SDSC MIDSEM

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1 sum11.c

As shown in the figures below, the command used to display the sizes of cache memory in each layer that exists in your local environment is:

```
lscpu | grep -i cache
```

make file commands are: make -f Makefile1 q11
make -f Makefile1 q12
make -f Makefile1 clean

Command Output Summary

Command	**Details**
`gcc -o sum11 sum11.c`	Compiles `sum11.c` into an executable
`./sum11`	Runs the executable,size allocated for array is 10,000,000 sums 7
Result	Value: -669867186
`valgrind --tool=cachegrind ./sum11`	Cache simulation with `Valgrind`
Cache Details	
Cache Type	**Details**
`L1 refs`	3,035,153,554
`L1 misses`	1,375
`L1 miss rate`	0.00%
`LL refs`	75,536,305
`LL misses`	40,336,536
`LL miss rate`	7.9%
`D refs`	960,049,961
`D1 misses`	75,536,305
`D1 miss rate`	7.9%
`LL cache`	288 KiB (6 instances)
`L1i cache`	192 KiB (6 instances)
`L2 cache`	1.5 MiB (6 instances)

`L3 cache`	18 MiB (1 instance)

2 sum12.c

Command Output Summary

[H]

Command	**Details**
`gcc -o sum12 sum12.c`	Compiles `sum12.c` into an executable
`./sum12`	Runs the executable,size allocated for array 2,000,000 sums 7,500
Result	Value: 1664309326
`valgrind --tool=cachegrind ./sum12`	Cache simulation with `Valgrind`
Cache Details	
Cache Type	**Details**
`L1 refs`	2,947,153,488
`L1 misses`	1,370
`L1 miss rate`	0.00%
`LL refs`	74,668,260
`LL misses`	128,280
`LL miss rate`	0.0%
`D refs`	912,049,935
`D1 misses`	74,666,890
`D1 miss rate`	8.2%

