

Gem5 and NVMain

Installation and Integration on Ubuntu 20.04 or 18.04

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Tested Machines

Specific Dependencies	Machine 1	Machine 2
lsbrelease -a	Ubuntu 20.04.3 LTS	Ubuntu 18.04.6 LTS
gcc -v	5.3.1	5.5.0
g++ -v	5.3.1	5.5.0
python -V	2.7.18	2.7.17
scons -v	3.0.5	3.0.5
swig -version	3.0.12	3.0.12

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My Directory Structure

Gem5-NVMain

|

+-- Gem5

|

+-- fs-image

|

+-- NVMain

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Dependencies

- GCC 5
- Python 2.7
- SCons 3.0.5
- SWIG 3.0.12
- Others

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Install GCC 5

- ❶ `sudo apt install vim`
- ❷ `sudo vim /etc/apt/sources.list`
- ❸ Add the below two lines in the end
 - ❶ `deb http://dk.archive.ubuntu.com/ubuntu/ xenial main`
 - ❷ `deb http://dk.archive.ubuntu.com/ubuntu/ xenial universe`
- ❹ `sudo apt update`
- ❺ `sudo apt install gcc-5 g++-5`
- ❻ `sudo update-alternatives --remove-all gcc`
- ❼ `sudo update-alternatives --install /usr/bin/gcc gcc /usr/bin/gcc-5 100`
- ❽ `sudo update-alternatives --remove-all g++`
- ❾ `sudo update-alternatives --install /usr/bin/g++ g++ /usr/bin/g++-5 100`

Install Python 2.7

- ❶ `sudo apt install python2.7`
- ❷ `sudo update-alternatives --remove-all python`
- ❸ `sudo update-alternatives --install /usr/bin/python python
/usr/bin/python2.7 100`

Install SCons 3.0.5

- ❶ Download SCons 3.0.5 from here:
<https://sourceforge.net/projects/scons/files/scons/>
- ❷ Go to the SCons directory
- ❸ `sudo python setup.py install --standard-lib`

Install SWIG 3.0.12

- ❶ Download SWIG 3.0.12 from here:
<https://sourceforge.net/projects/swig/files/swig/>
- ❷ Go to the SWIG directory
- ❸ `./configure`
- ❹ `make`
- ❺ `sudo make install`

Install Other Dependencies

```
sudo apt install build-essential git m4 zlib1g zlib1g-dev libprotobuf-dev  
protobuf-compiler libprotoc-dev libgoogle-perftools-dev libpython2.7-dev  
python2.7-dev python-six libpcrc3-dev libboost-all-dev libhdf5-serial-dev  
python-pydot libpng-dev libelf-dev pkg-config
```

Install Gem5

- ❶ Download the latest commit from my Github repository:
<https://github.com/DeepBCSE/Gem5-for-NVMain>
- ❷ Rename the folder as *Gem5*
- ❸ Go to the Gem5 directory
- ❹ `scons build/X86/gem5.opt -j <nthreads>`
- ❺ An error came in Machine 1 related to the file *timer.cc*
 - ❶ Rename *static* as *extern* in Gem5/src/cpu/kvm/timer.cc line 63
 - ❷ Step 3 & 4
- ❻ An error came in both the Machines related to Permission of the file *cpt_upgrader.py*
 - ❶ Run the command `chmod +x cpt_upgrader.py` in the directory Gem5/util
 - ❷ Step 3 & 4

Gem5 SE mode test

- ① Go to the Gem5 directory
- ② `./build/X86/gem5.opt configs/example/se.py -c tests/test-progs/hello/bin/x86/linux/hello`

Configure Gem5 for Full System mode

- ➊ Download the X86 Full System Files from here: <http://www.m5sim.org/Download>
- ➋ Extract this in a folder named *fs-image* and copy the path of this folder in Gem5/configs/common/SysPaths.py line 60

Gem5 FS mode test

- ① Go to the Gem5 directory
- ② `./build/X86/gem5.opt configs/example/fs.py
--kernel=x86_64-vmlinux-2.6.22.9 --disk-image=linux-x86.img`

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Install NVMain

- ❶ Download the the 29 Aug 2018 commit (ad28c0c) from here:
<https://github.com/SEAL-UCSB/NVmain/commits/master>
- ❷ Rename the folder as *NVMain*
- ❸ Comment out the whole line in */NVMain/SConscript* line 36:
from gem5_scons import Transform
- ❹ Go to the NVMain directory
- ❺ `scons --build-type=fast -j <nthreads>`

NVMain test

- ① Go to the NVMain directory
- ② `./nvmain.fast Config/PCM-ISSCC_2012_4GB.config
Tests/Traces/hello_world.nvt 1000000`

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Integrate Gem5 and NVMain

- ❶ Go to the Gem5 directory
- ❷ `git apply ../NVMain/patches/gem5/nvmain2-gem5-11688+`
- ❸ `scons EXTRAS=../NVMain build/X86/gem5.opt -j <nthreads>`

Test the integration

- ❶ Go to the Gem5 directory
- ❷ `./build/X86/gem5.opt configs/example/se.py -c
tests/test-progs/hello/bin/x86/linux/hello --mem-type=NVMainMemory
--nvmain-config=../NVMain/Config/2D_DRAM_example.config`

Best of luck!

Stuck somewhere? Happy to **help**

Deep Bhuiya

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