

PROJECT

C + Asm, Library, DLL ArrayMax 프로젝트

- C + Asm, Library, DLL로 구현한 ArrayMax 함수

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01 프로젝트 개요

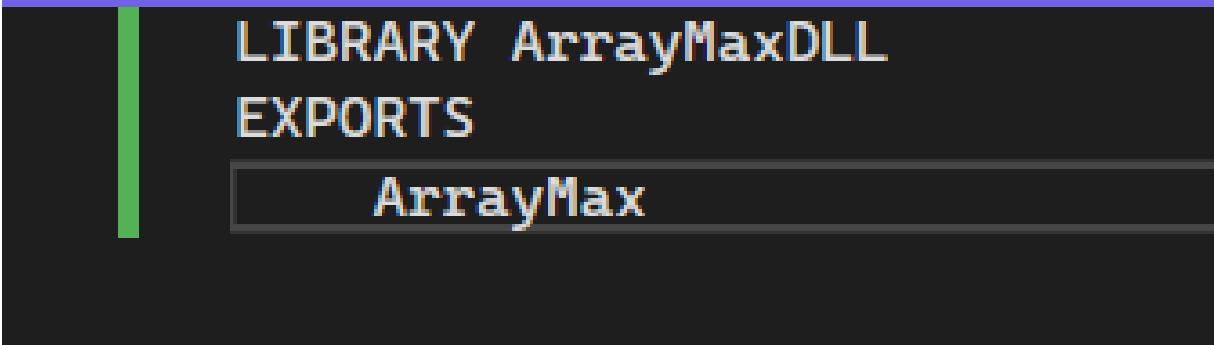
- 기능 설명:

C 언어와 어셈블리를 사용해
배열의 최댓값을 계산하는 ArrayMax 함수를
DLL 형태로 구현한 프로젝트입니다.
입력은 long long 배열, 출력은 최댓값이며
Visual Studio x64 + MASM 환경에서 제작했습니다.

02 C + Asm 구조

- Windows x64 호출 규약을 사용하며,
- RCX는 배열 주소, RDX는 개수, RAX는 반환값입니다.
- 전체 흐름은 클라이언트 → DLL → 어셈블리 순서로 동작합니다.”

