**Федеральное государственное образовательное бюджетное учреждение  
высшего образования  
«Финансовый университет при Правительстве РФ»**

**КОЛЛЕДЖ ИНФОРМАТИКИ И ПРОГРАММИРОВАНИЯ**

**ОТЧЁТ**

**По лабораторной работе №8**

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Дисциплина/Профессиональный модуль: Машинно-ориентированное программирование по защите информации

Группы: 3ОИБАС-818

Преподаватель

Сибирев И. В. /\_\_\_\_\_\_\_\_\_/

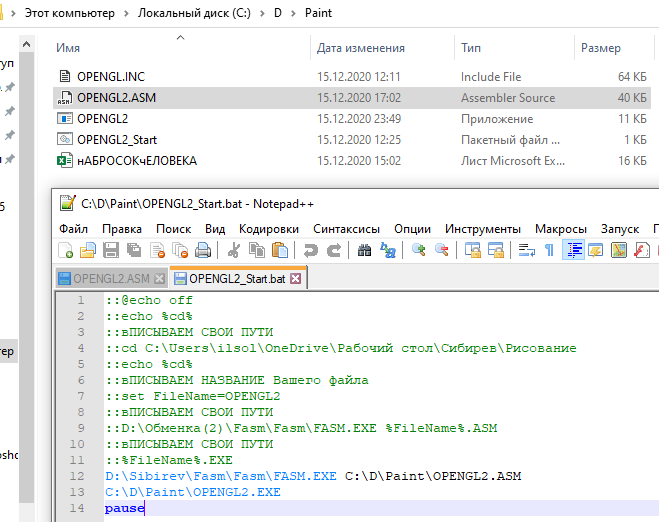
Оценка за работу: \_\_\_\_\_\_\_

Москва

2020

**Ход работы:**

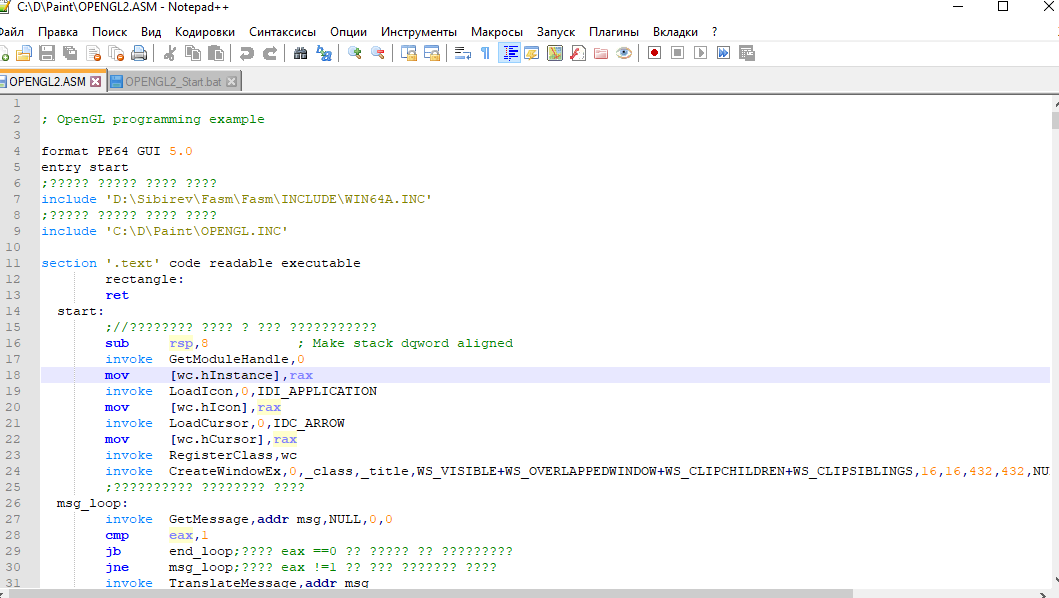
Создаем файл OPENGL2.ASM и OPENGL\_Start, затем открываем их через NotePad++.



