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ECEN 424 HW 6

6.24a)

Block count = file size/block size = 2MB/512B = 4000

T_max_rotation = 4ms

T_transfer = T_max_rotation * Block count/sectors per track = 4 * 4000/1000 = 16ms

T_avgSeek = 4ms

T_rotational = 1/2 × (60 secs / 15,000 RPM) × 1000 ms/sec = 2ms

T_total = T_avgSeek + T_rotational + T_transfer = 4ms + 2ms + 16ms = **22ms**

6.24b)

T_total = (T_avgSeek + T_rotational) * Block count = (4ms + 2ms) * 4000 = **24000ms**

6.26)

Cache	m	C	B	E	S	t	s	b
1.	32	**2048**	8	1	**256**	21	8	3
2.	32	2048	**8**	**2**	128	23	7	2
3.	32	1024	2	8	64	**25**	**6**	1
4.	32	1024	**32**	2	16	23	4	**5**

6.27a)

Both are valid. Tags 0x45 and 0x38.

All addresses that are 0 1000 1010 01xx and 0 0111 0000 01xx.

Address range: 0x08A4 - 0x08A7 for tag 0x45 and address range: 0x0704 - 0x0707 for

0x38

6.27b)

One valid. Tag 0x91.

Addresses of 1 0010 0011 10xx.

Address range: 0x1238 - 0x123B

6.29a)

CT	CT	CT	CT	CT	CT	CT	CT	CT	CI	CI	CO	CO
12	11	10	9	8	7	6	5	4	3	2	1	0

6.29b)

Operation	Address (hex)	Address (bin)	Tag	Set	Offset	Hit?	Read Value (or unknown)
Read	0x834	0 1000 0011 0100	83	1	0	**No**	**Unknown**
Write	0x836	0 1000 0011 0110	83	1	2	**Yes**	**Unknown**
Read	0xFFD	0 1111 1111 1101	FF	3	1	**Yes**	**0xC0**

