HANGMAN

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COMPUTER ORGANIZATION AND LANGUAGES

NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES - FAST

INTRODUCTION:

Implementing assembly language to make, childhood classic, hangman on a console based platform. The player has to guess the word before his/her lives run out and then loses the game.

LITERATURE REVIEW:

It is a very famous game, and we took inspiration from different string operations and tried to implement them in our game. Moreover, we also decided to use different animations to make the game more appealing and interesting.

PROBLEM DEFINITION:

Our program takes character inputs as guesses for the word needed to be guessed.

METHODOLOGY/SOLUTION STATEMENT:

The program will compare the input character with the word string. If any letters match it will output the letters onto the user's guess.

DETAILED DESIGN AND ARCHITECTURE:

main PROC //All The Main Part

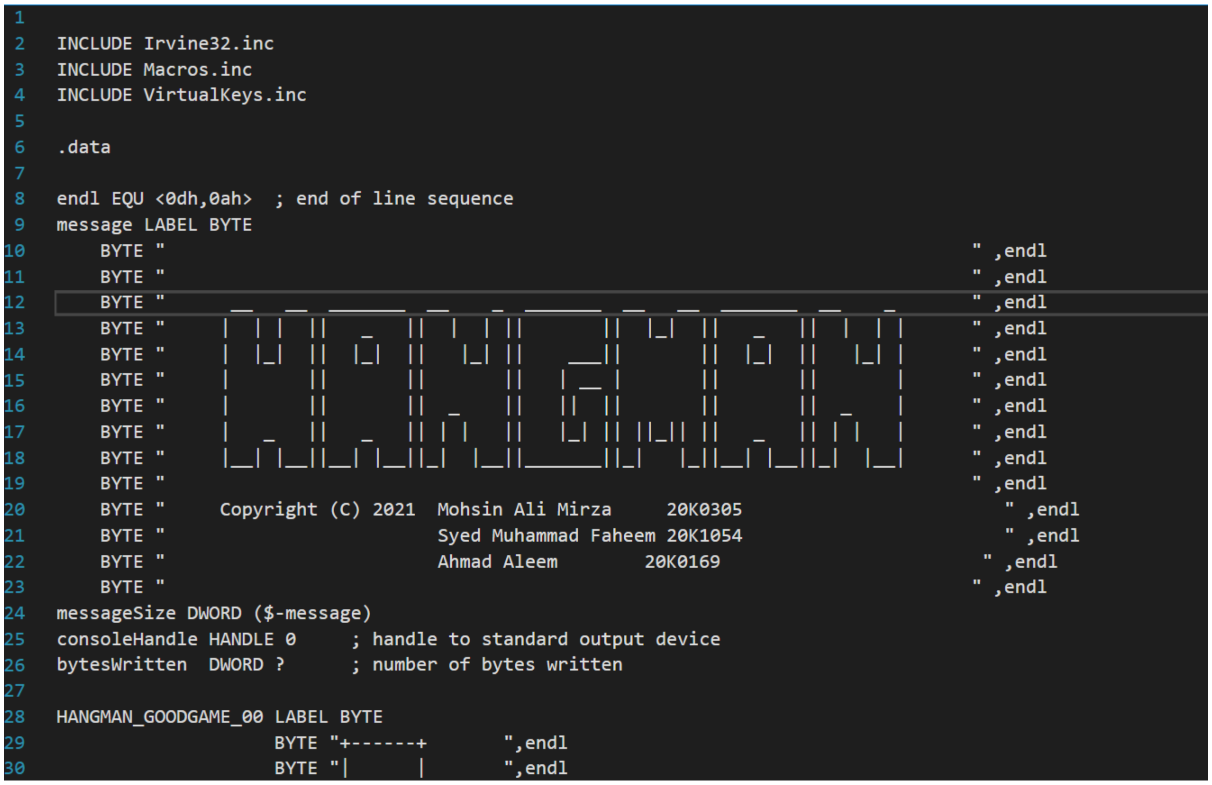
find_str PROC //Finds The String In The Word List

make_array_dash PROC //Makes The dashes for the word to be guessed

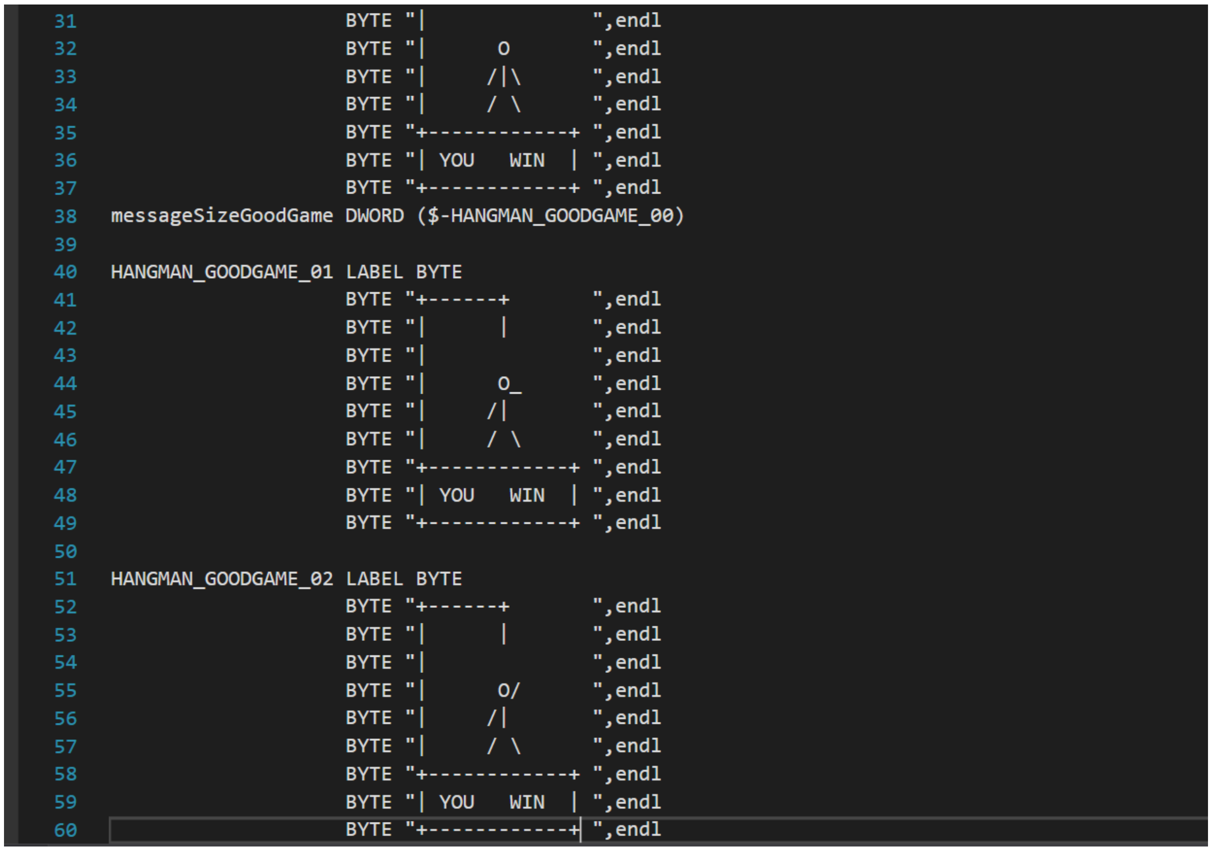
make_array_guess_letter PROC //Makes The dashes with our guessed character

print_hangman_live PROC //Printing/Animating The Current Status Of Hangman

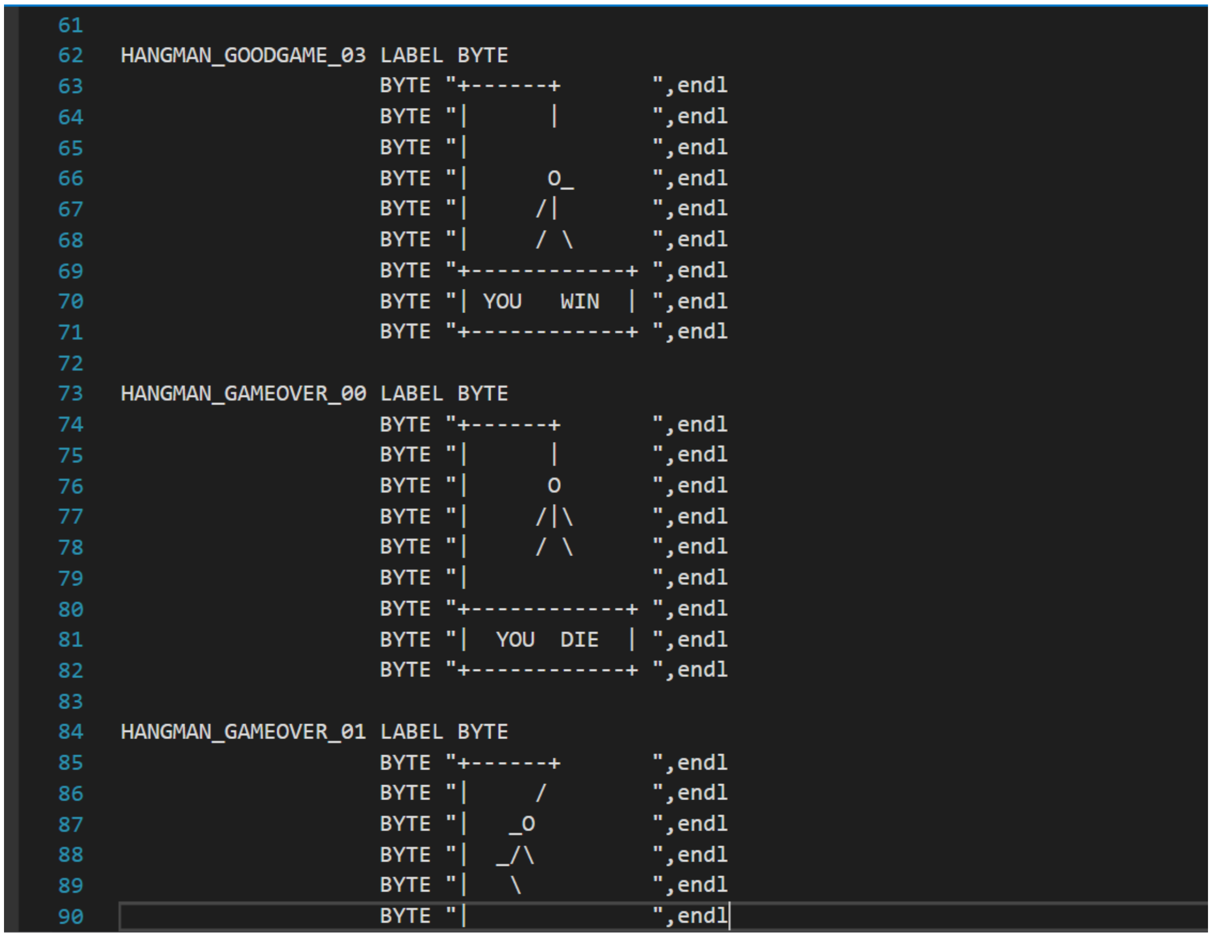
IMPLEMENTATION AND TESTING AND PROGRAMMING CODE:



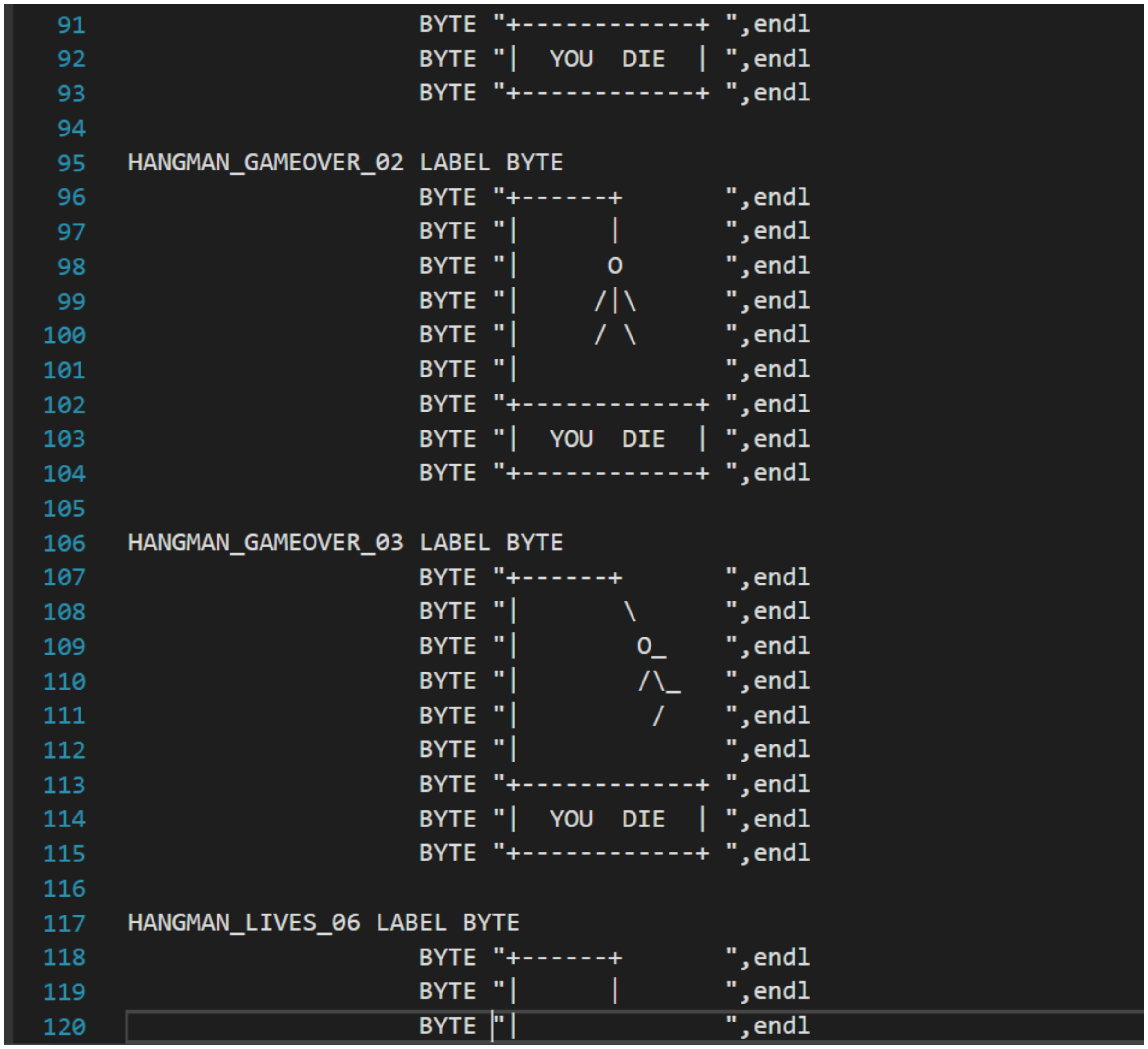
```

INCLUDE Irvine32.inc
INCLUDE Macros.inc
INCLUDE VirtualKeys.inc

.data

endl EQU <0dh,0ah>  ; end of line sequence
message LABEL BYTE
    BYTE "                                                                          " ,endl
    BYTE "                                                                          " ,endl
    BYTE "      __   __  _______  __    _  _______  __   __  _______  __    _       " ,endl
    BYTE "     |  | |  ||   _   ||  |  | ||       ||  |_|  ||   _   ||  |  | |      " ,endl
    BYTE "     |  |_|  ||  |_|  ||   |_| ||    ___||       ||  |_|  ||   |_| |      " ,endl
    BYTE "     |       ||       ||       ||   | __ |       ||       ||       |      " ,endl
    BYTE "     |       ||       ||  _    ||   ||  ||       ||       ||  _    |      " ,endl
    BYTE "     |   _   ||   _   || | |   ||   |_| || ||_|| ||   _   || | |   |      " ,endl
    BYTE "     |__| |__||__| |__||_|  |__||_______||_|   |_||__| |__||_|  |__|      " ,endl
    BYTE "                                                                          " ,endl
    BYTE "     Copyright (C) 2021  Mohsin Ali Mirza     20K0305                        " ,endl
    BYTE "                         Syed Muhammad Faheem 20K1054                        " ,endl
    BYTE "                         Ahmad Aleem        20K0169                        " ,endl
    BYTE "                                                                          " ,endl
messageSize DWORD ($-message)
consoleHandle HANDLE 0     ; handle to standard output device
bytesWritten  DWORD ?      ; number of bytes written

HANGMAN_GOODGAME_00 LABEL BYTE
                    BYTE "+-------+      ",endl
                    BYTE "|       |      ",endl
```



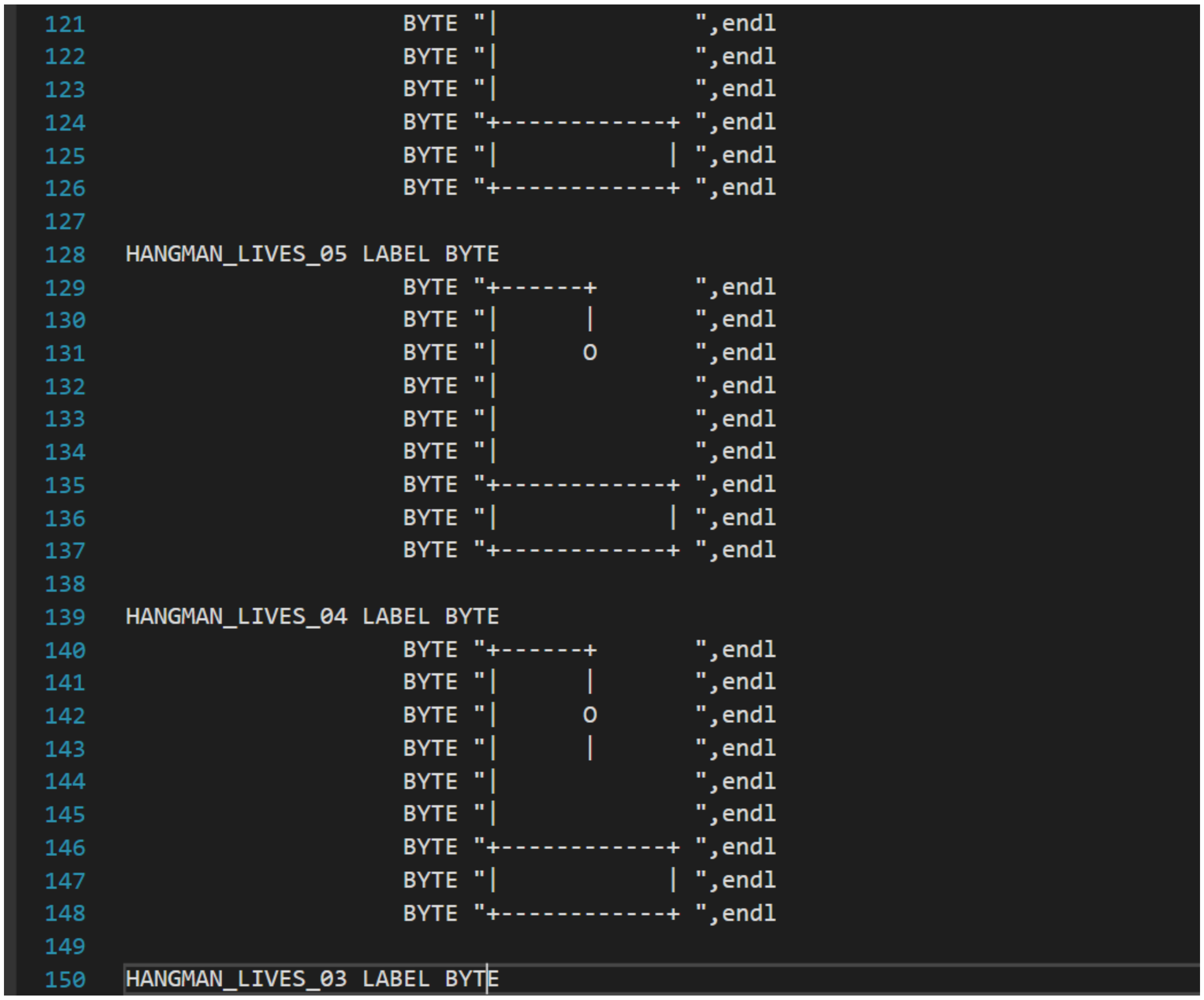
```
                    BYTE "|              ",endl
                    BYTE "|      O       ",endl
                    BYTE "|     /|\      ",endl
                    BYTE "|     / \      ",endl
                    BYTE "+------------+ ",endl
                    BYTE "| YOU   WIN  | ",endl
                    BYTE "+------------+ ",endl
messageSizeGoodGame DWORD ($-HANGMAN_GOODGAME_00)

HANGMAN_GOODGAME_01 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|              ",endl
                    BYTE "|      O_      ",endl
                    BYTE "|     /|       ",endl
                    BYTE "|     / \      ",endl
                    BYTE "+------------+ ",endl
                    BYTE "| YOU   WIN  | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_GOODGAME_02 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|              ",endl
                    BYTE "|      O/      ",endl
                    BYTE "|     /|       ",endl
                    BYTE "|     / \      ",endl
                    BYTE "+------------+ ",endl
                    BYTE "| YOU   WIN  | ",endl
                    BYTE "+------------+ ",endl
```



