IT314

SOFTWARE ENGINEERING

Group 16

Online Examination System

Non-Functional Testing

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1. Introduction

Non-functional requirements describe the qualities, constraints, and characteristics of a system rather than its specific behaviors or functions. Unlike functional requirements, which define what a system should do, NFRs define how well the system should perform or how scalable it must be.

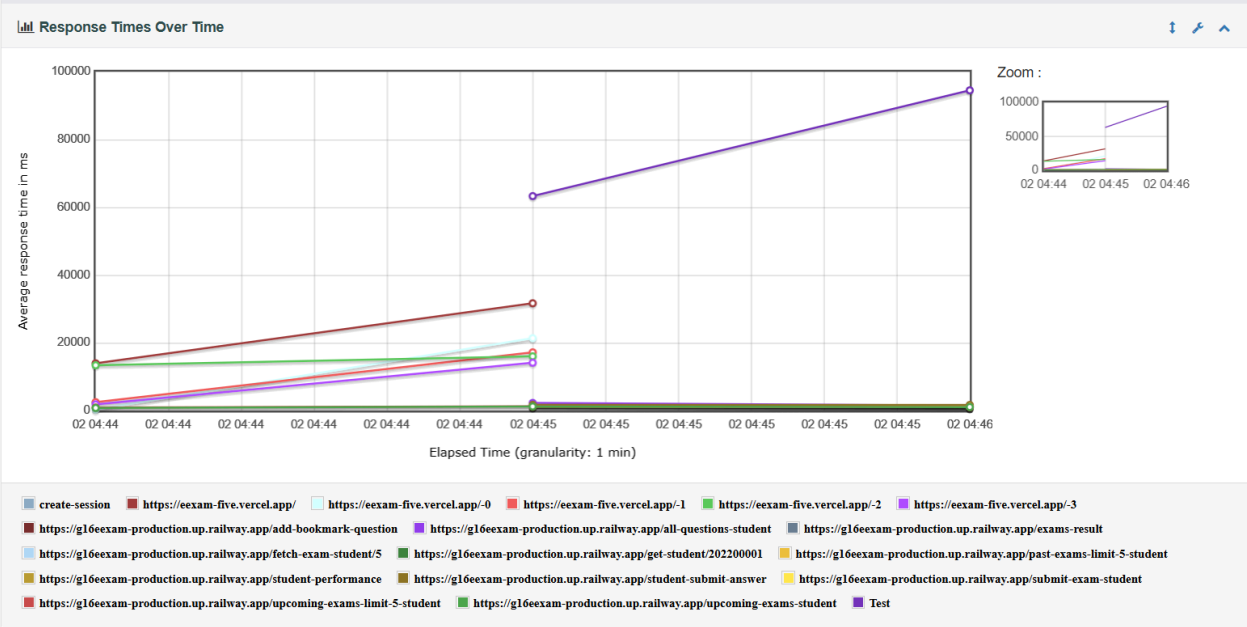
2. What did we do ?

We have done **load testing** using Apache jMeter. Also, We used BlazeMeter for getting the .jmx file.

We tried different loads on the Admin, Student and Examiner side.
On the Admin side, we used 10 and 50 numbers of threads (users).
On the Student side, we used 100 and 600 numbers of threads (users).
On the Examiner side, we used 20 and 200 numbers of threads (users).

3. Results:

Student - 100 number of threads

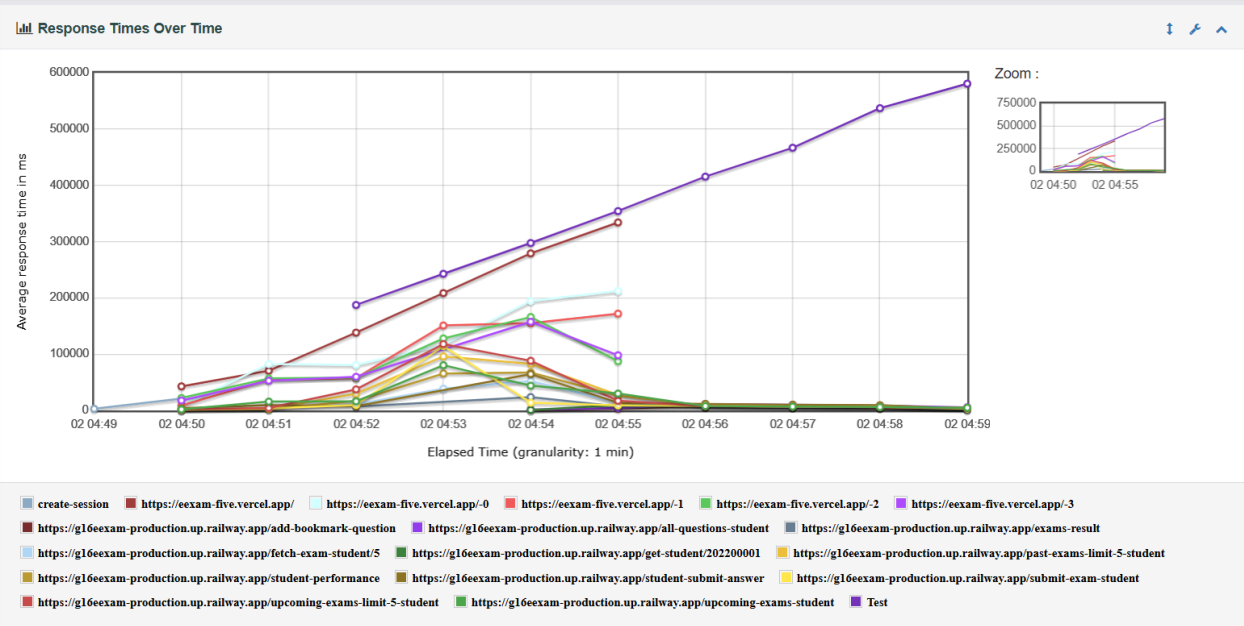


Summary Report:

Filename C:\Users\91786\Downloads\Student\student100.csv Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
create-session	100	2446	940	3984	774.85	0.00%	21.2/sec	14.35	10.36	693.9
https://eexam-five.v...	100	32640	10316	53071	17611.37	6.00%	1.8/sec	2677.75	7.36	1546963.1
https://g16eexam-pr...	600	1071	724	2526	240.34	0.00%	7.2/sec	2.44	4.92	345.2
https://g16eexam-pr...	400	1066	668	3099	268.61	0.00%	4.8/sec	1.68	3.30	355.8
https://g16eexam-pr...	400	1047	705	3317	231.36	0.00%	4.8/sec	3.14	3.27	667.3
https://g16eexam-pr...	400	1049	702	3090	228.97	0.00%	4.8/sec	1.66	3.22	355.6
https://g16eexam-pr...	300	1052	744	2083	192.31	0.00%	4.6/sec	3.66	3.09	812.9
https://g16eexam-pr...	800	1594	897	3300	365.03	100.00%	11.6/sec	4.89	8.47	430.8
https://g16eexam-pr...	200	1071	715	2822	256.68	100.00%	3.1/sec	1.31	2.18	430.8
https://g16eexam-pr...	100	1054	872	1878	188.12	0.00%	1.8/sec	1.21	1.16	670.8
https://g16eexam-pr...	200	1039	675	2093	219.21	0.00%	3.3/sec	1.56	2.19	482.8
https://g16eexam-pr...	100	1656	1016	2907	343.74	0.00%	1.9/sec	2.71	1.20	1469.8
https://g16eexam-pr...	100	1100	692	2009	227.10	0.00%	1.9/sec	0.80	1.34	427.8
Test	100	78113	48239	99066	20515.88	100.00%	58.7/min	1496.52	28.77	1565523.7
TOTAL	3900	4005	668	99066	13714.16	28.36%	38.2/sec	2993.04	57.53	80283.3