6.38a)
4 * 16 * 16 = **1024**
6.38b)
32
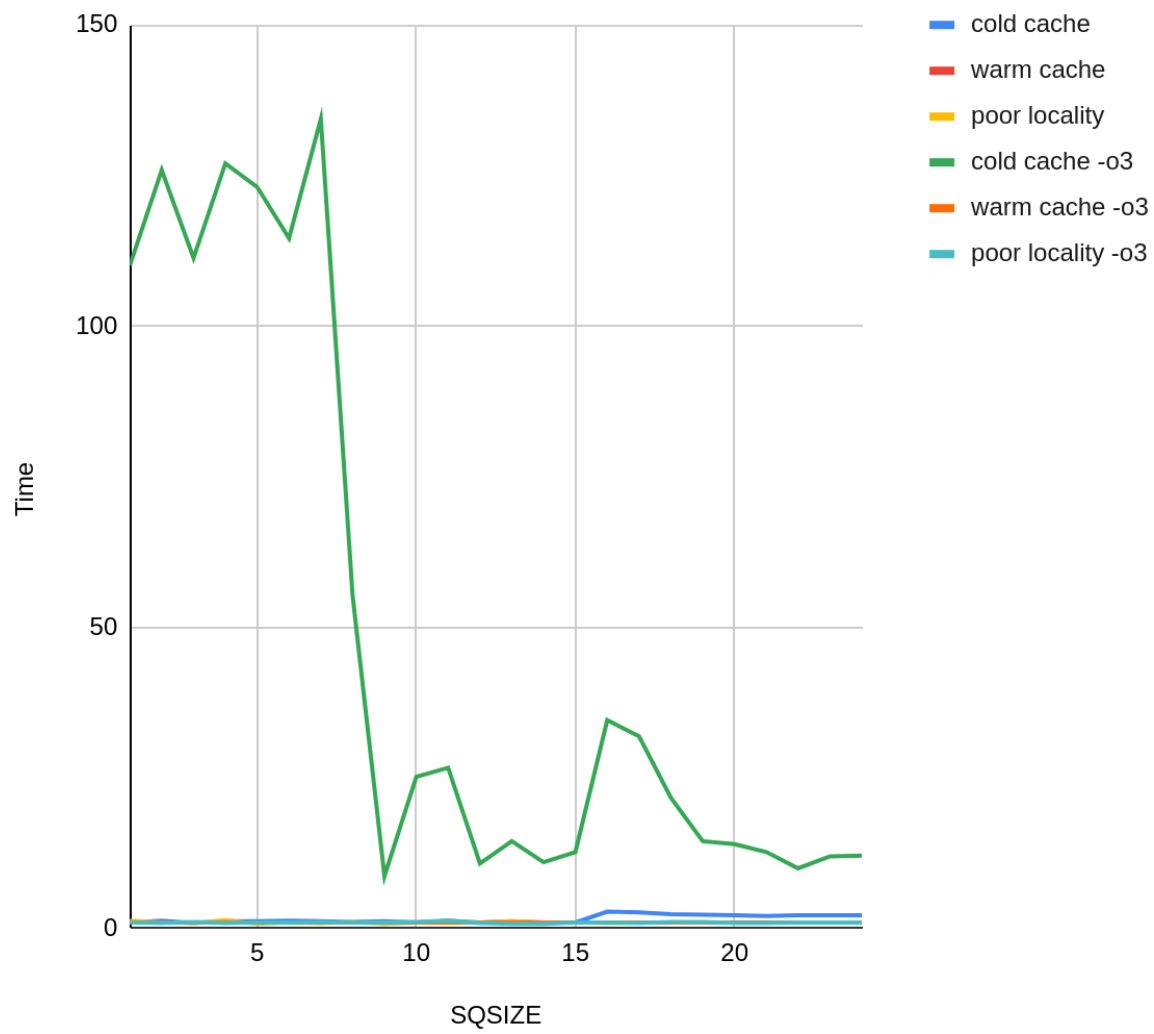6.38c)
⅛ or 12.5%

6.39a)
4 * 16 * 16 = **1024**
6.39b)
32
6.39c)
¼ or 25%

424-7)
The results for this program are not very consistent between repeated program calls. Below is a chart of the results I obtained when running the cacheperf with different options. It looks like the difference between the cold cache and warm cache is most apparent starting when SQSIZE is 16. From then on it seems to hold at about the same ratio. However, when compiled with the flag '-O3' there seems to be much larger discrepancies that are not consistent. Cold cache had a much longer time with low SQSIZE values but decreased over time. Without using compile flags, it seems that the poor locality code ran in about the same time as the code with good locality. However, when compiled with the '-O3' flag, the time increases when SQSIZE is above 17.

■	cold cache
■	warm cache
■	poor locality
■	cold cache -o3
■	warm cache -o3
■	poor locality -o3

SQSIZE

SQ SIZE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
cold cache	1	1.3	0.9	1.2	1.2	1.3	1.2	1.1	1.2	1	1.3	1	1.2	1	1	2.8	2.7	2.4	2.3	2.2	2.1	2.2	2.2	2.2
warm cache	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
poor locality	1.3	1	0.9	1.4	0.8	1	0.9	1.1	0.8	1	1.2	1	1.2	1	1	0.9	1	1	1	1	1	1	1	1
cold cache -o3	110.1	125.9	11.3	127	123.1	114.6	134.4	55.2	8.7	25.2	26.7	10.8	14.5	11	12.7	34.6	31.9	21.7	14.5	14	12.7	10	12	12.1
warm cache -o3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
poor locality -o3	1	0.9	1.1	0.9	1	1	1.1	1	1	1.1	1.3	0.9	0.8	0.8	1	1	0.9	1.1	1.1	0.9	0.9	1	1	1

Data: