DETAILED REPORT

1. OBJECTIVES:

A. Goals :

The main aim of the project is Performance Assessment of Moodle and creates a baseline for the same. In this, we are finding performance issue and ways to fix them.
Moodle stands for acronym for modular object-oriented dynamic learning environment . Moodle is a LMS ie a Learning Management System. Moodle is used for blended learning, distance education, flipped classroom and other e-learning projects in schools, universities, workplaces and other sectors.
In this part of the test we are interested in finding the bugs and ways to fix them.

B. Deployment Infrastructure :

1]   Target Infrastructure:
   i.   Hardware Configurations :
        16Gb RAM
        Processor : Octa Core
   ii. Software Configurations :
        OS : Ubuntu 14.04
        Database : MySQL
        Language : PHP

2]   Test Infrastructure :
   i.   Load Generator:
        8Gb RAM
        Processor: Quad Core
   ii. Tools :
        Jmeter 3,Gatling 2.2.2, SAR

The instance of moodle used for this test was deployed on 172.22.22.11.

C. Bugs Detected
   • High response time for Homepage, Login and Logout

D. Fixations:
   • Disable the debugging option.
   • The list of courses Visible on homepage to be reduced.
   • Increase cache size, enable query cache type in Mysql database
   • Increase cache size of opcache of moodle

2. MOODLE METRICS

The metrics that we would be interested wrt Moodle are :
- Number of courses offered
- Number of users
- Types of courses
- Types of users

The values for the above metrics are:
Total Number of courses :250

Types of courses:
1. Large courses:25
2. Medium courses:130
3. Small courses:65
4. Extra small courses :30
5. Number of users:100,000

3. SCENARIO DESCRIPTION

A] Reading Contents from Multiple Courses :
1. Login as student
2. Go to courses
3. Go to topic and select
4. Read contents
5. Logout

B] Commenting on Forum :
1. Login as student
2. Go to courses
3. Select forum
5. Read contents or comment on post
6. Logout

C] Taking Quiz :
1. Login as student
2. Go to courses
3. Select quiz
5. Attempt quiz
6. Logout

4. TEST LOAD

NO.	TEST	Number of users	Ramp up(seconds)	Duration (min)	Loop
1.	READ CONTENT	50	50	15	10
		100	100	15	10
2.	POST ON FORUM	50	50	15	10
		100	100	15	10

3.	QUIZ	50	50	15	10
		100	100	15	10
4.	MIXED SCENARIO TEST	50	50	15	20
		100	100	15	20

5. RESULTS

A] READ CONTENT :

(I) 50 Users :

1] Aggregate Table :

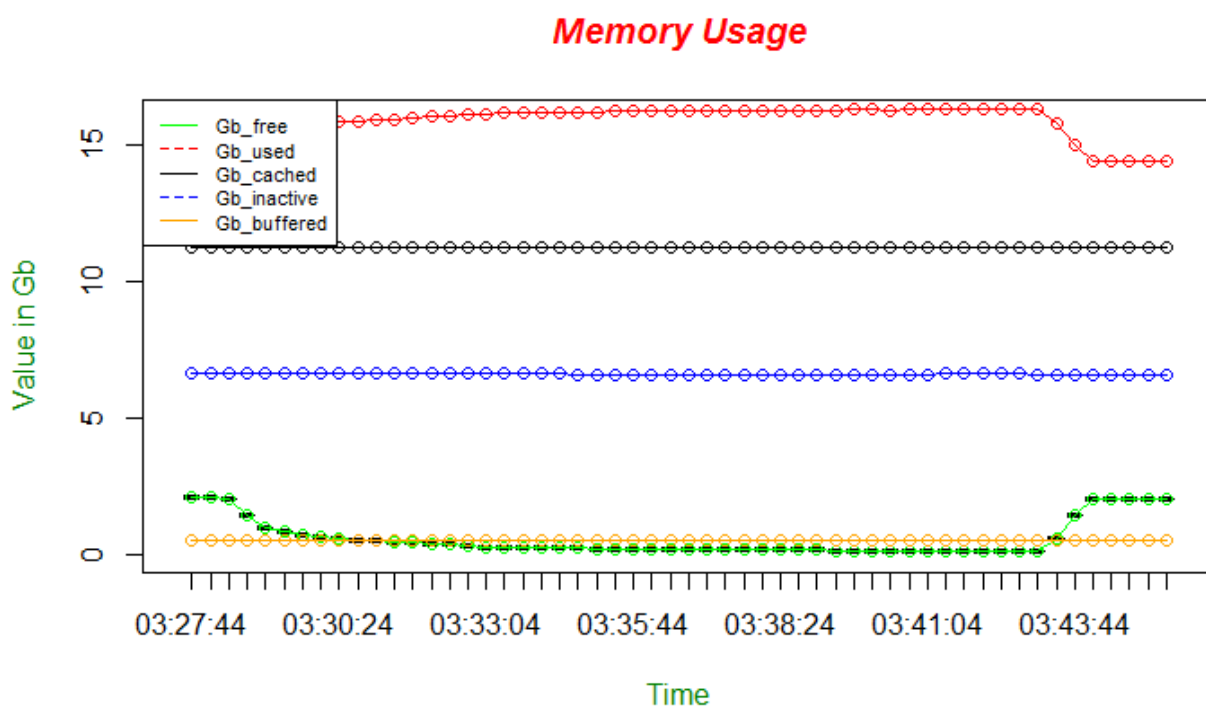| Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Throughput	KB/sec
Moodle Homepage	609	575	484	876	1006	1262	437	1385	0.00%	0.7	71.9
Log in Page	609	27	20	47	54	73	17	99	0.00%	0.7	4.6
login	609	751	649	1118	1246	1436	518	1607	0.00%	0.7	13.8
Course_View	5869	555	383	862	2434	3308	73	5291	0.00%	6.5	131.6
Course_Contents	5854	522	332	1073	1621	4174	69	8023	0.00%	6.5	92.4
Logout	559	620	532	931	1023	1210	464	1612	0.00%	0.7	7.7
TOTAL	14109	531	385	979	1731	3235	17	8023	0.00%	15.6	318.5

2] Aggregate Graph :
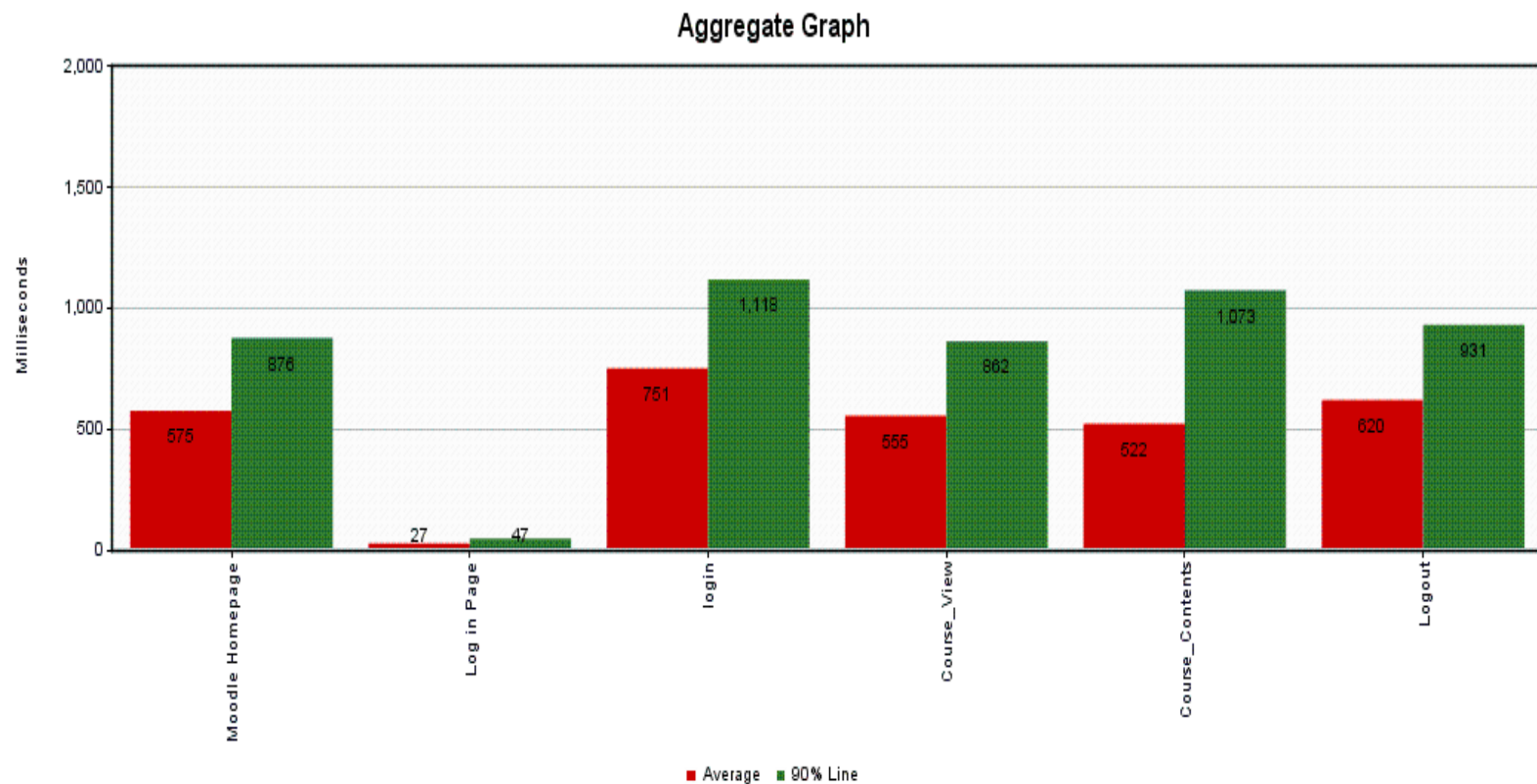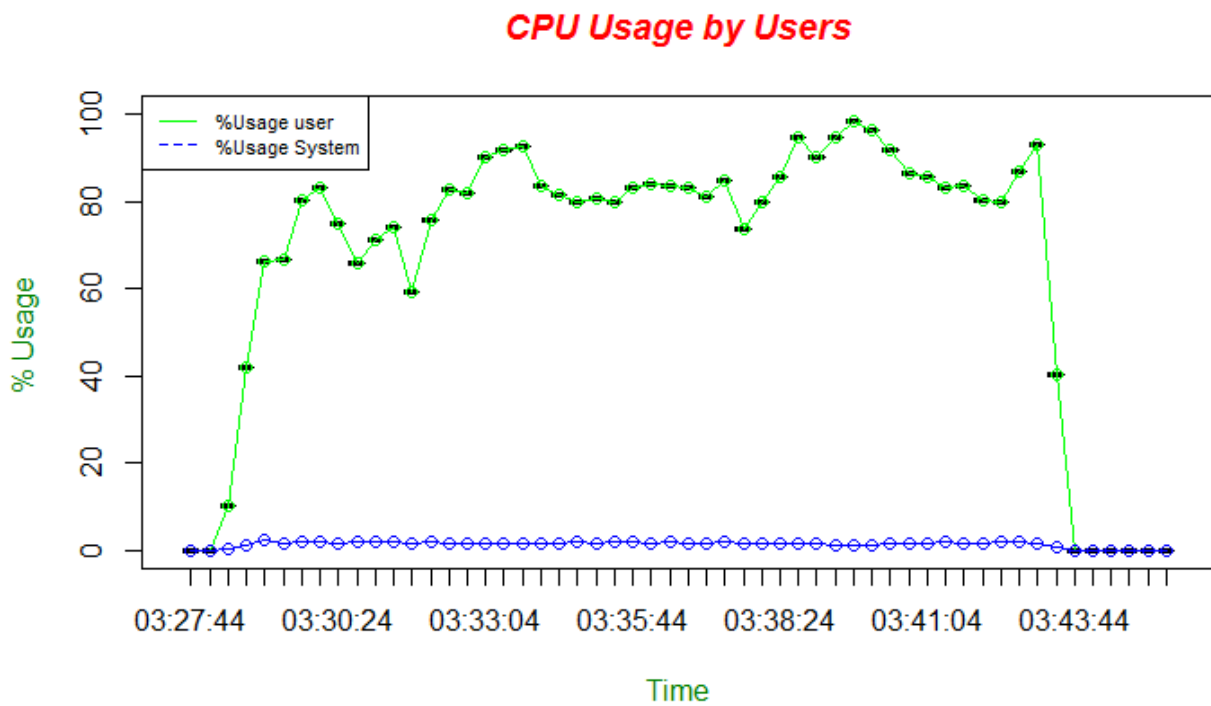
3] CPU usage (server 172.22.22.11) :
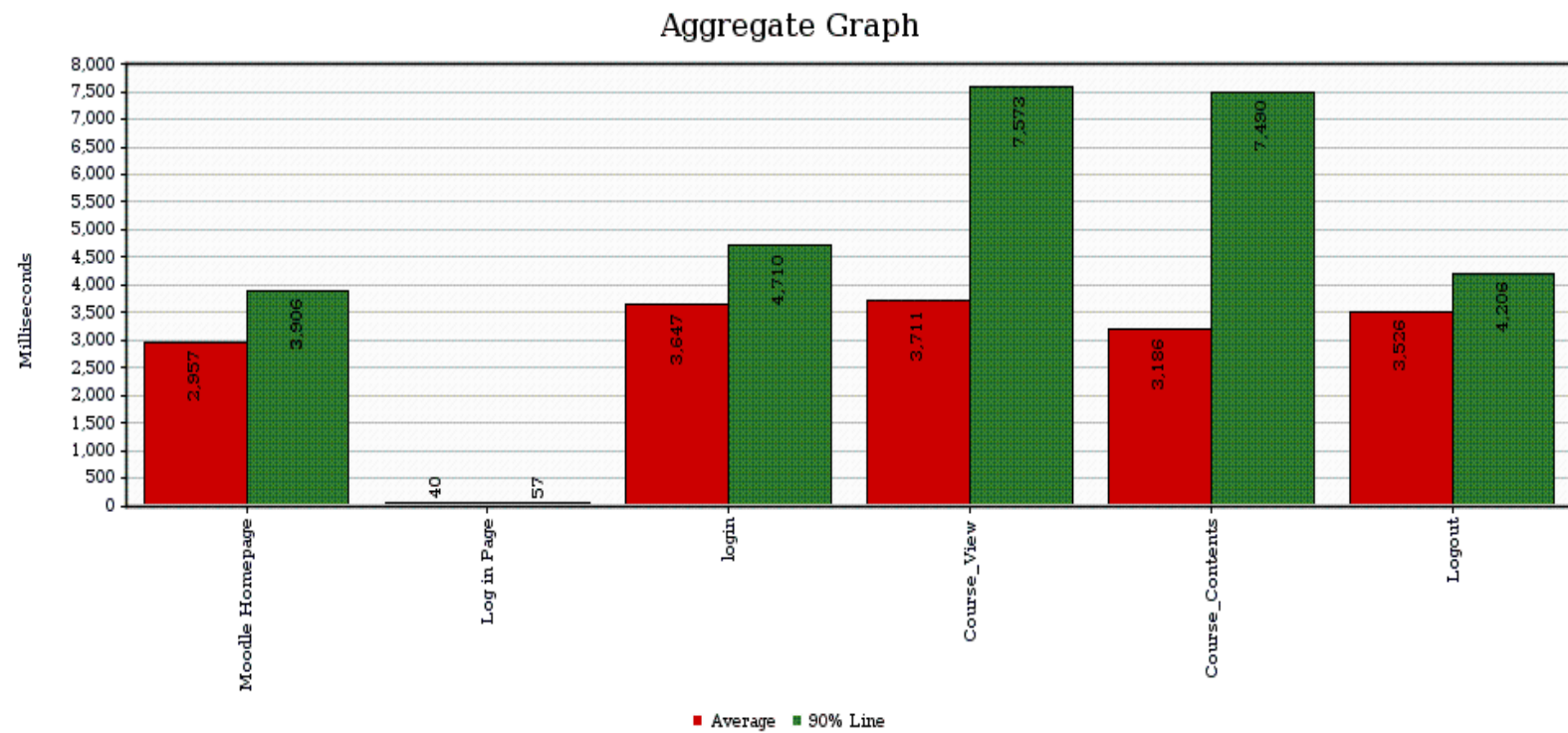

