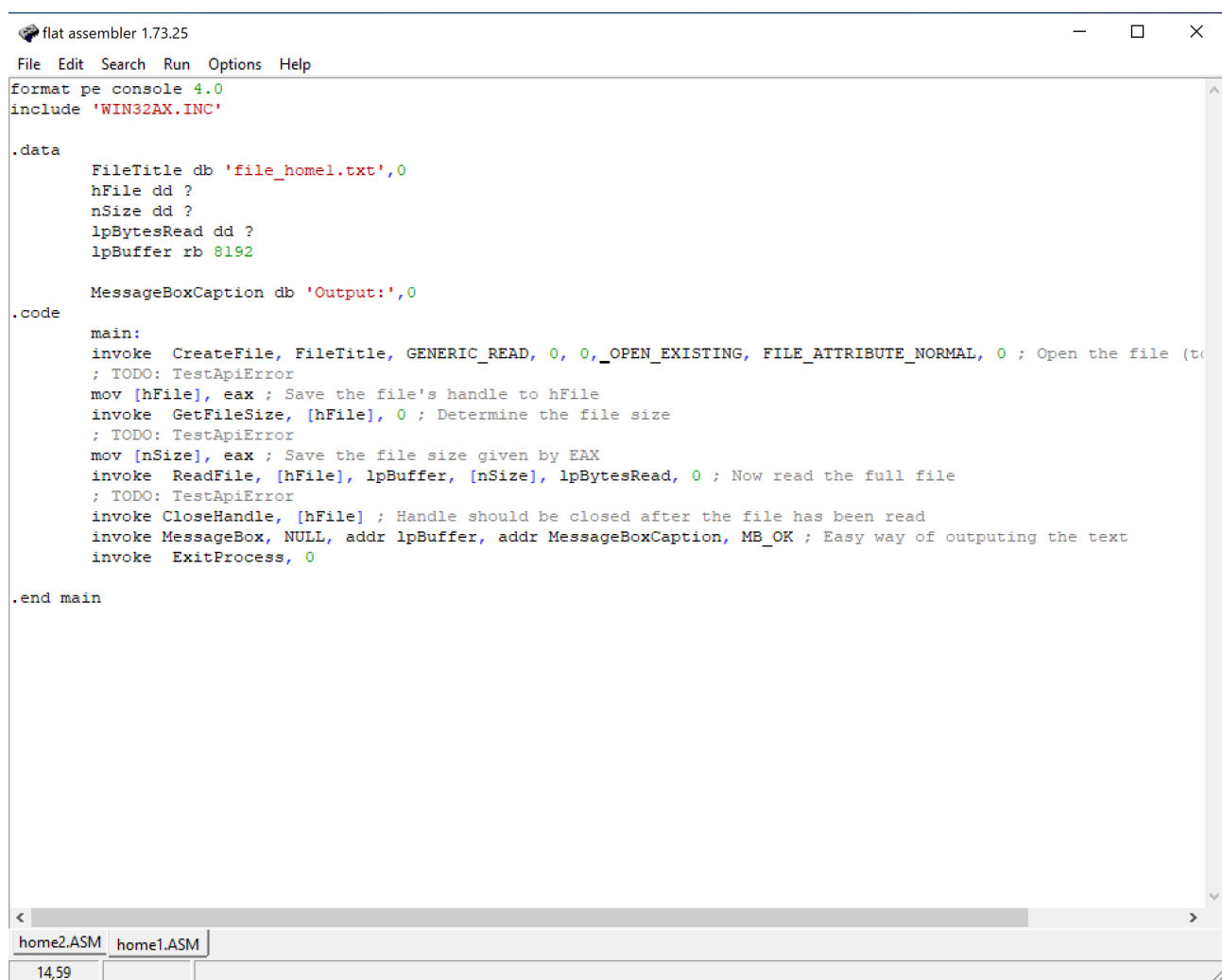


Домашняя работа 1 по “Архитектурам ВЫЧИСЛИТЕЛЬНЫХ СИСТЕМ”

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Пример программы 1:

Данная программа считывает файл file_home1.txt, после чего выводит содержимое файла на экран



```
flat assembler 1.73.25
File Edit Search Run Options Help

format pe console 4.0
include 'WIN32AX.INC'

.data
    FileName db 'file_home1.txt',0
    hFile dd ?
    nSize dd ?
    lpBytesRead dd ?
    lpBuffer rb 8192

    MessageBoxCaption db 'Output:',0

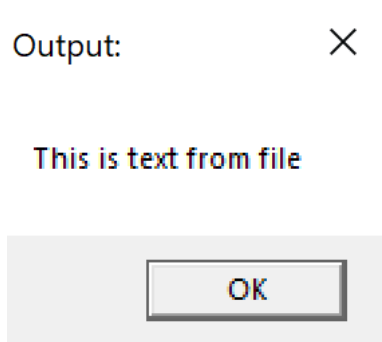
.code
main:
    invoke CreateFile, FileName, GENERIC_READ, 0, 0, _OPEN_EXISTING, FILE_ATTRIBUTE_NORMAL, 0 ; Open the file (to
; TODO: TestApiError
    mov [hFile], eax ; Save the file's handle to hFile
    invoke GetFileSize, [hFile], 0 ; Determine the file size
; TODO: TestApiError
    mov [nSize], eax ; Save the file size given by EAX
    invoke ReadFile, [hFile], lpBuffer, [nSize], lpBytesRead, 0 ; Now read the full file
; TODO: TestApiError
    invoke CloseHandle, [hFile] ; Handle should be closed after the file has been read
    invoke MessageBox, NULL, addr lpBuffer, addr MessageBoxCaption, MB_OK ; Easy way of outputting the text
    invoke ExitProcess, 0

.end main
```