Student - 600 number of threads

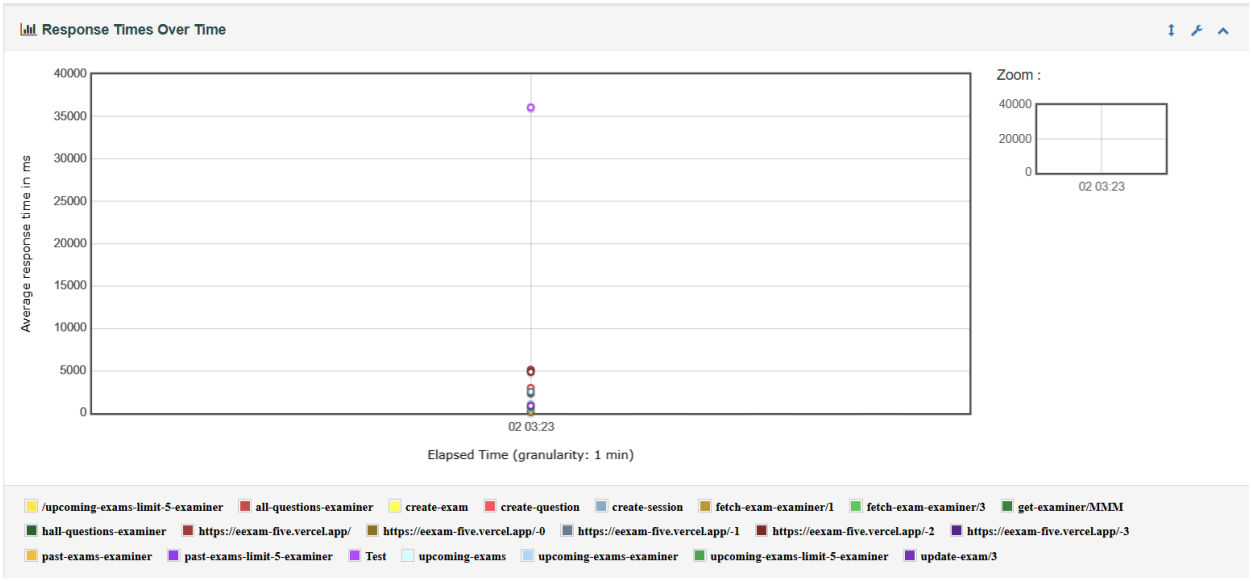


Summary Report:

Filename C:\Users\91786\Downloads\Student\student600.jtl Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
create-session	600	17817	974	21244	6977.63	82.17%	26.8/sec	65.72	2.34	2512.3
https://eexam-five.v...	600	99533	7370	353270	81589.16	97.00%	1.6/sec	214.19	1.05	136601.3
https://g16eexam-pr...	3546	12679	676	189243	20003.90	9.25%	6.2/sec	3.56	3.84	583.9
https://g16eexam-pr...	2359	13200	733	255198	27267.72	8.48%	4.2/sec	2.34	2.60	575.1
https://g16eexam-pr...	2356	12894	677	214577	25274.69	8.83%	4.2/sec	3.66	2.58	898.9
https://g16eexam-pr...	2355	12807	732	135961	23211.03	6.41%	4.2/sec	2.12	2.62	520.5
https://g16eexam-pr...	1780	9714	722	161774	17355.37	1.46%	3.3/sec	2.72	2.15	851.6
https://g16eexam-pr...	4730	13265	217	196898	21449.63	100.00%	8.7/sec	4.12	6.18	486.7
https://g16eexam-pr...	1178	7088	716	114342	9024.55	100.00%	2.2/sec	0.94	1.54	439.1
https://g16eexam-pr...	585	6225	766	94508	6769.14	0.34%	1.4/sec	0.91	0.86	678.3
https://g16eexam-pr...	1170	5078	671	87199	4370.18	0.09%	3.1/sec	1.48	2.07	484.9
https://g16eexam-pr...	585	6914	980	25203	2641.46	0.00%	1.8/sec	2.64	1.17	1469.8
https://g16eexam-pr...	585	4506	681	14613	1936.39	0.00%	1.8/sec	0.77	1.30	427.7
Test	585	529148	187443	594638	72757.38	100.00%	57.4/min	152.95	23.24	163656.5
TOTAL	23014	26994	217	594638	86451.88	36.86%	37.6/sec	307.36	46.67	8359.6