4] Memory usage (server 172.22.22.11):
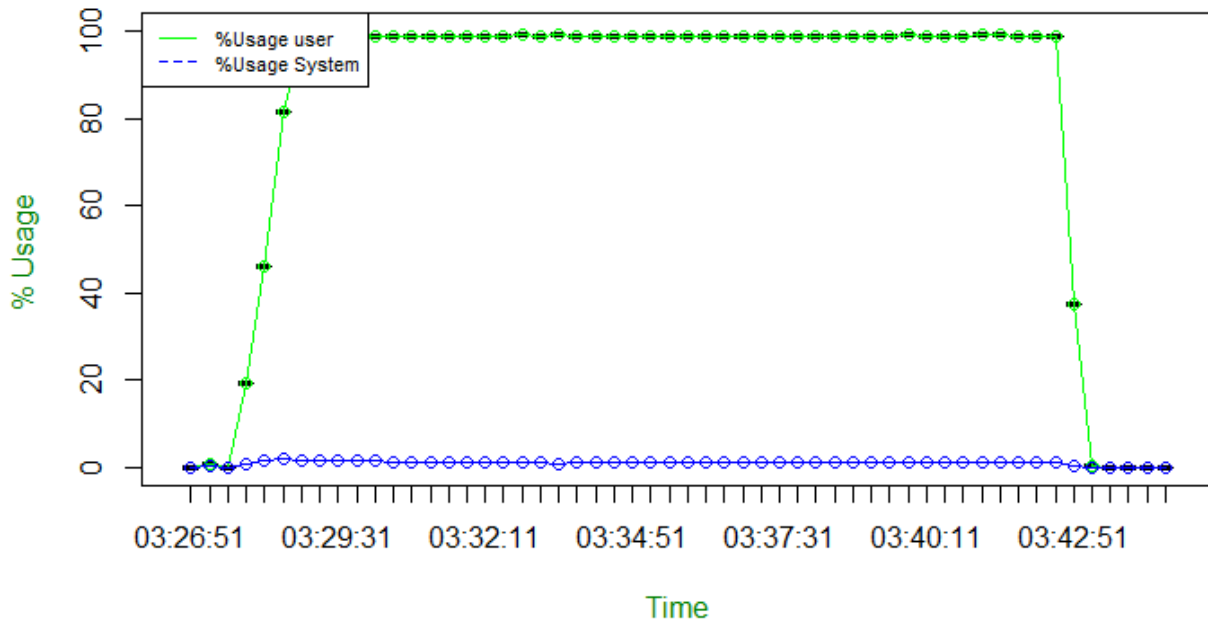
(II) 100 Users :

1] Aggregate Table :

| Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Throughput	KB/sec
Moodle Homepage	657	2957	3293	3906	4030	4314	451	4567	0.00%	0.7	77.4
Log in Page	657	40	40	57	63	90	18	102	0.00%	0.7	5
login	657	3647	4087	4710	4875	5177	520	5610	0.00%	0.7	14.8
Course_View	6056	3711	2641	7573	18960	21500	102	24689	0.00%	6.7	142.3
Course_Contents	6015	3186	1901	7490	10968	24394	71	44495	0.00%	6.7	95.7
Logout	557	3526	3644	4206	4416	4601	630	4827	0.00%	0.7	7.7
TOTAL	14599	3285	2427	6145	14033	21234	18	44495	0.00%	16	339.2

2] Aggregate Graph :

3] CPU usage (server 172.22.22.11) :

CPU Usage by Users

4] Memory usage (server 172.22.22.11) :
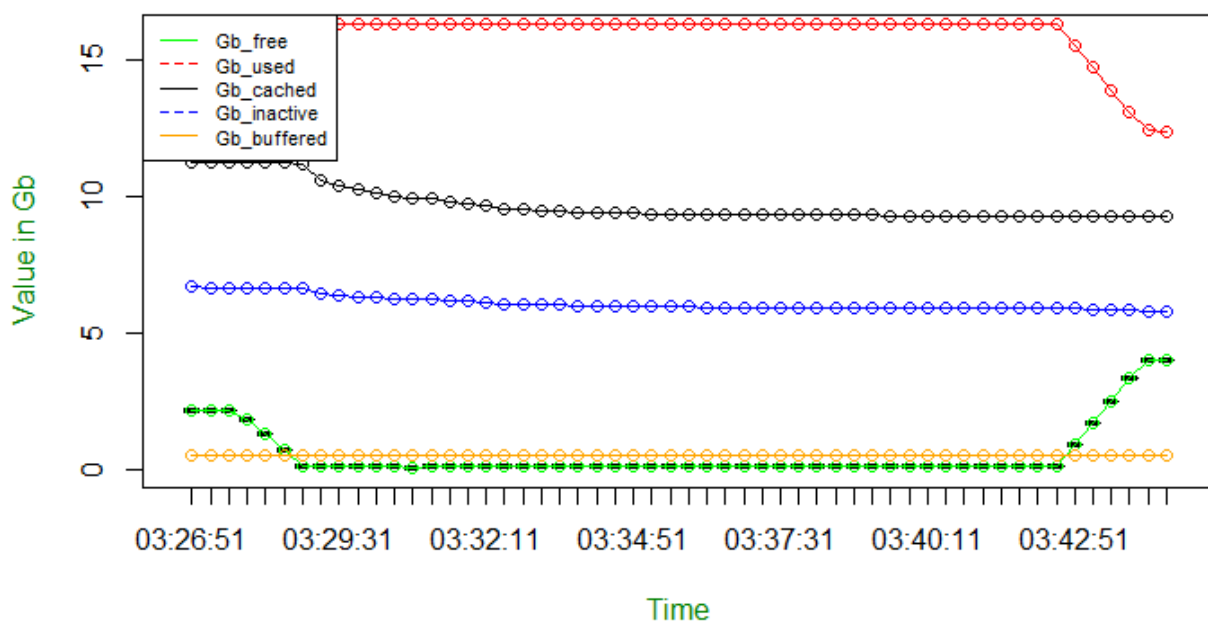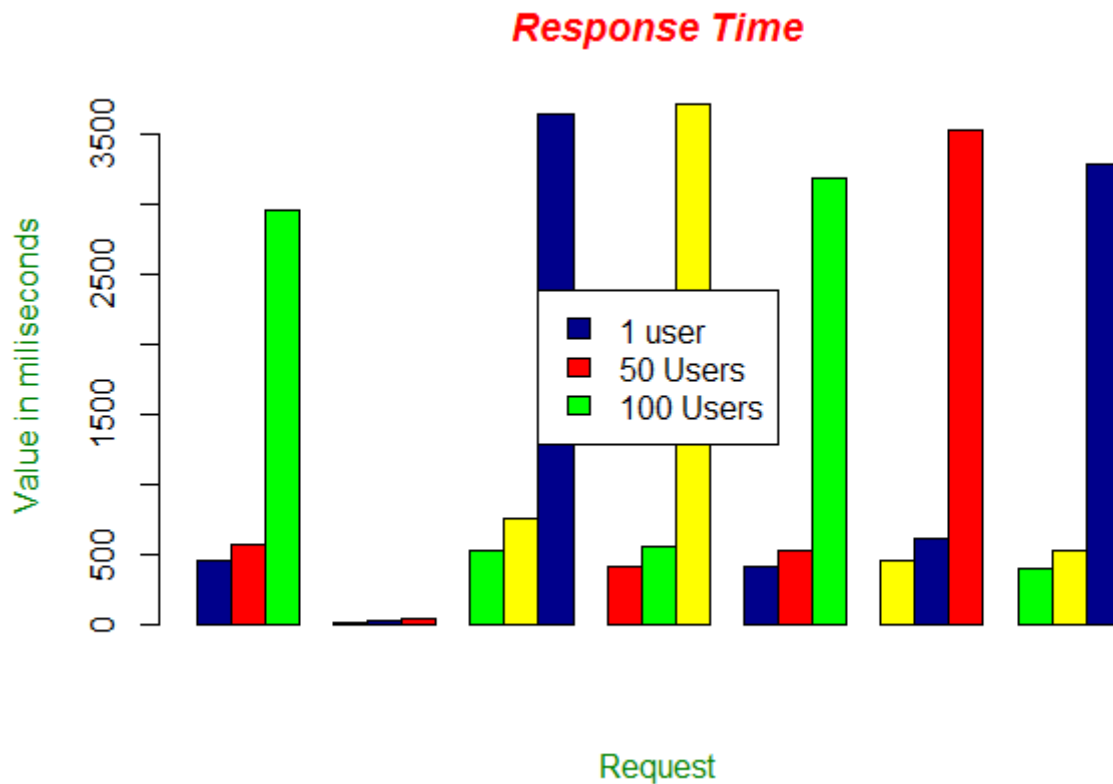
Memory Usage

Obervation :
- Response time for 100 users is 40 % higher than for 50 users
- Max CPU usage at server is 98 % and memory usage is approx. 16 GB which is very high.
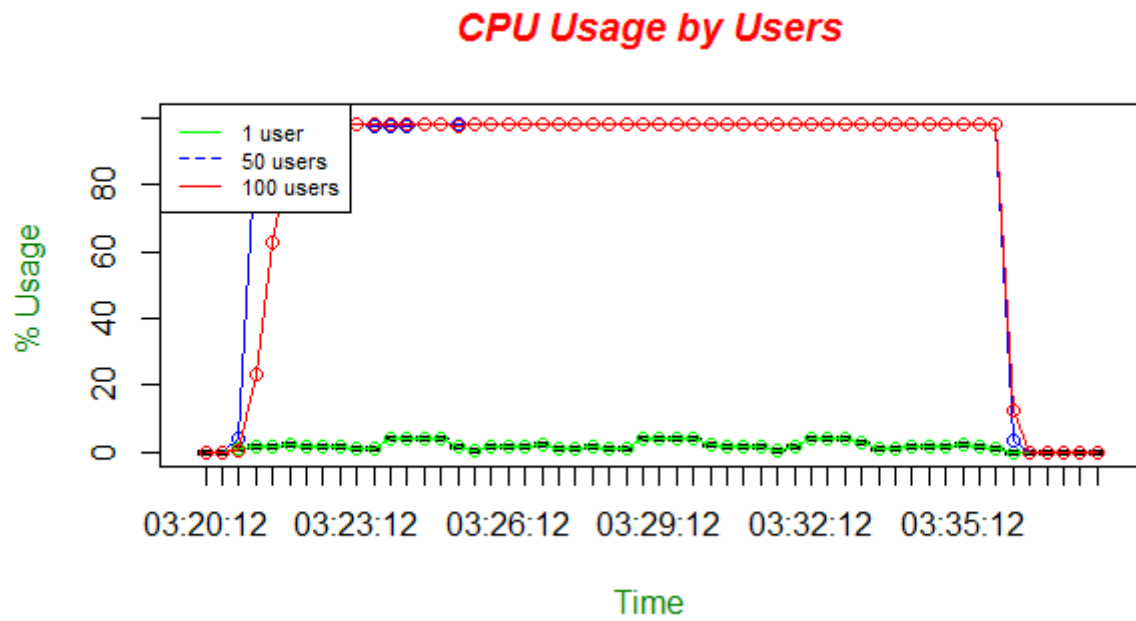
Comparison :

a. Comparison Table of Response Time for 1, 50 and 100 users

| Label	Average _1	Average _50	Average_100
Moodle Homepage	463	575	2957
Log in Page	18	27	40
login	528	751	3647
Course_View	407	555	3711
Course_Contents	416	522	3186
Logout	464	620	3526
TOTAL	404	531	3285

b. Comparion Graph of Response Time for 1, 50 and 100 users

c. CPU usage comparison for 1, 50 and 100 users

CPU Usage by Users
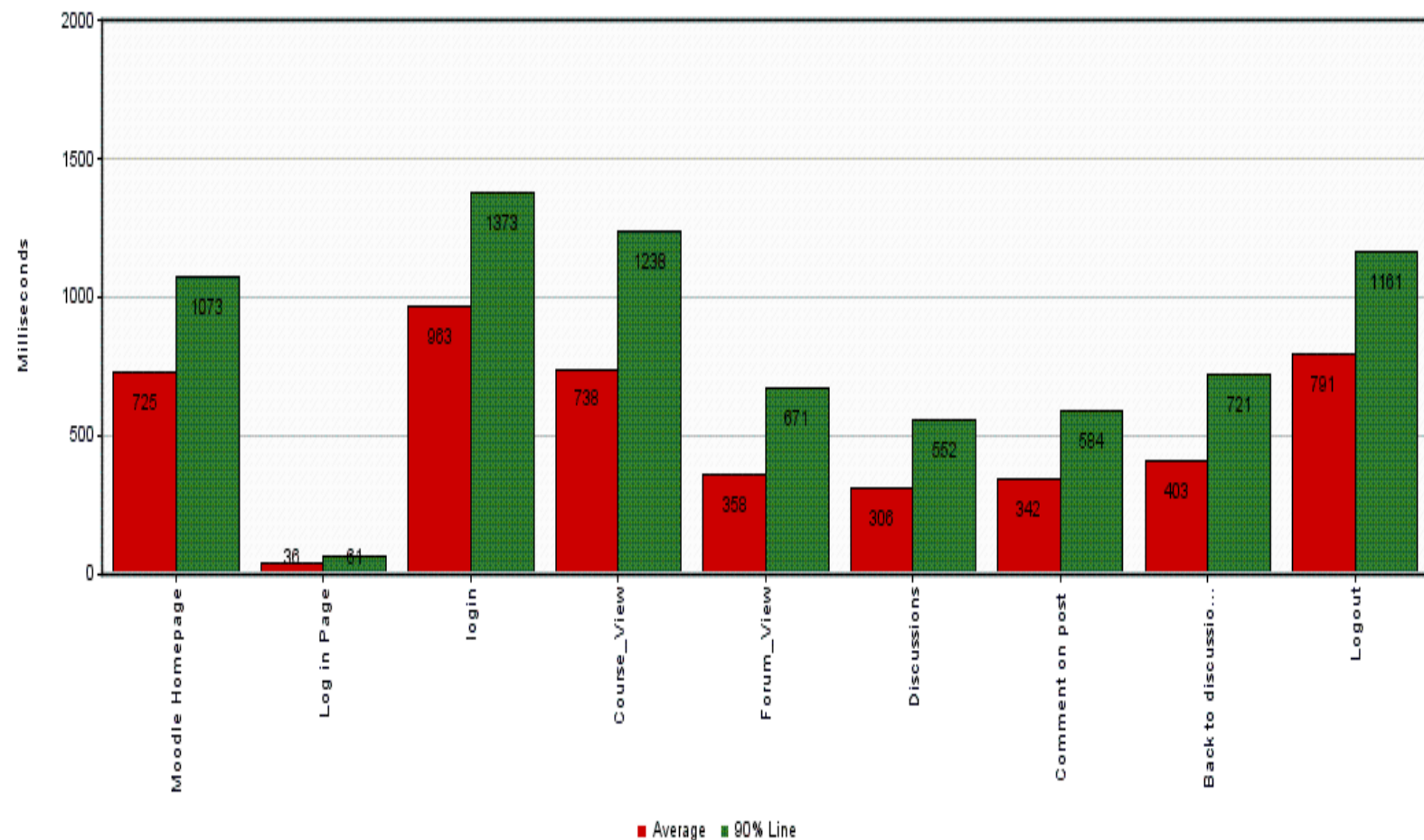

d. Memory usage comparison for 1, 50 and 100 users

Memory Usage
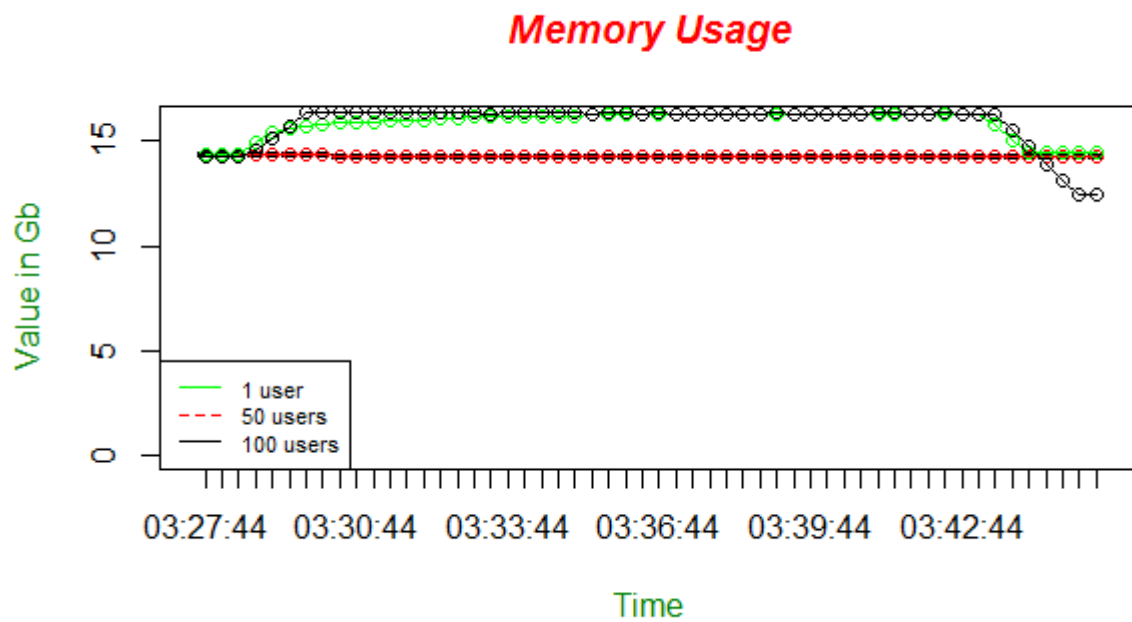
B] POST ON FORUM :

(I) 50 Users :

1] Aggregate Table :

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Throughput	KB/sec
Moodle Homepage	673	725	657	1073	1202	1478	443	3638	0.00%	0.7	79.3
Log in Page	673	36	31	61	69	88	17	860	0.00%	0.7	5.1
login	673	963	922	1373	1507	1827	524	4362	0.00%	0.7	15.3
Course_View	670	738	458	1238	3213	4318	112	5683	0.00%	0.7	15.8
Forum_View	6506	358	273	671	904	1452	71	3864	0.00%	7.3	125.3
Discussions	6501	306	211	552	973	1618	71	4160	0.00%	7.3	95.4
Comment on post	6481	342	273	584	837	1411	104	3478	0.00%	7.3	172.3
Back to discussion page	6467	403	306	721	1119	1757	106	4321	0.00%	7.3	104.3
Logout	629	791	737	1161	1298	1600	470	3487	0.00%	0.7	8.6
TOTAL	29273	386	280	790	1069	1656	17	5683	0.00%	32.5	615.5

2] Aggregate Graph :

3] CPU usage (server 172.22.22.11) :

CPU Usage by Users

4] Memory usage (server 172.22.22.11) :

Memory Usage

(II) 100 Users :

<u>1] Aggregate Table :</u>

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Throughput	KB/sec
Moodle Homepage	669	3469	3857	4517	4808	5213	447	6166	0.00%	0.7	78.6
Log in Page	664	58	56	85	101	127	18	167	0.00%	0.7	5
login	664	5068	5411	6740	6943	7537	530	7645	0.00%	0.7	15.1
Course_View	656	4614	3195	16412	22376	24775	112	30256	0.00%	0.7	16.4
Forum_View	6188	1800	1730	2957	5821	6606	72	8291	0.00%	6.9	120.8
Discussions	6174	1531	1146	2690	6510	7505	69	9098	0.00%	6.9	91.5
Comment on post	6148	1654	1394	2344	5476	6272	108	7705	0.00%	6.9	164.2
Back to discussion page	6133	2032	1617	2660	7576	8645	110	10414	0.00%	6.9	99.5
Logout	574	4091	4208	4832	5007	5534	626	6162	0.00%	0.7	7.8
TOTAL	27870	1949	1426	4886	6226	8050	18	30256	0.00%	30.8	593.7

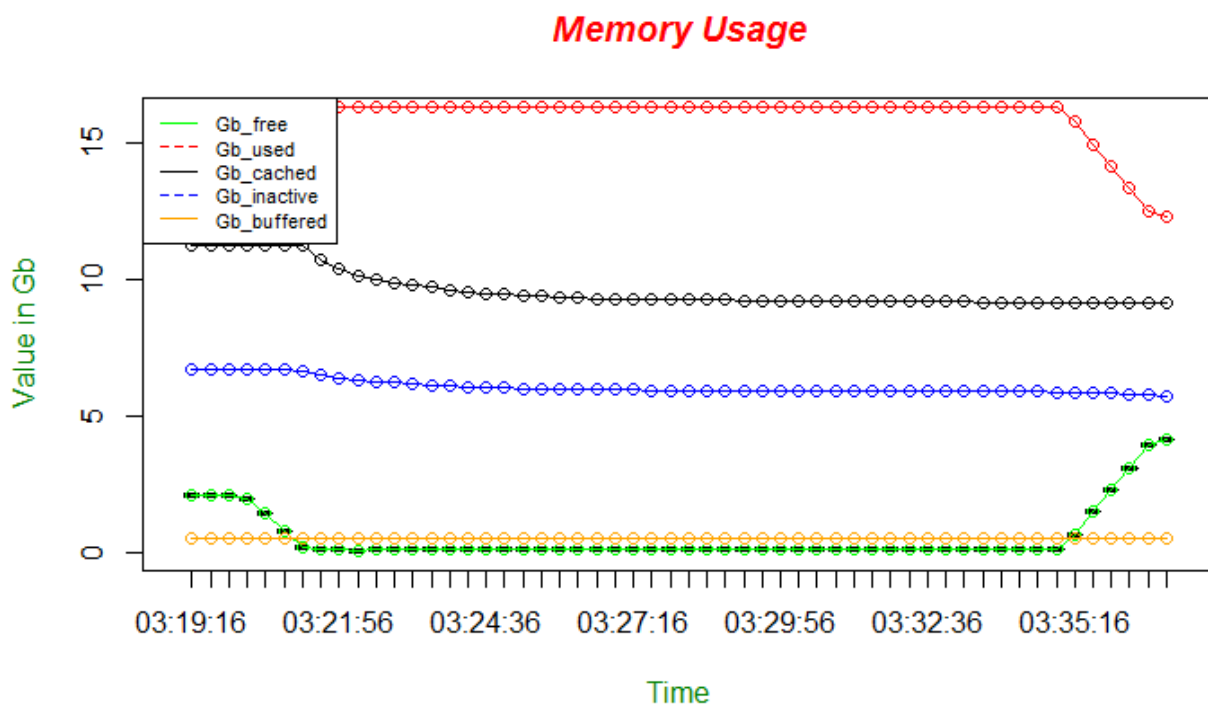<u>2] Aggregate Graph :</u>
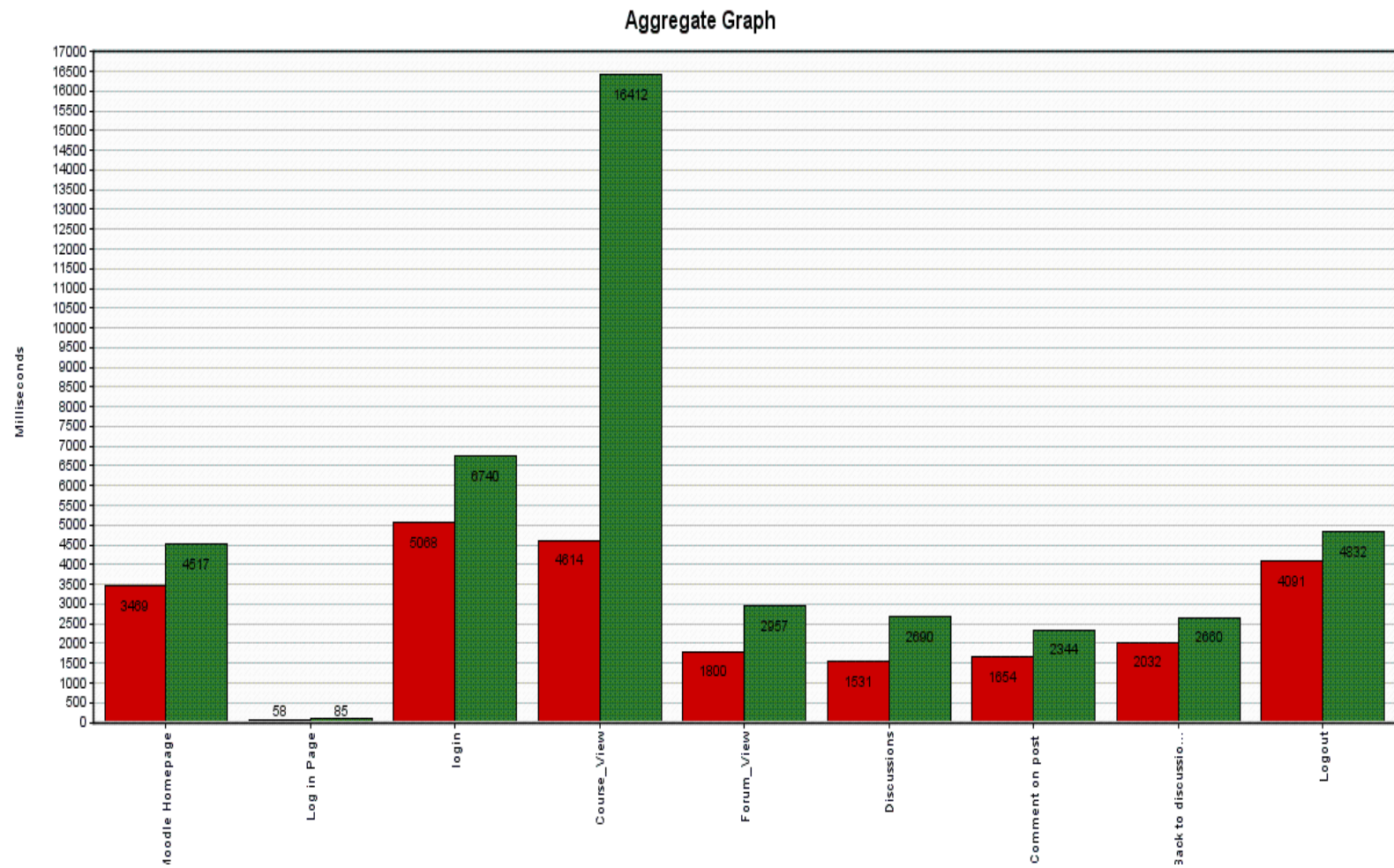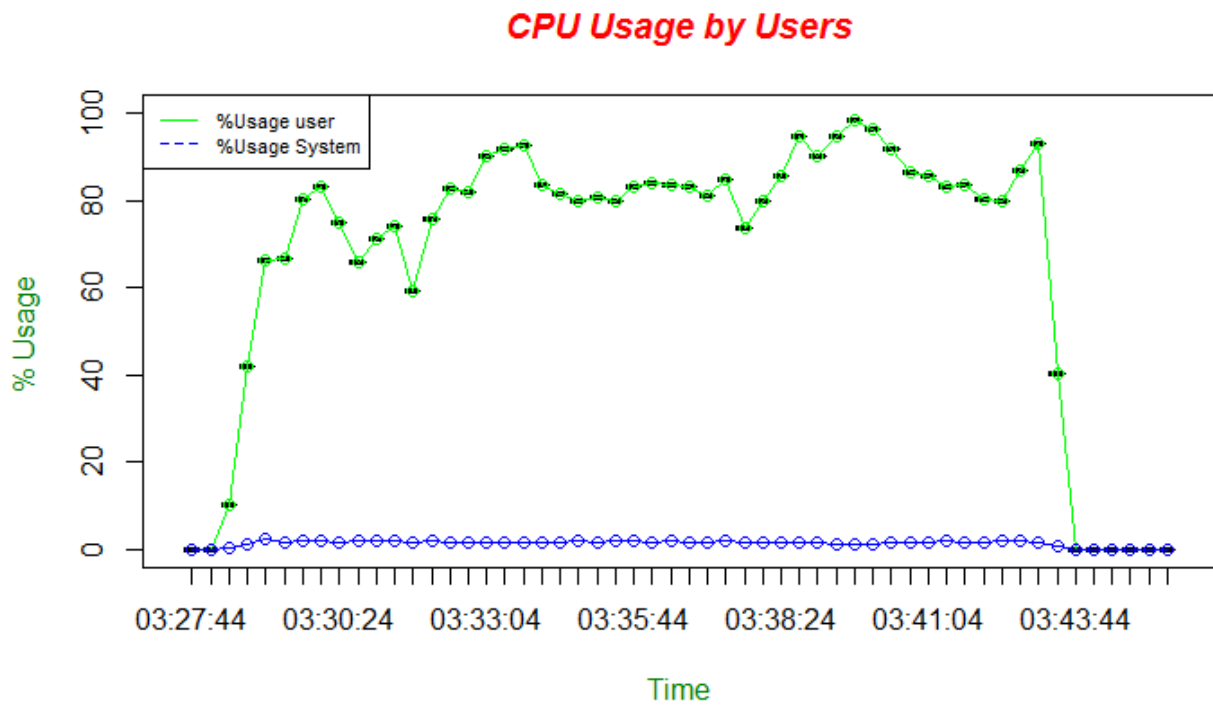
Aggregate Graph