03 DLL (ArrayMaxDLL) 설계

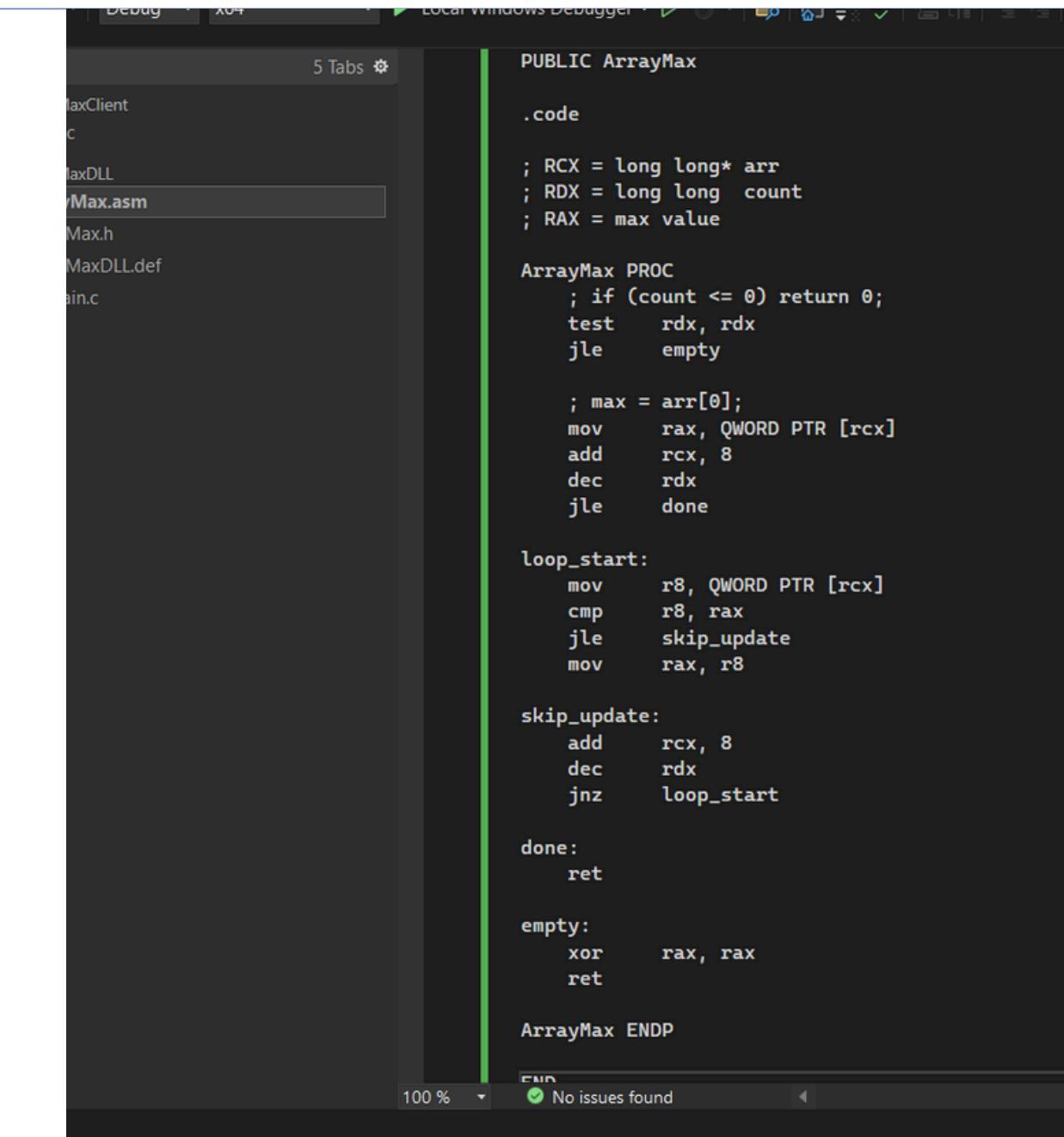
- 프로젝트 구성:
- ArrayMaxDLL (DLL 프로젝트)
 - ArrayMax.asm : 어셈블리 구현
 - DllMain.c : DLL 진입점
 - ArrayMaxDLL.def : 내보낼 함수 정의 (EXPORTS)
- .def 파일 내용:

```
LIBRARY ArrayMaxDLL
EXPORTS
    ArrayMax
```
- ArrayMaxDLL 프로젝트에는
- 어셈블리 파일, DllMain, 그리고 .def 파일이 포함됩니다.
- DllMain은 DLL 로드 시 호출되지만
- 이번 프로젝트에서는 별도 작업 없이 TRUE만 반환합니다.”

04 Assembly 코드 설명 (ArrayMax.asm)

“count가 0 이하이면 0을 반환하고,
첫 번째 요소를 max로 설정한 뒤
나머지 값을 하나씩 비교해 더 크면 max를
갱신합니다.
마지막에 RAX에 최댓값을 넣어 반환합니
다.”

