CS 553 Cloud Computing

Assignment #1

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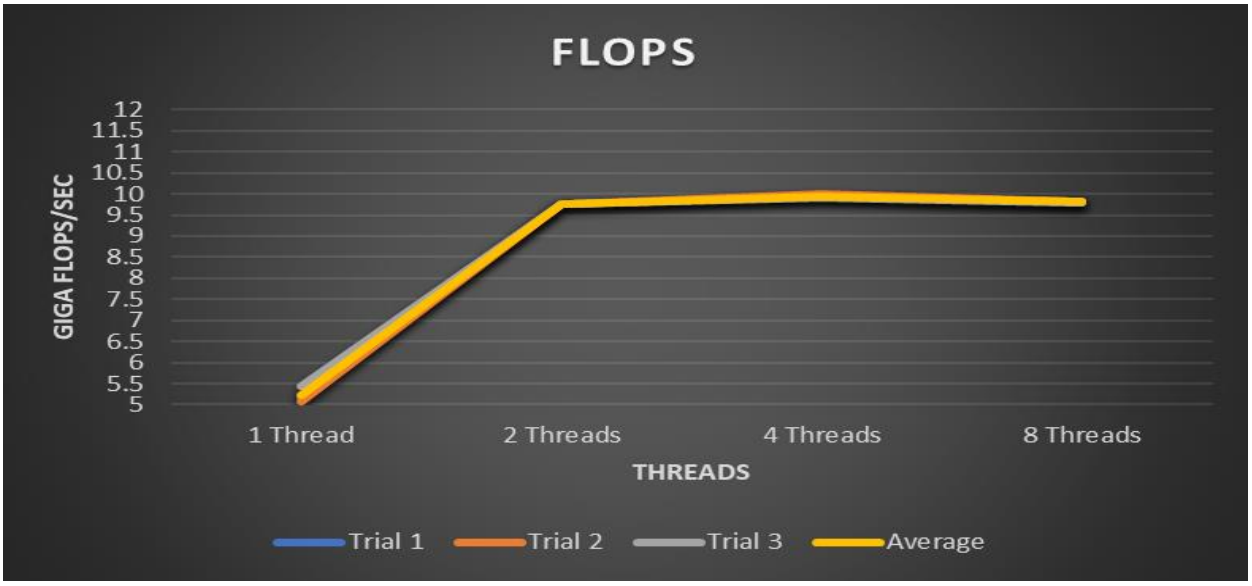
CPU Benchmarking

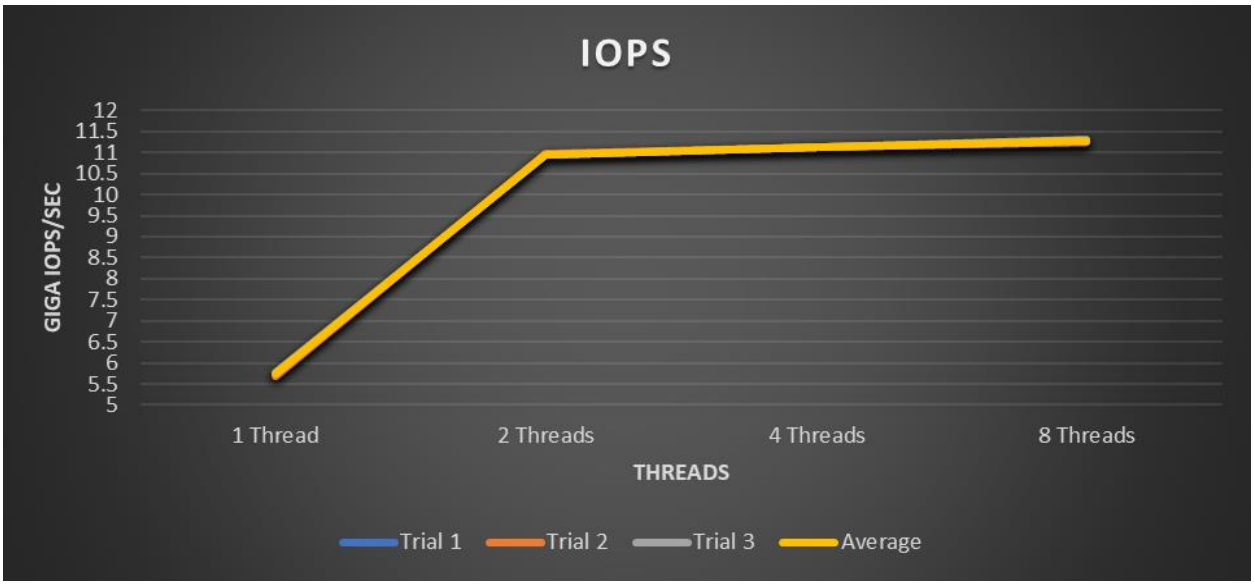
FLOPS & IOPS Computation

	FLOPS				IOPS			
	1 Thread	2 Threads	4 Threads	8 Threads	1 Thread	2 Threads	4 Threads	8 Threads
Trial 1	5.157303	9.758255	9.951452	9.819924	5.749513	10.940751	11.134636	11.252576
Trial 2	5.075643	9.745632	9.99098	9.810745	5.68342	10.97906	11.12312	11.26323
Trial 3	5.43214	9.764323	9.896743	9.801126	5.778761	10.94332	11.12909	11.30194
Average	5.221695333	9.75607	9.946391667	9.810598333	5.737231333	10.954377	11.12894867	11.272582
Std Deviation	0.186768057	0.009535148	0.047321858	0.009399858	0.048842667	0.021414663	0.005759301	0.025976837



The above graph shows the FLOPS trend for 3 trails and their average

Assignment achieves approximately 22.57%((8.3080 / 36.8)*100 = 22.57%)of theoritical performance



The above graph shows the IOPS trend for 3 Trail and their average

FLOPS and IOPS Sampling over 10 minutes with 1 second sampling interval

	FLOPS				IOPS			
Sampling Interval	Trail 1	Trail 2	Average	Std Deviation	Trail 1	Trail 2	Average	Std Deviation
1	9.861472	8.236642	9.049057	1.148928311	6.000309	4.077044	5.0386765	1.359953724
2	8.289651	8.017097	8.153374	0.192724782	6.888328	2.324362	4.606345	3.227211308
3	7.597994	8.659769	8.1288815	0.750788303	6.219014	4.934264	5.576639	0.908455437
4	7.816476	8.479567	8.1480215	0.468876143	5.778359	3.07759	4.4279745	1.909732074
5	8.223588	8.558238	8.390913	0.236633284	7.220854	5.703807	6.4623305	1.072714221
6	7.868757	8.944881	8.406819	0.760934578	5.156278	2.946731	4.0515045	1.562385667
7	8.20008	8.321118	8.260599	0.085586791	5.798996	6.544846	6.171921	0.527395593
8	9.034337	6.712139	7.873238	1.642041953	5.633607	4.104507	4.869057	1.081236979
9	9.009806	8.197462	8.603634	0.574413951	4.475207	4.364151	4.419679	0.078528451
10	8.140858	8.478879	8.3098685	0.239016941	7.147576	6.181348	6.664462	0.683226371
11	6.874244	8.36938	7.621812	1.057220804	7.193227	5.577572	6.3853995	1.142440607
12	8.137592	8.46848	8.303036	0.233973149	7.036582	6.729102	6.882842	0.217421193
13	7.919613	8.689006	8.3043095	0.544043008	7.50452	6.551575	7.0280475	0.673833872
14	8.620183	7.931463	8.275823	0.486998582	5.878917	6.38237	6.1306435	0.35599503
15	8.808996	7.505977	8.1574865	0.921373571	6.499333	4.179114	5.3392235	1.640642589
16	9.016612	7.662893	8.3397525	0.957223885	7.031997	6.081068	6.5565325	0.672408344
17	9.224802	8.039905	8.6323535	0.837848704	5.959494	6.603121	6.2813075	0.455113016
18	8.506831	8.53447	8.5206505	0.019543724	5.355841	5.214404	5.2851225	0.100011062
19	7.002776	8.479626	7.741201	1.04429065	7.582769	6.261648	6.9222085	0.934173618

20	8.31383	7.01091	7.66237	0.921303567	6.194763	5.452775	5.823769	0.524664746
21	9.213947	8.500855	8.857401	0.504232189	6.190384	7.543622	6.867003	0.956883766
22	8.508231	6.678315	7.593273	1.293946013	6.028259	5.473338	5.7507985	0.392388402
23	8.558508	8.387076	8.472792	0.12122073	7.192872	3.42597	5.309421	2.663601948
24	8.181985	9.131786	8.6568855	0.671610728	7.257688	5.880351	6.5690195	0.973924333
25	8.073933	7.949841	8.011887	0.087746295	6.265554	3.396791	4.8311725	2.028521771
26	7.511784	8.678655	8.0952195	0.825102397	5.461467	7.753999	6.607733	1.621064923
27	7.460151	8.806586	8.1333685	0.952073319	5.975857	6.631606	6.3037315	0.463684565
28	7.065072	8.851855	7.9584635	1.263446376	7.098404	6.202597	6.6505005	0.633431204
29	7.944203	7.991638	7.9679205	0.03354161	6.559514	7.564251	7.0618825	0.710456346
30	7.9915	8.162941	8.0772205	0.121227094	5.758347	4.974594	5.3664705	0.554197061
31	7.479579	7.954238	7.7169085	0.335634598	7.259686	4.766557	6.0131215	1.762908422
32	7.492563	7.529594	7.5110785	0.026184871	7.248813	4.966086	6.1074495	1.614131741
33	7.726376	7.266285	7.4963305	0.325333466	7.490723	5.330909	6.410816	1.527219126
34	8.969562	6.897673	7.9336175	1.465046762	7.253638	5.824048	6.538843	1.010872783
35	9.154526	7.843451	8.4989885	0.927070023	7.206551	6.049244	6.6278975	0.818339628
36	8.901342	7.92379	8.412566	0.691233648	6.014203	7.508594	6.7613985	1.05669401
37	7.089182	8.228085	7.6586335	0.805326034	7.402257	6.904586	7.1534215	0.351906539
38	8.812214	8.281245	8.5467295	0.37545178	7.105635	6.038739	6.572187	0.754409396
39	8.125179	8.133697	8.129438	0.006023136	5.928243	7.20455	6.5663965	0.902485335
40	9.288921	5.807127	7.548024	2.462000148	6.590582	7.341006	6.965794	0.530629899
41	8.085227	7.211392	7.6483095	0.617894654	7.228909	5.936211	6.58256	0.914075522
42	8.114715	8.44816	8.2814375	0.235781221	6.504992	5.464291	5.9846415	0.735886734
43	8.199153	6.784195	7.491674	1.000526397	7.295367	3.349175	5.322271	2.790379123
44	8.976062	8.455889	8.7159755	0.367817856	5.844704	6.499682	6.172193	0.463139385
45	8.96281	8.533577	8.7481935	0.303513565	4.758904	7.077917	5.9184105	1.639789818
46	7.61906	6.762821	7.1909405	0.605452403	5.863396	7.473647	6.6685215	1.138619402
47	8.069898	8.090897	8.0803975	0.014848535	7.130401	4.395768	5.7630845	1.933677538
48	8.769658	8.009658	8.389658	0.537401154	5.816698	3.37604	4.596369	1.725805822
49	7.810712	7.638814	7.724763	0.121550241	5.988366	4.44714	5.217753	1.089811356
51	7.692487	7.049247	7.370867	0.454839366	7.189433	7.290433	7.239933	0.071417785
51	7.793795	7.440173	7.616984	0.250048514	7.345266	3.52591	5.435588	2.700692527
52	8.37332	7.91706	8.14519	0.32262454	6.806404	5.765766	6.286085	0.735842187
53	8.082354	8.34206	8.212207	0.183639874	5.565905	6.048976	5.8074405	0.34158278
54	7.743373	6.674782	7.2090775	0.755607942	5.581624	7.287741	6.4346825	1.2064069
55	7.960787	7.932217	7.946502	0.020202041	6.900267	7.0775	6.9888835	0.125322656
56	7.727995	8.271231	7.999613	0.384125859	5.843961	6.899339	6.37165	0.746264941
57	8.22456	8.704924	8.464742	0.339668642	5.84386	3.358005	4.6009325	1.757764928
58	9.228188	7.948029	8.5881085	0.90520911	4.659746	5.426178	5.042962	0.541949265
59	8.111557	7.75605	7.9338035	0.25138141	7.132028	7.710835	7.4214315	0.409278355
60	9.137751	7.207948	8.1728495	1.364576788	6.025632	6.844039	6.4348355	0.578701139