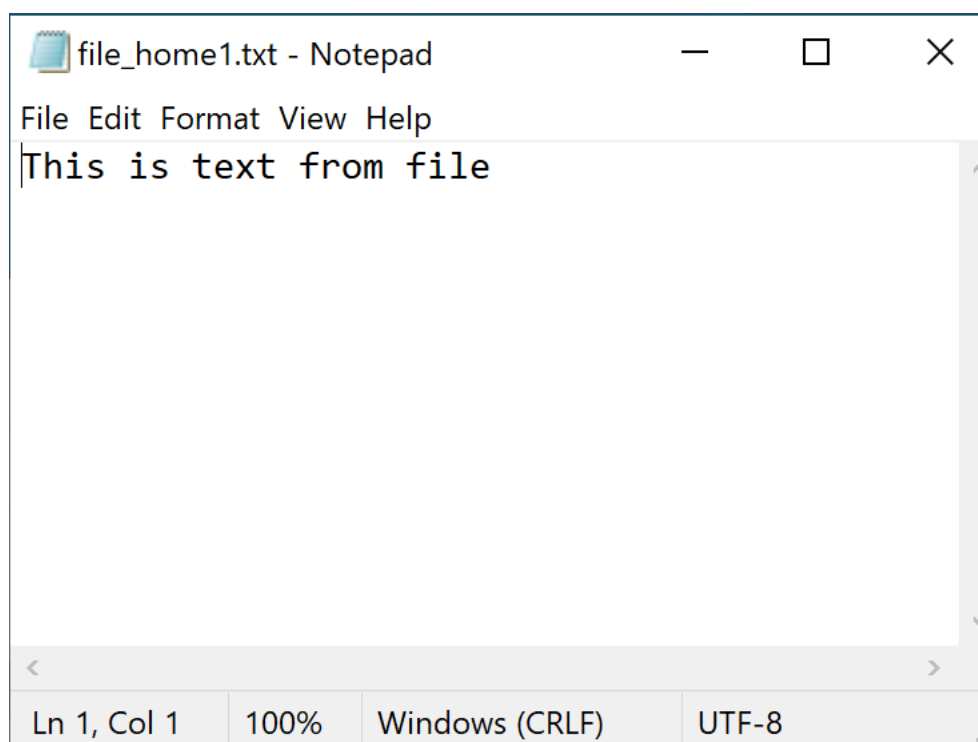
home2.ASM home1.ASM

14,59

Вывод программы (кроме окна, показанного ниже, также открывается пустая консоль):

