

ASSE Project Presentation

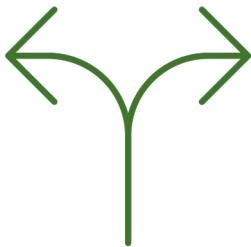
Group 3

by Atilla Güven, Fabian Gubler, Fabio Göldi,
Phil Daniel Natter, Valentin Berger

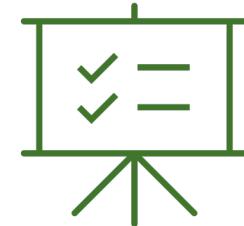
Schedule



Overview



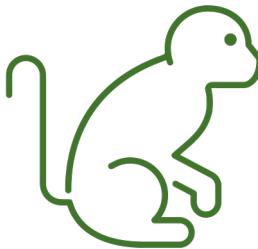
ADRs



Demonstration



JMeter



Chaos Monkey



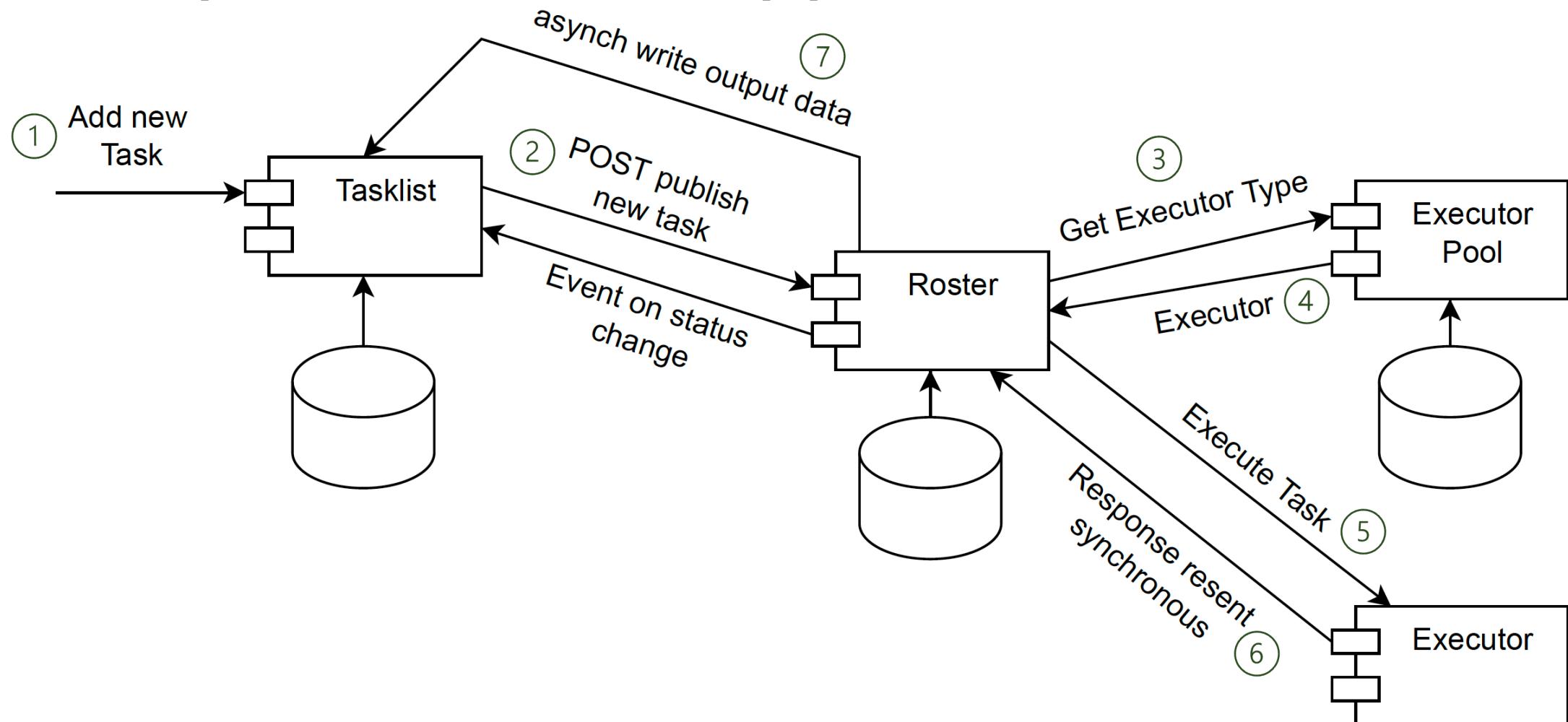
Challenges

Overview



miro

Sequence of the App



Architectural Decisions

- Service granularity
 - 5 Microservices according to the bounded Context
 - Tasklist
 - Executorpool
 - Roster
 - Executor
 - Auction house
- Data Ownership
 - Single Data Ownership
- Data Access
 - Interservice Communication Pattern

Architectural Decisions

- Communication
 - Asynchronous communication
- Data Consistency
 - Eventual consistency
- Coordinated
 - Choreographed distributed workflow
- Code sharing
 - Shared library