61	9.094743	7.069148	8.0819455	1.43231196	7.085263	7.098331	7.091797	0.009240471
62	8.967639	8.083716	8.5256775	0.625027947	7.332929	4.679564	6.0062465	1.876212384
63	8.717139	9.224179	8.970659	0.358531422	6.759198	4.160686	5.459942	1.837425456
64	8.957875	8.012416	8.4851455	0.66854047	5.677972	6.583408	6.13069	0.640239936
65	8.61771	8.063466	8.340588	0.391909691	5.535068	3.588345	4.5617065	1.376541034
66	8.37649	8.594795	8.4856425	0.154364946	4.788746	5.238314	5.01353	0.317892581
67	7.094558	8.379459	7.7370085	0.90856221	7.261061	5.151953	6.206507	1.491364569
68	8.705659	8.004496	8.3550775	0.495797112	7.413419	7.428248	7.4208335	0.010485686
69	7.463235	7.887556	7.6753955	0.300040256	7.048154	7.316545	7.1823495	0.189781096
70	8.022784	6.127891	7.0753375	1.33989169	5.705914	7.303516	6.504715	1.129675208
71	5.619695	7.914912	6.7673035	1.622963505	6.660201	5.850062	6.2551315	0.572854781
72	7.319293	7.44725	7.3832715	0.090479262	6.772439	5.46634	6.1193895	0.92355146
73	7.780561	7.658116	7.7193385	0.08658169	5.956977	6.988321	6.472649	0.729270336
74	7.756369	7.576278	7.6663235	0.127343567	6.929294	5.899119	6.4142065	0.728443728
75	9.110362	7.60879	8.359576	1.061771744	6.841802	4.915831	5.8788165	1.361867154
76	8.748852	7.210199	7.9795255	1.08799197	2.692194	5.474169	4.0831815	1.967153388
77	8.45681	6.947815	7.7023125	1.067020597	2.789964	4.606093	3.6980285	1.284197131
78	8.690144	7.552147	8.1211455	0.804685396	6.140097	5.052284	5.5961905	0.769199949
79	7.911162	8.545138	8.22815	0.448288729	6.151061	7.184034	6.6675475	0.730422213
80	6.627775	7.39095	7.0093625	0.539646218	5.525736	7.757285	6.6415105	1.57794343
81	7.79012	7.595412	7.692766	0.137679347	4.719127	4.759246	4.7391865	0.028368417
82	8.608111	7.412497	8.010304	0.845426767	5.723773	4.801514	5.2626435	0.652135593
83	9.522805	7.1826	8.3527025	1.654774825	3.375316	7.345746	5.360531	2.807517977
84	9.338187	8.001647	8.669917	0.945076497	4.240441	5.752101	4.996271	1.068905037
85	9.371247	8.627665	8.999456	0.525791875	7.876468	7.578706	7.727587	0.210549529
86	8.840119	8.270108	8.5551135	0.403058643	7.490675	6.827204	7.1589395	0.469144843
87	8.760785	9.684757	9.222771	0.653346867	6.072973	3.059132	4.5660525	2.131107409
88	8.064772	9.798028	8.9314	1.225597071	6.191103	5.439305	5.815204	0.531601464
89	8.903655	8.541139	8.722397	0.256337522	3.732596	5.548574	4.640585	1.284090358
90	8.531622	7.91107	8.221346	0.438796527	7.49321	6.824609	7.1589095	0.472772301
91	8.817773	7.917463	8.367618	0.636615306	7.884681	5.548904	6.7167925	1.651643756
92	8.313182	7.671136	7.992159	0.45399508	6.589438	5.885024	6.237231	0.498095916
93	8.613265	8.862848	8.7380565	0.176481832	7.895255	4.035846	5.9655505	2.729014275
94	9.03697	8.016724	8.526847	0.721422865	7.198105	3.281997	5.240051	2.769106523
95	8.811359	7.825744	8.3185515	0.69693505	6.339869	5.540804	5.9403365	0.56502428
96	8.443115	8.408021	8.425568	0.024815205	5.262423	4.027595	4.645009	0.873155252
97	9.153238	8.267634	8.710436	0.626216594	6.765119	6.090997	6.428058	0.476676238
98	9.933905	8.715457	9.324681	0.861572843	7.827224	7.562351	7.6947875	0.187293494
99	9.824811	6.284661	8.054736	2.503264071	6.606842	6.880864	6.743853	0.193762814
100	8.954636	7.459074	8.206855	1.057522032	6.344075	3.081748	4.7129115	2.306813544
101	8.776601	8.287623	8.532112	0.34575966	6.325719	5.17306	5.7493895	0.815052995

102	7.790975	7.637876	7.7144255	0.108257341	6.315097	3.989642	5.1523695	1.644345
103	7.140427	6.271277	6.705852	0.614581859	6.5732	4.117023	5.3451115	1.736779412
104	8.258685	7.906174	8.0824295	0.249262919	7.880202	7.174441	7.5273215	0.499048389
105	8.788969	8.028108	8.4085385	0.538009973	7.884895	4.864137	6.374516	2.135998466
106	8.741687	8.329181	8.535434	0.29168579	7.898123	6.849498	7.3738105	0.741489848
107	8.281167	8.859546	8.5703565	0.408975713	7.866828	4.574596	6.220712	2.327959572
108	7.821159	7.19171	7.5064345	0.445087656	5.900801	5.35505	5.6279255	0.385904233
109	8.756461	7.374223	8.065342	0.977389863	5.284703	5.308994	5.2968485	0.017176331
110	9.150188	6.391012	7.7706	1.95103206	6.332533	3.570027	4.95128	1.953386726
111	8.042852	6.173031	7.1079415	1.322163109	6.987825	5.620572	6.3041985	0.966793868
112	7.491919	6.30379	6.8978545	0.840134073	6.541329	5.242649	5.891989	0.918305435
113	8.127202	7.9849	8.056051	0.100622709	7.894935	6.764386	7.3296605	0.799418864
114	8.063584	6.621426	7.342505	1.019759701	7.353931	7.730326	7.5421285	0.266151457
115	8.264295	6.754057	7.509176	1.067899531	5.519839	7.812478	6.6661585	1.621140584
116	9.018414	6.182272	7.600343	2.005455241	7.536112	4.175852	5.855982	2.376062633
117	9.005175	8.575221	8.790198	0.304023389	7.884269	3.621518	5.7528935	3.014220139
118	8.90873	7.410749	8.1597395	1.059232523	7.897403	6.728535	7.312969	0.826514489
119	8.859162	7.563081	8.2111215	0.916467664	7.893064	5.67887	6.785967	1.565671592
120	8.898718	7.480046	8.189382	1.003152591	6.360802	4.275374	5.318088	1.47462028
121	9.056271	8.093384	8.5748275	0.680863927	5.277703	4.591987	4.934845	0.484874434
122	7.561258	8.516058	8.038658	0.675145555	7.270763	7.678574	7.4746685	0.288365924
123	8.696566	8.778895	8.7377305	0.058215394	7.811831	7.514184	7.6630075	0.210468212
124	9.262579	9.006625	9.134602	0.180986809	6.352938	6.205259	6.2790985	0.104424822
125	9.144457	8.611929	8.878193	0.37655416	5.283679	5.708844	5.4962615	0.300637055
126	8.560252	8.30383	8.432041	0.181317735	6.305471	4.684773	5.495122	1.146006546
127	8.400915	8.765649	8.583282	0.257905885	6.329467	5.839067	6.084267	0.346765165
129	8.974212	8.440846	8.707529	0.377146715	6.987706	4.911328	5.949517	1.468220964
129	6.10278	6.039416	6.071098	0.044805114	7.893295	5.462745	6.67802	1.718658387
130	7.975868	7.562129	7.7689985	0.292557653	6.591769	5.579846	6.0858075	0.715537615
131	7.651205	6.751397	7.201301	0.636260339	7.884324	4.187358	6.035841	2.614149728
133	6.118689	7.838906	6.9787975	1.216377106	7.891056	5.662087	6.7765715	1.576119095
133	8.261412	7.49149	7.876451	0.544417067	7.893736	6.726931	7.3103335	0.825055728
134	9.19971	7.320722	8.260216	1.328645157	7.898658	7.865154	7.881906	0.023690906
135	9.405802	8.186521	8.7961615	0.862161863	7.880975	4.905539	6.393257	2.103950973
136	9.310593	8.279739	8.795166	0.728923854	7.890339	4.500936	6.1956375	2.396669845
137	8.483179	8.012075	8.247627	0.333120833	6.948944	6.581079	6.7650115	0.260119836
138	9.359286	7.620943	8.4901145	1.229194123	7.656057	7.846508	7.7512825	0.134669194
139	8.848825	8.381947	8.615386	0.3301326	6.975914	7.781184	7.378549	0.569411878
140	7.861261	8.373979	8.11762	0.362546375	6.404992	7.847967	7.1264795	1.020337408
141	8.718096	9.559885	9.1389905	0.59523471	7.892961	7.818541	7.855751	0.052622887
142	7.65809	9.266512	8.462301	1.137326103	6.572958	7.806042	7.1895	0.871922058

143	7.53075	9.819764	8.675257	1.618577322	7.901724	7.778942	7.840333	0.086819985
144	8.111389	9.515636	8.8135125	0.992952576	6.429353	6.851919	6.640636	0.298799284
145	8.6157	7.791332	8.203516	0.582916203	6.925958	6.402707	6.6643325	0.36999433
146	8.258297	8.915516	8.5869065	0.464724012	7.895452	7.844458	7.869955	0.036058203
147	7.58875	8.521969	8.0553595	0.659885483	7.895161	7.822258	7.8587095	0.051550206
148	6.207416	8.370478	7.288947	1.529515808	7.886465	7.084283	7.485374	0.567228332
149	7.112673	7.716623	7.414648	0.42705714	7.885272	7.150209	7.5177405	0.519768032
150	7.505819	6.686138	7.0959785	0.579601994	7.895209	6.560518	7.2278635	0.943769057
151	7.534616	8.924848	8.229732	0.983042475	7.81253	7.775569	7.7940495	0.026135374
152	7.552324	9.153865	8.3530945	1.132460501	7.890855	7.828973	7.859914	0.043757182
153	6.535165	8.653564	7.5943645	1.497934298	7.82944	6.4136	7.12152	1.001150065
154	8.31581	8.458666	8.387238	0.101014446	7.720733	5.219352	6.4700425	1.768743467
155	7.751996	7.270772	7.511384	0.340276754	6.350387	7.528651	6.939519	0.833158464
156	9.094191	6.485365	7.789778	1.844718556	5.2885	7.825511	6.5570055	1.793937682
157	8.337259	6.612526	7.4748925	1.2195704	6.346954	7.811726	7.07934	1.035750214
158	8.067469	5.956548	7.0120085	1.492646554	6.355485	7.784703	7.070094	1.01060974
159	9.399999	5.502339	7.451169	2.756061817	6.354598	7.619884	6.987241	0.894692311
161	9.650522	4.980684	7.315603	3.302074117	5.281318	6.303355	5.7923365	0.722689293
161	9.529114	6.860576	8.194845	1.886941316	6.198136	7.243878	6.721007	0.73945126
162	9.36156	7.167491	8.2645255	1.551441068	6.168155	7.763527	6.965841	1.12809836
163	8.369124	8.283203	8.3261635	0.060755322	7.88673	6.286027	7.0863785	1.131867946
164	9.448474	8.89766	9.173067	0.389484315	7.878576	7.019183	7.4488795	0.607682618
165	8.4838	8.946498	8.715149	0.327176893	7.89204	7.714124	7.803082	0.12580561
166	8.559784	8.045625	8.3027045	0.363565316	7.907578	7.807076	7.857327	0.071065646
167	7.464995	9.256049	8.360522	1.266466429	6.736951	7.795007	7.265979	0.748158572
168	7.30549	8.760221	8.0328555	1.028650155	5.293869	6.536643	5.915256	0.878773923
169	8.318679	8.165257	8.241968	0.108485737	6.348636	7.806344	7.07749	1.030755212
170	7.585788	7.926858	7.756323	0.24117291	6.354082	7.844302	7.099192	1.053744667
171	9.177043	9.003945	9.090494	0.12239877	6.295115	7.824881	7.059998	1.081707912
172	9.008835	9.318209	9.163522	0.218760453	5.301777	7.801583	6.55168	1.767629774
173	8.944224	8.447074	8.695649	0.351538136	7.14229	5.703463	6.4228765	1.017404329
174	8.850209	7.243457	8.046833	1.136145235	7.89097	6.589868	7.240419	0.920018047
175	8.874806	8.140848	8.507827	0.518986679	7.548353	7.23946	7.3939065	0.218420335
176	8.904551	8.536335	8.720443	0.260368031	7.894351	7.398192	7.6462715	0.350837393
177	7.454713	7.4728	7.4637565	0.01278944	6.574245	4.563156	5.5687005	1.422054669
178	8.053541	7.193769	7.623655	0.607950611	7.855713	7.07375	7.4647315	0.55293134
179	8.83501	6.648989	7.7419995	1.545750273	7.349754	6.610936	6.980345	0.522423218
180	7.769348	7.074083	7.4217155	0.491626596	6.349609	5.762561	6.056085	0.415105622
181	8.076793	4.899709	6.488251	2.246537641	6.352401	5.53867	5.9455355	0.575394708
182	9.28775	4.329297	6.8085235	3.50615574	5.292139	5.076383	5.184261	0.152562531
183	8.077004	6.06822	7.072612	1.420424788	6.310679	6.324937	6.317808	0.010081928

184	7.976617	7.093883	7.53525	0.624187197	7.409922	7.739977	7.5749495	0.233384129
185	9.672982	7.577916	8.625449	1.481435376	7.657235	7.567117	7.612176	0.063723049
186	8.81254	8.398957	8.6057485	0.292447344	6.353019	7.769347	7.061183	1.001495133
187	8.577975	9.072757	8.825366	0.349863707	7.27529	7.827779	7.5515345	0.390668718
188	8.208129	8.076183	8.142156	0.093299911	7.897881	7.827389	7.862635	0.049845371
189	9.002048	6.476674	7.739361	1.78570908	7.900862	6.576619	7.2387405	0.936381205
190	8.828199	5.771799	7.299999	2.161201166	7.085076	6.38178	6.733428	0.497305371
191	8.918602	7.834037	8.3763195	0.766903266	6.349052	7.690167	7.0196095	0.948311511
192	8.95285	7.550473	8.2516615	0.991630286	5.280854	7.833773	6.5573135	1.805186337
193	8.209753	6.682164	7.4459585	1.080168541	5.842633	7.721855	6.782244	1.32881062
194	7.956825	7.675326	7.8160755	0.199049852	7.902595	6.534225	7.21841	0.967583706
195	8.309661	8.222314	8.2659875	0.061763656	6.527903	6.844548	6.6862255	0.223901827
196	8.170467	8.585481	8.377974	0.293459214	6.850139	6.212837	6.531488	0.450640566
197	9.093741	9.652159	9.37295	0.394861155	7.871348	7.047704	7.459526	0.582404258
198	8.267978	9.385148	8.826563	0.789958483	7.658961	6.137653	6.898307	1.075727203
199	8.391233	8.623798	8.5075155	0.164448289	7.88307	7.149575	7.5163225	0.518659288
200	9.049478	7.728658	8.389068	0.933960779	7.883548	7.06262	7.473084	0.580483756
201	7.82349	7.403664	7.613577	0.296861812	7.892409	7.127349	7.509879	0.540979114
202	7.30439	7.479818	7.392104	0.124046328	7.884118	6.021314	6.952716	1.31720134
203	7.701977	7.372553	7.537265	0.232937944	7.894779	7.435043	7.664911	0.325082443
204	7.426832	7.562736	7.494784	0.09609864	7.85237	7.447923	7.6501465	0.285987216
205	6.712048	7.77376	7.242904	0.750743755	7.805515	6.478875	7.142195	0.93807614
206	7.283238	8.664759	7.9739985	0.976882867	6.344722	7.191891	6.7683065	0.599038945
207	8.028514	8.907101	8.4678075	0.621254826	6.35125	6.1085	6.229875	0.171650171
208	7.537235	9.082296	8.3097655	1.09252311	6.327828	4.200776	5.264302	1.504052893
209	8.298277	6.739716	7.5189965	1.102069052	7.812265	6.722382	7.2673235	0.77066366
210	6.612877	7.036836	6.8248565	0.299784284	6.065403	7.368628	6.7170155	0.921519235
211	8.992389	9.409614	9.2010015	0.295022627	6.352529	7.745503	7.049016	0.984981361
212	8.820793	7.879201	8.349997	0.665806088	7.674248	7.780536	7.727392	0.075156966
213	8.916307	9.202712	9.0595095	0.202518918	7.428034	7.502981	7.4655075	0.052995532
214	8.313563	9.261828	8.7876955	0.670524612	6.347534	7.024994	6.686264	0.47903656
215	7.934549	9.320481	8.627515	0.980001915	6.351149	7.529402	6.9402755	0.833150686
216	7.304208	9.17129	8.237749	1.320226343	6.663322	7.454882	7.059102	0.559717444
217	8.295231	9.357377	8.826304	0.751050639	7.849619	7.163385	7.506502	0.485240715
218	8.429457	7.789064	8.1092605	0.452826233	7.861193	6.963319	7.412256	0.634892794
219	7.790334	8.345322	8.067828	0.392435778	7.863765	7.166365	7.515065	0.493136269
220	7.734974	7.885062	7.810018	0.106128243	7.865874	7.053439	7.4596565	0.574478298
221	7.922481	6.543379	7.23293	0.975172376	7.903013	7.175579	7.539296	0.514373514
222	8.554281	6.162286	7.3582835	1.691395885	7.857397	6.728945	7.293171	0.797936061
223	7.927949	6.351519	7.139734	1.114704343	7.885118	6.473145	7.1791315	0.998415683
224	7.359142	7.568487	7.4638145	0.148029269	7.885749	4.389272	6.1375105	2.472382597

225	7.666752	8.066062	7.866407	0.282354809	7.888343	4.645185	6.266764	2.293259014
226	7.91351	7.842938	7.878224	0.04990194	6.572175	7.558584	7.0653795	0.697496493
227	7.93169	7.457824	7.694757	0.335073862	7.892681	7.726623	7.809652	0.117420738
228	7.797685	8.404004	8.1008445	0.428732276	7.888558	4.799371	6.3439645	2.184385076
229	9.064391	9.536961	9.300676	0.334157452	7.877914	6.529884	7.203899	0.953201154
230	8.862415	9.658144	9.2602795	0.562665372	6.200996	7.285749	6.7433725	0.767036202
231	8.763457	9.105861	8.934659	0.24211619	6.353407	7.587402	6.9704045	0.872566232
232	7.594022	8.156613	7.8753175	0.397811911	6.349079	6.583626	6.4663525	0.165849774
233	6.37223	9.079197	7.7257135	1.914114722	6.348831	6.17869	6.2637605	0.120307855
234	7.792795	9.342098	8.5674465	1.095522657	6.338443	5.899773	6.119108	0.310186532
235	7.808209	9.857588	8.8328985	1.449129788	7.349412	5.276129	6.3127705	1.466032469
237	8.401687	7.924149	8.162918	0.337670358	7.887027	6.86055	7.3737885	0.725828847
237	6.473095	7.952326	7.2127105	1.045974271	7.880466	6.444261	7.1623635	1.015550295
238	8.406958	7.631779	8.0193685	0.548134328	6.56058	5.989313	6.2749465	0.40394677
239	7.740746	8.982411	8.3615785	0.877989741	7.900038	7.410843	7.6554405	0.345913102
240	8.852964	7.658284	8.255624	0.844766329	7.89201	6.530583	7.2112965	0.962674264
241	8.894985	8.252472	8.5737285	0.454325299	7.895462	6.391312	7.143387	1.063594665
242	8.200935	7.773458	7.9871965	0.302271886	7.897831	6.398699	7.148265	1.060046403
244	7.376483	6.920286	7.1483845	0.322579992	7.893773	5.445009	6.669391	1.73153763
244	7.654642	8.284507	7.9695745	0.445381813	7.891454	6.718827	7.3051405	0.829172504
245	7.032149	8.038604	7.5353765	0.711671155	7.352548	6.504943	6.9287455	0.599347243
246	8.491348	7.395338	7.943343	0.774996103	7.890788	6.121445	7.0061165	1.251114434
247	8.928961	7.623623	8.276292	0.923013352	7.484119	5.74752	6.6158195	1.227960929
248	7.866189	8.109455	7.987822	0.172015038	6.342529	7.411751	6.87714	0.756054127
249	7.048389	6.34015	6.6942695	0.5008006	7.441124	7.173253	7.3071885	0.189413401
250	7.343415	8.63832	7.9908675	0.915636106	7.622137	6.89372	7.2579285	0.5150686
251	7.537629	9.401231	8.46943	1.317765612	6.339445	6.286443	6.312944	0.037478074
252	7.359427	9.658567	8.508997	1.625737485	7.313127	7.535167	7.424147	0.15700599
253	7.370112	9.452945	8.4115285	1.472785338	7.898284	6.435224	7.166754	1.034539647
254	7.091333	8.704257	7.897795	1.140509498	7.895371	7.808846	7.8521085	0.061182414
255	6.927459	7.742472	7.3349655	0.576301219	7.895949	7.019633	7.457791	0.619648986
256	7.716339	8.888688	8.3025135	0.828975928	7.882168	7.47599	7.679079	0.287211218
257	7.499848	8.419069	7.9594585	0.649987403	7.855431	7.366982	7.6112065	0.3453856
258	7.223628	8.740482	7.982055	1.072577749	7.590155	6.923503	7.256829	0.47139415
259	7.343729	8.255408	7.7995685	0.644654403	7.874584	4.984589	6.4295865	2.043535062
260	5.972715	7.399624	6.6861695	1.00897703	5.380629	6.478382	5.9295055	0.77622859
261	8.226748	7.866038	8.046393	0.255060487	6.866321	7.387812	7.1270665	0.368749822
262	6.147585	6.674615	6.4111	0.372666487	7.876357	7.412229	7.644293	0.328188056
263	8.095089	5.993191	7.04414	1.486266329	7.89741	6.089912	6.993661	1.278094093
264	8.026555	7.664545	7.84555	0.255979726	7.894398	7.710483	7.8024405	0.130047544
265	8.091404	8.71126	8.401332	0.438304381	7.895813	7.547564	7.7216885	0.246249229

266	7.581046	8.725848	8.153447	0.809497257	7.881887	7.723472	7.8026795	0.112016321
267	6.401986	7.690893	7.0464395	0.91139488	7.889827	7.64466	7.7672435	0.173359248
268	7.80384	8.159496	7.981668	0.251486769	7.885633	7.767689	7.826661	0.083399002
269	9.409893	7.78833	8.5991115	1.146618193	7.895866	7.754799	7.8253325	0.099749432
270	9.596867	6.455921	8.026394	2.220984216	7.890126	6.636471	7.2632985	0.886467952
271	8.112402	7.873405	7.9929035	0.168996399	7.881078	6.726896	7.303987	0.816129919
272	7.536221	7.555906	7.5460635	0.013919397	7.878205	6.233254	7.0557295	1.163156007
273	8.619676	7.632527	8.1261015	0.698019752	7.879688	6.704878	7.292283	0.830716118
274	8.396012	7.352616	7.874314	0.737792387	7.891079	7.218167	7.554623	0.475820638
275	7.803652	7.27601	7.539831	0.373099236	7.906218	5.695122	6.80067	1.563480975
276	7.595896	7.446809	7.5213525	0.105420429	7.901114	3.869614	5.885364	2.850700988
277	7.582022	7.114928	7.348475	0.330285335	6.53344	6.040948	6.287194	0.348244433
278	8.146126	7.32148	7.733803	0.583112779	5.693206	6.772184	6.232695	0.762952661
279	8.115522	7.440018	7.77777	0.477653459	6.569135	7.317564	6.9433495	0.529219221
280	8.030491	7.254232	7.6423615	0.548898003	7.888346	7.059778	7.474062	0.585886051
281	8.649459	6.449089	7.549274	1.555896548	6.596032	6.839814	6.717923	0.172379905
282	8.442564	7.871894	8.157229	0.403524627	7.68275	6.337085	7.0099175	0.951528847
283	7.378768	8.075051	7.7269095	0.492346431	7.89538	6.13706	7.01622	1.243319995
284	8.766804	8.398069	8.5824365	0.260735019	7.82516	7.308911	7.5670355	0.365043169
285	8.99761	7.597725	8.2976675	0.989868176	6.567086	7.433364	7.000225	0.612551048
286	8.942148	7.713556	8.327852	0.868745735	7.857891	6.991965	7.424928	0.612302147
287	9.143683	9.452537	9.29811	0.218392758	7.885044	6.916895	7.4009695	0.684584723
288	9.003227	8.622247	8.812737	0.269393541	6.573246	7.441773	7.0075095	0.614141331
289	7.539614	9.068549	8.3040815	1.081120306	7.137382	6.771074	6.954228	0.259018871
290	6.898476	9.18828	8.043378	1.619135936	6.346003	5.528136	5.9370695	0.578319302
291	5.55949	6.773418	6.166454	0.858376721	7.807445	7.446378	7.6269115	0.255312924
292	8.547955	8.57934	8.5636475	0.022192546	7.89249	7.252942	7.572716	0.452228728
293	9.015475	8.093277	8.554376	0.652092459	7.894329	7.162463	7.528396	0.517507412
294	8.822002	8.838253	8.8301275	0.011491192	7.864608	7.567216	7.715912	0.2102879
295	7.388717	9.283025	8.335871	1.339478032	6.58658	7.203738	6.895159	0.436396607
296	7.964233	7.954352	7.9592925	0.006986922	7.887309	4.91397	6.4006395	2.10246817
297	9.176971	9.174342	9.1756565	0.001858984	7.886339	7.413142	7.6497405	0.334600808
298	9.180773	8.122405	8.651589	0.74837919	7.862558	6.758385	7.3104715	0.780768216
299	8.733487	7.508161	8.120824	0.866436324	7.898453	7.22448	7.5614665	0.476570879
300	8.331083	7.436829	7.883956	0.632333068	7.898905	6.366273	7.132589	1.08373448
301	7.278119	7.397871	7.337995	0.084677451	7.89724	7.154991	7.5261155	0.524849301
302	7.583022	8.017374	7.800198	0.307133245	7.897025	7.258144	7.5775845	0.451757087
303	8.832272	8.42684	8.629556	0.286683717	7.893538	7.020486	7.457012	0.61734099
304	7.972475	8.518516	8.2454955	0.386109294	7.892251	5.960576	6.9264135	1.365900492
305	7.483418	7.626489	7.5549535	0.101166474	7.860235	6.522527	7.191381	0.945902398
306	7.393962	7.112462	7.253212	0.199050559	6.592429	7.069075	6.830752	0.337039619

307	8.501792	6.649396	7.575594	1.309841773	7.903942	7.231316	7.567629	0.475618406
308	8.854884	5.956431	7.4056575	2.049515771	6.461098	7.081923	6.7715105	0.438989567
309	8.982255	5.282563	7.132409	2.616077302	6.352489	6.919258	6.6358735	0.400766203
310	8.866876	5.864274	7.365575	2.123160235	6.349728	5.805292	6.07751	0.384974388
311	8.568325	7.056034	7.8121795	1.069351221	6.357087	7.031388	6.6942375	0.47680281
312	8.433923	6.010506	7.2222145	1.713614594	6.35631	5.8794	6.117855	0.337226295
313	8.512628	8.359024	8.435826	0.10861443	5.597367	6.214481	5.905924	0.436365494
314	8.016883	7.015449	7.516166	0.708120772	6.22943	7.469434	6.849432	0.876815237
315	7.702633	6.867335	7.284984	0.59064488	7.61483	6.191524	6.903177	1.006429324
316	8.150764	6.767793	7.4592785	0.977908172	5.030537	6.322459	5.676498	0.913526807
317	8.667455	6.546468	7.6069615	1.499764291	4.449739	7.446069	5.947904	2.118725262
318	8.357741	7.277175	7.817458	0.764075546	3.607726	7.20136	5.404543	2.541082971
319	8.103225	9.509425	8.806325	0.994333556	4.11707	7.353426	5.735248	2.288449274
320	7.374779	9.613692	8.4942355	1.583150565	5.719296	7.470031	6.5946635	1.237956591
321	7.57879	7.990111	7.7844505	0.290847868	6.571992	4.729139	5.6505655	1.303093853
322	8.852079	7.489732	8.1709055	0.963324802	6.237442	5.803159	6.0203005	0.307084454
323	9.239555	7.820884	8.5302195	1.003151884	7.030488	7.437934	7.234211	0.28810783
324	9.391412	6.989565	8.1904885	1.698362301	7.889308	7.7039	7.796604	0.131103254
325	8.559349	6.120123	7.339736	1.724793245	7.89874	7.711427	7.8050835	0.132450293
326	8.045137	7.197525	7.621331	0.599352193	7.891717	6.914694	7.4032055	0.690859589
327	7.846351	8.186024	8.0161875	0.240185082	7.885783	7.286817	7.5863	0.42353292
328	6.594101	6.995391	6.794746	0.28375488	7.814942	6.911029	7.3629855	0.639163012
329	6.435411	6.144976	6.2901935	0.205368558	7.891033	5.918084	6.9045585	1.395085617
330	5.77686	7.177028	6.476944	0.990068288	7.889364	6.549197	7.2192805	0.947641174
331	7.5722	6.999672	7.285936	0.404838431	7.89716	7.288703	7.5929315	0.430244071
332	8.613457	6.991964	7.8027105	1.146568696	7.891407	5.745816	6.8186115	1.517161946
333	8.749617	7.563623	8.15662	0.8386244	7.260737	6.589683	6.92521	0.474506834
334	8.803658	7.566731	8.1851945	0.87463947	7.894569	5.461893	6.678231	1.720161696
335	8.436489	8.036736	8.2366125	0.282668057	7.864344	6.164983	7.0146635	1.201629687
336	9.090122	6.616344	7.853233	1.749225199	7.863862	6.103742	6.983802	1.244592788
337	8.866002	6.300858	7.58343	1.813830717	7.882966	5.755174	6.81907	1.504576152
338	9.747138	7.592409	8.6697735	1.523623488	7.884817	5.774623	6.82972	1.492132487
339	9.728528	6.091625	7.9100765	2.571678774	7.895421	6.729741	7.312581	0.824260233
340	9.724003	5.617812	7.6709075	2.903515501	7.889949	7.446254	7.6681015	0.313739743
341	9.432575	6.225907	7.829241	2.267456688	7.905521	7.444317	7.674919	0.326120476
342	9.517404	7.949466	8.733435	1.108699592	6.529606	7.416247	6.9729265	0.626949864
343	8.840048	8.425928	8.632988	0.29282706	6.338847	7.723803	7.031325	0.979311779
344	9.826259	9.765329	9.795794	0.043084016	6.134547	6.474604	6.3045755	0.240456611
345	9.442295	9.305913	9.374104	0.096436637	7.52246	7.774717	7.6485885	0.178372635
346	7.792104	8.812867	8.3024855	0.721788439	7.890831	7.779545	7.835188	0.078691085
347	5.870335	7.04228	6.4563075	0.828690257	7.87422	7.818155	7.8461875	0.039643942

348	8.428031	8.131798	8.2799145	0.209468363	7.899339	7.241548	7.5704435	0.465128477
349	9.046585	7.876591	8.461588	0.827310691	7.6738	6.246356	6.960078	1.009355332
350	8.545067	7.210859	7.877963	0.943427524	6.243098	6.327259	6.2851785	0.059510814
351	7.814657	7.01236	7.4135085	0.567309649	6.326036	7.749431	7.0377335	1.006492257
352	7.803472	7.535023	7.6692475	0.189822108	6.417198	7.358028	6.887613	0.665267273
353	7.554705	8.857751	8.206228	0.921392663	7.854482	6.619868	7.237175	0.873003932
354	8.20043	8.64135	8.42089	0.311777522	7.897657	5.960047	6.928852	1.37009717
355	8.545832	7.939922	8.242877	0.42844307	7.885812	7.446269	7.6660405	0.310803836
356	7.932329	7.108019	7.520174	0.582875191	7.900537	7.634713	7.767625	0.187965953
357	7.918216	7.669089	7.7936525	0.176159391	7.894069	7.448202	7.6711355	0.315275579
358	8.343293	9.244175	8.793734	0.637019771	7.906229	7.615843	7.761036	0.20533391
359	7.880267	8.652374	8.2663205	0.545962096	6.562883	7.712104	7.1374935	0.812621962
360	8.392129	9.054832	8.7234805	0.468601785	6.823405	7.121536	6.9724705	0.210810452
361	8.546399	8.389327	8.467863	0.111066676	7.886448	6.704636	7.295542	0.835667279
362	9.258514	6.526972	7.892743	1.931491871	7.876914	6.000604	6.938759	1.326751525
363	9.305297	8.473283	8.88929	0.588322741	7.890968	7.204184	7.547576	0.485629624
364	7.574605	7.789495	7.68205	0.151950176	7.891712	6.622227	7.2569695	0.897661452
365	9.129086	7.132413	8.1307495	1.411861018	7.887681	6.354676	7.1211785	1.083998231
366	7.302185	6.915283	7.108734	0.273581028	7.898987	6.164138	7.0315625	1.226723492
367	7.256545	7.933025	7.594785	0.478343595	7.894516	7.61949	7.757003	0.19447275
368	7.729199	7.824217	7.776708	0.067187872	7.898434	7.623654	7.761044	0.194298801
369	6.803167	7.998394	7.4007805	0.845153117	7.892476	7.771424	7.83195	0.08559669
370	5.835433	8.384423	7.109928	1.802408114	7.893254	7.358776	7.626015	0.377933018
371	6.682324	8.667276	7.6748	1.40357302	7.879398	5.550814	6.715106	1.646557537
372	9.646226	7.906067	8.7761465	1.230478229	7.899044	5.751847	6.8254455	1.518297559
373	8.145325	9.312923	8.729124	0.825616463	7.896063	7.615628	7.7558455	0.19829749
374	6.518879	9.277944	7.8984115	1.950953571	7.898203	7.618729	7.758466	0.197617961
375	7.728001	9.653918	8.6909595	1.361828971	7.886807	7.367315	7.627061	0.367336316
376	9.006603	9.16383	9.0852165	0.111176278	7.894061	5.141674	6.5178675	1.946231512
377	9.048222	8.315965	8.6820935	0.51778389	7.864417	5.599177	6.731797	1.601766565
378	8.317839	6.024039	7.170939	1.621961535	7.697999	7.521955	7.609977	0.124481906
379	8.372819	7.53533	7.9540745	0.592194151	7.864288	7.351745	7.6080165	0.362422631
380	7.735863	5.845915	6.790889	1.336395047	7.601503	5.964618	6.7830605	1.157452484
381	6.926223	7.052593	6.989408	0.089357084	6.342047	3.899082	5.1205645	1.727437118
382	8.494618	7.766842	8.13073	0.514615345	6.350667	3.967186	5.1589265	1.685375578
383	7.30549	6.793469	7.0494795	0.362053521	6.486439	6.213796	6.3501175	0.192787714
384	8.645651	6.853992	7.7498215	1.266894228	7.867655	5.305907	6.586781	1.811429382
385	9.015337	7.173803	8.09457	1.302161179	7.881861	3.802193	5.842027	2.884760908
386	8.698173	5.226455	6.962314	2.45487534	7.875723	4.196668	6.0361955	2.601484739
387	8.608342	7.598456	8.103399	0.714097239	6.354743	4.428018	5.3913805	1.362400313
388	7.974745	7.836303	7.905524	0.097893277	6.349825	5.856422	6.1031235	0.348888607

389	5.415075	7.590348	6.5027115	1.538150289	6.351872	7.343477	6.8476745	0.70117062
390	8.427697	8.402445	8.415071	0.01785586	5.616463	7.485108	6.5507855	1.321331551
391	8.638653	8.84523	8.7419415	0.146071998	3.219368	6.403367	4.8113675	2.251427284
392	8.044273	6.831324	7.4377985	0.857684463	3.76754	6.631372	5.199456	2.025035027
393	8.864244	6.193494	7.528869	1.888505436	3.105829	6.167735	4.636782	2.165094496
394	8.406141	6.390858	7.3984995	1.425020275	3.198377	4.7167	3.9575385	1.073616489
396	7.512417	7.43601	7.4742135	0.054027908	3.790151	6.384483	5.087317	1.83446975
396	8.667399	7.779577	8.223488	0.627784957	3.812032	6.085828	4.94893	1.607816571
397	9.530952	6.176648	7.8538	2.371851105	3.679941	5.8535	4.7667205	1.536938308
398	7.870165	3.074916	5.4725405	3.390753085	2.971573	7.250603	5.111088	3.02573113
399	8.563024	6.91623	7.739627	1.164459205	2.925685	5.917521	4.421603	2.115547524
400	8.556972	7.042609	7.7997905	1.070816346	3.587686	7.430535	5.5091105	2.717304587
401	8.179903	5.836814	7.0083585	1.656814121	4.586909	5.98619	5.2865495	0.989441084
402	8.49722	5.440915	6.9690675	2.161133991	3.80237	7.140375	5.4713725	2.360325971
403	7.103821	6.349352	6.7265865	0.533490146	5.161019	5.720182	5.4406005	0.395387949
404	8.020858	6.503354	7.262106	1.073037369	7.452602	6.824401	7.1385015	0.444205187
405	8.519646	6.464665	7.4921555	1.453091	6.532292	6.689873	6.6110825	0.111426594
406	7.257855	7.287603	7.272729	0.021035013	4.000272	6.381563	5.1909175	1.683827014
407	7.861612	6.987079	7.4243455	0.618388215	4.863061	6.089446	5.4762535	0.86718515
408	8.559202	7.050227	7.8047145	1.067006455	3.187324	5.316401	4.2518625	1.505484784
409	8.77603	6.08909	7.43256	1.899953495	6.719268	6.947589	6.8334285	0.161447327
410	7.879643	5.852051	6.865847	1.433724053	6.453816	7.4688	6.961308	0.717702069
411	6.56365	8.772514	7.668082	1.561902713	7.574777	7.553316	7.5640465	0.015175219
412	5.211951	8.691136	6.9515435	2.460155307	7.502878	7.469087	7.4859825	0.023893845
413	5.557676	8.917271	7.2374735	2.375592407	6.448938	6.939666	6.694302	0.346997097
414	6.672517	7.559025	7.115771	0.626855818	7.555852	5.77065	6.663251	1.26232844
415	7.597319	7.29832	7.4478195	0.21142422	7.54395	5.835713	6.6898315	1.207905967
416	7.554049	8.584198	8.0691235	0.728425344	7.739064	7.123566	7.431315	0.43522281
417	8.924828	7.732818	8.328823	0.842878354	7.592025	7.461796	7.5269105	0.092085809
418	8.929671	8.377873	8.653772	0.390180108	7.747096	7.106017	7.4265565	0.453311308
419	7.997991	7.745666	7.8718285	0.178420719	7.888294	7.360143	7.6242185	0.373459154
420	7.446145	8.52249	7.9843175	0.761090848	7.849121	6.60463	7.2268755	0.879988025
421	7.716156	8.659213	8.1876845	0.666842	6.350913	6.097496	6.2242045	0.179192879
422	7.754789	7.972481	7.863635	0.153931489	6.349126	5.684387	6.0167565	0.470041455
423	8.61165	7.968742	8.290196	0.454604606	6.332987	6.09286	6.2129235	0.16979543
424	9.030887	6.931411	7.981149	1.484553717	7.72689	5.899164	6.813027	1.292397449
425	8.686289	7.510723	8.098506	0.83125069	6.588263	4.890673	5.739468	1.200377401
426	8.429794	7.6938	8.061797	0.520426348	7.871561	5.520111	6.695836	1.662726241
427	8.559038	6.946721	7.7528795	1.140080284	6.611078	6.78445	6.697764	0.122592517
428	8.56516	6.611492	7.588326	1.381451891	6.728674	7.406599	7.0676365	0.479365365
429	8.60729	7.54582	8.076555	0.750572635	7.852514	7.454833	7.6536735	0.281202932

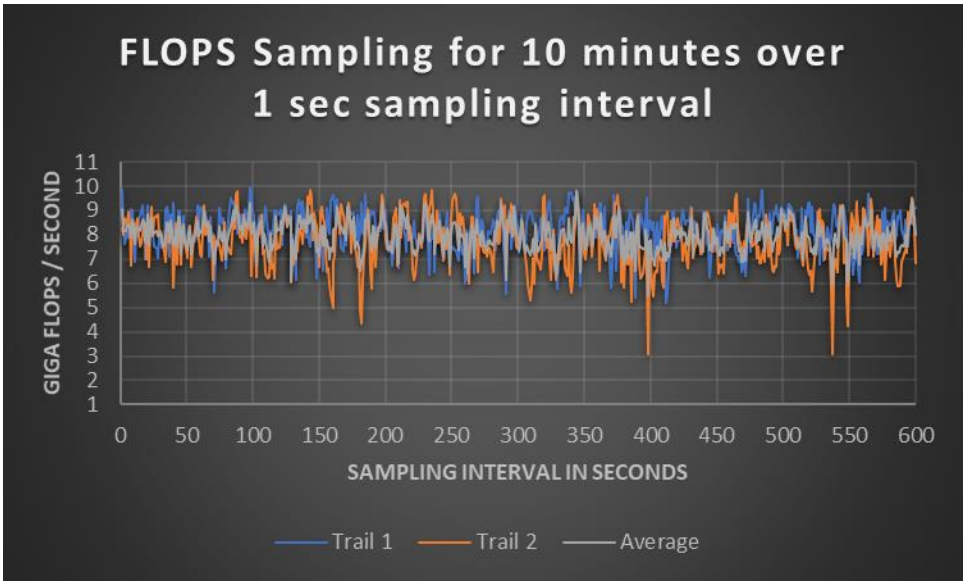
430	9.143092	8.108592	8.625842	0.731501965	7.862151	6.976438	7.4192945	0.626293668
431	8.334412	9.108144	8.721278	0.547111144	7.865775	5.026136	6.4459555	2.007927993
432	7.313918	7.026085	7.1700015	0.203528666	7.891791	6.100844	6.9963175	1.266390768
433	8.553347	7.396534	7.9749405	0.817990317	6.574641	7.740522	7.1575815	0.824402361
435	8.174634	7.657005	7.9158195	0.366018976	7.887419	7.819664	7.8535415	0.04791002
435	8.368743	8.451533	8.410138	0.05854137	7.891261	7.777877	7.834569	0.080174595
436	7.673775	7.860813	7.767294	0.132255838	7.864407	7.782106	7.8232565	0.058195595
437	7.567972	7.73712	7.652546	0.119605698	7.885076	7.784195	7.8346355	0.071333639
438	7.795157	7.195949	7.495553	0.42370404	6.179572	6.838264	6.508918	0.46576558
439	7.19501	7.458109	7.3265595	0.186039087	6.33715	6.33052	6.333835	0.004688118
440	8.946479	7.306848	8.1266635	1.159394199	6.333978	6.002777	6.1683775	0.234194473
441	8.944131	8.838607	8.891369	0.074616736	7.711306	7.385471	7.5483885	0.230400138
442	8.835829	8.73703	8.7864295	0.069861443	6.585961	7.651663	7.118812	0.753565111
443	7.633988	8.927325	8.2806565	0.914527363	7.8809	7.490605	7.6857525	0.275980241
444	7.531227	8.7985	8.1648635	0.896097332	7.878316	7.236959	7.5576375	0.453507884
445	6.250547	8.488749	7.369648	1.582647812	6.537223	6.741836	6.6395295	0.14468324
446	6.916341	8.189872	7.5531065	0.900522406	7.860502	6.186889	7.0236955	1.183423101
447	7.645669	7.320479	7.483074	0.229944054	7.89235	6.581128	7.236739	0.927173968
448	8.272333	8.193435	8.232884	0.055789311	7.668713	6.115911	6.892312	1.097996824
449	7.28853	7.919791	7.6041605	0.446368934	6.352064	4.368941	5.3605025	1.402279721
450	8.438693	7.33221	7.8854515	0.782401633	6.352733	2.780841	4.566787	2.525709055
451	7.908678	6.419986	7.164332	1.052664208	6.354193	5.675462	6.0148275	0.479935293
452	7.51901	6.760265	7.1396375	0.536513735	6.355273	4.587953	5.471613	1.249683957
453	8.19617	6.688214	7.442192	1.066285913	7.150154	6.690348	6.920251	0.325131941
454	8.157882	6.784055	7.4709685	0.971442388	7.890844	7.226331	7.5585875	0.469881648
455	8.084545	6.403529	7.244037	1.188657813	6.370919	6.117734	6.2443265	0.17902883
456	8.761371	8.275441	8.518406	0.343604398	6.762798	3.727306	5.245052	2.146416977
457	7.973524	8.165852	8.069688	0.135996433	7.896767	7.354505	7.625636	0.383437137
458	7.373674	7.939263	7.6564685	0.399931817	6.523658	7.557145	7.0404015	0.730785666
459	7.491102	9.000474	8.245788	1.067287177	6.849424	7.503506	7.176465	0.462505818
460	8.114259	7.525097	7.819678	0.416600445	6.596073	6.107599	6.351836	0.345403278
461	7.901561	8.905452	8.4035065	0.709858134	7.273455	6.769811	7.021633	0.356130088
462	7.672756	8.810267	8.2415115	0.804341742	7.514133	6.050155	6.782144	1.035188771
463	8.268888	8.273807	8.2713475	0.003478258	7.887467	6.859744	7.3736055	0.726709902
464	7.425828	9.458456	8.442142	1.437285042	7.881203	7.474623	7.677913	0.287495475
465	7.169501	9.689044	8.4292725	1.781585941	7.892736	7.79941	7.846073	0.065991447
466	7.12316	8.243095	7.6831275	0.791913633	7.8651	7.609155	7.7371275	0.180980445
467	6.860808	7.769549	7.3151785	0.642576923	6.953552	7.768325	7.3609385	0.576131513
468	7.144709	7.675523	7.410116	0.375342179	6.40724	7.703965	7.0556025	0.916923041
469	6.458746	7.348201	6.9034735	0.628939662	7.901628	6.31821	7.109919	1.119645605
470	6.654702	7.162838	6.90877	0.359306411	7.117403	5.978963	6.548183	0.804998644

471	7.076936	7.710174	7.393555	0.447766884	6.301653	7.446198	6.8739255	0.809315531
472	6.326321	7.526482	6.9264015	0.848641982	6.343674	7.311969	6.8278215	0.684687961
473	7.154043	8.395796	7.7749195	0.878051967	6.966883	5.130109	6.048496	1.298795351
474	9.48194	8.362297	8.9221185	0.791707158	7.903528	3.262152	5.58284	3.281948444
475	8.46277	8.026983	8.2448765	0.308147943	4.379733	4.17544	4.2775865	0.144456966
476	7.288475	8.075674	7.6820745	0.556633751	6.799124	6.669393	6.7342585	0.09173367
477	8.312324	7.522685	7.9175045	0.558359092	7.869521	7.364197	7.616859	0.357318027
478	9.318151	7.637041	8.477596	1.188724281	6.713329	4.793393	5.753361	1.357599765
479	9.198742	8.023627	8.6111845	0.830931785	6.682115	5.290536	5.9863255	0.983994947
480	8.32964	7.03298	7.68131	0.916877079	7.903781	6.010444	6.9571125	1.338791432
481	8.761674	7.531737	8.1467055	0.869696793	6.868213	4.916348	5.8922805	1.380176977
482	8.73431	6.810622	7.772466	1.36025283	6.349593	6.190495	6.270044	0.112499275
483	9.391113	6.833761	8.112437	1.808320941	5.278189	4.82135	5.0497695	0.323033955
484	9.859123	7.155899	8.507511	1.911468021	7.220402	3.1648	5.192601	2.867743676
485	8.769215	7.406229	8.087722	0.963776643	7.898353	5.878205	6.888279	1.42846035
486	7.733767	6.871044	7.3024055	0.610037284	6.55018	4.802406	5.676293	1.235862847
487	7.961333	8.819079	8.390206	0.606518013	7.018187	7.455406	7.2367965	0.30916052
488	7.88295	8.237254	8.060102	0.250530761	6.213549	6.252906	6.2332275	0.027829602
489	8.607001	7.112337	7.859669	1.05688705	7.771976	6.901292	7.336634	0.615666561
490	8.894426	8.092706	8.493566	0.566901649	7.307041	7.73803	7.5225355	0.304755245
491	8.169371	7.133765	7.651568	0.732284025	6.321226	4.798344	5.559785	1.076840189
492	8.052798	6.540612	7.296705	1.069276975	7.4986	3.285575	5.3920875	2.979058547
493	8.944467	6.456406	7.7004365	1.759324805	7.844186	7.513625	7.6789055	0.233741925
494	8.821938	6.728316	7.775127	1.480414313	7.863485	6.132677	6.998081	1.223866074
495	9.184772	6.667231	7.9260015	1.780170313	6.72505	6.810423	6.7677365	0.060367827
496	8.795279	7.86267	8.3289745	0.659454148	6.62464	7.687704	7.156172	0.751699763
497	8.567821	7.179965	7.873893	0.981362389	7.880938	6.269961	7.0754495	1.139132761
498	8.874966	7.417255	8.1461105	1.030757333	7.61601	5.303644	6.459827	1.635089679
499	9.13976	8.936787	9.0382735	0.143523585	7.730345	7.016643	7.373494	0.504663524
500	9.030244	8.528874	8.779559	0.354522127	6.342531	5.943594	6.1430625	0.282091058
501	8.990553	8.64888	8.8197165	0.241599295	7.184362	6.539397	6.8618795	0.456059125
502	8.38605	8.148232	8.267141	0.16816272	7.880166	7.780639	7.8304025	0.070376217
503	8.746972	8.441438	8.594205	0.216045163	6.346744	7.777363	7.0620535	1.011600396
504	9.124215	7.563851	8.344033	1.103343966	6.989089	7.825257	7.407173	0.591260063
505	9.258673	8.856145	9.057409	0.284630278	7.85041	7.76918	7.809795	0.057438284
506	9.100817	8.584046	8.8424315	0.365412278	7.887781	7.803642	7.8457115	0.059495257
507	8.75715	8.762563	8.7598565	0.003827569	7.894002	7.717161	7.8055815	0.12504547
508	8.902013	8.129576	8.5157945	0.546195441	7.876917	4.111747	5.994332	2.662377239
509	8.232143	7.584791	7.908467	0.457746989	6.622451	5.456837	6.039644	0.824213564
510	8.191103	7.39822	7.7946615	0.560652946	6.755106	5.089959	5.9225325	1.177436735
511	7.037122	7.895208	7.466165	0.606758429	7.899644	4.977445	6.4385445	2.066306729

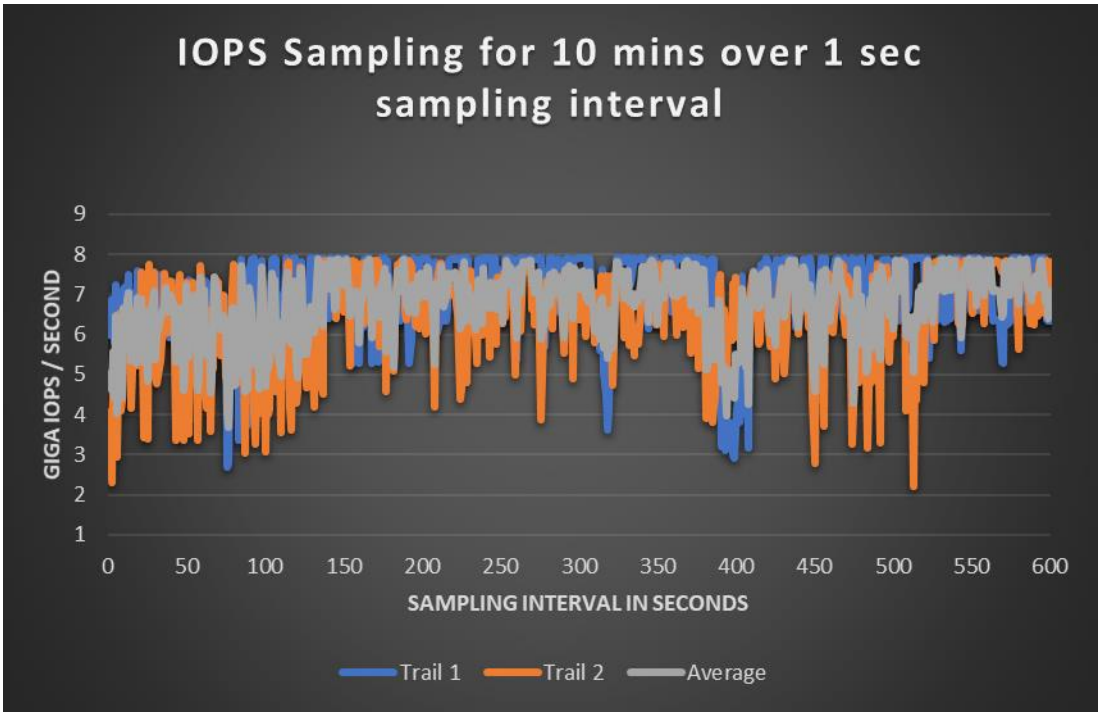
512	7.682644	7.578606	7.630625	0.073565975	7.895302	4.653676	6.274489	2.292175727
513	7.658563	7.455113	7.556838	0.143860875	7.897983	2.209192	5.0535875	4.022582693
514	9.126659	7.054927	8.090793	1.464935746	7.868401	5.057081	6.462741	1.987903436
515	7.170157	6.721661	6.945909	0.317134563	7.89929	4.366731	6.1330105	2.497896424
516	8.213339	7.901727	8.057533	0.220342958	7.896373	6.239836	7.0681045	1.171348546
517	8.984666	8.454326	8.719496	0.37500701	7.903223	5.634892	6.7690575	1.603952232
518	8.737593	7.119057	7.928325	1.144477781	7.898237	6.513186	7.2057115	0.979378954
519	9.292238	6.59144	7.941839	1.90975258	7.900294	5.030714	6.465504	2.029099477
520	9.305519	6.368415	7.836967	2.076846155	7.890578	4.804972	6.347775	2.181852927
521	8.087642	6.533723	7.3106825	1.098786662	5.804974	7.779189	6.7920815	1.395980814
522	9.176502	5.691386	7.433944	2.464349157	7.891889	7.785434	7.8386615	0.075275052
523	8.025017	6.349644	7.1873305	1.184667609	5.416809	7.781151	6.59898	1.671842261
524	7.960042	7.098909	7.5294755	0.608912984	6.339732	7.781183	7.0604575	1.019259777
525	7.17997	7.222406	7.201188	0.030006783	6.29656	6.292183	6.2943715	0.003095006
526	8.941653	7.621974	8.2818135	0.93315397	7.553823	5.842134	6.6979785	1.210346899
527	8.25277	8.942377	8.5975735	0.487625786	7.487857	7.81593	7.6518935	0.231982643
528	6.782968	9.052697	7.9178325	1.604940767	6.350104	7.822966	7.086535	1.041470708
529	8.308941	8.150593	8.229767	0.111968945	7.428856	7.828078	7.628467	0.282292583
530	8.027093	8.572457	8.299775	0.385630583	7.892434	7.789515	7.8409745	0.072774723
531	6.923899	8.430632	7.6772655	1.065421122	7.900148	7.834638	7.867393	0.046322565
532	7.781205	6.975158	7.3781815	0.5699613	6.957614	7.395773	7.1766935	0.3098252
533	7.906728	7.535875	7.7213015	0.262232671	6.316598	7.809949	7.0632735	1.055958619
534	8.285014	7.405078	7.845046	0.622208713	6.338607	7.841348	7.0899775	1.062598351
535	7.606849	7.327101	7.466975	0.197811708	7.146514	7.835781	7.4911475	0.48738537
536	7.913746	5.712159	6.8129525	1.556757097	7.904673	7.822121	7.863397	0.058373079
537	8.725867	3.076769	5.901318	3.994515503	6.398769	7.784043	7.091406	0.979536639
538	9.264358	6.288566	7.776462	2.104202703	6.987355	7.818549	7.402952	0.587742914
539	9.112215	6.992614	8.0524145	1.498784241	7.908486	7.789758	7.849122	0.083953374
540	8.375144	6.983864	7.679504	0.983783523	6.544213	7.815849	7.180031	0.899182439
541	8.445095	6.443326	7.4442105	1.415464434	6.832429	7.846269	7.339349	0.716893139
542	7.558665	8.616671	8.087668	0.748123217	7.899447	6.276051	7.087749	1.14791432
543	8.662523	9.225722	8.9441225	0.398241832	5.601935	6.244505	5.92322	0.454365604
544	9.141234	9.045872	9.093553	0.067431117	6.695196	6.232527	6.4638615	0.327156387
545	9.192658	9.185577	9.1891175	0.005007023	7.871632	7.392217	7.6319245	0.338997598
546	9.067182	6.811196	7.939189	1.595222999	7.263367	7.827204	7.5452855	0.398692966
548	8.249422	7.163193	7.7063075	0.768079892	7.880038	7.784986	7.832512	0.067211914
548	7.653999	5.430593	6.542296	1.57218546	7.894055	7.81973	7.8568925	0.052555712
549	7.597872	4.261616	5.929744	2.359089241	7.899668	7.833363	7.8665155	0.046884715
550	7.191875	6.785234	6.9885545	0.287538609	6.590304	7.740049	7.1651765	0.812992486
551	7.21934	8.27954	7.74944	0.749674609	7.894877	6.53223	7.2135535	0.963536934
552	7.258256	8.909857	8.0840565	1.167858267	7.891953	7.8123	7.8521265	0.056323176

553	6.373365	8.57355	7.4734575	1.555765733	6.602559	6.854515	6.728537	0.178159796
554	6.840393	7.272093	7.056243	0.305257997	7.889325	7.796545	7.842935	0.065605367
556	7.354725	9.347314	8.3510195	1.408973194	7.900826	7.833769	7.8672975	0.047416459
556	7.64947	9.066682	8.358076	1.002120216	6.597245	7.752161	7.174703	0.816648935
557	6.555038	8.44941	7.502224	1.339523287	7.860763	7.047523	7.454143	0.575047519
558	6.048396	7.521914	6.785155	1.04193457	7.691813	6.28064	6.9862265	0.997849998
559	7.786732	8.2838	8.035266	0.351480154	7.887705	7.718344	7.8030245	0.119756312
560	7.193119	8.035973	7.614546	0.595987779	7.886302	7.807831	7.8470665	0.055487376
561	7.476171	9.087908	8.2820395	1.139670162	6.568614	7.850808	7.209711	0.906648072
562	8.449583	8.977411	8.713497	0.373230758	7.882619	7.799102	7.8408605	0.059055437
563	8.427507	8.226808	8.3271575	0.141915624	6.87068	7.810569	7.3406245	0.664601885
564	9.669541	7.12321	8.3963755	1.800527917	6.346662	7.773107	7.0598845	1.008648932
565	9.185334	7.8738	8.529567	0.927394585	6.354893	7.828085	7.091489	1.041704053
566	8.590562	9.470071	9.0303165	0.621906778	6.354134	7.835987	7.0950605	1.047828305
567	7.451291	8.972551	8.211921	1.075693262	6.351891	7.777654	7.0647725	1.008166686
568	7.666627	7.080827	7.373727	0.414223152	6.335943	7.82274	7.0793415	1.051324241
569	8.165302	7.584533	7.8749175	0.410665698	5.300295	7.564006	6.4321505	1.600685399
570	7.928353	8.28868	8.1085165	0.254789665	5.283949	7.746098	6.5150235	1.741002254
571	7.193864	8.781438	7.987651	1.122584341	7.759375	7.822529	7.790952	0.044656622
572	7.424755	7.595987	7.510371	0.121079308	7.289889	7.831691	7.56079	0.383111868
573	7.208254	8.625572	7.916913	1.002195169	6.24346	7.816248	7.029854	1.11212906
574	7.934569	6.765911	7.35024	0.826365997	6.321297	7.627316	6.9743065	0.923494891
575	8.94237	7.199148	8.070759	1.232644097	7.885764	7.768302	7.827033	0.083058177
576	8.066249	8.000496	8.0333725	0.046494392	7.895648	7.813832	7.85474	0.057852648
577	9.1187	6.153208	7.635954	2.096919503	7.898235	7.543233	7.720734	0.251024322
578	7.513766	7.191107	7.3524365	0.228154367	7.888496	7.696751	7.7926235	0.13558419
579	8.552832	8.026522	8.289677	0.37215737	7.896883	6.460654	7.1787685	1.015567265
580	8.446235	7.487303	7.966769	0.67806732	7.896666	5.621056	6.758861	1.609099262
581	8.335427	7.104267	7.719847	0.870561585	7.900335	7.813941	7.857138	0.061089783
582	8.467985	7.662416	8.0652005	0.569623303	7.864448	7.826647	7.8455475	0.026729343
583	8.791728	7.819332	8.30553	0.687587806	7.888146	7.821789	7.8549675	0.046921485
584	8.919963	8.196547	8.558255	0.511532359	7.886763	7.762349	7.824556	0.087973983
585	7.84447	6.87014	7.357305	0.68895535	7.891973	7.848358	7.8701655	0.030840462
586	8.002526	6.187728	7.095127	1.283255972	6.537456	7.65736	7.097408	0.791891713
587	8.774569	5.873569	7.324069	2.051316772	7.879288	6.278659	7.0789735	1.13181562
588	8.658336	5.863024	7.26068	1.976584071	6.574941	7.131203	6.853072	0.393336632
589	9.016142	5.94464	7.480391	2.171879893	7.861316	6.510814	7.186065	0.954949122
590	8.228415	6.888958	7.5586865	0.947139128	7.861007	6.254528	7.0577675	1.135952195
591	7.839307	7.209923	7.524615	0.445041694	7.901397	7.005194	7.4532955	0.633711219
592	8.612005	7.38431	7.9981575	0.86811146	7.894513	6.461164	7.1778385	1.013530798
593	7.842239	7.230052	7.5361455	0.432881579	6.576075	7.756579	7.166327	0.834742384

594	7.496577	8.955348	8.2259625	1.031506866	7.887527	7.81925	7.8533885	0.04827913
595	8.352461	8.530764	8.4416125	0.12607926	7.891308	7.808843	7.8500755	0.058311561
596	8.992422	8.47238	8.732401	0.367725225	7.908144	6.523712	7.215928	0.978941255
597	9.356168	9.540504	9.448336	0.130345236	6.927552	6.710869	6.8192105	0.153218019
598	8.437573	9.283485	8.860529	0.598150111	6.353687	7.824855	7.089271	1.040272869
599	9.166906	8.272646	8.719776	0.63233731	6.351536	6.452507	6.4020215	0.071397279
600	9.121124	6.82373	7.972427	1.624502876	6.351331	7.806617	7.078974	1.029042599



The above graph shows the trending chart for FLOPS for 600 sampling intervals for the 2 trails and their average



The above graph shows the trending chart for IOPS for 600 sampling intervals for the 2 trails and their average

Theoritical performance:

Processor: Intel Xeon E312XX (Sandy Bridge)

Frequency: 2299.99 (Using the command lscpu | grep MHz)

Cache Size: 32 K

CPU Cores:2

No of CPUs:2

IPC: 16

Theoretical FLOPS: (Frequency * IPC * Cores)

2.3 * 16 * 1 = 36.8 Giga Flops

LINPACK GFLOPS Performance Summary

Number of equations to solve (problem size): 2000

Leading dimension of array: 2000

Number of trials to run: 4

Data alignment value (in Kbytes): 8

Current date/time: Sat Oct 7 19:22:48 2017

CPU frequency: 3.091 GHz

Number of CPUs: 2

Number of cores: 2

Number of threads: 2

Parameters are set to:

Number of tests: 1

Number of equations to solve (problem size) : 2000

Leading dimension of array : 2000

Number of trials to run : 4

Data alignment value (in Kbytes) : 8

Maximum memory requested that can be used=32048192, at the size=2000

========== Timing linear equation system solver ==========

Size	LDA	Align.	Time(s)	GFlops	Residual	Residual(norm)	Check
2000	2000	8	0.091	58.8338	3.329198e-12	2.895994e-02	pass
2000	2000	8	0.091	58.9176	3.329198e-12	2.895994e-02	pass
2000	2000	8	0.091	58.7729	3.329198e-12	2.895994e-02	pass
2000	2000	8	0.088	60.5554	3.329198e-12	2.895994e-02	pass

Performance Summary (GFlops)

Size LDA Align. Average Maximal

2000 2000 8 59.2699 60.5554

Residual checks PASSED

LINPACK Achieves approximately ((60.5554/ 36.8)*100 = 164.55%) of theoritical performance

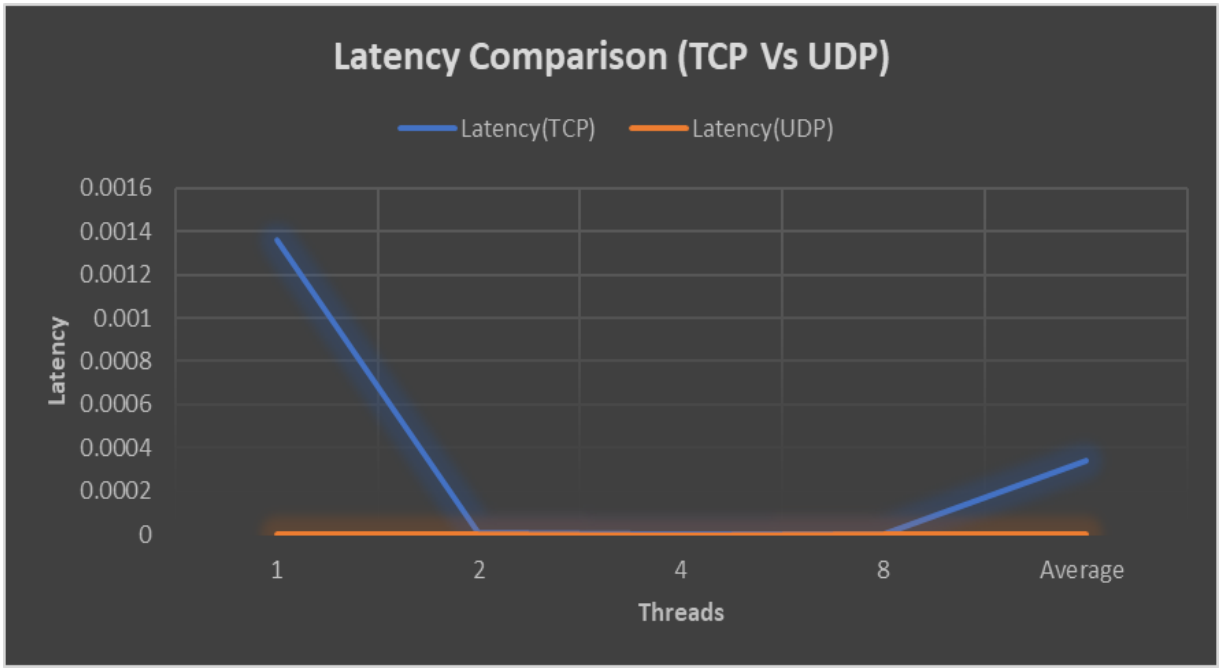
Analysis:

- Since there was a difficulty in understanding the LINPACK benchmarking, my program's performance is no match for the LINPACK Output
- Experiment can be tested with more number of threads in different instances to attain best results
- Better results are achieveable if the logic is even more understood with practical knowledge in this field.

Network Benchmarks:

Latency

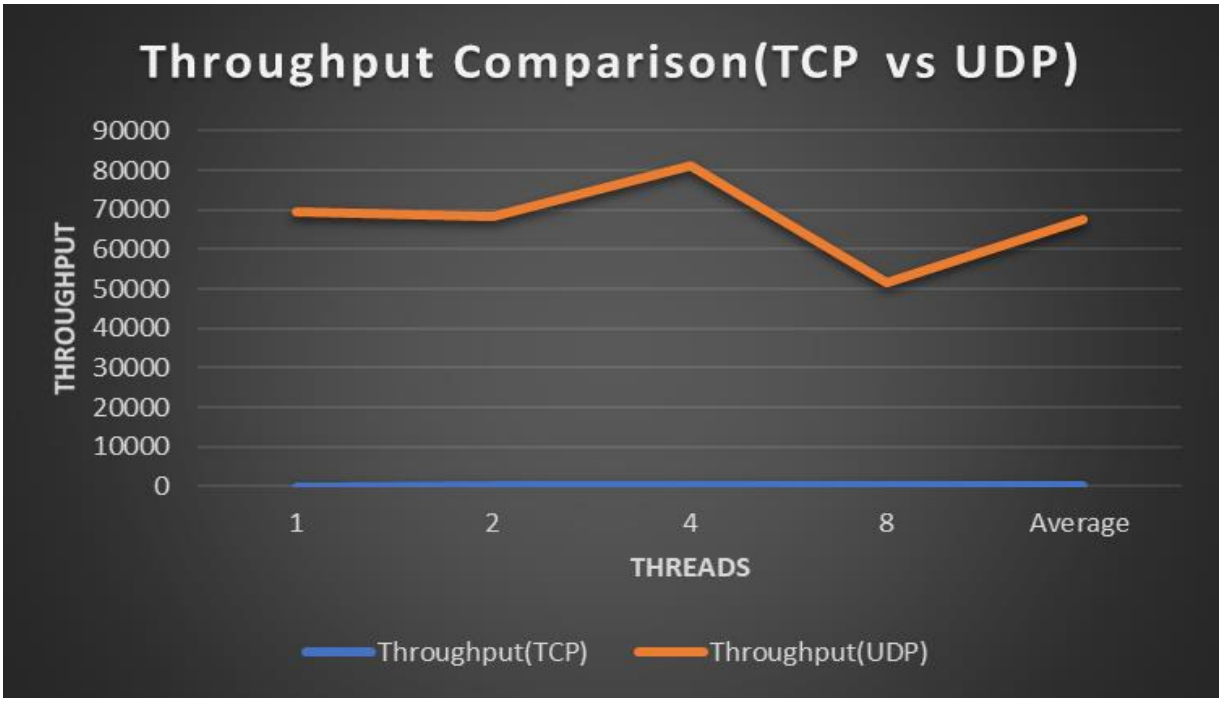
	TCP	UDP
No of Threads	Latency(TCP)	Latency(UDP)
1	0.00136	0.000000014
2	0.000004224	0.000000023
4	0.000000327	0.000000012
8	0.000000223	0.000000019
Average	0.000341194	0.000000017
Std Deviation	0.000679207	4.96655E-09



The above graph shows the implementation and comparison between TCP and UDP Latency.

Throughput:

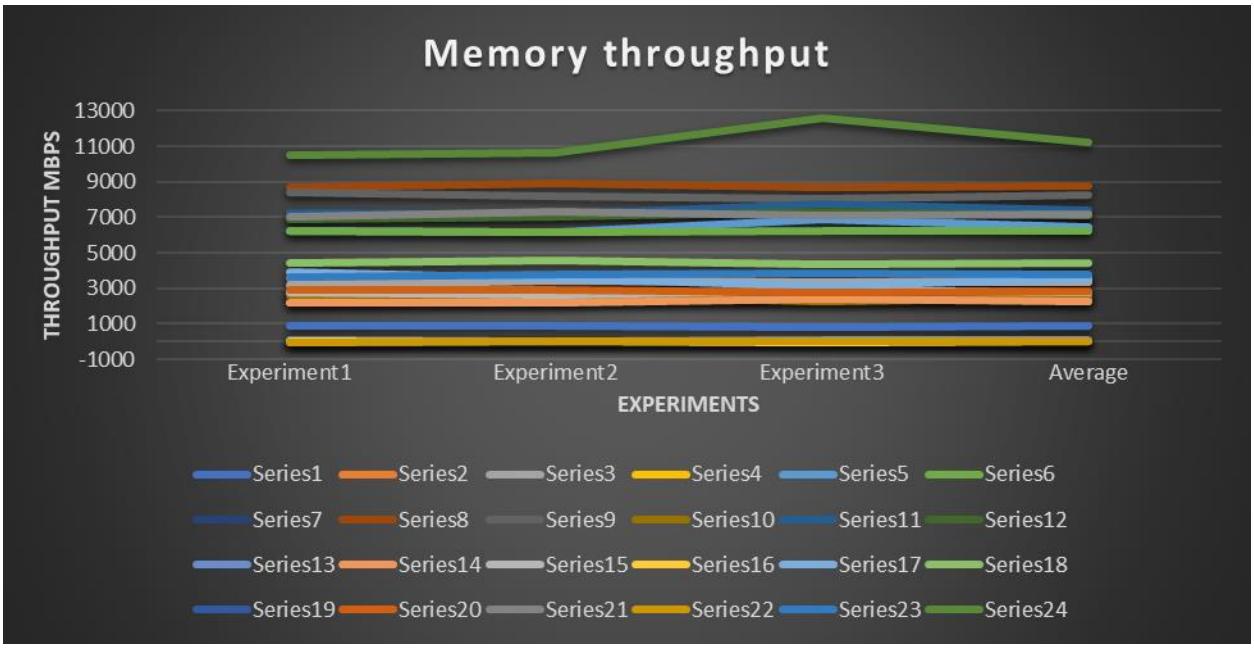
	TCP	UDP
No of Threads	Throughput(TCP)	Throughput(UDP)
1	0.007012	69445.50408
2	2.257948	68307.0532
4	2.812275	81170.06971
8	3.563903	51411.11414
Average	2.1602845	67583.43528
Std Deviation	1.532031018	12249.23847



The above graph shows the implementation and comparison between TCP and UDP Throughput.

Memory Benchmarking:

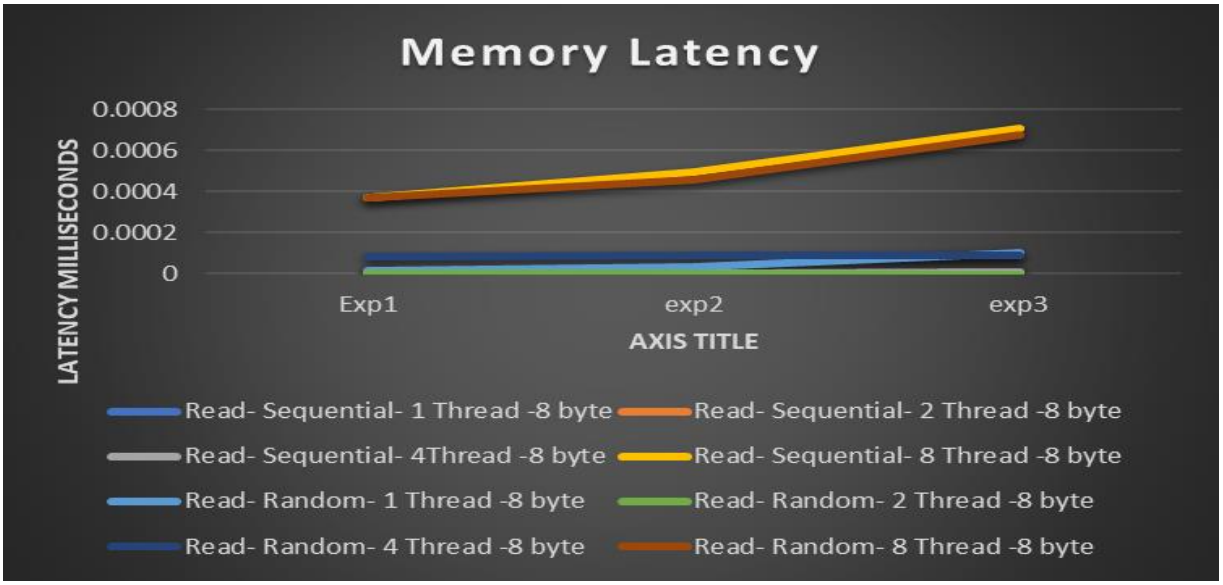
Throughput for random and sequential access



A	B	C	D	E	F
Description	Experiment1	Experiment2	Experiment3	Average	Standard Deviation
Sequential - thread1 8 b	878.0711	889.34	876.34	881.2504	7.059093596
Sequential - thread1 8 kb	3590.4806	3456.23	3345.34	3464.017	122.7556716
Sequential - thread1 8 mb	3207.1828	3398.45	3376.542	3327.392	104.6785881
Sequential - thread2 8 b	2218.3018	2345.33	2897.44	2487.024	361.0610083
Sequential - thread2 8 kb	6250.5956	6167.34	6890.55	6436.162	395.7073483
Sequential - thread2 8 mb	6244.7109	6198.789	6199	6214.167	26.45232126
Sequential - thread4 8 b	2505.7448	2432.765	2566.34	2501.617	66.88311956
Sequential - thread4 8 kb	8674.5586	8897.4321	8674.33	8748.774	128.7421171
Sequential - thread4 8 mb	8394.6734	8196.5523	8067.98	8219.735	164.5759117
Sequential - thread8 8 b	2620.2762	2610.7732	2289.45	2506.833	188.3192681
Sequential - thread8 8kb	7235.3073	7156.6433	7745.674	7379.208	319.7966434
Sequential - thread8 8 mb	6888.6737	7001.865	7345.32	7078.62	237.8022465
Random - thread1 8 b	72.0968	70.654	77.98	73.57693	3.880807263
Random - thread1 8 kb	2209.7157	2164.3452	2367.9	2247.32	106.860744
Random - thread1 8 mb	2748.8742	2654.124	2877.9	2760.299	112.3246453
Random - thread2 8 b	25.3612	24.789	22.34	24.1634	1.604818956
Random- thread2 8 kb	3918.3477	3567.456	3125.781	3537.195	397.1489571
Random- thread2 8 mb	4400.0466	4589.056	4321.89	4436.998	137.3624639
Random - thread4 8 b	24.0494	25.678	24.765	24.8308	0.816291443
Random - thread4 8 kb	2880.122	2886.23	2778.76	2848.371	60.3619135
Random - thread4 8 mb	7034.1177	7324.675	7134.65	7164.481	147.5577788
Random - thread8 8 b	24.3402	25.678	26.98	25.66607	1.319940458
Random- thread8 8kb	3637.3233	3789.1245	3866.31	3764.253	116.5018702
Random- thread8 8 mb	10490.1798	10673.12	12569.33	11244.21	1151.227246

The assignment achieves 21.57% approximately to the theoretical performance.

Latency:



Theoretical performance:

- The best memory value as per stream data is 13780.4 .However it was unable to determine the type of RAM using (sudo dmidecode –type 17) from the chameleon instance it can be assumed that the installed type can be one of the DDR3 model RAM.
- The assumed DDR3 RAM'S model has peak transfer rate of 1500 MBPS.

Stream Performance summary

Function	Best Rate MB/s	Avg time	Min time	Max time
Copy:	12372.4	0.013576	0.012932	0.013966
Scale:	12347.8	0.013422	0.012958	0.013858
Add:	13780.4	0.018049	0.017416	0.018867
Triad:	13660.4	0.018280	0.017569	0.019029

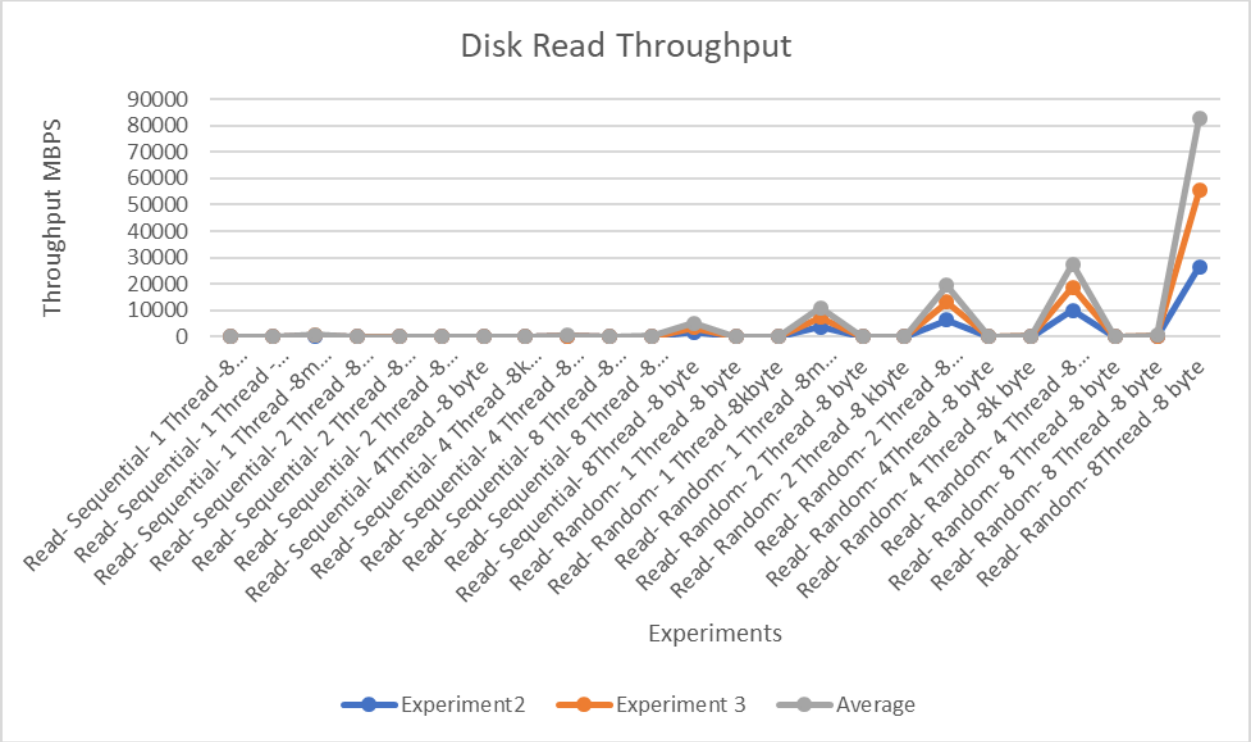
- It achieves approximately 91.8 % (13780/15000)*100 of theoretical performane.

Analysis:

Disabling the cache may result in better performance.

Disk Benchmarking

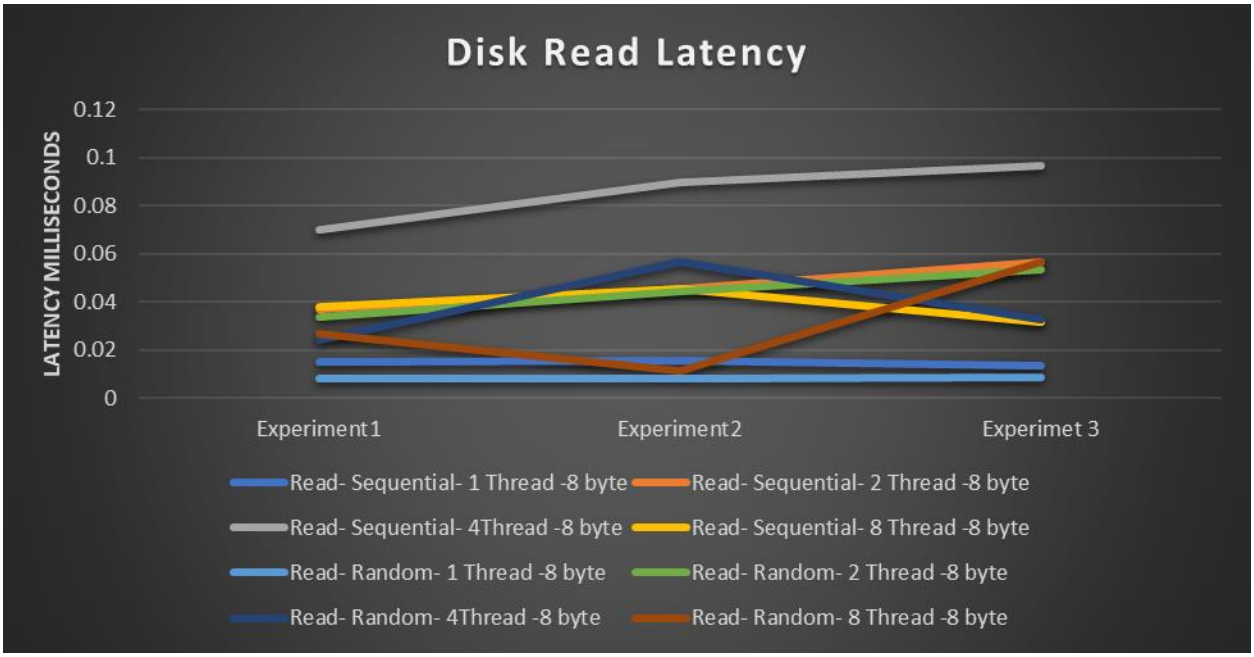
Disk Read throughput



The above graph shows the Disk read throughput

Description	Experiment1	Experiment2	Experiment 3	Average	Standard deviation
Read- Sequential- 1 Thread -8 byte	0.0639	0.07892	0.05678	0.066533	0.011302466
Read- Sequential- 1 Thread -8kbyte	0.7376	0.78556	0.6785	0.733887	0.05362651
Read- Sequential- 1 Thread -8m byte	204.8444	233.765	243.12	227.2431	19.95385796
Read- Sequential- 2 Thread -8 byte	0.0514	0.0678	0.0785	0.0659	0.013649542
Read- Sequential- 2 Thread -8 kbyte	11.2784	11.765	12.678	11.90713	0.710543069
Read- Sequential- 2 Thread -8 mbyte	11.0951	15.567	14.567	13.74303	2.347054154
Read- Sequential- 4Thread -8 byte	0.0703	0.08976	0.0425	0.06752	0.02375233
Read- Sequential- 4 Thread -8k byte	0.6197	0.5342	0.6784	0.610767	0.072513884
Read- Sequential- 4 Thread -8 mbyte	120.9062	123.7864	133.6542	126.1156	6.685563213
Read- Sequential- 8 Thread -8 byte	0.3073	0.456	0.2405	0.3346	0.110313326
Read- Sequential- 8 Thread -8 byte	46.1275	45.789	44.67	45.52883	0.762785411
Read- Sequential- 8Thread -8 byte	1581.5558	1678.66	1789.22	1683.145	103.9047314
Read- Random- 1 Thread -8 byte	0.1155	0.1345	0.14567	0.13189	0.015253403
Read- Random- 1 Thread -8kbyte	31.6572	33.8974	34.876	33.47687	1.650092292
Read- Random- 1 Thread -8m byte	3646.3571	3567.987	3789.22	3667.855	112.172279
Read- Random- 2 Thread -8 byte	0.0567	0.04231	0.05567	0.05156	0.008027272
Read- Random- 2 Thread -8 kbyte	31.5901	34.5782	33.785	33.31777	1.547874557
Read- Random- 2 Thread -8 mbyte	6099.4687	6421.56	6732.11	6417.713	316.3381952
Read- Random- 4Thread -8 byte	0.1569	0.2456	0.1713	0.191267	0.047601716
Read- Random- 4 Thread -8k byte	56.1072	65.435	58.543	60.0284	4.838054679
Read- Random- 4 Thread -8 mbyte	8046.0296	9934.1	8742.11	8907.413	954.8279006
Read- Random- 8 Thread -8 byte	0.2853	0.345	0.3456	0.3253	0.034642315
Read- Random- 8 Thread -8 byte	108.7313	121.785	131.56	120.6921	11.45352386
Read- Random- 8Thread -8 byte	27079.4541	26513.5677	28913.897	27502.31	1254.790083