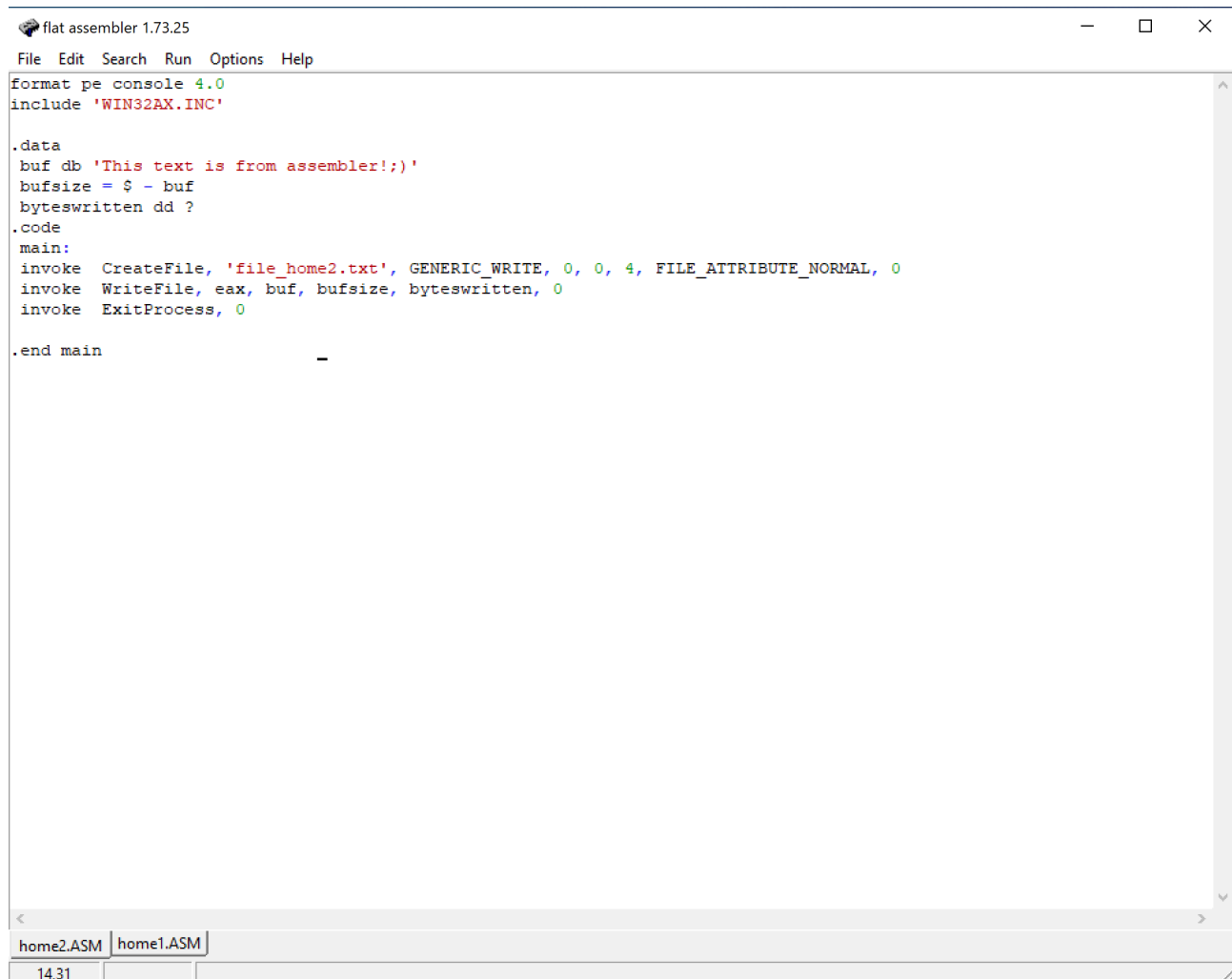


Содержимое файла:



Пример программы 2:

Данная программа создает(или перезаписывает) файл file_home2.txt. Файл будет содержать данный текст: “This text is from assembler!;)”

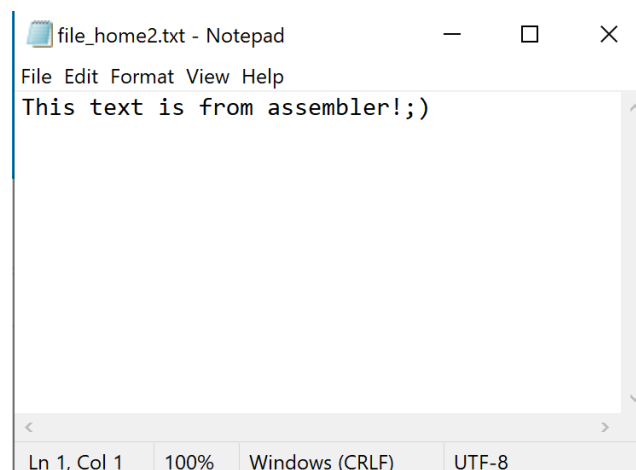


```
flat assembler 1.73.25
File Edit Search Run Options Help
format pe console 4.0
include 'WIN32AX.INC'

.data
buf db 'This text is from assembler!;)'
bufsize = $ - buf
byteswritten dd ?
.code
main:
invoke CreateFile, 'file_home2.txt', GENERIC_WRITE, 0, 0, 4, FILE_ATTRIBUTE_NORMAL, 0
invoke WriteFile, eax, buf, bufsize, byteswritten, 0
invoke ExitProcess, 0
.end main
```

После запуска открывается и сразу закрывается консоль

Сгенерированный файл:



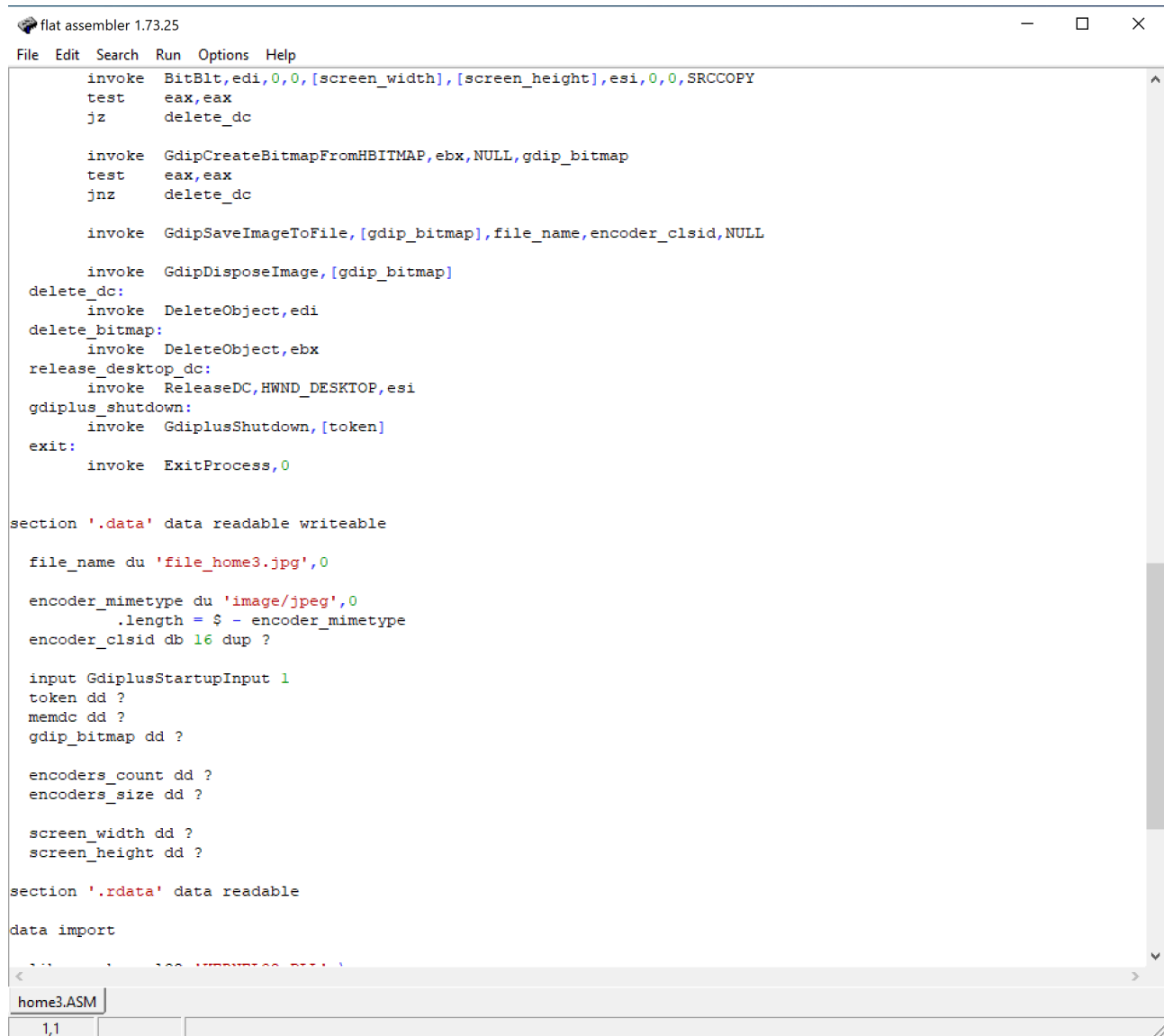
```
file_home2.txt - Notepad
File Edit Format View Help
This text is from assembler!;)

Ln 1, Col 1 100% Windows (CRLF) UTF-8
```

Пример программы 3:

Данная программа фотографирует экран в момент запуска и сохраняет его в file_home3.jpg:

На снимке представлена лишь часть программы, так как код достаточно внушительных размеров



```
flat assembler 1.73.25
File Edit Search Run Options Help

    invoke  BitBlt,edi,0,0,[screen_width],[screen_height],esi,0,0,SRCCOPY
    test   eax,eax
    jz      delete_dc

    invoke  GdipCreateBitmapFromHBITMAP,ebx,NULL,gdip_bitmap
    test   eax,eax
    jnz     delete_dc

    invoke  GdipSaveImageToFile,[gdip_bitmap],file_name,encoder_clsid,NULL

    invoke  GdipDisposeImage,[gdip_bitmap]
delete_dc:
    invoke  DeleteObject,edi
delete_bitmap:
    invoke  DeleteObject,ebx
release_desktop_dc:
    invoke  ReleaseDC,HWND_DESKTOP,esi
gdiplus_shutdown:
    invoke  GdiplusShutdown,[token]
exit:
    invoke  ExitProcess,0

section '.data' data readable writeable

    file_name du 'file_home3.jpg',0

    encoder_mimetype du 'image/jpeg',0
    .length = $ - encoder_mimetype
    encoder_clsid db 16 dup ?

    input GdiplusStartupInput 1
    token dd ?
    memdc dd ?
    gdip_bitmap dd ?

    encoders_count dd ?
    encoders_size dd ?

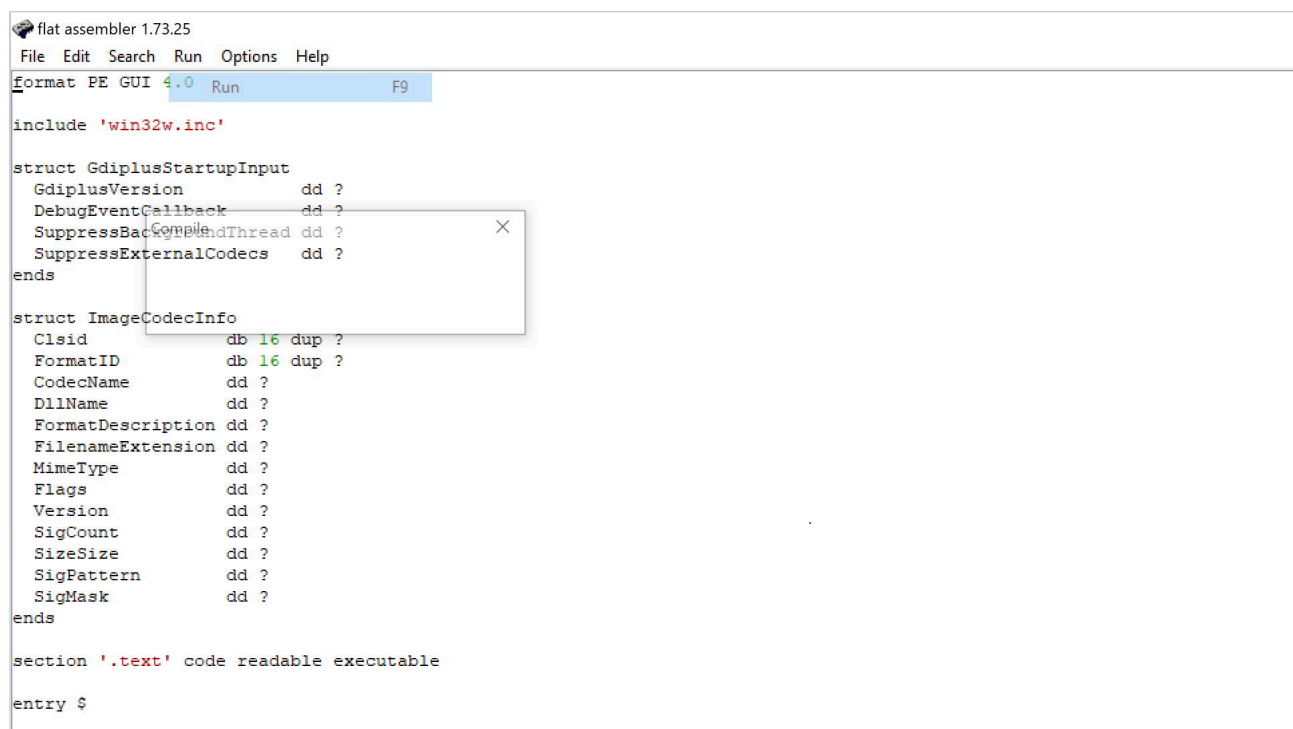
    screen_width dd ?
    screen_height dd ?

section '.rdata' data readable

data import

home3.ASM
1,1
```

Скриншот сохраненной программой в file_home3.jpg:



```
flat assembler 1.73.25
File Edit Search Run Options Help
Format PE GUI 4.0 Run F9

include 'win32w.inc'

struct GdiplusStartupInput
    GdiplusVersion      dd ?
    DebugEventCallback  dd ?
    SuppressBackgroundThread dd ?
    SuppressExternalCodecs dd ?
ends

struct ImageCodecInfo
    Clsid               db 16 dup ?
    FormatID            db 16 dup ?
    CodecName           dd ?
    DllName             dd ?
    FormatDescription   dd ?
    FilenameExtension  dd ?
    MimeType            dd ?
    Flags               dd ?
    Version             dd ?
    SigCount            dd ?
    SizeSize            dd ?
    SigPattern          dd ?
    SigMask             dd ?
ends

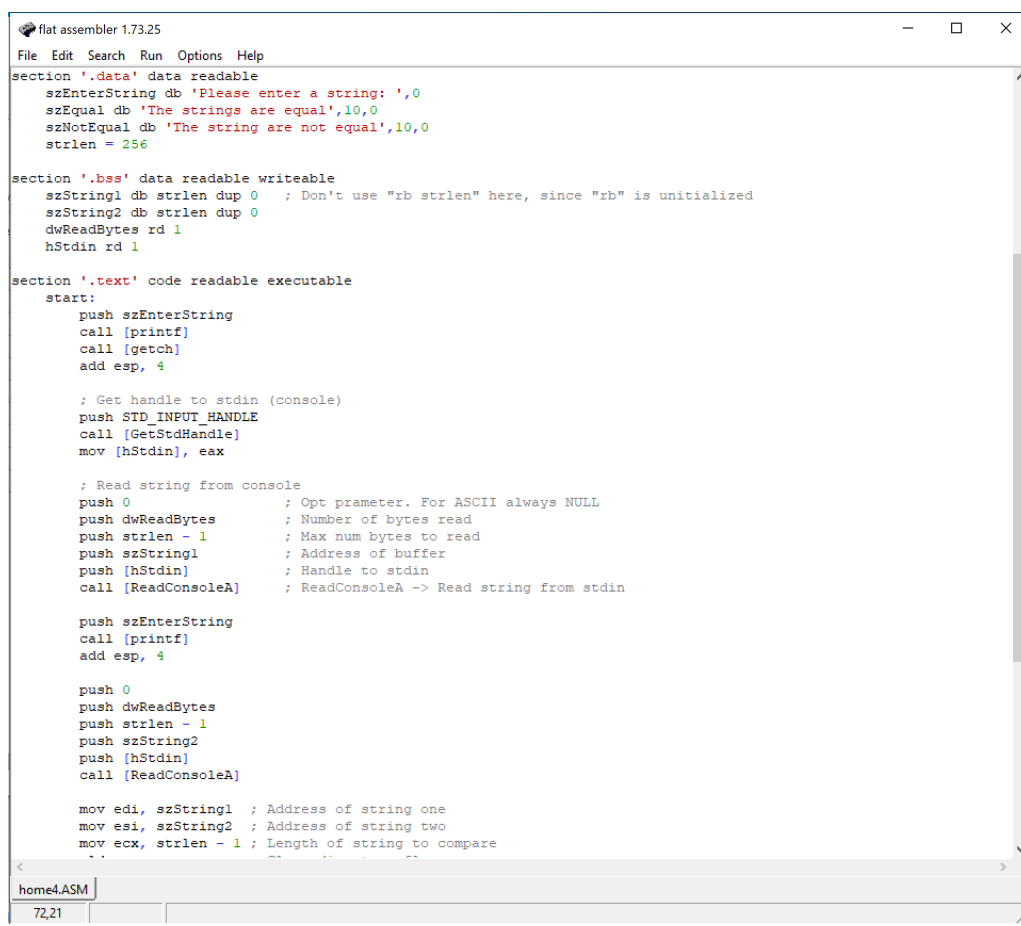
section '.text' code readable executable

entry $
```

