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Technology

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**IT314 - Software Engineering
Non - Functional Testing**

Project title: NextChapter

Group-10

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Tool used: Apache jmeter

Load Testing (Using Apache JMeter):

Overview:

Load testing is a type of non-functional testing used to check how a website or application behaves when multiple users access it at the same time. The main goal is to measure performance under expected user traffic and identify any bottlenecks before real users face issues.

Apache JMeter is one of the most popular tools for load testing. In JMeter, we simulate virtual users by using threads, and each thread performs the same actions a real user would do, such as opening a webpage or loading content.

During a load test, JMeter collects metrics such as response time, throughput, error rate, and server performance under stress. These metrics help us understand if the application can handle the expected workload. For example, we can test how the system performs with 100 or 200 users accessing a specific page simultaneously.

Overall, load testing ensures that the system stays stable, responsive, and reliable when traffic increases. It helps developers optimize performance, fix bottlenecks, and prepare the application for real-world usage.

Parameters in a Summary report:

The Summary Report is a JMeter listener that displays overall performance statistics of each request during a load test. It provides metrics like:

1. Label

- The name of the sampler/request being tested (e.g., HTTP Request).

2. # Samples

- Total number of requests sent during the test. It equals the number of virtual users \times loop count.

3. Average (ms)

- The average response time taken by the server to handle the requests. Lower average time means better performance.

4. Min (ms)

- The fastest response time recorded during the test. Shows the best-case performance under the given load.

5. Max (ms)

- The slowest response time recorded. Indicates worst-case performance and possible delay spikes.

6. Std. Dev

- Standard deviation shows how much the response times vary. A lower value means the system is stable and consistent.

7. Error %

- Percentage of failed requests out of total samples.

8. Throughput

- Number of requests the server can handle per second. Higher throughput = better capacity to handle load.

9. Received KB/sec

- Amount of data the server sends back to JMeter per second. It shows how efficiently the server delivers responses.

10. Sent KB/sec

- Amount of data JMeter sends to the server each second. Useful for understanding request payload size and server input load.

11. Avg. Bytes

- Average size of the response received per request.

Web-Pages:

1. Sign up
2. Sign in
3. Home page
4. Library
5. Subscription
6. Open book
7. Reading list
8. Already read
9. Admin dashboard

1. Sign up:

a) 100 users:

Summary Report										
Name:	Summary Report for SignUp									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="button" value="Configure"/>					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
SignUp request	100	333	200	1339	198.97	0.00%	5.0/sec	5.48	0.64	1130.0
TOTAL	100	333	200	1339	198.97	0.00%	5.0/sec	5.48	0.64	1130.0

b) 200 users:

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="button" value="Configure"/>					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Sign up for 200 users	4033	11652	157	42247	17875.68	26.68%	1.4/sec	2.11	0.13	1590.9
TOTAL	4033	11652	157	42247	17875.68	26.68%	1.4/sec	2.11	0.13	1590.9

2. Sign in

a. 100 Users:

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="button" value="Configure"/>					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Sign in for 100 users	100	248	203	344	29.65	0.00%	1.7/sec	1.85	0.22	1128.3
TOTAL	100	248	203	344	29.65	0.00%	1.7/sec	1.85	0.22	1128.3

b. 200 Users:

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="button" value="Configure"/>					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Sign in for 200 users	200	261	193	568	40.56	0.00%	3.3/sec	3.68	0.43	1128.2
TOTAL	200	261	193	568	40.56	0.00%	3.3/sec	3.68	0.43	1128.2

3. Home page

a. 100 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="button" value="Configure"/>					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Homepage for 100 u...	100	252	208	361	28.73	0.00%	1.7/sec	1.85	0.20	1128.3
TOTAL	100	252	208	361	28.73	0.00%	1.7/sec	1.85	0.20	1128.3

b. 200 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="button" value="Configure"/>					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Homepage for 200 u...	200	282	192	1384	122.35	0.00%	3.3/sec	3.68	0.41	1128.2
TOTAL	200	282	192	1384	122.35	0.00%	3.3/sec	3.68	0.41	1128.2