3] CPU usage(server 172.22.22.11) :

4] Memory usage (server 172.22.22.11) :

Obervation :

- Response time for 100 users is 40 % higher than for 50 users
- Max CPU usage at server is 98 %
- Memory usage on server is maximum 15 GB

Comparison :

a. Comparison Table of Response Time for 1, 50 and 100 users

| Label	Average_1	Average_50	Average_100
Moodle Homepage	441	725	3469
Log in Page	18	36	58
login	526	963	5068
Course_View	594	738	4614
Forum_View	220	358	1800
Discussions	199	306	1531
Comment on post	207	342	1654
Back to discussion page	247	403	2032
Logout	465	791	4091
TOTAL	239	386	1949

b. Comparion Graph of Response Time for 1, 50 and 100 users
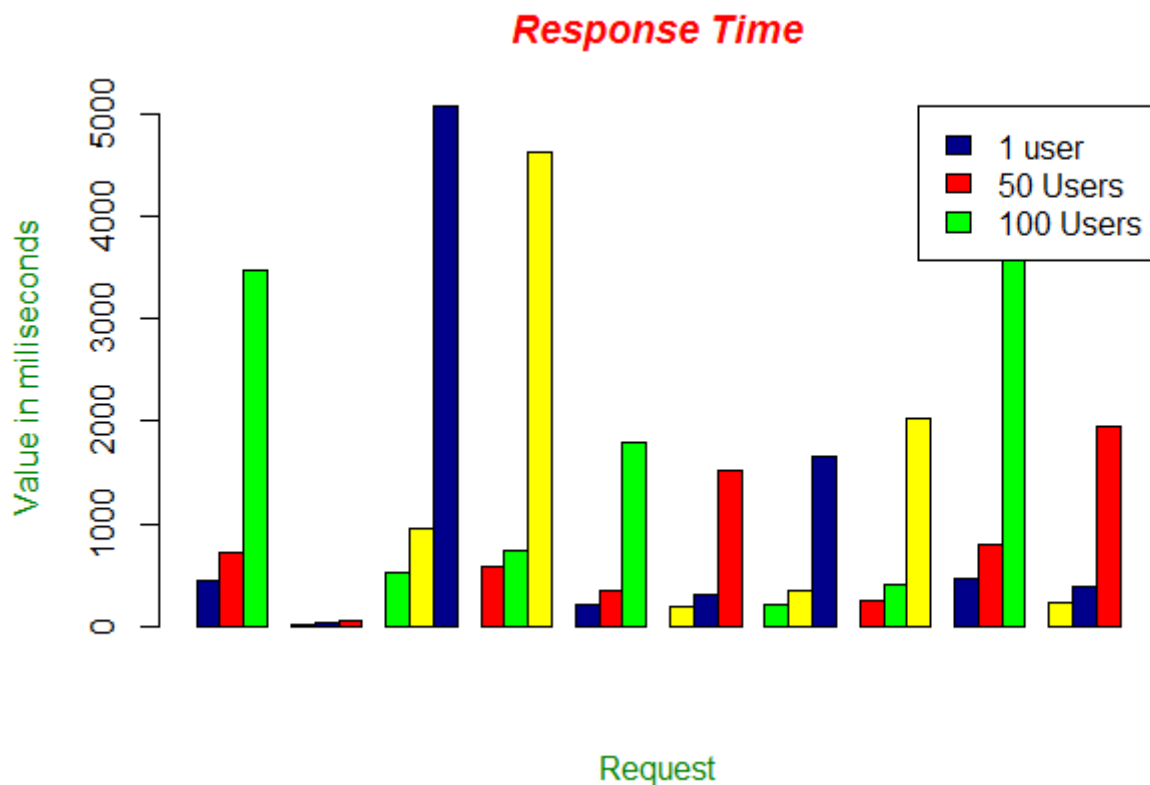
c. CPU usage comparison for 1, 50 and 100 users
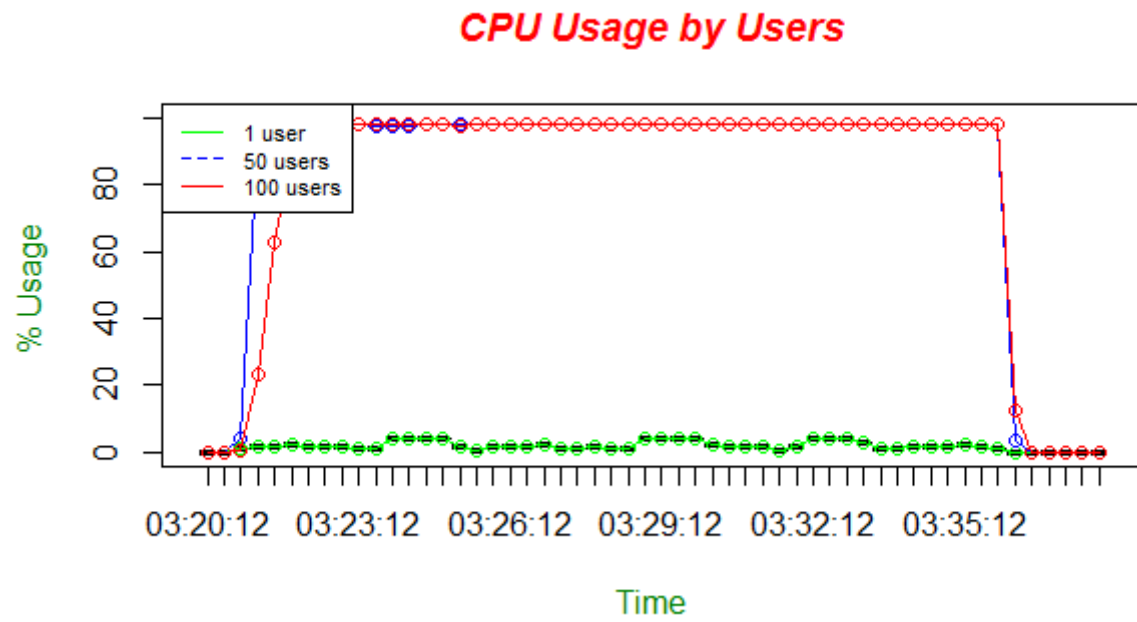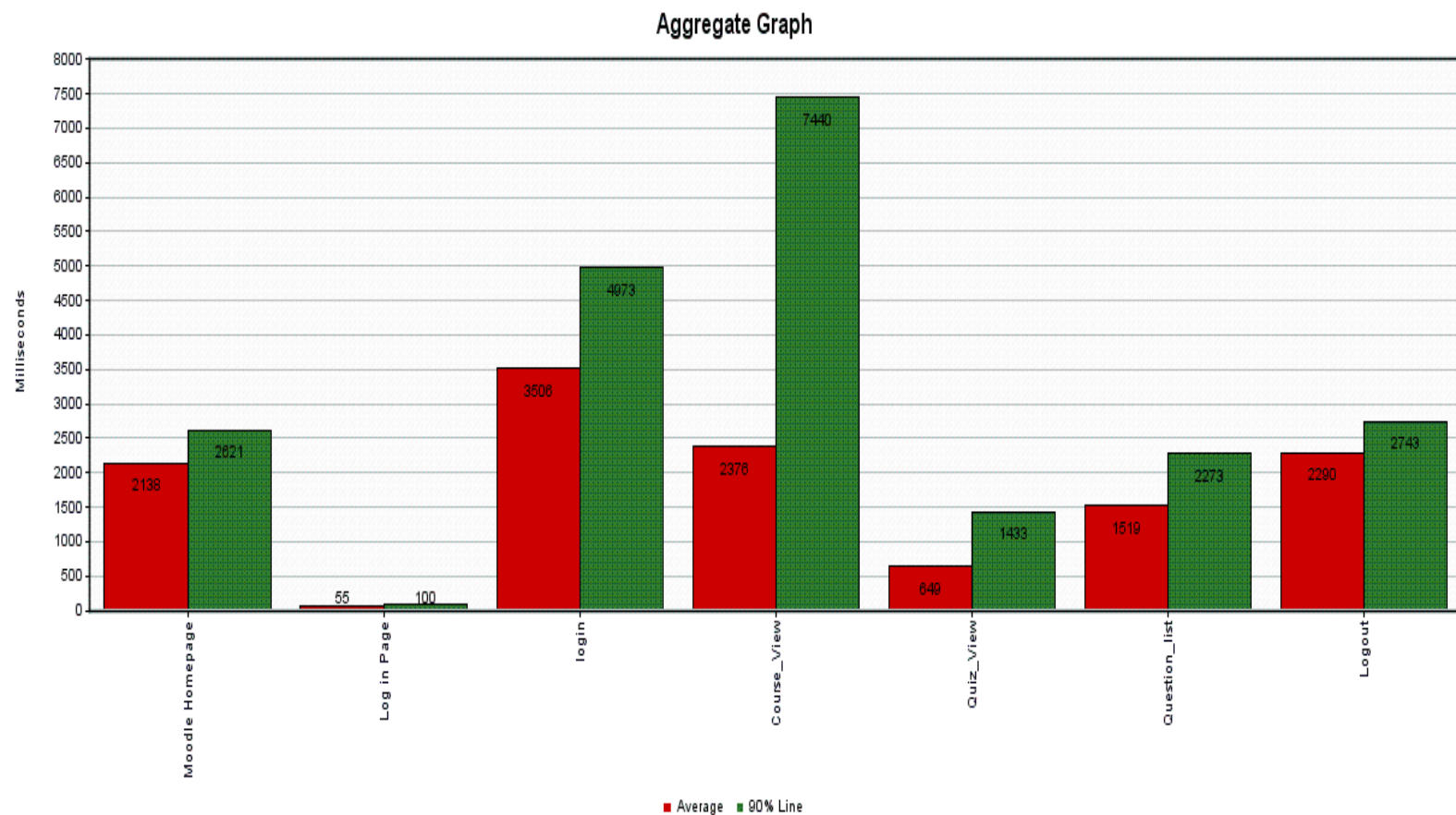