Implementation

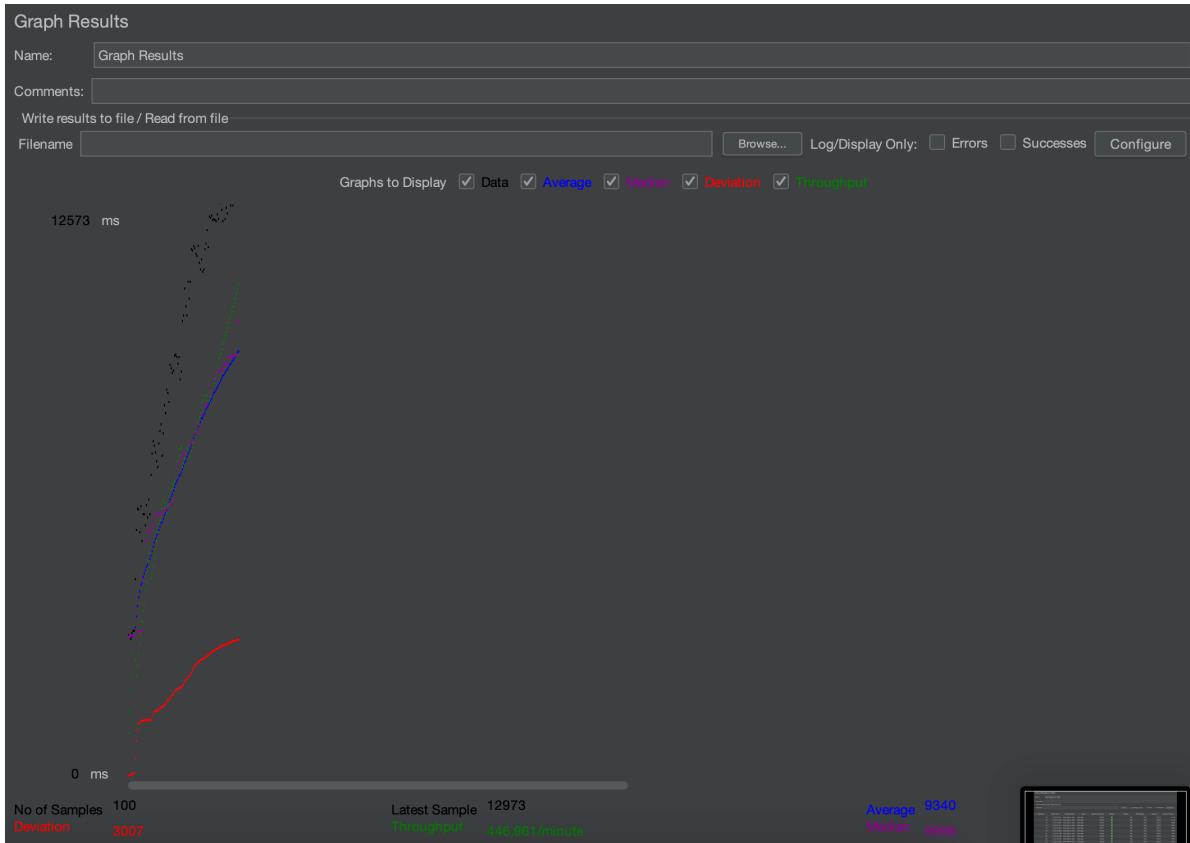
Testing local

	Error	Throughput	Latency	Deviation
POST - Add task - 100	0%	23.0/sec	194 - 3428	804
POST - Add task - 1000	0%	32.4/sec	1090 - 30065	8506
POST - Add task - 5000	stopped at 4071	42.7/sec	2046 - 91558	25263
GET - Get task 100	0%	90.0 /sec	35 - 258	55
GET - Get task 1000	0%	158.3/sec	36 - 6119	1430
GET - Get task 5000	stopped at 4070	217.4/sec	44 - 18405	4061
POST - Add executor - 100	0%	50.2/sec	106 - 1170	279
POST - Add executor - 1000	0%	88.3/sec	421 - 10337	2881
POST - Add executor - 5000	stopped at 4098	42.7/sec	1200 - 35405	8207

Standard Deviation informs us how stable the application under test is.

It tells us if the requests that occur during the test are consistent or not.

Testing VM – add 100 tasks – Load Test



View Results in Table

Name: View Results in Table
Comments:
Write results to file / Read from file
Filename Browse... Log/Display Only: Errors Successes Configure

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(..)
75	11:52:45.721	Add Task to VM...	Add task	12313	✓	186	264	12313	1743
76	11:52:45.769	Add Task to VM...	Add task	12265	✓	186	264	12265	1714
77	11:52:45.821	Add Task to VM...	Add task	12213	✓	186	264	12213	1666
78	11:52:45.871	Add Task to VM...	Add task	12235	✓	186	264	12235	1647
79	11:52:45.900	Add Task to VM...	Add task	12211	✓	186	264	12211	1622
80	11:52:45.932	Add Task to VM...	Add task	12185	✓	186	264	12185	1597
81	11:52:45.784	Add Task to VM...	Add task	12333	✓	186	264	12333	1697
82	11:52:45.890	Add Task to VM...	Add task	12235	✓	186	264	12235	1630
83	11:52:45.561	Add Task to VM...	Add task	12573	✓	186	264	12573	1353
84	11:52:45.262	Add Task to VM...	Add task	12872	✓	186	264	12872	1991
85	11:52:45.699	Add Task to VM...	Add task	12436	✓	186	264	12436	1760
86	11:52:45.940	Add Task to VM...	Add task	12197	✓	186	264	12197	1590
87	11:52:45.582	Add Task to VM...	Add task	12607	✓	186	264	12607	1357
88	11:52:45.971	Add Task to VM...	Add task	12234	✓	186	264	12234	1566
89	11:52:45.762	Add Task to VM...	Add task	12481	✓	186	264	12481	1718
90	11:52:45.882	Add Task to VM...	Add task	12367	✓	186	264	12367	1637
91	11:52:45.367	Add Task to VM...	Add task	12912	✓	186	264	12912	2233
92	11:52:45.171	Add Task to VM...	Add task	13120	✓	186	264	13120	518
93	11:52:45.812	Add Task to VM...	Add task	12534	✓	186	264	12534	863
94	11:52:45.123	Add Task to VM...	Add task	13238	✓	186	264	13238	516
95	11:52:45.829	Add Task to VM...	Add task	12534	✓	186	264	12534	876
96	11:52:45.179	Add Task to VM...	Add task	13229	✓	186	264	13229	519
97	11:52:45.572	Add Task to VM...	Add task	12850	✓	186	264	12850	1932
98	11:52:45.322	Add Task to VM...	Add task	13103	✓	186	264	13103	1978
99	11:52:45.430	Add Task to VM...	Add task	12997	✓	186	264	12997	1923
100	11:52:45.460	Add Task to VM...	Add task	12973	✓	186	264	12973	2036

Scroll automatically? Child samples? No of Samples 100 Latest Sample 12973 Average 8340 Deviation 3007

sample time = response time: difference between time when request has been sent and time when response has been fully received

Testing VM – add 5000 tasks – Stress Test

Results in Table

[View Results in Table](#)

