Test Plan

- 測試範圍：A Library System, an online library service provided by CSIE@NTUT for allowing users to borrow books, search book, and return books
- 測試方法：每一個Scenario分成兩個Script，其中一個腳本設Ramp-up，另外一個腳本不設，其中有設Ramp-up的腳本又再分成兩種：
  - 第一種：
    - thread = 256 -> Ramp-up = 10
    - thread = 512 -> Ramp-up = 20
    - thread = 1024 -> Ramp-up = 20
  - 第二種：
    - thread = 64 -> Ramp-up = 10
    - thread = 128 -> Ramp-up = 20
    - thread = 256 -> Ramp-up = 20
- 測試終止條件：每個腳本的thread group順利執行完畢，e.g. thread=256 -> Sample數就會有256個
- 測試環境：
  - Docker for windows
  - Apache Jmeter 3.2
    - Plugins Manager
    - PerMon (Servers Performance Monitoring)
  - Win10 64-bits (OS)

Test Design

Test Case ID	1
Script Name	LoginNonRampUp
Precondition	1. Docker正確運行Library System 2. userdata.csv檔案內使用者資料正確
Scenario	1. 所有人登入 2. 所有人登出
Thread-Ramp Up (Sec)	1. 256-null 2. 512-null 3. 1024-null

Test Case ID	2
Script Name	LoginRampUp
Precondition	1. Docker正確運行Library System

	2. userdata.csv檔案內使用者資料正確
Scenario	1. 所有人登入 2. 所有人登出
Thread-Ramp Up (Sec)	1. 256-10 2. 512-20 3. 1024-40

Test Case ID	3
Script Name	ISBN_Scenario1
Precondition	1. Docker正確運行Library System 2. userdata.csv檔案內使用者資料正確
Scenario	1. 所有人登入 2. 利用書本的ISBN號碼進行查詢書本 3. 等待全部人都查詢完畢後 4. 所有人登出
Thread-Ramp Up (Sec)	1. 256-10 2. 512-20 3. 1024-40

Test Case ID	4
Script Name	ISBN_Scenario2
Precondition	1. Docker正確運行Library System 2. userdata.csv檔案內使用者資料正確
Scenario	1. 所有人登入 2. 等待所有人登入完成 3. 利用書本的ISBN號碼進行查詢書本 4. 等待全部人都查詢完畢後 5. 所有人登出
Thread-Ramp Up (Sec)	1. 256-10 2. 512-20 3. 1024-40

|	
Test Case ID	5
Script Name	CheckInOutBooks_Scenario1
Precondition	1. Docker正確運行Library System 2. userdata.csv檔案內使用者資料正確

Scenario	1. 所有人登入
	2. 利用書本的code號碼進行借書
	3. 利用書本的code號碼進行還書
	4. 等待全部人都借完和還完後
	5. 所有人登出
Thread-Ramp Up (Sec)	1. 64-10
	2. 128-20
	3. 256-40

| Test Case ID	6
Script Name	CheckInOutBooks_Scenario2
Precondition	1. Docker正確運行Library System
	2. userdata.csv檔案內使用者資料正確
Scenario	1. 所有人登入
	2. 等待所有人登入完成
	3. 利用書本的code號碼進行借書
	4. 利用書本的code號碼進行還書
	5. 等待全部人都借完和還完後
	6. 所有人登出
Thread-Ramp Up (Sec)	1. 64-10
	2. 128-20
	3. 256-40

Test Result

Login with non ramp-up (Thread = 256)

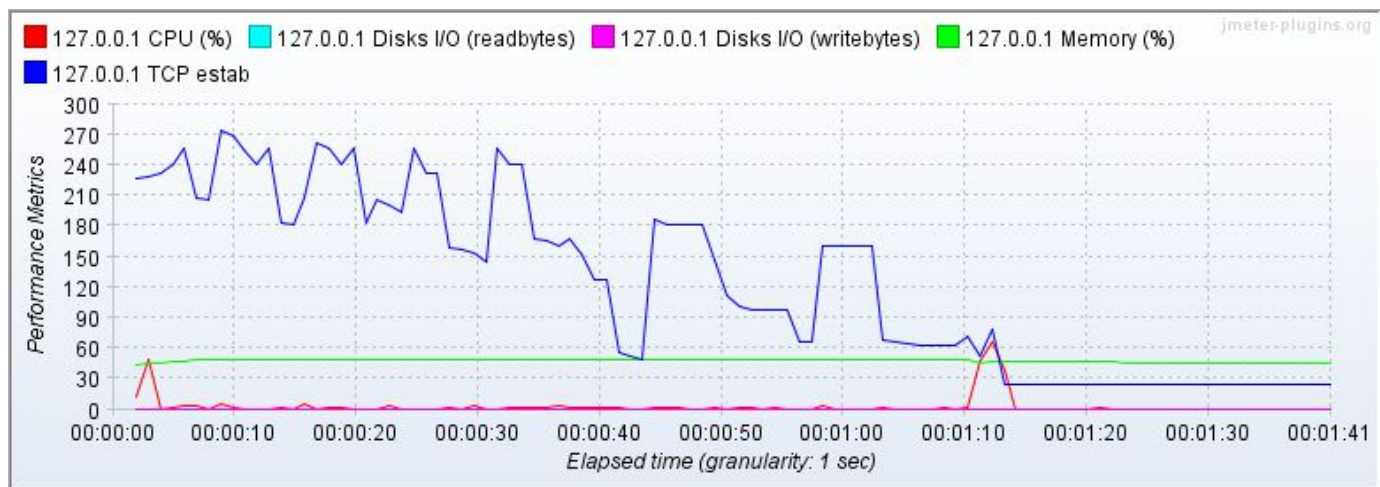| Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/...	Sent KB/sec	Avg. Bytes
Login	256	7396	19	13028	3360.02	0.00%	18.2/sec	7.74	4.09	435.0
Logout	256	550	120	883	202.06	0.00%	286.7/sec	113.38	38.07	405.0
TOTAL	512	3973	19	13028	4169.18	0.00%	34.3/sec	14.06	6.13	420.0
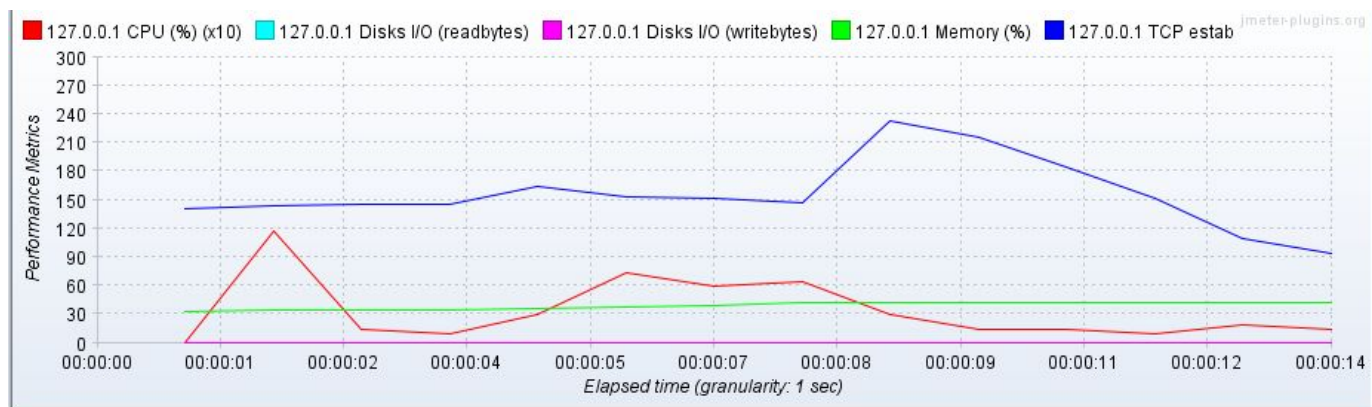
Login with non ramp-up (Thread = 512)

