

# Αρχιτεκτονική Προηγμένων Υπολογιστών και Επιταχυντών Gem5 Report

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# Contents

<b>1</b>	<b>Gem5 Assignment</b>	<b>2</b>
1.1	Step 1: Downloading Gem5 . . . . .	2
1.2	Step 2: Hello World . . . . .	2
1.2.1	The different CPU models . . . . .	3
1.3	Step 3: First Program . . . . .	3
1.4	Step 4: SPEC CPU2006 Benchmark . . . . .	4

# Chapter 1

## Gem5 Assignment

In this assignment we are going to be System call Emulation (SE) where we focus on running a specific program in contrast with Full System (FS) mode where we emulate an entire operating system.

### 1.1 Step 1: Downloading Gem5

In this assigment we utilize a ready built virtual machine which has the correct ubuntu version, the necessary dependencies and the gem5 tool preinstalled.

### 1.2 Step 2: Hello World

Here the starter\_se.py script configures the gem5 emulator by defining the following parameters:

Parameter	Value
CPU Type	Minor
Operation Frequency	1GHz
Basic Units	
Caches	
Memory	

- CPU Type: Minor
  - 1 core
  - Clock 1GHz
  - Voltage 3.3V
- Caches
  - Cache line size = 64 columns
  - L1 Instruction cache
  - L1 Data cache
  - Page Table Walker cache
- Memory
  - DDR3 1600 8x8
  - 2 memory channels

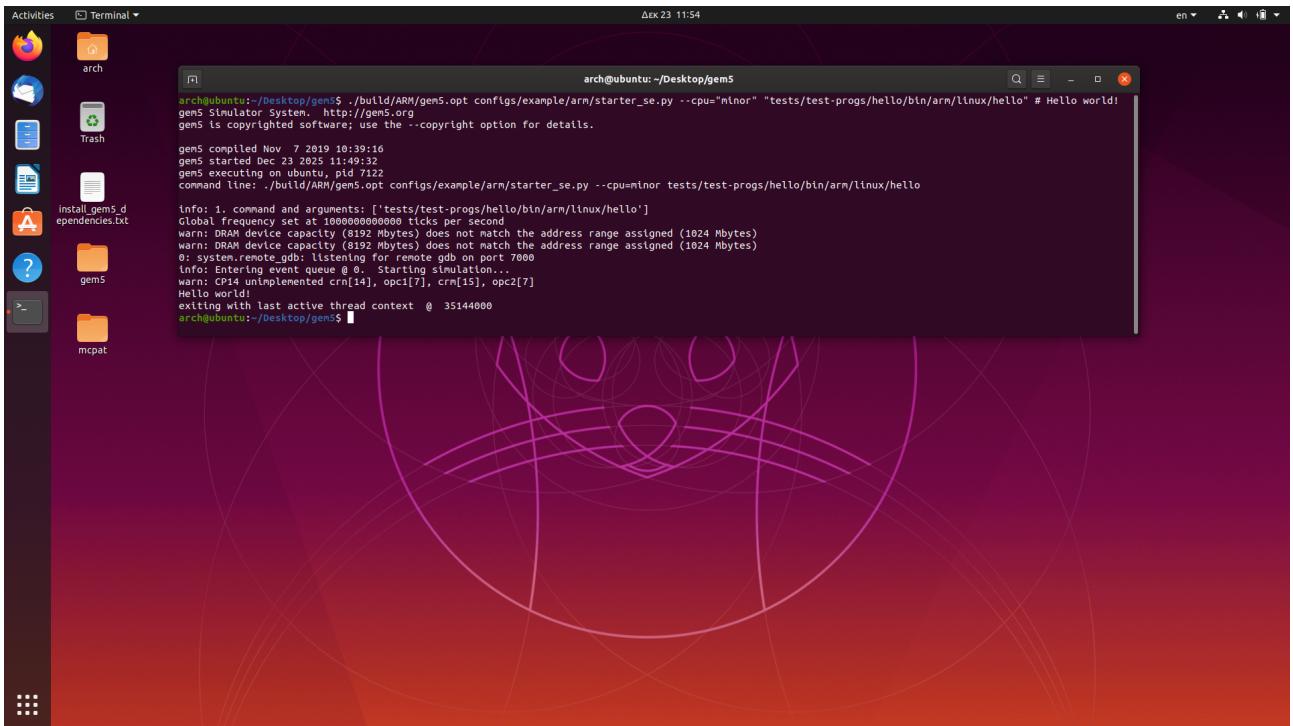


Figure 1.1: hello-world

- 2 GB

Parameter	Value
sim_seconds	
sim_ticks	
sim_insts	
host_inst_rate	
# committed instructions	
L1 data cache accesses	
L2 cache accesses	

### 1.2.1 The different CPU models

In the documentation we can explore and learn more about the different cpu models gem5 provides:

atomic

minor

hpi

## 1.3 Step 3: First Program

Next step has us create a simple Clang triangular number generator program and cross compiling it to run on the gem5 simulator. A triangular number can be defined as:

$$T_N = \frac{(N + 1) * N}{2}$$

```
./build/ARM/gem5.opt configs/example/se.py  
--cpu-type=MinorCPU  
--caches -c "/home/arch/Downloads/tri" --options "7"
```

## 1.4 Step 4: SPEC CPU2006 Benchmark

SPEC CPU2006 is a benchmarking suite that stresses a system's:

- CPU
- Memory
- Compiler

It is trying to emulate computationally intensive real usage scenarios.