Events:

results to file / Read from file

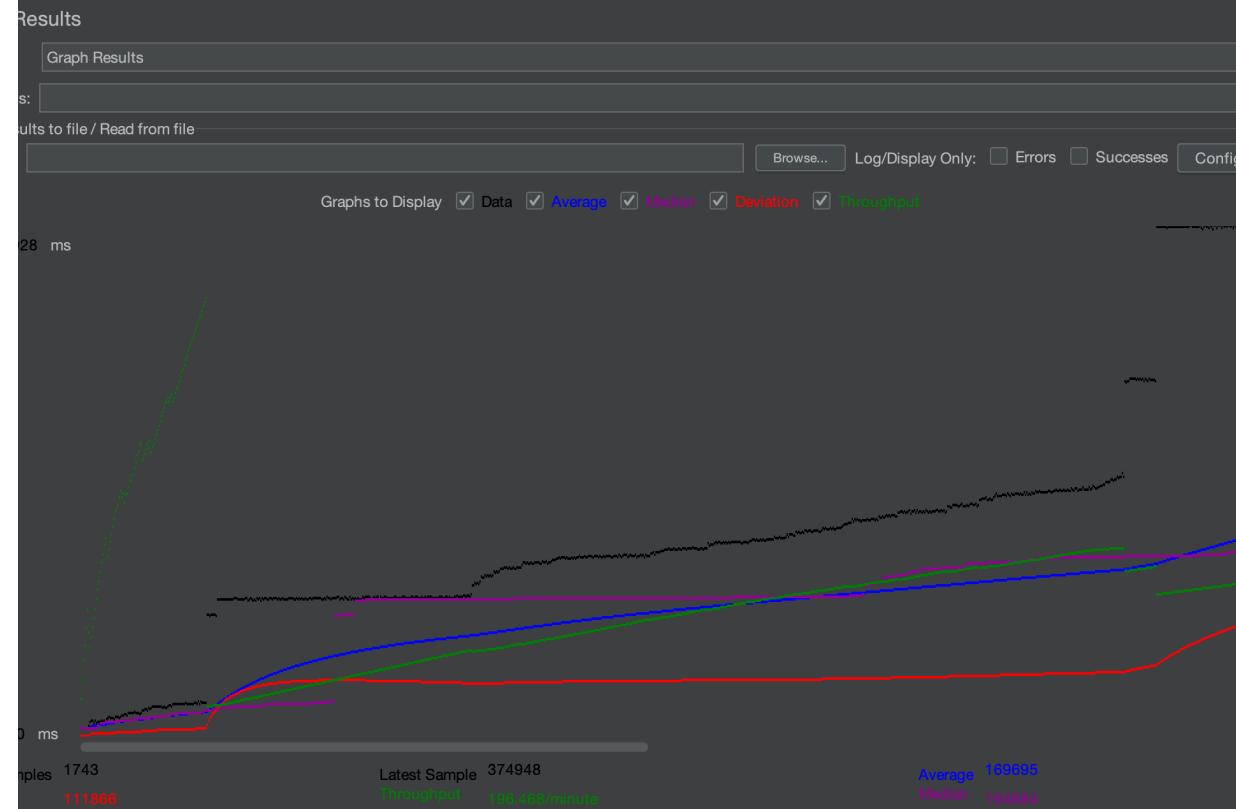
Name []

Sample # Start Time Thread Name Label Sample Time(ms) Status Bytes Sent Bytes Latency Connection

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connection
1720	11:55:21.091	Add Task to VM...	Add task	365100	✓	100	204	365100	
1724	11:55:21.942	Add Task to VM...	Add task	364915	✓	186	264	364915	
1725	11:55:22.327	Add Task to VM...	Add task	364533	✓	186	264	364533	
1726	11:55:21.682	Add Task to VM...	Add task	365178	✓	186	264	365178	
1727	11:55:21.675	Add Task to VM...	Add task	365185	✓	186	264	365185	
1728	11:55:22.386	Add Task to VM...	Add task	364475	✓	186	264	364475	
1729	11:55:21.722	Add Task to VM...	Add task	365145	✓	186	264	365145	
1730	11:55:22.312	Add Task to VM...	Add task	364565	✓	186	264	364565	
1731	11:55:21.724	Add Task to VM...	Add task	365166	✓	186	264	365166	
1732	11:55:22.310	Add Task to VM...	Add task	364580	✓	186	264	364580	
1733	11:55:21.682	Add Task to VM...	Add task	365208	✓	186	264	365208	
1734	11:55:22.349	Add Task to VM...	Add task	364542	✓	186	264	364542	
1735	11:55:21.710	Add Task to VM...	Add task	365462	✓	186	264	365462	
1736	11:55:22.397	Add Task to VM...	Add task	367439	✓	186	264	367439	
1737	11:55:22.364	Add Task to VM...	Add task	367472	✓	186	264	367472	
1738	11:55:22.389	Add Task to VM...	Add task	367447	✓	186	264	367447	
1739	11:55:22.361	Add Task to VM...	Add task	367475	✓	186	264	367475	
1740	11:55:22.381	Add Task to VM...	Add task	367456	✓	186	264	367456	
1741	11:55:22.384	Add Task to VM...	Add task	367453	✓	186	264	367453	
1742	11:55:22.363	Add Task to VM...	Add task	371977	✓	186	264	371977	
1743	11:55:22.361	Add Task to VM...	Add task	374948	✓	186	264	374948	

Roll automatically? Child samples?