Пример программы 4:

Данное консольное приложение проверяет одинаковы ли две введенные строки, после чего выводит результат

Скриншот программы:



```
flat assembler 1.73.25
File Edit Search Run Options Help

section '.data' data readable
    szEnterString db 'Please enter a string: ',0
    szEqual db 'The strings are equal',10,0
    szNotEqual db 'The string are not equal',10,0
    strlen = 256

section '.bss' data readable writeable
    szString1 db strlen dup 0 ; Don't use "rb strlen" here, since "rb" is uninitialized
    szString2 db strlen dup 0
    dwReadBytes rd 1
    hStdin rd 1

section '.text' code readable executable
    start:
        push szEnterString
        call [printf]
        call [getch]
        add esp, 4

        ; Get handle to stdin (console)
        push STD_INPUT_HANDLE
        call [GetStdHandle]
        mov [hStdin], eax

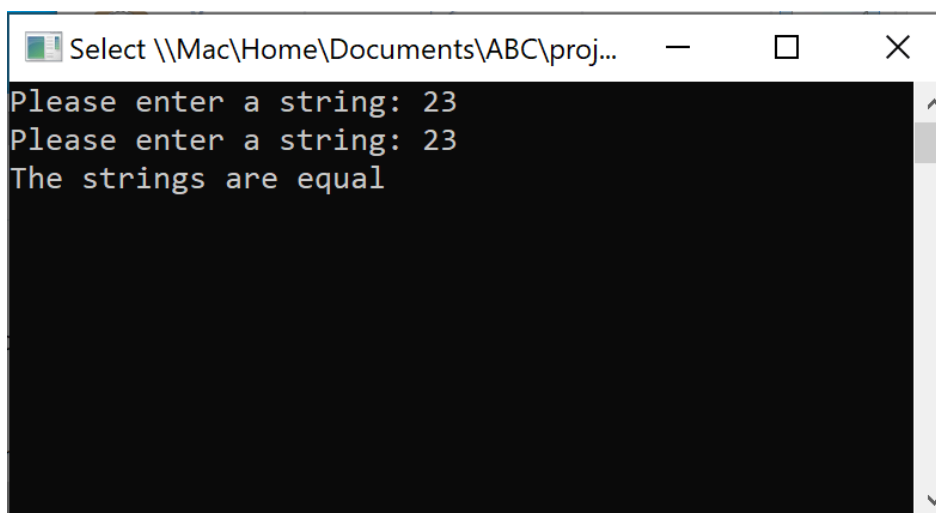
        ; Read string from console
        push 0 ; Opt parameter. For ASCII always NULL
        push dwReadBytes ; Number of bytes read
        push strlen - 1 ; Max num bytes to read
        push szString1 ; Address of buffer
        push [hStdin] ; Handle to stdin
        call [ReadConsoleA] ; ReadConsoleA -> Read string from stdin

        push szEnterString
        call [printf]
        add esp, 4

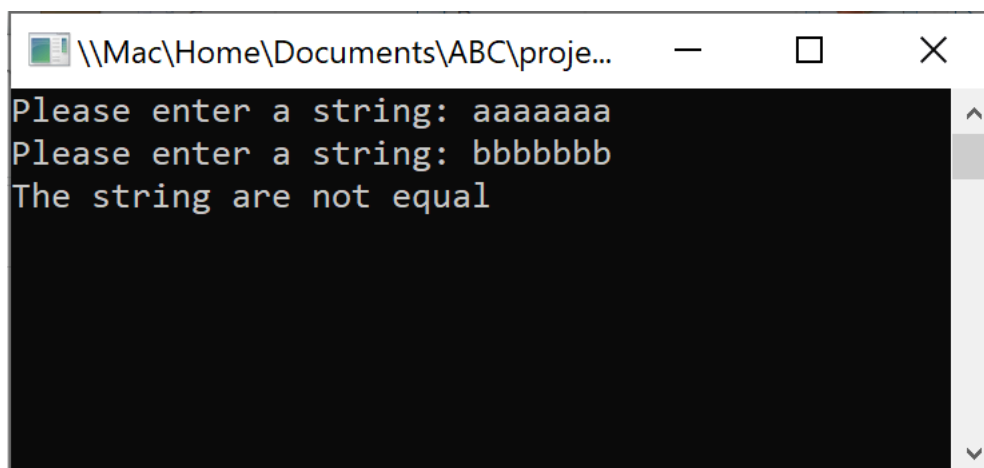
        push 0
        push dwReadBytes
        push strlen - 1
        push szString2
        push [hStdin]
        call [ReadConsoleA]

        mov edi, szString1 ; Address of string one
        mov esi, szString2 ; Address of string two
        mov ecx, strlen - 1 ; Length of string to compare
```

