

The results for the lab exercise LS2 are as bellows :

On a login node in the Lonestar system the noted values are:

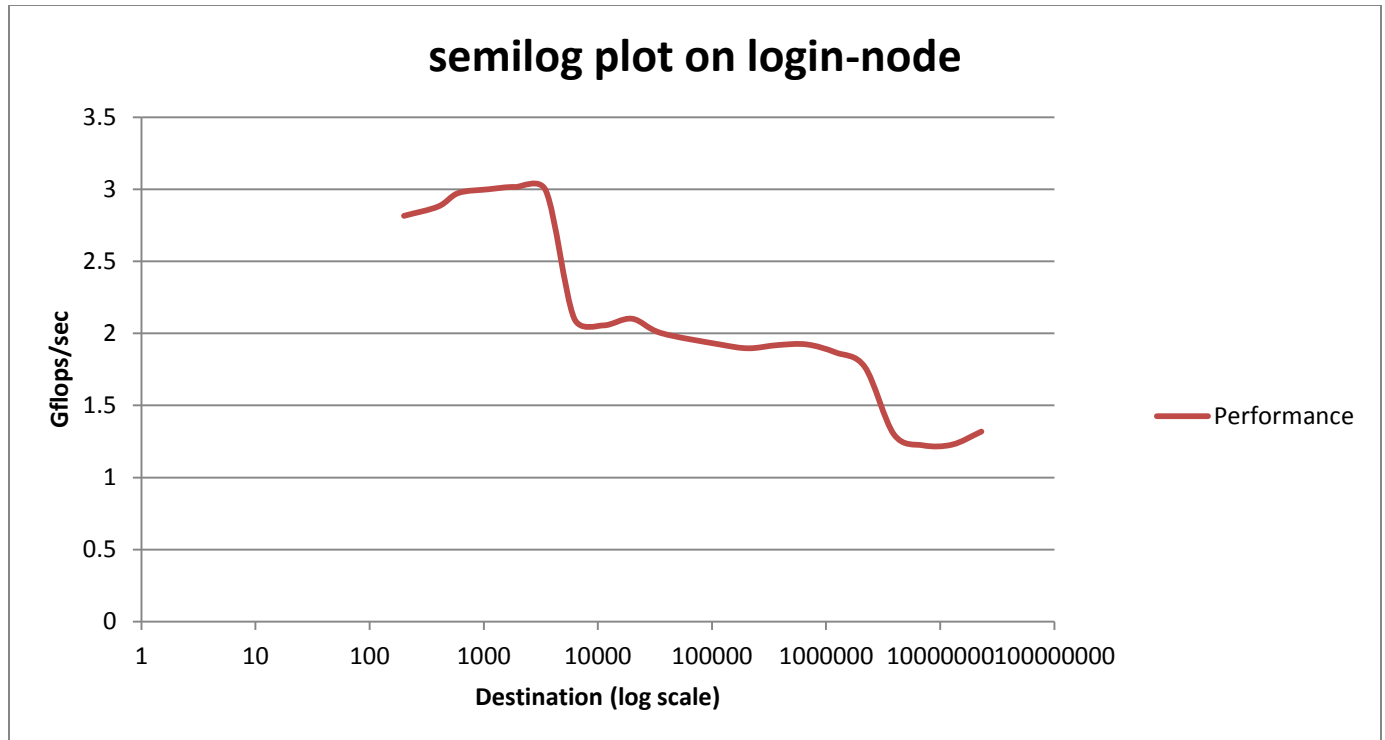
Loop unrolling factor L ->

K	1	2	3	4	5	6
----------	----------	----------	----------	----------	----------	----------

1	2.698522	2.699368	2.689370	2.654222	2.680711	2.652556
2	0	1.357396	0	1.359652	0	1.360305
3	0	0	0.926927	0	0	0.906716
4	0	0	0	0.917156	0	0
5	0	0	0	0	0.921316	0
6	0	0	0	0	0	0.916797

The best performance is at K=3 and L=6 which is less than the theoretical value of 1(3 cycles latency and 1 cycle/issue). Now the required exercise is done as per the part b) requirements i.e. for l = 1 to 21 n=100.ceil(1.8^i) with clock freq:2.67Ghz,IntelNehalam and the results are tabulated as below!

