Content

Scope of testing

The following items are part of the scope:

1. Find pets
2. Add pets
3. Place an order
4. User login

Terminology

- Tps = transactions per second.

Findings

Find pets

2120 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Get - Find pet by ID	127200	327	4	13510	414.86	0.01%	5515.1/sec	2742.11	861.68
TOTAL	127200	327	4	13510	414.86	0.01%	5515.1/sec	2742.11	861.68

2135 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Get - Find pet by ID	128100	390	0	2519	306.83	1.23%	5244.4/sec	2740.89	809.33
TOTAL	128100	390	0	2519	306.83	1.23%	5244.4/sec	2740.89	809.33

2150 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Get - Find pet by ID	129000	407	0	14554	614.93	2.91%	4760.7/sec	2653.45	722.21
TOTAL	129000	407	0	14554	614.93	2.91%	4760.7/sec	2653.45	722.21

2200 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Get - Find pet by ID	132000	438	0	24438	1810.61	3.47%	3868.5/sec	2201.35	583.45
TOTAL	132000	438	0	24438	1810.61	3.47%	3868.5/sec	2201.35	583.45

I performed several tests and found that the server normally supports 2120tps. As we can see in the first image above, I sent a total of 127200 transactions (2120 transactions per second 60 times) and only 0.01% failed. The average time for each transaction is 327ms and the max time a transaction took was 13.5 seconds.

We can see that once transactions exceed 2120 per second the error rate starts to increase.

User login

2060 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Get - user login	12360	2164	1	15217	4056.24	0.03%	682.8/sec	305.11	128.65
TOTAL	12360	2164	1	15217	4056.24	0.03%	682.8/sec	305.11	128.65

2100 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Get - user login	12600	2170	1	15649	4050.56	1.24%	668.2/sec	315.71	124.38
TOTAL	12600	2170	1	15649	4050.56	1.24%	668.2/sec	315.71	124.38

2170 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Get - user login	13020	2077	11	14919	3769.41	5.41%	736.3/sec	413.04	131.27
TOTAL	13020	2077	11	14919	3769.41	5.41%	736.3/sec	413.04	131.27

2200 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Get - user login	13200	2502	1	24457	5520.54	18.36%	489.7/sec	409.36	75.36
TOTAL	13200	2502	1	24457	5520.54	18.36%	489.7/sec	409.36	75.36

For user login the server usually supports 2120tps with a 0.03% error rate. In this case the average time for each transaction is 2.1 seconds and the max time a transaction took was 15.2 seconds, which means that a user must wait a max of 15 seconds to be able to login to the system and at least 1 user out of 2120 won't be able to login.

If the quantity of users increases to 2200 per second, each user must wait a max of 24.4 seconds and it's possible that 403 users won't be able to login due the error rate increases considerably to 18.36%.

Add pets

38 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Post - Add a new pet	2280	387	1	15579	1441.30	0.04%	95.9/sec	45.59	38.56
TOTAL	2280	387	1	15579	1441.30	0.04%	95.9/sec	45.59	38.56

40 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Post - Add a new pet	2400	363	1	13514	1424.49	0.29%	107.3/sec	51.23	43.14
TOTAL	2400	363	1	13514	1424.49	0.29%	107.3/sec	51.23	43.14

42 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Post - Add a new pet	2520	394	1	14845	1523.79	0.36%	103.7/sec	49.98	41.56
TOTAL	2520	394	1	14845	1523.79	0.36%	103.7/sec	49.98	41.56

45 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Post - Add a new pet	2700	368	0	4489	358.95	9.67%	108.4/sec	71.96	39.67
TOTAL	2700	368	0	4489	358.95	9.67%	108.4/sec	71.96	39.67

The server support 38tps with a 0.04% error rate when trying to add pets to the store. Between 39-42 tps the server still response with an error rate less than 0.4%. For these cases, the max time a transaction took was between 13 and 16 seconds.

Once the server reaches 45 tps the error rate increases considerably to 9.67%

Place an order

6 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Post - place an order for a pet	360	364	4	13346	1369.00	0.00%	16.1/sec	7.31	5.30
TOTAL	360	364	4	13346	1369.00	0.00%	16.1/sec	7.31	5.30

7 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Post - place an order for a pet	420	383	21	2319	290.92	0.95%	17.6/sec	8.28	5.76
TOTAL	420	383	21	2319	290.92	0.95%	17.6/sec	8.28	5.76

8 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Post - place an order for a pet	480	384	3	14379	1353.27	2.50%	20.4/sec	9.26	6.71
TOTAL	480	384	3	14379	1353.27	2.50%	20.4/sec	9.26	6.71

9 tps

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec
Post - place an order for a pet	540	388	2	15070	1631.09	9.44%	22.7/sec	10.31	7.46
TOTAL	540	388	2	15070	1631.09	9.44%	22.7/sec	10.31	7.46

For the most critical functionality, the server only supports 6tps with an average time of 354ms and a max time of 13 seconds.

Once the quantity of transactions increases, the error rate also increases exponentially reaching 9.44% for 9tps, suggesting the server struggles with higher loads.

Recommendations

- **Find pets and User login:** The server performs well at or below 2100 tps with minimal errors, but performance degrades beyond this point. Monitor the load and consider scaling the infrastructure if higher loads are expected.
- **Add pets:** The server seems to perform well until 38 tps with minor tolerance up to 42 tps. If higher loads are expected, consider increasing the server capacity due the performance degrades exponentially above 43 tps.
- **Place an order:** This operation is the most critical, with the server struggling at only 6tps. Consider optimizing this operation or increasing server capacity to improve performance and reduce error rates under higher loads.