No of Samples 1743 Latest Sample 374948 Average 189685 Deviation 111866



- high latency
- stopped at thread 1743
- VM crashed

Testing VM – get 100 tasks – Load Test

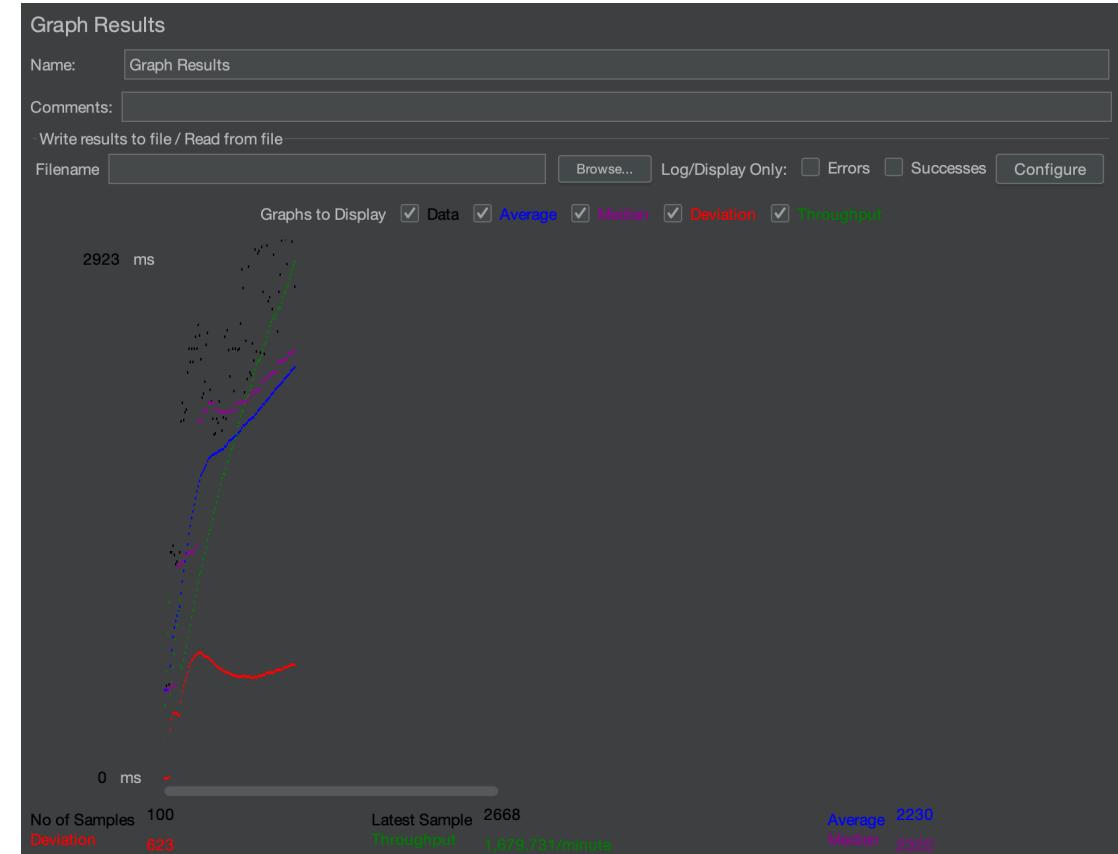
View Results in Table

Name: Comments:

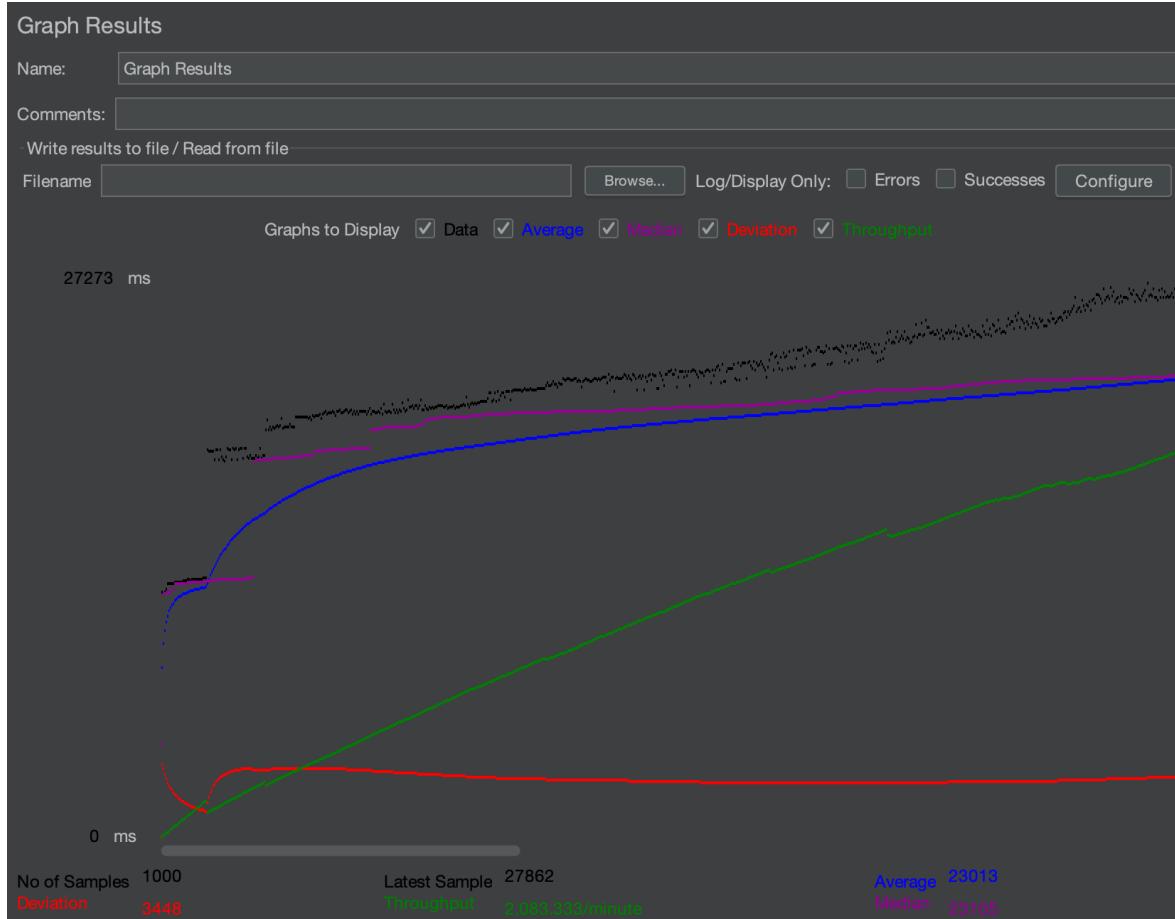
- Write results to file / Read from file

Sample #	Start Time	Thread Name	Label	Sample Tim...	Status	Bytes	Sent Bytes	Latency	Connect Ti...
80	12:19:15.000	Tappas use...	HTTP Tapp...	2602	✓	457	366	760	3
81	12:19:15.015	Tappas use...	HTTP Tapp...	2615	✓	457	366	217	5
82	12:19:14.635	Tappas use...	HTTP Tapp...	3003	✓	457	366	666	4
83	12:19:15.113	Tappas use...	HTTP Tapp...	2551	✓	457	366	89	4
84	12:19:14.828	Tappas use...	HTTP Tapp...	2842	✓	457	366	307	4
85	12:19:14.544	Tappas use...	HTTP Tapp...	3186	✓	457	366	191	4
86	12:19:14.662	Tappas use...	HTTP Tapp...	3078	✓	457	366	279	4
87	12:19:15.317	Tappas use...	HTTP Tapp...	2426	✓	457	366	652	3
88	12:19:15.127	Tappas use...	HTTP Tapp...	2644	✓	457	366	705	4
89	12:19:15.073	Tappas use...	HTTP Tapp...	2735	✓	457	366	878	4
90	12:19:14.888	Tappas use...	HTTP Tapp...	2921	✓	457	366	234	17
91	12:19:14.618	Tappas use...	HTTP Tapp...	3199	✓	457	366	159	3
92	12:19:14.698	Tappas use...	HTTP Tapp...	3126	✓	457	366	839	3
93	12:19:14.927	Tappas use...	HTTP Tapp...	2923	✓	457	366	719	4
94	12:19:15.057	Tappas use...	HTTP Tapp...	2793	✓	457	366	100	4
95	12:19:14.766	Tappas use...	HTTP Tapp...	3106	✓	457	366	73	4
96	12:19:14.845	Tappas use...	HTTP Tapp...	3027	✓	457	366	802	4
97	12:19:14.728	Tappas use...	HTTP Tapp...	3149	✓	457	366	858	3
98	12:19:14.967	Tappas use...	HTTP Tapp...	2914	✓	457	366	137	4
99	12:19:14.908	Tappas use...	HTTP Tapp...	2980	✓	457	366	2668	4
100	12:19:15.228	Tappas use...	HTTP Tapp...	2668	✓	457	366	569	4