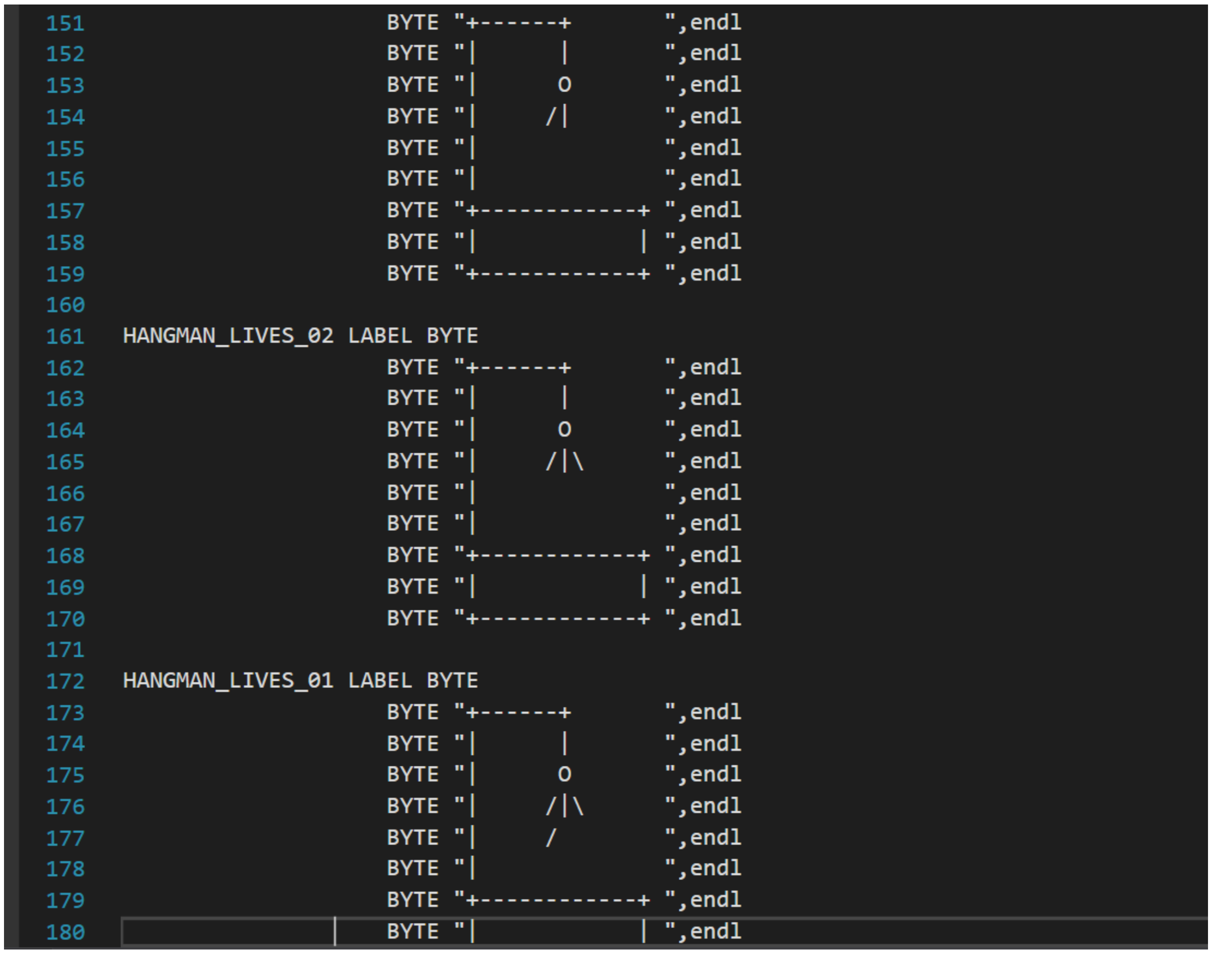
```

HANGMAN_GOODGAME_03 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|              ",endl
                    BYTE "|      O_      ",endl
                    BYTE "|     /|       ",endl
                    BYTE "|     / \      ",endl
                    BYTE "+------------+ ",endl
                    BYTE "| YOU   WIN  | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_GAMEOVER_00 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|      O       ",endl
                    BYTE "|     /|\      ",endl
                    BYTE "|     / \      ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|  YOU  DIE  | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_GAMEOVER_01 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|     /        ",endl
                    BYTE "|   _O         ",endl
                    BYTE "|  _/\         ",endl
                    BYTE "|   \          ",endl
                    BYTE "|              ",endl
```



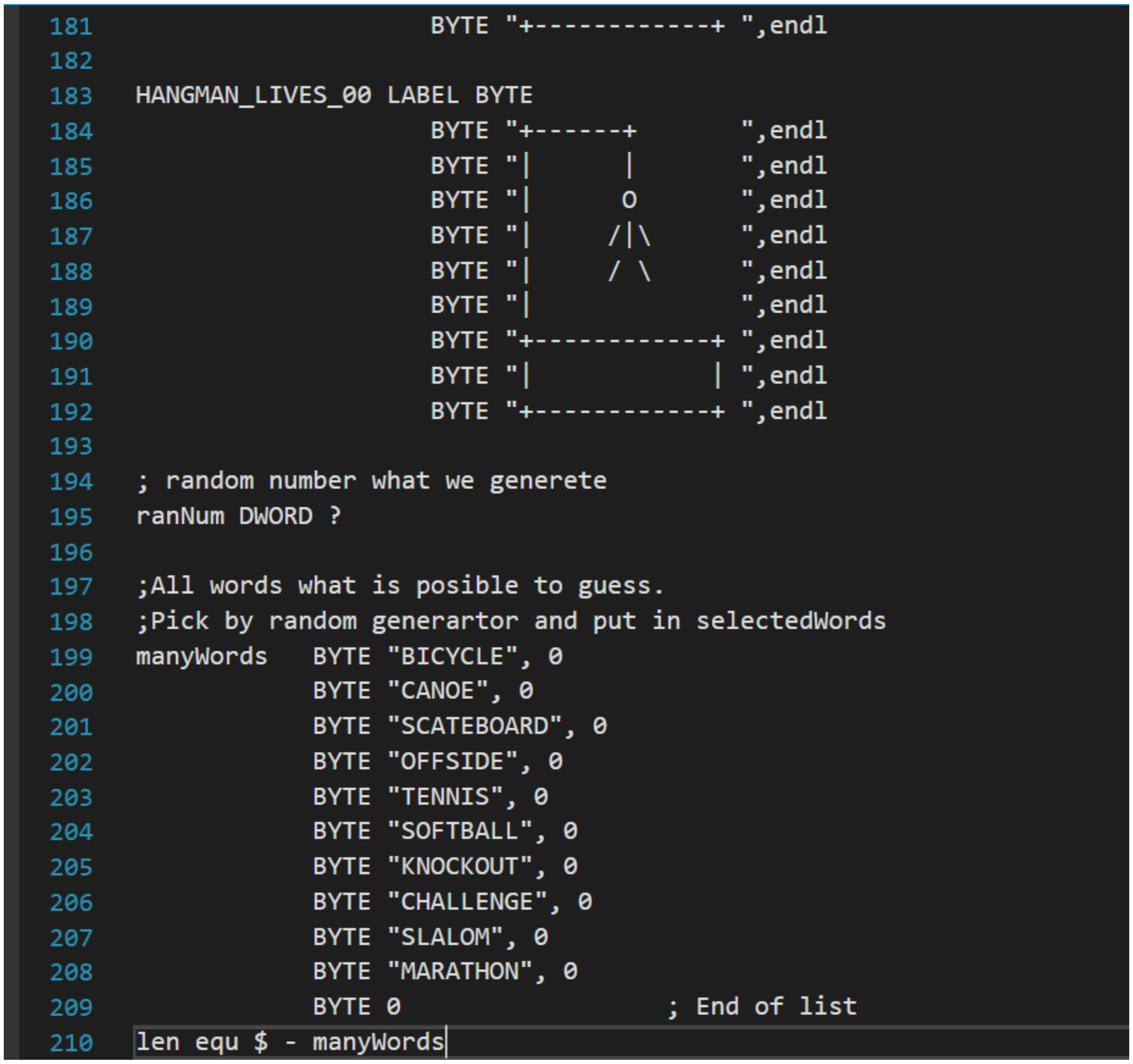
```
                    BYTE "+------------+ ",endl
                    BYTE "|  YOU  DIE  | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_GAMEOVER_02 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|      O       ",endl
                    BYTE "|     /|\      ",endl
                    BYTE "|     / \      ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|  YOU  DIE  | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_GAMEOVER_03 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|       \      ",endl
                    BYTE "|        O_    ",endl
                    BYTE "|        /\_   ",endl
                    BYTE "|         /    ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|  YOU  DIE  | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_LIVES_06 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|              ",endl
```



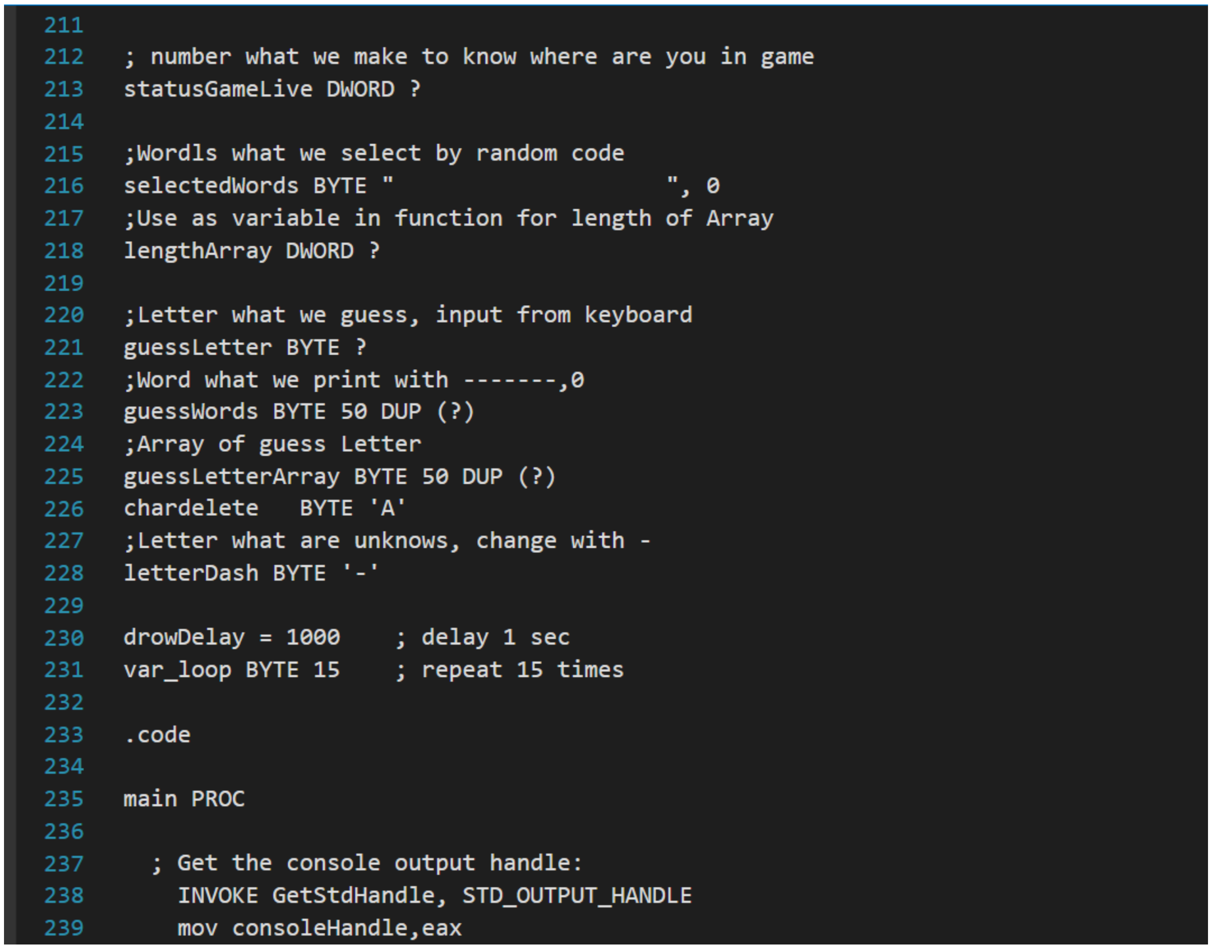
```
                    BYTE "|              ",endl
                    BYTE "|              ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|            | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_LIVES_05 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|      O       ",endl
                    BYTE "|              ",endl
                    BYTE "|              ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|            | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_LIVES_04 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|      O       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|              ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|            | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_LIVES_03 LABEL BYTE
```



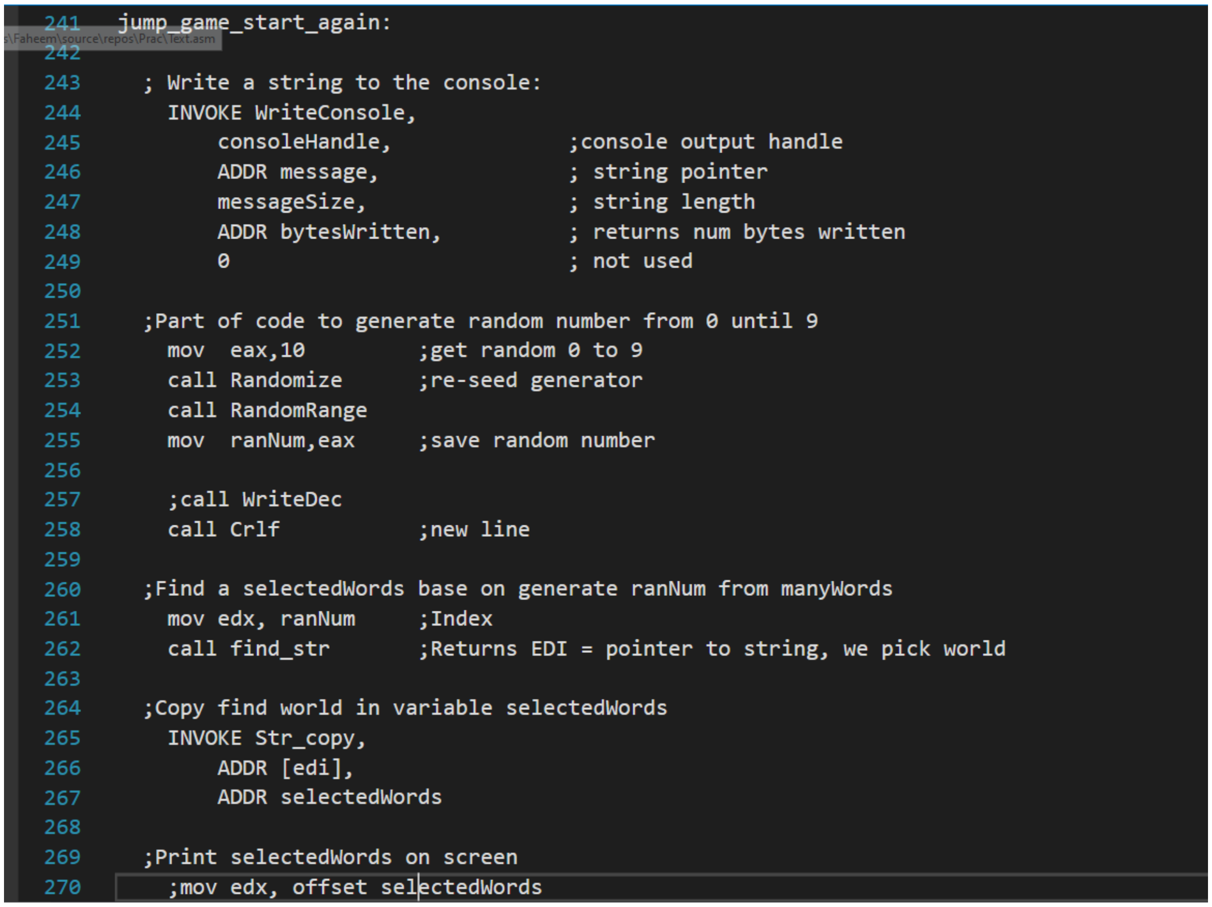
```
                    BYTE "+-------+      ",endl
                    BYTE "|       |      ",endl
                    BYTE "|       O      ",endl
                    BYTE "|      /|      ",endl
                    BYTE "|              ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|            | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_LIVES_02 LABEL BYTE
                    BYTE "+-------+      ",endl
                    BYTE "|       |      ",endl
                    BYTE "|       O      ",endl
                    BYTE "|      /|\     ",endl
                    BYTE "|              ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|            | ",endl
                    BYTE "+------------+ ",endl

HANGMAN_LIVES_01 LABEL BYTE
                    BYTE "+-------+      ",endl
                    BYTE "|       |      ",endl
                    BYTE "|       O      ",endl
                    BYTE "|      /|\     ",endl
                    BYTE "|      /       ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|            | ",endl
```



