CS654A
ASSIGNMENT - 3

Prithvi Sharma (11541)
Shujaat Ishaq (11710)

Following are the jMeter statistics for the respective server configurations: -

Without Load Balancer: -

No. of threads(users) – 5
Loop count - 10

1. Maximum number of threads spawned LARGE

Server Configuration: -

Start Servers	-	5
Min Spare Servers	-	1
Max Spare Servers	-	1
Max Request Workers	-	150
Max Connections/Child	-	0

Stats: -

	sampler_lab	report_count	average	report_min	report_max	report_stddev	report_error	report_rate	report_bandwidth	average_byte
1										
2	/drupal7/	150	10821	47	35003	8964.786364	0	0.45080378	1.452154621	3298.56667
3	/drupal7/the	150	11	1	97	12.83831072	0	0.48580636	0.412223774	868.9
4	/drupal7/mo	150	8	0	59	9.565409906	0	0.48590865	0.339155379	714.733333
5	/drupal7/mo	150	9	1	34	7.363284291	0	0.48588976	0.20968231	441.9
6	/drupal7/mo	150	11	0	102	11.86853918	0	0.48585986	0.489624007	1031.93333
7	/drupal7/mo	150	9	1	115	12.57656551	0	0.48588504	0.269387825	567.733333
8	/drupal7/mo	150	8	1	59	8.913881808	0	0.48587717	0.737815238	1554.96667
9	/drupal7/mis	150	11	1	69	9.900529728	0	0.48596532	0.671492707	1414.93333
10	/drupal7/the	150	8	0	136	12.80007118	0	0.48590708	0.373398708	786.9
11	/drupal7/the	150	18	2	127	16.36291335	0	0.48596217	3.364133253	7088.76667
12	/drupal7/the	150	10	1	38	8.212524311	0	0.48592754	0.31933285	672.933333
13	/drupal7/mo	150	8	1	56	9.542711005	0	0.48602673	0.471661098	993.733333
14	/drupal7/mis	150	15	2	224	21.02541214	0	0.48602831	2.527869293	5325.9
15	/drupal7/mis	150	59	11	693	57.66508668	0	0.48602516	13.01727885	27425.9333
16	/drupal7/mo	150	12	1	52	9.084954595	0	0.48614802	1.053447316	2218.93333
17	/drupal7/mis	25	9	1	25	7.064955768	0	0.0922254	0.081327671	903
18	TOTAL	2275	726	0	35003	3534.360212	0	6.83595804	24.01385554	3597.18242

2. Maximum number of threads spawned SMALL

Server Configuration: -

Start Servers	-	1
Min Spare Servers	-	1
Max Spare Servers	-	1
Max Request Workers	-	1
Max Connections/Child	-	0

Stats: -

	sampler_lab	report_count	average	report_min	report_max	report_stddev	report_error	report_rate	report_bandwidth	average_b
2	/drupal7/	150	5272	24	70201	12925.4	0	0.43069043	1.387350317	3298.5333
3	/drupal7/the	150	2	1	12	2.037700229	0	0.43790762	0.37158001	868.
4	/drupal7/mo	150	3	1	30	3.382543422	0	0.43799713	0.30571401	714.73333
5	/drupal7/mo	150	2	0	13	2.157251338	0	0.43796516	0.189000783	441.
6	/drupal7/mo	150	2	1	19	2.546815004	0	0.43793702	0.441329896	1031.9333
7	/drupal7/mo	150	3	1	74	6.207124938	0	0.4379562	0.242814781	567.73333
8	/drupal7/mo	150	1799	1	77357	10368.95047	0	0.43794342	0.665026774	1554.9666
9	/drupal7/mis	150	2	1	14	2.378617713	0	0.4380355	0.605264676	1414.9333
10	/drupal7/the	150	2	1	19	2.400518463	0	0.43797155	0.336562317	786.
11	/drupal7/the	150	6	2	25	3.836294508	0	0.43800736	3.03216012	7088.7666
12	/drupal7/the	150	2202	1	70069	11859.29356	0	0.43795748	0.287808778	672.93333
13	/drupal7/mo	150	3	1	26	2.655509995	0	0.43804573	0.425098287	993.73333
14	/drupal7/mis	150	4	2	16	2.548934418	0	0.43803422	2.278248485	5325.
15	/drupal7/mis	150	13	7	35	4.989985527	0	0.43800736	11.73121154	27425.933
16	/drupal7/mo	150	1876	1	59722	10102.59623	0	0.43806236	0.949249198	2218.9333
17	/drupal7/mis	25	3	1	6	1.496662955	0	0.0742342	0.065462385	90
18	TOTAL	2275	738	0	77357	6013.302643	0	6.53069426	22.9414885	3597.1802

The figures to note here are the report_rate column. The natural reasoning shows that as the number of threads that can be spawned increases, more requests can be spawned per second and thus the report rate should increase. This is evident on comparing the report_rate columns of both tables above.

