aarch64汇编开发和学习环境有哪些

Arm精选 2024年11月27日 19:31 上海

Arm精选
ARMv8/ARMv9架构、SOC架构、Trustzone/TEE安全、终端安全、SOC安全、ARM安全、A...
819篇原创内容

公众号

目录

GNU GCC + QEMU + GDB

安装ARM交叉编译器:
sudo apt install gcc-aarch64-linux-gnu binutils-aarch64-linux-gnu
安装QEMU环境:
sudo apt install qemu qemu-user qemu-user-static
安装gdb环境
sudo apt install gdb-multiarch

```
test@pc:~/workspace/code/test$ sudo apt install gcc-aarch64-linux-gnu binutils-aarch64-linux-gnu
Reading package lists... Done
Building dependency tree
Reading state information... Done
test@pc:~/workspace/code/test$ sudo apt install qemu qemu-user qemu-user-static
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

编写汇编代码：hello_world.s

```
.section .data
msg:    .asciz "Hello, AArch64!\n"

.section .text
.global _start

_start:
```

```
    // Write the string to stdout
    mov     x0, 1                   // File descriptor (stdout)
    ldr     x1, =msg                // Load the address of the string
    mov     x2, 16                  // Length of the string
    mov     x8, 64                  // syscall: write
    svc     0                       // Make syscall

    // Exit the program
    mov     x8, 93                  // syscall: exit
    mov     x0, 0                   // Exit status
    svc     0                       // Make syscall
```

编写Makefile文件

```
hello_world:hello_world.o
	aarch64-linux-gnu-ld -o hello_world hello_world.o

hello_world.o:hello_world.s
	aarch64-linux-gnu-as -o hello_world.o hello_world.s

clean:
	rm hello_world.o
```

执行hello_world程序

```
test@pc:~/workspace/code/test/hello_world$ make
aarch64-linux-gnu-as -o hello_world.o hello_world.s
aarch64-linux-gnu-ld -o hello_world hello_world.o
test@pc:~/workspace/code/test/hello_world$
test@pc:~/workspace/code/test/hello_world$ qemu-aarch64 ./hello_world
Hello, AArch64!
test@pc:~/workspace/code/test/hello_world$
test@pc:~/workspace/code/test/hello_world$
```

hello_world代码的程序解释

```
.section .data
msg:    .asciz "Hello, AArch64!\n"

.section .text
.global _start

_start:
    // Write the string to stdout
    mov     x0, 1           // File descriptor (stdout)
    ldr     x1, =msg        // Load the address of the string
    mov     x2, 16          // Length of the string
    mov     x8, 64          // syscall: write
    svc     0               // Make syscall

