

CS410 Visual Programming Solved Subjective

For Final Term Exam Preparation by Virtualians Social Network

MS-DOS and Windows operating

Only one DOS program can be executed at a given time and these programs own the system resources. While in Windows, we can execute several different programs simultaneously. Windows operating system doesn't give us the direct access to interrupts, video ports and memory etc.

Pointers

Pointers are very important and useful as with the help of them we can access a very large data structure.

Function Pointers

That is such pointers which points to the address of the function.

Arrays

Arrays are basically a data structure that is used to store homogenous or same type of data in it. A very useful thing, when we pass the name of the array as an argument to some function, then only the memory address of array is passed as parameters to the function and not all the values of an array are passed. In the end we

The custom or user defined data types

The custom or user defined data types are those data types which we create by our own selves according to the requirements or the given situation. The most commonly used custom data types include structures, unions etc. Unlike arrays, structures can store data members of different data types.

Unions

Unions are also a very important custom data type that at a given time contains only one element from its member list.

Enum declarations

Enum declarations create a new integer type. The integer type is chosen to represent the values of an enumeration type. Thus, a variable declared as enum is an int.

Typedefs

Typedefs are also used for making a synonym or provides way to shorten the long chain of keywords in declarations.

Preprocessor

The preprocessor is a program that runs prior to compilation and potentially modifies a source code file. It may add code in response to the `#include` directive, conditionally include code in response to `#if`, `#ifdef`, `#ifndef` directives or define constants using the

`#define` directive.

Macro

A simple macro is a kind of abbreviation. It is a name which stands for a fragment of code. Some standard pre-defined Macros include `FILE` , `LINE` , `DATE` , `__TIME` etc.

Bitwise Operators

The three major bitwise operators AND, OR, XOR. Bitwise operators operates on individual bits. Using “typedefs” provide an easy way to avoid the long names during the declarations and thus make our code more simple.

Typecasting

It is making a variable of one type, act like another type for one single application. The two types of type casting include the implicit type casting and the explicit type casting.

Assertions

In C, the assertions are implemented with standard `assert` macro, the argument to assert must be true when the macro is executed, otherwise the programmes aborts and printouts an error message.

Switch-Case Statement

The switch-case statement is a multi-way decision statement. Unlike the multiple decisions statement that can be created using if-else, the switch statement evaluates the conditional expression and tests it against numerous constant values.

Calling Conventions

The calling conventions tells us in which order the parameters will be passed in a function and whether the calling function or the called function is responsible for the cleaning of the stack.

The default calling convention for C programs is `cdecl` and in this convention, The caller is responsible for cleaning the stack after the function call. Similarly, the default calling convention for the windows programs is `stdcall`. Here the called function itself has to do the stack clean up and so no extra code is required for stack clean up with each function call. It is very obvious that the `cdecl` calling convention creates larger executables because it requires each function call to include the clean up code.

Storage classes

Storage classes are used to describe the scope and visibility of the variables and functions. The common storage classes are `auto`, `register`, `static`, and `extern` etc.

Lifetime of Variables

In the lifetime of variables each `{ }` block creates a new scope. Variables declared and initialized in a scope are deleted when execution leaves that scope.

Const Keyword

The `const` keyword is used to create a read only variable. Thus constant variables are not allowed to be modified after initialization.

Command line arguments

Command line arguments provide an easy way to pass some parameters to the programme in the main function when the programme execution starts. When using an executable that requires startup arguments to debug, we can type these arguments at the command line, or from within the development environment

Windows Components

Kernel, GDI and User are windows components.

Kernel Component

Kernel is the heart of Operating system.

GDI Component

GDI is a Graphics device interface in windows which is used to display and print graphics and

text objects.

User Component

The user component is responsible to control all the dialogs, menu, windows, Windows controls, etc.

‘Handles in windows’

„Handles in windows“ are the introductory part of handles used in windows.

Handles are 32 bit number that may be void * type which is defined in „WinUser.h“ header file.

WinMain

WinMain is the starting point of Windows Programs. We always write WinMain in every windows program

Register Window class

Register Window class using RegisterClass API

CreateWindow

CreateWindow API uses window class name, caption name, style of window, starting points, width and height of windows and windows parent handle or handle to owner mainly.

Window Handle

We have window handle in variable of type handle to window. Using window handle we can send different types of messages to the window.

Windows message procedure

After getting messages from application message queue, we dispatch messages to the windows message handling procedure. Windows message procedure inputs four parameters. These parameters are also the members of MSG structure. These parameters are important for everyone who is developing applications for Windows.

