state of the user interface as it would appear to the end-user.

## **3. Interface Construction**

After identifying the objects, operations and events the designer creates a **prototype**. This prototype helps in the evaluation of the real-world scenario. This process is also iterative and the construction continues till the prototype is approved for conducting real-world scenarios.

#### 4. Interface validation

The validation phase is performed to see whether the interface can perform user tasks along with all the variations in the real world. Like, as to whether the interface can perform all general user tasks? Is it easy to use, and understand and we can accept it as a useful tool?

## • Multimedia User Interface Design

Multimedia design involves several specialisms, which are technical subjects in their own right. For instance, design of text is the science (or art) of calligraphy that has developed new fonts over many years; visualization design encompasses the creation of images, either drawn or captured as photographs. Design of moving images, cartoons, video, and film are further specializations, as are musical composition and design of sound effects. Multimedia design lies on an interesting cultural boundary between the creative artistic community and science-based engineering. Design for multimedia user interfaces (UIs) expands conventional definitions of usability (e.g., ISO 9241 Part 11: ISO 1997) into five concerns as follows:

1. **Operational usability:** It is the conventional sense of usability that concerns design of graphical user interface (GUI) features such as menus, icons, metaphors, and navigation in hypermedia.

**2. Information delivery:** It is a prime concern for multimedia or any information-intensive application and raises issues of media selection, integration, and design for attention.

**3. Learning:** Training and education are both important markets for multimedia and hence learnability of the product and its content are key quality attributes. However, design of educational technology is a complex subject in its own right, and multimedia is only one part of the design problem.

**4.** Utility: In some applications, this will be the functionality that supports the user's task; in others, information delivery and learning will represent the value perceived by the user.

**5. Engagement and attractiveness:** The attractiveness of multimedia is now a key factor especially for websites. Multimedia interfaces have to attract users and deliver a stimulating user experience, as well as being easy to use and learn.

#### Multimedia

#### • Multimedia Systems Modality

In the multimedia systems, message is conveyed by a medium and received through a modality. A modality is the sensory channel that we use to send and receive messages to and from the world, essentially our senses. Two principal modalities are used in human– computer communication as follows:

- 1. Vision: All information received through our eyes, including text and image-based media.
- 2. Hearing: All information received through our ears, as sound, music, and speech.

#### • Multimedia Design Process

Multimedia design has to address the problems inherent in the design of any UI, namely, defining user requirements, tasks, and dialogue design; however, there are three issues that concern multimedia specifically:

- 1. Matching the media to the message by selecting and integrating media so the user comprehends the information content effectively.
- 2. Managing users' attention so key items in the content are noticed and understood, and the user follows the message thread across several media.
- 3. Interaction and navigation so the user can access, play, and interact with media in an engaging and predictable manner

#### • Users, Requirements, and Domains

The starting point for multimedia, as in all applications, is requirements analysis. The difference in multimedia lies in the greater emphasis on information requirements. A variety of analytic approaches can be adopted, such as task analysis, contextual inquiry, or scenario analysis. Requirements are listed and categorized into information, task-related, and nonfunctional classes. These will be expanded in subsequent analyses. It is important to get a profile of the target user population to guide media selection. There are three motivations for user analysis:

- 1. **Choice of modalities:** This is important for people with disabilities, but also for user preferences. Some people prefer verbal-linguistic material over image.
- 2. **Tuning the content:** This is presented to the level of users' existing knowledge. This is particularly important for training and educational applications.
- 3. **Capturing the users' expectations:** So, the experience can be geared to their background, for example, different styles for younger people, older people, culture, and socioeconomic audiences.

#### Multimedia

## Multimedia System Development

The Multimedia system development process involves a number of steps like traditional software system development and is known as the Multimedia System Development Life Cycle (MSDLC) and their processes is shown in Figure 3, and these processes are:

- Defining the system
- System Design
- Tools selection
- Authoring/rendering
- Testing



Figure 3: Multimedia System Development Life Cycle

## 1. Defining the system to be developed

To develop a multimedia presentation or program, it is valuable to understand precisely who the user is. to compose a multimedia the developer should consider the following that will help the multimedia developer to create a successful product.

- Level of understanding of the audience
- The expectation of the users
- The goal of presentation (training/entertainment)
- Allocated time
- Type of presentation required (text, graphics, sound, video, animation, or combination)
- Interactive/non-interactive presentation
- Impact of the presentation to the audience (instant or long-term).

# 2. System Design

The most common way to start a design is by composing an outline of the sequences and locks of information that will appear on the screen. This determines the amount of information-text, graphics, clickable objects which will be presented on each screen.

# 3. Tools Selection

Multimedia product requires many types of software tools, for instance, creating text often requires a word processor; working with digital images requires graphics software; using video requires a video-capture program and editing software; sound often requires its own editing software. All of this software is used to generate the content. When the content is ready, it needs to be assembled in a process called multimedia authoring.

# 4. Authoring/Rendering

After the creation of all the contents, it is required to put them all together. For a complex product created with the use of a sophisticated tool such as a director, the multimedia authoring generally is performed by a skilled multimedia developer or programmer.

# 5. Testing

The multimedia product should be tested by the users. By going through this testing, the developer can locate flaws ahead of time and repaired them before unleashing the finished product. During the test, the developer should consider the following points:

- Is it a product to read (in case of descriptive text)?
- Is it user friendly?
- Is it interactive and easy to navigate?