Win32 Programming

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CSE775 – Distributed Objects

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References

- Programming Applications for Microsoft Windows, 4th Edition, Jeffrey Richter, Microsoft Press, 1999
- Unicode, More Unicode
- Win32 Code Tips
- www.Catch22.net
    - Tips #1, Tips #2, Tutorials
- Windows SDK Issues

Topics

- Important header files
- Errors
- Win32 Types
- Unicode – coming later
- Win32 API

Important Windows Header Files

- Important header files in PlatformSDK folder
  - Windows.h Includes other headers
    - Commdlg.h   Common controls (COM based)
    - Dlgs.h   Dialog definitions
    - OLE2.h   COM definitions
    - ShellAPI.h   Shell API
    - ShFolder.h   Folder definitions
    - Winbase.h   Managing processes
    - Windef.h   Windows type definitions
    - WinUser   Windows messages
    - Many other headers
  - WinError.h   Error codes and strings
  - Winsock2.h   sockets
  - MSHTML.h   Browser Control definitions and IE DOM handling
- Important header files in VC folder
  - Process.h   Threading

Win32 API Error Protocols

Error code returned from API function call	
Data Type	Meaning
VOID	Function cannot fail
BOOL	If function fails value is zero; otherwise nonzero.
HANDLE	If the function fails usually value is NULL; otherwise valid handle to kernel object. Some functions return INVALID_HANDLE on failure.
PVOID	If the function fails, value is NULL; otherwise PVOID points to a memory address to be manipulated.
LONG/DWORD	Usually indicates a count is returned. If counting fails, function usually returns -1 or 0. Check the platform SDK documentation.

Data Types

Windows Type	Equivalent
LPVOID	void*
LPSTR	wchar_t*
TCHAR	char or wchar_t
LPTSTR	char* or wchar_t*
DWORD	unsigned 32 bit integer
WORD	unsigned 16 bit integer
HANDLE	Windows handle
HINSTANCE	Handle to program instance
HMODULE	Handle to loaded DLL
HMENU	Menu handle
WPARAM	16 bit parameter
LPARAM	32 bit parameter

Win32 API

- Path to documentation
  - **Windows API Reference:**
    MSDN Library > Development Tools and Languages > Windows API
  - **Windows Data Types**:
    MSDN Library > Windows Development > Getting Started > Using Windows Headers > Windows Data Types
  - **System Services** (DLLs and Processes, File Services, …):
    MSDN Library > Windows Development > System Services
  - **User Interface** (Windows Controls, Windows Shell, …)
    MSDN Library > Windows Development > Windows Application UI Development

- C-Style functions often with extended versions

Win32 API – Extended Functions

- Example – extended function
  - ReadFile
    BOOL ReadFile(
      HANDLE *hFile*, LPVOID *lpBuffer*,
      DWORD *nNumberOfBytesToRead*,
      LPDWORD *lpNumberOfBytesRead*,
      LPOVERLAPPED *lpOverlapped*);
  - ReadFileEx
    BOOL ReadFileEx(
      HANDLE *hFile*, LPVOID *lpBuffer*,
      DWORD *nNumberOfBytesToRead*,
      LPOVERLAPPED *lpOverlapped*,
      LPOVERLAPPED_COMPLETION_ROUTINE *lpCompletionRoutine*);

Win32 API by Function

- ### File services
  - Disk, Volume, Directory, and File management
- ### Windows System Information
  - Handles, Objects, Registry, System Info, Time
- ### DLLs, Processes, and Threads
  - DLLs, Processes and Threads, Services, Synchronization
- ### Memory Management
  - Reserving and committing memory, File Mapping
- ### Interprocess Communication
  - Mailslots, Network DDE (deprecated), Pipes

Files

- <u>File Management</u>
  - CreateFile, OpenFile, CloseHandle, ReplaceFile
  - ReadFile(Ex), WriteFile(Ex), CopyFile(Ex), DeleteFile, MoveFile(Ex)
  - FindFirstFile(Ex), FindNextFile, FindClose, SearchPath
  - GetFileAttributes(Ex), SetFileAttributes, GetFileSize(Ex)
  - GetFullPathName
  - LockFile(Ex), UnlockFile(Ex)

Directories

- **Directory Management Functions**
  - CreateDirectory(Ex), RemoveDirectory
  - GetCurrentDirectory, SetCurrentDirectory
  - FindFirstChangeNotification, FindNextChangeNotification, FindCloseChangeNotification

Registry

- <u>Registry Functions</u>
  - RegCreateKeyEx, RegOpenKeyEx, RegCloseKey, RegDeleteKey(Ex), RegDeleteKeyValue, RegReplaceKey, RegRestoreKey, RegSaveKey(Ex), RegQueryValueEx
  - RegGetValue, RegSetValueEx, RegDeleteValue, RegSetKeyValue
  - RegLoadKey, RegUnloadKey
  - RegEnumKeyEx, RegEnumValue
  - RegCopyTree, RegDeleteTree

Dynamic-Link Libraries

- **Dynamic-Link Library Functions**
  - DllMain
  - LoadLibrary(Ex), FreeLibrary, GetProcAddress
  - GetDllDirectory, SetDllDirectory
  - GetModuleFileName(Ex), GetModuleHandle(Ex)