Label ▼	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Logout	512	7380	32	30581	12272.48	21.88%	16.7/sec	14.33	1.74	876.4
Login	512	90	1	601	160.73	0.00%	16.4/sec	6.97	3.69	434.2
TOTAL	1024	3735	1	30581	9412.95	10.94%	32.8/sec	21.02	5.39	655.3
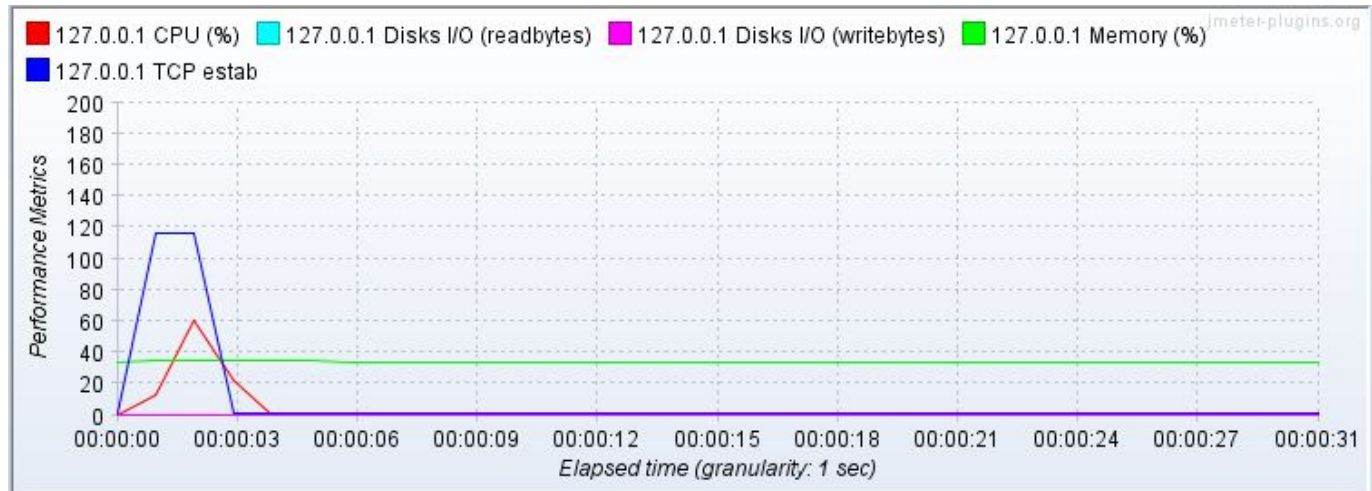
Login with non ramp-up (Thread = 1024)

Label ▼	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Logout	1024	2795	32	30622	5861.02	25.68%	33.4/sec	31.38	3.30	961.2
Login	1024	28283	7	69321	19312.15	0.00%	14.7/sec	6.23	3.29	435.0
TOTAL	2048	15539	7	69321	19133.05	12.84%	20.4/sec	13.90	3.30	698.1