destination	CPI	IPC	Performance(Gflops/Sec)
200	0.948319	1.054497484	2.815508
400	0.926882	1.078885985	2.880626
600	0.897725	1.113926871	2.974185
1100	0.890061	1.1235185	2.999794
1900	0.885365	1.129477673	3.015705
3500	0.893012	1.119805781	2.989881
6200	1.268823	0.788131993	2.104312
11100	1.299127	0.769747684	2.055226
19900	1.270329	0.787197647	2.101818
35800	1.333412	0.749955753	2.002382
115700	1.38772	0.720606462	1.924019
208300	1.407718	0.710369548	1.896687
374900	1.391587	0.718604011	1.918673
674700	1.388015	0.720453309	1.92361
1214400	1.429712	0.699441566	1.867509
2186000	1.511525	0.6615835	1.766428
3934700	2.056532	0.486255502	1.298302
7082400	2.182915	0.458103041	1.223135
12748300	2.173495	0.460088475	1.228436
22946900	2.024655	0.493911308	1.318743



The peak performance is around 3.1 to 3,2 Gflops. Now when the file is profiled using the valgrind and the cache grind in the Lone-star the observations made for the above plateaus in the graph are as below::

I refs: 116,878

I1 misses: 644; I1 miss rate: 0.55%

L2i misses: 644 ; L2i miss rate: 0.55%

D refs: 44,665 (31,778 rd + 12,887 wr)

D1 misses: 930 (684 rd + 246 wr); D1 miss rate: 2.0% (2.1% + 1.9%)

L2d misses: 929 (683 rd + 246 wr); L2d miss rate: 2.0% (2.1% + 1.9%)

L2 refs: 1,574 (1,328 rd + 246 wr); L2 misses: 1,573 (1,327 rd + 246 wr) ;

L2 miss rate: 0.9% (0.8% + 1.9%)

Out of curiosity when the entire experiment was run on a compute node in Lone-star of frequency 3.33Ghz