-



The screenshot shows a debugger interface with multiple tabs open. The current tab displays assembly code for a function named `ArrayMax`. The code is written in AT&T syntax. It starts with a `PUBLIC` directive, followed by a `.code` section containing comments about registers: `; RCX = long long* arr`, `; RDX = long long count`, and `; RAX = max value`. The `ArrayMax` procedure begins with a check if `count` is less than or equal to 0. If true, it returns 0. Otherwise, it initializes `RAX` to the first element of the array (`arr[0]`) and enters a loop. In each iteration of the loop, it compares the current element (`r8`) with `RAX`. If `r8` is greater than `RAX`, it updates `RAX` to `r8`. After the loop, it returns the final value in `RAX`. There are also `empty` and `done` labels, and the `skip_update` label which branches back to the start of the loop.

```
PUBLIC ArrayMax
.code

; RCX = long long* arr
; RDX = long long count
; RAX = max value

ArrayMax PROC
    ; if (count <= 0) return 0;
    test    rdx, rdx
    jle     empty

    ; max = arr[0];
    mov     rax, QWORD PTR [rcx]
    add     rcx, 8
    dec     rdx
    jle     done

loop_start:
    mov     r8, QWORD PTR [rcx]
    cmp     r8, rax
    jle     skip_update
    mov     rax, r8

skip_update:
    add     rcx, 8
    dec     rdx
    jnz     loop_start

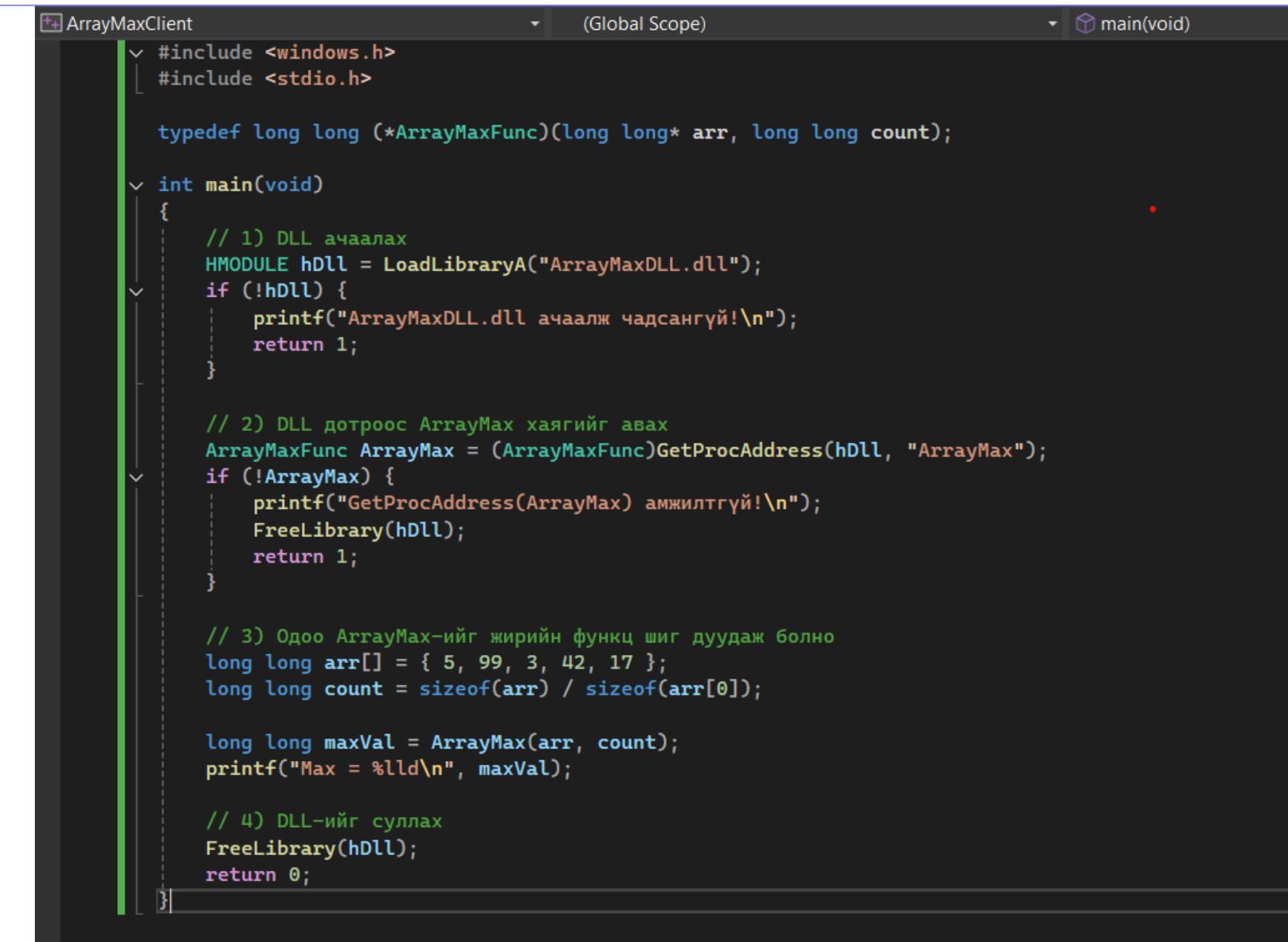
done:
    ret

empty:
    xor     rax, rax
    ret

ArrayMax ENDP
```

