

## Lab 5 Report

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### 1 Test Plan

#### 1.1 Summary

This Lab aims to help students to learn the concepts of Load/Stress testing and to be familiar with a well-known open-source tool, called JMeter, for performance testing.

#### 1.2 Features to be tested

1.2.1 Login with Ramp-up

1.2.2 Login without Ramp-up

1.2.3 ISBN Search books

1.2.4 ISBN Search books waiting all finished login

1.2.5 Check in books / Check out books

1.2.6 Check in books / Check out books waiting all finished login

#### 1.3 Success criteria of completing the test

All test script must be passed.

#### 1.4 Test environment and infrastructure

- OS: macOS
- JMeter : v4.0
- Docker

#### 1.5 Test approaches

This lab use “user scenarios” and “workload” to design test case. For the Login scenarios, using 2, 4, 8, 16, 32, 64, 128, 256, 512 and 1024 people with ramp-up and without ramp-up. For ISBN Search books, using javascript to generate random ISBN with 2, 4, 8, 16, 32, 64, 128, 256, 512 and 1024 people, with waiting all finished login and without waiting all finished login. For Check in/out books, using javascript to generate random book code with 2, 4, 8, 16, 32, 64, 128 and 256 people, with waiting all finished login and without waiting all finished login.

#### 1.6 Testing tasks

To implement the proposed strategy, the following activities are planned to perform.

No.	Activity Name	Plan hours	Schedule Date
1	Study Jmeter	4	2018/06/08
2	Install and use docker for environment	2	2018/06/09
3	Design test cases for the features	4	2018/06/09
4	Implement test cases	4	2018/06/10
5	Perform test	6	2018/06/11
6	Complete Lab5 report	3	2018/06/12

## 2 Test Design

Scenario: Login	
Preconditions	Loading user data with account and password
Input actions	1 User login into library system 2 User logout
Expected output	1. Verify response status is "success" and authority is "2" 2. Verify text response is "success"
Design of workload	The number of users is 2 The number of users is 4 The number of users is 8 The number of users is 16 The number of users is 32 The number of users is 64 The number of users is 128 The number of users is 256 The number of users is 512 The number of users is 1024

Scenario: Login with ramp-up	
Preconditions	Loading user data with account and password
Input actions	1 User login into library system 2 User logout
Expected output	1. Verify response status is "success" and authority is "2" 2. Verify text response is "success"
Design of workload	The number of users is 2, and the ramp-up period is 1 sec. The number of users is 4, and the ramp-up period is 1 sec.

	<p>The number of users is 8, and the ramp-up period is 1 sec.</p> <p>The number of users is 16, and the ramp-up period is 1 sec.</p> <p>The number of users is 32, and the ramp-up period is 1 sec</p> <p>The number of users is 64, and the ramp-up period is 1 sec</p> <p>The number of users is 128, and the ramp-up period is 1 sec</p> <p>The number of users is 256, and the ramp-up period is 10 sec</p> <p>The number of users is 512, and the ramp-up period is 20 sec</p> <p>The number of users is 1024, and the ramp-up period is 40 sec</p>
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Scenario: ISBN search books	
Preconditions	Loading user data with account and password
Input actions	<ol style="list-style-type: none"> <li>1 User login into library system</li> <li>2 Search book with ISBN</li> <li>3 User logout</li> </ol>
Expected output	<ol style="list-style-type: none"> <li>1. Verify response status is "success" and authority is "2"</li> <li>2. Verify response code is 200</li> <li>3. Verify text response is "success"</li> </ol>
Design of workload	<p>The number of users is 2, and the ramp-up period is 1 sec.</p> <p>The number of users is 4, and the ramp-up period is 1 sec.</p> <p>The number of users is 8, and the ramp-up period is 1 sec.</p> <p>The number of users is 16, and the ramp-up period is 1 sec.</p> <p>The number of users is 32, and the ramp-up period is 1 sec</p> <p>The number of users is 64, and the ramp-up period is 1 sec</p> <p>The number of users is 128, and the ramp-up period is 1 sec</p> <p>The number of users is 256, and the ramp-up period is 10 sec</p> <p>The number of users is 512, and the ramp-up period is 20 sec</p> <p>The number of users is 1024, and the ramp-up period is 40 sec</p>