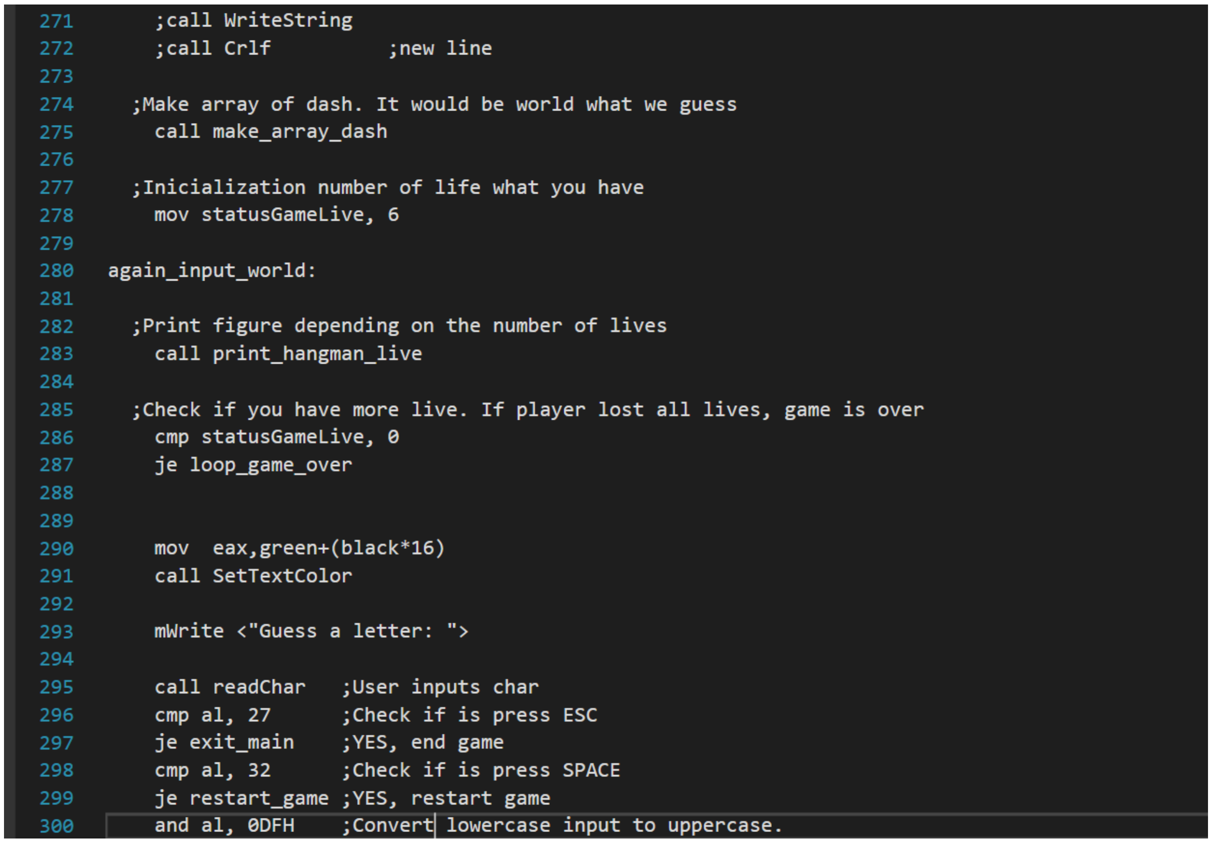
```
                    BYTE "+------------+ ",endl

HANGMAN_LIVES_00 LABEL BYTE
                    BYTE "+------+       ",endl
                    BYTE "|      |       ",endl
                    BYTE "|      O       ",endl
                    BYTE "|     /|\      ",endl
                    BYTE "|     / \      ",endl
                    BYTE "|              ",endl
                    BYTE "+------------+ ",endl
                    BYTE "|            | ",endl
                    BYTE "+------------+ ",endl

; random number what we generete
ranNum DWORD ?

;All words what is posible to guess.
;Pick by random generartor and put in selectedWords
manyWords   BYTE "BICYCLE", 0
            BYTE "CANOE", 0
            BYTE "SCATEBOARD", 0
            BYTE "OFFSIDE", 0
            BYTE "TENNIS", 0
            BYTE "SOFTBALL", 0
            BYTE "KNOCKOUT", 0
            BYTE "CHALLENGE", 0
            BYTE "SLALOM", 0
            BYTE "MARATHON", 0
            BYTE 0                  ; End of list
len equ $ - manyWords
```



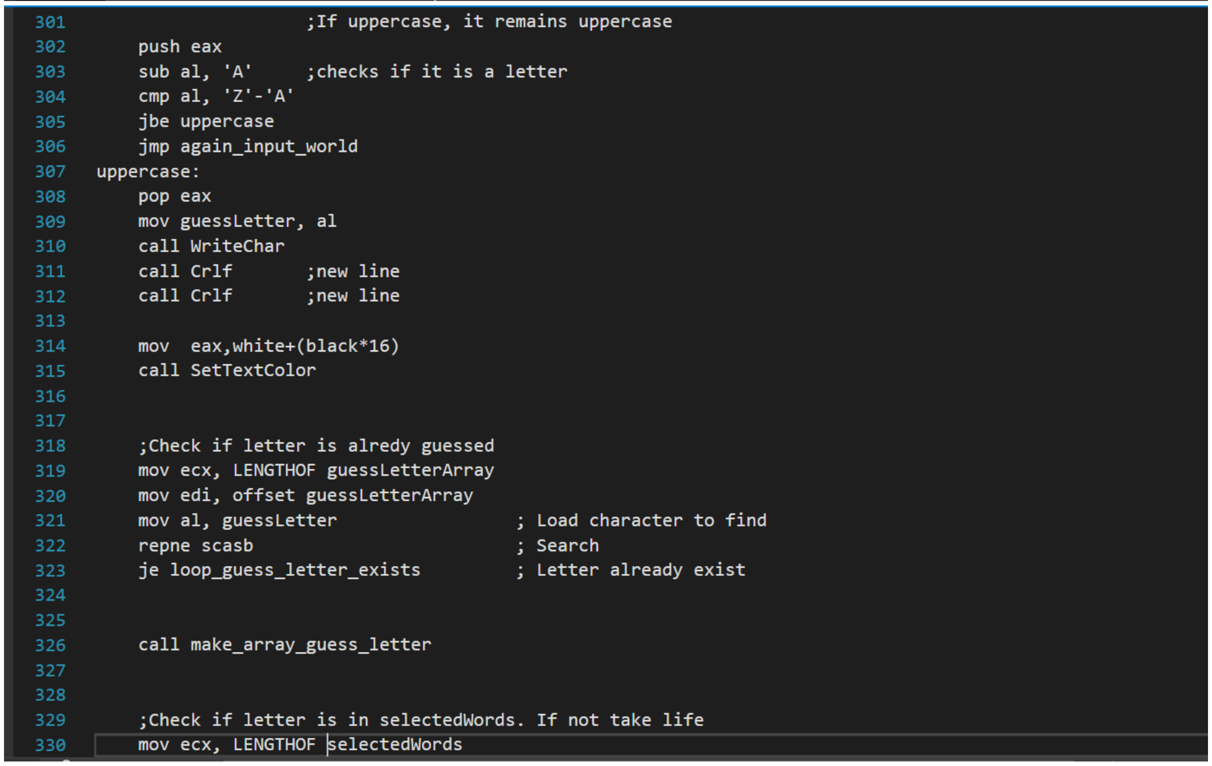
```

; number what we make to know where are you in game
statusGameLive DWORD ?

;Wordls what we select by random code
selectedWords BYTE "                    ", 0
;Use as variable in function for length of Array
lengthArray DWORD ?

;Letter what we guess, input from keyboard
guessLetter BYTE ?
;Word what we print with -------,0
guessWords BYTE 50 DUP (?)
;Array of guess Letter
guessLetterArray BYTE 50 DUP (?)
chardelete   BYTE 'A'
;Letter what are unknows, change with -
letterDash BYTE '-'

drowDelay = 1000    ; delay 1 sec
var_loop BYTE 15    ; repeat 15 times

.code

main PROC

  ; Get the console output handle:
    INVOKE GetStdHandle, STD_OUTPUT_HANDLE
    mov consoleHandle,eax
```



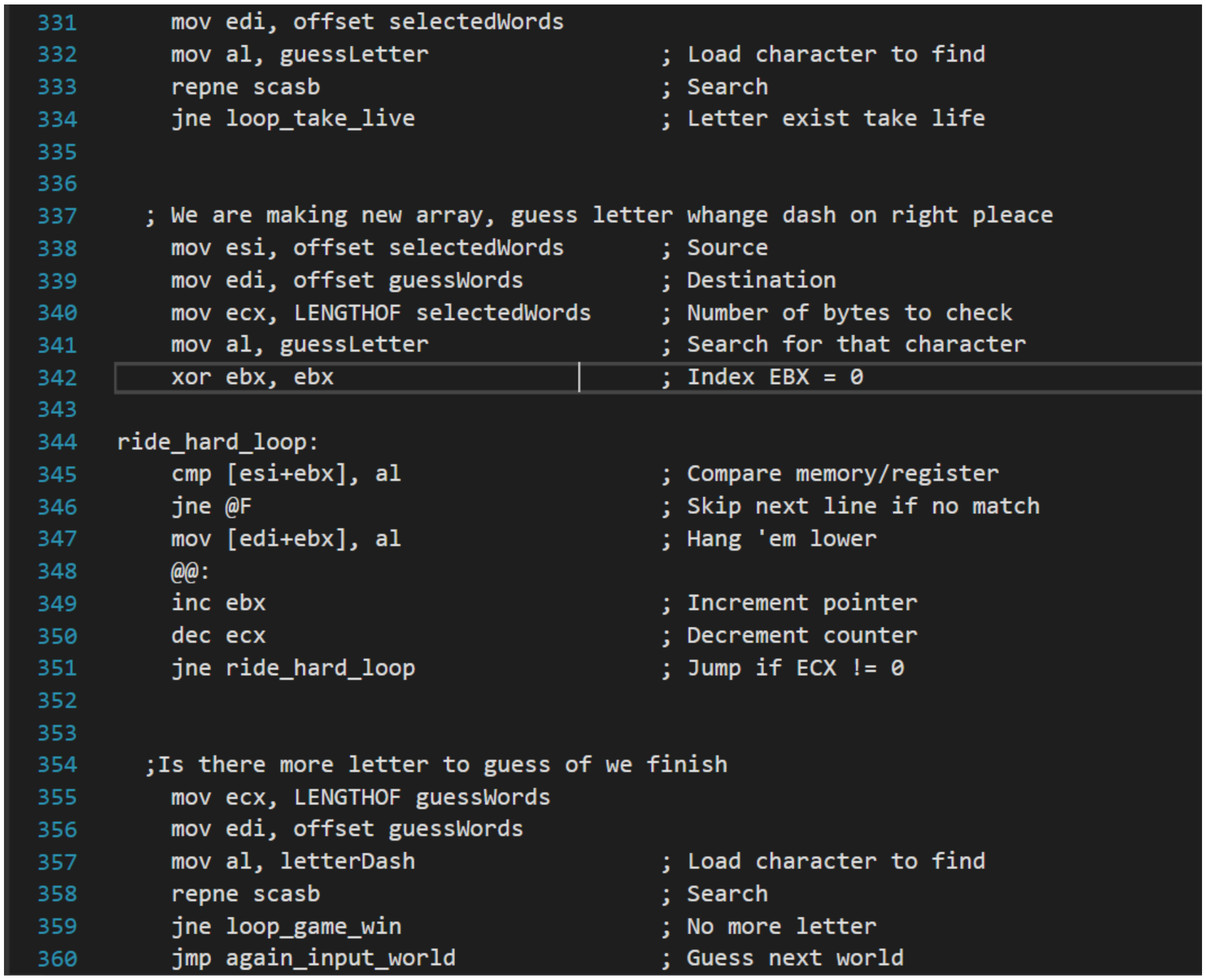
```
jump_game_start_again:

  ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,              ;console output handle
        ADDR message,               ; string pointer
        messageSize,                ; string length
        ADDR bytesWritten,          ; returns num bytes written
        0                           ; not used

  ;Part of code to generate random number from 0 until 9
    mov  eax,10         ;get random 0 to 9
    call Randomize      ;re-seed generator
    call RandomRange
    mov  ranNum,eax     ;save random number

    ;call WriteDec
    call Crlf           ;new line

  ;Find a selectedWords base on generate ranNum from manyWords
    mov edx, ranNum     ;Index
    call find_str       ;Returns EDI = pointer to string, we pick world

  ;Copy find world in variable selectedWords
    INVOKE Str_copy,
        ADDR [edi],
        ADDR selectedWords

  ;Print selectedWords on screen
    ;mov edx, offset selectedWords
```



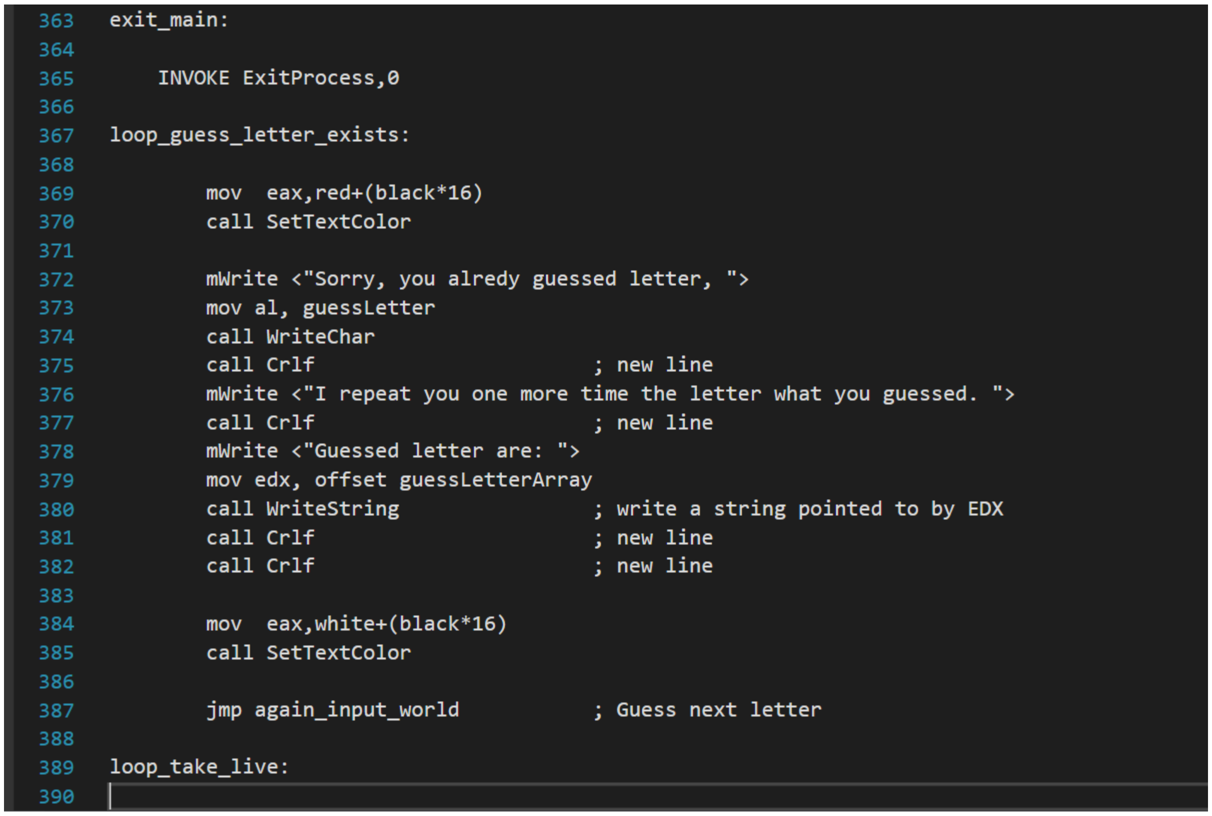
```
    ;call WriteString
    ;call Crlf          ;new line

  ;Make array of dash. It would be world what we guess
    call make_array_dash

  ;Inicialization number of life what you have
    mov statusGameLive, 6

again_input_world:

  ;Print figure depending on the number of lives
    call print_hangman_live

  ;Check if you have more live. If player lost all lives, game is over
    cmp statusGameLive, 0
    je loop_game_over


    mov  eax,green+(black*16)
    call SetTextColor

    mWrite <"Guess a letter: ">

    call readChar   ;User inputs char
    cmp al, 27      ;Check if is press ESC
    je exit_main    ;YES, end game
    cmp al, 32      ;Check if is press SPACE
    je restart_game ;YES, restart game
    and al, 0DFH    ;Convert lowercase input to uppercase.
```



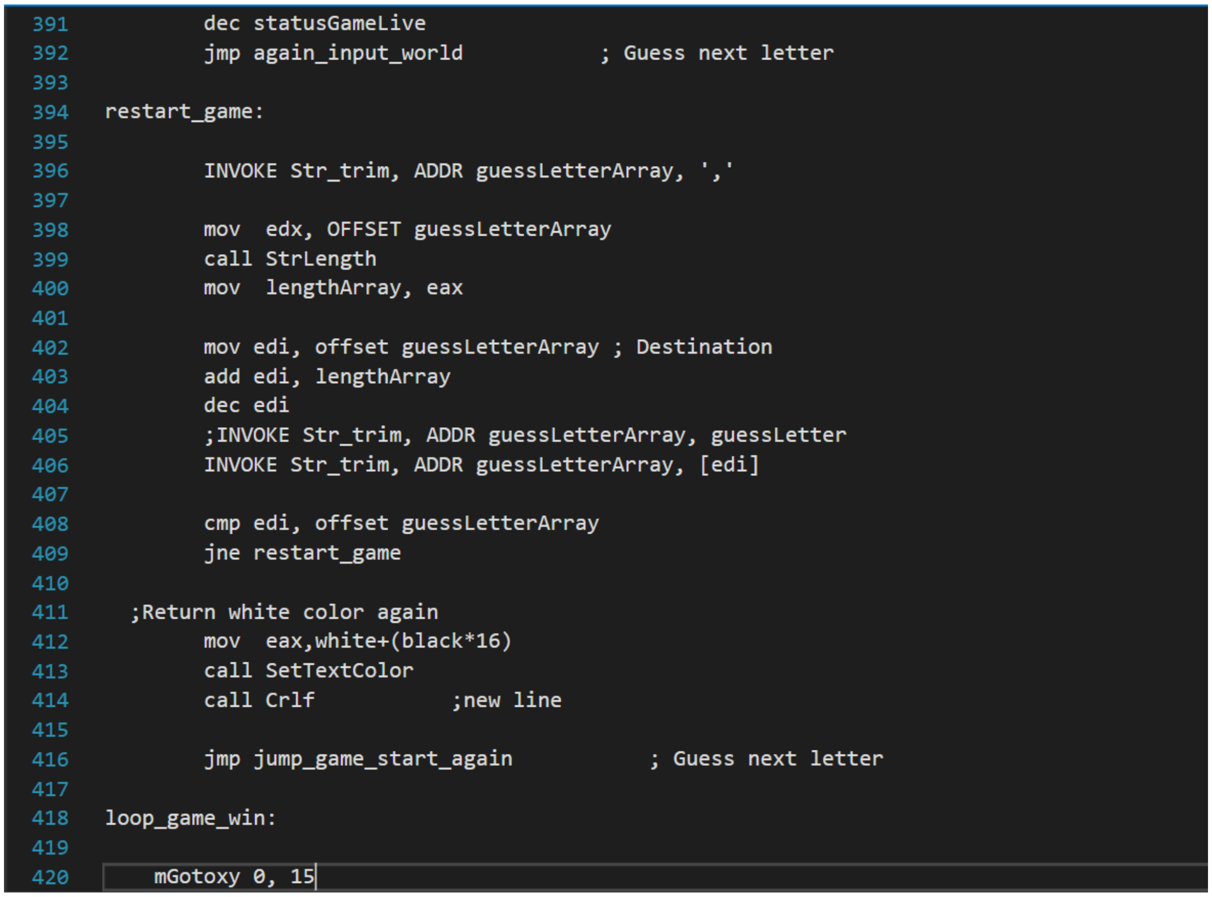
```
                    ;If uppercase, it remains uppercase
    push eax
    sub al, 'A'     ;checks if it is a letter
    cmp al, 'Z'-'A'
    jbe uppercase
    jmp again_input_world
uppercase:
    pop eax
    mov guessLetter, al
    call WriteChar
    call Crlf       ;new line
    call Crlf       ;new line

    mov  eax,white+(black*16)
    call SetTextColor


    ;Check if letter is alredy guessed
    mov ecx, LENGTHOF guessLetterArray
    mov edi, offset guessLetterArray
    mov al, guessLetter                 ; Load character to find
    repne scasb                         ; Search
    je loop_guess_letter_exists         ; Letter already exist


    call make_array_guess_letter


    ;Check if letter is in selectedWords. If not take life
    mov ecx, LENGTHOF selectedWords
```