Scroll automatically? Child samples? No of Samples 100 Latest Sample 2668 Average 2230 Deviation 623



Testing VM – get 1000 tasks – Stress Test



View Results in Table

Name: View Results in Table

Comments: Write results to file / Read from file

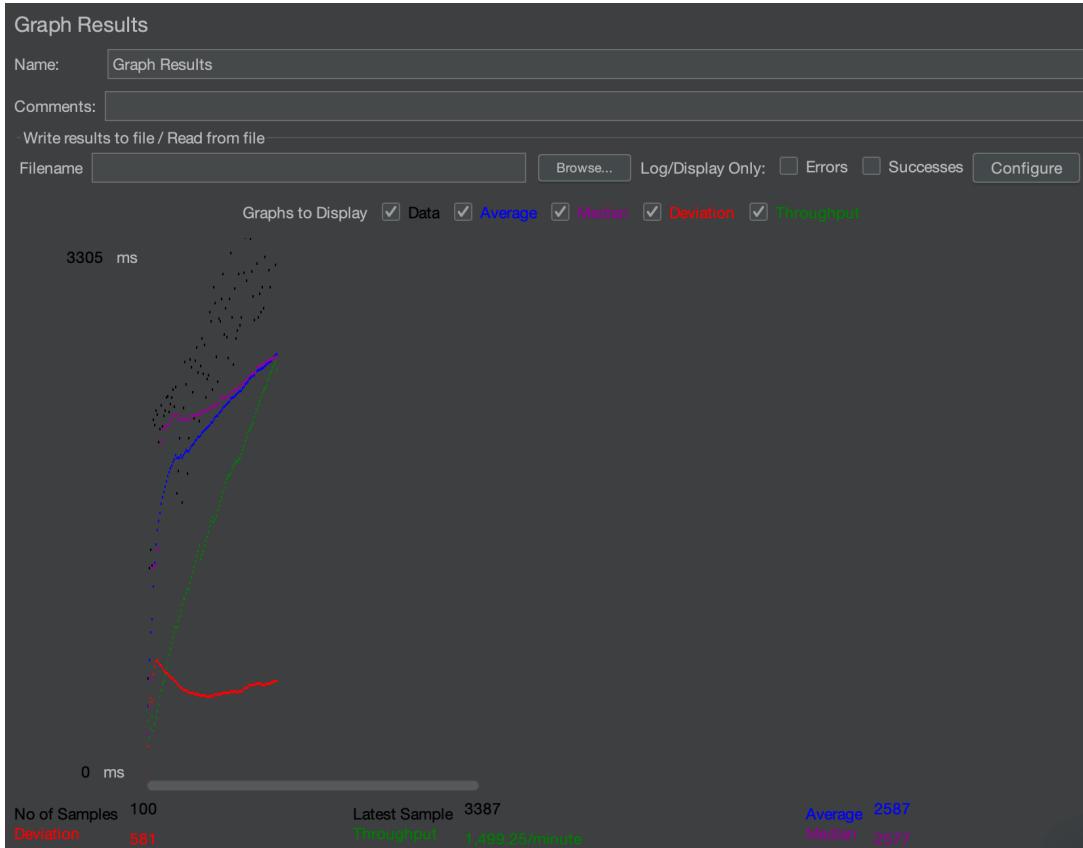
Filename Browse... Log/Display Only: Errors Successes Configure

Sample #	Start Time	Thread Name	Label	Sample Tim...	Status	Bytes	Sent Bytes	Latency	Connect Ti...
980	12:25:45.773	Tappas use...	HTTP Tapp...	27737	✓	457	366	8387	4
981	12:25:45.759	Tappas use...	HTTP Tapp...	28161	✓	457	366	8387	5
982	12:25:45.768	Tappas use...	HTTP Tapp...	28152	✓	457	366	3975	5
983	12:25:45.984	Tappas use...	HTTP Tapp...	27936	✓	457	366	8009	3
984	12:25:46.180	Tappas use...	HTTP Tapp...	27749	✓	457	366	8166	4
985	12:25:46.029	Tappas use...	HTTP Tapp...	27911	✓	457	366	4018	4
986	12:25:45.899	Tappas use...	HTTP Tapp...	28041	✓	457	366	4020	5
987	12:25:45.896	Tappas use...	HTTP Tapp...	28044	✓	457	366	4024	3
988	12:25:45.835	Tappas use...	HTTP Tapp...	28115	✓	457	366	4045	5
989	12:25:45.867	Tappas use...	HTTP Tapp...	28083	✓	457	366	3993	5
990	12:25:45.933	Tappas use...	HTTP Tapp...	28017	✓	457	366	8156	6
991	12:25:46.054	Tappas use...	HTTP Tapp...	27896	✓	457	366	4039	4
992	12:25:45.874	Tappas use...	HTTP Tapp...	28076	✓	457	366	4031	4
993	12:25:45.995	Tappas use...	HTTP Tapp...	27955	✓	457	366	3974	4
994	12:25:45.840	Tappas use...	HTTP Tapp...	28110	✓	457	366	4027	5
995	12:25:46.100	Tappas use...	HTTP Tapp...	27850	✓	457	366	3624	3
996	12:25:45.827	Tappas use...	HTTP Tapp...	28135	✓	457	366	4031	4
997	12:25:45.776	Tappas use...	HTTP Tapp...	28186	✓	457	366	8381	4
998	12:25:46.118	Tappas use...	HTTP Tapp...	27849	✓	457	366	3615	4
999	12:25:46.150	Tappas use...	HTTP Tapp...	27825	✓	457	366	3603	4
1000	12:25:46.118	Tappas use...	HTTP Tapp...	27862	✓	457	366	3616	4