Scenario: ISBN search books waiting all finished login	
Preconditions	Loading user data with account and password
Input actions	<ol style="list-style-type: none"> <li>1 User login into library system</li> <li>2 Wait for all the users finished login</li> <li>3 Search book with ISBN</li> <li>4 User logout</li> </ol>
Expected output	<ol style="list-style-type: none"> <li>1. Verify response status is "success" and authority is "2"</li> </ol>

	2. Verify response code is 200 3. Verify text response is "success"
Design of workload	The number of users is 2, and the ramp-up period is 1 sec. The number of users is 4, and the ramp-up period is 1 sec. The number of users is 8, and the ramp-up period is 1 sec. The number of users is 16, and the ramp-up period is 1 sec. The number of users is 32, and the ramp-up period is 1 sec The number of users is 64, and the ramp-up period is 1 sec The number of users is 128, and the ramp-up period is 1 sec The number of users is 256, and the ramp-up period is 10 sec The number of users is 512, and the ramp-up period is 20 sec The number of users is 1024, and the ramp-up period is 40 sec

Scenario: Check in books / Check out books	
Preconditions	Loading user data with account and password
Input actions	1 User login into library system 2 Enter account 3 Check in books with book code 4 Check out books with same book code 5 User logout
Expected output	1. Verify response status is "success" and authority is "2" 2. Verify text response is "success"
Design of workload	The number of users is 2, and the ramp-up period is 1 sec. The number of users is 4, and the ramp-up period is 1 sec. The number of users is 8, and the ramp-up period is 1 sec. The number of users is 16, and the ramp-up period is 1 sec. The number of users is 32, and the ramp-up period is 1 sec The number of users is 64, and the ramp-up period is 10 sec The number of users is 128, and the ramp-up period is 20 sec The number of users is 256, and the ramp-up period is 40 sec

Scenario: Check in books / Check out books waiting all finished login	
Preconditions	Loading user data with account and password
Input actions	1 User login into library system 2 Wait for all the users finished login

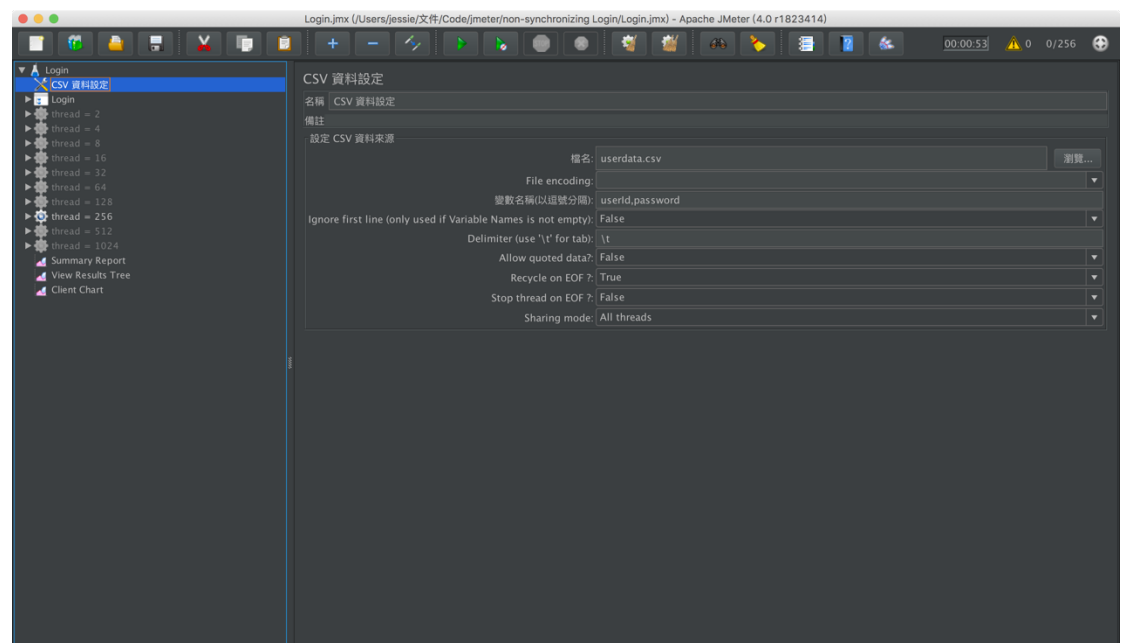
	3 Enter account 4 Check in books with book code 5 Check out books with same book code 6 User logout
Expected output	1. Verify response status is “success” and authority is “2” 2. Verify text response is “success”
Design of workload	The number of users is 2, and the ramp-up period is 1 sec. The number of users is 4, and the ramp-up period is 1 sec. The number of users is 8, and the ramp-up period is 1 sec. The number of users is 16, and the ramp-up period is 1 sec. The number of users is 32, and the ramp-up period is 1 sec The number of users is 64, and the ramp-up period is 10 sec The number of users is 128, and the ramp-up period is 20 sec The number of users is 256, and the ramp-up period is 40 sec