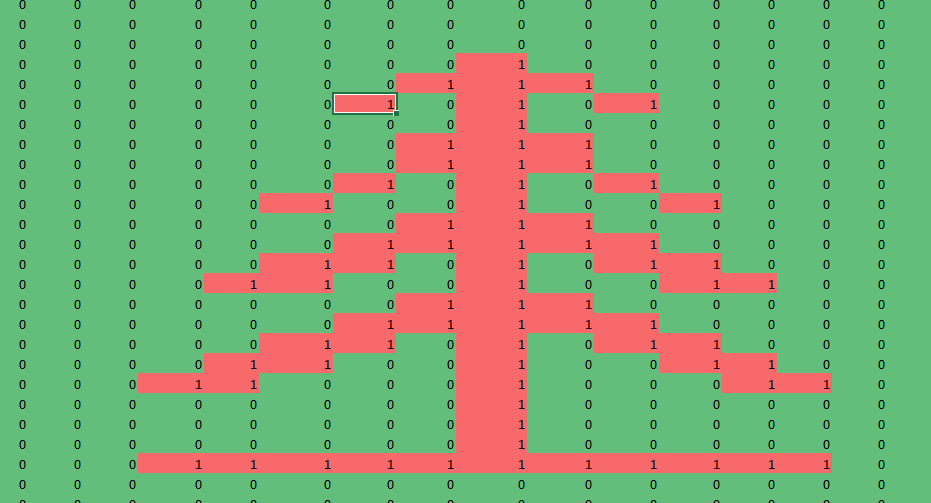
В файле OPENGL2.ASM в первой строчке указываем путь к Fasm.exe и путь к нашему файлу OPENGL2.ASM, во второй строчке указываем путь, где необходимо создать EXE файл для запуска программы.

В папку с FASM закидываем скачанный файл OPENGL.INC и прописываем пути.

В первой строчке пишем путь к WIN64A.INC. Во второй строчке пишем путь до OPENGL.INC.



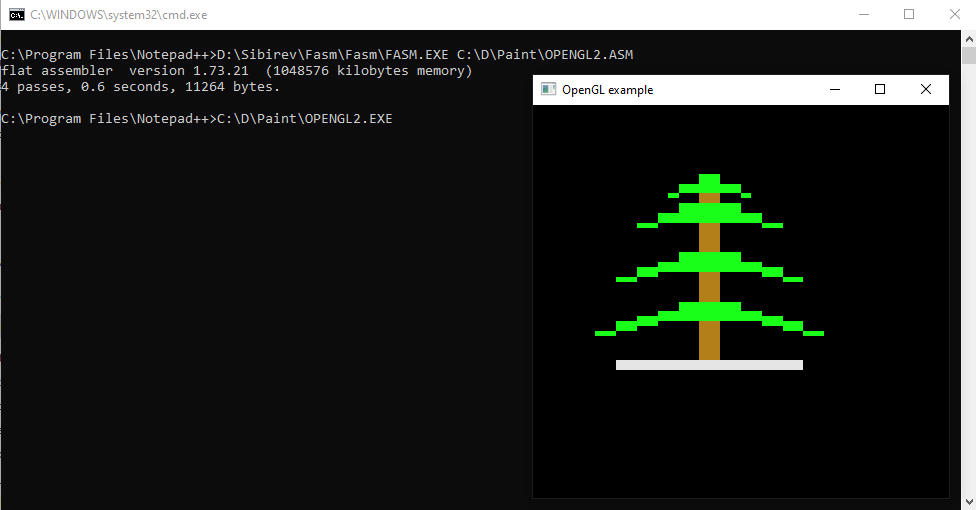
Открываем EXCEL, рисуем в таблице ёлку, путем присваивания ячейке значения «1», где необходимо закрасить.



