

Assignment 10 (By Utkarsh Ranjan)

1. Performance Snapshot

	Image	IPC	Bad Speculation	Physical Core Utilization	DRAM Bound
(bfs) hugebubbles-00020.sg		0.208	7.3%	91.1%	32.3%
(pr) hugebubbles-00020.sg		0.153	0.0%	93.8%	82.5%
(cc) hugebubbles-00020.sg		0.146	5.9%	96.3%	68.4%
(bfs) soc-LiveJournal1.sg		0.087	0.1%	99.1%	89.9%
(pr) soc-LiveJournal1.sg		0.310	6.4%	93.4%	62.2%
(cc) soc-LiveJournal1.sg		0.419	16.4%	82.5%	36.5%

2. Microarchitecture Exploration

	Image	Instructions Retired	CPI Rate	Port Utilization	Average CPU Frequency
(bfs) hugebubbles-00020.sg		50,626,100,100	7.696	27.4%	3.7Ghz
(pr) hugebubbles-00020.sg		10,006,800,000	2.153		3.6Ghz
(cc) hugebubbles-00020.sg		50,164,200,100	7.702	17.7%	3.6Ghz

(bfs) soc-LiveJournal1.sg		20,314,300,000 Instructions	2.043 CPI	35.5% Port	Average CPU
(pr) soc-LiveJournal1.sg		Retired 152,805,200,000	Rate 3.260	Utilization 18.5%	Frequency 3.7Ghz
(cc) soc-LiveJournal1.sg		12,896,000,000	5.299	71.4%	3.6Ghz

3. Hotspots

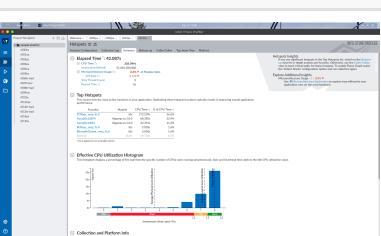
	Image	Top Hotspot Function	% CPU
(bfs) hugebubbles-00020.sg		TDstep_omp_fn.0	56.6%

	Image	Top Hotspot Function	% CPU
(pr) hugebubbles- 00020.sg		BUStep_omp_fn.0	40.5%
(cc) hugebubbles- 00020.sg		Link	74.2%
(bfs) soc- LiveJournal1.sg		BUStep_omp_fn.0	28.7%
(pr) soc- LiveJournal1.sg		PageRankPullGS._omp_fn.1	82.1%
(cc) soc- LiveJournal1.sg		func@0x1d0f4	27.5%

4. Memory Access

	Image	Loads	Stores	LLC Miss Count	Average Latency
(bfs) hugebubbles-00020.sg		31,068,642,391	3,655,414,701	545,768,314	26
(pr) hugebubbles-00020.sg		3,056,018,312	439,575,734	14,544,839	18
(cc) hugebubbles-00020.sg		15,357,544,620	2,291,028,197	1,169,439,126	42
(bfs) soc-LiveJournal1.sg		2,951,038,636	433,407,842	16,440,171	25
(pr) soc-LiveJournal1.sg		48,656,556,482	2,994,074,976	3,974,291,192	65
(cc) soc-LiveJournal1.sg		2,812,882,505	306,319,717	44,513,533	16

5. Threading

	Image	Total Thread Count	Wait time with poor CPU utilization
(bfs) hugebubbles-00020.sg		8	0.238 s
(pr) hugebubbles-00020.sg		8	24.193 s
(cc) hugebubbles-00020.sg		8	20.608 s
(bfs) soc-LiveJournal1.sg		8	2.467 s
(pr) soc-LiveJournal1.sg		8	0.255 s
(cc) soc-LiveJournal1.sg		8	5.985 s

6. Memory Consumption

	Memory Consumption Function	Allocation / Deallocation Data
(bfs) hugebubbles-00020.sg	<code>TDStep_.omp_fn.0</code> <code>DOBFS</code> <code>Reader<int, int, int, (bool)1>::ReadSerializedGraph</code> <code>BitmapToQueue_.omp_fn.0</code> <code>func@0xa6a64</code>	1.3 GB
(pr) hugebubbles-00020.sg	<code>Reader<int, int, int, (bool)1>::ReadSerializedGraph</code> <code>DOBFS</code> <code>TDStep_.omp_fn.0</code> <code>BitmapToQueue_.omp_fn.0</code> <code>func@0xa6a64</code>	1.4 GB
(cc) hugebubbles-00020.sg	<code>main</code> <code>Reader<int, int, int, (bool)1>::ReadSerializedGraph</code> <code>func@0xa6a64</code> <code>__alloc_dir</code> <code>SampleFrequentElement.constprop.0</code>	2.4 GB
(bfs) soc-LiveJournal1.sg	<code>Reader<int, int, int, (bool)1>::ReadSerializedGraph</code> <code>DOBFS</code> <code>TDStep_.omp_fn.0</code> <code>BitmapToQueue_.omp_fn.0</code> <code>func@0xa6a64</code>	1.4 GB
(pr) soc-LiveJournal1.sg	<code>Reader<int, int, int, (bool)1>::ReadSerializedGraph</code> <code>PageRankPulGS</code> <code>func@0xa6a64</code> <code>__alloc_dir</code> <code>PrintTime</code>	1.3 GB
(cc) soc-LiveJournal1.sg	<code>Reader<int, int, int, (bool)1>::ReadSerializedGraph</code> <code>main</code> <code>func@0xa6a64</code> <code>SampleFrequentElement.constprop.0</code> <code>__alloc_dir</code>	974.5 MB