Scroll automatically? Child samples? No of Samples 1000 Latest Sample 27862 Average 23013 Deviation 3448

- VM crashed again, so we just made 1000 threads

Testing VM – add 100 executor – Load Test



View Results in Table

Name: View Results in Table

Comments:

Write results to file / Read from file

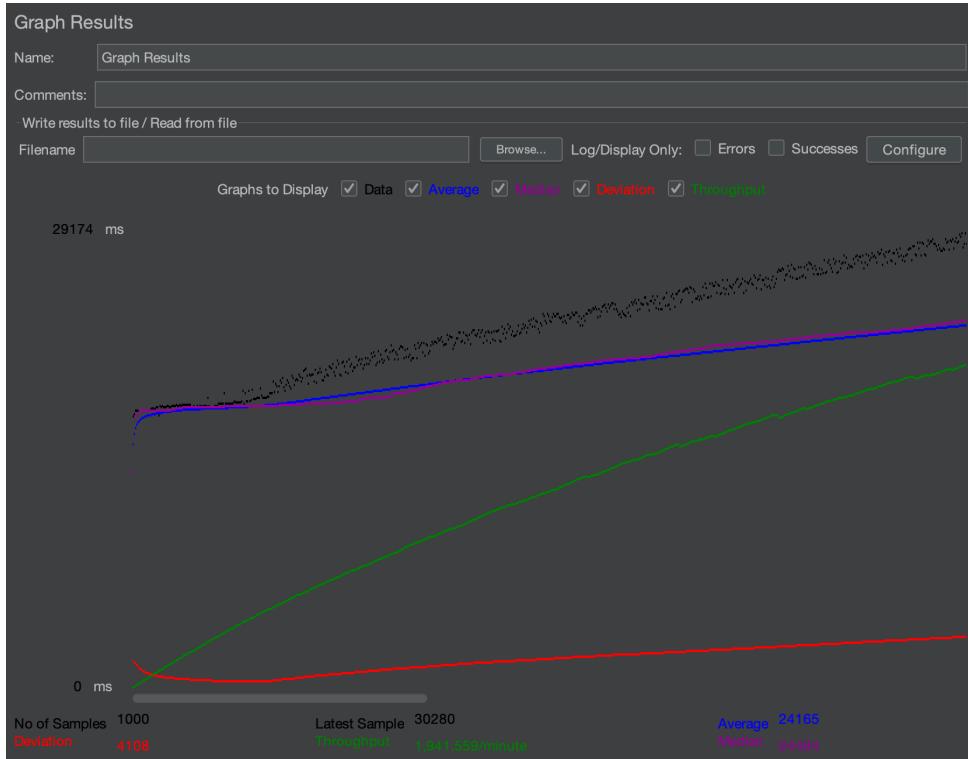
Filename Browse... Log/Display Only: Errors Successes

Sample #	Start Time	Thread Name	Label	Sample Tim...	Status	Bytes	Sent Bytes	Latency	Connect Ti...
80	12:34:17.030	Thread Gro...	HTTP Requ...	3097	✓	197	310	3097	1634
81	12:34:17.080	Thread Gro...	HTTP Requ...	2944	✓	197	310	2944	1149
82	12:34:17.240	Thread Gro...	HTTP Requ...	2797	✓	197	310	2797	1403
83	12:34:17.389	Thread Gro...	HTTP Requ...	3518	✓	197	310	3518	1101
84	12:34:16.670	Thread Gro...	HTTP Requ...	3149	✓	197	310	3149	1660
85	12:34:17.041	Thread Gro...	HTTP Requ...	2813	✓	197	310	2813	1193
86	12:34:17.378	Thread Gro...	HTTP Requ...	2964	✓	197	310	2964	1144
87	12:34:17.230	Thread Gro...	HTTP Requ...	2846	✓	197	310	2846	1418
88	12:34:17.349	Thread Gro...	HTTP Requ...	3005	✓	197	310	3005	1144
89	12:34:17.197	Thread Gro...	HTTP Requ...	2874	✓	197	310	2874	1180
90	12:34:17.340	Thread Gro...	HTTP Requ...	3186	✓	197	310	3186	1653
91	12:34:17.051	Thread Gro...	HTTP Requ...	3384	✓	197	310	3384	1022
92	12:34:16.861	Thread Gro...	HTTP Requ...	3326	✓	197	310	3326	1014
93	12:34:16.920	Thread Gro...	HTTP Requ...	3104	✓	197	310	3104	1124
94	12:34:17.150	Thread Gro...	HTTP Requ...	2998	✓	197	310	2998	1156
95	12:34:17.257	Thread Gro...	HTTP Requ...	3375	✓	197	310	3375	1022
96	12:34:16.897	Thread Gro...	HTTP Requ...	3542	✓	197	310	3542	1085
97	12:34:16.731	Thread Gro...	HTTP Requ...	3578	✓	197	310	3578	1096
98	12:34:16.710	Thread Gro...	HTTP Requ...	3136	✓	197	310	3136	1569
99	12:34:17.169	Thread Gro...	HTTP Requ...	3387	✓	197	310	3387	1665
100	12:34:17.031	Thread Gro...	HTTP Requ...						

Scroll automatically? Child samples? No of Samples 100 Latest Sample 3387 Average 2587 Deviation 581