Сверху и слева мы имеем координаты, для масштабирования изображения делим координаты на 0.5.

Затем переходим к файлу OPENGL2.ASM.

Мы получаем следующее



**Код программы:**

; OpenGL programming example

format PE64 GUI 5.0

entry start

;????? ????? ???? ????

include 'D:\Sibirev\Fasm\Fasm\INCLUDE\WIN64A.INC'

;????? ????? ???? ????

include 'C:\D\Paint\OPENGL.INC'

section '.text' code readable executable

rectangle:

ret

start:

;//???????? ???? ? ??? ???????????

sub rsp,8 ; Make stack dqword aligned

invoke GetModuleHandle,0

mov [wc.hInstance],rax

invoke LoadIcon,0,IDI\_APPLICATION

mov [wc.hIcon],rax

invoke LoadCursor,0,IDC\_ARROW

mov [wc.hCursor],rax

invoke RegisterClass,wc

invoke CreateWindowEx,0,\_class,\_title,WS\_VISIBLE+WS\_OVERLAPPEDWINDOW+WS\_CLIPCHILDREN+WS\_CLIPSIBLINGS,16,16,432,432,NULL,NULL,[wc.hInstance],NULL

;?????????? ???????? ????

msg\_loop:

invoke GetMessage,addr msg,NULL,0,0

cmp eax,1

jb end\_loop;???? eax ==0 ?? ????? ?? ?????????

jne msg\_loop;???? eax !=1 ?? ??? ??????? ????

invoke TranslateMessage,addr msg

invoke DispatchMessage,addr msg

jmp msg\_loop

end\_loop:

invoke ExitProcess,[msg.wParam]

;?????????, ??????? ??????????? ??????????? ???- ?? ???

proc WindowProc uses rbx rsi rdi, hwnd,wmsg,wparam,lparam

mov [hwnd],rcx

frame

cmp edx,WM\_CREATE

je .wmcreate

cmp edx,WM\_SIZE

je .wmsize

cmp edx,WM\_PAINT

je .wmpaint

cmp edx,WM\_KEYDOWN

je .wmkeydown

cmp edx,WM\_DESTROY

je .wmdestroy

.defwndproc:

invoke DefWindowProc,rcx,rdx,r8,r9

jmp .finish

.wmcreate:

invoke GetDC,rcx

mov [hdc],rax

lea rdi,[pfd]

mov rcx,sizeof.PIXELFORMATDESCRIPTOR shr 3

xor eax,eax

rep stosq

mov [pfd.nSize],sizeof.PIXELFORMATDESCRIPTOR

mov [pfd.nVersion],1

mov [pfd.dwFlags],PFD\_SUPPORT\_OPENGL+PFD\_DOUBLEBUFFER+PFD\_DRAW\_TO\_WINDOW

mov [pfd.iLayerType],PFD\_MAIN\_PLANE

mov [pfd.iPixelType],PFD\_TYPE\_RGBA

mov [pfd.cColorBits],16

mov [pfd.cDepthBits],16

mov [pfd.cAccumBits],0

mov [pfd.cStencilBits],0

invoke ChoosePixelFormat,[hdc],addr pfd

invoke SetPixelFormat,[hdc],eax,addr pfd

invoke wglCreateContext,[hdc]

mov [hrc],rax

invoke wglMakeCurrent,[hdc],[hrc]

invoke GetClientRect,[hwnd],addr rc

invoke glViewport,0,0,[rc.right],[rc.bottom]

invoke GetTickCount

mov [clock],eax

xor eax,eax

jmp .finish

.wmsize:

invoke GetClientRect,[hwnd],addr rc

invoke glViewport,0,0,[rc.right],[rc.bottom]

xor eax,eax

jmp .finish

.wmpaint:;?????? ?????

invoke GetTickCount

sub eax,[clock]

cmp eax,10

jb .animation\_ok

add [clock],eax

;;???????? ?????? ??? ????