d.Memory usage comparison for 1, 50 and 100 users
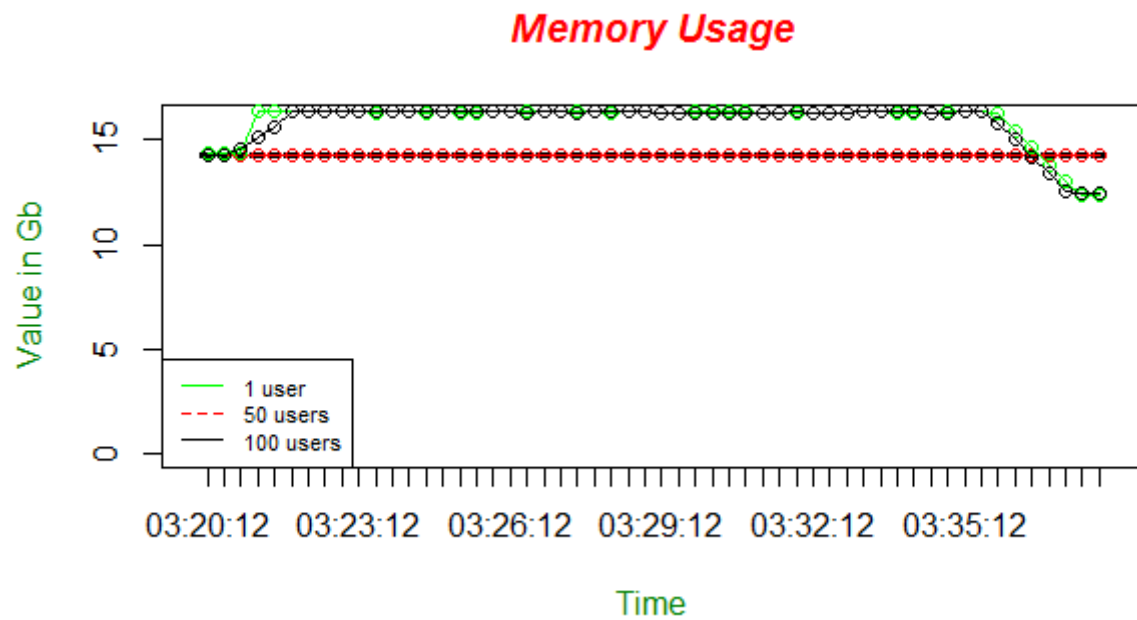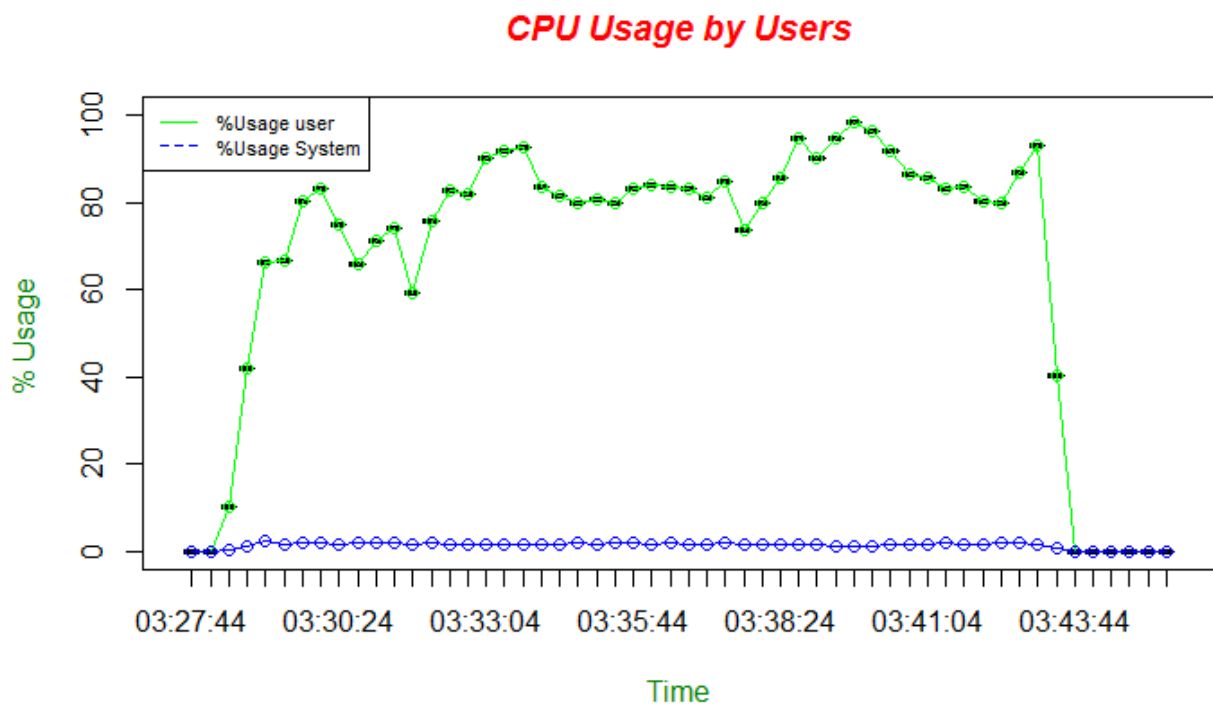
C] QUIZ :

(I) 50 Users :

1] Aggregate Report :

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Throughput	KB/sec
Moodle Homepage	2802	2138	2230	2621	2724	3103	437	3772	0.00%	3.1	329.3
Log in Page	2797	55	45	100	119	156	18	245	0.00%	3.1	21.1
login	2796	3506	3139	4973	5381	6014	526	7333	0.00%	3.1	63.4
Course_View	2778	2376	1676	7440	11475	13410	107	18059	0.00%	3.1	65.7
Quiz_View	2770	649	526	1433	2192	2645	64	3348	0.00%	3.1	35.3
Question_list	2768	1519	1120	2273	5568	7963	103	9520	21.13%	3.1	85.6
Logout	2762	2290	2369	2743	2875	3244	463	3868	0.00%	3.1	35.4
TOTAL	19473	1791	1731	3159	4628	9800	18	18059	3.00%	21.6	633.5

2] Aggregate Graph :
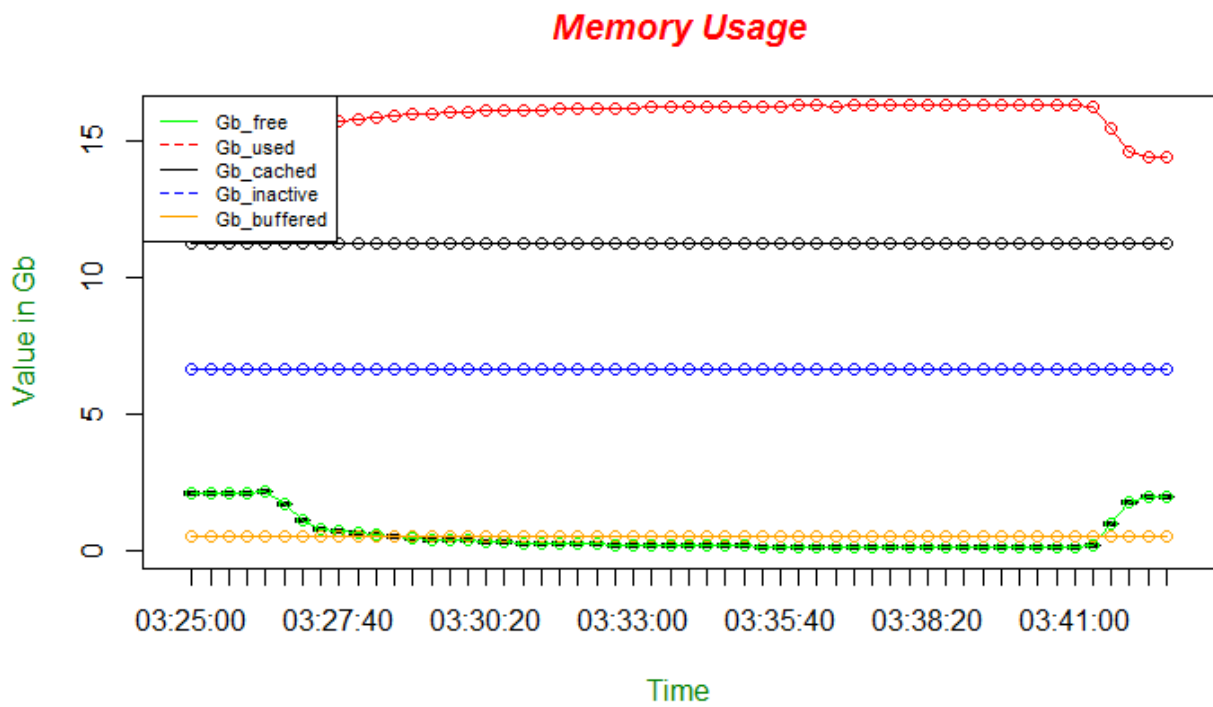
3] CPU usage (server 172.22.22.11) :

CPU Usage by Users

4] Memory usage (server 172.22.22.11) :

Memory Usage

(II) 100 Users :

1] Aggregate Table :

| Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Through
Moodle Homepage	669	3469	3857	4517	4808	5213	447	6166	0.00%	0.7
Log in Page	664	58	56	85	101	127	18	167	0.00%	0.7
login	664	5068	5411	6740	6943	7537	530	7645	0.00%	0.7
Course_View	656	4614	3195	16412	22376	24775	112	30256	0.00%	0.7
Forum_View	6188	1800	1730	2957	5821	6606	72	8291	0.00%	6.9
Discussions	6174	1531	1146	2690	6510	7505	69	9098	0.00%	6.9
Comment on post	6148	1654	1394	2344	5476	6272	108	7705	0.00%	6.9
Back to discussion page	6133	2032	1617	2660	7576	8645	110	10414	0.00%	6.9
Logout	574	4091	4208	4832	5007	5534	626	6162	0.00%	0.7
TOTAL	27870	1949	1426	4886	6226	8050	18	30256	0.00%	30.8