Login with ramp-up (Thread = 256)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	256	4372	4	6576	1452.16	0.00%	16.8/sec	7.13	3.77	435.0
Logout	256	471	103	724	163.99	0.00%	351.2/sec	138.89	46.64	405.0
TOTAL	512	2421	4	6576	2207.49	0.00%	32.0/sec	13.14	5.73	420.0
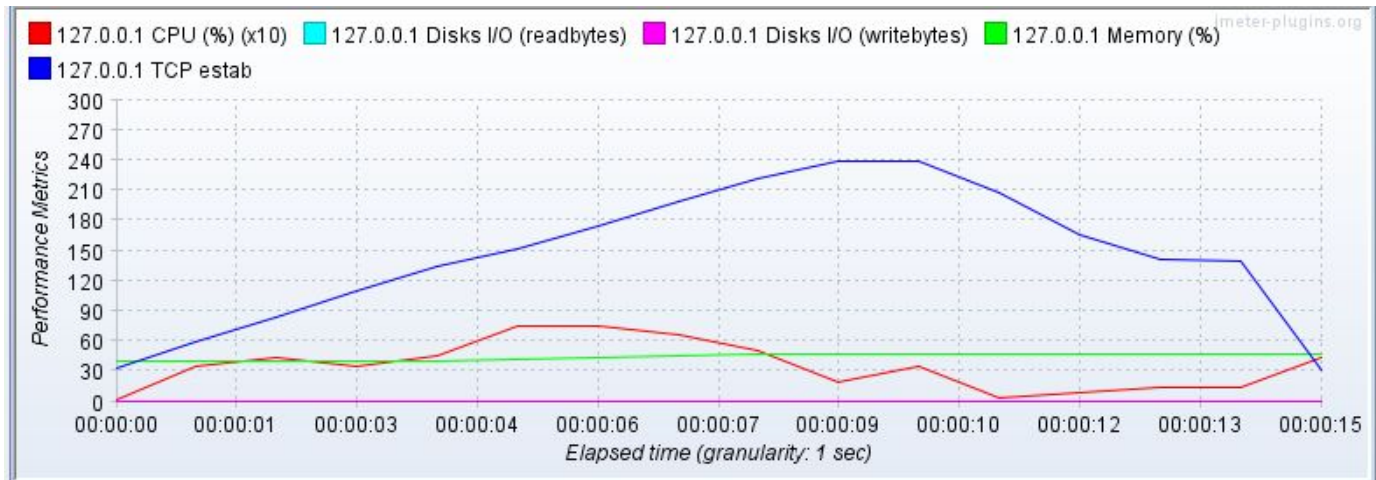
Login with ramp-up (Thread = 512)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	512	6258	3	15235	2757.59	0.00%	17.6/sec	7.48	3.95	435.0
Logout	512	320	32	993	306.27	46.68%	514.1/sec	726.79	36.40	1447.8
TOTAL	1024	3289	3	15235	3558.90	23.34%	34.0/sec	31.30	5.03	941.4
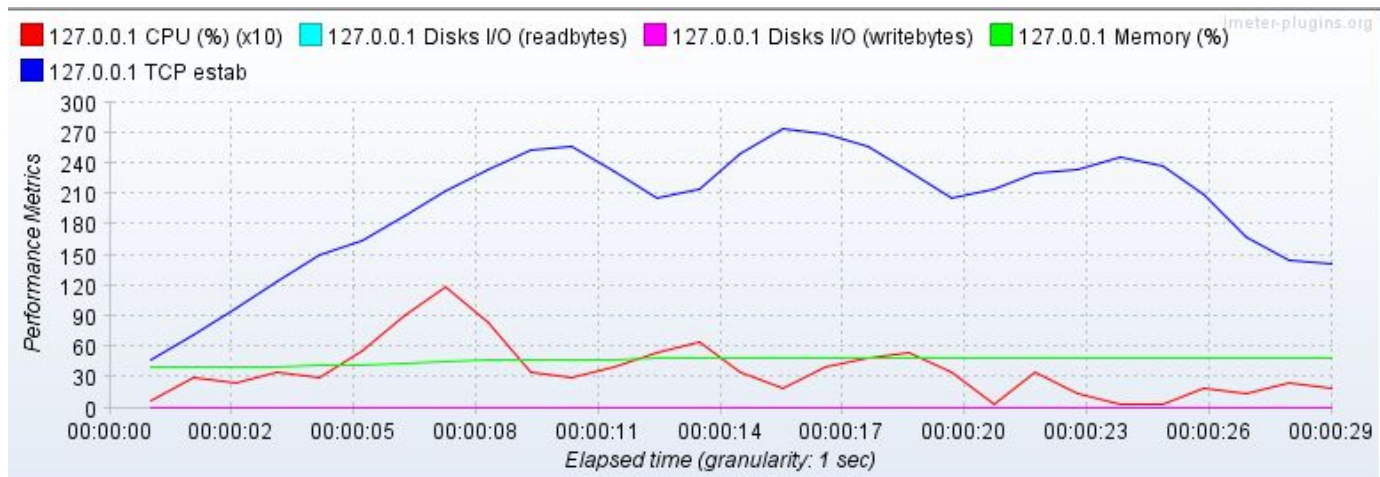
Login with ramp-up (Thread = 1024)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	1024	8639	3	38197	7150.49	0.00%	18.0/sec	7.63	4.04	435.0
Logout	1024	361	72	1376	465.69	73.14%	742.6/sec	1489.16	26.49	2053.6
TOTAL	2048	4500	3	38197	6542.30	36.57%	35.1/sec	42.63	4.57	1244.3
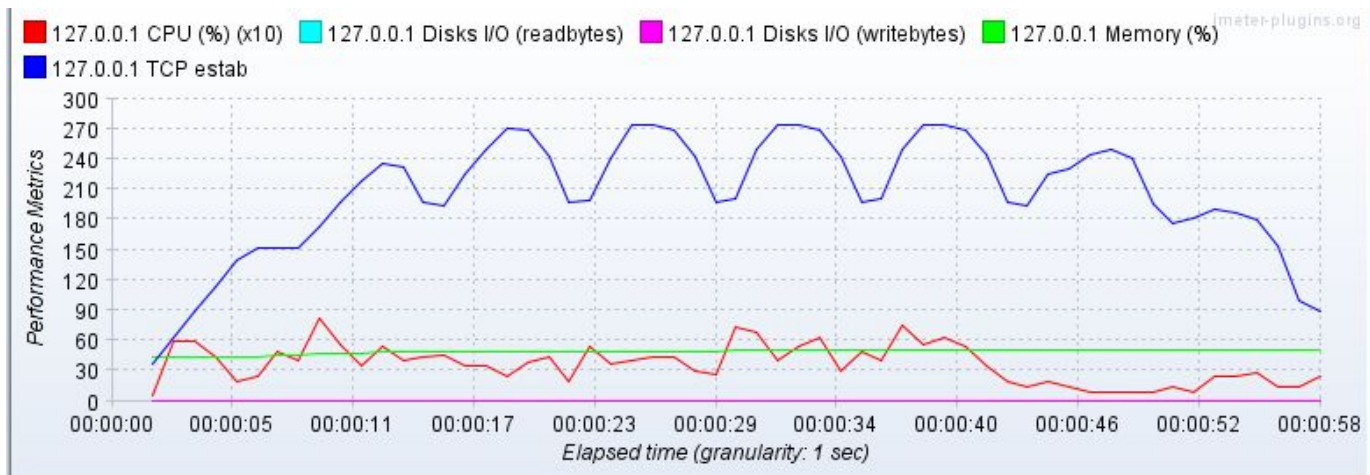
從錯誤率來看，有設Ramp Up的再Thread越大的狀況下，提升的更多