04 Client 코드 (ArrayMaxClient)

“클라이언트 프로그램은 LoadLibrary로 DLL을 로드하고, GetProcAddress로 ArrayMax 함수 주소를 가져옵니다. 배열을 전달해 최댓값을 계산한 후 출력합니다.”



```
#include <windows.h>
#include <stdio.h>

typedef long long (*ArrayMaxFunc)(long long* arr, long long count);

int main(void)
{
    // 1) DLL ачаалах
    HMODULE hDll = LoadLibraryA("ArrayMaxDLL.dll");
    if (!hDll) {
        printf("ArrayMaxDLL.dll ачаалж чадсангүй!\n");
        return 1;
    }

    // 2) DLL дотроос ArrayMax хаягийг авах
    ArrayMaxFunc ArrayMax = (ArrayMaxFunc)GetProcAddress(hDll, "ArrayMax");
    if (!ArrayMax) {
        printf("GetProcAddress(ArrayMax) амжилтгүй!\n");
        FreeLibrary(hDll);
        return 1;
    }

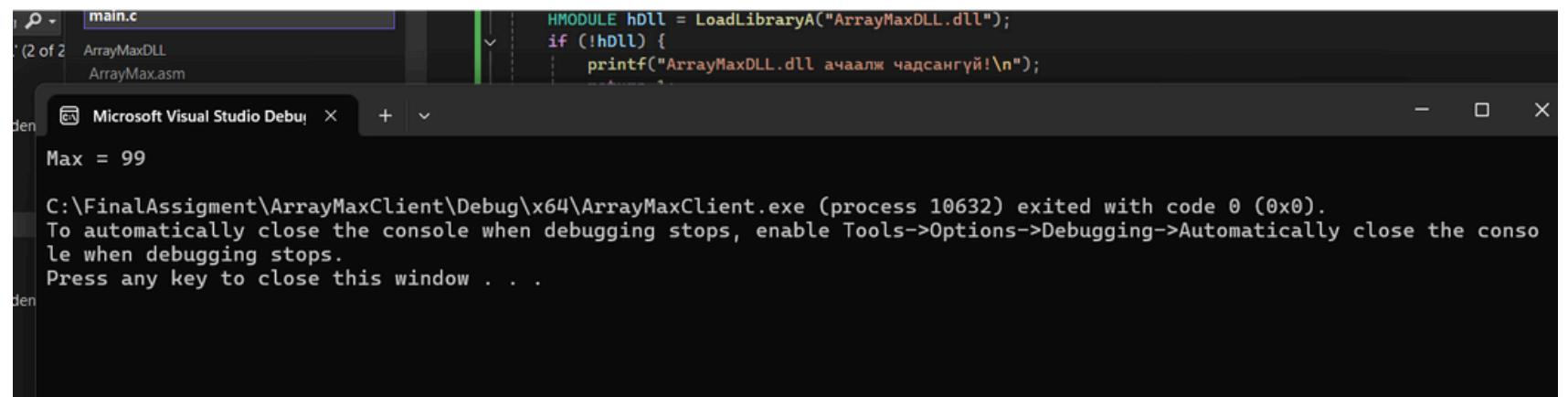
    // 3) Одоо ArrayMax-ийг жирийн функци шиг дуудаж болно
    long long arr[] = { 5, 99, 3, 42, 17 };
    long long count = sizeof(arr) / sizeof(arr[0]);

    long long maxVal = ArrayMax(arr, count);
    printf("Max = %lld\n", maxVal);

    // 4) DLL-ийг суллах
    FreeLibrary(hDll);
    return 0;
}
```