## 7 Test Implementation

There are upload in the Lab5 folder in gitlab.

## 8 Test Results

### 8.1 Jmeter snapshot



## 8.2 Summary Report

### ● Login with Ramp-up

Label	取樣數	平均值	最小值	最大值	Std. Dev.	錯誤率	處理量	每秒仟位元組	Sent KB/sec	Avg. Bytes
Login	256	8439	410	13906	3614.75	0.00%	17.9/sec	7.61	3.97	435.0
Logout	256	9	3	34	6.02	0.00%	18.4/sec	7.30	2.40	405.0
總計	512	4224	3	13906	4929.56	0.00%	11.6/sec	4.74	2.03	420.0

### ● Login without Ramp-up

Label	取樣數	平均值	最小值	最大值	Std. Dev.	錯誤率	處理量	每秒仟位元組	Sent KB/sec	Avg. Bytes
Login	256	3623	3	5402	1093.60	0.00%	18.2/sec	7.73	4.04	435.0
Logout	256	21	4	58	13.62	0.00%	18.2/sec	7.19	2.36	405.0
總計	512	1822	3	5402	1960.27	0.00%	11.6/sec	4.76	2.04	420.0

### ● ISBN Search books

Label	取樣數	平均值	最小值	最大值	Std. Dev.	錯誤率	處理量	每秒仟位元組	Sent KB/sec	Avg. Bytes
Login	256	1117	3	2683	920.42	0.00%	20.8/sec	8.84	4.61	435.0
RandomISBN	256	3	1	78	5.29	0.00%	20.8/sec	0.00	0.00	.0
Search Books	256	336	1	2163	684.38	0.00%	18.1/sec	7.04	3.94	399.2
Logout	256	333	0	553	133.11	8.59%	395.1/sec	219.97	46.90	570.2
總計	1024	447	0	2683	707.95	2.15%	68.7/sec	23.56	9.60	351.1

### ● ISBN Search books waiting all finished login

Label	取樣數	平均值	最小值	最大值	Std. Dev.	錯誤率	處理量	每秒仟位元組	Sent KB/sec	Avg. Bytes
Login	256	1868	3	4735	1434.73	0.00%	18.1/sec	7.67	4.00	435.0
RandomISBN	256	235	1	633	219.57	0.00%	403.8/sec	0.00	0.00	.0
Search Books	256	2849	11	7049	3297.17	0.00%	35.3/sec	13.77	7.70	400.0
Logout	256	292	0	492	123.38	5.47%	479.4/sec	235.23	58.86	502.5
總計	1024	1311	0	7049	2113.39	1.37%	46.2/sec	15.10	6.50	334.4