ISBN_Scenario1 (Thread = 256)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Login	256	2164	4	3948	848.45	0.00%	22.1/sec	9.39	4.97	435.0
Get All Books	256	1025	1	3967	1077.07	0.00%	18.8/sec	69.75	4.25	3806.5
Get A Random Book	256	592	1	3963	968.35	0.00%	17.5/sec	10.00	4.28	583.7
Logout	256	451	14	643	151.32	0.78%	396.9/sec	163.45	52.30	421.7
TOTAL	1024	1058	1	3967	1078.37	0.20%	67.1/sec	86.01	13.88	1311.7
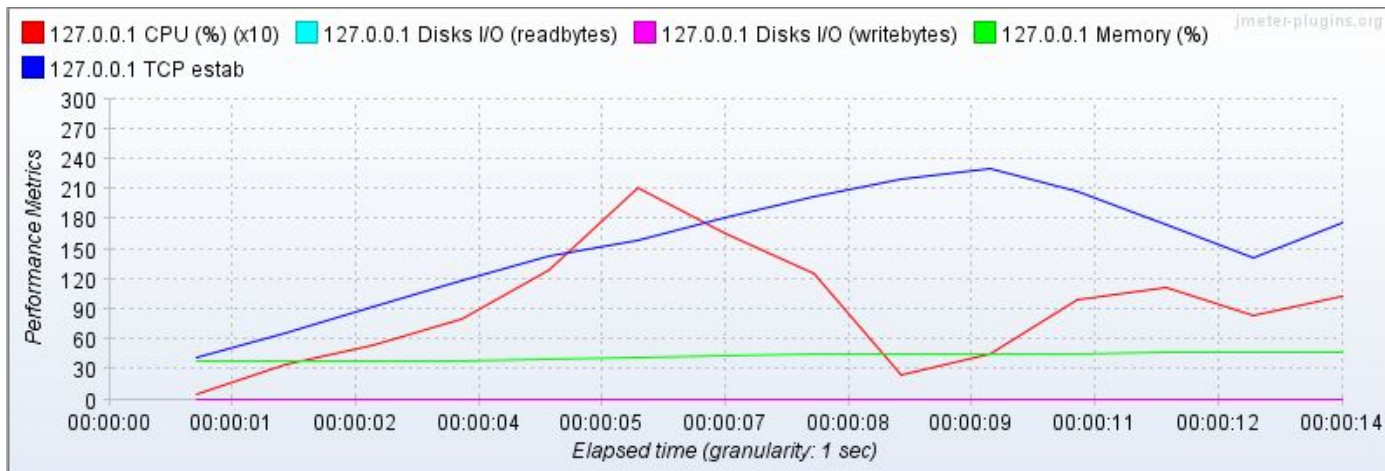
ISBN_Scenario1 (Thread = 512)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Login	512	3752	3	17471	2776.55	0.00%	17.3/sec	7.36	3.89	435.0
Get All Books	512	1788	1	5873	1444.30	0.00%	17.3/sec	64.41	3.93	3806.8
Get A Random Book	512	1145	1	5875	1383.98	0.00%	17.3/sec	9.89	4.23	584.7
Logout	512	866	162	1442	354.09	0.78%	352.9/sec	145.32	46.50	421.7
TOTAL	2048	1888	1	17471	2056.57	0.20%	66.0/sec	84.61	13.65	1312.0
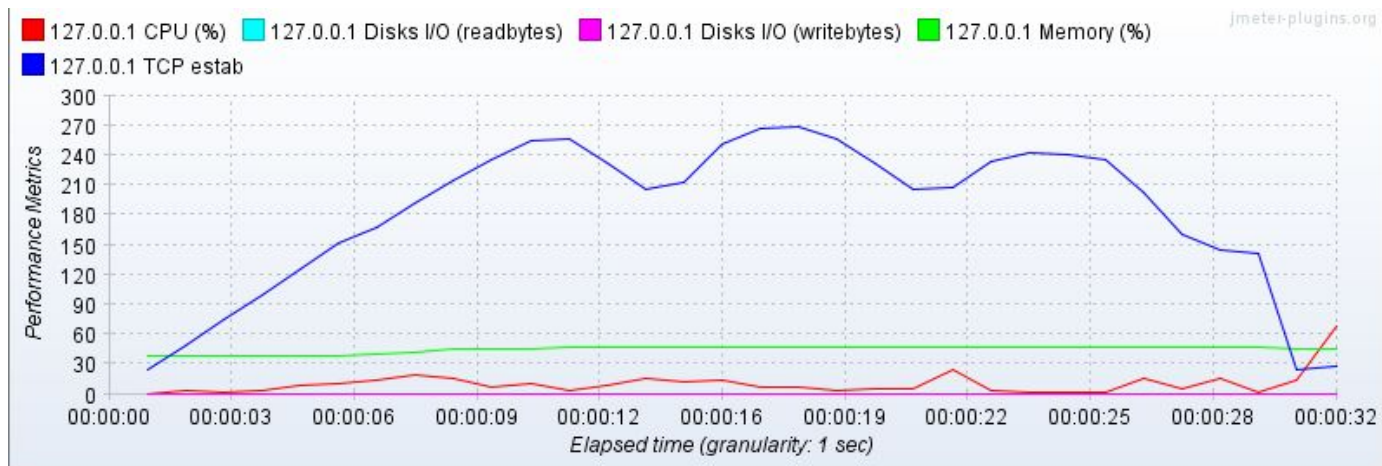
ISBN_Scenario1 (Thread = 1024)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Login	1024	6994	3	64744	8670.04	0.00%	12.5/sec	5.32	2.81	435.0
Get All Books	1024	1854	1	27956	1876.22	0.00%	12.5/sec	46.57	2.84	3806.8
Get A Random Book	1024	1004	1	16483	1760.30	0.00%	12.5/sec	7.16	3.06	585.6
Logout	1024	1498	32	3216	627.75	26.95%	317.2/sec	306.96	30.78	990.9
TOTAL	4096	2837	1	64744	5137.60	6.74%	48.2/sec	68.46	9.55	1454.6
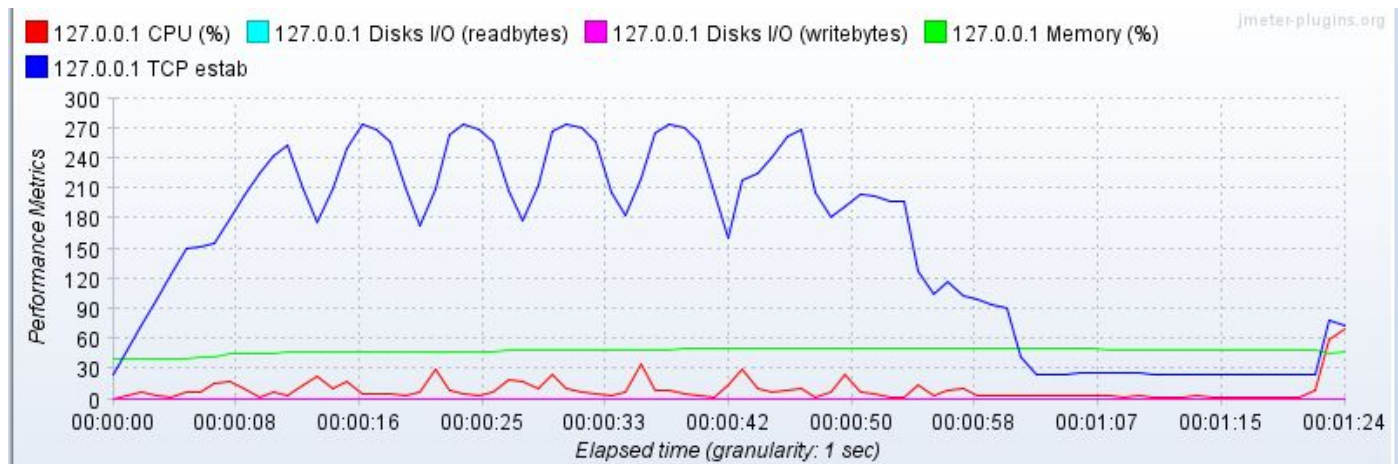