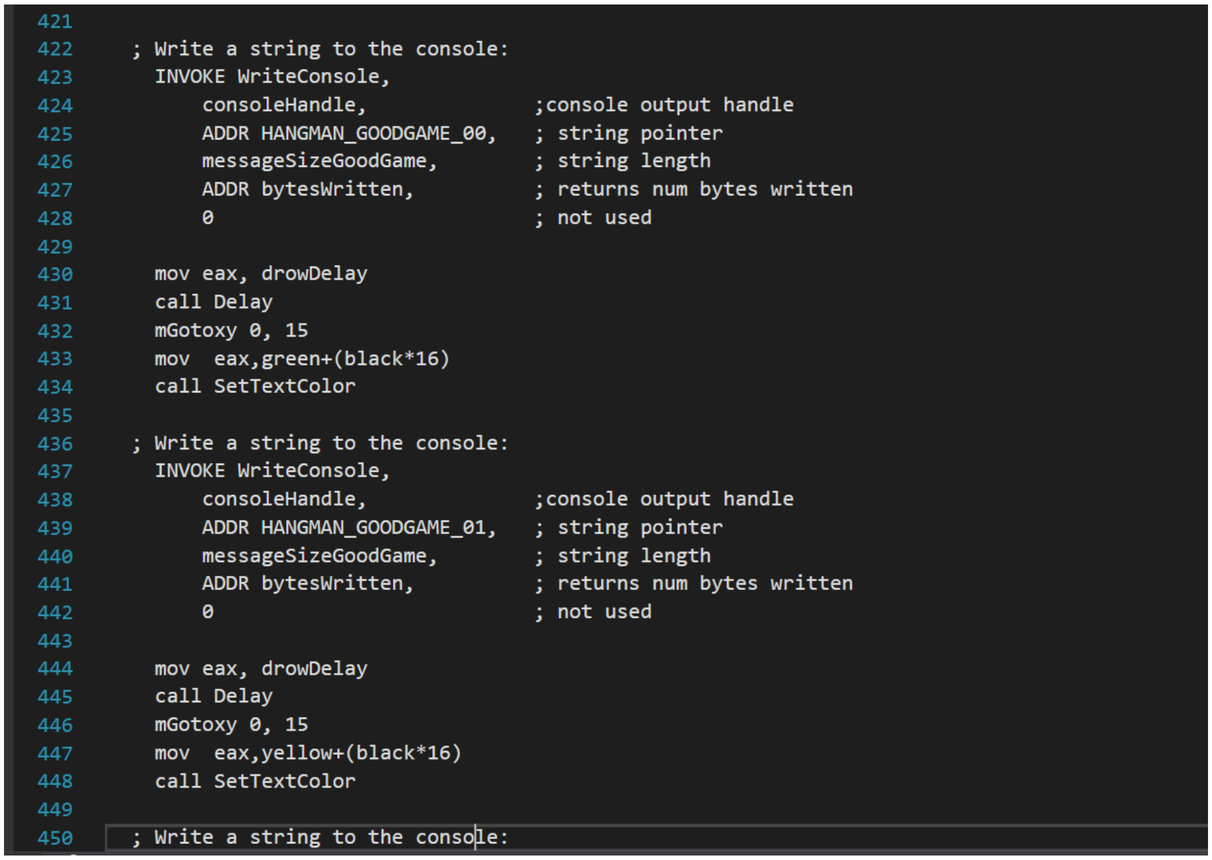
```
    mov edi, offset selectedWords
    mov al, guessLetter                  ; Load character to find
    repne scasb                          ; Search
    jne loop_take_live                   ; Letter exist take life


  ; We are making new array, guess letter whange dash on right pleace
    mov esi, offset selectedWords        ; Source
    mov edi, offset guessWords           ; Destination
    mov ecx, LENGTHOF selectedWords      ; Number of bytes to check
    mov al, guessLetter                  ; Search for that character
    xor ebx, ebx                         ; Index EBX = 0

ride_hard_loop:
    cmp [esi+ebx], al                    ; Compare memory/register
    jne @F                               ; Skip next line if no match
    mov [edi+ebx], al                    ; Hang 'em lower
    @@:
    inc ebx                              ; Increment pointer
    dec ecx                              ; Decrement counter
    jne ride_hard_loop                   ; Jump if ECX != 0


  ;Is there more letter to guess of we finish
    mov ecx, LENGTHOF guessWords
    mov edi, offset guessWords
    mov al, letterDash                   ; Load character to find
    repne scasb                          ; Search
    jne loop_game_win                    ; No more letter
    jmp again_input_world                ; Guess next world
```



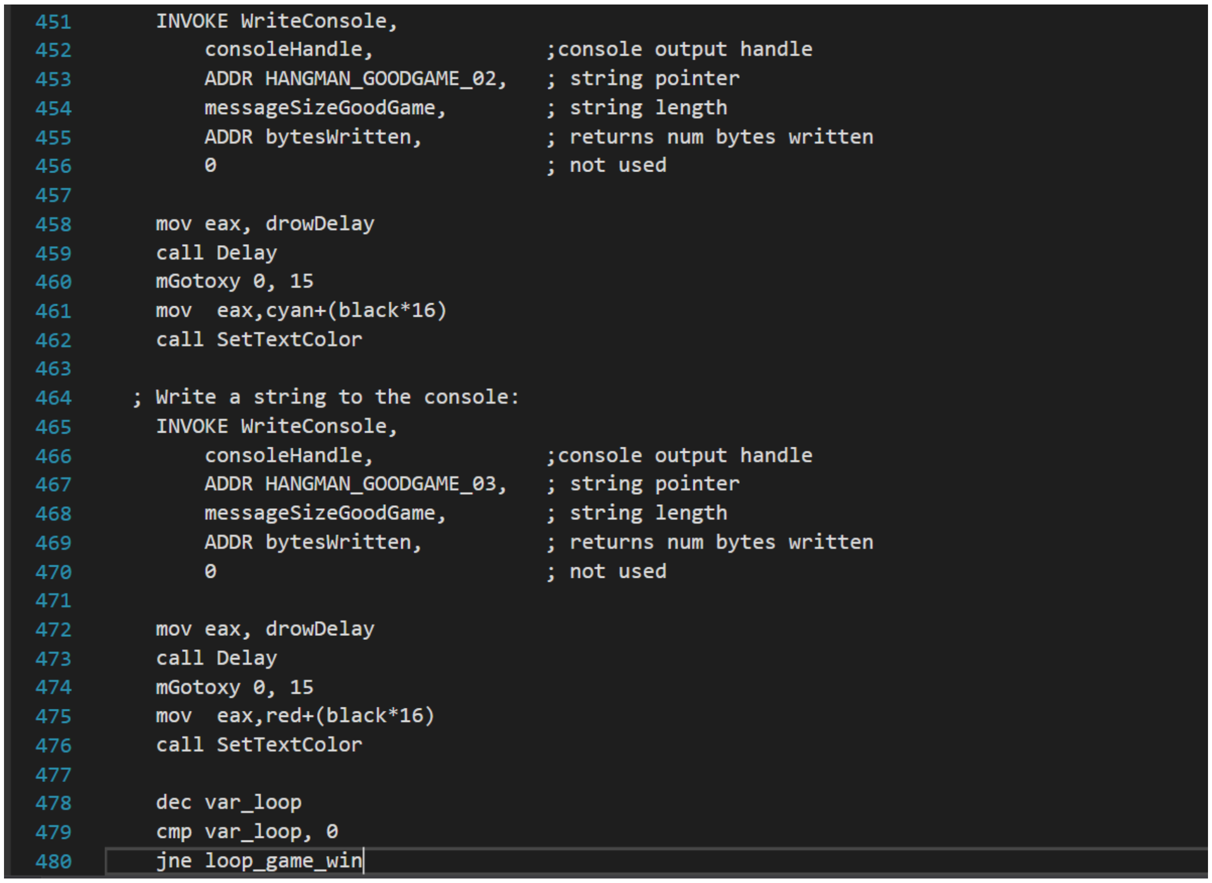
```
exit_main:

    INVOKE ExitProcess,0

loop_guess_letter_exists:

        mov  eax,red+(black*16)
        call SetTextColor

        mWrite <"Sorry, you alredy guessed letter, ">
        mov al, guessLetter
        call WriteChar
        call Crlf                       ; new line
        mWrite <"I repeat you one more time the letter what you guessed. ">
        call Crlf                       ; new line
        mWrite <"Guessed letter are: ">
        mov edx, offset guessLetterArray
        call WriteString                ; write a string pointed to by EDX
        call Crlf                       ; new line
        call Crlf                       ; new line

        mov  eax,white+(black*16)
        call SetTextColor

        jmp again_input_world           ; Guess next letter

loop_take_live:

```



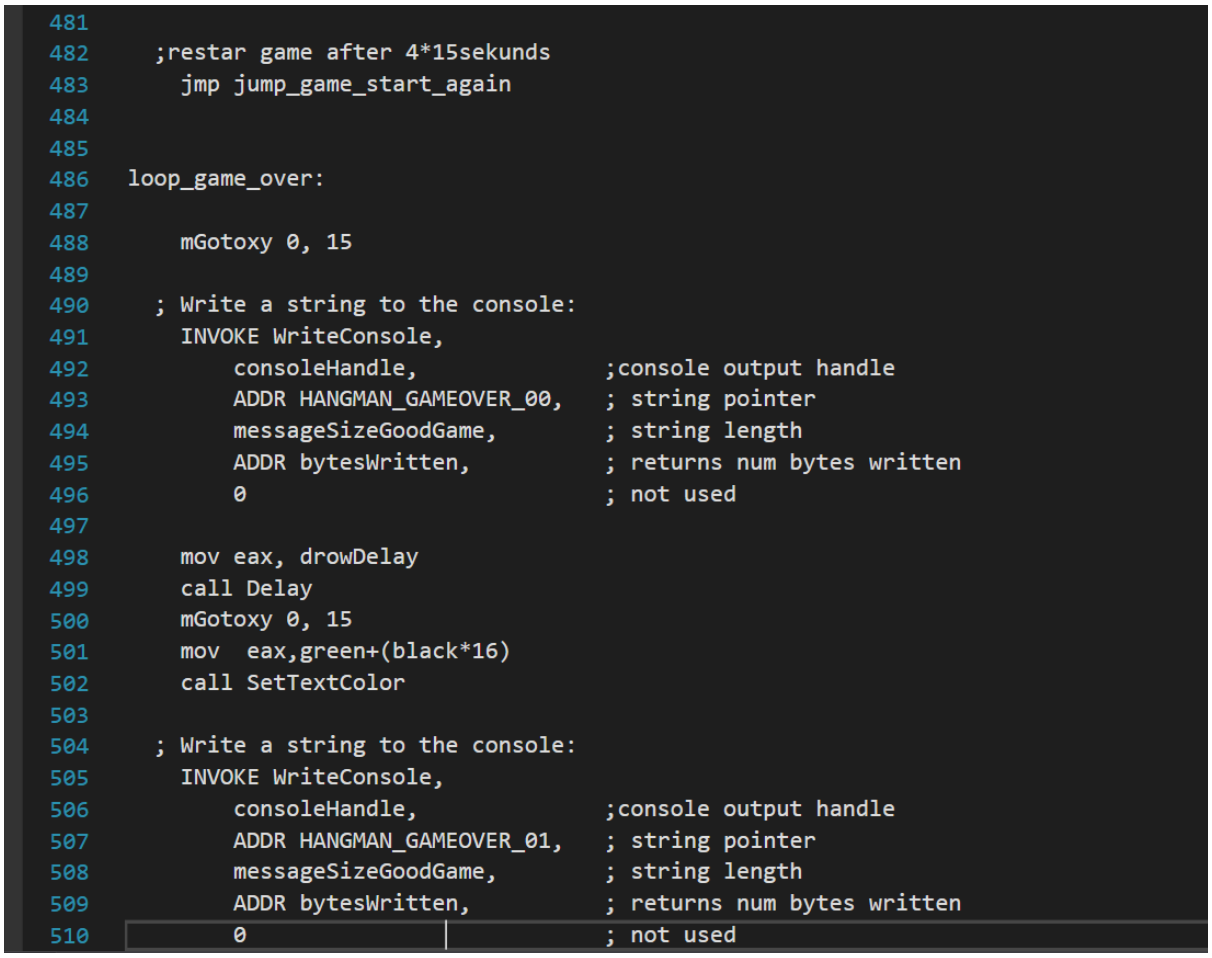
```
        dec statusGameLive
        jmp again_input_world           ; Guess next letter

restart_game:

        INVOKE Str_trim, ADDR guessLetterArray, ','

        mov  edx, OFFSET guessLetterArray
        call StrLength
        mov  lengthArray, eax

        mov edi, offset guessLetterArray ; Destination
        add edi, lengthArray
        dec edi
        ;INVOKE Str_trim, ADDR guessLetterArray, guessLetter
        INVOKE Str_trim, ADDR guessLetterArray, [edi]

        cmp edi, offset guessLetterArray
        jne restart_game

  ;Return white color again
        mov  eax,white+(black*16)
        call SetTextColor
        call Crlf           ;new line

        jmp jump_game_start_again           ; Guess next letter

loop_game_win:

    mGotoxy 0, 15
```



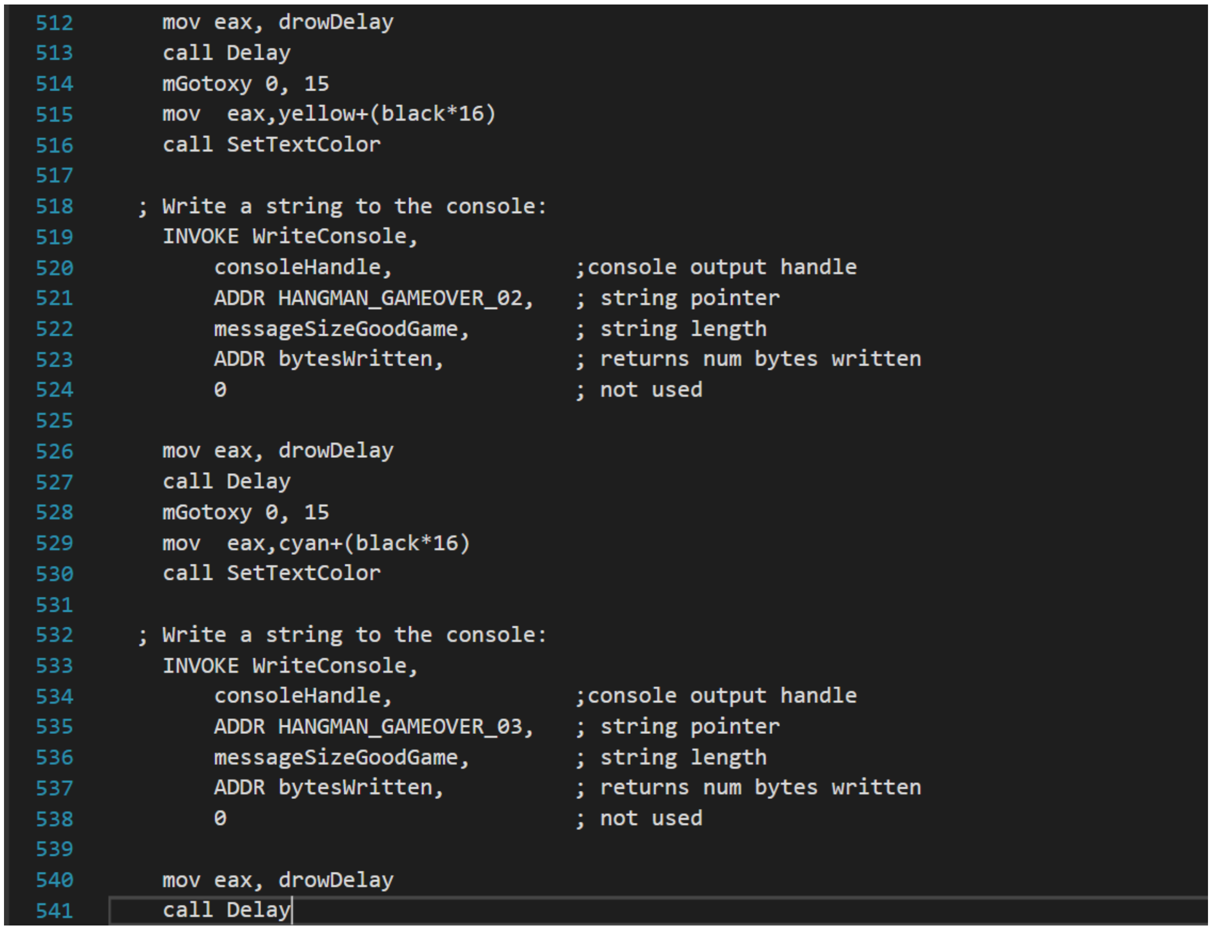
```

 ; Write a string to the console:
   INVOKE WriteConsole,
       consoleHandle,              ;console output handle
       ADDR HANGMAN_GOODGAME_00,   ; string pointer
       messageSizeGoodGame,        ; string length
       ADDR bytesWritten,          ; returns num bytes written
       0                           ; not used

   mov eax, drowDelay
   call Delay
   mGotoxy 0, 15
   mov  eax,green+(black*16)
   call SetTextColor

 ; Write a string to the console:
   INVOKE WriteConsole,
       consoleHandle,              ;console output handle
       ADDR HANGMAN_GOODGAME_01,   ; string pointer
       messageSizeGoodGame,        ; string length
       ADDR bytesWritten,          ; returns num bytes written
       0                           ; not used

   mov eax, drowDelay
   call Delay
   mGotoxy 0, 15
   mov  eax,yellow+(black*16)
   call SetTextColor

 ; Write a string to the console:
```



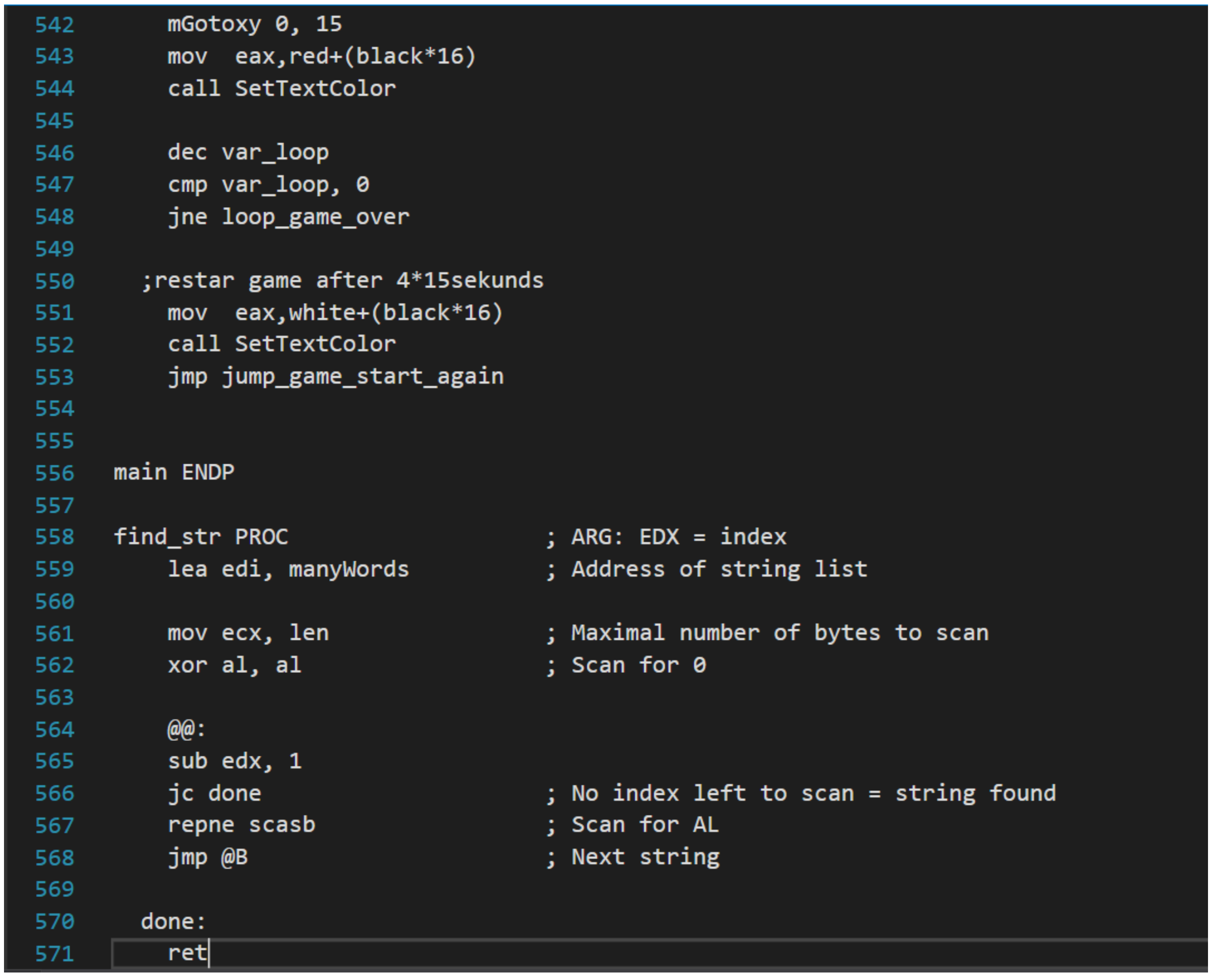
```
    INVOKE WriteConsole,
        consoleHandle,                ;console output handle
        ADDR HANGMAN_GOODGAME_02,     ; string pointer
        messageSizeGoodGame,          ; string length
        ADDR bytesWritten,            ; returns num bytes written
        0                             ; not used

    mov eax, drowDelay
    call Delay
    mGotoxy 0, 15
    mov  eax,cyan+(black*16)
    call SetTextColor

  ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,                ;console output handle
        ADDR HANGMAN_GOODGAME_03,     ; string pointer
        messageSizeGoodGame,          ; string length
        ADDR bytesWritten,            ; returns num bytes written
        0                             ; not used

    mov eax, drowDelay
    call Delay
    mGotoxy 0, 15
    mov  eax,red+(black*16)
    call SetTextColor

    dec var_loop
    cmp var_loop, 0
    jne loop_game_win
```