Examiner - 20 number of threads

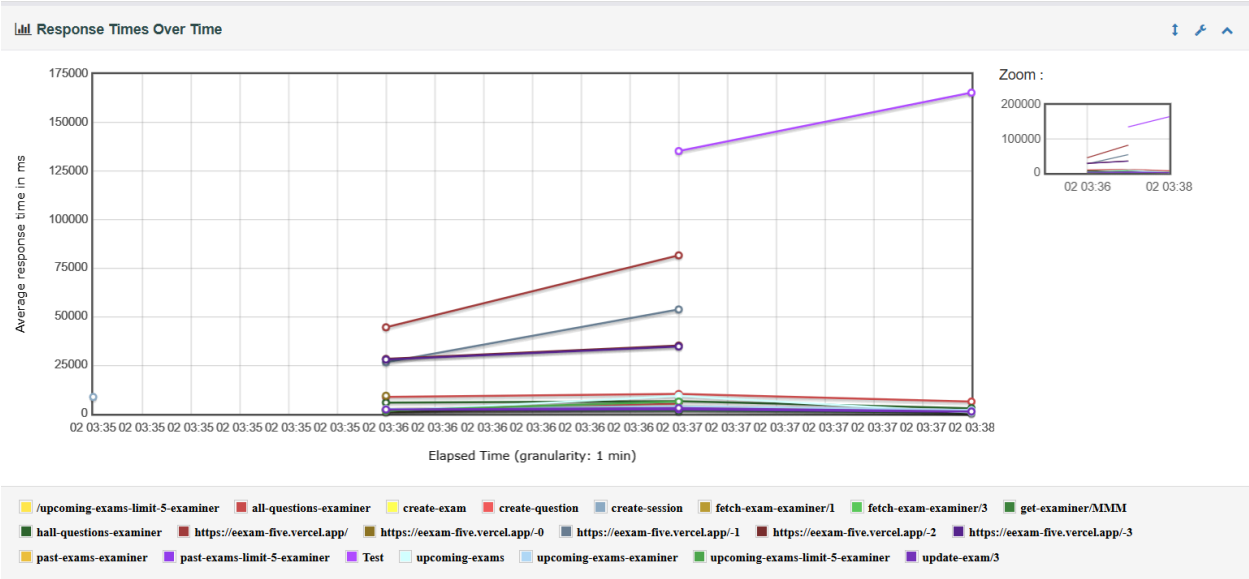


Summary Report:

Filename C:\Users\91786\Downloads\Examiner\Examiner.csv Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
create-session	20	1239	844	1492	149.27	0.00%	9.6/sec	6.38	4.63	682.0
https://eexam-five.v...	20	5907	5603	6480	231.93	0.00%	3.1/sec	4781.16	12.83	1602186.1
upcoming-exams	40	647	452	837	91.61	0.00%	2.0/sec	1.14	1.30	582.0
upcoming-exams-li...	20	731	686	811	22.77	0.00%	17.3/sec	14.20	11.09	839.0
past-exams-limit-5-e...	40	776	664	994	56.01	0.00%	2.0/sec	1.15	1.31	595.0
all-questions-examin...	80	3006	1338	4202	673.45	0.00%	2.4/sec	908.70	1.64	381357.1
upcoming-exams-ex...	100	1228	902	2731	323.99	0.00%	3.4/sec	2.32	2.32	688.0
past-exams-examiner	40	1118	937	1537	103.11	0.00%	2.0/sec	2.09	1.29	1081.5
create-question	20	1067	940	1348	124.61	0.00%	4.2/sec	3.31	3.58	811.0
fetch-exam-examine...	20	839	733	1024	106.64	0.00%	4.5/sec	6.16	2.83	1407.0
create-exam	20	631	461	717	76.87	100.00%	4.8/sec	2.14	6.15	452.0
get-examiner/MMM	20	640	454	1805	342.80	0.00%	3.5/sec	1.99	2.18	586.0
/upcoming-exams-li...	20	871	708	1027	106.81	0.00%	4.0/sec	1.27	2.76	325.0
hall-questions-exami...	20	2169	1760	2769	285.53	0.00%	3.1/sec	1205.21	2.14	393504.7
fetch-exam-examine...	20	794	670	1003	101.92	0.00%	3.8/sec	6.85	2.42	1822.0
update-exam/3	40	827	667	1009	111.25	100.00%	6.7/sec	2.96	13.78	452.0
Test	20	39801	38102	42264	856.49	100.00%	27.0/min	1551.49	11.13	3536904.0
TOTAL	560	2842	452	42264	7212.79	14.29%	12.6/sec	3102.98	22.27	252636.0

Examiner - 200 number of threads

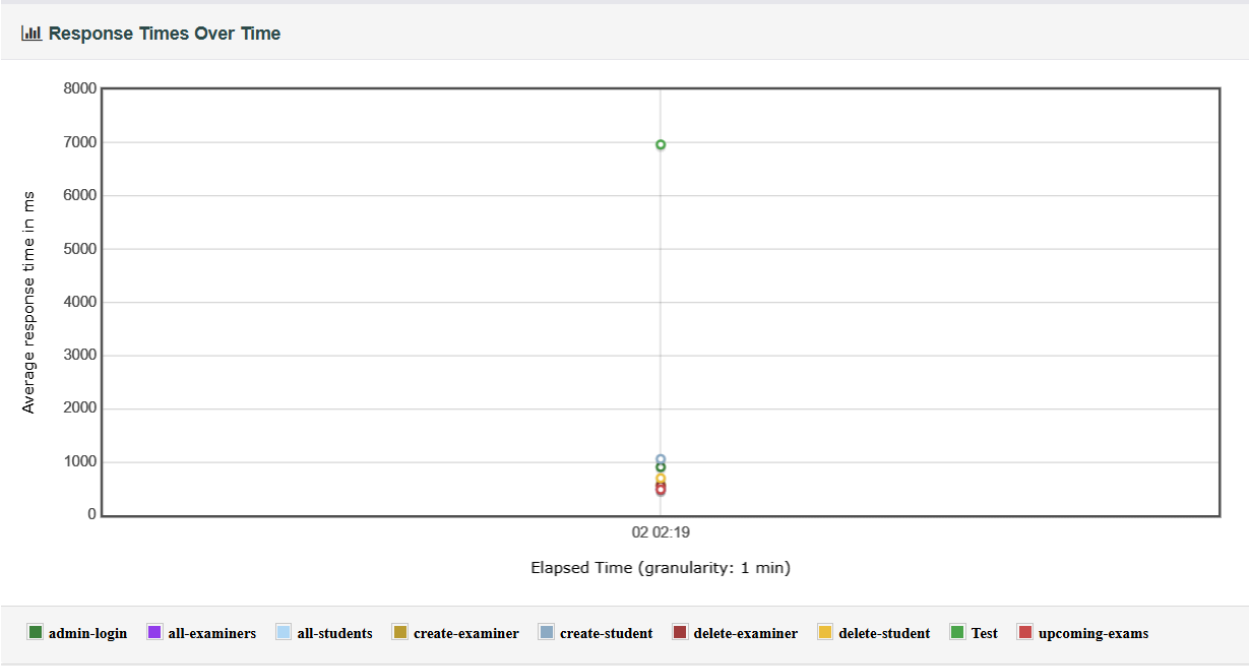


Summary Report:

Filename C:\Users\91786\Downloads\Examiner\Examiner200.jtl Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
create-session	440	8106	844	21082	8305.61	28.86%	24.9/min	0.54	0.14	1324.1
https://eexam-five.v...	440	42793	4647	97806	15899.10	70.68%	23.1/min	193.15	0.57	512728.7
upcoming-exams	880	3459	446	21118	6532.70	12.05%	44.6/min	0.65	0.42	892.8
upcoming-exams-li...	440	2886	662	18663	2873.85	0.00%	23.2/min	0.32	0.25	838.8
past-exams-limit-5-e...	880	1794	660	7021	909.93	0.00%	44.6/min	0.43	0.49	594.8
all-questions-examin...	1760	7582	1243	19914	3153.94	0.00%	1.5/sec	590.07	0.98	414351.5
upcoming-exams-ex...	2200	2991	886	21048	1383.32	0.05%	1.8/sec	1.23	1.23	688.9
past-exams-examiner	880	2855	887	10787	1355.28	0.00%	44.5/min	0.78	0.48	1081.3
create-question	440	3004	902	7212	1438.55	0.00%	22.8/min	0.30	0.32	810.8
fetch-exam-examine...	440	2267	663	5987	1079.38	0.00%	22.8/min	0.52	0.24	1406.8
create-exam	440	1484	450	3787	710.37	100.00%	22.7/min	0.17	0.48	451.5
get-examiner/MMM	440	1410	448	4388	870.26	0.00%	22.6/min	0.22	0.24	585.8
/upcoming-exams-li...	440	1686	667	6928	945.59	0.00%	22.6/min	0.12	0.26	324.8
hall-questions-exami...	440	5108	1327	11301	2345.35	0.00%	22.5/min	92.32	0.26	251889.0
fetch-exam-examine...	440	1965	670	4787	941.38	0.00%	22.5/min	0.67	0.24	1821.7
update-exam/3	880	2206	667	6666	1035.09	100.00%	44.9/min	0.33	1.54	451.7
Test	440	136634	34082	176376	35503.36	100.00%	21.7/min	860.00	7.86	2439073.6
TOTAL	12320	9759	446	176376	26748.83	18.71%	10.1/sec	1720.00	15.71	174219.5