Window Application

For creating window, we register window class with the attributes required. After successful registration we create window. For creating window we use CreateWindow API. In

CreateWindow API we mention some of the Window styles. Window styles are used to create different styles of windows.

Windows Types

These are owned windows and child windows. We must keep this point in mind that owned windows and child windows have different concepts.

Owned Windows

Owned windows have the handle of their owner windows, these handle make a chain of owned windows. If we bring some change to owner window then the owned windows will response on some changes like minimize and destroying operations.

Child windows

These are the part of its parent's client area.

Threads

Threads are two types one is User interface thread and second is working thread. UI (User interface) thread is attached with user interfaces like windows, messages and dialog boxes.

System Window Classes

System Window Classes include buttons, combo boxes, list box, etc.

SetWindowLong and GetWindowLong APIs

We can change windows attributes by using SetWindowLong and GetWindowLong APIs. Using SetWindowLong and GetWindowLong, we can also make a new procedure and change the message behavior of a window. Using SetClassLong and GetClassLong, we can change one of the attributes of a registered class.

Subclassing

Changing class values will affect the change for every window that is using this class. This is called subclassing.

Super-classing

We register new window class by using the properties of previous window class.

GDI

GDI is window's most important component. GDI is very much useful for every programmer because it gives platform independent interface. So whenever we want to write something on screen or on printer we take a device context of that particular device either display or printer.

We used GetDC functions for getting device context of a display device or printer device to output a graphics or text data. Printing or drawing can always be done through Device context provided by Windows. Whenever window needs to draw or paint in its client area it receives WM_PAINT message.

Painting in Windows

For painting we used an important message i.e. WM_PAINT. This message is always sent when windows need to paint its portion or region that was previously invalidated. Windows paint only its region when it become invalidates otherwise it is not sent WM_PAINT message. In some cases, WM_PAINT messages are not sent—when menu drops down or small dialog boxes appear.

Invalidation and Validation of a Region

If region is invalidated then it will be receiving WM_PAINT messages until it become validate.

Sending and Posting of messages

Messages can be sent to windows procedure directly or it can be posted to message queue. All the sent messages are not returned until the message is processed but the posted messages are returned after posting the message in queue.

Windows Management Functions

These functions are very helpful to interact with windows and hierarchy of windows and also with windows handling, windows manipulation and windows management.

Function includes GetParent, GetDlgItem, CreateWindow and notification codes that are sent to window by controls or other child windows.

Controls

Controls are normally considered are child windows, because these can be placed in any windows and become the part of the window but controls can be main window.

Notification messages

Notification messages are considered to transfer information to parent window by child windows. Child windows can send notification message to parent windows which aim only to inform about some events to parent window. The notification events could be e.g. in case of edit control is selection change i.e. EN_SELCHANGE or EN_CLICKED in case of button.

Popup Window

Popup window is not a child window. Popup windows are very useful when to show message on screen or working in full screen modes in Microsoft Windows Operating systems.

Keyboard

Keyboard is used to input the system. Whenever we press a key on keyboard, we generate a message. This message directly goes to the Operating system and then rout to our application. Keyboard messages include Key down and key up messages. Another type of messages is character messages these messages also come from keyboard. Keyboard messages are translated to their Character values and then send to the application in form of character message.

Mouse

Mouse is another input device. Almost all user interfaces uses mouse as input device as well as keyboard. Mouse device is optional in the system but useful in complex applications. Mouse can be used to point anywhere onscreen. Mouse sends different messages e.g. mouse can send left button down message when the mouse left button is down and in the same way left button up message when the left button is up. During the movement of mouse pointer on screen mouse move message Input Devices 22 is always sent.

Caret

During input session, caret is used to position the keyboard. Caret shows character can be placed where the caret is blinking.

Resources

Resources are also very much important subject in Windows executable files. Resources are separately compiled using resource compiler. Resource compiler (RC) compiles them to binary resource and these binary resource are then become the part of final executable file. Resource files are simply text script files. Resource can be loaded from any DLL and EXE module. For loading the resource, we have useful resource functions like LoadString that loads a string from resource table and Load Icon etc. that loads an Icon data from resource data.

Menus

Menus are used by almost every application except some games or other system tools. Using menus we can watch different facilities or action provided by application. Using menu accelerators you can use short cut keys to operate menus.

Dialogs

Dialogs are another useful and multipurpose resource in windows. Dialogs are used to display temporary information and other data.

