MEMORY ACCESS TOOL – LMBENCH3

LAB 10

AIM: Determine the latency of individual integer access times in main memory, L1 Cache and L2 Cache. Plot the results in log of memory accessed vs average latency.

Memory latency and bandwidth are two major factors of performance. These two key aspects of system architecture can be broken up into processor cache and system memory. The open source LMBench Benchmarking suite provides utilities to accurately measure latency and bandwidth. These measurements are good indicators that describe the impact during the tuning processes, compare data from one platform to another and possibly identify other potential performance areas of improvement.

What is LMbench?

- lmbench is a suite of simple, portable, ANSI/C microbenchmarks for UNIX/POSIX. In general, it measures two key features: latency and bandwidth. lmbench is intended to give system developers insight into basic costs of key operations.

Lmbench

- Compares different systems performance
- Bandwidth benchmarks
  - Cached file read
  - Memory copy (bcopy)
  - Memory read
  - Memory write
  - Pipe
  - TCP
- Latency benchmarks
  - Context switching.
  - Networking: connection establishment, pipe, TCP, UDP, and RPC hot potato
  - File system creates and deletes.
  - Process creation.
  - Signal handling
  - System call overhead
  - Memory read latency
  - Processor clock rate calculation

Commands executed

1. Download Lmbench3
2. Extract the .taz.gz file. ($ tar -xzvf lmbench3.tar.gz)
3. Open lmbench3 folder. ($ cd lmbench3)
4. Run Makefile ($ make), you may get error.
   To overcome the errors,
5. create a folder SCCS ($ mkdir SCCS)
6. update the access date or modification date of the file. ($ touch SCCS/s.ChangeSet)
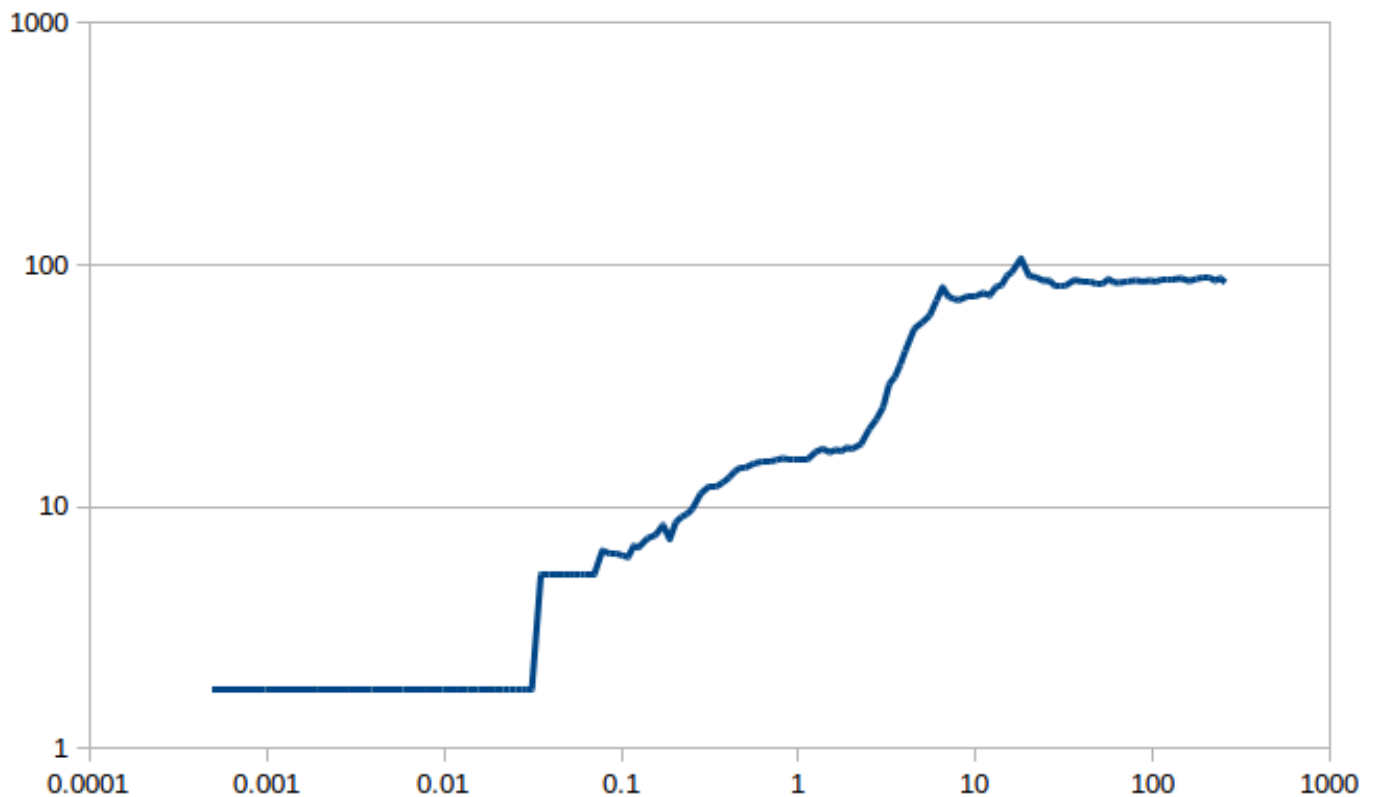
   To measure the latency,
7. Open lmbench3/bin/your-current-os- (cd bin/x86_64-linux-gnu)
8. Type taskset command at prompt. ($ taskset -c 1 ./lat_mem_rd 256 512)

SCENARIO 1: LMBench3 run on my Dell laptop

Measuring the latency by running "taskset" command

```
dhruv@dhruv-Inspiron-5559:~/Downloads/lmbench3/bin/x86_64-linux-gnu$ taskset -c
1 ./lat_mem_rd 256 512
"stride=512
0.00049 1.745
0.00098 1.744
0.00195 1.744
0.00293 1.744
0.00391 1.744
0.00586 1.744
0.00781 1.744
0.00977 1.744
0.01172 1.744
0.01367 1.744
0.01562 1.744
0.01758 1.744
0.01953 1.745
0.02148 1.747
```
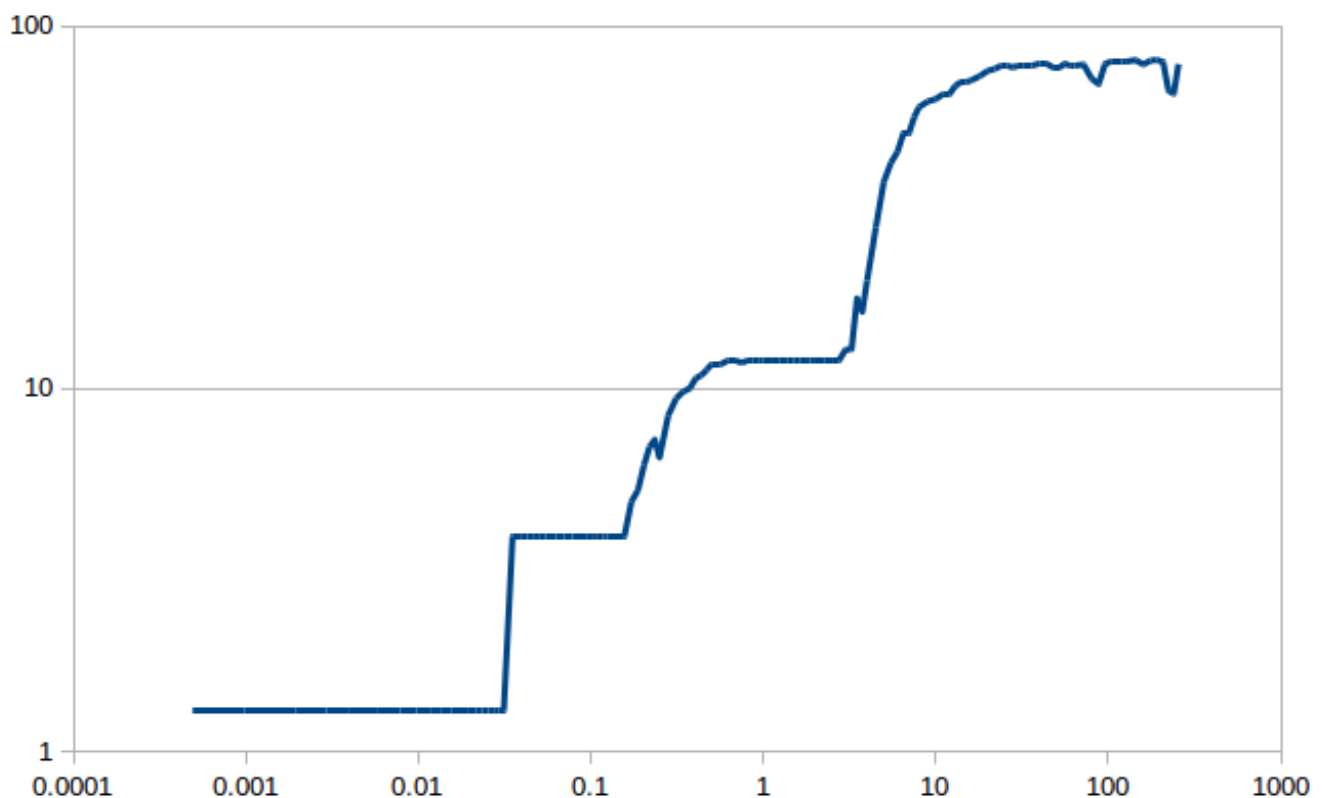
Graph made from the above obtained values

SCENARIO 2: <u>LMBench3 run on my friend's Lenovo laptop</u>

Measuring the latency by running "taskset" command

Graph made from the above obtained values

RESULT

As shown by the two plots made after using LMBench3 benchmark, **my friend's Lenovo laptop performs better in terms of memory access when compared to my laptop.** This is justified since my friend's Lenovo laptop has better specifications (i7th-6 gen processor, 8GB RAM and a faster hard disk) when compared to my Dell laptop which has (i3-6th gen processor, 4GB RAM and a relatively slower hard disk).