ISBN_Scenario2 (Thread = 256)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	256	3729	4	5831	1367.99	0.00%	17.6/sec	7.48	3.96	435.0
Get All Books	256	3947	138	14197	3598.08	0.00%	18.0/sec	66.99	4.08	3807.0
Get A Rand...	256	9785	72	30067	12263.56	25.78%	8.5/sec	9.10	1.54	1094.9
Logout	256	538	108	824	195.94	0.00%	309.6/sec	122.43	41.11	405.0
TOTAL	1024	4500	4	30067	7241.94	6.45%	17.2/sec	24.07	3.28	1435.5
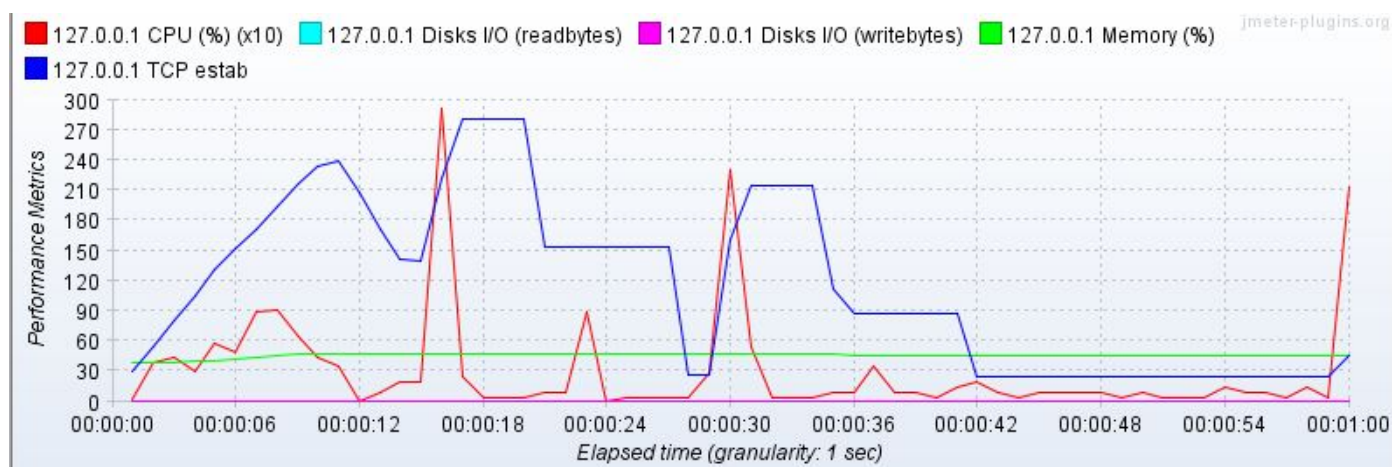
ISBN_Scenario2 (Thread = 512)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	512	5836	4	15164	2666.84	0.00%	17.9/sec	7.60	4.02	435.0
Get All Books	512	10915	17	30560	9014.72	5.08%	16.7/sec	61.24	3.60	3743.7
Get A Rand...	512	8300	179	21424	7251.06	13.48%	23.9/sec	18.33	5.04	786.4
Logout	512	996	234	30566	1337.63	0.20%	16.7/sec	6.69	2.22	409.2
TOTAL	2048	6512	4	30566	7003.75	4.69%	18.4/sec	24.16	3.61	1343.6
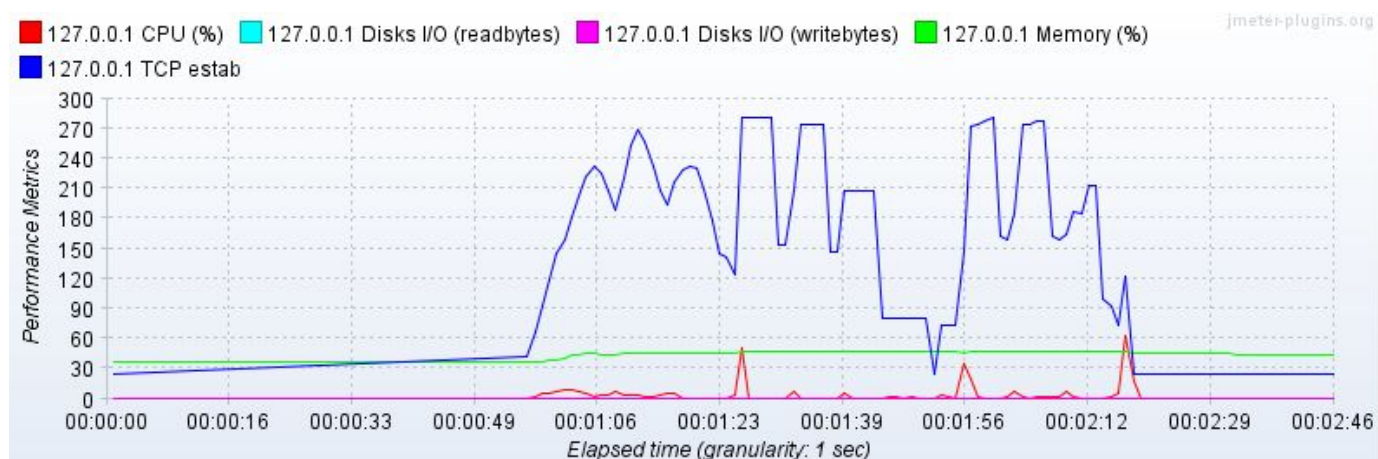
ISBN_Scenario2 (Thread = 1024)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	1024	10648	4	38927	7812.42	0.00%	15.8/sec	6.72	3.55	435.0
Get All Books	1024	5883	47	29439	8091.68	49.80%	34.8/sec	109.96	3.96	3237.6
Get A Rand...	1024	10152	175	35359	10784.59	35.64%	28.9/sec	29.56	4.49	1045.6
Logout	1024	9792	32	31032	13673.59	60.16%	33.0/sec	55.04	1.75	1708.6
TOTAL	4096	9119	4	38927	10536.98	36.40%	25.5/sec	40.01	3.48	1606.7
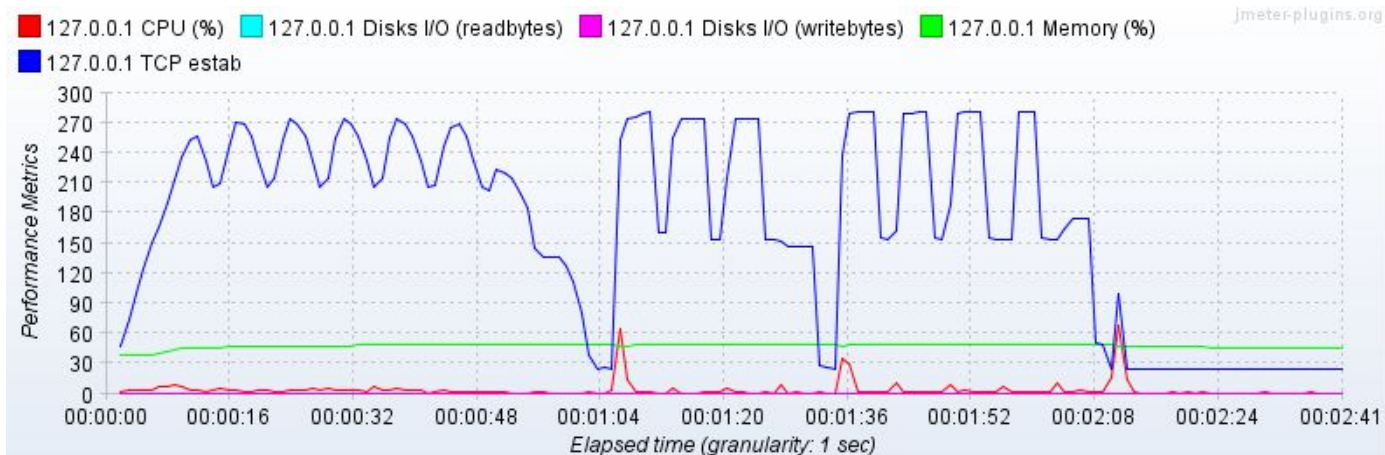
等待所有人登入成功之後再開始做動作，會讓伺服器一瞬間承受大量的request，很容易就會崩潰