3. Outstanding Requests' Queue SMALL

Server Configuration: -

Start Servers	-	1	No. of threads(users) – 30
Min Spare Servers	-	1	Loop count – 20
Max Spare Servers	-	1	
Max Request Workers	-	1	
Listen Backlog	-	5	
Max Connections/Child	-	0	

Stats: -

	sampler_lab	report_count	average	report_min	report_max	report_stddev	report_error	report_rate	report_bandwidth	average_byt
2	/drupal7/	1500	9047	18	232939	22491.15889	0.08	0.2651636	0.833372601	3218.29067
3	/drupal7/the	1500	3165	0	184078	14613.22698	0.07333333	0.26561281	0.253196794	976.133333
4	/drupal7/mo	1500	4019	0	184304	17551.55839	0.074	0.26561568	0.216776979	835.717333
5	/drupal7/mo	1500	3523	0	176264	15718.07547	0.074	0.26561502	0.151028943	582.247333
6	/drupal7/mo	1500	4243	0	239380	19658.94254	0.07133333	0.26561384	0.291795311	1124.93533
7	/drupal7/mo	1500	4252	0	205834	19867.32204	0.07	0.26561464	0.179622767	692.483333
8	/drupal7/mo	1500	4040	1	175103	18693.04009	0.07133333	0.26561389	0.417802005	1610.71867
9	/drupal7/mis	1500	3146	0	177190	13725.55003	0.07266667	0.26561676	0.384423713	1482.022
10	/drupal7/the	1500	3250	0	224347	14822.7624	0.072	0.26561497	0.233043937	898.432
11	/drupal7/the	1500	3807	2	174112	17393.29329	0.07066667	0.26561615	1.751903129	6753.91467
12	/drupal7/the	1500	5514	0	229270	24063.4826	0.074	0.26561408	0.206477941	796.017333
13	/drupal7/mo	1500	3655	0	187358	16443.78133	0.07466667	0.26561704	0.283958107	1094.708
14	/drupal7/mis	1500	4750	1	184539	20147.77664	0.07666667	0.26561695	1.322062881	5096.78467
15	/drupal7/mis	1500	3706	6	212988	17095.97999	0.07066667	0.26561605	6.654060884	25652.66
16	/drupal7/mo	1500	5319	1	184157	22135.18605	0.076	0.26561765	0.577852244	2227.716
17	/drupal7/mis	250	2274	1	163297	15894.44907	0.04	0.04434671	0.041561354	959.684
18	TOTAL	22750	4339	0	239380	18564.20275	0.07305495	4.02159322	13.77659662	3507.87218

The figures to note here are in the report_error% column. As the requests' queue is made small, more requests are being dropped and thus are not responded to by the servers. This has led to an increase in the error% of the responses.

With Load Balancer: -

1. Maximum number of threads spawned LARGE
Server configuration for both processing servers: -

Start Servers	-	5
Min Spare Servers	-	1
Max Spare Servers	-	1
Max Request Workers	-	150
Max Connections/Child	-	0

Stats: -

	sampler_lab	report_count	average	report_min	report_max	report_stddev	report_error	report_rate	report_bandwidth	average_bytes
2	/drupal7/	300	6069	2	76197	20480.36443	0	0.54315453	0.877458015	1654.25667
3	/drupal7/the	300	26	4	1321	107.9392156	0	0.54330208	0.519850956	979.8
4	/drupal7/mo	300	17	4	102	15.25256809	0	0.54343987	0.43881177	826.85
5	/drupal7/mo	300	21	4	1352	78.52914102	0	0.54340344	0.29340602	552.9
6	/drupal7/mo	300	15	3	118	13.78339218	0	0.543369	0.606461354	1142.9
7	/drupal7/mo	300	14	4	96	11.20558591	0	0.54339852	0.360779827	679.866667
8	/drupal7/mo	300	16	3	289	20.82199692	0	0.54337096	0.88399487	1665.91667
9	/drupal7/mis	300	16	3	118	14.37313234	0	0.54348417	0.809865715	1525.9
10	/drupal7/the	300	17	3	129	15.59599094	0	0.54340344	0.476486282	897.9
11	/drupal7/the	300	19	5	120	14.19127275	0	0.54345069	3.821588802	7200.85
12	/drupal7/the	300	16	3	115	13.18975823	0	0.54337195	0.415992617	783.95
13	/drupal7/mo	300	18	4	281	21.80467738	0	0.54350189	0.586891813	1105.75
14	/drupal7/mis	300	22	5	1347	78.34915273	0	0.54349697	2.885691137	5436.91667
15	/drupal7/mis	300	27	9	295	21.52675235	0	0.54346645	14.61463007	27536.9
16	/drupal7/mo	300	17	4	197	18.02474965	0	0.5435206	1.236659754	2329.88333
17	/drupal7/mis	50	13	4	40	8.327208416	0	0.12523168	0.123996483	1013.9
18	TOTAL	4550	417	2	76197	5469.177797	0	8.23566677	28.89493197	3592.71582

The report rate is higher as compared to the last cases as there are 2 processing servers now and a load balancer.