7. HPC Performance characterization

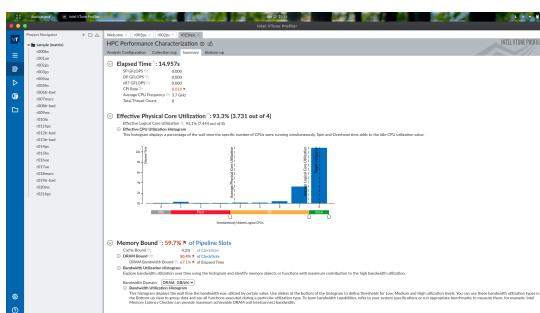
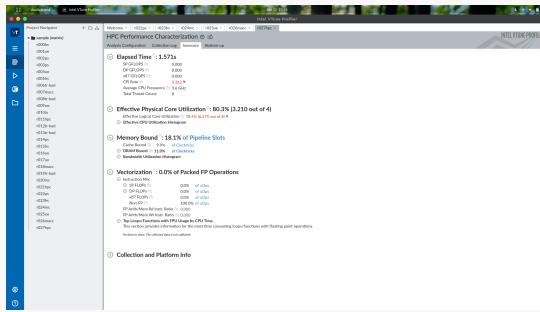
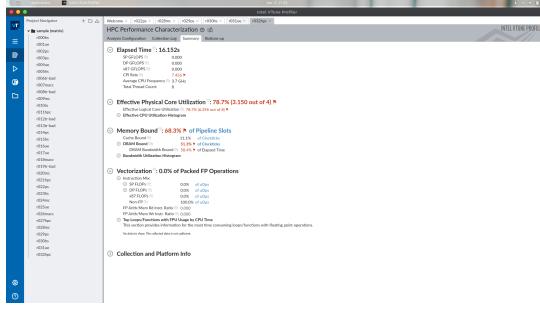
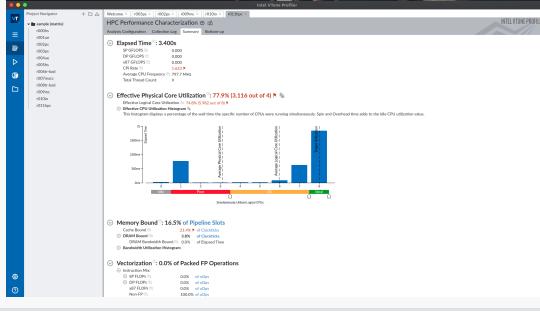
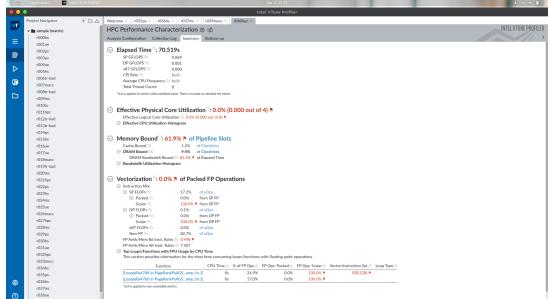
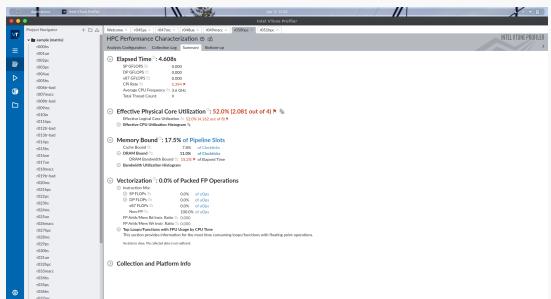
	Image	Memory Bound	Effective Logical Core utilization
(bfs) hugebubbles- 00020.sg		59.7%	93.1%
(pr) hugebubbles- 00020.sg		18.1%	80.3%
(cc) hugebubbles- 00020.sg		68.3%	78.7%
(bfs) soc- LiveJournal1.sg		16.5%	77.9%

	Image	Memory Bound	Effective Logical Core utilization
(pr) soc-LiveJournal1.sg		61.9%	0.0%
(cc) soc-LiveJournal1.sg		17.5%	52.0%