- less latency than with adding tasks

Testing VM – add 1000 executor – Stress Test



View Results in Table

Name: View Results in Table

Comments: Write results to file / Read from file

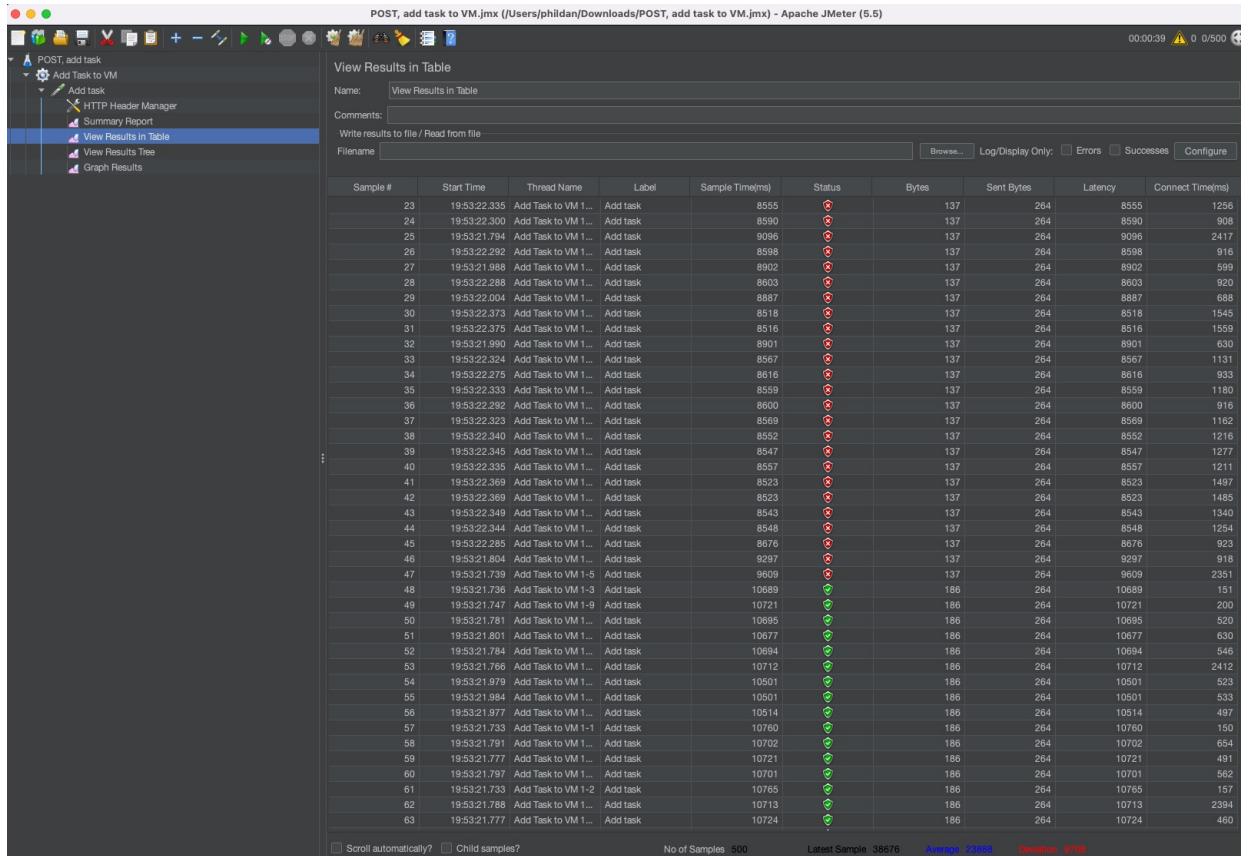
Filename: Browse... Log/Display Only: Errors Successes Configure

Sample #	Start Time	Thread Name	Label	Sample Tim...	Status	Bytes	Sent Bytes	Latency	Connect Ti...
981	12:37:21.495	Thread Gro...	HTTP Requ...	30042	✓	197	310	30042	16725
982	12:37:21.508	Thread Gro...	HTTP Requ...	30038	✓	197	310	30038	16747
983	12:37:21.490	Thread Gro...	HTTP Requ...	30058	✓	197	310	30058	16720
984	12:37:21.262	Thread Gro...	HTTP Requ...	30286	✓	197	310	30286	16160
985	12:37:20.832	Thread Gro...	HTTP Requ...	30718	✓	197	310	30718	16851
986	12:37:21.482	Thread Gro...	HTTP Requ...	30070	✓	197	310	30070	16522
987	12:37:20.932	Thread Gro...	HTTP Requ...	30627	✓	197	310	30627	16799
988	12:37:20.960	Thread Gro...	HTTP Requ...	30601	✓	197	310	30601	16811
989	12:37:21.486	Thread Gro...	HTTP Requ...	30077	✓	197	310	30077	16711
990	12:37:21.241	Thread Gro...	HTTP Requ...	30322	✓	197	310	30322	16037
991	12:37:21.497	Thread Gro...	HTTP Requ...	30068	✓	197	310	30068	16735
992	12:37:20.960	Thread Gro...	HTTP Requ...	30611	✓	197	310	30611	16803
993	12:37:21.337	Thread Gro...	HTTP Requ...	30236	✓	197	310	30236	16245
994	12:37:21.279	Thread Gro...	HTTP Requ...	30295	✓	197	310	30295	16150
995	12:37:21.481	Thread Gro...	HTTP Requ...	30094	✓	197	310	30094	16636
996	12:37:21.330	Thread Gro...	HTTP Requ...	30247	✓	197	310	30247	16233
997	12:37:21.696	Thread Gro...	HTTP Requ...	29883	✓	197	310	29883	15577
998	12:37:21.255	Thread Gro...	HTTP Requ...	30335	✓	197	310	30335	16130
999	12:37:21.468	Thread Gro...	HTTP Requ...	30127	✓	197	310	30127	16572
1000	12:37:21.318	Thread Gro...	HTTP Requ...	30280	✓	197	310	30280	16208

Scroll automatically? Child samples? No of Samples 1000 Latest Sample 30280 Average 24165 Deviation 4108

