

My Personal Experience with Setting Up Gem5 on WSL (Ubuntu 22.04)

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Environment

- Platform: Windows 10
- WSL Version: WSL 2 with Ubuntu 22.04.5 LTS
- Processor: AMD Ryzen 5 3600X
- RAM: 16 GB
- GPU: NVIDIA 4060Ti

Step-by-Step Setup

1. Installing WSL & Ubuntu

Enabled WSL and installed Ubuntu 22.04.5 LTS using:

```
wsl --install
```

Set up a username and password for Ubuntu.

2. Preparing the Environment

Updated the system:

```
sudo apt update && sudo apt upgrade
```

Installed essential packages:

```
sudo apt install -y build-essential python3 python3-pip git scons m4  
zlib1g-dev
```

3. Cloning Gem5 Repository

Cloned the gem5 repository:

```
git clone https://gem5.googlesource.com/public/gem5  
cd gem5
```

4. Building gem5

Used the following command to build gem5 for X86:

scons build/X86/gem5.opt -j4

What was easy:

- scons build process was straightforward after installing the dependencies.
- Documentation from gem5's official site was helpful.

⚠ Challenges I faced:

- 'No SConstruct file found' error due to wrong directory.
- HDF5 warnings — safe to ignore.
- Initial slow performance, it took me a lot of time downloading gem5.
- applying some programs doesn't work with and takes much time for example a simple for loop.

5. Running My First Simulation

Compiled and ran a basic C program in gem5:

```
gcc -o hello hello.c  
./build/X86/gem5.opt configs/deprecated/example/se.py --  
cmd=./hello
```

Ran a TSP simulation:

```
gcc -o tsp tsp.c  
./build/X86/gem5.opt configs/deprecated/example/se.py --  
cmd=./tsp
```

Reflections

What I Liked

- Full system simulation.
- Clear separation of architecture and workload.

Challenges

- Learning curve with deprecated scripts.
- Slow simulation.
- Limited syscall support.

Some of the images I took during installation:

```
C:\Windows\system32>wsl --list --verbose
  NAME      STATE      VERSION
* Ubuntu-22.04  Stopped      2

C:\Windows\system32>wsl -d Ubuntu-22.04
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

wave@DESKTOP-007UBUH:/mnt/c/Windows/system32$
```

```
Processing triggers for libc-bin (2.35-0ubuntu3.8) ...
wave@DESKTOP-007UBUH:/mnt/c/Windows/system32$ cd gem5
-bash: cd: gem5: No such file or directory
wave@DESKTOP-007UBUH:/mnt/c/Windows/system32$ cd gemm5
-bash: cd: gemm5: No such file or directory
wave@DESKTOP-007UBUH:/mnt/c/Windows/system32$ cd
wave@DESKTOP-007UBUH:~$ cd f
-bash: cd: f: No such file or directory
wave@DESKTOP-007UBUH:~$ cd /mnt/f/Gemm5
wave@DESKTOP-007UBUH:/mnt/f/Gemm5$ git clone https://gem5.googlesource.com/public/gem5
Cloning into 'gem5'...
remote: Total 270560 (delta 211415), reused 270560 (delta 211415)
Receiving objects: 100% (270560/270560), 208.02 MiB | 10.74 MiB/s, done.
Resolving deltas: 100% (211415/211415), done.
Updating files: 84% (8579/10206)
```

```
wave@DESKTOP-007UBUH:/mnt/f/Gemm5/gem5$ scons build/X86/gem5.opt
scons: Reading SConscript files ...
```

