

Running Assembly (NASM + MinGW) on Windows

1. Go to: <https://www.nasm.us/pub/nasm/releasebuilds/2.16.03/win64/>
2. Download:
 - Latest version
 - File: `nasm-2.16.03-installer-x64.exe`
3. Run the installer
4. Add NASM to your **System PATH**
5. Path for NASM look like this: `C:\Users\SAM\AppData\Local\bin\NASM`
6. Test in Command Prompt:

```
nasm -v
```

2. Install MinGW-w64 (Both 32-bit & 64-bit GCC)

Steps

1. Download **MSYS2** from: https://github.com/msys2/msys2-installer/releases/download/2025-06-22/msys2-x86_64-20250622.exe
2. Install and **launch MSYS2**.
3. Paste Following Command in Terminal of MSYS2: `

```
pacman -S --needed base-devel mingw-w64-ucrt-x86_64-toolchain
```

3. Update core packages:

```
pacman -Syu
```

4. Reopen **MSYS2 terminal**, run:

```
pacman -Syu
```

5. Install **both toolchains**:

```
pacman -S mingw-w64-i686-gcc      # 32-bit GCC
pacman -S mingw-w64-x86_64-gcc   # 64-bit GCC
```

6. Now you'll have:

- `i686-w64-mingw32-gcc` → 32-bit
- `x86_64-w64-mingw32-gcc` → 64-bit

3. Add GCC to Windows PATH

1. Navigate to:

```
C:\msys64\ucrt64\bin
C:\msys32\ucrt32\bin
```

2. Add both paths to **System Environment Variables → PATH**

- Press Win + R , type `sysdm.cpl` , go to **Environment Variables**
- Add each path to **System PATH**

3. Open **Command Prompt** and test:

```
i686-w64-mingw32-gcc --version
x86_64-w64-mingw32-gcc --version
```

4. Assemble and Run 32-bit Assembly Code

hello.asm

```
section .data
    msg db 'Hello, 32-bit World!', 0xA
    len equ $ - msg

section .text
    global _start

_start:
    mov eax, 4      ; sys_write
    mov ebx, 1      ; stdout
    mov ecx, msg
    mov edx, len
    int 0x80

    mov eax, 1      ; sys_exit
    xor ebx, ebx
    int 0x80
```

Build it:

```
nasm -f win32 hello.asm -o hello.obj
i686-w64-mingw32-gcc hello.obj -o hello.exe
```

OR (For 64 Bit)

Just change `-f win32` → `-f win64` And use `x86_64-w64-mingw32-gcc` to compile.

Run:

```
.\hello.exe
```