### ● Check in books / Check out books

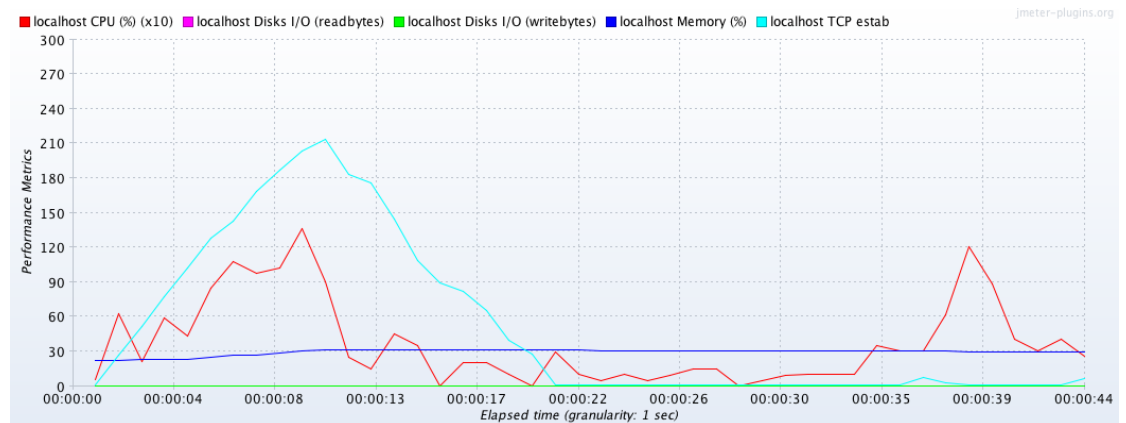
Label	取樣數	平均值	最小值	最大值	Std. Dev.	錯誤率	處理量	每秒仟位元組	Sent KB/sec	Avg. Bytes
Login	256	6	3	22	1.65	0.00%	6.4/sec	2.72	1.42	435.0
RandomBook...	256	2	1	28	2.22	0.00%	6.4/sec	0.00	0.00	.0
UserAccount...	256	2	1	11	1.11	0.00%	6.4/sec	1.87	1.42	298.0
InBooks	256	2	1	10	0.92	0.00%	6.4/sec	1.27	1.41	202.0
OutBooks	256	2	1	6	0.89	0.00%	6.4/sec	1.27	1.41	202.0
Logout	256	258	2	454	133.07	16.80%	477.6/sec	339.79	51.61	728.5
總計	1536	45	1	454	109.74	2.80%	37.9/sec	11.52	6.26	310.9

### ● Check in books / Check out books waiting all finished login

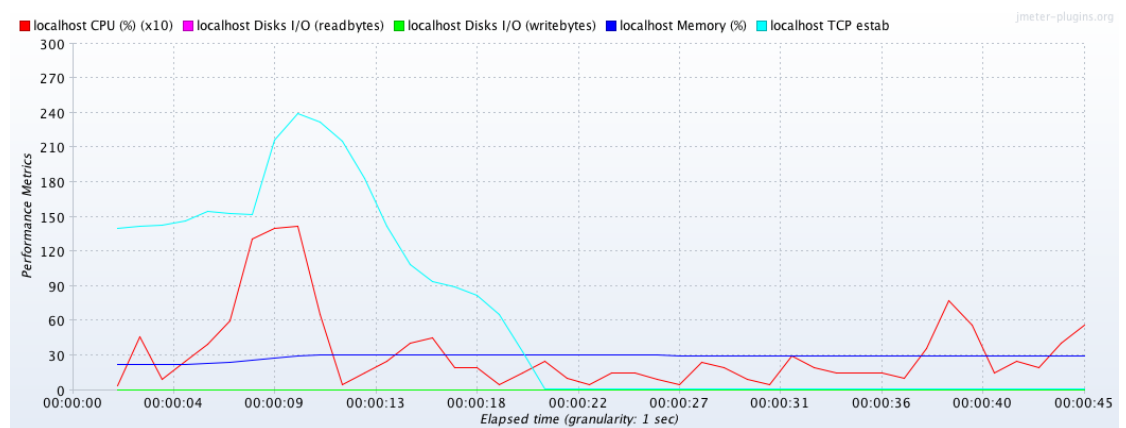
Label	取樣數	平均值	最小值	最大值	Std. Dev.	錯誤率	處理量	每秒仟位元組	Sent KB/sec	Avg. Bytes
Login	256	128	3	2036	388.28	0.00%	6.4/sec	2.72	1.42	435.0
RandomBook...	256	225	2	468	112.02	0.00%	545.8/sec	0.00	0.00	.0
UserAccount...	256	3139	6	7327	2468.95	0.78%	33.7/sec	10.43	7.37	317.2
InBooks	256	1618	3	7104	1044.15	0.00%	25.5/sec	5.06	5.61	202.8
OutBooks	256	1145	1	2831	1061.52	0.00%	20.0/sec	3.97	4.40	202.6
Logout	256	339	0	613	165.28	3.52%	392.6/sec	179.74	49.20	468.8
總計	1536	1099	0	7327	1592.62	0.72%	28.6/sec	7.58	4.80	271.1