;invoke glRotatef,float [theta],float dword 0.0,float dword 0.0,float dword 1.0

.animation\_ok:

invoke glClear,GL\_COLOR\_BUFFER\_BIT

;???? ??? ????????? ????? ??????

;?????? ??????

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.9,float dword 0.9,float dword 0.9

;(-0.5;0.5);(-0.2;0.5)

;(-0.5;0.2);(-0.2;0.2)

invoke glVertex3d,float -0.6,float -0.35,float 0.0

invoke glVertex3d,float 0.3,float -0.35,float 0.0

invoke glVertex3d,float 0.3,float -0.30,float 0.0

invoke glVertex3d,float -0.6,float -0.30,float 0.0

invoke glVertex3d,float -0.6,float -0.35,float 0.0

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glEnd

;?????? ???

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.7,float dword 0.5,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.2,float 0.65,float 0.0

invoke glVertex3d,float -0.1,float 0.65,float 0.0

invoke glVertex3d,float -0.1,float -0.3,float 0.0

invoke glVertex3d,float -0.2,float -0.3,float 0.0

invoke glVertex3d,float -0.2,float 0.65,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.3,float 0.5,float 0.0

invoke glVertex3d,float 0.0,float 0.5,float 0.0

invoke glVertex3d,float 0.0,float 0.4,float 0.0

invoke glVertex3d,float -0.3,float 0.4,float 0.0

invoke glVertex3d,float -0.3,float 0.5,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.3,float 0.25,float 0.0

invoke glVertex3d,float 0.0,float 0.25,float 0.0

invoke glVertex3d,float 0.0,float 0.15,float 0.0

invoke glVertex3d,float -0.3,float 0.15,float 0.0

invoke glVertex3d,float -0.3,float 0.25,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.3,float 0.0,float 0.0

invoke glVertex3d,float 0.0,float 0.0,float 0.0

invoke glVertex3d,float 0.0,float -0.1,float 0.0

invoke glVertex3d,float -0.3,float -0.1,float 0.0

invoke glVertex3d,float -0.3,float 0.0,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.3,float 0.6,float 0.0

invoke glVertex3d,float 0.0,float 0.6,float 0.0

invoke glVertex3d,float 0.0,float 0.55,float 0.0

invoke glVertex3d,float -0.3,float 0.55,float 0.0

invoke glVertex3d,float -0.3,float 0.6,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.35,float 0.55,float 0.0

invoke glVertex3d,float -0.3,float 0.55,float 0.0

invoke glVertex3d,float -0.3,float 0.525,float 0.0

invoke glVertex3d,float -0.35,float 0.525,float 0.0

invoke glVertex3d,float -0.35,float 0.55,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.0,float 0.55,float 0.0

invoke glVertex3d,float 0.05,float 0.55,float 0.0

invoke glVertex3d,float 0.05,float 0.525,float 0.0

invoke glVertex3d,float 0.0,float 0.525,float 0.0

invoke glVertex3d,float 0.0,float 0.55,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.0,float 0.45,float 0.0

invoke glVertex3d,float 0.1,float 0.45,float 0.0

invoke glVertex3d,float 0.1,float 0.4,float 0.0

invoke glVertex3d,float 0.0,float 0.4,float 0.0

invoke glVertex3d,float 0.0,float 0.45,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.4,float 0.45,float 0.0

invoke glVertex3d,float -0.3,float 0.45,float 0.0

invoke glVertex3d,float -0.3,float 0.4,float 0.0

invoke glVertex3d,float -0.4,float 0.4,float 0.0

invoke glVertex3d,float -0.4,float 0.45,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.4,float 0.2,float 0.0

invoke glVertex3d,float -0.3,float 0.2,float 0.0

invoke glVertex3d,float -0.3,float 0.15,float 0.0

invoke glVertex3d,float -0.4,float 0.15,float 0.0

invoke glVertex3d,float -0.4,float 0.2,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.0,float 0.2,float 0.0