CheckInOutBooks_Scenario1 (Thread = 64)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	64	268	4	1457	418.96	0.00%	6.5/sec	2.76	1.46	435.0
Get All Books	64	3	1	12	2.38	0.00%	6.5/sec	24.15	1.47	3806.0
Get A Rand...	64	11	4	39	8.86	0.00%	6.5/sec	10.91	1.62	1719.3
Check In A ...	64	25	12	56	10.79	0.00%	6.5/sec	1.43	1.65	225.0
Check Out ...	64	19	7	93	11.83	0.00%	6.5/sec	1.43	1.66	225.0
Logout	64	110	20	187	51.89	0.00%	340.4/sec	134.57	45.21	404.8
TOTAL	384	72	1	1457	196.58	0.00%	38.1/sec	42.26	8.53	1135.9
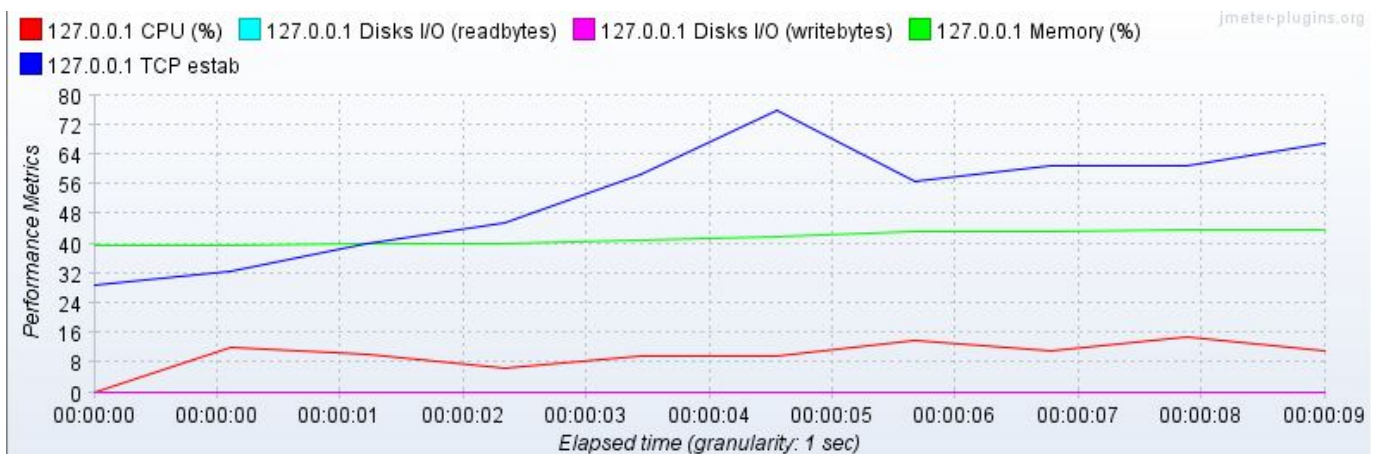
CheckInOutBooks_Scenario1 (Thread = 128)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	128	252	3	2105	520.91	0.00%	6.4/sec	2.74	1.45	435.0
Get All Books	128	11	1	1029	90.38	0.00%	6.4/sec	23.95	1.46	3806.0
Get A Rand...	128	10	3	58	8.61	0.00%	6.4/sec	12.81	1.60	2036.4
Check In A ...	128	21	8	79	11.28	0.00%	6.4/sec	1.42	1.64	225.0
Check Out ...	128	23	6	1022	88.83	0.00%	6.4/sec	1.42	1.64	225.0
Logout	128	194	26	277	71.57	0.00%	458.8/sec	181.41	60.93	404.9
TOTAL	768	85	1	2105	242.11	0.00%	38.0/sec	44.14	8.51	1188.7
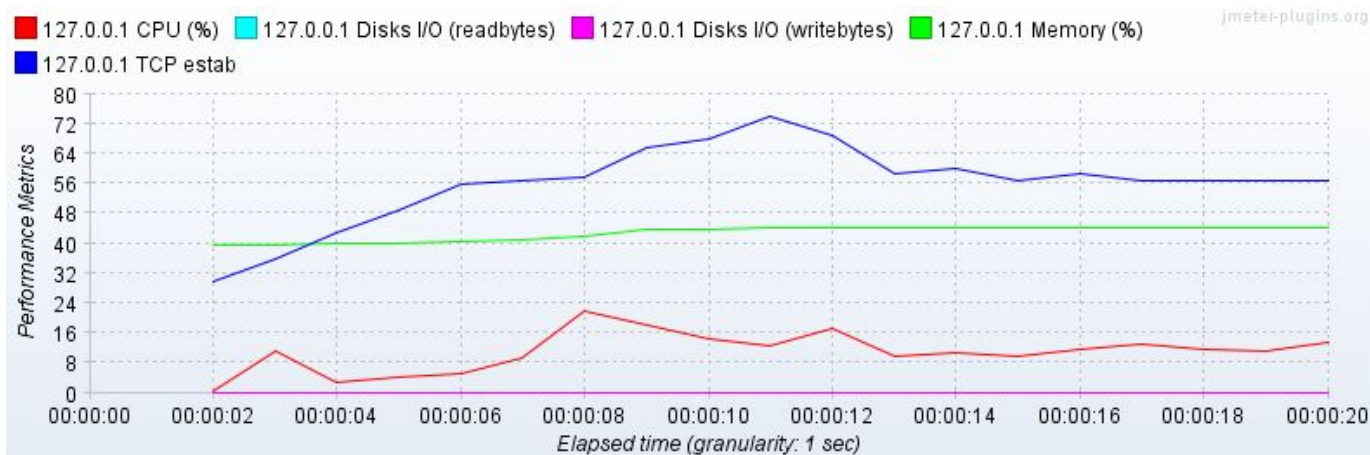
■ 127.0.0.1 CPU (%) ☐ 127.0.0.1 Disks I/O (readbytes) ■ 127.0.0.1 Disks I/O (writebytes) ■ 127.0.0.1 Memory (%)
■ 127.0.0.1 TCP estab