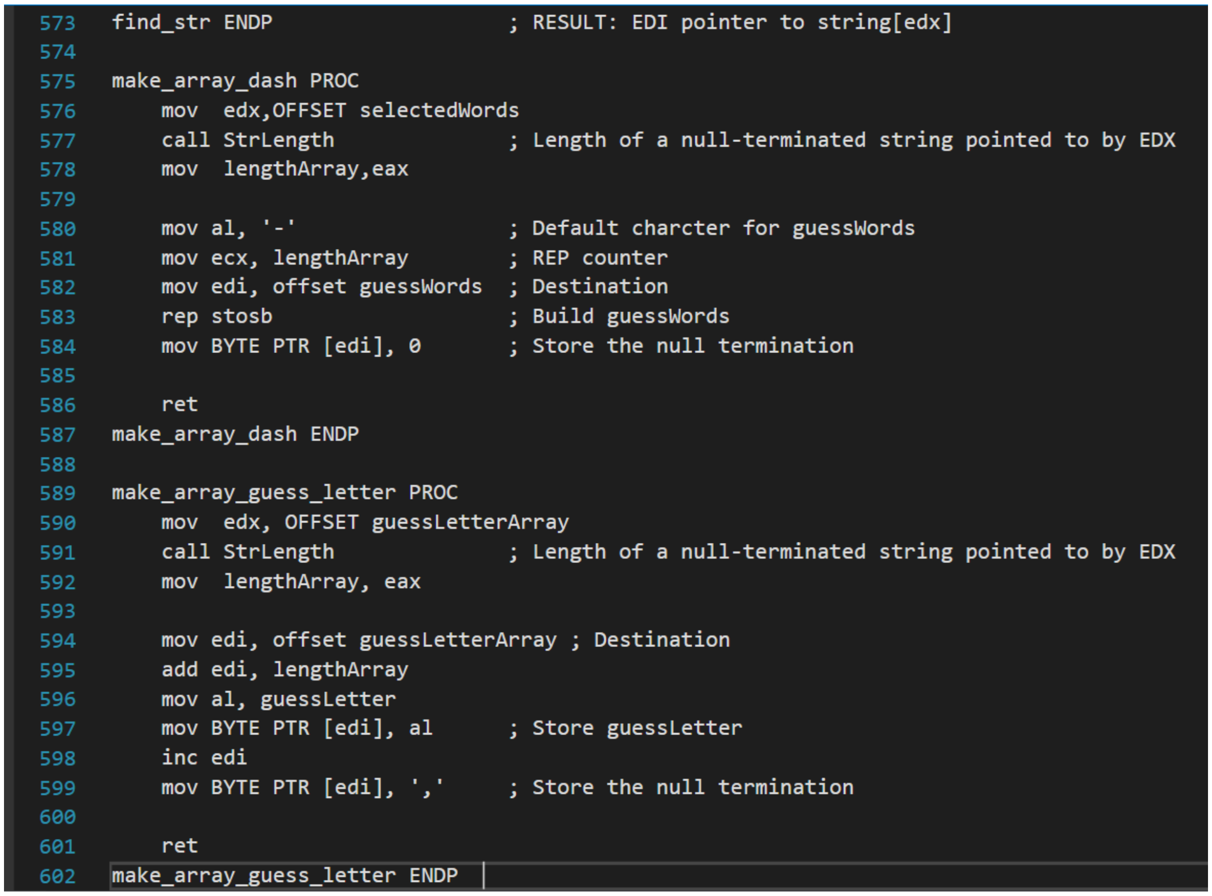


```

  ;restar game after 4*15sekunds
    jmp jump_game_start_again


loop_game_over:

    mGotoxy 0, 15

  ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,              ;console output handle
        ADDR HANGMAN_GAMEOVER_00,   ; string pointer
        messageSizeGoodGame,        ; string length
        ADDR bytesWritten,          ; returns num bytes written
        0                           ; not used

    mov eax, drowDelay
    call Delay
    mGotoxy 0, 15
    mov  eax,green+(black*16)
    call SetTextColor

  ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,              ;console output handle
        ADDR HANGMAN_GAMEOVER_01,   ; string pointer
        messageSizeGoodGame,        ; string length
        ADDR bytesWritten,          ; returns num bytes written
        0                           ; not used
```

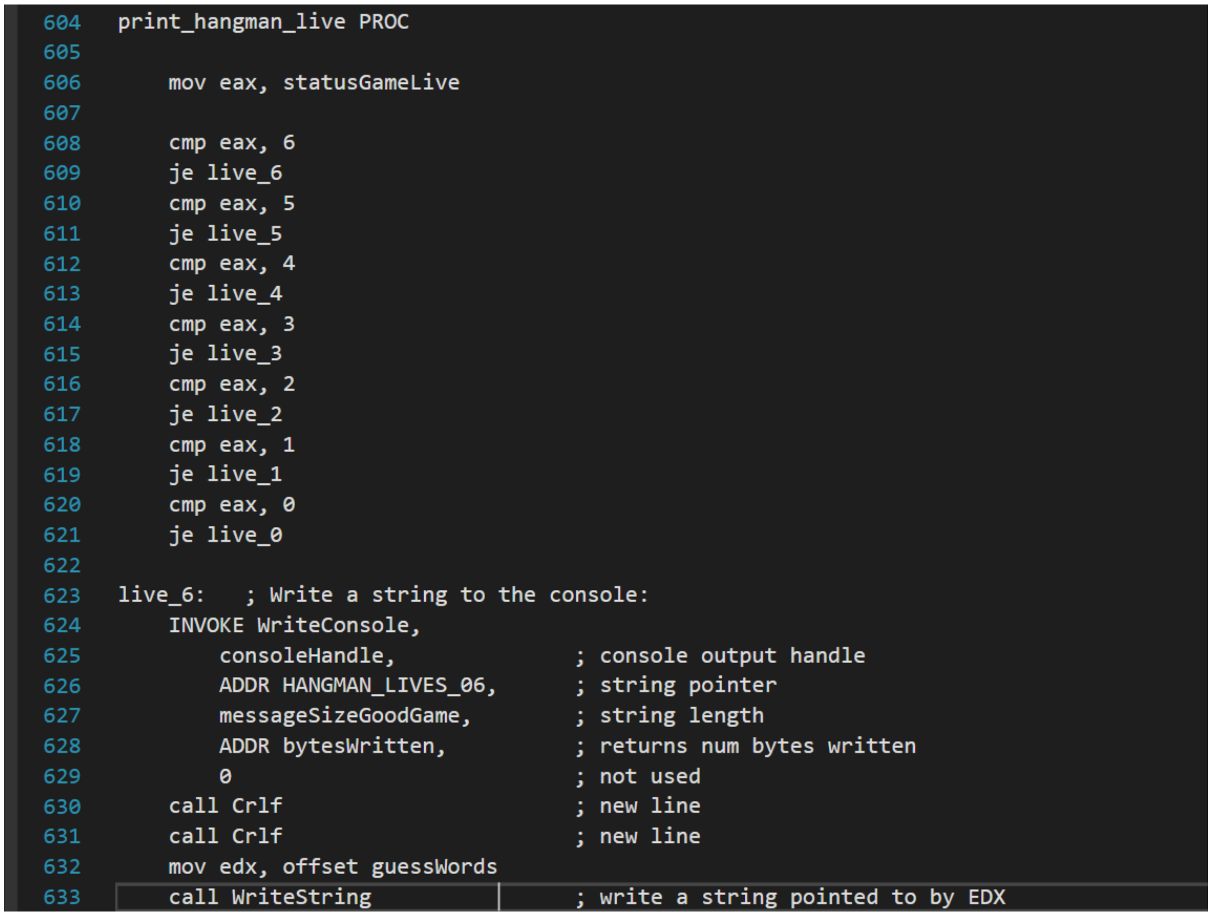


```
    mov eax, drowDelay
    call Delay
    mGotoxy 0, 15
    mov  eax,yellow+(black*16)
    call SetTextColor

  ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,               ;console output handle
        ADDR HANGMAN_GAMEOVER_02,    ; string pointer
        messageSizeGoodGame,         ; string length
        ADDR bytesWritten,           ; returns num bytes written
        0                            ; not used

    mov eax, drowDelay
    call Delay
    mGotoxy 0, 15
    mov  eax,cyan+(black*16)
    call SetTextColor

  ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,               ;console output handle
        ADDR HANGMAN_GAMEOVER_03,    ; string pointer
        messageSizeGoodGame,         ; string length
        ADDR bytesWritten,           ; returns num bytes written
        0                            ; not used

    mov eax, drowDelay
    call Delay
```

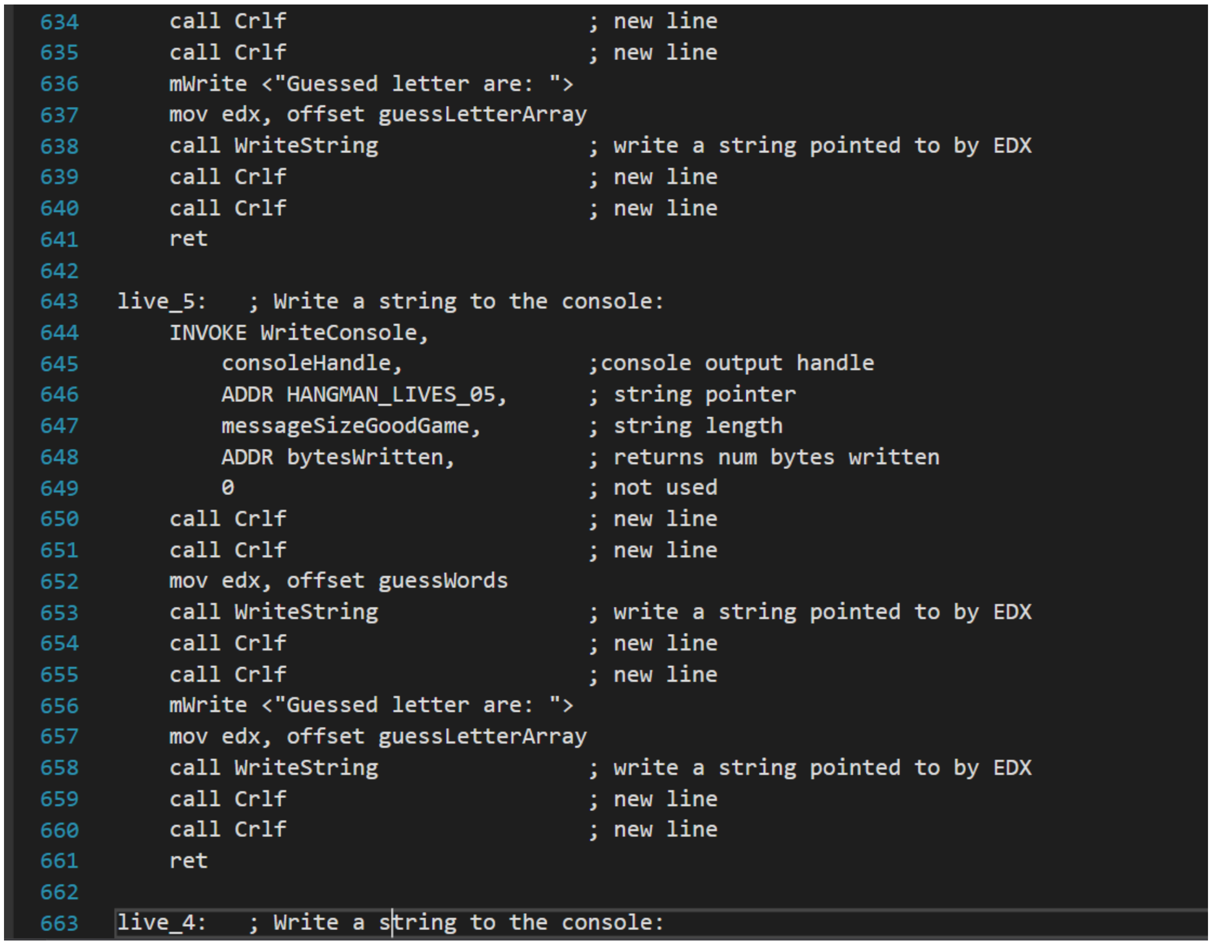

```
    mGotoxy 0, 15
    mov  eax,red+(black*16)
    call SetTextColor

    dec var_loop
    cmp var_loop, 0
    jne loop_game_over

  ;restar game after 4*15sekunds
    mov  eax,white+(black*16)
    call SetTextColor
    jmp jump_game_start_again


main ENDP

find_str PROC                     ; ARG: EDX = index
    lea edi, manyWords            ; Address of string list

    mov ecx, len                  ; Maximal number of bytes to scan
    xor al, al                    ; Scan for 0

    @@:
    sub edx, 1
    jc done                       ; No index left to scan = string found
    repne scasb                   ; Scan for AL
    jmp @B                        ; Next string

  done:
    ret
```



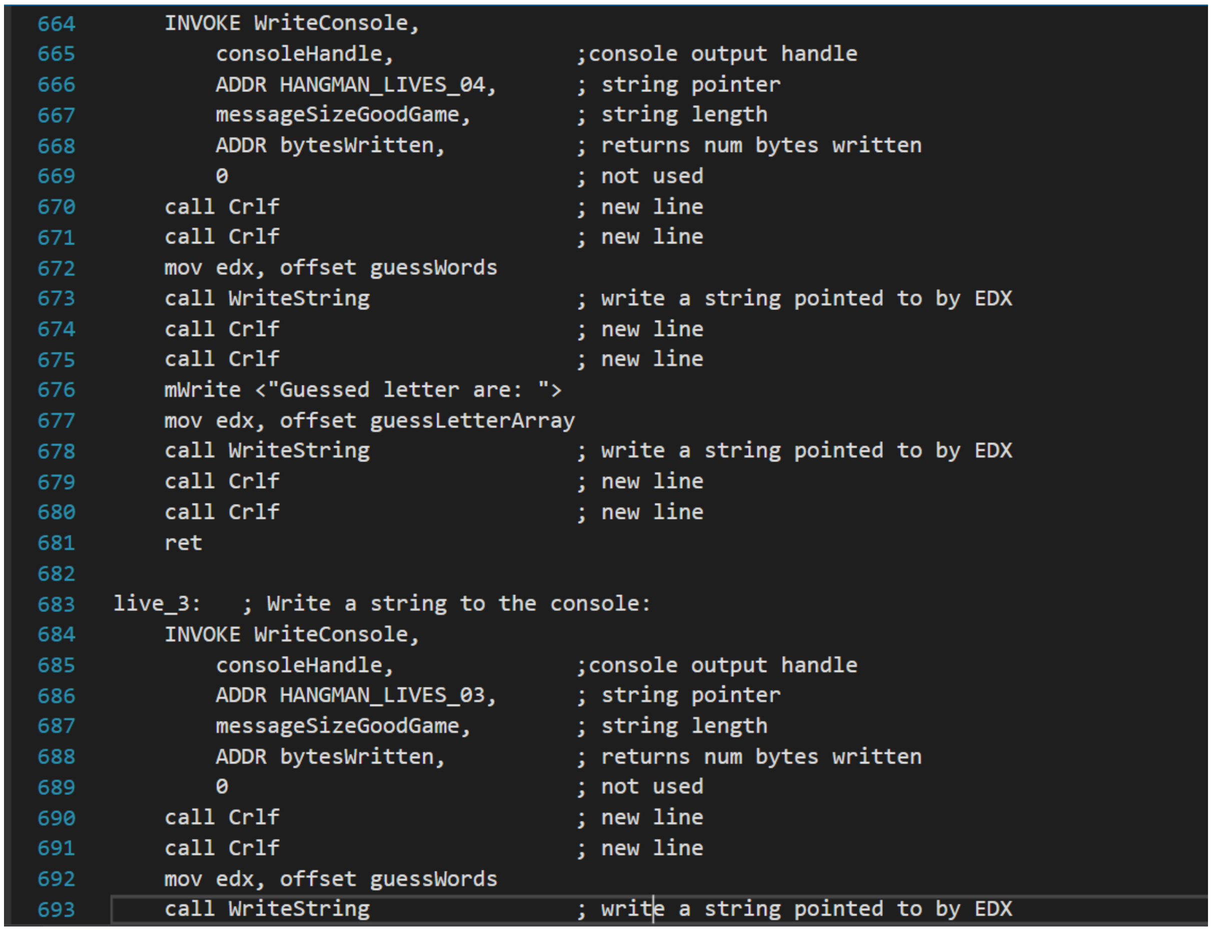
```
find_str ENDP                   ; RESULT: EDI pointer to string[edx]

make_array_dash PROC
    mov  edx,OFFSET selectedWords
    call StrLength              ; Length of a null-terminated string pointed to by EDX
    mov  lengthArray,eax

    mov al, '-'                 ; Default charcter for guessWords
    mov ecx, lengthArray        ; REP counter
    mov edi, offset guessWords  ; Destination
    rep stosb                   ; Build guessWords
    mov BYTE PTR [edi], 0       ; Store the null termination

    ret
make_array_dash ENDP

make_array_guess_letter PROC
    mov  edx, OFFSET guessLetterArray
    call StrLength              ; Length of a null-terminated string pointed to by EDX
    mov  lengthArray, eax

    mov edi, offset guessLetterArray ; Destination
    add edi, lengthArray
    mov al, guessLetter
    mov BYTE PTR [edi], al      ; Store guessLetter
    inc edi
    mov BYTE PTR [edi], ','     ; Store the null termination

    ret
make_array_guess_letter ENDP
```