Problems with VM

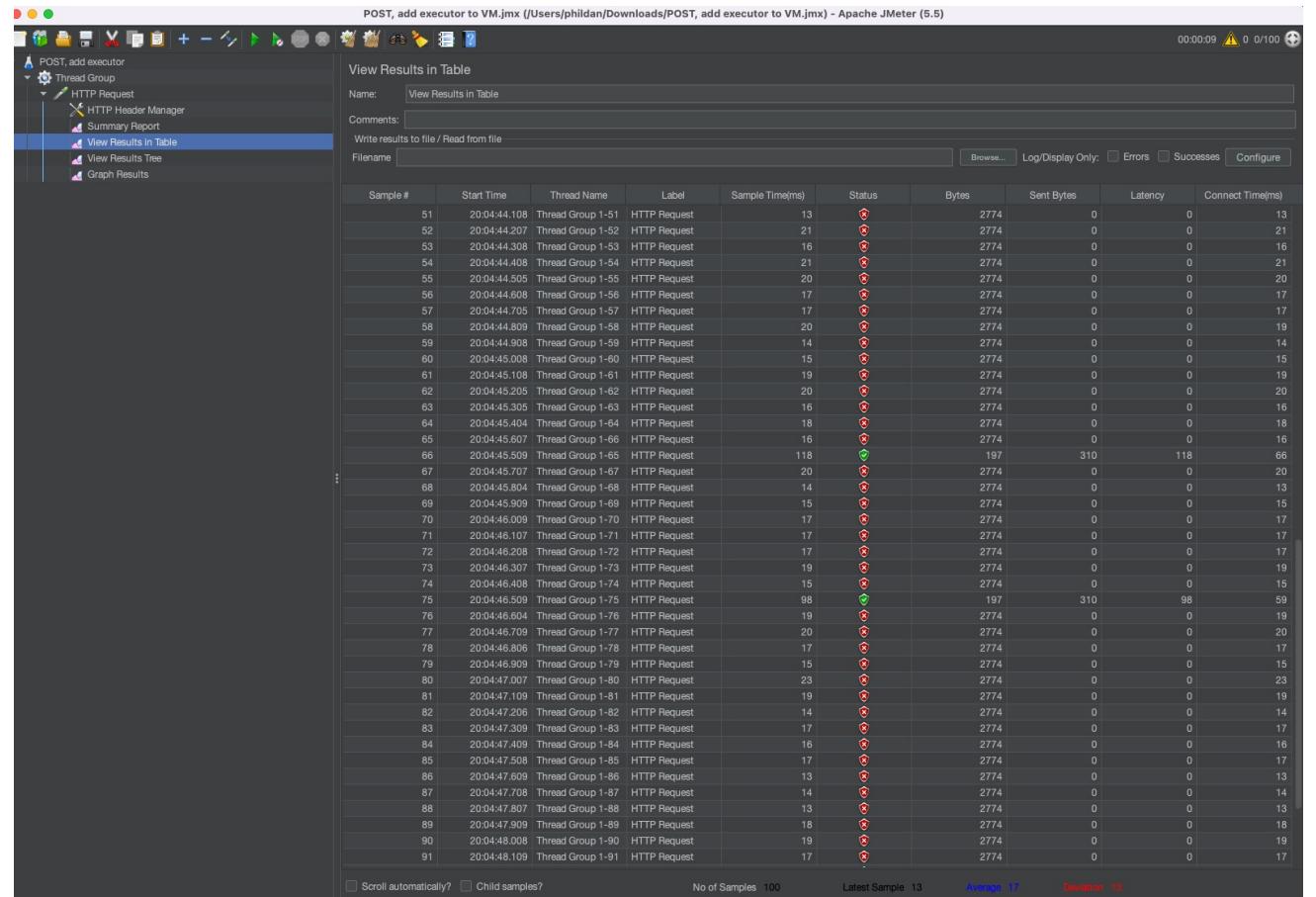
- the first requests end in an error
- same problem with add executor



VM	Error	Throughput	Latency	Deviation
POST - Add task - 100	0%	6.9/sec	3000 - 13254	3005
POST - Add task - 500	9%	12.7/sec	10105 - 38676	9708

Problems with VM

- just a few requests between a lot of errors are successful



VM	Error	Throughput	Latency	Deviation
POST - Add executor - 100	98%	10.7/sec		

Chaos Engineering

Chaos Monkey

Chaos tests using Rest Endpoints and one chaos toolkit workflow

JMeter

Examined behavioral changes of app by sending requests

Latency	<ul style="list-style-type: none">• Requests could still be handled• However, user must expect longer loading times
Memory	<ul style="list-style-type: none">• Assault did not pose problems• handled differently depending on Java version)
Exception	<ul style="list-style-type: none">• Requests could not be handled by tasklist service
Killapp	<ul style="list-style-type: none">• Tasklist service restarts without issues (502)• No tasks can be created for a brief period (~ 30 sec.)

Status	Bytes	Sent Bytes	Latency	Connect Time(...)
✓	186	264	18670	179
✓	186	264	19014	484
✓	186	264	15018	176
✓	186	264	15986	83
✓	186	264	15096	63
✓	186	264	14761	75
✓	186	264	16181	47
✓	186	264	17352	61
✓	186	264	18115	43
✓	186	264	15490	61
✓	186	264	16896	223
✓	186	264	15226	44
✓	186	264	19029	108
✓	186	264	16238	69
✓	186	264	15287	76
✓	186	264	17592	53
✓	186	264	15390	46
✓	186	264	16132	66
✓	186	264	16756	47
✓	186	264	15464	157
✓	186	264	17008	76
✓	186	264	16888	55
✓	186	264	16835	112
✓	186	264	18925	68
✓	186	264	18188	152
✓	186	264	20687	60

Latest Sample 20687 Average 16110 Deviation 1713

Status	Bytes	Sent Bytes	Latency	Connect Time(...)
✗	612	264	110	58
✗	612	264	103	54
✗	612	264	95	53
✗	612	264	87	46
✗	612	264	79	47
✗	612	264	83	55
✗	612	264	69	50
✗	612	264	74	48
✗	612	264	63	45
✗	612	264	69	47
✗	612	264	65	37
✗	612	264	82	56
✗	612	264	78	46
✗	612	264	61	43
✗	612	264	69	41
✗	612	264	76	44
✗	612	264	70	49
✗	612	264	85	57
✗	612	264	73	52
✗	612	264	82	61
✗	612	264	84	52
✗	612	264	62	40
✗	612	264	86	56
✗	612	264	81	39
✗	612	264	82	43
✗	612	264	51	34

Latest Sample 77 Average 74 Deviation 10

POST {{vm}}/tasks/

Params Authorization Headers (8) Body

none form-data x-www-form-urlencoded

```

1   ...
2   ... "taskName": "Test_Task_#3",
3   ... "taskType": "COMPUTE_ADD",
4   ... "inputData": "1,3"
5   ...
6   /* available types: joke, compute-add
7

```

Body Cookies Headers (3) Test Results

Pretty Raw Preview Visualize Text

1 Bad Gateway

Adding Random Latency (1000 – 3000)

Exception Assault

Kill app / Restart

Key Takeaways

- 1 For current use case our **VM was sufficient**, in terms of handling the requests, when introducing random latency and recovery after killing the application
- 2 We should **implement better exception handling**, as with the current state information about the requested task is lost.
- 3 It is **challenging to quantify the results** obtained by chaos engineering, due to the lack of metrics. To achieve **reproducibility** **chaos toolkit** was required

Outlook



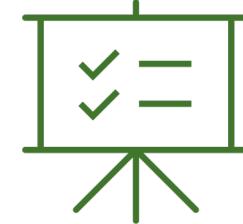
Break

Changing and Refactoring our Components to meet needs of our ADRs



Challenge: Testing

Struggled with Tests concerning our mongo database



Team Atmosphere

Good Communication, Pair-programming, Confident in solving upcoming assignment

Thank you (and
Stack Overflow)!