    // Exit the program
    mov     x8, 93          // syscall: exit
    mov     x0, 0           // Exit status
    svc     0               // Make syscall
```

syscall 使用:

write 的 syscall 编号为 64，参数依次为:

x0: 文件描述符（1 为 stdout）。

x1: 字符串地址。

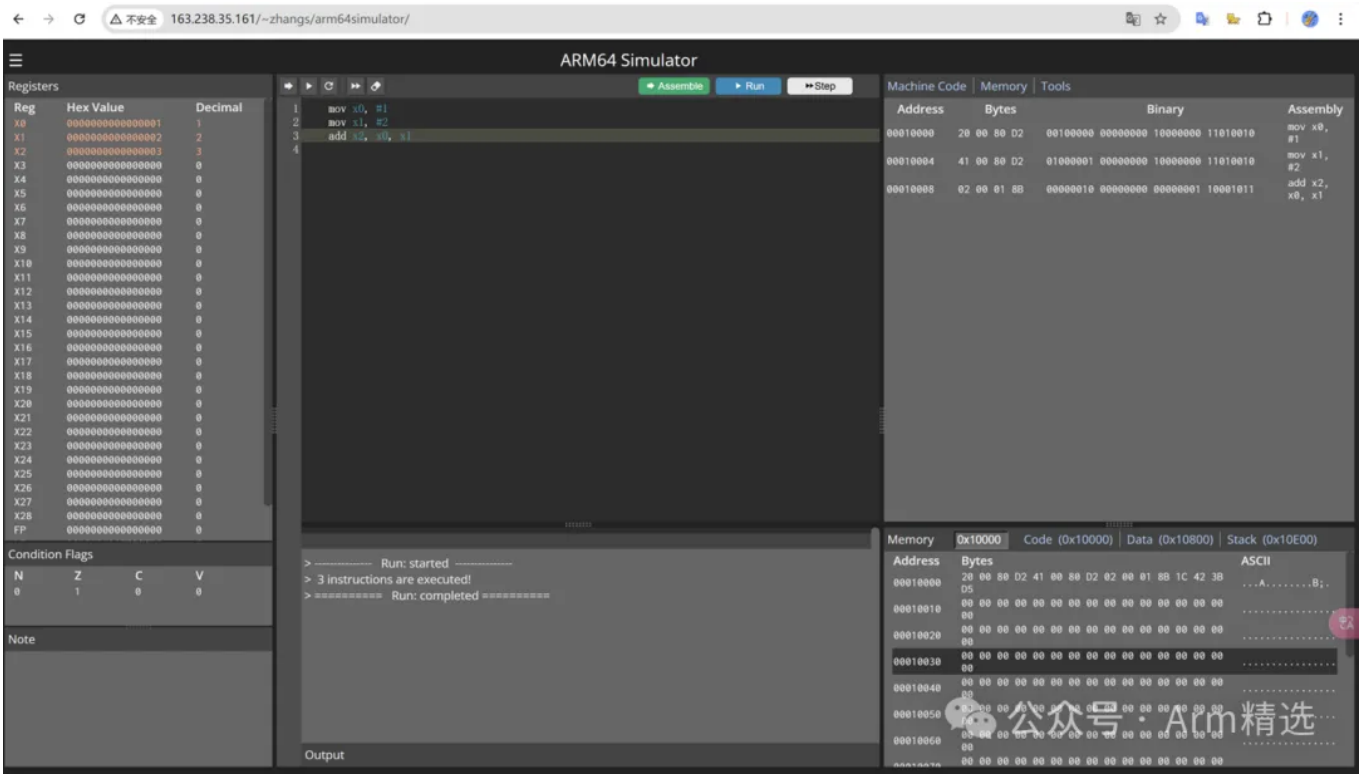
x2: 字符串长度。

exit 的 syscall 编号为 93，参数为:

x0: 退出状态。

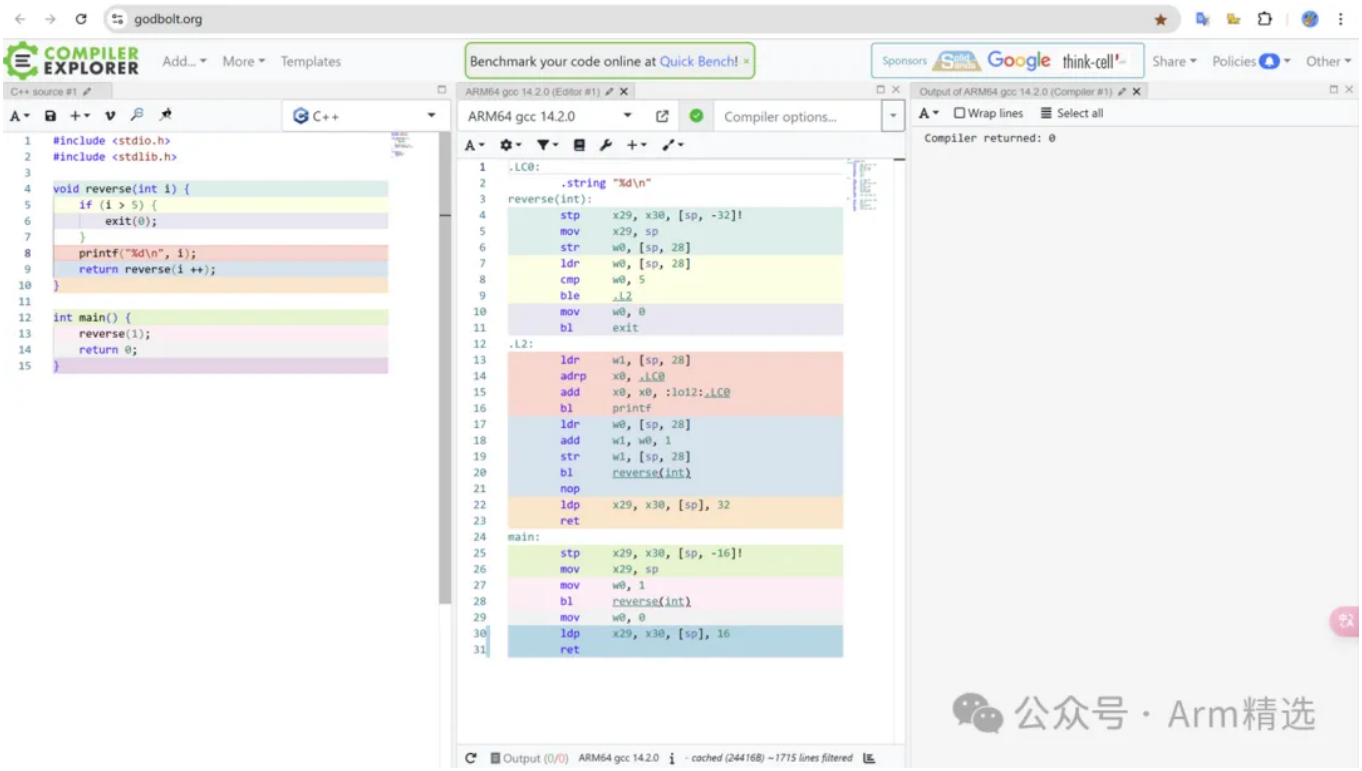
ARM汇编在线仿真器

http://163.238.35.161/~zhangs/arm64simulator/



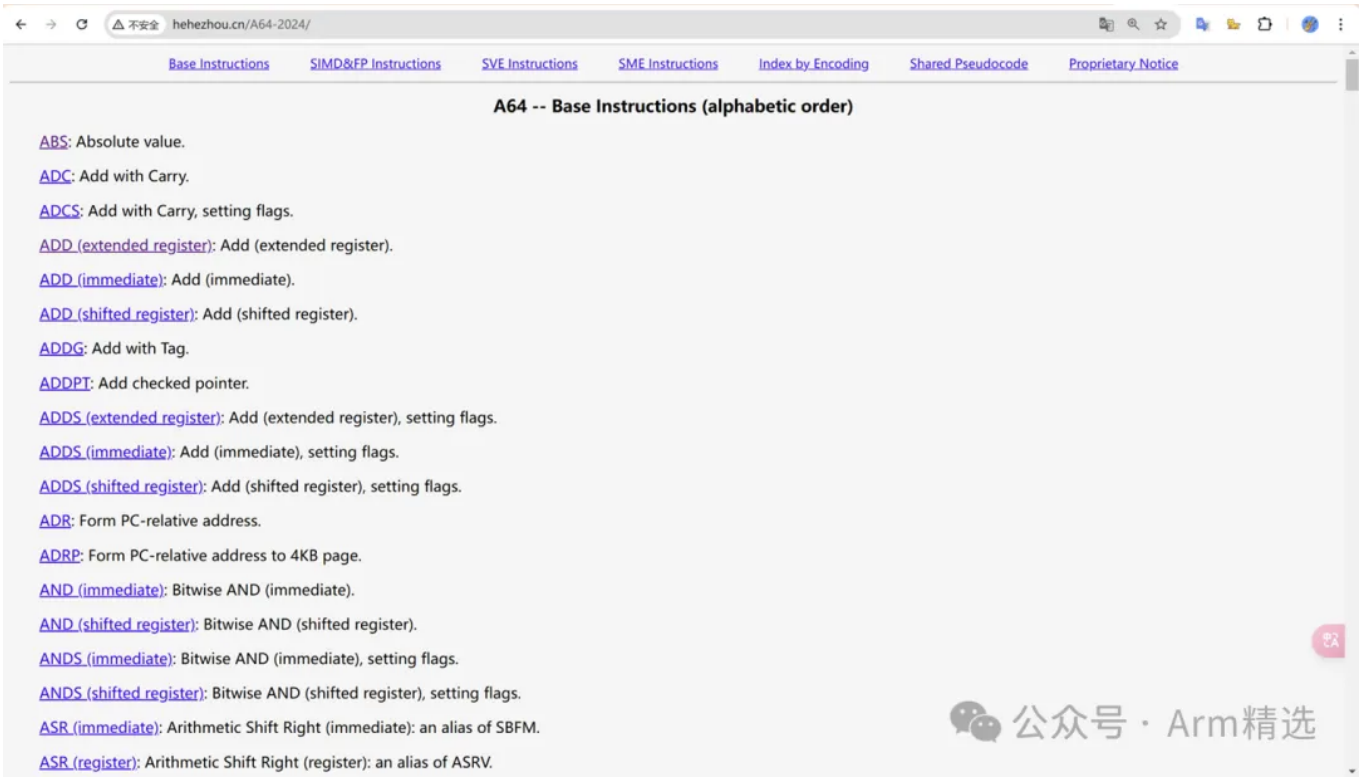
C语言/汇编在线转换工具

https://godbolt.org/

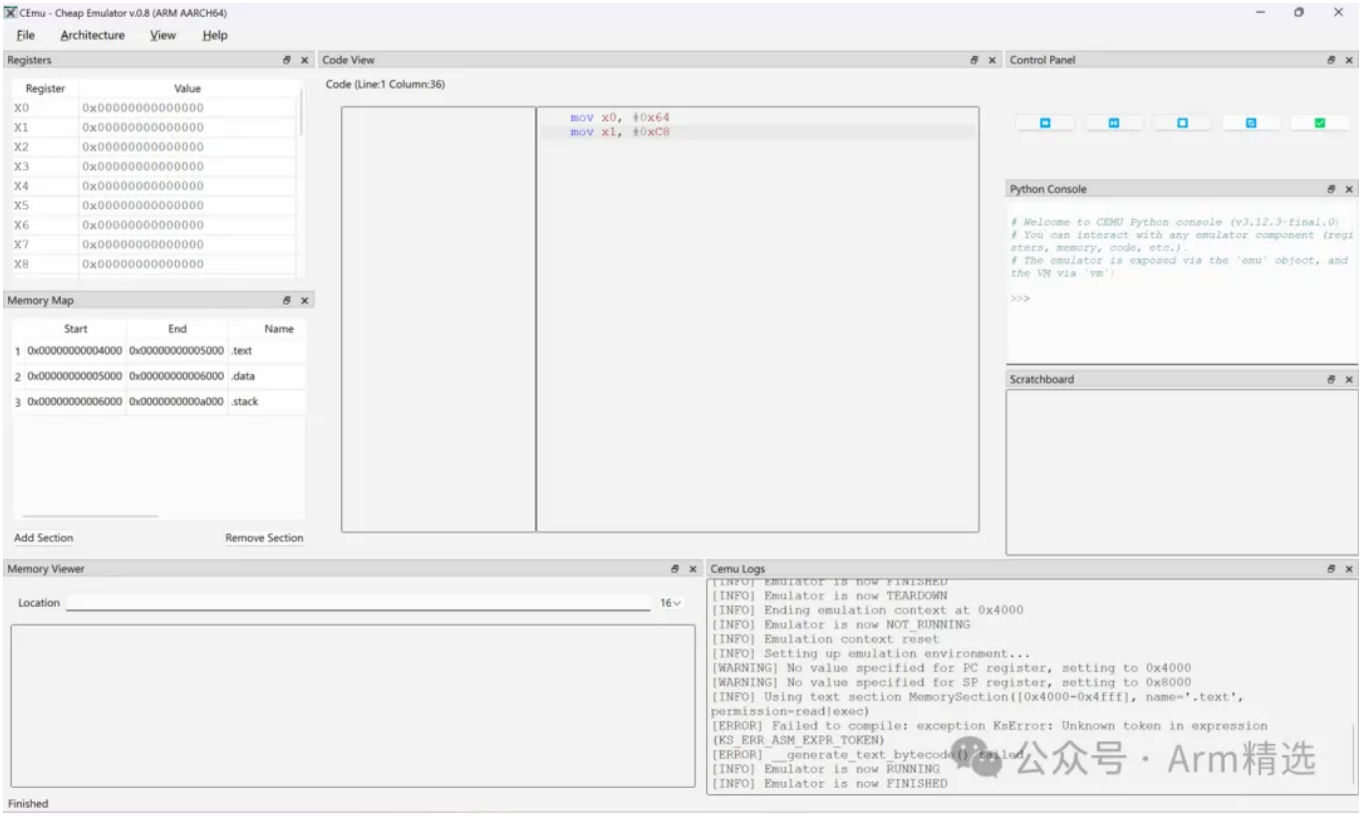


在线指令速查网站

http://hehezhou.cn/A64-2024/



cemu 汇编模拟器


CEmu - Cheap Emulator v.0.8 (ARM AARCH64)
File
Architecture
View
Help
Registers