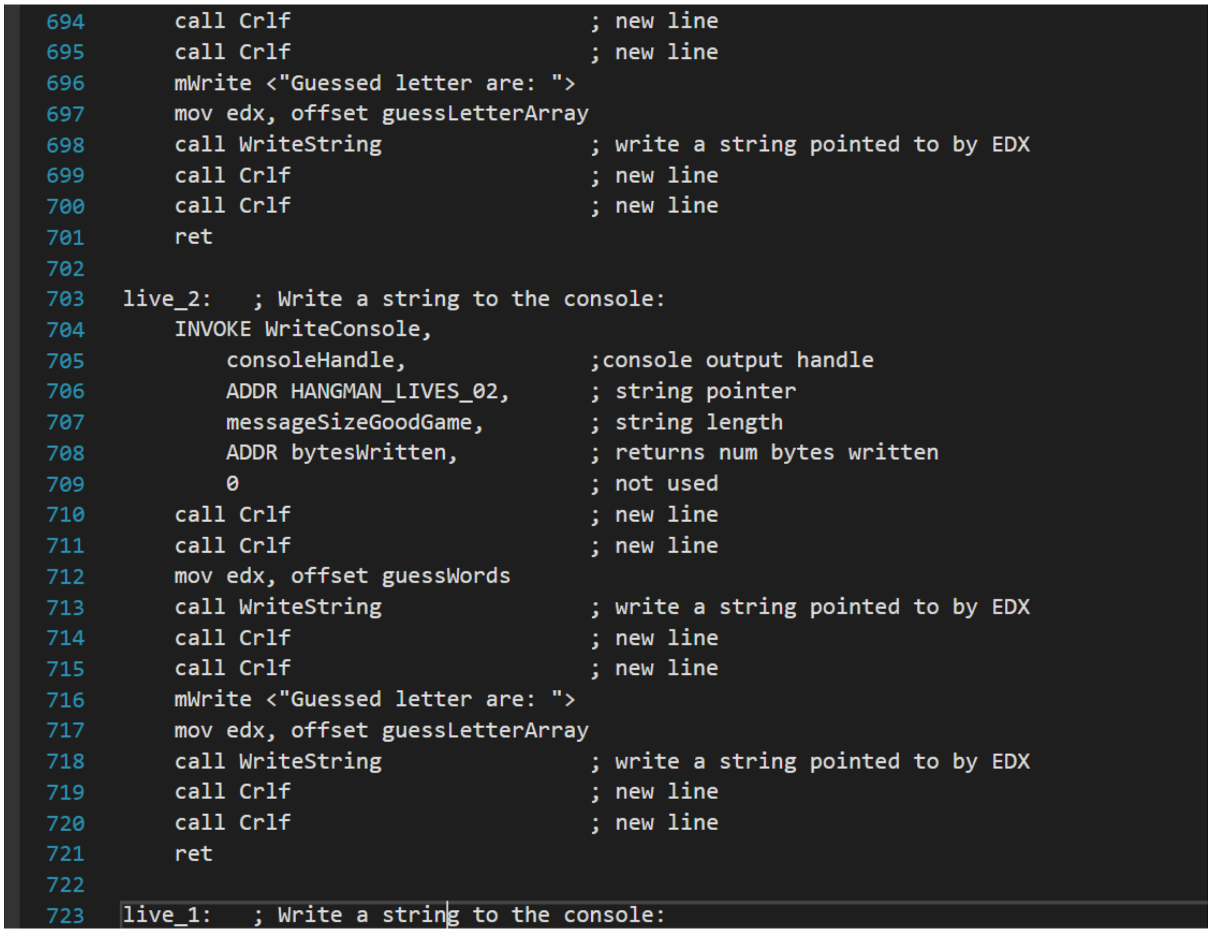
```
print_hangman_live PROC

    mov eax, statusGameLive

    cmp eax, 6
    je live_6
    cmp eax, 5
    je live_5
    cmp eax, 4
    je live_4
    cmp eax, 3
    je live_3
    cmp eax, 2
    je live_2
    cmp eax, 1
    je live_1
    cmp eax, 0
    je live_0

live_6:   ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,              ; console output handle
        ADDR HANGMAN_LIVES_06,      ; string pointer
        messageSizeGoodGame,        ; string length
        ADDR bytesWritten,          ; returns num bytes written
        0                           ; not used
    call Crlf                       ; new line
    call Crlf                       ; new line
    mov edx, offset guessWords
    call WriteString                ; write a string pointed to by EDX
```

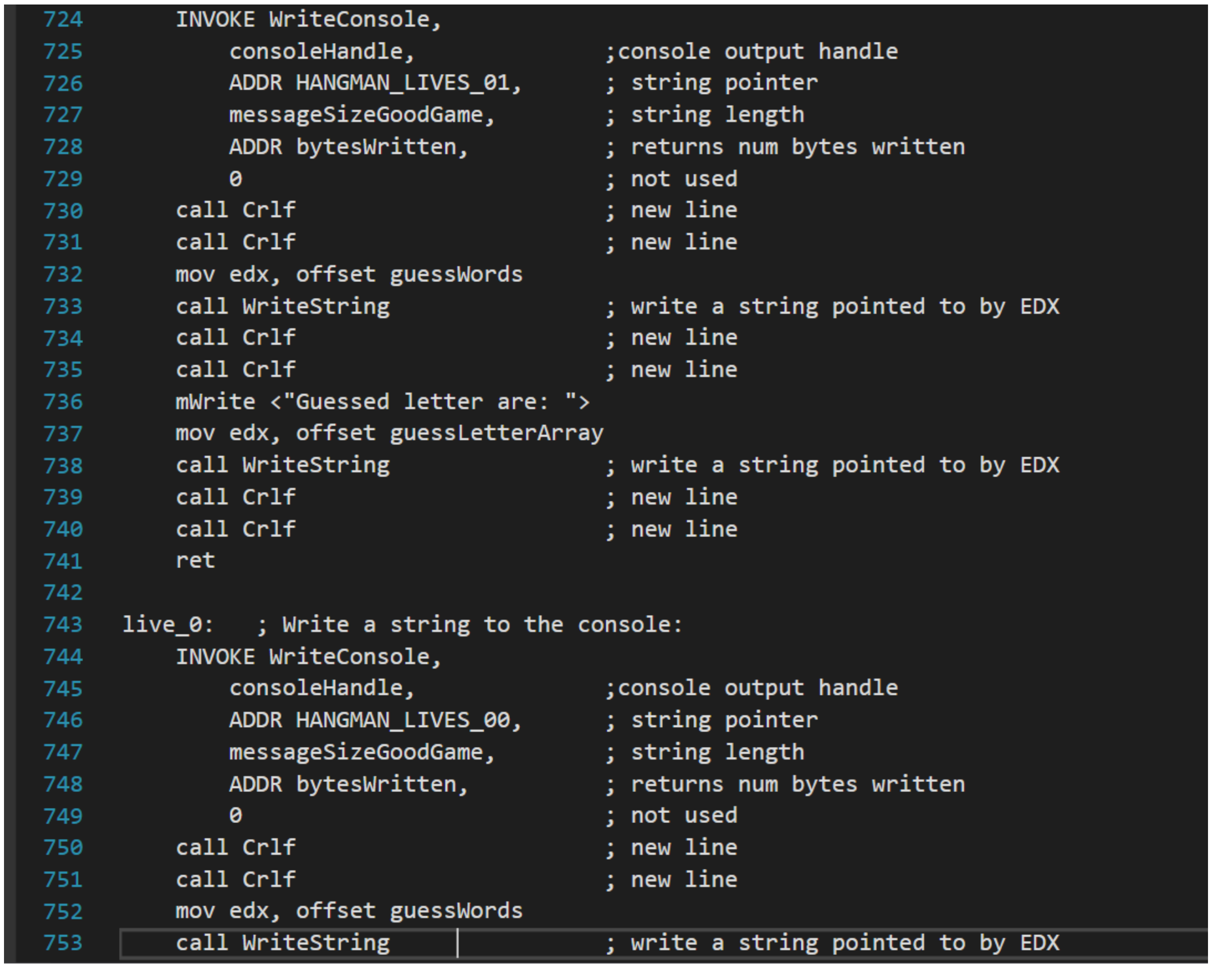


```
    call Crlf                           ; new line
    call Crlf                           ; new line
    mWrite <"Guessed letter are: ">
    mov edx, offset guessLetterArray
    call WriteString                    ; write a string pointed to by EDX
    call Crlf                           ; new line
    call Crlf                           ; new line
    ret

live_5:   ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,                 ;console output handle
        ADDR HANGMAN_LIVES_05,          ; string pointer
        messageSizeGoodGame,            ; string length
        ADDR bytesWritten,              ; returns num bytes written
        0                               ; not used
    call Crlf                           ; new line
    call Crlf                           ; new line
    mov edx, offset guessWords
    call WriteString                    ; write a string pointed to by EDX
    call Crlf                           ; new line
    call Crlf                           ; new line
    mWrite <"Guessed letter are: ">
    mov edx, offset guessLetterArray
    call WriteString                    ; write a string pointed to by EDX
    call Crlf                           ; new line
    call Crlf                           ; new line
    ret

live_4:   ; Write a string to the console:
```

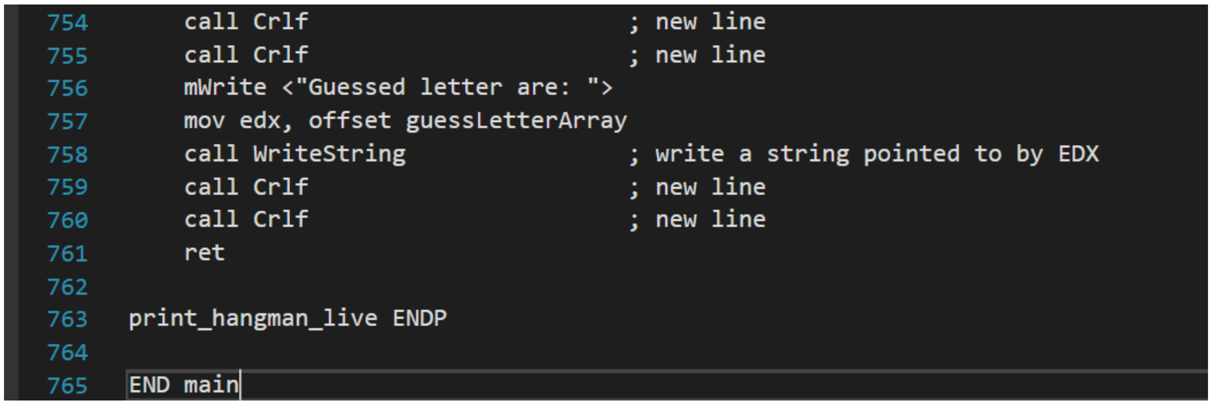


```
    INVOKE WriteConsole,
        consoleHandle,              ;console output handle
        ADDR HANGMAN_LIVES_04,      ; string pointer
        messageSizeGoodGame,        ; string length
        ADDR bytesWritten,          ; returns num bytes written
        0                           ; not used
    call Crlf                       ; new line
    call Crlf                       ; new line
    mov edx, offset guessWords
    call WriteString                ; write a string pointed to by EDX
    call Crlf                       ; new line
    call Crlf                       ; new line
    mWrite <"Guessed letter are: ">
    mov edx, offset guessLetterArray
    call WriteString                ; write a string pointed to by EDX
    call Crlf                       ; new line
    call Crlf                       ; new line
    ret

live_3:   ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,              ;console output handle
        ADDR HANGMAN_LIVES_03,      ; string pointer
        messageSizeGoodGame,        ; string length
        ADDR bytesWritten,          ; returns num bytes written
        0                           ; not used
    call Crlf                       ; new line
    call Crlf                       ; new line
    mov edx, offset guessWords
    call WriteString                ; write a string pointed to by EDX
```


```
    call Crlf                       ; new line
    call Crlf                       ; new line
    mWrite <"Guessed letter are: ">
    mov edx, offset guessLetterArray
    call WriteString                ; write a string pointed to by EDX
    call Crlf                       ; new line
    call Crlf                       ; new line
    ret

live_2:   ; Write a string to the console:
    INVOKE WriteConsole,
        consoleHandle,              ;console output handle
        ADDR HANGMAN_LIVES_02,      ; string pointer
        messageSizeGoodGame,        ; string length
        ADDR bytesWritten,          ; returns num bytes written
        0                           ; not used
    call Crlf                       ; new line
    call Crlf                       ; new line
    mov edx, offset guessWords
    call WriteString                ; write a string pointed to by EDX
    call Crlf                       ; new line
    call Crlf                       ; new line
    mWrite <"Guessed letter are: ">
    mov edx, offset guessLetterArray
    call WriteString                ; write a string pointed to by EDX
    call Crlf                       ; new line
    call Crlf                       ; new line
    ret

live_1:   ; Write a string to the console:
```



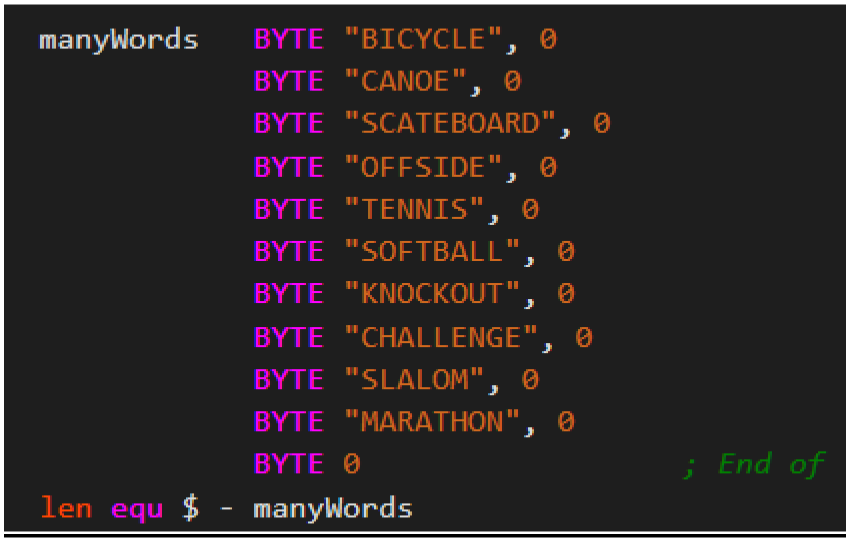
```
        INVOKE WriteConsole,
            consoleHandle,              ;console output handle
            ADDR HANGMAN_LIVES_01,      ; string pointer
            messageSizeGoodGame,        ; string length
            ADDR bytesWritten,          ; returns num bytes written
            0                           ; not used
        call Crlf                       ; new line
        call Crlf                       ; new line
        mov edx, offset guessWords
        call WriteString                ; write a string pointed to by EDX
        call Crlf                       ; new line
        call Crlf                       ; new line
        mWrite <"Guessed letter are: ">
        mov edx, offset guessLetterArray
        call WriteString                ; write a string pointed to by EDX
        call Crlf                       ; new line
        call Crlf                       ; new line
        ret

    live_0:   ; Write a string to the console:
        INVOKE WriteConsole,
            consoleHandle,              ;console output handle
            ADDR HANGMAN_LIVES_00,      ; string pointer
            messageSizeGoodGame,        ; string length
            ADDR bytesWritten,          ; returns num bytes written
            0                           ; not used
        call Crlf                       ; new line
        call Crlf                       ; new line
        mov edx, offset guessWords
        call WriteString                ; write a string pointed to by EDX
```



```
        call Crlf                       ; new line
        call Crlf                       ; new line
        mWrite <"Guessed letter are: ">
        mov edx, offset guessLetterArray
        call WriteString                ; write a string pointed to by EDX
        call Crlf                       ; new line
        call Crlf                       ; new line
        ret

    print_hangman_live ENDP

    END main
```

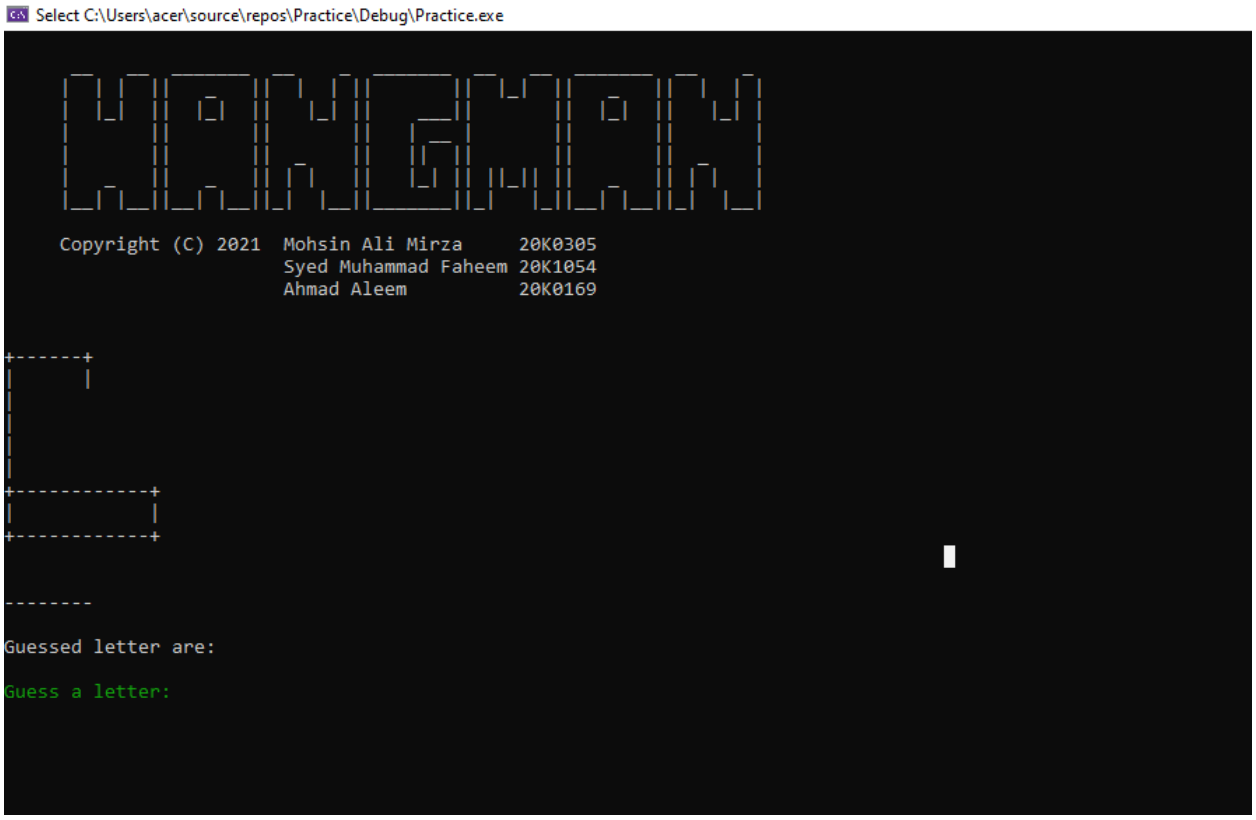
RESULTS SOFTWARE SIMULATION AND DISCUSSION (INCLUDE AT LEAST ALL POSSIBLE TEST CASES WITH PICTURES OF YOUR RESULT):

Word List:



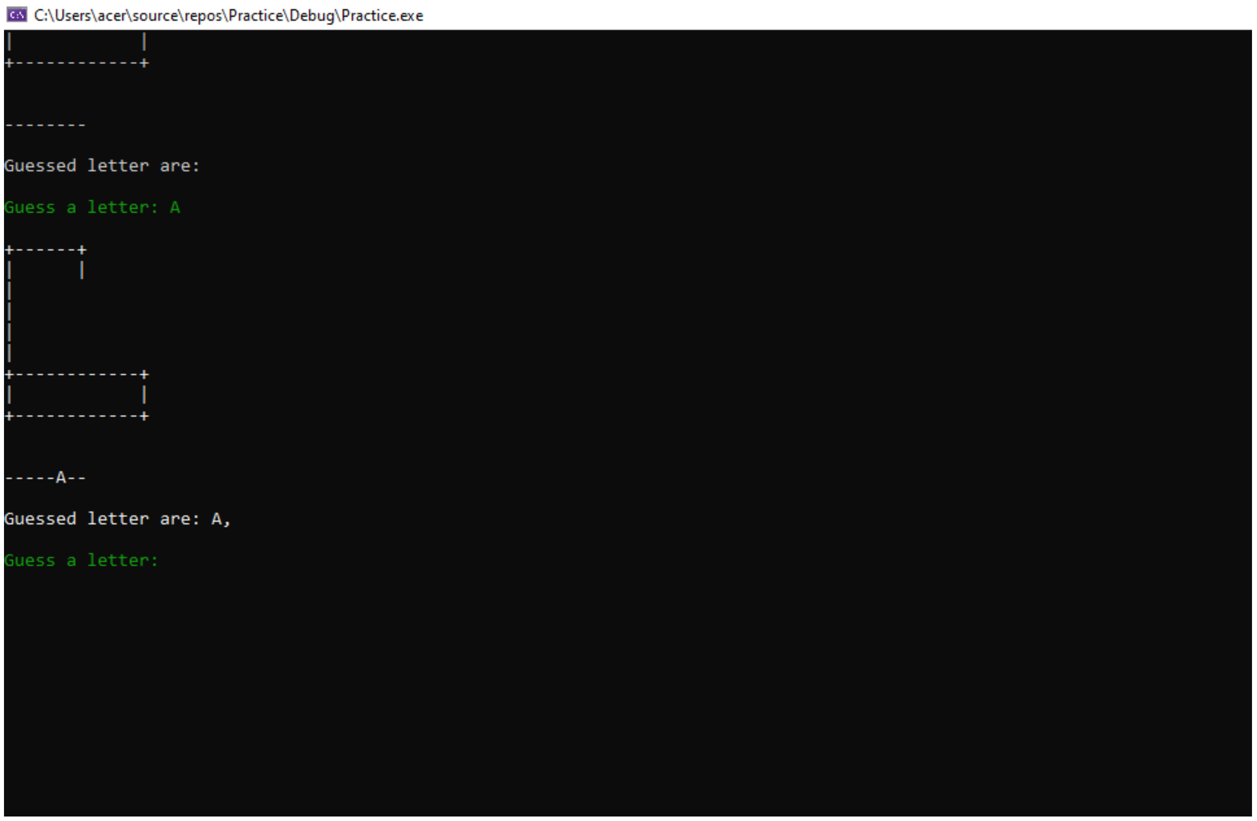
```
manyWords   BYTE "BICYCLE", 0
            BYTE "CANOE", 0
            BYTE "SCATEBOARD", 0
            BYTE "OFFSIDE", 0
            BYTE "TENNIS", 0
            BYTE "SOFTBALL", 0
            BYTE "KNOCKOUT", 0
            BYTE "CHALLENGE", 0
            BYTE "SLALOM", 0
            BYTE "MARATHON", 0
            BYTE 0                   ; End of
len equ $ - manyWords
```

