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Video link:
https://drive.google.com/file/d/1lQuPTYrXtjQWr8uHLeUx1Rn4SGBHf9ZW/view?usp=share_link

Simulating Matrix Multiplication Application in gem5 Simulator

In this homework, I work on gem5 simulation for calculating hit rate for different cache line sizes. These are the subtitles I am going to explain.

Which files in the simulator you mainly changed?

I mainly changed two files in the simulator those are 'simple.py' and 'caches.py'. When I said changed, I want to mention that those files are exist as default, but I made some changes.

What is the main code you added into the simulator (not all the lines, just your main change is enough)?

In cache.py:

I just changed 'size = 64KB' for both instruction cache and data cache. We don`t need to change those lines. We can set size value when we build the simulation from terminal by just adding '--l1d_size=64kB --l1i_size=64kB'.

In simple.py:

```
from caches import * // importing caches script
system.cpu.icache = L1ICache() // creation of L1 instruction and data cache
system.cpu.dcache = L1DCache()
system.cache_line_size = 128 //changing cache line size
system.cpu.icache.connectCPU(system.cpu)  // connections to the CPU
system.cpu.dcache.connectCPU(system.cpu)
system.cpu.icache.connectBus(system.membus)// connections to system bus
system.cpu.dcache.connectBus(system.membus)
"tests/test-progs/mm/MatrixMultiplication" // changed path.
```

Table showing the L1 hit rate for different block sizes for the L1 data cache.

	2	4	8	16	32	64	128
Hit rate	**No output**	**No output**	**0.997201**	**0.998498**	**0.999177**	**0.99954**	**0.999737**

We can see that when we increase block size, we get better hit rate.

Graph showing the changes in the hit rate according to the block size for L1 data cache.