4. Library

a. 100 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="button" value="Configure"/>					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Library for 100 users	100	361	193	1359	212.50	0.00%	1.7/sec	1.84	0.21	1128.3
TOTAL	100	361	193	1359	212.50	0.00%	1.7/sec	1.84	0.21	1128.3

b. 200 Users

Summary Report											
Name: <input type="text" value="Summary Report"/> Comments: <input type="text"/> <input type="checkbox"/> Write results to file / Read from file Filename <input type="text"/> Browse... <input type="checkbox"/> Log/Display Only <input type="checkbox"/> Errors <input type="checkbox"/> Successes Configure 											
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes	
Library for 200 users	200	289	206	1278	110.20	0.00%	3.3/sec	3.67	0.42	1128.3	
TOTAL	200	289	206	1278	110.20	0.00%	3.3/sec	3.67	0.42	1128.3	

5. Subscription

a. 100 Users

Summary Report											
Name: <input type="text" value="Summary Report"/> Comments: <input type="text"/> <input type="checkbox"/> Write results to file / Read from file Filename <input type="text"/> Browse... <input type="checkbox"/> Log/Display Only <input type="checkbox"/> Errors <input type="checkbox"/> Successes Configure 											
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes	
Subscription for 100 ...	100	275	217	482	38.26	0.00%	1.7/sec	1.84	0.22	1128.3	
TOTAL	100	275	217	482	38.26	0.00%	1.7/sec	1.84	0.22	1128.3	

b. 200 Users

Summary Report											
Name: <input type="text" value="Summary Report"/> Comments: <input type="text"/> <input type="checkbox"/> Write results to file / Read from file Filename <input type="text"/> Browse... <input type="checkbox"/> Log/Display Only <input type="checkbox"/> Errors <input type="checkbox"/> Successes Configure 											
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes	
Subscription for 200 u...	200	294	200	1203	109.47	0.00%	3.3/sec	3.67	0.45	1128.1	
TOTAL	200	294	200	1203	109.47	0.00%	3.3/sec	3.67	0.45	1128.1	

6. Open book

a. 100 Users

Summary Report											
Name: <input type="text" value="Summary Report"/> Comments: <input type="text"/> <input type="checkbox"/> Write results to file / Read from file Filename <input type="text"/> Browse... <input type="checkbox"/> Log/Display Only <input type="checkbox"/> Errors <input type="checkbox"/> Successes Configure 											
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes	
Open book for 100 u...	100	281	206	1298	110.70	0.00%	1.7/sec	1.85	0.24	1128.2	
TOTAL	100	281	206	1298	110.70	0.00%	1.7/sec	1.85	0.24	1128.2	

b. 200 Users

Summary Report											
Name: <input type="text" value="Summary Report"/> Comments: <input type="text"/> <input type="checkbox"/> Write results to file / Read from file Filename <input type="text"/> Browse... <input type="checkbox"/> Log/Display Only <input type="checkbox"/> Errors <input type="checkbox"/> Successes Configure 											
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes	
Open book for 200 u...	200	271	191	1460	119.65	0.00%	3.3/sec	3.67	0.49	1128.3	
TOTAL	200	271	191	1460	119.65	0.00%	3.3/sec	3.67	0.49	1128.3	

7. User Profile

a. 100 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="checkbox"/> Configure					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
User profile for 100 u...	100	357	218	1291	148.58	0.00%	5.0/sec	5.46	0.64	1128.1
TOTAL	100	357	218	1291	148.58	0.00%	5.0/sec	5.46	0.64	1128.1

b. 200 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="checkbox"/> Configure					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
User profile for 200 u...	200	356	200	1941	212.08	0.00%	18.5/sec	20.40	2.39	1128.3
TOTAL	200	356	200	1941	212.08	0.00%	18.5/sec	20.40	2.39	1128.3