### 8.3 Client Chart

#### ● Login with Ramp-up

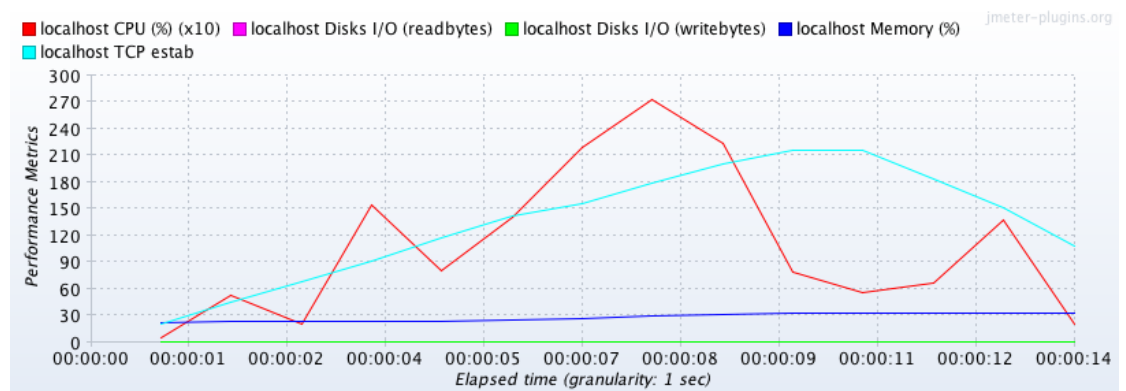


#### ● Login without Ramp-up

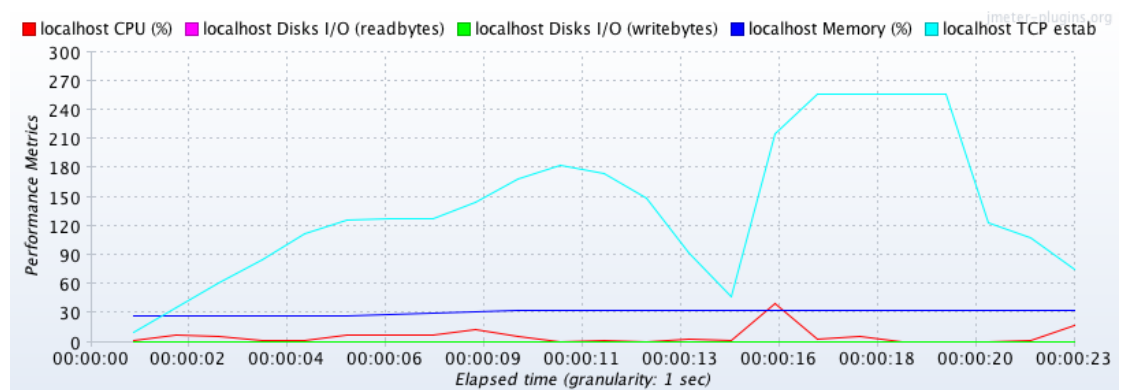


Compare: At the beginning, login with Ramp-up, the TCP estab gradually increase not like login without Ramp-up.

