MASM Mini Disassembler (C + MASM Hybrid)

- A 32-bit x86 Disassembler Project for Windows 11
- Hybrid architecture using MASM (assembly) for decoding logic and C for program control, file I/O, and CLI.

- GitHub: https://github.com/piotrek1459/masm-minidis

Introduction

The MASM Mini Disassembler is a low-level systems project focused on developing a minimal 32-bit x86 disassembler.

It uses:

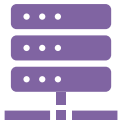
- MASM for decoding algorithms (opcode tables, ModR/M, SIB handling)
- C for program logic, CLI argument parsing, and I/O

The goal is to produce readable assembly instructions from raw binary data.

Why This Project

- Strengthen understanding of x86 architecture and assembly language.

- Combine MASM with C to build a hybrid systems-level tool.



- Practice bitwise operations, data parsing, and control flow logic.

- Create a practical, educational reverse-engineering utility.

- Keep the project compact, maintainable, and extensible.

Scope and Limitations

- Scope:
- • Reads raw .bin files.
- • Decodes selected 32-bit x86 instructions (MOV, ADD, SUB, PUSH, POP, CALL, JMP, RET, etc.).
- • Displays addresses, bytes, and mnemonics with formatted output.

- Limitations:
- • No PE file parsing.
- • Limited opcode coverage in v1.
- • Decoding only — no instruction execution.

Example Output

- Input bytes: 55 8B EC 83 EC 10

- Output:
- 00401000 55 push ebp
- 00401001 8B EC mov ebp, esp
- 00401003 83 EC 10 sub esp, 0x10

- Another test:
- B8 78 56 34 12
- 00402000 B8 78 56 34 12 mov eax, 0x12345678

Project Architecture

- The hybrid architecture separates logic and decoding:
- • C handles CLI, file loading, printing, and test harnesses.
- • MASM implements decode_one(), opcode tables, and ModR/M parsing.

- Structure:
- masm-minidis/
- ├─ minidism/ (Visual Studio project)
- │ ├─ main.c, format.c
- │ ├─ decoder.asm, tables.asm, util.asm
- │ ├─ decoder.h, format.h
- │ └─ minidism.sln
- ├─ samples/ (binary inputs)
- └─ tests/ (validation)

Implementation Plan

1. Setup hybrid C + MASM build in Visual Studio 2022 (x86).

2. Implement CLI and file I/O in C.

3. Create MASM decode_one() for opcode recognition.

4. Add ModR/M and SIB support.

5. Implement control flow and relative addressing.

6. Add testing samples and comparison against ndisasm/objdump.

7. Polish output, bounds checks, and --hex option.

Testing & Validation

- • Compare results with ndisasm or objdump.
- • Maintain golden binary samples in /samples.
- • Store expected disassembly in /tests.
- • Fuzz test random inputs to ensure no crashes.
- • Validate correctness by comparing instruction-by-instruction output.

Future Extensions

- • x64 support (ml64 + Win64 calling conventions).
- • Prefix decoding (0x66, 0x67, 0xF3).
- • PE .text section extraction and disassembly.
- • Colorized / symbolized console output.
- • Two-byte opcode coverage (0x0F prefix group).
- • Modular plugin for adding new instruction sets.

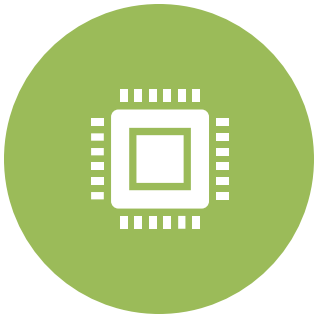
How to Clone & Run

- 1. Clone the repository:
- git clone https://github.com/piotrek1459/masm-minidis.git
- cd masm-minidis

- 2. Open minidism/minidism.sln in Visual Studio 2022.
- 3. Install "Desktop development with C++" workload.
- 4. Enable MASM: Project → Build Customizations → check masm.
- 5. Set Platform to x86 (Win32).
- 6. Build → Rebuild Solution.
- 7. Create test.bin with bytes 90 C3 and run:
- minidism.exe -i test.bin -a 0x401000 --hex

Conclusion

THE MASM MINI DISASSEMBLER DEMONSTRATES PRACTICAL INTEGRATION BETWEEN ASSEMBLY AND C.



IT SOLIDIFIES LOW-LEVEL UNDERSTANDING OF CPU ARCHITECTURE AND BINARY CODE INTERPRETATION, PRODUCING A WORKING TOOL FOR ANALYZING MACHINE CODE.

THIS PROJECT PROVIDES AN EDUCATIONAL, REALISTIC FOUNDATION FOR REVERSE-ENGINEERING AND SYSTEMS DEVELOPMENT.