Project 3 Report

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1. Data

   Our team compares the performance of the implementation with respect to message complexity, response time, system throughput and synchronization delay using experiments for various values of system parameters.

   For each group of parameters, we have run 5 times. And the final line of each group is average over multiple runs.

   Below data is based on same number of nodes, inter-request-delay and different cs-execution time.

no. of nodes	inter-request delay	cs-execution time	message complexity	response time	system throughput	synchronization delay
			15.49	1843.33	259.71	145.43
			15.6	1893.34	254.44	149.41
			15.37	1798.11	264.99	142.43
			15.76	1878.73	257.7	145.48
			15.64	1927.23	250.14	149.16
9	10	10	**15.572**	**1868.148**	**257.396**	**146.382**
			message complexity	response time	system throughput	synchronization delay
			15.76	2608.3	183.55	150.62
			15.64	2554.24	187.4	145.03
			15.83	2676.83	178.81	147.48
			15.59	2525.2	188.94	146.77
			15.6	2564.09	186.06	146.89
9	10	100	**15.684**	**2585.732**	**184.952**	**147.358**
			message complexity	response time	system throughput	synchronization delay
			15.79	3382.42	141.68	148.79
			15.73	3304.47	144.47	144.63
			15.72	3400.44	140.36	150.28
			15.76	3299.53	144.64	141.92
			15.75	3438.23	138.62	144.9
9	10	200	**15.75**	**3365.018**	**141.954**	**146.104**
			message complexity	response time	system throughput	synchronization delay
			15.76	4868.1	97.62	145.14
			15.78	5264.66	90.75	141.56
			15.67	4890.92	97.62	146.07
			15.72	4984.96	95.72	144.03
			15.82	4617.31	103.33	141.36
9	10	400	**15.75**	**4925.19**	**97.008**	**143.632**

Below data is based on same number of nodes, different inter-request-delay and same cs-execution time.

no. of nodes	inter-request delay	cs-execution time	message complexity	response time	system throughput	synchronization delay
			15.49	1843.33	259.71	145.43
			15.6	1893.34	254.44	149.41
			15.37	1798.11	264.99	142.43
			15.76	1878.73	257.7	145.48
			15.64	1927.23	250.14	149.16
9	10	10	**15.572**	**1868.148**	**257.396**	**146.382**
			message complexity	response time	system throughput	synchronization delay
			15.89	1881.66	246.94	154.57
			15.52	1813.69	253.51	147.25
			15.49	1814.89	252.29	152.64
			15.66	1851.43	248.36	153.04
			15.88	1809.97	256.54	141.82
9	100	10	**15.688**	**1834.328**	**251.528**	**149.864**
			message complexity	response time	system throughput	synchronization delay
			15.76	1782.41	249	153.23
			15.76	1528.2	279.28	128.73
			15.76	1534.2	282	129.61
			15.79	1609.02	271.15	132.5
			15.67	1584.22	273.94	133.38
9	200	10	**15.748**	**1607.61**	**271.074**	**135.49**
			message complexity	response time	system throughput	synchronization delay
			15.51	1351.36	272.71	135.71
			15.64	1330.7	281.79	130.01
			15.77	1392.98	274.87	131.21
			15.5	1347.72	269.44	135.98
			15.44	1334.5	273.18	133.63
9	400	10	**15.572**	**1351.452**	**274.398**	**133.308**

Below data is based on different number of nodes, same inter-request-delay and cs-execution time.