If You Lose:

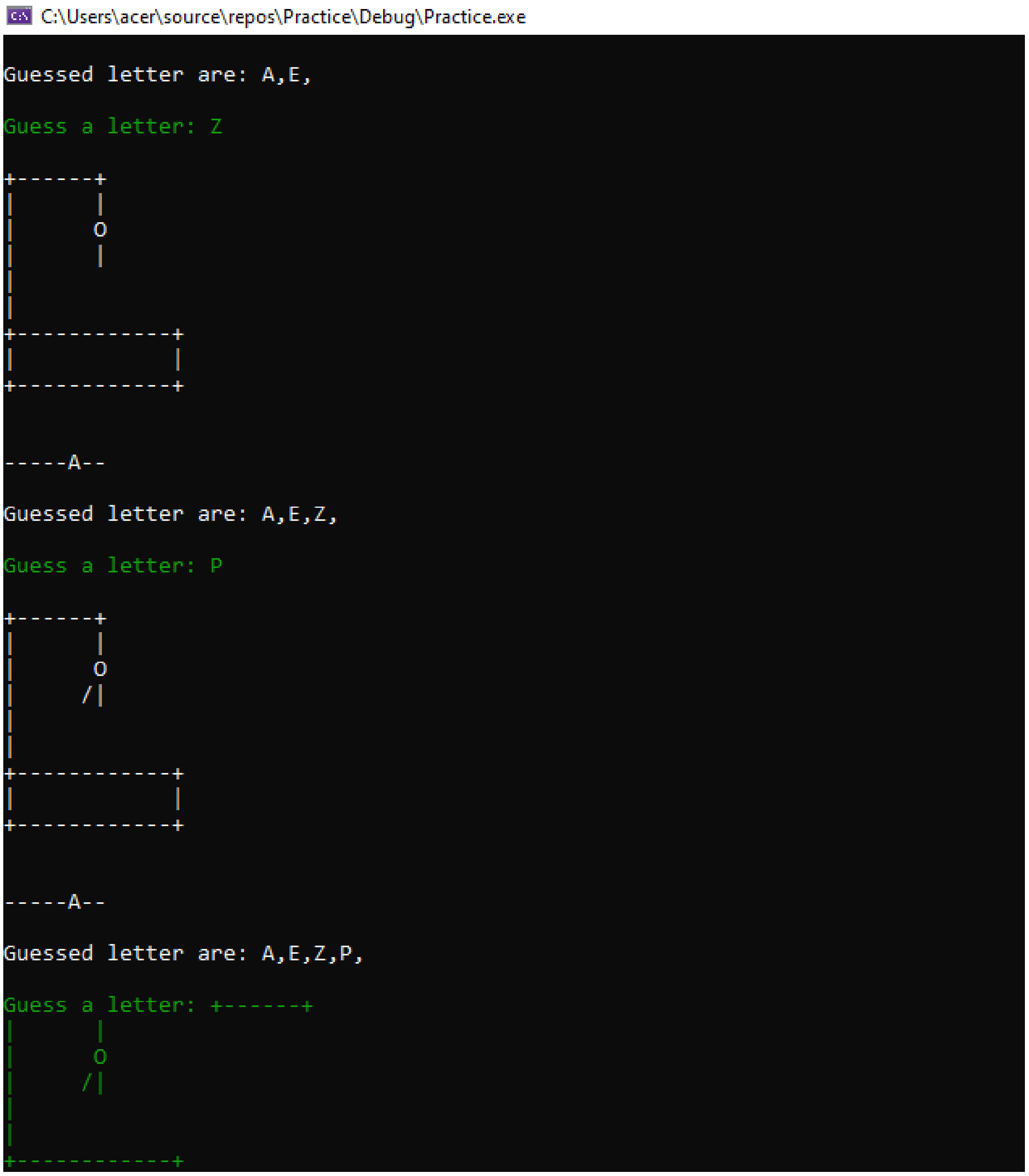


Select C:\Users\acer\source\repos\Practice\Debug\Practice.exe

```
    Copyright (C) 2021  Mohsin Ali Mirza     20K0305
                        Syed Muhammad Faheem 20K1054
                        Ahmad Aleem          20K0169


+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


--------

Guessed letter are:

Guess a letter:
```

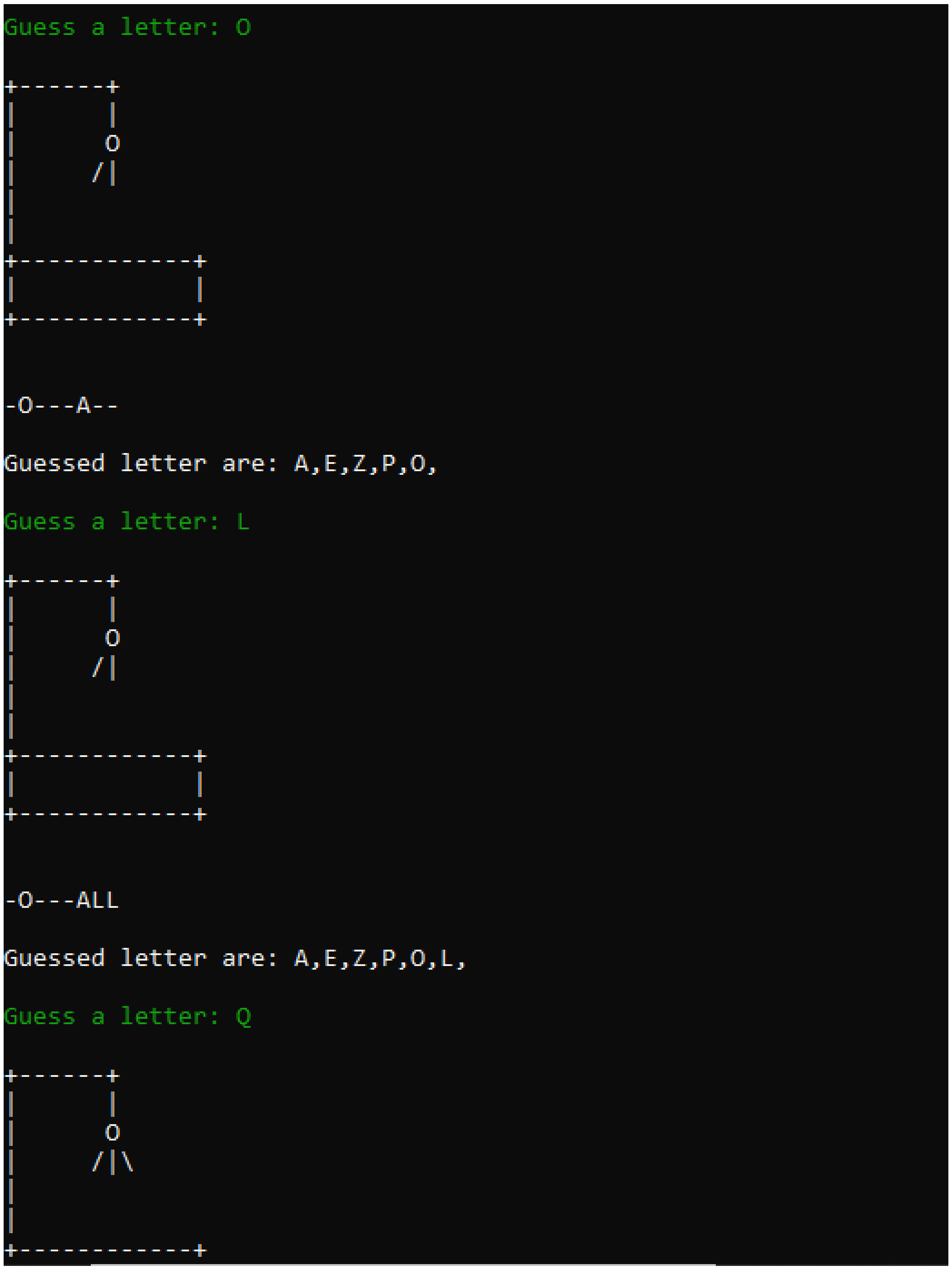


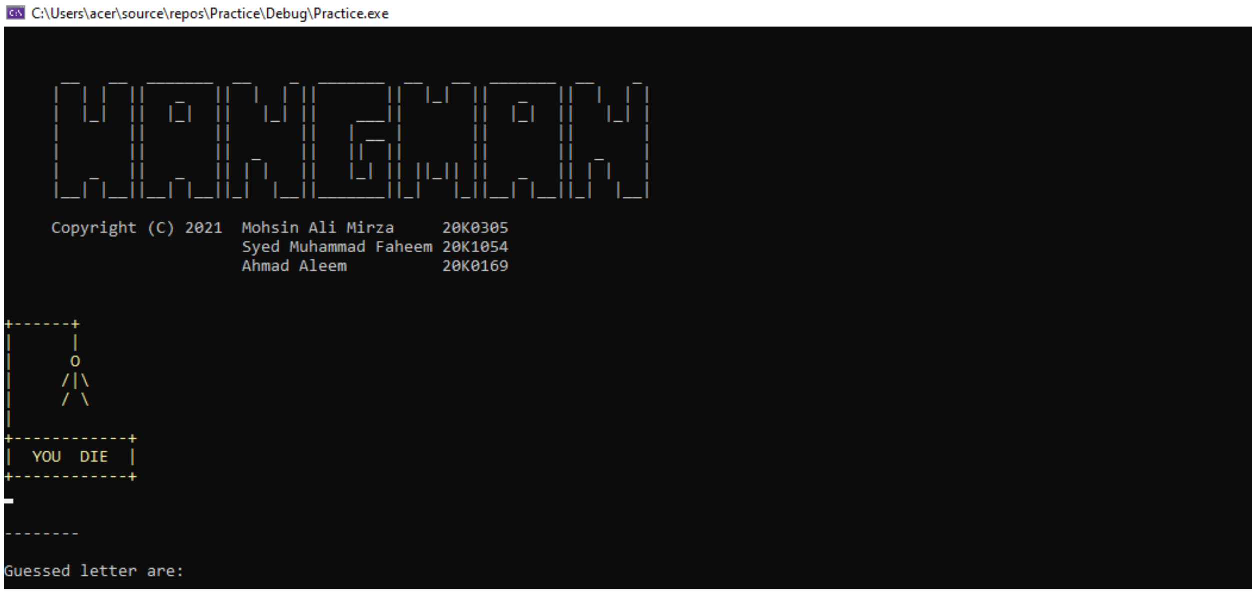
```
C:\Users\acer\source\repos\Practice\Debug\Practice.exe
|            |
+------------+


--------

Guessed letter are:

Guess a letter: A

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


-----A--

Guessed letter are: A,

Guess a letter:
```



C:\Users\acer\source\repos\Practice\Debug\Practice.exe

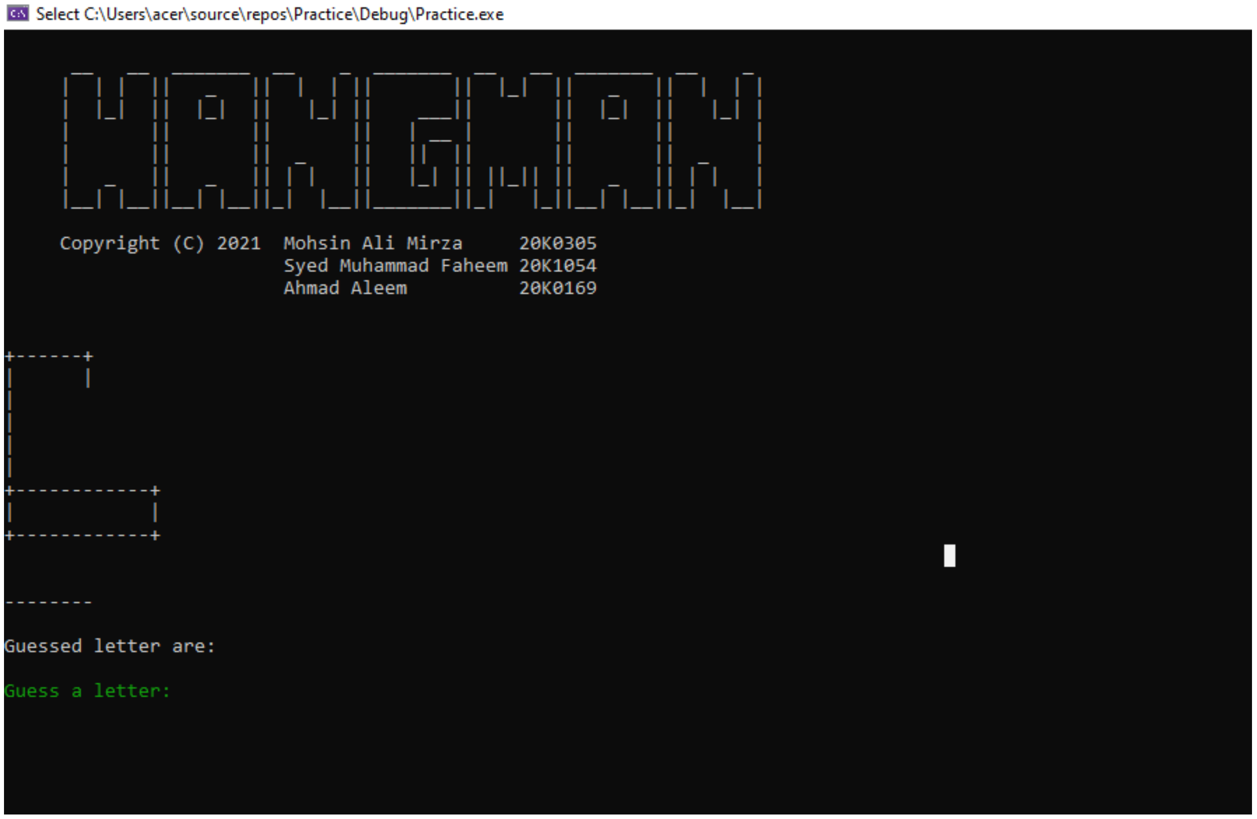
```
Guessed letter are: A,E,

Guess a letter: Z

+------+
|      |
|      O
|      |
|
|
+------------+
|            |
+------------+


-----A--

Guessed letter are: A,E,Z,

Guess a letter: P

+------+
|      |
|      O
|     /|
|
|
+------------+
|            |
+------------+


-----A--

Guessed letter are: A,E,Z,P,

Guess a letter: +------+
|      |
|      O
|     /|
|
|
+------------+
```


```
Guess a letter: O

+-------+
|       |
|       O
|      /|
|
|
+------------+
|            |
+------------+


-O---A--

Guessed letter are: A,E,Z,P,O,

Guess a letter: L

+-------+
|       |
|       O
|      /|
|
|
+------------+
|            |
+------------+


-O---ALL

Guessed letter are: A,E,Z,P,O,L,

Guess a letter: Q

+-------+
|       |
|       O
|      /|\
|
|
+------------+
```

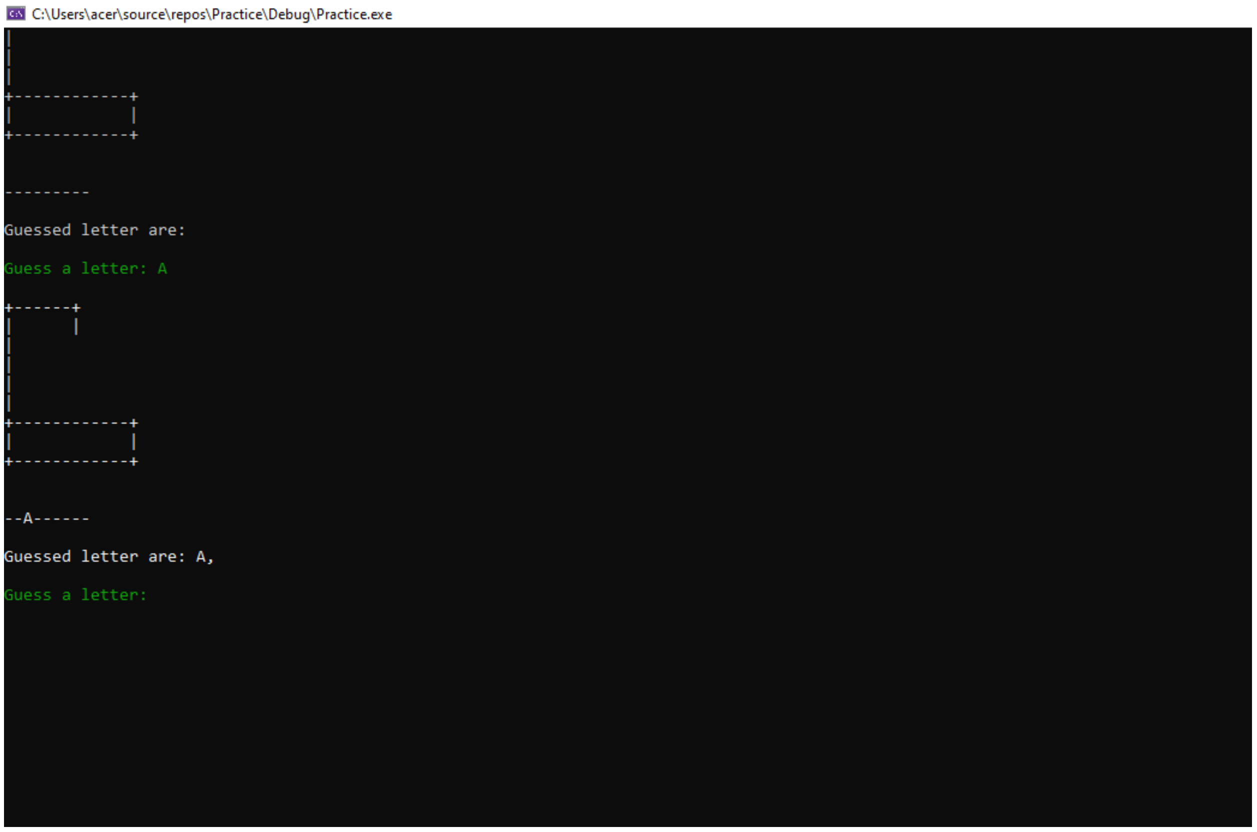


```
C:\Users\acer\source\repos\Practice\Debug\Practice.exe

    Copyright (C) 2021  Mohsin Ali Mirza     20K0305
                        Syed Muhammad Faheem 20K1054
                        Ahmad Aleem          20K0169


+------+
|      |
|      O
|     /|\
|     / \
|
+-----------+
|  YOU  DIE  |
+-----------+

--------

Guessed letter are:
```