Примеры работы:



```
Select \\Mac\Home\Documents\ABC\proj...  
Please enter a string: 23  
Please enter a string: 23  
The strings are equal
```

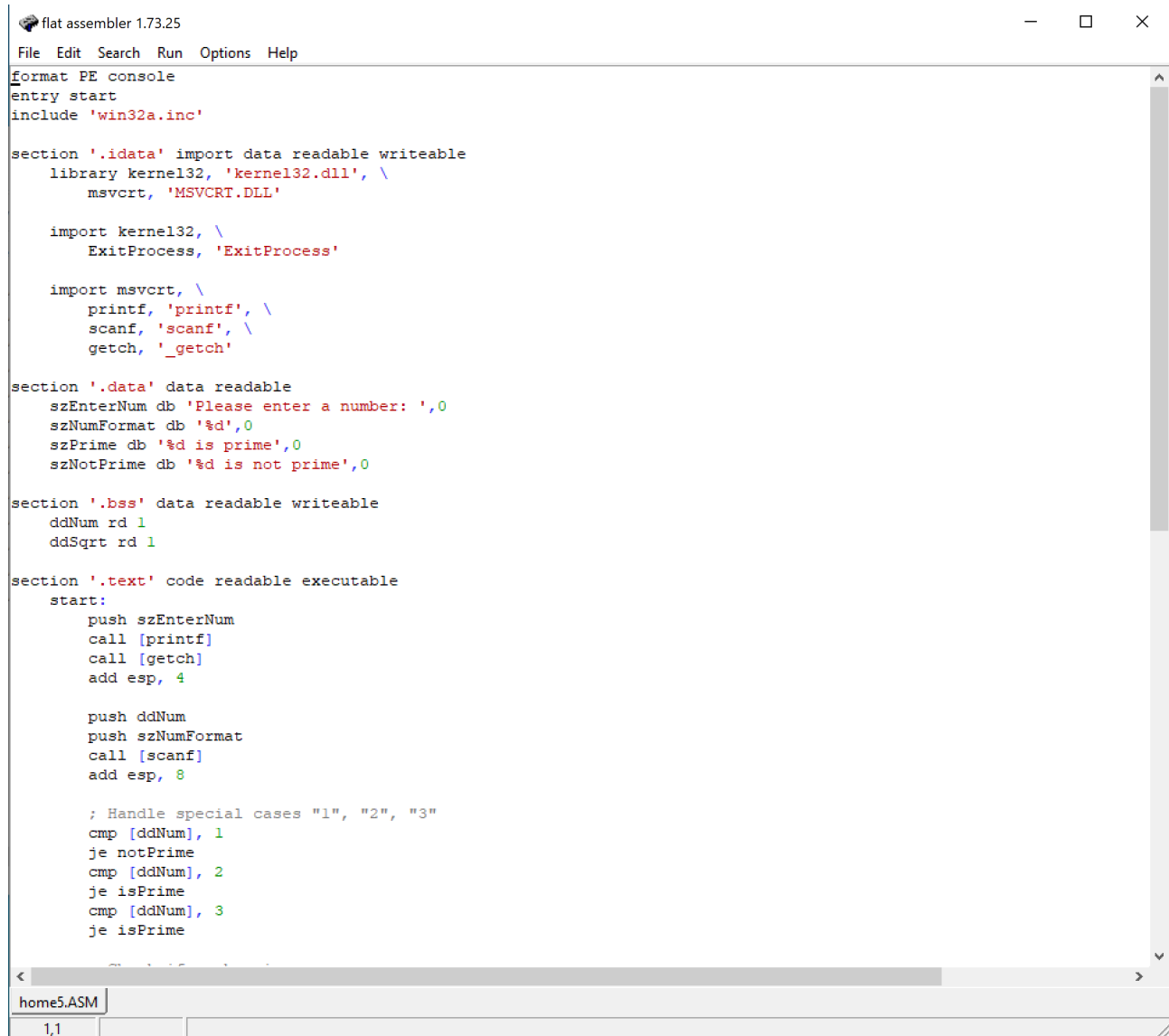


```
\\Mac\Home\Documents\ABC\proje...  
Please enter a string: aaaaaaa  
Please enter a string: bbbbbbb  
The string are not equal
```