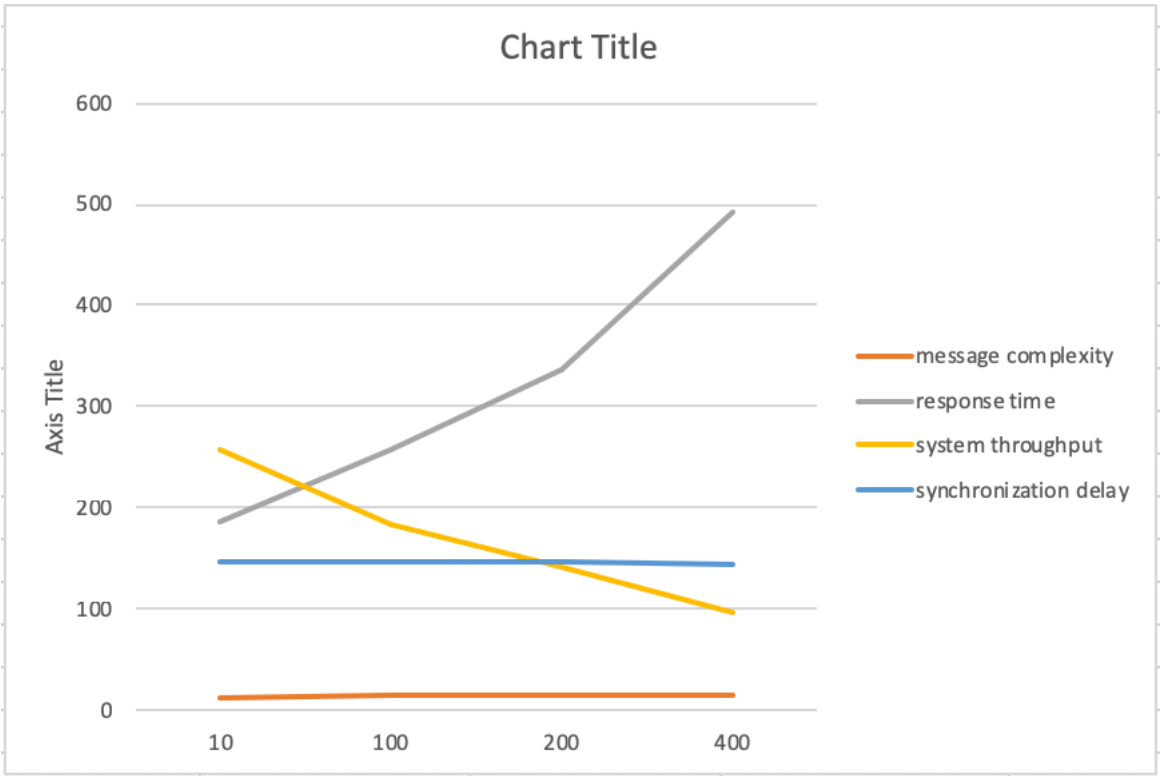
no. of nodes	inter-request delay	cs-execution time	message complexity	response time	system throughput	synchronization delay
			15.49	1843.33	259.71	145.43
			15.6	1893.34	254.44	149.41
			15.37	1798.11	264.99	142.43
			15.76	1878.73	257.7	145.48
			15.64	1927.23	250.14	149.16
9	10	10	**15.572**	**1868.148**	**257.396**	**146.382**
			message complexity	response time	system throughput	synchronization delay
			32.83	10845.05	90.61	540.6
			33.2	9484.49	107.27	444.47
			32.31	9443.82	101.8	477.5
			32.7	10892.14	90.65	544.97
			32.95	8984.79	111.39	428.37
18	10	10	**32.798**	**9930.058**	**100.344**	**487.182**
			message complexity	response time	system throughput	synchronization delay
			51.63	15774.78	95.46	460.55
			50.91	13132.78	116.39	395.66
			50.33	11144.37	136.84	323.18
			51.69	13816.43	110.02	397.33
			51.62	13216.37	112.78	374.66
27	10	10	**51.236**	**13416.946**	**114.298**	**390.276**
			message complexity	response time	system throughput	synchronization delay
			64.29	30403.86	64.36	789.01
			66.57	37507.71	53.08	970.94
			66.05	25756.66	75.67	643.62
			67.3	17884.86	113.09	412.75
			66.87	17604.24	113.93	409.52
36	10	10	**66.216**	**25831.466**	**84.026**	**645.168**

2. Graph

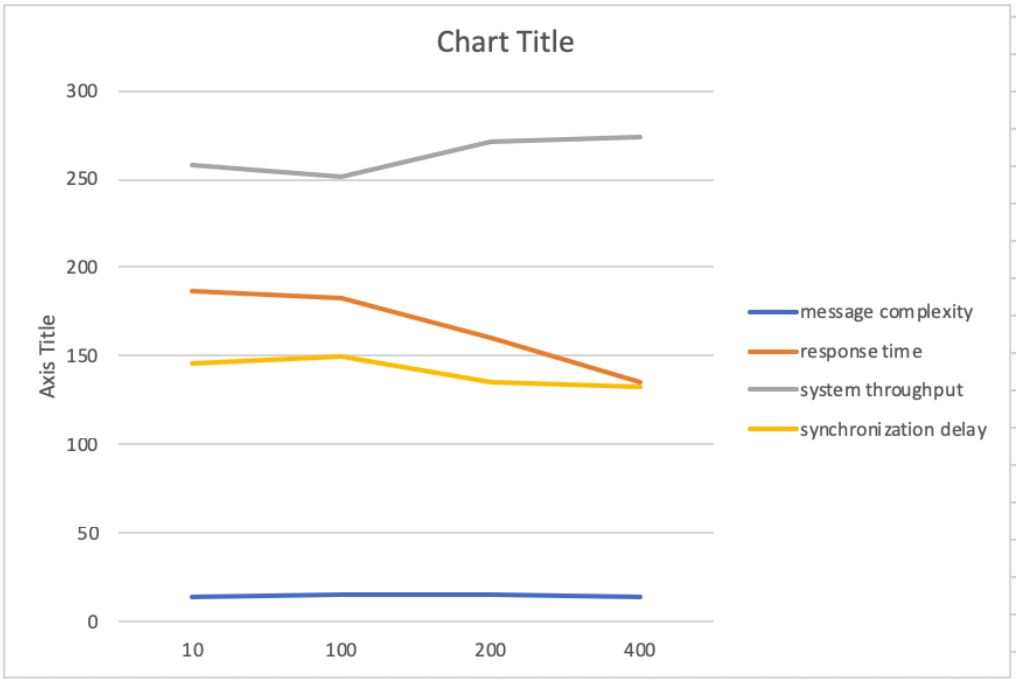
Below are average data based on different groups of parameters.