8. Reading list

a. 100 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="checkbox"/> Configure					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Reading list for 100 u...	100	418	224	1732	261.60	0.00%	19.0/sec	20.90	2.54	1128.2
TOTAL	100	418	224	1732	261.60	0.00%	19.0/sec	20.90	2.54	1128.2

b. 200 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="checkbox"/> Configure					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Reading list for 200 u...	200	23774	264	42116	20659.28	56.00%	4.5/sec	9.43	0.27	2126.6
TOTAL	200	23774	264	42116	20659.28	56.00%	4.5/sec	9.43	0.27	2126.6

9. Already read

a. 100 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Filename	Browse...	Log/Display Only:	<input type="checkbox"/> Errors	<input type="checkbox"/> Successes	<input type="checkbox"/> Configure					
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Already read for 100 ...	100	13809	177	42111	17619.40	22.00%	30.2/min	0.75	0.05	1520.4
TOTAL	100	13809	177	42111	17619.40	22.00%	30.2/min	0.75	0.05	1520.4

b. 200 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Already read for 200 ...	200	13089	200	42109	17571.45	22.00%	54.8/min	1.35	0.10	1520.2
TOTAL	200	13089	200	42109	17571.45	22.00%	54.8/min	1.35	0.10	1520.2

10. Admin dashboard

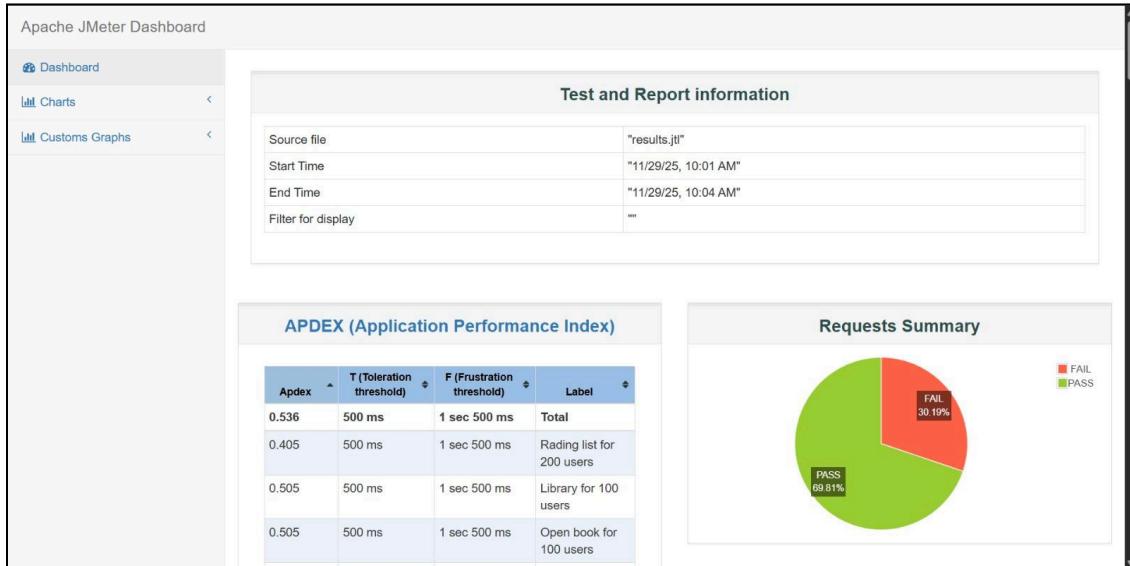
a. 100 Users

Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Admin dashboard fo...	100	11542	177	42071	17057.15	19.00%	24.2/min	0.58	0.04	1467.0
TOTAL	100	11542	177	42071	17057.15	19.00%	24.2/min	0.58	0.04	1467.0