CheckInOutBooks_Scenario1 (Thread = 256)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	256	69	3	1447	234.10	0.00%	6.4/sec	2.73	1.44	435.0
Get All Books	256	2	1	23	2.60	0.00%	6.4/sec	23.86	1.45	3806.0
Get A Rand...	256	7	3	36	4.36	0.00%	6.4/sec	11.71	1.60	1868.7
Check In A ...	256	18	9	57	6.83	0.00%	6.4/sec	1.41	1.64	225.0
Check Out ...	256	14	6	40	5.45	0.00%	6.4/sec	1.41	1.64	225.0
Logout	256	519	13	824	200.81	4.30%	310.7/sec	150.95	39.49	497.5
TOTAL	1536	105	1	1447	224.95	0.72%	37.7/sec	43.31	8.40	1176.2

■ 127.0.0.1 CPU (%) ☐ 127.0.0.1 Disks I/O (readbytes) ■ 127.0.0.1 Disks I/O (writebytes) ■ 127.0.0.1 Memory (%)
■ 127.0.0.1 TCP estab
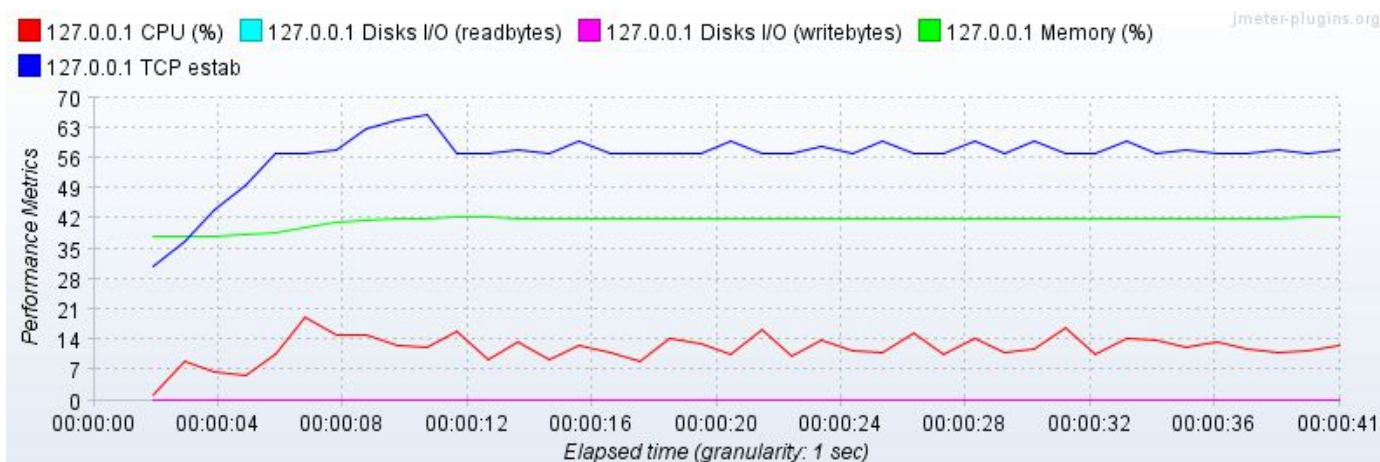
CheckInOutBooks_Scenario2 (Thread = 64)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	64	179	4	1200	314.29	0.00%	6.5/sec	2.75	1.45	435.0
Get All Books	64	110	15	152	36.00	0.00%	421.1/sec	1565.29	95.39	3806.8
Get A Rand...	64	188	24	1067	307.85	0.00%	60.0/sec	102.73	14.94	1753.8
Check In A ...	64	133	119	146	6.91	0.00%	438.4/sec	96.37	111.73	225.1
Check Out ...	64	60	32	77	12.59	0.00%	831.2/sec	183.87	211.85	226.5
Logout	64	27	3	54	13.21	0.00%	1163.6/sec	459.11	154.55	404.0
TOTAL	384	116	3	1200	189.58	0.00%	33.7/sec	37.62	7.55	1141.9