Dialogs Types

Dialogs are of two types: One is modal dialogs and second is modeless dialogs. Modal dialogs do not return control to the application until they are not ended or destroyed. Modeless dialogs act like a normal windows they return control after they have created. Message boxes are normally modal dialog boxes.

Dialog Box Template

A dialog box template is binary data that describes the dialog box, defining its height, width, style, and the controls it contains. Dialog box template becomes later part of the executable file.

Dialogs are of two types: Modal dialogs and Modeless dialogs. For dispatching message for Modeless dialogs, we can use IsDialogMessage Function in our main Message Loop. In windows lot of common dialogs are available. Print dialog is used to print the document, this dialog show the setting for printer and its path name. Choose color dialog help the user to choose the color of its own choice. File Open dialog are useful to open and save the files on disk.

Windows Controls

Windows controls are basic controls that are pre-registered in windows. Button, list box and edit box controls are helpful to display information in a very organized manner in a dialog box or in a window. Edit box control is simple to use. It has few message and notifications messages. Sending message to edit box window we can limit text in edit box, set text and get text etc. Button is another ubiquitous control in windows. Button is used almost in every user interactive application. Button is sent messages like edit box and list box, and also send notification messages to its parent window. List View is another useful control in windows systems. List view control list the items in its window. These items can be selected and clicked on each click list box send notification message to its parent window.

Common Dialogs

Common dialogs are very much useful in windows. Using common dialogs, you can show user to choose colors, files and printer, etc. Dialog resources are easy to use and easier to handle.

Controls can be displayed on the dialogs. Dialogs by default set the font and dimensions of the controls. Dialogs are used in many areas like configuration of hardware devices, internet connections, properties and database configurations. Another important dialogs are called property sheets. This property sheet enables you to select any category from the tabs.

Common Controls

Common Controls are the part of Microsoft Windows Graphics Operating System. Almost all the WYSIWYG application use Common Controls for their compatibility and user friendliness with windows. Common controls include controls like page controls, tree controls, and list view controls that is modified from windows original control, button control that is also modified from windows original controls, data and time picker control, status bar, progress bar, rebar controls. These all controls reside in common controls library and the library has shipped with many versions. Before using the library you must check the valid version of the library because different version of library contains different controls properties.

Dynamic Link Libraries

Dynamic link libraries are the windows executables but these cannot be executed by writing its name on command line or double clicking on it. These libraries contain separate modules that load and run in any process address space. Thread is the execution unit in a Process. A process can have more than one thread. There are two types of dynamic linking load time dynamic

linking and run time dynamic linking. In load time dynamic linking, a module makes explicit calls to exported DLL functions as if they were local functions and in run time dynamic linking Load library function is used to load the library and Get procedure address functions are called to get the address of the function from loaded library. DLL can export functions in the form definition files. In definition file we can provide ordinal as well. Ordinal is a number that is used to locate the function instead of function name.

Multitasking Operating Systems

Multitasking Operating systems are useful to run applications simultaneously. Threads and processes are the key features of Operating systems. Many Threads can work better than using single thread sometime.

Threads and Synchronization

To synchronize access to a resource, use one of the synchronization objects in one of the wait functions. The state of a synchronization object is either signaled or nonsignaled. The wait functions allow a thread to block its own execution until a specified nonsignaled object is set to the signaled state. Critical section objects provide synchronization similar to that provided by mutex objects, except that critical section objects can be used only by the threads of a single process. Event, mutex, and semaphore objects can also be used in a single-process. Another synchronization object is semaphore, events and mutex. Threads with synchronization problems have the best use in network applications.

Socket

Socket is important in an inter-process communication. Sockets are more reliable and secure. Socket version 2 is used these days. In windows, sockets are started using WSStartup API.

WSAStartup API starts and initializes Windows Sockets.

DNS

Domain Name System (DNS), the locator service of choice in Microsoft® Windows®, is an industry-standard protocol that locates computers on an IP-based network.

WinSock Functions

These functions include connect, recv, send, accept, bind, gethostbyname, etc.

Whois server

This application tells that the name is registered name or not. If the name is registered, then we cannot register it again.

HTTP

HTTP (hypertext transfer protocol) is used to transfer text data across the net work.

HTML

HTML is hyper text markup language. It simplifies a text script. Html is loaded in web browser and web browser translates the text and executes instruction written in form of text.

MIME

MIME is used for transferring media like image data and movie data.