CS40: hw3
Dan Glorioso & Brandon Dionisio (dglori02 & bdioni01)

All tests were performed on a 2022 MacBook Air M2 with six-core CPU @3.49 GHz, but code was run on the Halligan servers, which are Intel(R) Xeon(R) Silver 4214Y CPU @ 2.20GHz

Attached are performance results for 0, 90, 180, 270 degree rotation, flip horizontal and vertical, and transpose for two images (small and large) using row-, column, and block-major order. Calculated transformation time only includes the time for the program to perform the specified transformation.

<u>Small Image #1:</u> from-wind-cave.ppm
Size: 816x458 pixels

from-wind-cave on Macbook Air Apple M2 24GB memory 8-core GPU

	0 deg rotation		90 deg rotation		180 deg rotation		270 deg rotation		flip horizontally		flip vertically		transpose	
	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel
row major	1107.33333	0.0029662	22014345.00	58.90	18623141.67	49.83	20085328.00	53.74	16277504.33	43.55	16483703.67	44.11	18118587	48.48067833
column major	996.6666667	0.0026667	23619706.67	63.20	33374292.33	89.30	23457302.33	62.77	27862970.00	74.55	29550888.33	79.07	22070329.67	59.05452533
block major	1074.666667	0.0028757	80795902.00	216.19	77534422.00	207.46	70253732.67	187.98	75594724.00	202.18	76519137.67	204.75	65812293.00	176.0967683

Row Major	1129	0.003021	21616150	57.839257	18648605	49.89887	20075547	53.717	16364348	43.786786	16778517	44.894996	18287128	48.931651
	1063	0.00284	21988070	58.83442	18683167	49.991349	19896568	53.238098	16252933	43.488468	16349442	43.74601	18188421	48.667536
	1130	0.003024	22438815	60.040497	18537653	49.601991	20283869	54.274416	16215232	43.38779	16323152	43.676556	17880212	47.842848
AVERAGE	1107.333333	0.002961666667	22014345	58.90472467	18623141.67	49.83073667	20085328	53.74317133	16277504.33	43.554348	16483703.67	44.105854	18118587	48.48067833

Column Major	891	0.002384	23635323	63.242045	32413004	86.728862	22744845	60.859355	27611495	73.881259	30040701	80.381189	22077752	59.074386
	1014	0.002713	23646346	63.27154	33184877	88.794195	22403728	59.946614	27709400	74.143227	28885706	77.290719	22739188	60.844218
	1085	0.002903	23577451	63.087194	34524996	92.380009	25223334	67.491154	28268015	75.637937	29726258	79.53982	21394049	57.244972
AVERAGE	996.6666667	0.002666666667	23619706.67	63.20025967	33374292.33	89.301022	23457302.33	62.76570767	27862970	74.554141	29550888.33	79.070576	22070329.67	59.05452533

Block Major	1217	0.003256	67948009	181.811395	78898994	211.113414	68875600	184.29339	74968566	200.5966	81655378	218.488789	65104989	174.204205
	908	0.00243	71183252	190.468073	76753737	205.373258	71820857	192.17414	76042947	203.471369	74813253	200.181022	66713817	178.509015
	1099	0.002941	103256445	276.287688	76950535	205.899839	70064741	187.475225	75772659	202.478146	73088782	195.566781	65618073	175.577085
AVERAGE	1074.666667	0.002875666667	80795902	216.189052	77534422	207.4621703	70253732.67	187.9809183	75594724	202.1820383	76519137.67	204.7455307	65812293	176.0967683

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<u>Large Image #2:</u> mobo.ppm
Size: 8160x6120 pixels

mobo on Macbook Air Apple M2 24GB memory 8-core GPU

	0 deg rotation		90 deg rotation		180 deg rotation		270 deg rotation		flip horizontally		flip vertically		transpose	
	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel	Total	Per Pixel
row major	1426.00	0.000028	4948679597.00	99.09	2520308820	50.47	4914196376.67	98.40	2158938848	43.23	2171932612.00	43.49	4548824450	91.09
column major	1415.33	0.000028	5638911268.33	112.92	8290754495	166.02	5696242759.33	114.06	7062499608	141.42	7102157282.67	142.22	5110321730	102.33
block major	1293.67	0.000026	14312316244.67	286.59	14391692780	288.18	14862564262.67	297.61	13437029722	269.07	13722796575.3	274.79	13600321883	272.34
Row Major	1369	0.000027	4891544560	97.949998	2522548794	50.512399	4926666891	98.6533	2163881022	43.33031	2167687033	43.406523	4616028480	92.432968
	1298	0.000026	4995394707	100.02953	2527280768	50.607154	4845938940	97.036776	2159805326	43.248697	2168748105	43.42777	4528502800	90.680323
	1611	0.000032	4959099524	99.302743	2511096897	50.283082	4969983299	99.520683	2153130195	43.115032	2179362698	43.640321	4501942069	90.148462
AVERAGE	1426	0.0000283333333	4948679597	99.09409033	2520308820	50.467545	4914196377	98.40358633	2158938848	43.23134633	2171932612	43.491538	4548824450	91.087251
Column Major	1513	0.00003	5498411979	110.102124	8169087763	163.580669	5897886153	118.101334	6988364588	139.937456	7078689140	141.746146	5061074582	101.344727
	1504	0.00003	5860134176	117.345375	8309066368	166.38365	5601891840	112.174241	7162799970	143.430411	7114789392	142.46903	5116110688	102.446789
	1229	0.000025	5558187650	111.299093	8394109354	168.08658	5588950285	111.915094	7036334265	140.898017	7112993316	142.433065	5153779920	103.201091
AVERAGE	1415.333333	0.0000283333333	5638911268	112.9155307	8290754495	166.0169663	5696242759	114.0635563	7062499608	141.4219613	7102157283	142.2160803	5110321730	102.330869
Block Major	1283	0.000026	13923064926	278.80032	14465806578	289.668368	14804643283	296.453353	13491434168	270.157195	13776158089	275.858606	13645917474	273.250622
	1333	0.000027	14903536865	298.433633	14292081853	286.189644	14959919078	299.56265	13451193887	269.351409	13660444294	273.541512	13504311660	270.415058
	1265	0.000025	14110346943	282.55052	14417189909	288.694851	14823130427	296.823546	13368461110	267.694739	13731787343	274.970111	13650736514	273.34712
AVERAGE	1293.666667	0.000026	14312316245	286.5948243	14391692780	288.1842877	14862564263	297.613183	13437029722	269.067781	13722796575	274.7900763	13600321883	272.3376