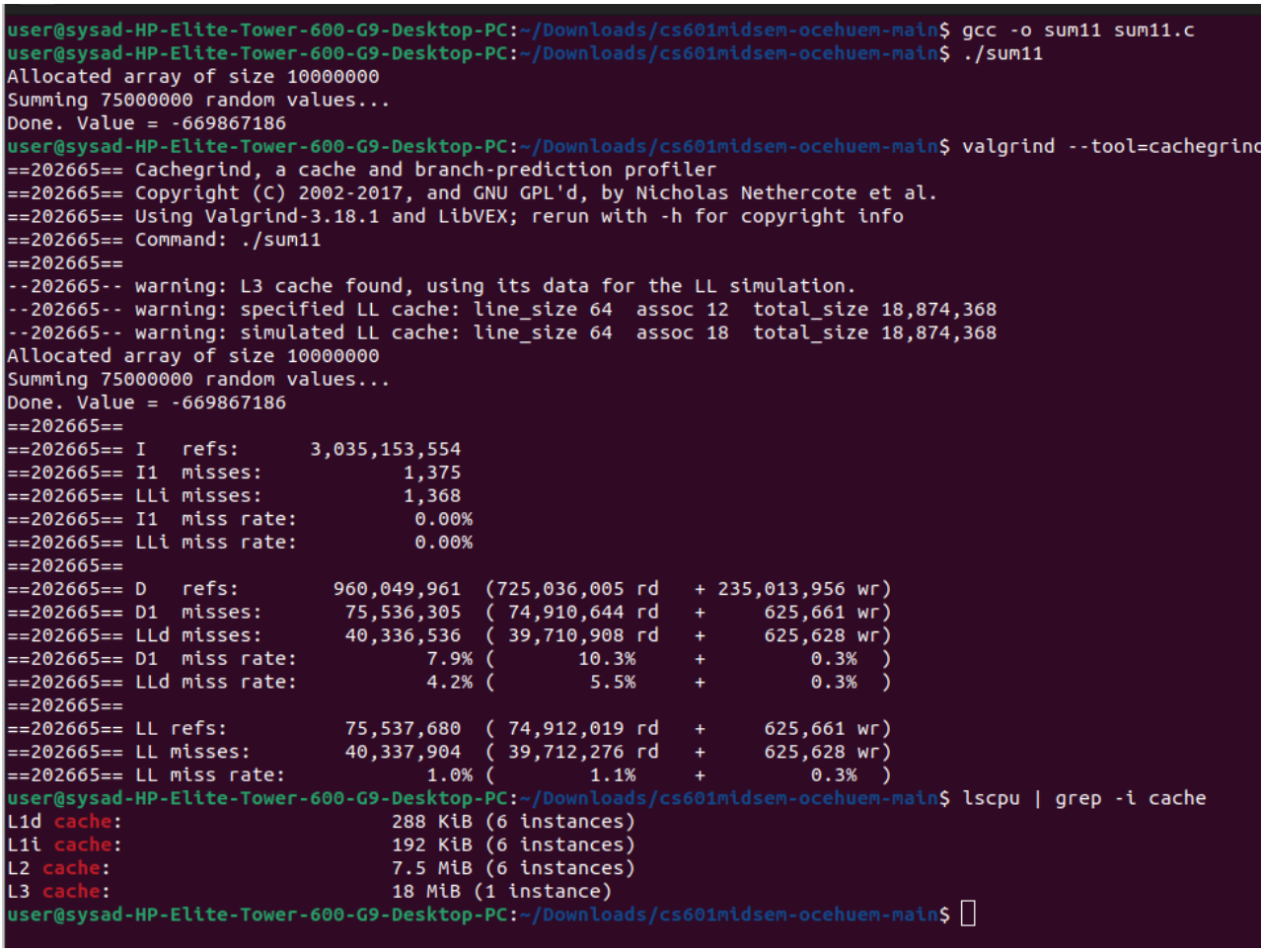

Figure 1: sum11.c Cache Output

```
==203536== LL miss rate:          0.2% (    0.1%     +     2.4%   )
user@sysad-HP-Elite-Tower-600-G9-Desktop-PC:~/Downloads/cs601midsem-ocehuem-main$ gcc -o sum12 sum12.c
user@sysad-HP-Elite-Tower-600-G9-Desktop-PC:~/Downloads/cs601midsem-ocehuem-main$ ./sum12
Allocated array of size 2000000
Summing 75000000 random values...
Done. Value = 1664309326
user@sysad-HP-Elite-Tower-600-G9-Desktop-PC:~/Downloads/cs601midsem-ocehuem-main$ valgrind --tool=cachegrind ./sum12
==203536== Cachegrind, a cache and branch-prediction profiler
==203536== Copyright (C) 2002-2017, and GNU GPL'd, by Nicholas Nethercote et al.
==203536== Using Valgrind-3.18.1 and LibVEX; rerun with -h for copyright info
==203536== Command: ./sum12
==203536==
--203536-- warning: L3 cache found, using its data for the LL simulation.
--203536-- warning: specified LL cache: line_size 64  assoc 12  total_size 18,874,368
--203536-- warning: simulated LL cache: line_size 64  assoc 18  total_size 18,874,368
Allocated array of size 2000000
Summing 75000000 random values...
Done. Value = 1664309326
==203536==
==203536== I   refs:      2,947,153,488
==203536== I1  misses:            1,370
==203536== LLi misses:            1,349
==203536== I1  miss rate:          0.00%
==203536== LLi miss rate:          0.00%
==203536==
==203536== D   refs:        912,049,935  (685,035,987 rd   + 227,013,948 wr)
==203536== D1  misses:       74,666,890  ( 74,541,229 rd   +     125,661 wr)
==203536== LLd misses:          126,931  (      1,341 rd   +     125,590 wr)
==203536== D1  miss rate:           8.2% (       10.9%     +         0.1%  )
==203536== LLd miss rate:           0.0% (        0.0%     +         0.1%  )
==203536==
==203536== LL refs:          74,668,260  ( 74,542,599 rd   +     125,661 wr)
==203536== LL misses:           128,280  (      2,690 rd   +     125,590 wr)
==203536== LL miss rate:            0.0% (        0.0%     +         0.1%  )
user@sysad-HP-Elite-Tower-600-G9-Desktop-PC:~/Downloads/cs601midsem-ocehuem-main$
```

Figure 2: sum12.c Output