2. Maximum number of threads spawned SMALL
Server configuration for both processing servers: -

Start Servers	-	1
Min Spare Servers	-	1
Max Spare Servers	-	1
Max Request Workers	-	1
Max Connections/Child	-	0

Stats: -

	sampler_label	report_count	average	report_min	report_max	report_stddev	report_error%	report_rate	report_bandwidth	average_bytes
2	/drupal7/	300	29112	2	79973	36877.55273	0	0.11880393	0.192898986	1662.64333
3	/drupal7/the	300	16	3	1200	71.265704	0	0.11882299	0.113694104	979.8
4	/drupal7/mo	300	12	3	157	15.73145328	0	0.11883089	0.095952466	826.85
5	/drupal7/mo	300	15	4	1202	70.32480288	0	0.11882911	0.064160754	552.9
6	/drupal7/mo	300	13	3	176	20.05849086	0	0.11882807	0.132625587	1142.9
7	/drupal7/mo	300	9	3	85	9.1495349	0	0.11882962	0.078894824	679.866667
8	/drupal7/mo	300	9	3	49	7.398050794	0	0.11882812	0.193318106	1665.91667
9	/drupal7/mis	300	10	3	81	10.77324412	0	0.11883414	0.177079118	1525.9
10	/drupal7/the	300	10	3	88	9.403472172	0	0.11883009	0.104196818	897.9
11	/drupal7/the	300	13	5	76	10.4042534	0	0.11883226	0.835637962	7200.85
12	/drupal7/the	300	10	3	79	8.916583177	0	0.11882779	0.090971723	783.95
13	/drupal7/mo	300	10	3	127	9.819660551	0	0.11883588	0.128323026	1105.75
14	/drupal7/mis	300	28	4	1203	119.9900766	0	0.1188365	0.630961058	5436.91667
15	/drupal7/mis	300	21	9	143	14.8352025	0	0.11883593	3.195676896	27536.9
16	/drupal7/mo	300	21	3	1191	98.30429012	0	0.11883899	0.270391585	2329.88333
17	/drupal7/mis	50	8	4	37	5.761388721	0	0.02106792	0.020860126	1013.9
18	TOTAL	4550	1933	2	79973	11908.59003	0	1.80173545	6.322382572	3593.26879

As the number of threads that can be spawned is decreased there is a substantial drop in the report_rate, which is evident from natural reasoning.

3. Outstanding Requests' Queue SMALL

Server Configuration for both processing servers: -

Start Servers   -   1
Min Spare Servers   -   1
Max Spare Servers   -   1
Max Request Workers   -   1
Listen Backlog   -   5
Max Connections/Child   -   0

Stats: -

	sampler_label	report_count	average	report_min	report_max	report_stddev	report_error	report_rate	report_bandwidth	average_by
2	/drupal7/	1500	5329	2	80060	19319.01072	0	2.46466897	3.978323917	1652.8806
3	/drupal7/the	1500	53	3	5287	232.6708779	0	2.46427216	2.357904163	979.
4	/drupal7/mo	1500	57	3	5432	228.3773267	0	2.4650335	1.990442333	826.8
5	/drupal7/mo	1500	56	3	9447	290.1535898	0	2.46469327	1.33078995	552.
6	/drupal7/mo	1500	54	3	5450	246.2257129	0	2.4644584	2.750614754	1142.
7	/drupal7/mo	1500	51	3	5250	185.8641413	0	2.46468922	1.635751334	679.60266
8	/drupal7/mo	1500	73	3	9674	358.6137818	0	2.46457178	4.009542193	1665.9166
9	/drupal7/mis	1500	46	3	2339	130.6309342	0	2.46534141	3.673695757	1525.
10	/drupal7/the	1500	80	3	9870	475.1691688	0	2.46472162	2.16120463	897.
11	/drupal7/the	1500	72	5	9435	375.432539	0	2.46508616	17.3346833	7200.8
12	/drupal7/the	1500	57	3	9655	297.4226212	0	2.46457178	1.886817429	783.9
13	/drupal7/mo	1500	52	3	3245	167.3085262	0	2.46532115	2.662137559	1105.7
14	/drupal7/mis	1500	72	4	16721	487.4795638	0	2.4652158	13.08903603	5436.9166
15	/drupal7/mis	1500	62	8	1392	134.6138286	0	2.46493628	66.28584364	27536.
16	/drupal7/mo	1500	61	3	9916	380.178658	0	2.46536572	5.609389163	2329.8833
17	/drupal7/mis	250	65	4	1833	193.0322804	0	0.41386617	0.409784094	1013.
18	TOTAL	22750	408	2	80060	5138.539738	0	37.3674278	131.1001059	3592.6076

As the outstanding requests' queue size is reduced, the report_rate increases as more queuing slows down the whole serving process, but there are still not any request drops probably because of the presence of the load balancer which can now enable handling of more requests per second than in the without balancer case.