2] Aggregate Graph :
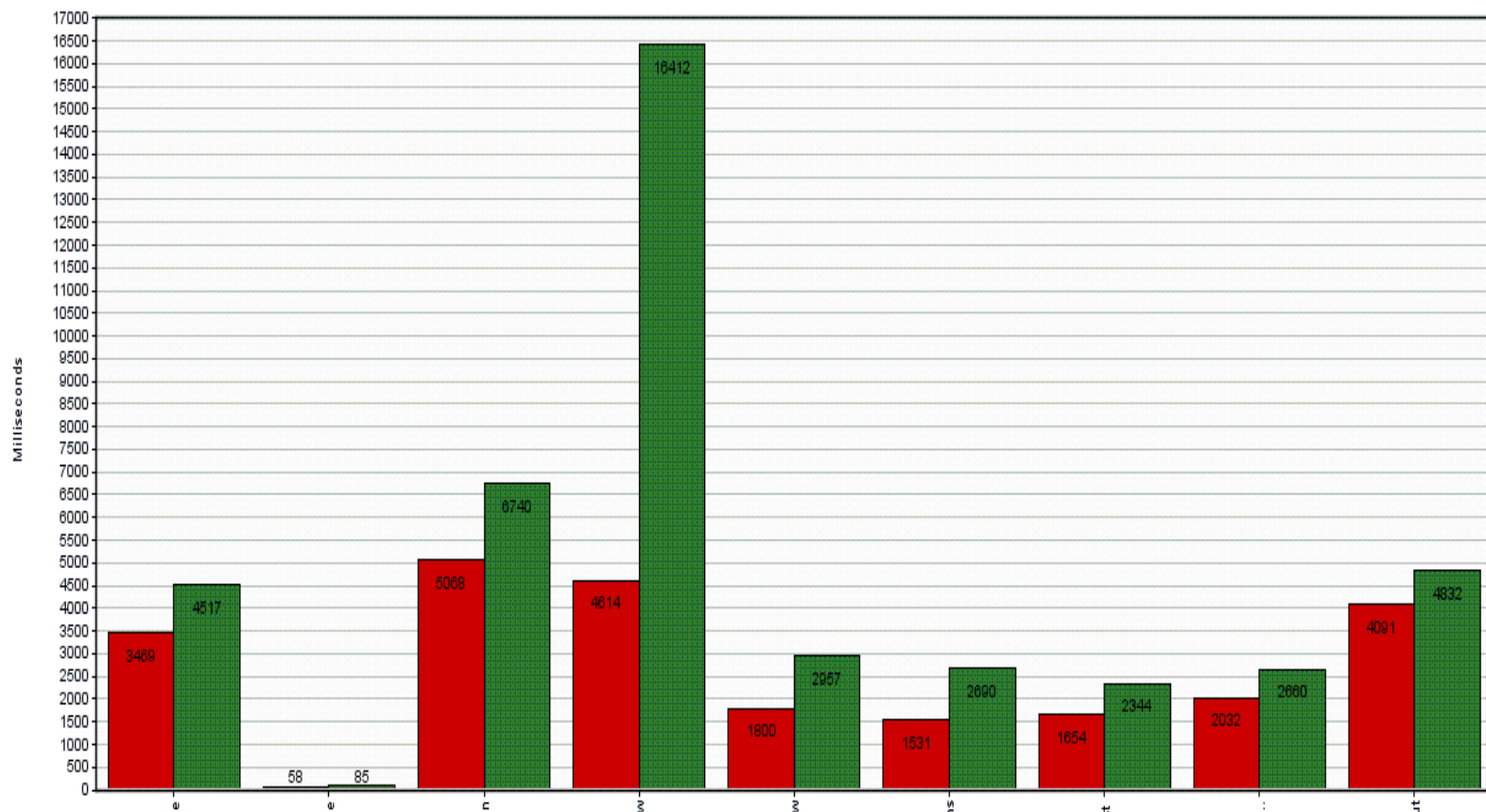
3] CPU usage (server 172.22.22.11):
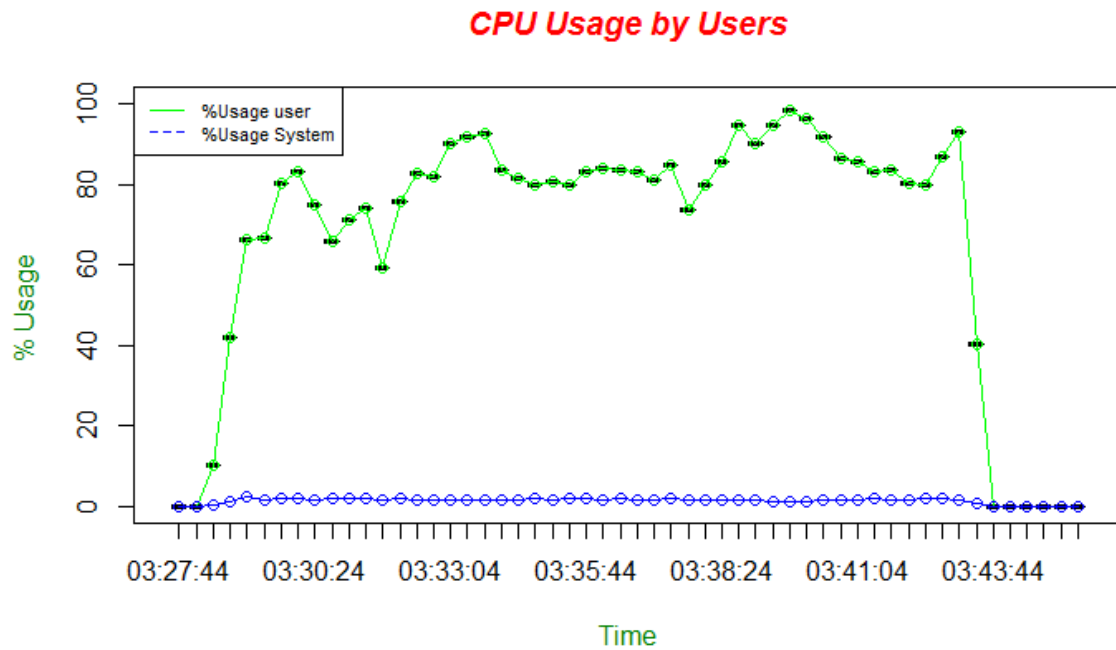
## 4] Memory usage (server 172.22.22.11) :
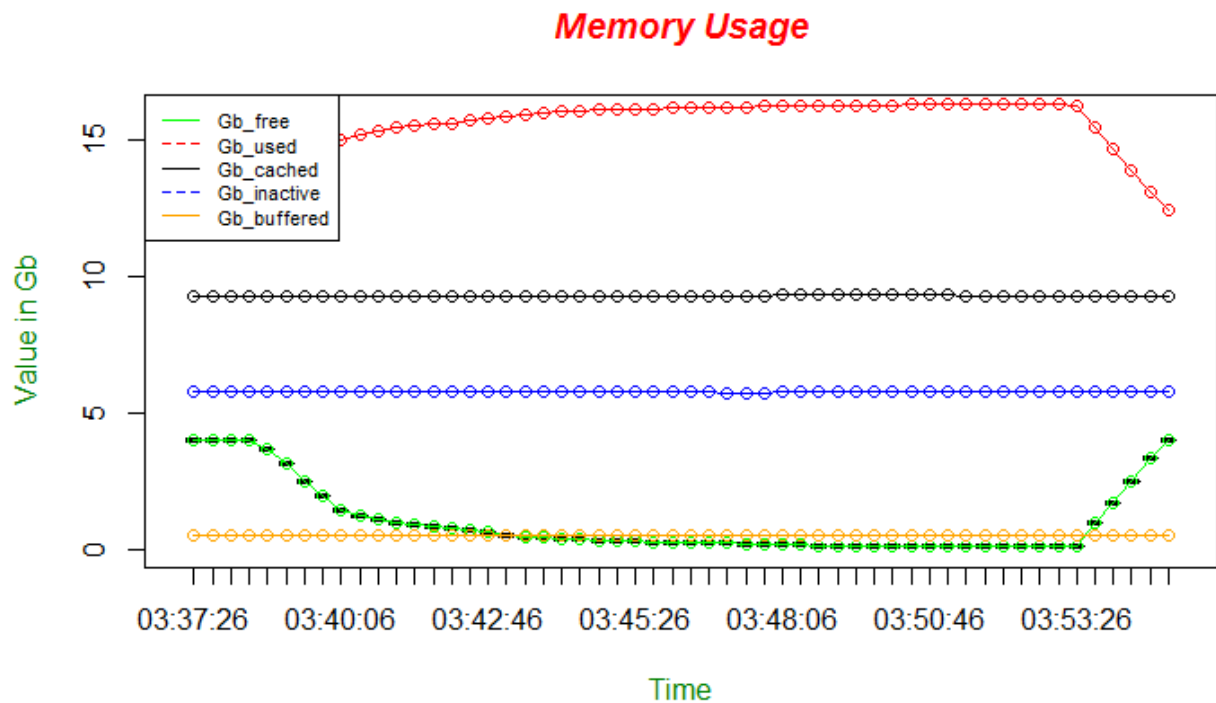
Obervation :
- Response time for login request is higher than for other requests
- Max CPU usage at server is 98 %

Comparison :

a. Comparison Table of Response Time for 1, 50 and 100 users

Label	Average_1	Average_50	Average_100
Moodle Homepage	437	2138	5025
Log in Page	25	55	60
login	545	3506	6544
Course_View	417	2376	6130
Quiz_View	117	649	1532
Question_list	256	1519	3466
Logout	464	2290	5343
TOTAL	323	1791	4015

b. Comparion Graph of Response Time for 1, 50 and 100 users
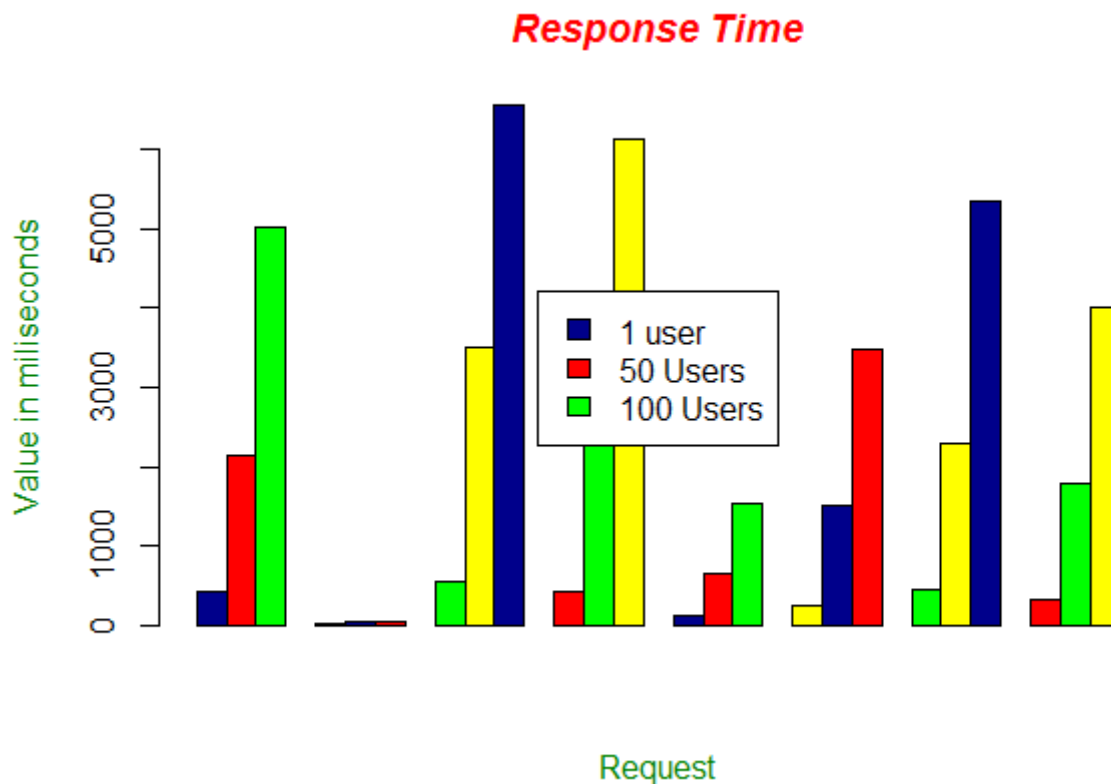
c. CPU usage comparison for 1, 50 and 100 users

CPU Usage by Users
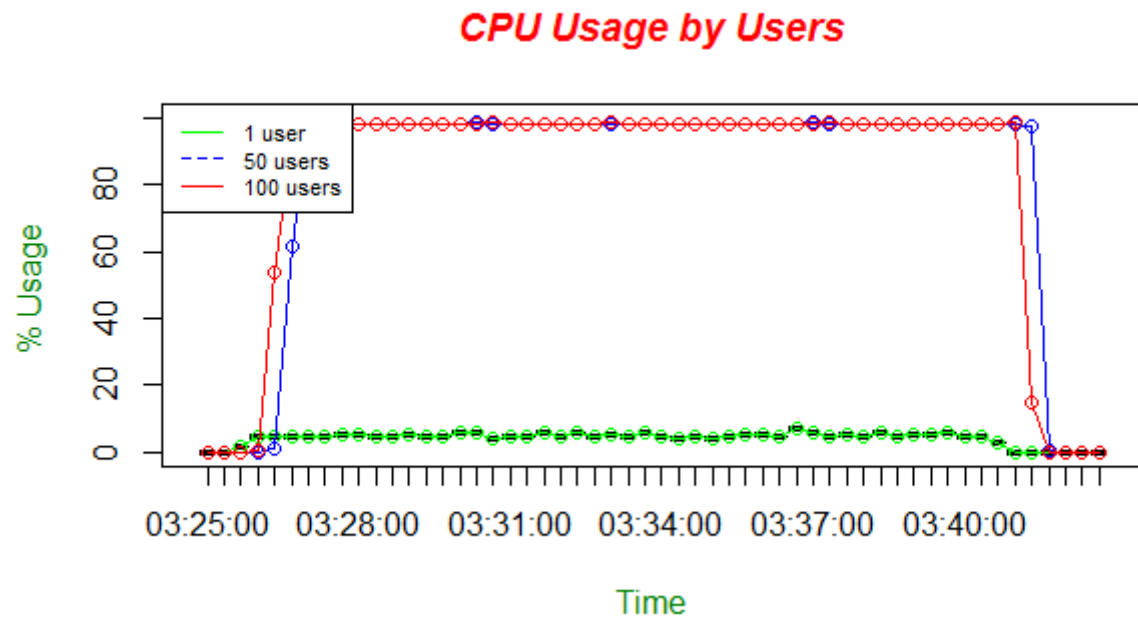
d.Memory usage comparison for 1, 50 and 100 users

Memory Usage
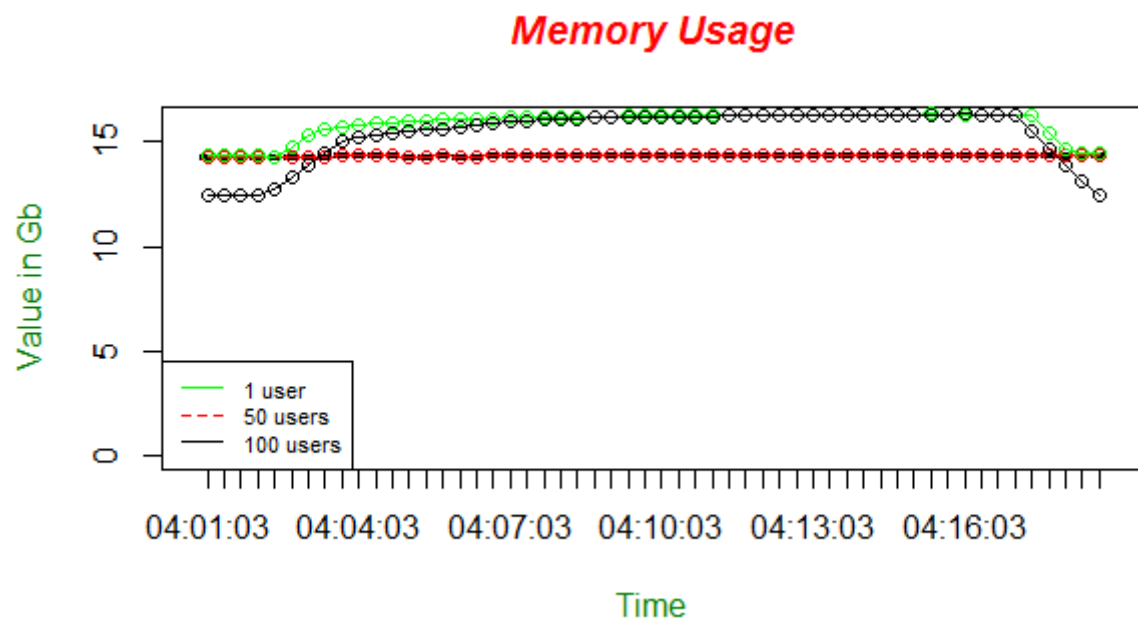
D] Mixed Scenario Test :

(I) 50 Users :