b. 200 Users

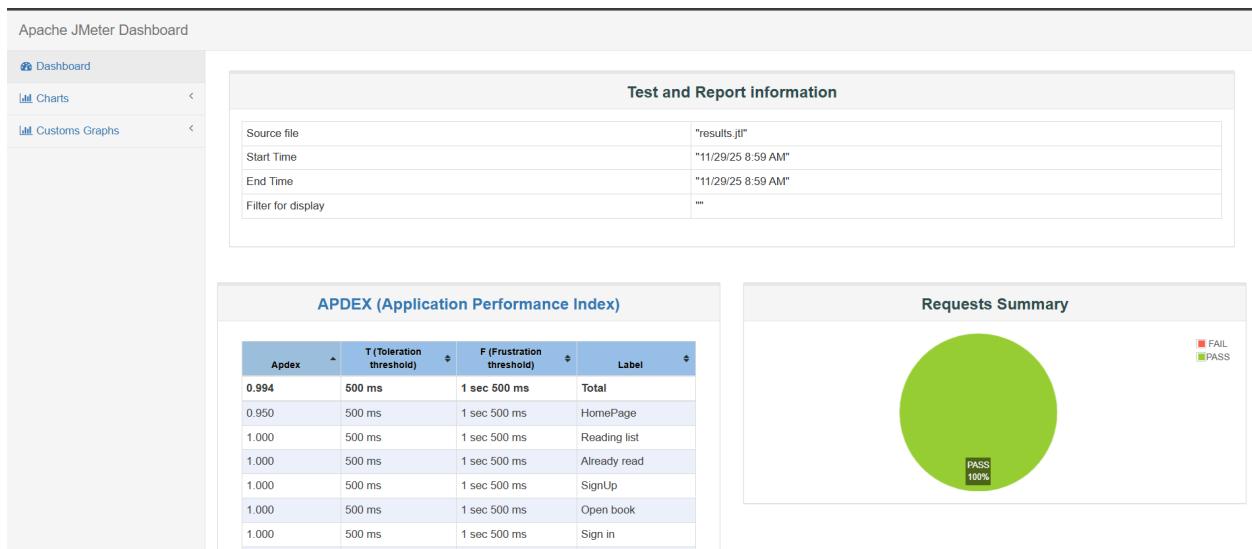
Summary Report										
Name:	Summary Report									
Comments:										
Write results to file / Read from file										
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Admin dashboard fo...	200	9193	164	42104	15796.52	15.50%	40.2/min	0.92	0.07	1403.5
TOTAL	200	9193	164	42104	15796.52	15.50%	40.2/min	0.92	0.07	1403.5

Summary of Load Testing



Performance Testing - Summary Report (10 Users):

Summary Report										
Name:	Summary Report									
Comments:	Write results to file / Read from file									
Filename:	Browse... Log/Display Only: Errors Successes Configure									
Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
HomePage	10	275	211	348	41.01	0.00%	1.1/sec	1.20	0.13	1127.6
SignUp	10	96	67	105	11.39	0.00%	1.1/sec	1.22	0.14	1127.8
Sign in	10	107	99	139	10.89	0.00%	1.1/sec	1.22	0.14	1126.6
Library	10	111	95	202	30.33	0.00%	1.1/sec	1.22	0.14	1127.2
Reading list	10	112	99	204	30.63	0.00%	1.1/sec	1.22	0.15	1126.9
Already read	10	100	74	113	9.53	0.00%	1.1/sec	1.22	0.15	1127.7
Subscription	10	105	93	127	10.44	0.00%	1.1/sec	1.22	0.15	1127.1
User profile	10	107	60	178	29.59	0.00%	1.1/sec	1.22	0.14	1126.9
Open book	10	104	65	171	29.68	0.00%	1.1/sec	1.24	0.15	1128.0
TOTAL	90	124	60	348	59.27	0.00%	8.9/sec	9.78	1.16	1127.3



This summary report shows the performance of the website when tested with 10 concurrent users across all major pages, including HomePage, SignUp, Sign In, Library, Reading List, Subscription, User Profile, and Open Book. Each request was executed 10 times, and the metrics below capture the average response time, min/max time, throughput, error rate, and data transfer rate for each page.

All requests completed successfully with 0% error, indicating that the application performs smoothly under a light load of 10 users. Response times remained stable across most pages, and throughput stayed consistent at 1.1/sec, showing that the system can comfortably handle normal user traffic without failures.