- ISBN Search books



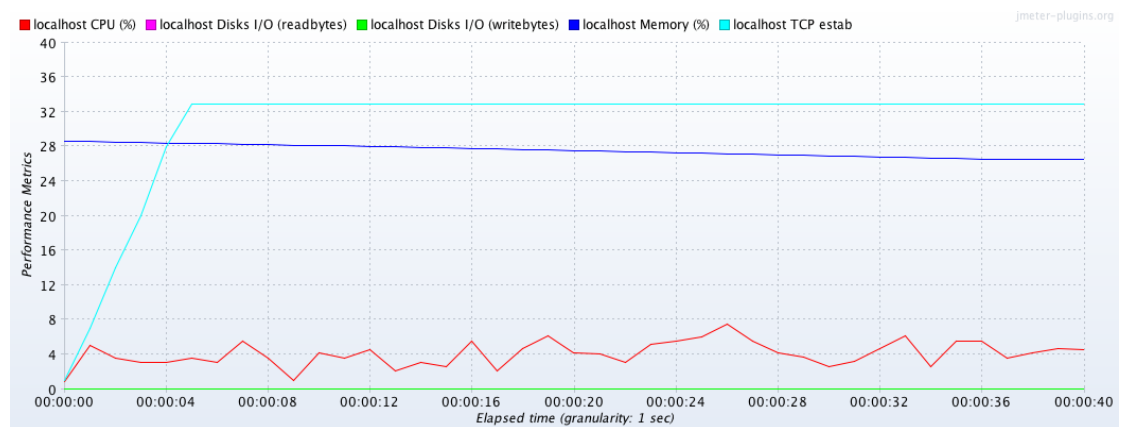
- ISBN Search books waiting all finished login



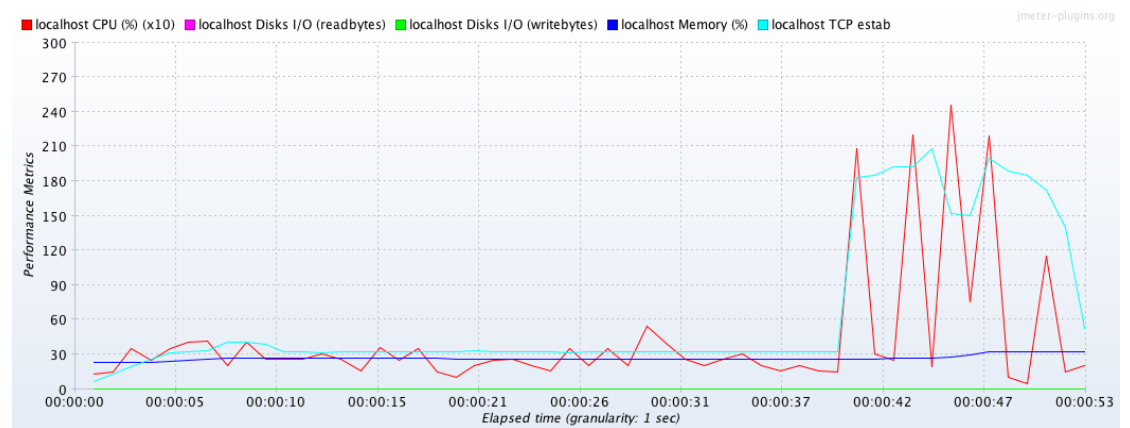
Compare: The CPU performance is much higher than with waiting all finished login.



- Check in books / Check out books



- Check in books / Check out books waiting all finished login



Compare: The CPU and estab dramatically increase with waiting all finished login.