<u>1] Aggregate Report :</u>

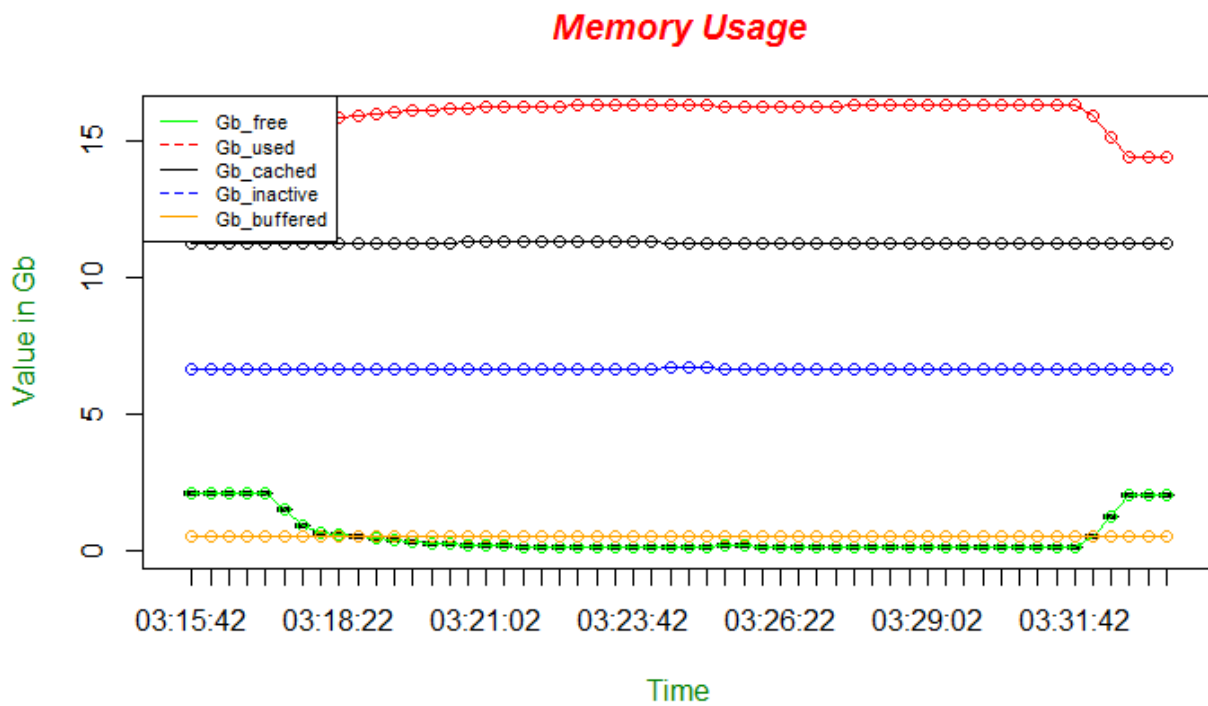| Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Throughput	KB/sec
Moodle Homepage	1762	1161	1175	1567	1675	1861	439	1993	0.00%	1.9	205.4
Log in Page	1762	48	45	81	93	111	17	141	0.00%	1.9	13.2
login	1762	1515	1513	1965	2121	3195	523	4768	0.00%	1.9	39.7
Course_View	4004	1146	855	1499	5179	6926	107	8721	0.00%	4.4	89.4
Forum_View	1134	577	528	912	1599	2164	72	2539	0.00%	1.3	22.2
Discussions	1134	474	357	635	1765	2489	70	3106	0.00%	1.3	16.5
Course_Contents	2508	1040	676	2109	3191	6919	95	14166	0.00%	2.8	39.2
Comment on post	1128	539	439	772	1562	2100	109	2692	0.00%	1.3	30.1
Back to discussion page	1125	634	508	859	2159	2720	109	3017	0.00%	1.3	18.1
Quiz_View	1371	357	287	584	1114	1441	62	1952	0.00%	1.5	17.4
Question_list	1370	797	577	1220	2765	4205	58	4987	20.66%	1.5	41.9
Logout	1717	1242	1255	1647	1745	1972	465	2327	0.00%	1.9	22
TOTAL	20777	877	656	1622	1975	5482	17	14166	1.36%	22.8	550.1

<u>2] Aggregate Graph</u> **:**
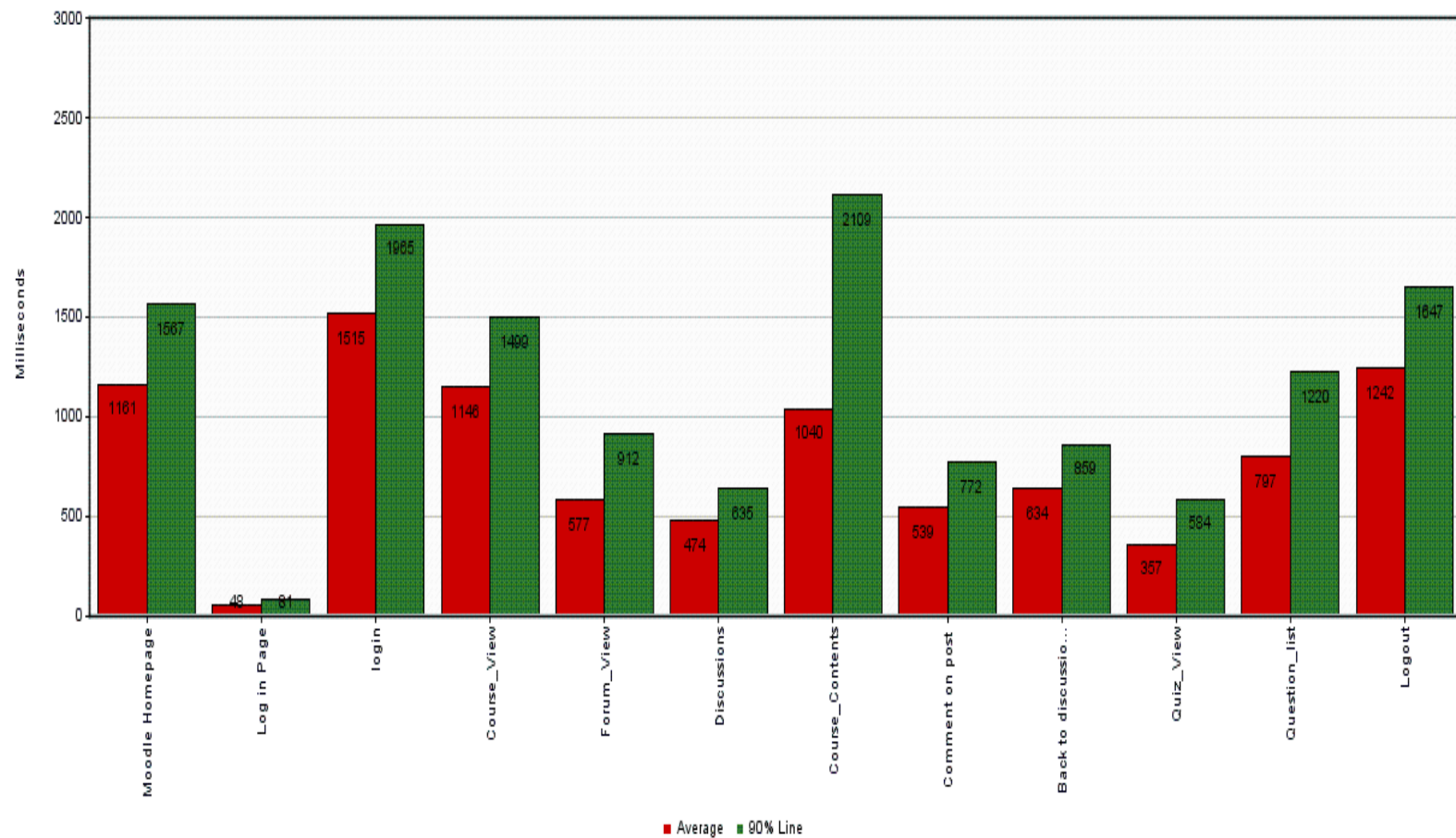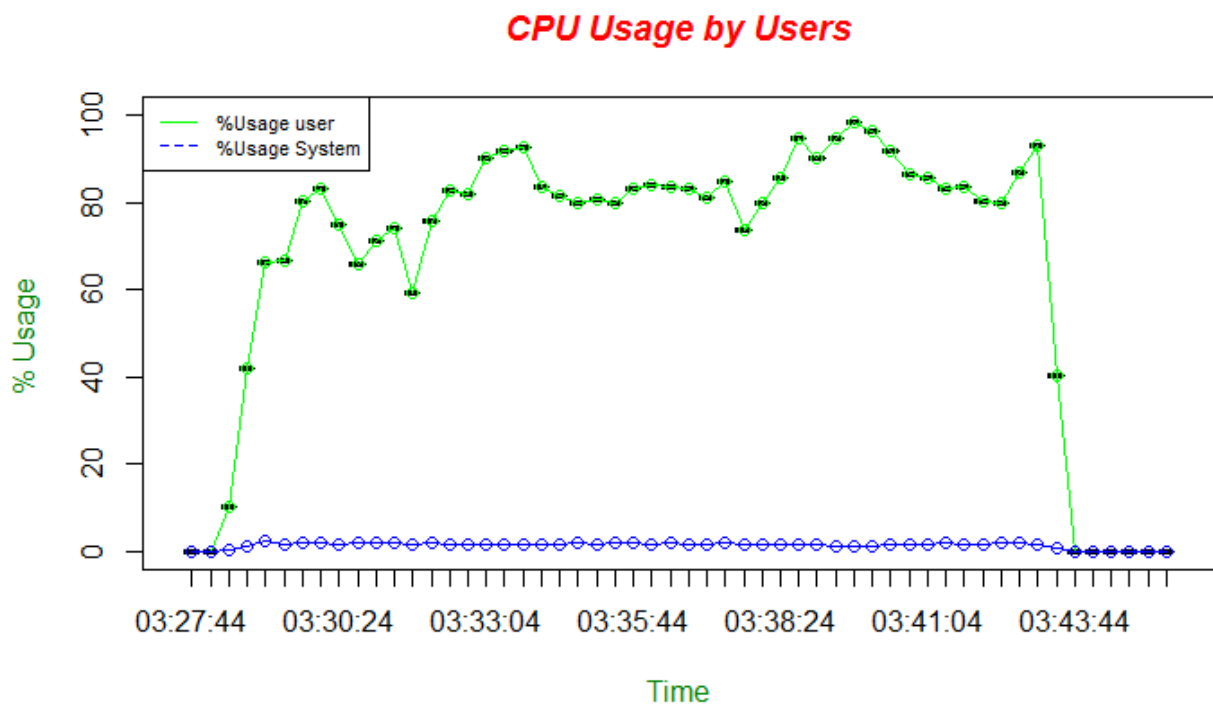
3] CPU usage (server 172.22.22.11) :

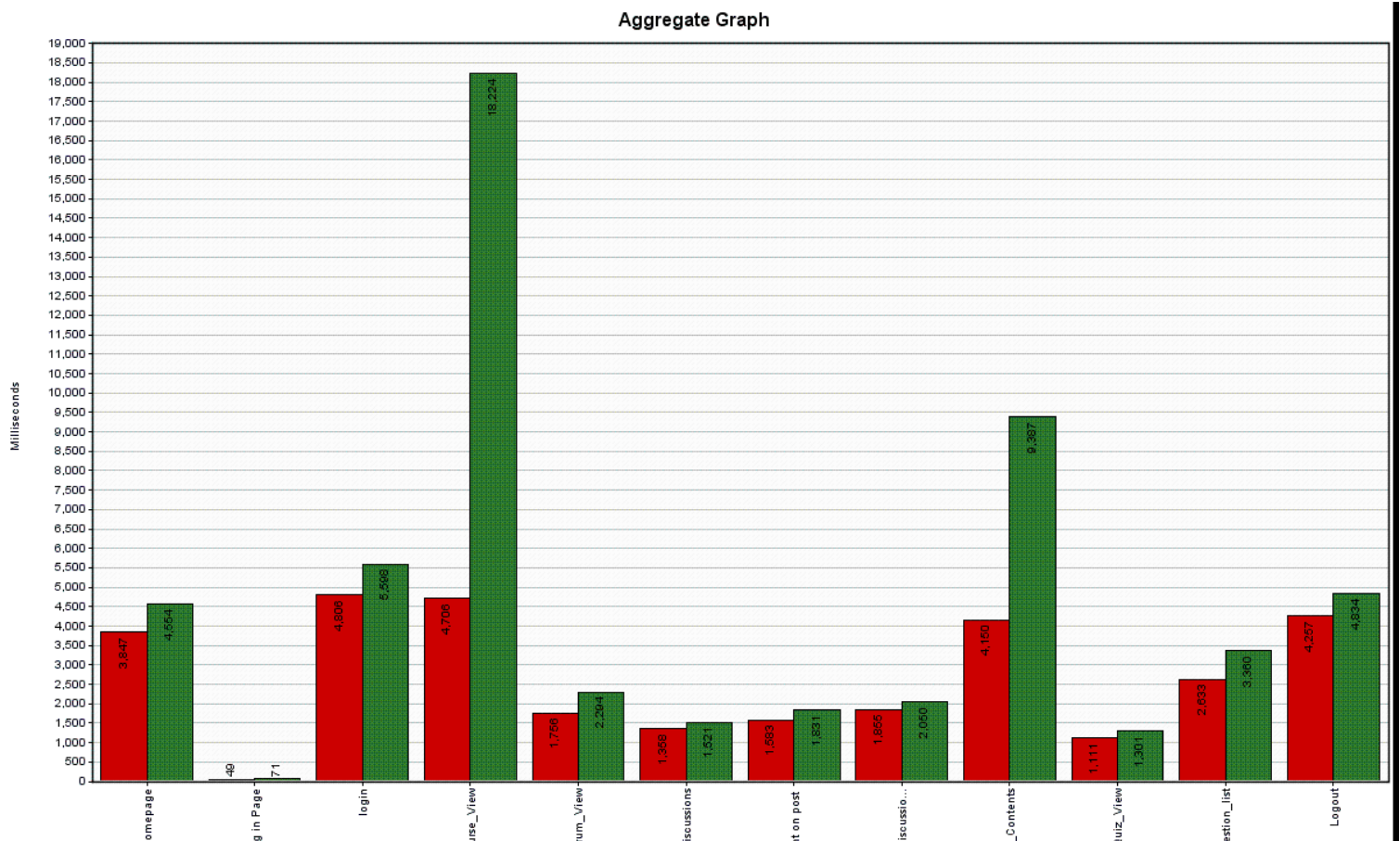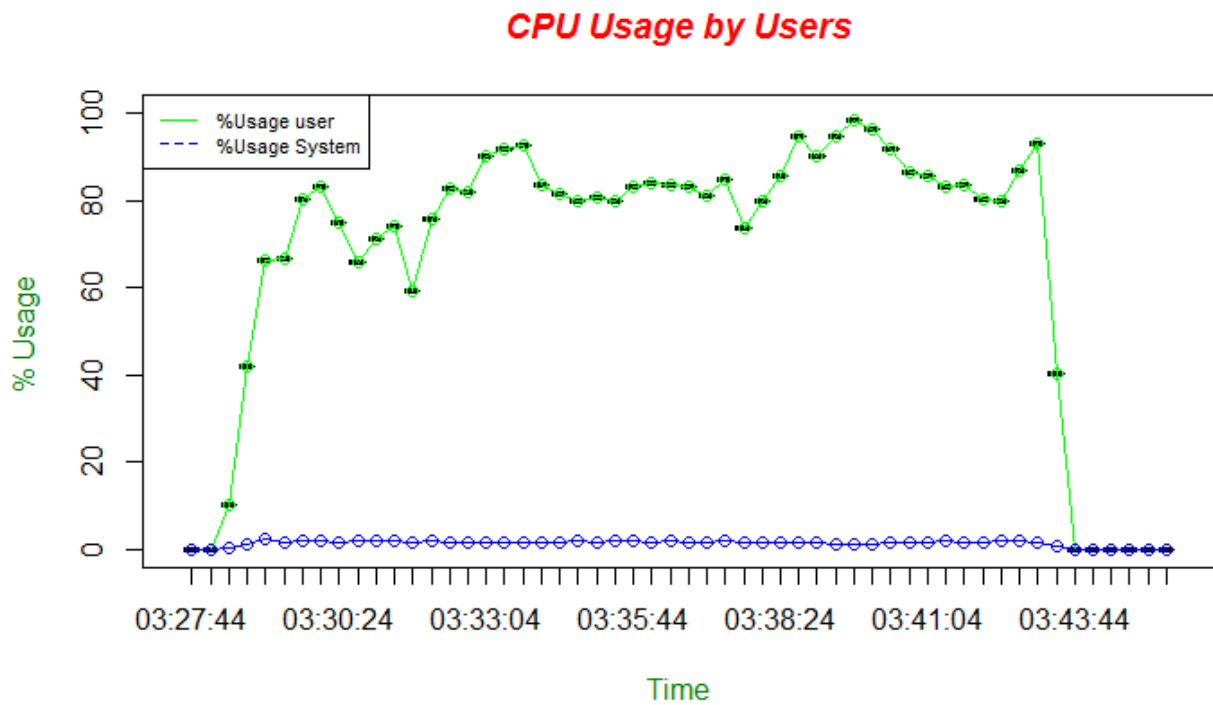4] Memory usage (server 172.22.22.11) :