Register
Value
X0 0x0000000000000000
X1 0x0000000000000000
X2 0x0000000000000000
X3 0x0000000000000000
X4 0x0000000000000000
X5 0x0000000000000000
X6 0x0000000000000000
X7 0x0000000000000000
X8 0x0000000000000000
Memory Map
Start
End
Name
1 0x0000000000004000 0x0000000000005000 .text
2 0x0000000000005000 0x0000000000006000 .data
3 0x0000000000006000 0x000000000000a000 .stack
Add Section
Remove Section
Code View
Code (Line:1 Column:36)
mov x0, #0x64
mov x1, #0xC8
Control Panel
Python Console
Welcome to CEMU Python console (v3.12.3-final.0)
You can interact with any emulator component (registers, memory, code, etc.).
The emulator is exposed via the `emu` object, and the VM via `vm`.
>>>
Scratchboard
Memory Viewer
Location
16
Cemu Logs
[INFO] Emulator is now FINISHED
[INFO] Emulator is now TEARDOWN
[INFO] Ending emulation context at 0x4000
[INFO] Emulator is now NOT_RUNNING
[INFO] Emulation context reset
[INFO] Setting up emulation environment...
[WARNING] No value specified for PC register, setting to 0x4000
[WARNING] No value specified for SP register, setting to 0x8000
[INFO] Using text section MemorySection([0x4000-0x4fff], name='.text', permission=read|exec)
[ERROR] Failed to compile: exception KsError: Unknown token in expression (KS_ERR_ASM_EXPR_TOKEN)
[ERROR] __generate_text_bytecode() failed
[INFO] Emulator is now RUNNING
[INFO] Emulator is now FINISHED
Finished