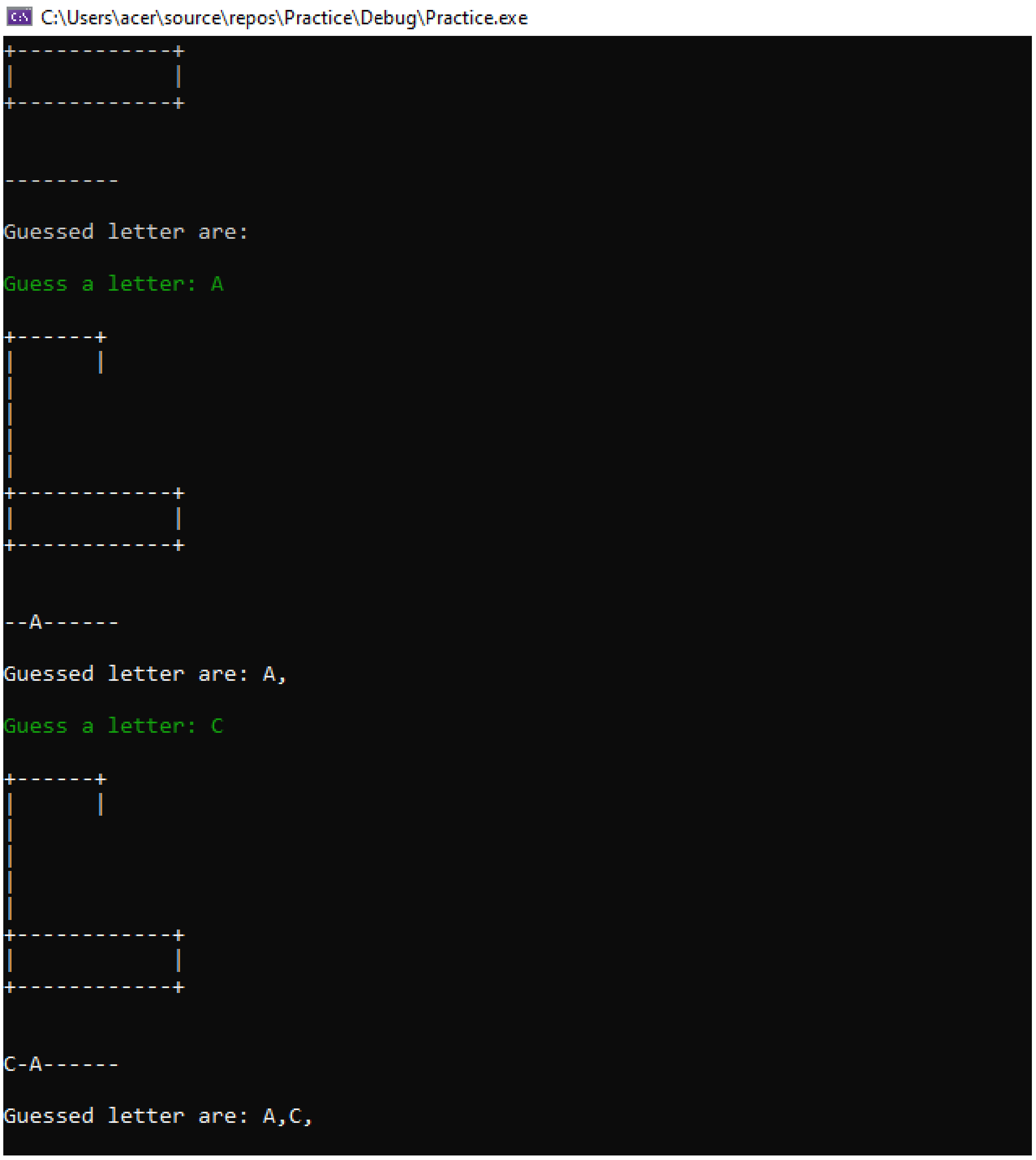
If You Win:



```
Select C:\Users\acer\source\repos\Practice\Debug\Practice.exe

    Copyright (C) 2021  Mohsin Ali Mirza     20K0305
                        Syed Muhammad Faheem 20K1054
                        Ahmad Aleem          20K0169


+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


--------

Guessed letter are:

Guess a letter:
```

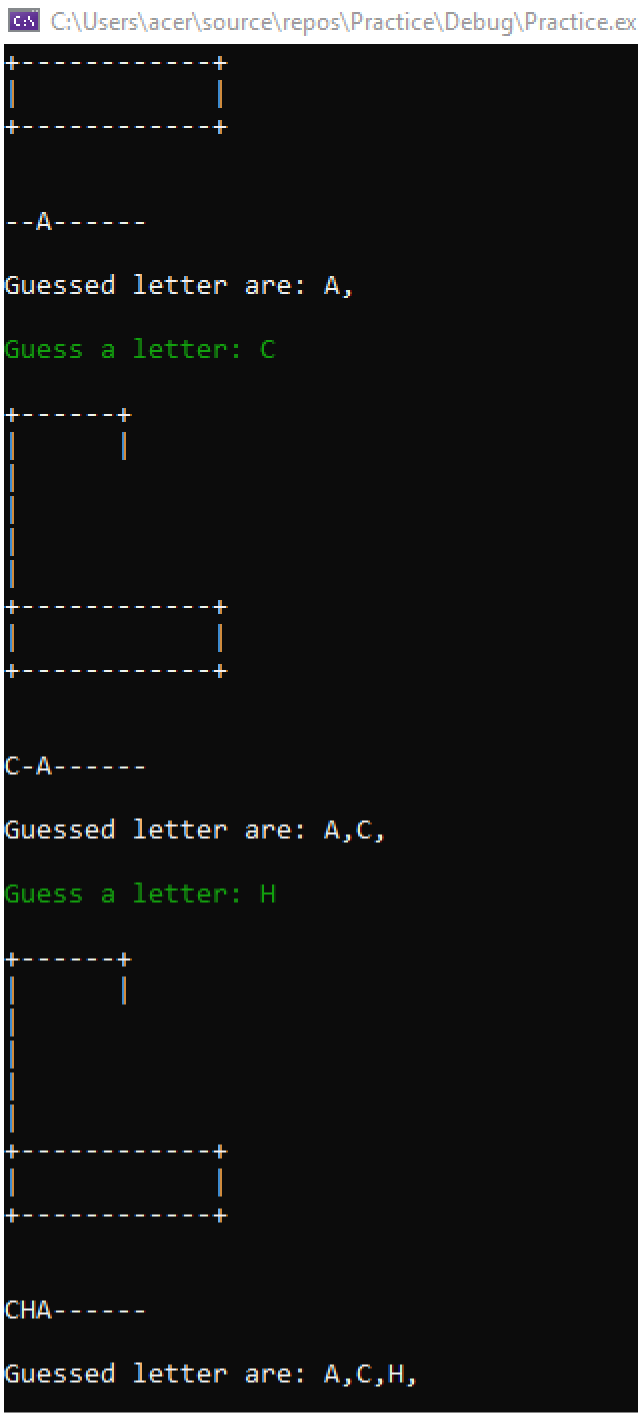


```
C:\Users\acer\source\repos\Practice\Debug\Practice.exe
|
|
|
+------------+
|            |
+------------+


---------

Guessed letter are:

Guess a letter: A

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


--A------

Guessed letter are: A,

Guess a letter:
```

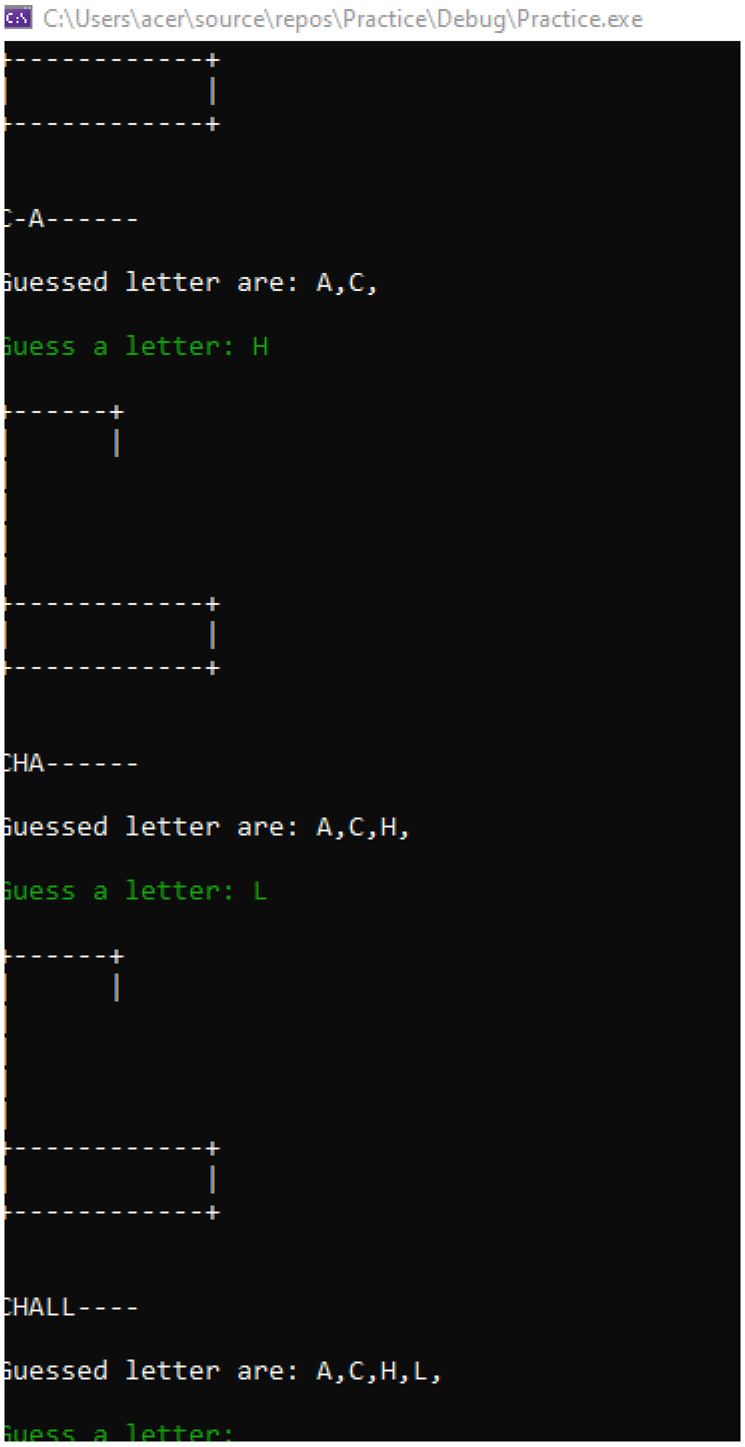


C:\Users\acer\source\repos\Practice\Debug\Practice.exe

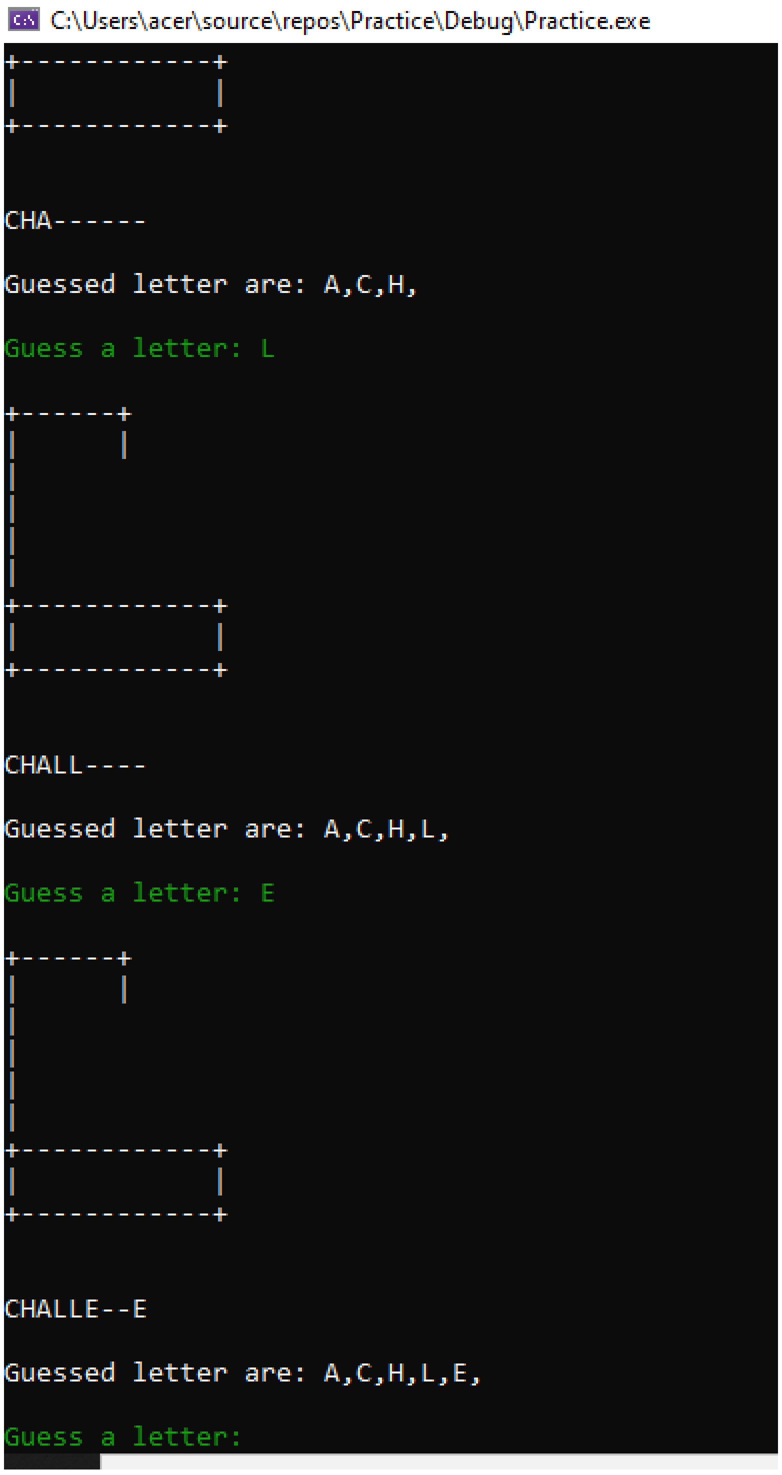
```
+------------+
|            |
+------------+


---------

Guessed letter are:

Guess a letter: A

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


--A------

Guessed letter are: A,

Guess a letter: C

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


C-A------

Guessed letter are: A,C,
```



```
C:\Users\acer\source\repos\Practice\Debug\Practice.ex
+------------+
|            |
+------------+


--A------

Guessed letter are: A,

Guess a letter: C

+-------+
|       |
|
|
|
|
+------------+
|            |
+------------+


C-A------

Guessed letter are: A,C,

Guess a letter: H

+-------+
|       |
|
|
|
|
+------------+
|            |
+------------+


CHA------

Guessed letter are: A,C,H,
```

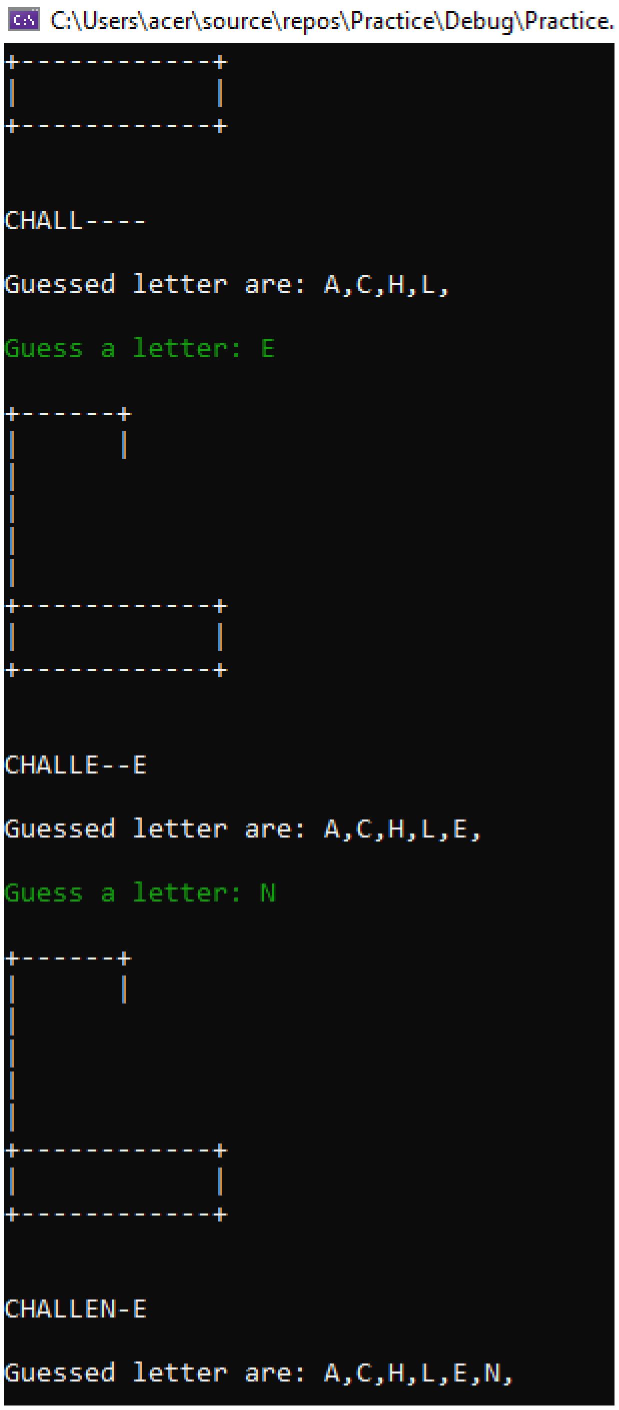


```
C:\Users\acer\source\repos\Practice\Debug\Practice.exe
+------------+
|            |
+------------+


C-A------

Guessed letter are: A,C,

Guess a letter: H

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


CHA------

Guessed letter are: A,C,H,

Guess a letter: L

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


CHALL----

Guessed letter are: A,C,H,L,

Guess a letter:
```

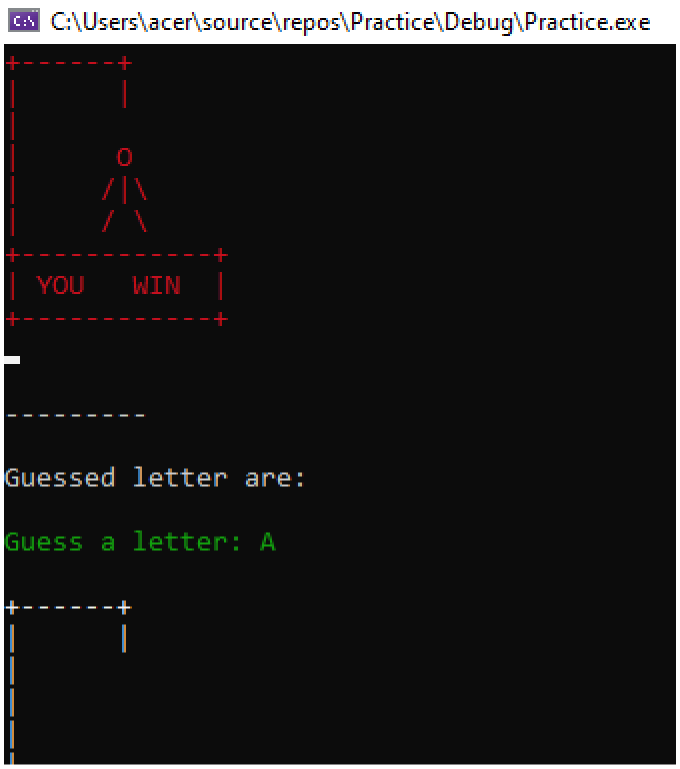


C:\Users\acer\source\repos\Practice\Debug\Practice.exe

```
+------------+
|            |
+------------+


CHA------

Guessed letter are: A,C,H,

Guess a letter: L

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


CHALL----

Guessed letter are: A,C,H,L,

Guess a letter: E

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


CHALLE--E

Guessed letter are: A,C,H,L,E,

Guess a letter:
```



```
C:\Users\acer\source\repos\Practice\Debug\Practice.
+------------+
|            |
+------------+


CHALL----

Guessed letter are: A,C,H,L,

Guess a letter: E

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


CHALLE--E

Guessed letter are: A,C,H,L,E,

Guess a letter: N

+------+
|      |
|
|
|
|
+------------+
|            |
+------------+


CHALLEN-E

Guessed letter are: A,C,H,L,E,N,
```



```
C:\Users\acer\source\repos\Practice\Debug\Practice.exe
+-------+
|       |
|
|       O
|      /|\
|      / \
+-------------+
| YOU    WIN  |
+-------------+

---------

Guessed letter are:

Guess a letter: A

+-------+
|       |
|
|
|
|
```

CONCLUSION, COST AND FUTURE WORK:

We were able to achieve our core goal of our project which was to learn the basic fundamentals of game development and create a soothing and engaging game for the user using a low level language.

REFERENCES:

https://en.wikipedia.org/wiki/Hangman_(game)

https://csc.csudh.edu/mmccullough/asm/help/index.html?page=source%2Fabout.htm