Пример программы 5:

Данное консольное приложение проверяет является ли простым введенное пользователем число

Скриншот программы:



The screenshot shows the flat assembler 1.73.25 window. The title bar reads "flat assembler 1.73.25". The menu bar includes "File", "Edit", "Search", "Run", "Options", and "Help". The main text area contains the following assembly code:

```
format PE console
entry start
include 'win32a.inc'

section '.idata' import data readable writeable
    library kernel32, 'kernel32.dll', \
        msvcrt, 'MSVCRT.DLL'

    import kernel32, \
        ExitProcess, 'ExitProcess'

    import msvcrt, \
        printf, 'printf', \
        scanf, 'scanf', \
        getch, '_getch'

section '.data' data readable
    szEnterNum db 'Please enter a number: ',0
    szNumFormat db '%d',0
    szPrime db '%d is prime',0
    szNotPrime db '%d is not prime',0

section '.bss' data readable writeable
    ddNum rd 1
    ddSqrt rd 1

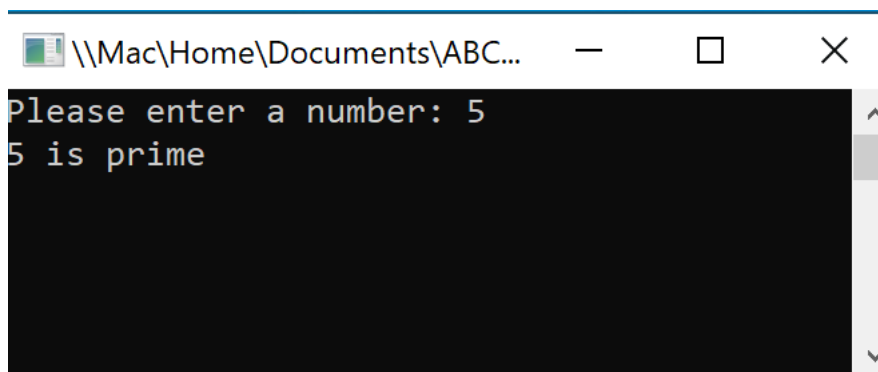
section '.text' code readable executable
    start:
        push szEnterNum
        call [printf]
        call [getch]
        add esp, 4

        push ddNum
        push szNumFormat
        call [scanf]
        add esp, 8

        ; Handle special cases "1", "2", "3"
        cmp [ddNum], 1
        je notPrime
        cmp [ddNum], 2
        je isPrime
        cmp [ddNum], 3
        je isPrime
```

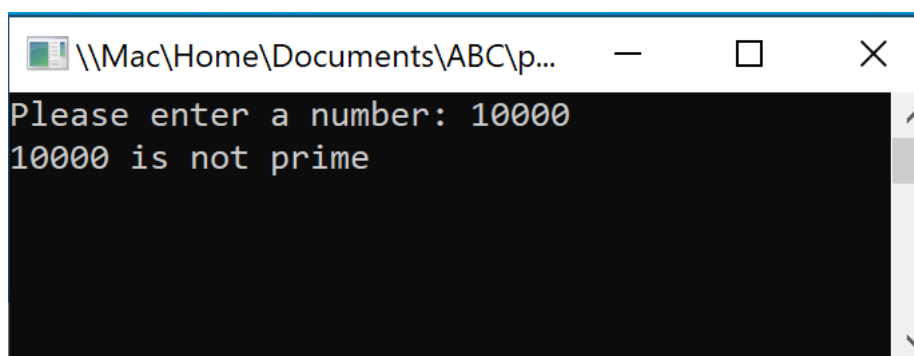
At the bottom, the file name "home5.ASM" is displayed in the status bar, along with the address "1,1".

Примеры работы программы:



A terminal window with a title bar showing the file path `\\Mac\Home\Documents\ABC...`. The terminal has a black background and white text. It displays the prompt `Please enter a number:` followed by the user input `5`. Below the input, the program outputs `5 is prime`. A vertical scrollbar is visible on the right side of the terminal window.

```
\\Mac\Home\Documents\ABC...  
Please enter a number: 5  
5 is prime
```



A terminal window with a title bar showing the file path `\\Mac\Home\Documents\ABC\p...`. The terminal has a black background and white text. It displays the prompt `Please enter a number:` followed by the user input `10000`. Below the input, the program outputs `10000 is not prime`. A vertical scrollbar is visible on the right side of the terminal window.

```
\\Mac\Home\Documents\ABC\p...  
Please enter a number: 10000  
10000 is not prime
```

Все исходные файлы также находятся на <https://github.com/DenSmugg/ABC>