invoke glVertex3d,float 0.1,float 0.2,float 0.0

invoke glVertex3d,float 0.1,float 0.15,float 0.0

invoke glVertex3d,float 0.0,float 0.15,float 0.0

invoke glVertex3d,float 0.0,float 0.2,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.4,float -0.05,float 0.0

invoke glVertex3d,float -0.3,float -0.05,float 0.0

invoke glVertex3d,float -0.3,float -0.1,float 0.0

invoke glVertex3d,float -0.4,float -0.1,float 0.0

invoke glVertex3d,float -0.4,float -0.05,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.0,float -0.05,float 0.0

invoke glVertex3d,float 0.1,float -0.05,float 0.0

invoke glVertex3d,float 0.1,float -0.1,float 0.0

invoke glVertex3d,float 0.0,float -0.1,float 0.0

invoke glVertex3d,float 0.0,float -0.05,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.1,float -0.075,float 0.0

invoke glVertex3d,float 0.2,float -0.075,float 0.0

invoke glVertex3d,float 0.2,float -0.125,float 0.0

invoke glVertex3d,float 0.1,float -0.125,float 0.0

invoke glVertex3d,float 0.1,float -0.075,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.5,float -0.075,float 0.0

invoke glVertex3d,float -0.4,float -0.075,float 0.0

invoke glVertex3d,float -0.4,float -0.125,float 0.0

invoke glVertex3d,float -0.5,float -0.125,float 0.0

invoke glVertex3d,float -0.5,float -0.075,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.1,float 0.375,float 0.0

invoke glVertex3d,float 0.2,float 0.375,float 0.0

invoke glVertex3d,float 0.2,float 0.4,float 0.0

invoke glVertex3d,float 0.1,float 0.4,float 0.0

invoke glVertex3d,float 0.1,float 0.375,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.4,float 0.375,float 0.0

invoke glVertex3d,float -0.5,float 0.375,float 0.0

invoke glVertex3d,float -0.5,float 0.4,float 0.0

invoke glVertex3d,float -0.4,float 0.4,float 0.0

invoke glVertex3d,float -0.4,float 0.375,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.5,float 0.175,float 0.0

invoke glVertex3d,float -0.4,float 0.175,float 0.0

invoke glVertex3d,float -0.4,float 0.125,float 0.0

invoke glVertex3d,float -0.5,float 0.125,float 0.0

invoke glVertex3d,float -0.5,float 0.175,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.1,float 0.175,float 0.0

invoke glVertex3d,float 0.2,float 0.175,float 0.0

invoke glVertex3d,float 0.2,float 0.125,float 0.0

invoke glVertex3d,float 0.1,float 0.125,float 0.0

invoke glVertex3d,float 0.1,float 0.175,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.6,float 0.125,float 0.0

invoke glVertex3d,float -0.5,float 0.125,float 0.0

invoke glVertex3d,float -0.5,float 0.1,float 0.0

invoke glVertex3d,float -0.6,float 0.1,float 0.0

invoke glVertex3d,float -0.6,float 0.125,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.3,float 0.125,float 0.0

invoke glVertex3d,float 0.2,float 0.125,float 0.0

invoke glVertex3d,float 0.2,float 0.1,float 0.0

invoke glVertex3d,float 0.3,float 0.1,float 0.0

invoke glVertex3d,float 0.3,float 0.125,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.6,float -0.1,float 0.0

invoke glVertex3d,float -0.5,float -0.1,float 0.0

invoke glVertex3d,float -0.5,float -0.15,float 0.0

invoke glVertex3d,float -0.6,float -0.15,float 0.0

invoke glVertex3d,float -0.6,float -0.1,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.3,float -0.1,float 0.0