Legend:
■ 127.0.0.1 CPU (%) ■ 127.0.0.1 Disks I/O (readbytes) ■ 127.0.0.1 Disks I/O (writebytes) ■ 127.0.0.1 Memory (%)
■ 127.0.0.1 TCP estab
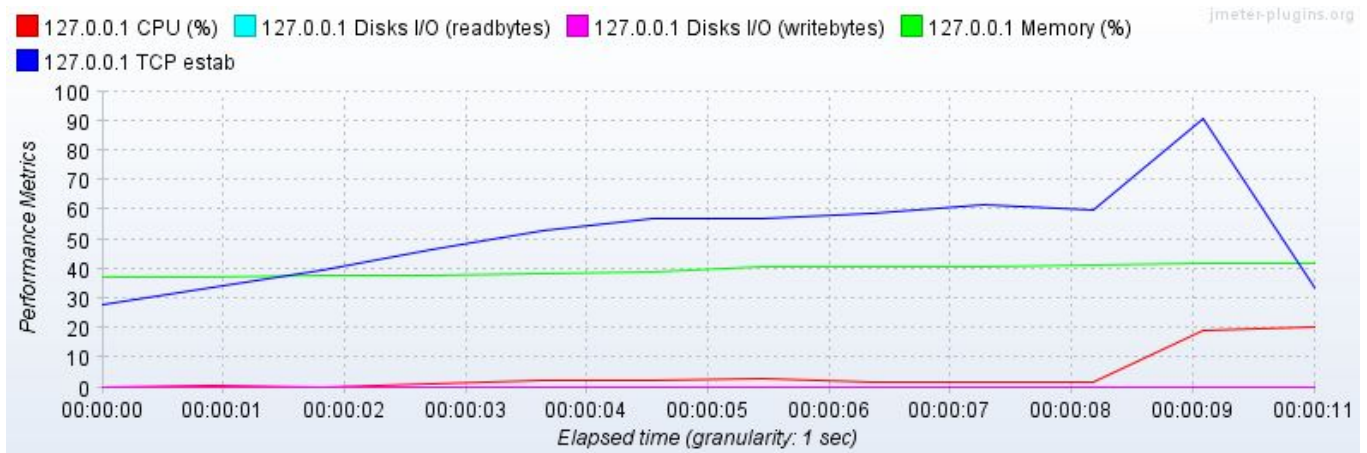
CheckInOutBooks_Scenario2 (Thread = 128)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Login	128	95	3	1231	246.68	0.00%	6.4/sec	2.74	1.45	435.0
Get All Books	128	2998	123	7072	2752.36	0.00%	18.1/sec	67.29	4.10	3806.9
Get A Rand...	128	503	94	7089	754.22	0.00%	18.1/sec	34.15	4.50	1936.9
Check In A ...	128	656	143	7166	716.40	0.00%	17.9/sec	3.94	4.55	226.0
Check Out ...	128	680	133	7160	729.85	0.00%	17.9/sec	3.96	4.56	226.8
Logout	128	254	81	401	96.68	0.00%	316.8/sec	125.31	42.08	405.0
TOTAL	768	864	3	7166	1580.23	0.00%	15.7/sec	18.04	3.52	1172.8
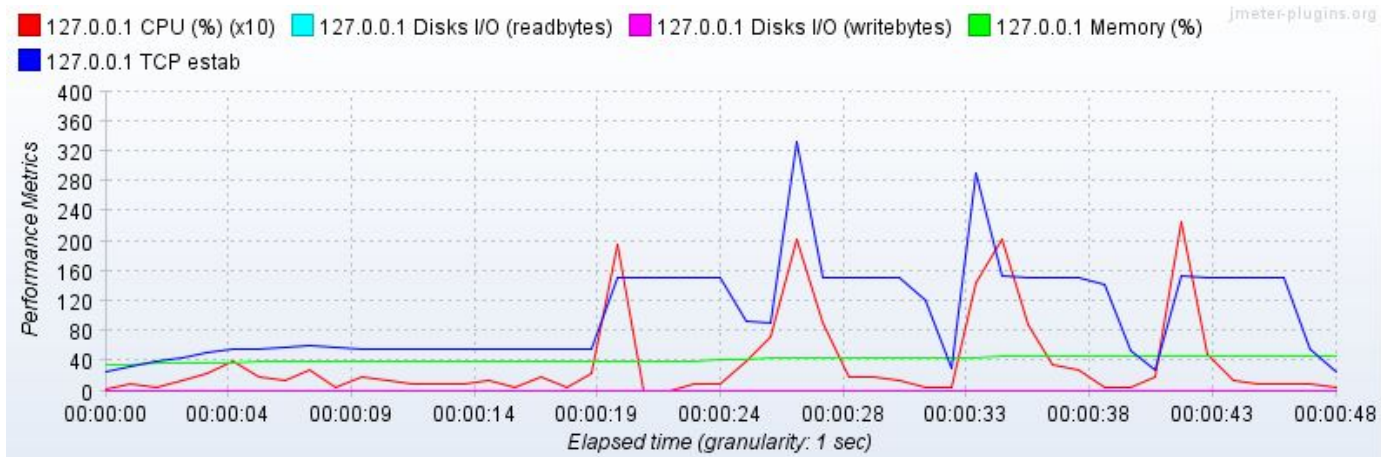
Legend:
■ 127.0.0.1 CPU (%) (x10) ■ 127.0.0.1 Disks I/O (readbytes) ■ 127.0.0.1 Disks I/O (writebytes) ■ 127.0.0.1 Memory (%)
■ 127.0.0.1 TCP estab

CheckInOutBooks_Scenario2 (Thread = 256)

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Login	256	5	3	34	1.99	0.00%	6.4/sec	2.73	1.44	435.0
Get All Books	256	6738	94	14074	4409.36	0.00%	18.2/sec	67.62	4.12	3806.9
Get A Random Book Code	256	4151	120	14153	3611.00	0.00%	18.1/sec	32.32	4.50	1829.6
Check In A Book	256	7333	13	30110	10402.52	21.88%	8.5/sec	6.12	1.69	736.6
Check Out A Book	256	4564	75	14260	3798.69	0.00%	17.9/sec	3.97	4.57	226.4
Logout	256	533	150	790	193.43	0.00%	323.2/sec	127.84	42.93	405.0
TOTAL	1536	3887	3	30110	5802.51	3.65%	13.6/sec	16.42	2.91	1239.9
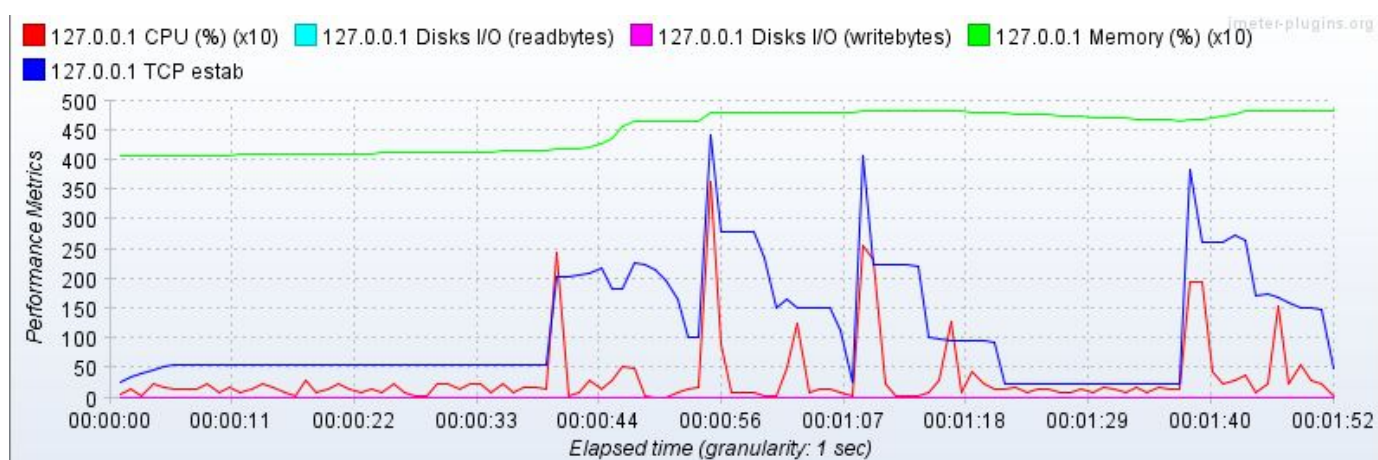
雖然跟Test Case 2&3一樣，等待登入完成再讓所有成做事情，會讓錯誤率提高，但是可能是Thread的數量不夠多，導致錯誤率的漲幅並沒有顯著的提升