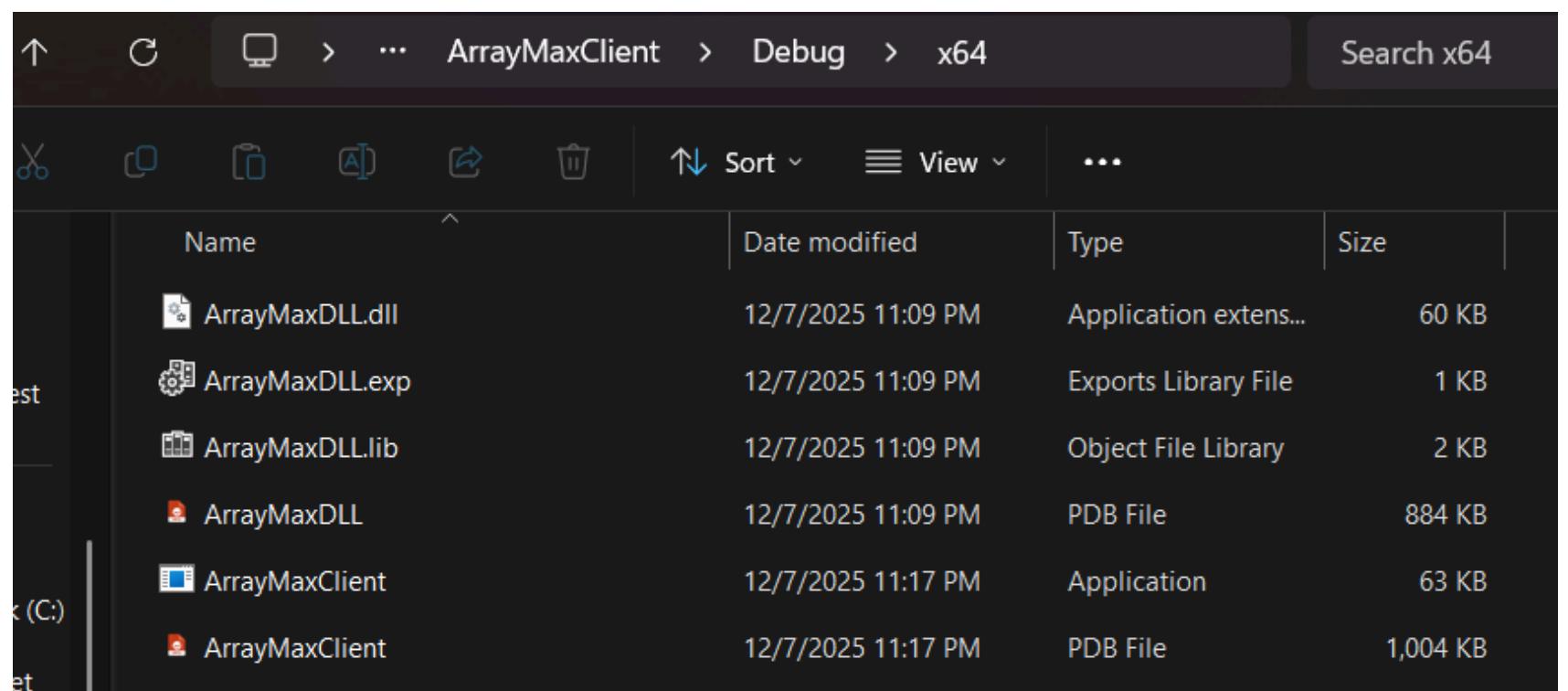
05 실행 화면 (결과)

최댓값을 Max=99
로 출력:



The screenshot shows the Microsoft Visual Studio Debug console window. The code in main.c is displayed at the top, which includes a call to LoadLibraryA and a printf statement. The console output shows "Max = 99". Below the output, there is a message about the application exiting with code 0 and instructions to close the console when debugging stops.

폴더 구조:



The screenshot shows a Windows File Explorer window displaying the contents of a folder. The path shown is C:\FinalAssignment\. The table below lists the files and their details.

	Name	Date modified	Type	Size
	ArrayMaxDLL.dll	12/7/2025 11:09 PM	Application extens...	60 KB
	ArrayMaxDLL.exp	12/7/2025 11:09 PM	Exports Library File	1 KB
	ArrayMaxDLL.lib	12/7/2025 11:09 PM	Object File Library	2 KB
	ArrayMaxDLL	12/7/2025 11:09 PM	PDB File	884 KB
	ArrayMaxClient	12/7/2025 11:17 PM	Application	63 KB
	ArrayMaxClient	12/7/2025 11:17 PM	PDB File	1,004 KB

점수:6점

06 Github 정리

The screenshot shows a GitHub repository page for 'assembly' under the user 'cecuboiz'. The URL in the address bar is <https://github.com/cecuboiz/assembly/commits/main/>. The page displays a list of commits, each with a green 'Verified' badge, indicating they have been reviewed. The commits are organized by date:

- Commits on Dec 3, 2025:**
 - Add files via upload** (Verified) 78bb42a
 - Create 9.10** (Verified) 2d88c39
- Commits on Nov 20, 2025:**
 - Create 1120** (Verified) a0b42d0
- Commits on Oct 30, 2025:**
 - Create home** (Verified) dc9d6fe
- Commits on Oct 16, 2025:** (No commits listed)

06 Github 정리

The screenshot shows a GitHub commit history with the following entries:

- Commits on Oct 1, 2025**
 - Add files via upload** (Verified) efb5377
 - Create HW** (Verified) da8cd12
- Commits on Sep 24, 2025**
 - Add files via upload** (Verified) f1b8cb6
 - Create Presentation** (Verified) 4999722
 - Create HW18** (Verified) 81707b5
- Commits on Sep 15, 2025**
 - Add files via upload** (Verified) f237777
- Commits on Sep 11, 2025**
 - Create readme.md** (Verified) 147438b
Activate Windows
Go to Settings to activate Windows
 - Create readme.md** (Verified) e6718e5

GitHub 점수 :5

<https://github.com/cecuboiz/assembly>

THANK YOU

Referrence

<https://www.canva.com/>

<https://chatgpt.com/>

<https://visualstudio.microsoft.com/>