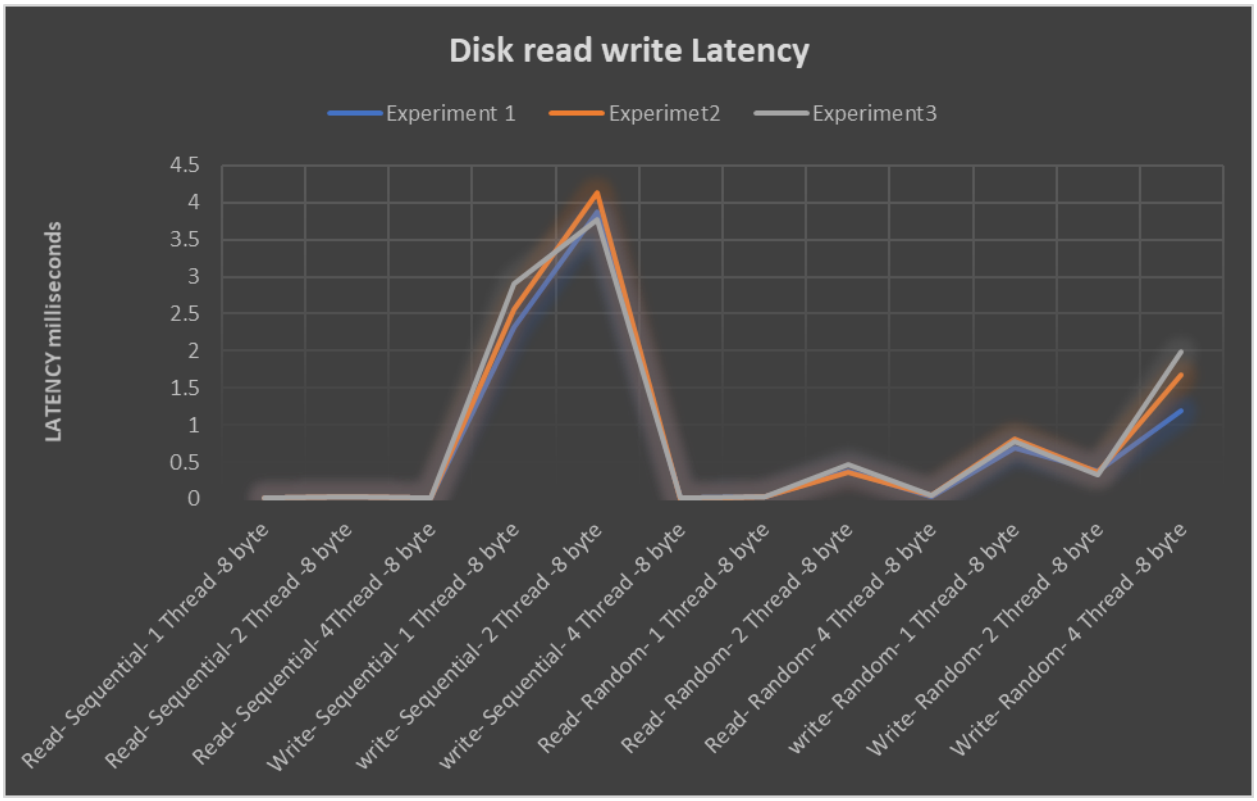
Disk Read Latency



The above graph shows the disk read latency

Description	Experiment1	Experiment2	Experimet 3	Average	Standard deviation
Read- Sequential- 1 Thread -8 byte	0.01491947	0.015632	0.01324	0.043791	0.014631558
Read- Sequential- 2 Thread -8 byte	0.03711512	0.045678	0.05678	0.139573	0.047215747
Read- Sequential- 4Thread -8 byte	0.07027738	0.08956	0.09653	0.256367	0.086174136
Read- Sequential- 8 Thread -8 byte	0.03802596	0.045678	0.031452	0.115156	0.038823025
Read- Random- 1 Thread -8 byte	0.0082554	0.0078772	0.008742	0.024875	0.008299087
Read- Random- 2 Thread -8 byte	0.03362529	0.044321	0.053221	0.131167	0.044450295
Read- Random- 4Thread -8 byte	0.02430709	0.056771	0.03275	0.113828	0.040358161
Read- Random- 8 Thread -8 byte	0.02672829	0.011345	0.056421	0.094494	0.036635318

Disk Read write Latency



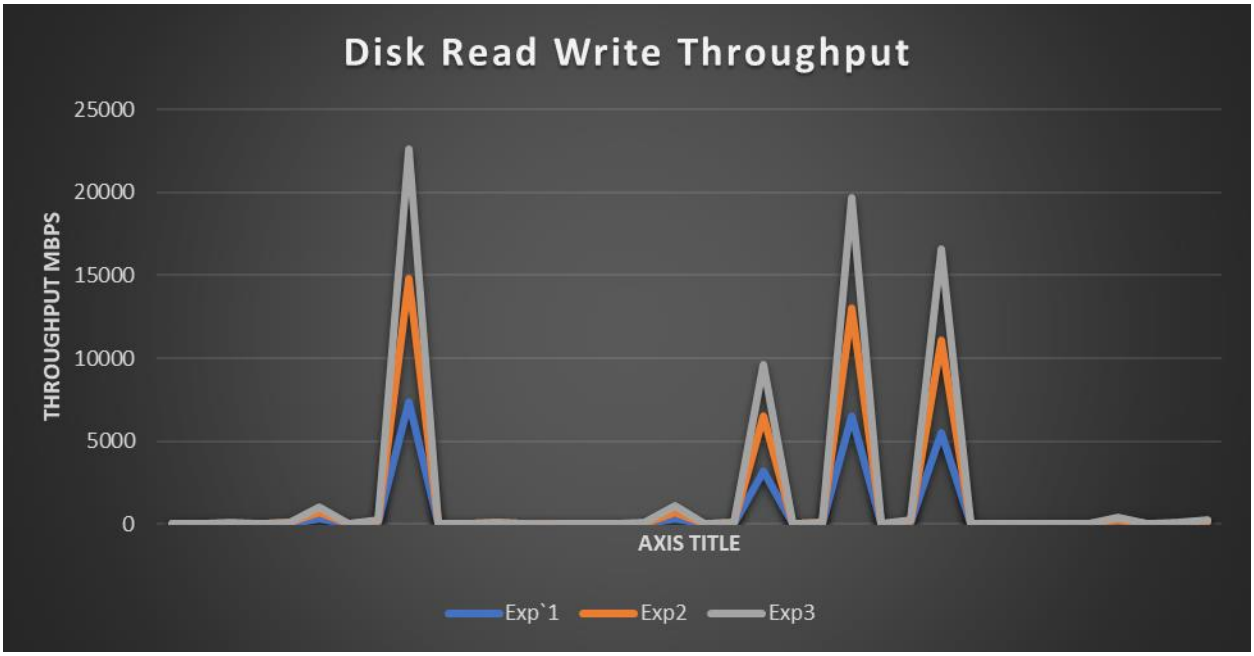
The above graph shows the disk read write latency

Description	Experiment 1	Experimet2	Experiment3	Average	Standard deviation
Read- Sequential- 1 Thread -8 byte	0.013318913	0.014459	0.023455	0.017077638	0.005552298
Read- Sequential- 2 Thread -8 byte	0.029338509	0.0306733	0.027899	0.029303603	0.001387479
Read- Sequential- 4Thread -8 byte	0.009486577	0.00987	0.0078234	0.009059992	0.001087945
Write- Sequential- 1 Thread -8 byte	2.314801302	2.56744	2.897723	2.593321434	0.292321421
write- Sequential- 2 Thread -8 byte	3.878939583	4.12980753	3.76641	3.925052371	0.186035569
write- Sequential- 4 Thread -8 byte	0.009486577	0.00123778	0.0087645	0.006496286	0.004568289
Read- Random- 1 Thread -8 byte	0.026384082	0.03459	0.0278552	0.029609761	0.004375287
Read- Random- 2 Thread -8 byte	0.378646842	0.356789	0.468977	0.401470947	0.059474714
Read- Random- 4 Thread -8 byte	0.035271387	0.05678922	0.0456783	0.045912969	0.010760836
write- Random- 1 Thread -8 byte	0.690039876	0.80944567	0.778956	0.759480515	0.062039558
Write- Random- 2 Thread -8 byte	0.378646842	0.356789021	0.327655	0.354363621	0.025582297
Write- Random- 4 Thread -8 byte	1.189692424	1.679904523	1.9876342	1.619077049	0.402433542

Theoretical Performance:

Since it was unable to determine the exact type of storage attached in the chameleon but if we assume that the general purpose EBS is used the maximum throughput will be 180 MBPS/volume

Disk Read write Throughput



The assignment achieves (20.50/180) *100 approximately 13.55% of theoretical performance

Description	Exp`1	Exp2	Exp3	Average	Standard Deviation
Read- Sequential- 1 Thread -8 byte	0.0716	0.095	0.0616	0.076067	0.017142151
Read- Sequential- 1 Thread -8kbyte	11.7195	11.599	13.44	12.25283	1.029880373
Read- Sequential- 1 Thread -8m byte	27.453	24.67	25.66	25.92767	1.410675843
Read- Sequential- 2 Thread -8 byte	0.0653	0.0785	0.0569	0.0669	0.010888526
Read- Sequential- 2 Thread -8 kbyte	31.6022	33.66	34.77	33.34407	1.607357961
Read- Sequential- 2 Thread -8 mbyte	341.1125	350.227	342.66	344.6665	4.877300406
Read- Sequential- 4Thread -8 byte	0.0791	0.088	0.0667	0.077933	0.010697819
Read- Sequential- 4 Thread -8k byte	72.8231	71.55	71.55	71.97437	0.735024628
Read- Sequential- 4 Thread -8 mbyte	7406.3304	7423.456	7786.5	7538.762	214.718093
Write- Sequential- 1 Thread -8 byte	0.0033	0.0056	0.0078	0.005567	0.002250185
write- Sequential- 1 Thread -8k byte	6.4821	8.66	7.52	7.554033	1.089348798
write- Sequential- 1 Thread -8 mbyte	39.3314	37.12	33.42	36.6238	2.986774735
write- Sequential- 2 Thread -8 byte	0.0039	0.0045	0.0056	0.004667	0.000862168
write- Sequential- 2 Thread -8 kbyte	9.9914	12.33	11.92	11.4138	1.248775929
write- Sequential- 2 Thread -8m byte	9.9872	9.886	8.67	9.5144	0.733020382
write- Sequential- 4 Thread -8 byte	0.0095	0.0087	0.0072	0.008467	0.001167619
write- Sequential- 4 Thread -8 kbyte	19.7236	21.56	18.92	20.06787	1.353251511
write- Sequential- 4 Thread -8 mbyte	360.1033	366.234	367.52	364.6191	3.963304963
Read- Random- 1 Thread -8 byte	0.0361	0.0291	0.044	0.0364	0.007454529
Read- Random- 1 Thread -8 kbyte	36.0444	38.088	37.554	37.2288	1.059901656
Read- Random- 1 Thread -8 mbyte	3165.0672	3345.008	3100.56	3203.545	126.6851051
Read- Random- 2 Thread -8 byte	0.0506	0.0447	0.0478	0.0477	0.002951271
Read- Random- 2 Thread -8 kbyte	38.2428	36.661	37.66	37.52127	0.799973758
Read- Random- 2 Thread -8 mbyte	6489.5188	6500.23	6672.12	6553.956	102.4728421
Read- Random- 4 Thread -8 byte	0.1083	0.2235	0.1189	0.150233	0.063671762
Read- Random- 4 Thread -8 kbyte	88.9043	87.93	86.77	87.8681	1.068495592
Read- Random- 4 Thread -8m byte	5534.5626	5535.89	5544	5538.151	5.108793229
write- Random- 1 Thread -8 byte	0.0014	0.0016	0.0015	0.0015	0.0001
Write Random- 1 Thread -8k byte	5.9791	4.5567	3.778	4.771267	1.116126984
Write- Random- 1Thread -8m byte	12.9541	11.675	12.89	12.50637	0.72069765
Write- Random- 2 Thread -8 byte	0.005	0.0044	0.0067	0.005367	0.001193035
write- Random- 2 Thread -8k byte	10.484	9.567	11.002	10.351	0.726686315
write- Random- 2 Thread -8m byte	128.5159	130.77	125.88	128.3886	2.447482912
Write- Random- 4 Thread -8 byte	0.0032	0.0052	0.006	0.0048	0.001442221
Write- Random- 4 Thread -8k byte	17.6378	18.44	17.55	17.87593	0.490464691
write- Random- 4 Thread -8m byte	88.9043	89.77	88.562	89.07877	0.622611406

IOZONE Performance

write	rewrite	read	reread	random read	random write
2627157	6262718	12723357	12521788	12720456	6965985

backward read	record rewrite	stride read	fwrite	frewrite	fread	freread
7427017	6393827	7129529	3826249	3696750	9729214	11976610

IOZONE achieves approximately 50000.09% of theoretical performance.

Analysis:

- Testing the disk throughput and memory by avoiding cache usage.
- During the sequential read and write cache is used which is more of memory bench marking than disk bench marking.