no. of nodes	inter-request del	cs-execution tir	message complex	response tir	system throughp	synchronization del
9	10	10	15.572	186.8148	257.396	146.382
9	10	100	15.684	258.5732	184.952	147.358
9	10	200	15.75	336.5018	141.954	146.104
9	10	400	15.75	492.519	97.008	143.632
9	10	10	15.572	186.8148	257.396	146.382
9	100	10	15.688	183.4328	251.528	149.864
9	200	10	15.748	160.761	271.074	135.49
9	400	10	15.572	135.1452	274.398	133.308
9	10	10	15.572	186.8148	257.396	146.382
18	10	10	32.798	993.0058	100.344	487.182
27	10	10	51.236	1341.6946	114.298	390.276
36	10	10	66.216	2583.1466	84.026	645.168

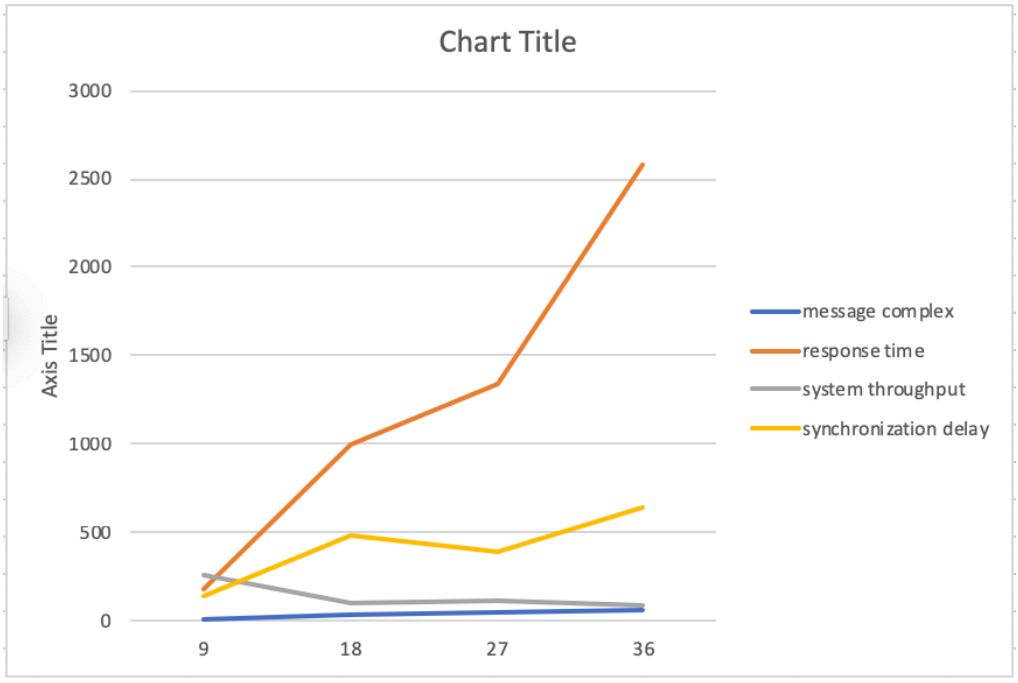
For no. of nodes = 9, inter-request-delay = 10, cs-execution-time = 10, 100, 200, 400, we have a graph:



For no. of nodes = 9, inter-request-delay = 10, 100, 200, 400, cs-execution-time = 10, we have a graph:



For no. of nodes = 9, 18, 27, 36, inter-request-delay = 10, cs-execution-time = 10, we have a graph:



3. Result
   From the graph, we find that:
   a. With the increment of cs-execution-time, response time increases.
   b. With the increment of number of nodes, response time increases.
   c. System throughput and synchronization delay basically hold steady with the changes of parameter for each graph.