Admin - 10 number of threads

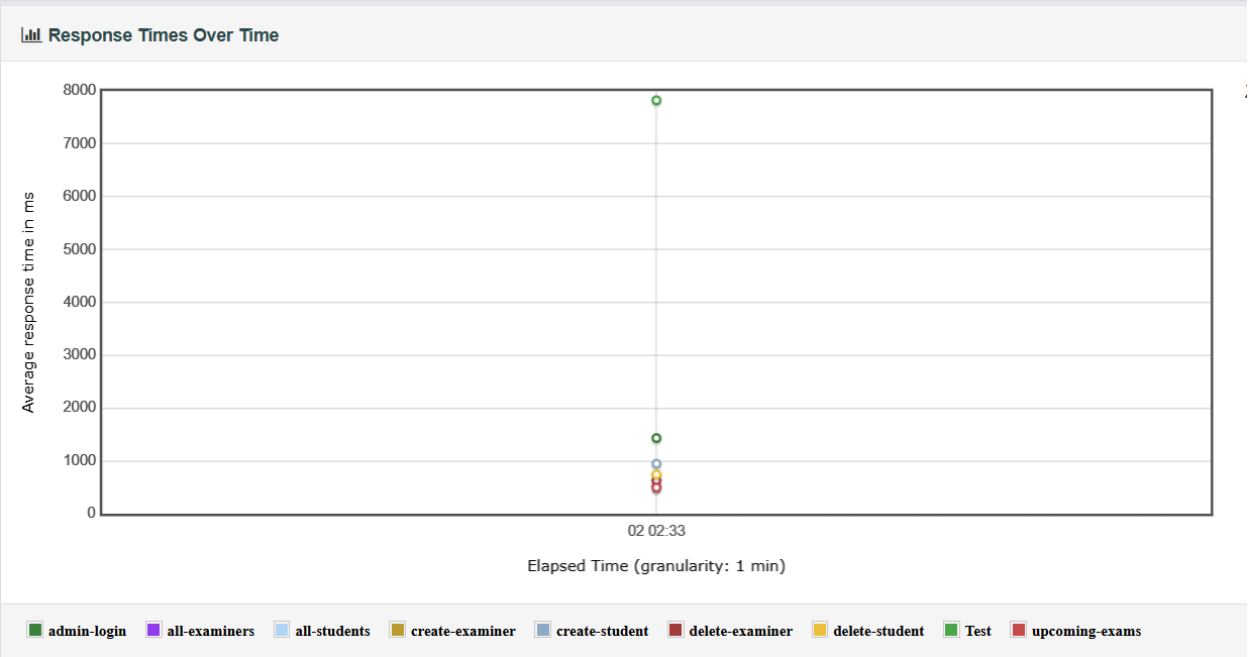


Summary Report:

Filename C:\Users\91786\Downloads\Admin\admin.csv Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
admin-login	20	1048	846	1356	168.67	0.00%	4.7/min	0.05	0.04	679.6
all-students	40	483	449	568	31.81	0.00%	9.2/min	0.08	0.10	550.6
delete-student	40	706	670	816	34.53	0.00%	9.3/min	0.07	0.11	443.6
create-student	20	911	731	1139	153.63	100.00%	4.7/min	0.04	0.07	519.6
all-examiners	20	473	446	529	20.88	0.00%	4.7/min	0.13	0.05	1667.3
delete-examiner	40	540	452	1130	151.69	95.00%	9.3/min	0.06	0.11	418.4
create-examiner	20	586	512	813	85.40	100.00%	4.7/min	0.04	0.07	524.9
upcoming-exams	20	477	450	567	29.28	0.00%	4.7/min	0.06	0.05	836.1
Test	20	6958	6435	7489	237.46	100.00%	4.6/min	0.52	0.58	7052.7
TOTAL	240	1159	446	7489	1761.31	40.83%	54.7/min	1.05	1.15	1175.5

Admin - 50 number of threads



Summary Report:

Filename C:\Users\91786\Downloads\Admin\admin50.jtl Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
admin-login	100	1444	867	2117	298.35	0.00%	45.8/min	0.51	0.35	679.7
all-students	200	511	450	808	65.26	0.00%	1.5/sec	0.79	0.94	550.7
delete-student	200	847	664	2933	291.17	0.00%	1.5/sec	0.66	1.09	443.7
create-student	100	1083	760	2901	249.87	100.00%	45.8/min	0.39	0.67	519.7
all-examiners	100	625	454	1172	138.06	0.00%	46.0/min	1.23	0.48	1645.0
delete-examiner	200	755	447	2807	345.87	90.00%	1.5/sec	0.63	1.08	420.4
create-examiner	100	854	515	1653	227.20	100.00%	46.1/min	0.39	0.65	525.0
upcoming-exams	100	530	447	846	91.00	0.00%	46.2/min	0.63	0.48	838.7
Test	100	8766	6905	12102	1152.12	100.00%	43.5/min	4.99	5.49	7038.1
TOTAL	1200	1461	447	12102	2254.20	40.00%	8.7/sec	9.97	10.98	1173.0