(II) 100 Users

1] Aggregate Table :

| Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Through
Moodle Homepage	1493	3847	4156	4554	4667	4889	439	6343	0.00%	1.6
Log in Page	1488	49	46	71	82	126	17	166	0.00%	1.6
login	1488	4806	5123	5598	5853	7294	524	8819	0.00%	1.6
Course_View	3772	4706	3453	18224	23695	25198	107	32282	0.00%	4.2
Forum_View	1287	1756	1917	2294	5493	6494	69	6937	0.00%	1.4
Discussions	1286	1358	1267	1521	5659	7140	68	8013	0.00%	1.4
Comment on post	1282	1583	1540	1831	4822	6117	104	7625	0.00%	1.4
Back to discussion page	1275	1855	1751	2050	6016	8476	103	9762	0.00%	1.4
Course_Contents	2561	4150	2403	9387	14892	39174	133	47457	0.00%	2.8
Quiz_View	1047	1111	1003	1301	4155	4566	65	4766	0.00%	1.2
Question_list	1046	2633	2198	3360	11495	15112	91	15804	19.31%	1.2
Logout	1396	4257	4459	4834	4948	5242	466	7117	0.00%	1.6
TOTAL	19421	3069	1942	5123	6980	24085	17	47457	1.04%	21.3

2] Aggregate Graph :

3] CPU usage (server 172.22.22.11) :

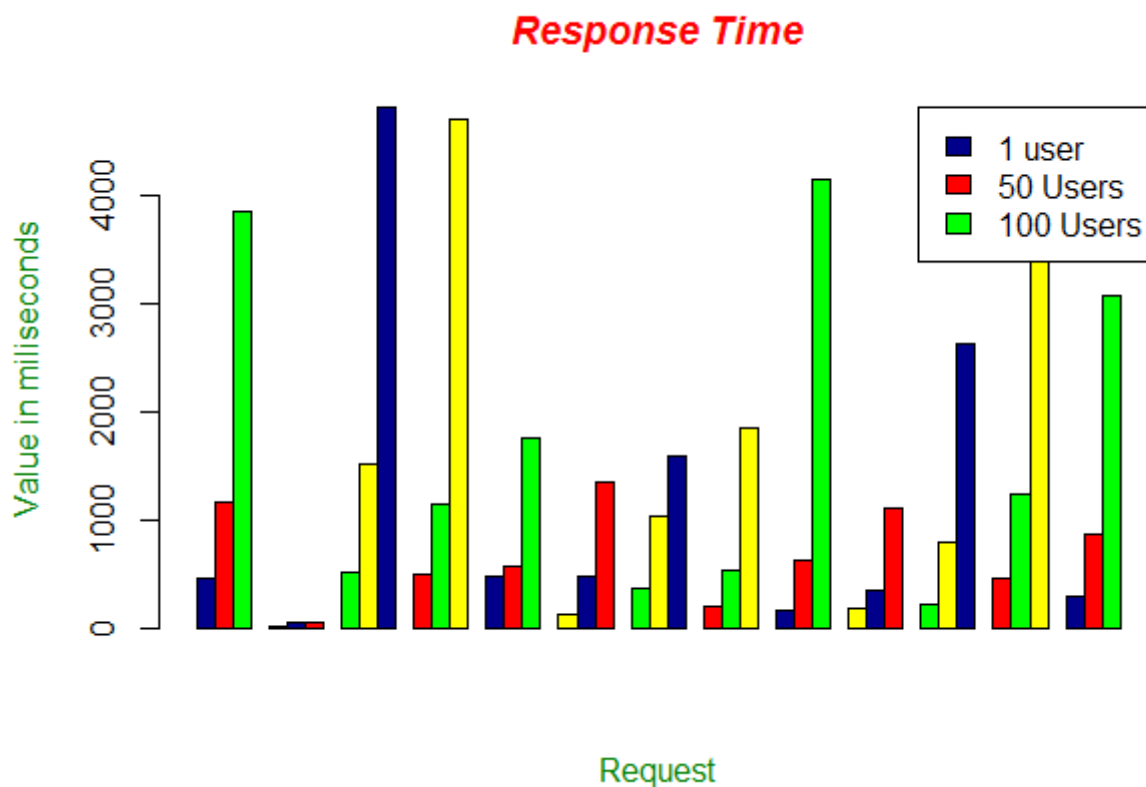4] Memory usage (server 172.22.22.11) :
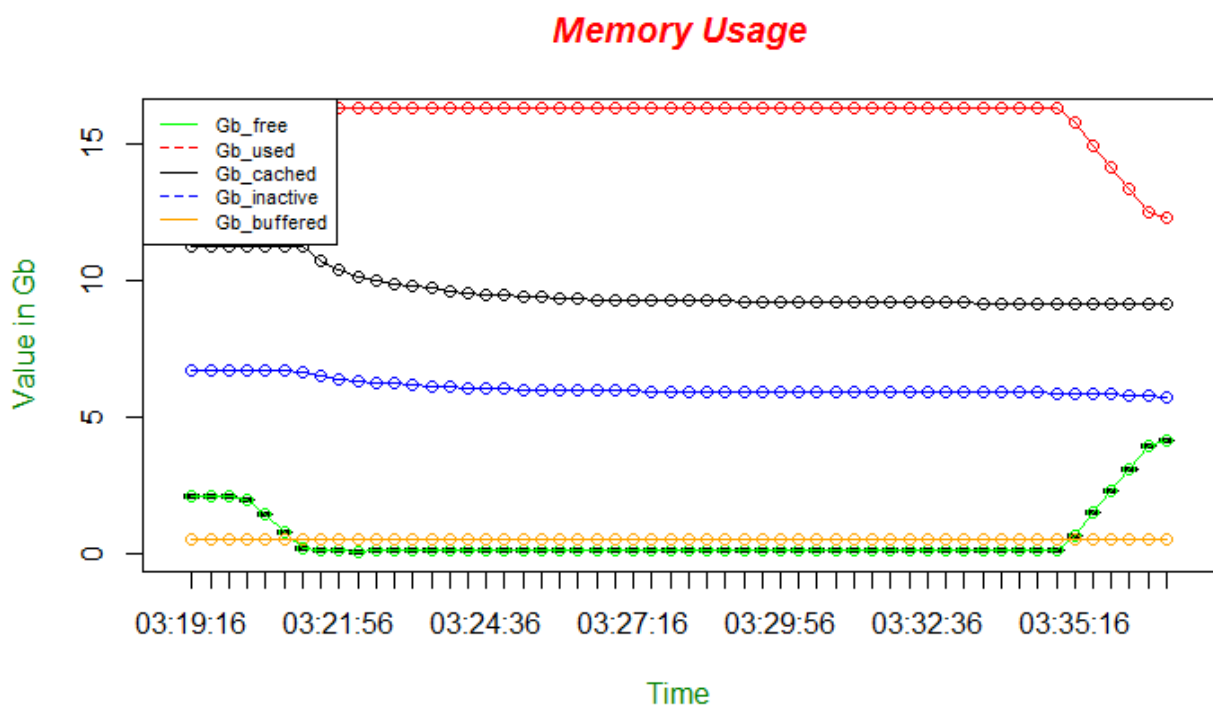
Observation :

1. After optimization for database and caching response time decreased to less than 5 sec for all requests.

- Response time for 100 users is 40 % more than for 50 users
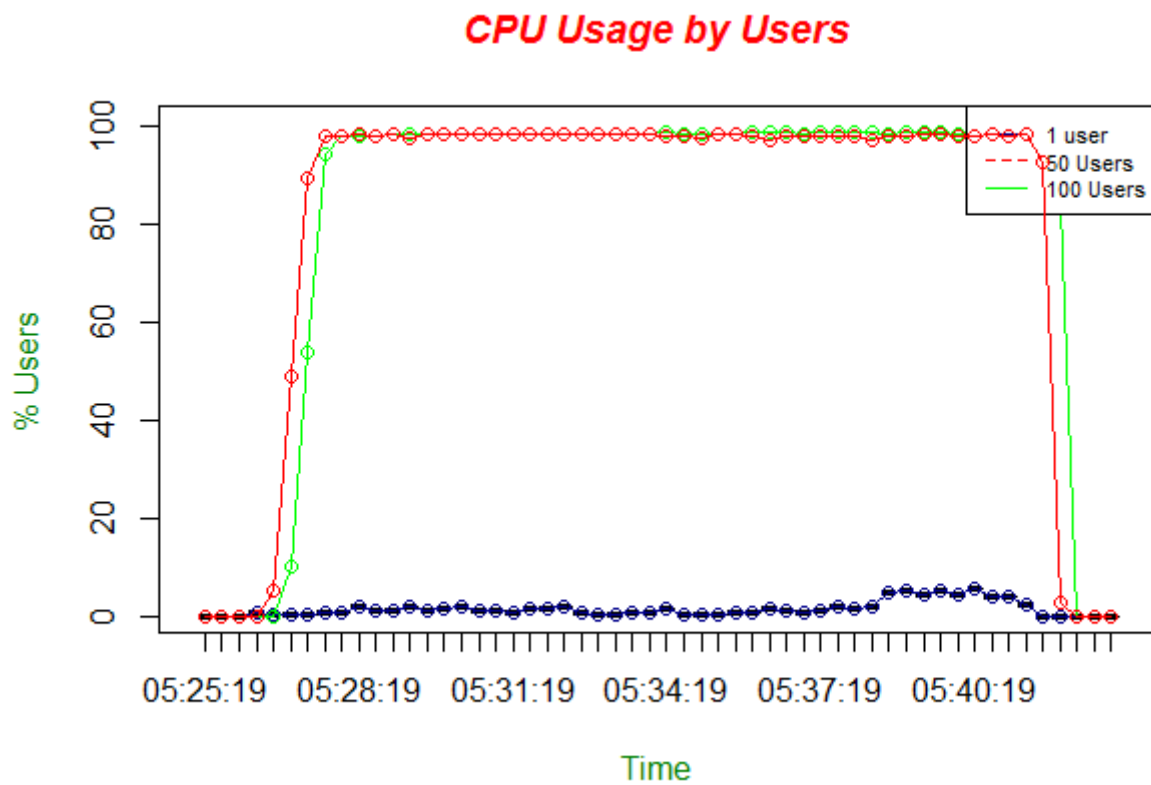
Comparison :

a. Comparison Table of Response Time for 1, 50 and 100 users

Label	Average_1	Average_50	Average_100
Moodle Homepage	467	1161	3847
Log in Page	20	48	49
login	524	1515	4806
Course_View	493	1146	4706
Forum_View	479	577	1756
Discussions	127	474	1358
Course_Contents	377	1040	1583
Comment on post	196	539	1855
Back to discussion page	169	634	4150
Quiz_View	182	357	1111
Question_list	214	797	2633
Logout	464	1242	4257
TOTAL	299	877	3069

b. Comparion Graph of Response Time for 1, 50 and 100 users

c. CPU usage comparison for 1, 50 and 100 users

d.Memory usage comparison for 1, 50 and 100 users