Processes

- <u>Process Functions</u>
  - CreateProcess, OpenProcess, ExitProcess, GetExitCodeProcess, GetStartupInfo, TerminateProcess
  - EnumProcesses, Process32First, Process32Next
  - GetCurrentProcess, GetCurrentProcessId
  - GetProcessId, GetProcessHandleCount
  - GetCommandLine, GetEnvironmentStrings, GetEnvironmentVariable, SetEnvironmentVariable, GetGuiResources
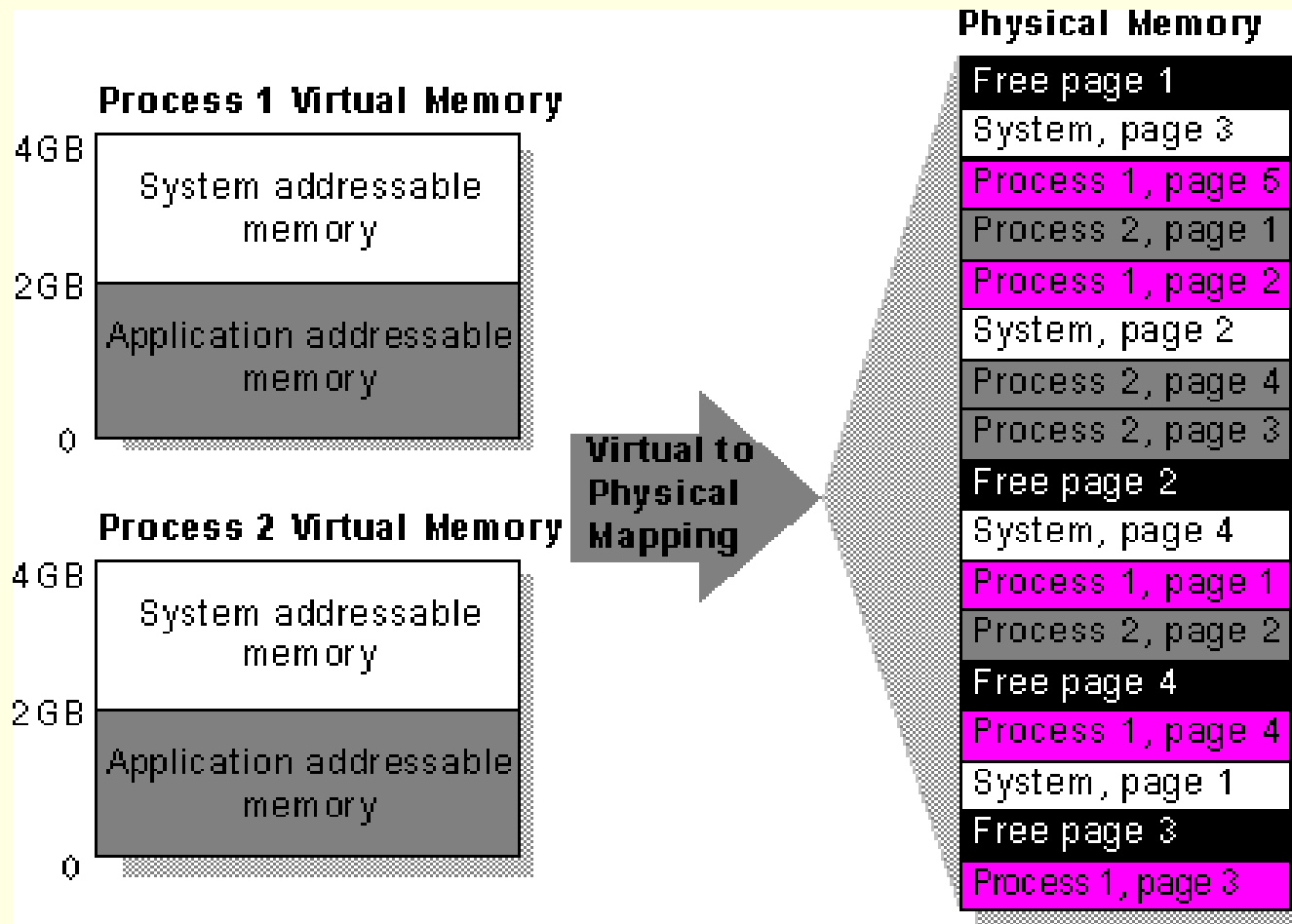
Threads

- **<u>Thread Functions</u>**
  - CreateThread, OpenThread, ThreadProc
    - don't use if you call C/C++ libraries
    - Use _beginthread(Ex)
  - CreateRemoteThread, ExitThread, ResumeThread, TerminateThread, GetExitCodeThread
  - Sleep(Ex), WaitForInputIdle
  - GetCurrentThead, GetCurrentThreadId
  - GetThreadId
  - GetThreadPriority, SetThreadPriority
  - TlsAlloc, TlsFree, TlsGetValue, TlsSetValue

C Run-Time Library Thread Functions

- <u>Thread functions</u>
  - _beginthread(Ex), _endthread(ex)

Virtual to Physical Mapping

Memory Management

- **Memory Management Functions**
  - **Used by COM – Allocates on heap**
    GlobalAlloc, GlobalReAlloc, GlobalLock, GlobalUnlock, GlobalFree, GlobalHandle
  - **Newer Heap Management** – not movable
    HeapAlloc, HeapCompact, HeapCreate, HeapDestroy, GetProcessHeap(s)
    - CopyMemory, FillMemory, MoveMemory
  - **Memory Mapped Files**
    CreateFileMapping, OpenFileMapping, MapViewOfFile(Ex), FlushViewOfFile, UnmapViewOfFile
  - **Virtual Memory**
    VirtualAlloc(Ex), VirtualFree(Ex)

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