invoke glVertex3d,float 0.2,float -0.1,float 0.0

invoke glVertex3d,float 0.2,float -0.15,float 0.0

invoke glVertex3d,float 0.3,float -0.15,float 0.0

invoke glVertex3d,float 0.3,float -0.1,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.7,float -0.15,float 0.0

invoke glVertex3d,float -0.6,float -0.15,float 0.0

invoke glVertex3d,float -0.6,float -0.175,float 0.0

invoke glVertex3d,float -0.7,float -0.175,float 0.0

invoke glVertex3d,float -0.7,float -0.15,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float 0.4,float -0.15,float 0.0

invoke glVertex3d,float 0.3,float -0.15,float 0.0

invoke glVertex3d,float 0.3,float -0.175,float 0.0

invoke glVertex3d,float 0.4,float -0.175,float 0.0

invoke glVertex3d,float 0.4,float -0.15,float 0.0

invoke glEnd

invoke glBegin,GL\_QUADS

invoke glColor3f,float dword 0.1,float dword 1.0,float dword 0.1

;(-0.4;0.2);(-0.3;0.1)

;(-0.4;0.2);(-0.3;0.1)

invoke glVertex3d,float -0.2,float 0.65,float 0.0

invoke glVertex3d,float -0.1,float 0.65,float 0.0

invoke glVertex3d,float -0.1,float 0.6,float 0.0

invoke glVertex3d,float -0.2,float 0.6,float 0.0

invoke glVertex3d,float -0.2,float 0.65,float 0.0

invoke glEnd

invoke SwapBuffers,[hdc]

xor eax,eax

jmp .finish

.wmkeydown:

cmp r8d,VK\_ESCAPE

jne .defwndproc

.wmdestroy:

invoke wglMakeCurrent,0,0

invoke wglDeleteContext,[hrc]

invoke ReleaseDC,[hwnd],[hdc]

invoke PostQuitMessage,0

xor eax,eax

.finish:

endf

ret

endp

section '.data' data readable writeable

\_title db 'OpenGL example',0

\_class db 'FASMOPENGL32',0

theta GLfloat 0.6

wc WNDCLASS 0,WindowProc,0,0,NULL,NULL,NULL,NULL,NULL,\_class

hdc dq ?

hrc dq ?

msg MSG

rc RECT

pfd PIXELFORMATDESCRIPTOR

clock dd ?

section '.idata' import data readable writeable

library kernel,'KERNEL32.DLL',\

user,'USER32.DLL',\

gdi,'GDI32.DLL',\

opengl,'OPENGL32.DLL',\

glu,'GLU32.DLL'

import kernel,\

GetModuleHandle,'GetModuleHandleA',\

GetTickCount,'GetTickCount',\

ExitProcess,'ExitProcess'

import user,\

RegisterClass,'RegisterClassA',\

CreateWindowEx,'CreateWindowExA',\

DefWindowProc,'DefWindowProcA',\

GetMessage,'GetMessageA',\

TranslateMessage,'TranslateMessage',\

DispatchMessage,'DispatchMessageA',\

LoadCursor,'LoadCursorA',\

LoadIcon,'LoadIconA',\

GetClientRect,'GetClientRect',\

GetDC,'GetDC',\

ReleaseDC,'ReleaseDC',\

PostQuitMessage,'PostQuitMessage'

import gdi,\

ChoosePixelFormat,'ChoosePixelFormat',\

SetPixelFormat,'SetPixelFormat',\

SwapBuffers,'SwapBuffers'

import opengl,\

glAccum,'glAccum',\

glAlphaFunc,'glAlphaFunc',\

glAreTexturesResident,'glAreTexturesResident',\

glArrayElement,'glArrayElement',\

glBegin,'glBegin',\

glBindTexture,'glBindTexture',\

glBitmap,'glBitmap',\

glBlendFunc,'glBlendFunc',\

glCallList,'glCallList',\

glCallLists,'glCallLists',\

glClear,'glClear',\

glClearAccum,'glClearAccum',\

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