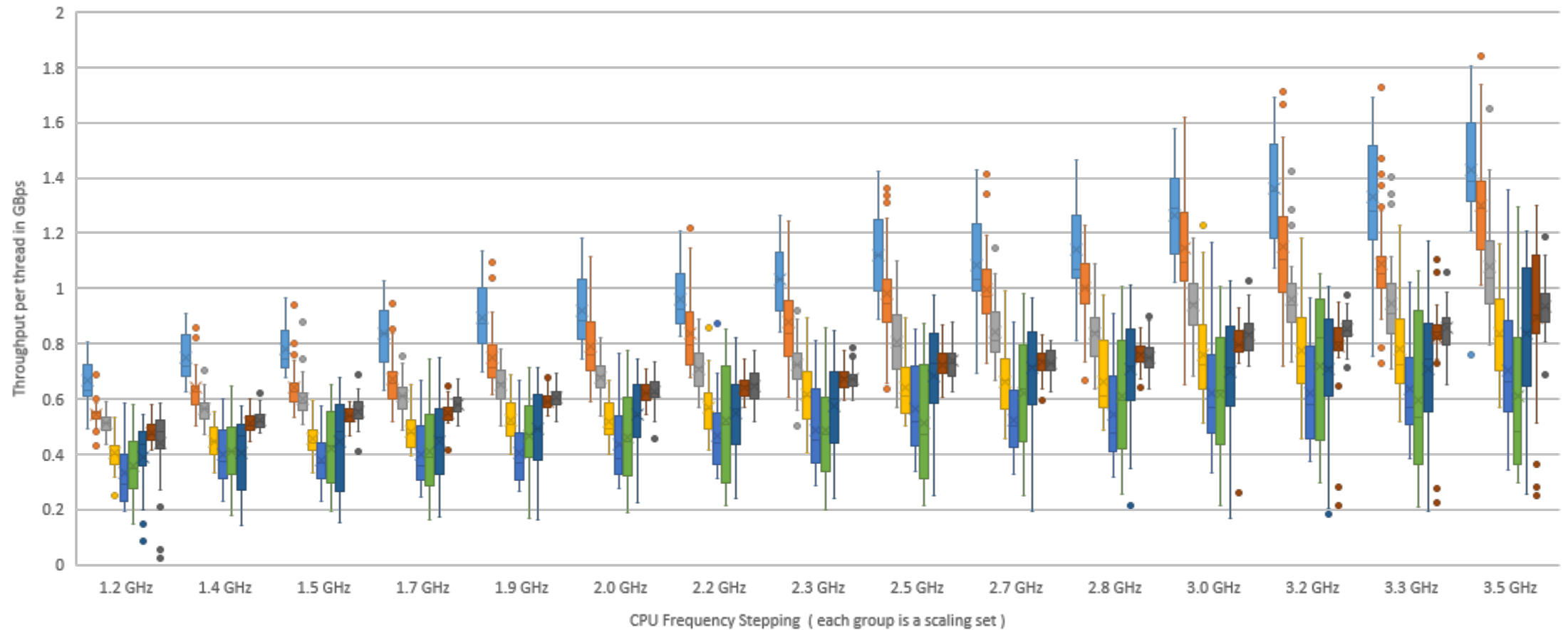# Data points for 40 runs of a single threaded IOZone, across every frequency stepping

Run / Processor Frequency	1.2	1.4	1.5	1.7	1.9	2	2.2	2.3	2.5	2.7	2.8	3	3.2	3.3	3.5	3.501
1	610842.2	639967.9	785584.9	904732.6	1049800	742146.6	842278.8	1147398	1173738	691930.6	1070738	1178892	1437779	1561112	1347558	1924939
2	624339.1	876663	695516.2	764334.8	725106.5	823544.4	1070738	913974	1312955	1286218	1035625	1292410	1224606	1169901	1340827	1384034
3	787890.6	675391.9	856386.2	731528.6	810490.1	782721.5	873098.8	947860.6	970126.8	1040643	1415042	1084801	1622443	1479379	1694118	1552086
4	697322.9	731528.6	859127	913974	817898.5	812944.6	886067.7	941213.6	1084801	999940.6	1036625	1375172	1523458	1430119	1514861	1195962
5	579209.5	680960.1	839644.3	944525.4	1032637	1076103	870974.1	1147398	965763.9	992545.9	1062263	1023776	1430119	1683494	1802168	1413179
6	699594.6	658008.4	775934	750445.6	807442.7	1084801	927393.8	948698.1	1422541	955451.5	1312955	1093640	1298663	1132871	1766587	1729594
7	705570.9	680528.6	847597.9	985259.9	808050.3	847597.9	879535.4	1019886	996229.5	1016026	1049800	1306564	1471271	1591187	1790149	1686137
8	583299.9	627623.5	966633.4	723153.1	965763.9	897923.4	894929.8	930608.9	921029.9	1354357	1089202	1175022	1169901	1581810	1540949	1437779
9	615393.4	658008.4	787890.6	706964.6	759469.2	815414.1	886067.7	1158540	1108315	897923.4	1260548	1405779	1321031	1184093	1376935	1190658
10	626159.5	873809.3	713068	807442.7	963165	930608.9	844930	1262029	1254656	933846.4	1384034	1298663	1267991	1201315	1398455	1384034
11	606700.4	667000.9	933846.4	848267.5	837026.1	859127	924200.9	947860.6	1362953	1040643	1036625	1437779	1143732	1089202	1514861	1463251
12	716876.6	684432.6	675391.9	820398.2	992545.9	1016026	977189.9	1093640	1142515	1027695	987979.6	1137673	1639787	1514861	1208073	1280084
13	621448.3	680528.6	711178.8	744204.1	921029.9	985259.9	947860.6	1254656	886067.7	1016026	1053922	1128110	1102624	1190658	1306564	1829808
14	608074.8	889002.1	717355.6	723153.1	807442.7	996229.5	1084801	945357	999940.6	1163562	1044693	1572544	1354357	1400279	1802168	1384034
15	766517.3	759469.2	716876.6	1003679	750445.6	865358.6	901693.6	1132871	1132871	1032637	1040643	1062263	1532153	1175022	1256124	1514861
16	611189.9	780445.9	708831.4	852984.6	815414.1	867455.9	920240.5	1248819	1012195	1243036	991629.3	1148626	1071806	1230219	1325925	1430119
17	744204.1	792543.1	792543.1	1003679	809878.8	853662.8	891956.1	894929.8	1300235	1070738	1071806	1306564	1334163	1235883	1347558	1152324
18	677522.7	861885.5	738065.4	721210.2	768712.4	837026.1	1053922	1094755	1354357	987979.6	1031645	1070738	1206715	1213534	1339155	1180188
19	789628.9	684869.2	764334.8	725106.5	924200.9	980760.2	1016026	1031645	1137673	1019886	1040643	1453348	1178892	1652404	1361225	1376935
20	602276.4	684432.6	686182.3	780445.9	815414.1	834424.3	1044693	1032637	1190658	895676.3	1219045	1184093	1662639	1213534	1219045	1062263
21	668246.3	701422.7	739590.6	913974	910872.6	828628.8	1019886	891956.1	1032637	996229.5	1235883	1430119	1163562	1168628	1312955	1704878
22	739590.6	649647.9	693718.8	1027695	771473.9	792543.1	867455.9	870268.2	1312955	941213.6	1016026	1292410	1190658	1230219	1619995	1581810
23	746273	880256.4	802014.7	768712.4	1080434	1036625	958864.4	842278.8	969251.1	1163562	1235883	1497954	1274009	1114065	1319408	1506360
24	632056.9	690151.6	729045.1	876663	1007446	886067.7	859127	970126.8	977189.9	1422541	1262029	1340827	1347558	1407622	1652404	1274009
25	715443.6	789628.9	699139.1	630572.1	777619.8	1084801	952062.8	1152324	1407622	1036625	1020856	1332507	1471271	1694118	1455318	1479379
26	618227.9	680960.1	876663	740100.4	1040643	883152.5	827989.8	928195.5	999940.6	1413179	1325925	1137673	1523458	1453348	1304976	1540949
27	723153.1	794889.9	944525.4	924200.9	951219.4	1076103	870974.1	1094755	1185400	1332507	1340827	1415042	1235883	1362953	1805198	1552086
28	766517.3	775934	941213.6	879535.4	1137673	1094755	1058076	1112910	1153562	1003679	1058076	1123389	1694118	1561112	1523458	1514861
29	603630.8	697322.9	746273	775934	1090308	1180188	1053922	1062263	1208073	1012195	1044693	1112910	1117543	1208073	1534343	1718521
30	627623.5	831194.6	870974.1	706964.6	1044693	748353.5	1062263	1062263	1003679	1274009	1206715	1332507	1376935	1600675	775934	1422541
31	632056.9	686621	725106.5	677095.4	1008392	812329.6	1148626	1254656	1235883	1003679	1044693	1053922	1112910	1325925	1325925	1267991
32	693718.8	844265.6	842278.8	910872.6	699594.6	962301.8	855703.7	1075026	991629.3	913974	1463251	1439707	1662639	1132871	1479379	1168628
33	493264.9	790210	691930.6	941213.6	937925	1040643	927393.8	897923.4	977189.9	1206715	1354357	1319408	1415042	1118708	1224606	1168628
34	805021.2	705107.6	951219.4	977189.9	750970.4	1016026	850282.7	1202660	977189.9	1266495	1137673	1455318	1453348	752549.4	757326.5	1683494
35	699594.6	733527.6	691930.6	984356.7	797843.1	805021.2	1208073	897923.4	886067.7	814795.3	992545.9	1052889	1683494	1514861	1455318	1382253
36	742146.6	858440.2	711178.8	663292.6	800221.6	778183.4	897923.4	1117543	1293968	1430119	812944.6	1311351	1173738	1243036	1778290	958864.4
37	568777.8	668246.3	725596.5	876663	924200.9	1036625	1044693	882426.7	1142515	1080434	1311351	1579483	1137673	1361225	1361225	1286218
38	603970.3	904732.6	741633.9	820398.2	1011241	937925	1208073	850282.7	1003679	1036625	1084801	1163562	1420659	1312955	1629831	1455318
39	629094.4	827989.8	817898.5	883152.5	969251.1	1147398	1190658	1128110	1007446	1079348	1070738	1112910	1570244	1561112	1260548	1826695
40	621448.3	910872.6	714967.3	977189.9	794889.9	764334.8	868157.3	847597.9	1312955	1311351	1376935	1292410	1514861	1173738	1430119	1610277

Variability plots of Throughput per Thread for multiple IOZone runs.

Variables

Columns (top axis):

- **Application**
  - Library: AIO, MPI, OpenMP, Posix
  - I/O workload: File Size, Record Size / IOPS
  - Threads: Scaling, CPU Pinning, NUMA Aware
  - Kernel: Kernel 2.6, Kernel 3.x, Kernel 4.4
- **OS Stack**
  - CPU Scheduling
  - I/O Scheduling: CFQ, NOOP, DEAD
  - Virtualization: KVM, XEN, BM
  - Interrupt policies: IRQ balance
  - Page reclamation: Swappiness, RCUOS, Journaling, Distributed / Networked
  - CPU Frequency: DVFS
- **H/W**
  - Memory Frequency, Hyper Threading (SMT), Turbo Boost, NUMA, CPU Cache
  - Storage Medium: HDD, SSD, RAM
  - IO Controller: Cached, Non Cached

Variables		AIO	MPI	OpenMP	Posix	File Size	Record Size / IOPS	Scaling	CPU Pinning	NUMA Aware	Kernel 2.6	Kernel 3.x	Kernel 4.4	CFQ	NOOP	DEAD	KVM	XEN	BM	IRQ balance	Swappiness	RCUOS	Journaling	Distributed / Networked	DVFS	HDD	SSD	RAM	Cached	Non Cached
Application																														
Library	AIO																													
Library	MPI																													
Library	OpenMP																													
Library	Posix																													
I/O workload	File Size																													
I/O workload	Record Size / IOPS																													
Threads	Scaling																													
Threads	CPU Pinning																													
Threads	NUMA Aware																													
Kernel	Kernel 2.6																													
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OS Stack	CPU Scheduling																													
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CPU Frequency	DVFS																													
H/W	Memory Frequency																													
H/W	Hyper Threading (SMT)																													
H/W	Turbo Boost																													
H/W	NUMA																													
H/W	CPU Cache																													
Storage Medium	HDD																													
Storage Medium	SSD																													
Storage Medium	RAM																													
IO Controller	Cached																													
IO Controller	Non Cached																													