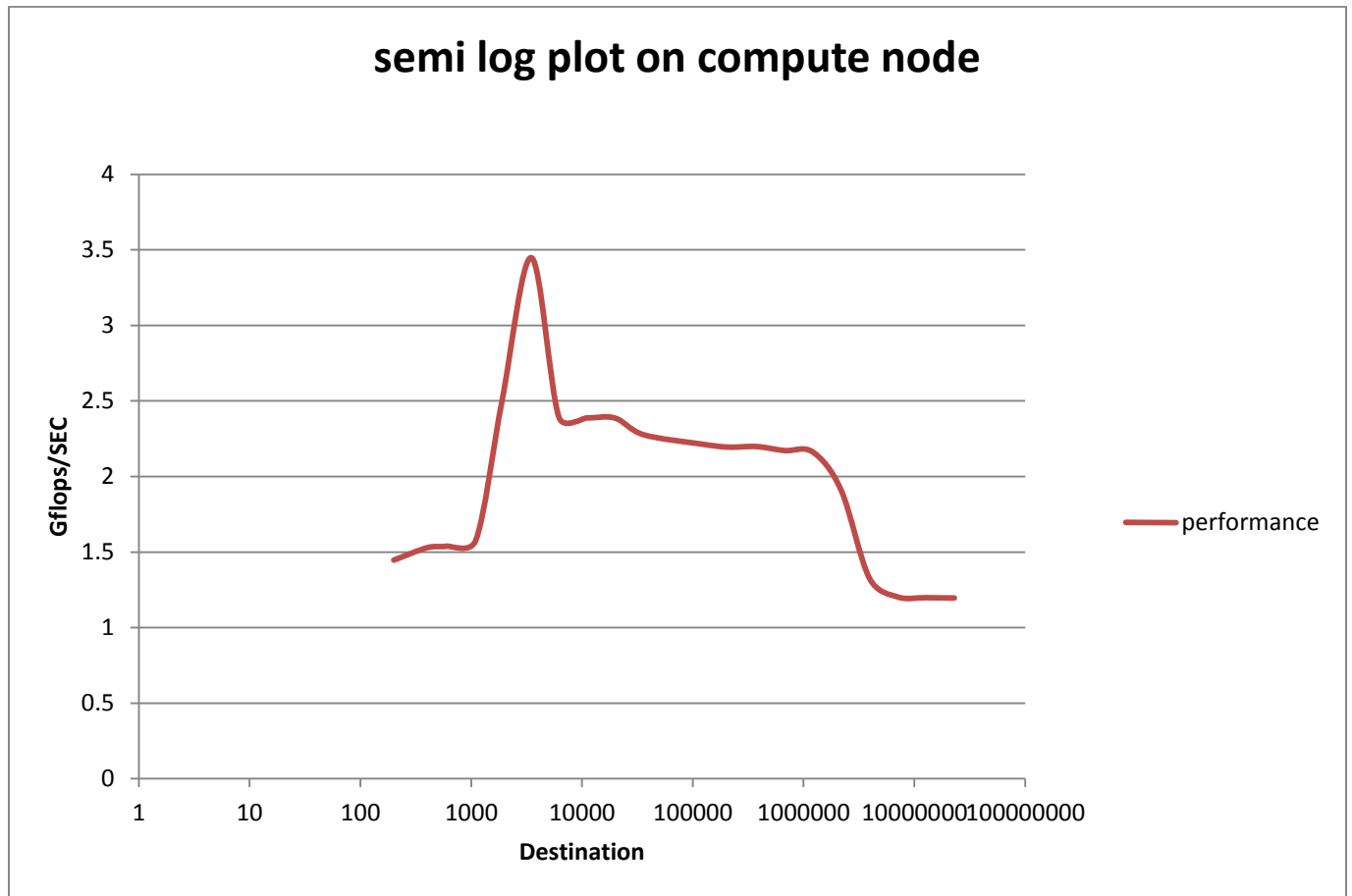
Loop unrolling factor L ->

K	1	2	3	4	5	6
---	---	---	---	---	---	---

1	6.200609	6.214115	6.195378	6.188239	6.195157	2.862640
2	0	1.457700	0	1.440886	0	1.443158
3	0	0	0.984904	0	0	0.967563
4	0	0	0	0.971552	0	0
5	0	0	0	0	0.975381	0
6	0	0	0	0	0	0.969977

The best performance is at K=3 and L=6 which is less than the theoretical value of 1(3 cycles latency and 1 cycle/issue) . Part b) results are tabulated as below

Destination	CPI	IPC	Performance(Gflops/sec)
200	2.301723	0.434457	1.446742
400	2.178269	0.45908	1.528737
600	2.164111	0.462084	1.538738
1100	2.111021	0.473704	1.577436
1900	1.330474	0.751612	2.502867
3500	0.965716	1.035501	3.448219
6200	1.392208	0.718283	2.391884
11100	1.394591	0.717056	2.387797
19900	1.395227	0.716729	2.386708
35800	1.462489	0.683766	2.27694
115700	1.502417	0.665594	2.216429
208300	1.517336	0.65905	2.194636
374900	1.514815	0.660147	2.198288
674700	1.533368	0.652159	2.17169
1214400	1.540525	0.649129	2.161601
2186000	1.744852	0.573115	1.908471
3934700	2.510875	0.398268	1.326231
7082400	2.768517	0.361204	1.20281
12748300	2.779007	0.359841	1.19827
22946900	2.784109	0.359181	1.196074



The observations for the compute node calculation with the valgrind and cachegrind is the below : the peak performance is observed near and around 3.45-3.49 gflops

Events : Ir Dr Dw l1mr D1mr D1mw l2mr D2mr D2mw AcCost1 SpLoss1 AcCost2 SpLoss2

Collected : 117451 31911 12875 644 708 246 644 707 246 309368 48956 309034 48892

I refs: 117,451; l1 misses: 644; l1 miss rate: 0.54%

L2i misses: 644 ; L2i miss rate: 0.54%

D refs: 44,786 (31,911 rd + 12,875 wr)

D1 misses: 954 (708 rd + 246 wr) ; L2d misses: 953 (707 rd + 246 wr)

D1 miss rate: 2.1% (2.2% + 1.9%) ; L2d miss rate: 2.1% (2.2% + 1.9%)

L2 refs: 1,598 (1,352 rd + 246 wr); L2 misses: 1,597 (1,351 rd + 246 wr)

L2 miss rate: 0.9% (0.9% + 1.9%);