You're missing the pre-commit/commit-msg hooks. These hook help to ensure your code follows gem5's style rules on git commit and your commit messages follow our commit message requirements. This script will now install these hooks in your .git/hooks/ directory.
Press enter to continue, or ctrl-c to abort:

```
wave@DESKTOP-007UBUH:/mnt/f/Gemm5/gem5$ scons build/X86/gem5.opt
scons: Reading SConscript files ...
Mkdir("/mnt/f/Gemm5/gem5/build/X86/gem5.build")
Checking for linker -Wl,--as-needed support... yes
Checking for compiler -gz support... yes
Checking for linker -gz support... yes
Info: Using Python config: python3-config
Checking for C header file Python.h... yes
Checking Python version... 3.10.12
Checking for accept(0,0,0) in C++ library None... yes
Checking for zlibVersion() in C++ library z... yes
Checking for C library tcmalloc_minimal... yes
Building in /mnt/f/Gemm5/gem5/build/X86
Using saved variables file(s) /mnt/f/Gemm5/gem5/build/X86/gem5.build/variables
Checking size of struct kvm_xsave ... yes
Checking for C header file fenv.h... yes
Checking for C header file png.h... yes
Checking for clock_nanosleep(0,0,NULL,NULL) in C library None... yes
Checking for C header file valgrind/valgrind.h... no
Checking for H5Fcreate("", 0, 0, 0) in C library hdf5... no
Warning: Couldn't find HDF5 C++ libraries. Disabling HDF5 support.
Checking for C header file linux/kvm.h... yes
Checking for timer_create(CLOCK_MONOTONIC, NULL, NULL) in C library None... yes
Checking for member exclude_host in struct perf_event_attr...yes
Checking for C header file linux/if_tun.h... yes
Checking for shm_open("/test", 0, 0) in C library None... yes
Checking for GOOGLE_PROTOBUF_VERIFY_VERSION in C++ library protobuf... yes
Checking for backtrace_symbols_fd((void *)1, 0, 0) in C library None... yes
Checking whether __i386__ is declared... no
Checking whether __x86_64__ is declared... yes
Generating LALR tables
WARNING: 4 shift/reduce conflicts
WARNING: 1 reduce/reduce conflict
WARNING: reduce/reduce conflict in state 98 resolved using rule (params -> empty)
WARNING: rejected rule (types -> empty) in state 98
Checking for compiler -Wno-self-assign-overloaded support... yes
```

[illegible]

```

gem5 version 23.0.0-1
gem5 compiled Jan 22 2025 00:50:44
gem5 started Jan 22 2025 15:59:13
gem5 executing on DESKTOP-067UJH6, pid 23380
command line: build/X86/gem5.opt configs/deprecated/example/se.py --cmd/bin/echo --options=Hello Gem5

warn: The 'get_runtime_isa' function is deprecated. Please migrate away from using this function.
warn: The 'se.py' script is deprecated. It will be removed in future releases of gem5.
warn: The 'get_runtime_isa' function is deprecated. Please migrate away from using this function.
global frequency set at 1000000000 ticks per second
warn: No dot files generated. Please install xdist to generate the dot file and pdf.
src/mem/dram_interface.cc:6080: warn: DRAM device capacity (1024 Mbytes) does not match the address range assigned (512 Mbytes)
src/mem/traffic_light.cc:140: warn: The state is a legacy stat. Legacy stat is not a stat that does not belong to any statistics::Group. Legacy stat is deprecated.
*** REAL SIMULATION ***
src/sim/execute.cc:144: info: Entering event queue @ 0. Starting simulation...
src/sim/mem_state.cc:443: info: Increasing stack size by one page.
src/sim/syscall_emul.cc:774: warn: ignoring syscall mprotect(...)
src/sim/syscall_emul.cc:774: warn: ignoring syscall set robust list(...)
src/sim/syscall_emul.cc:774: warn: ignoring syscall rseq(...)
src/sim/syscall_emul.cc:774: warn: ignoring syscall mprotect(...)
src/sim/syscall_emul.cc:774: warn: ignoring syscall mprotect(...)
src/sim/syscall_emul.cc:774: warn: ignoring syscall mprotect(...)
Hello Gem5
Exiting @ tick 144571800 because exiting with last active thread context
$ cd /opt/DESKTOP-067UJH6/mnt/f/gem5/gem5

```