Linnéuniversitetet
Kalmar Växjö

Assignment

Performance Engineering

Författare: Helena Tevar
Examinator: Diego Perez
Termin: 19VT
Ämne: Software Engineering Design
Kurskod: 2DV603

Index

Introduction

This report shows the results of the mathematical representation fo the behaviour from the system proposed, a model created with JMT and the results got by it.

Calculations

Server	S	X	U
1 - Web Server	0.2508	0.83	0.209
2 - User App S	0.1992	3	0.2988
3 - User App L	0.0996	3	0.2988
4 - Admin App S	0.3	0.16	0.05
5 - Admin App L	0.1	0.16	0.016
6 - DB	0.05	2.5	0.125
7 - Security Check	0.3	0.83	0.25

Web Server

$$C_1 = 6000 \quad B_1 = 1504.8$$

$$S_1 = \frac{1504.8}{6000} = 0.2508$$

$$X_1 = \frac{6000}{7200} = 0.8\widehat{3}$$

$$U_1 = \frac{1504.8}{7200} = 0.209$$

User App Server

$$C_2 = 21600 \quad U_2 = 0.2988 \quad c = 2$$

$$X_2 = \frac{21600}{7200} = 3$$

$$S_2 = \frac{0.2988}{3} \cdot 2 = 0.1992$$

User App Log

$$C_3 = 21600 \quad U_3 = 0.2988$$

$$S_3 = \frac{0.2988}{3} = 0.0996$$

$$X_3 = \frac{21600}{7200} = 3$$

Admin App Server

$$C_4 = 1200 \quad B_4 = 360$$

$$X_4 = \frac{1200}{7200} = 0.1\widehat{6}$$

$$S_4 = \frac{0.05}{0.166} = 0.3$$

$$U_4 = \frac{360}{7200} = 0.05$$

Admin App Log

$$C_5 = 1200 \quad B_5 = 120$$

$$S_5 = \frac{120}{1200} = 0.1$$

$$B_5 = \frac{120}{7200} = 0.01\widehat{6}$$

$$X_5 = 0.1\widehat{6}$$

Database

$$B_6 = 900 \quad N_6 = 0.14325 \quad R_6 = 0.0573$$

$$X_6 = \frac{0.14325}{0.0573} = 2.5$$

$$U_6 = \frac{900}{7200} = 0.125$$

$$S_6 = \frac{0.125}{2.5} = 0.05$$

In this case, I made an extra calculation to know the exact number of request that accesses the database.

$$C_6 = \frac{900}{0.05} = 18000$$

Because the total of completed requests by the database is exactly three times the system requests, I will assume that the request iterates three times before leaving the database.

Security Check

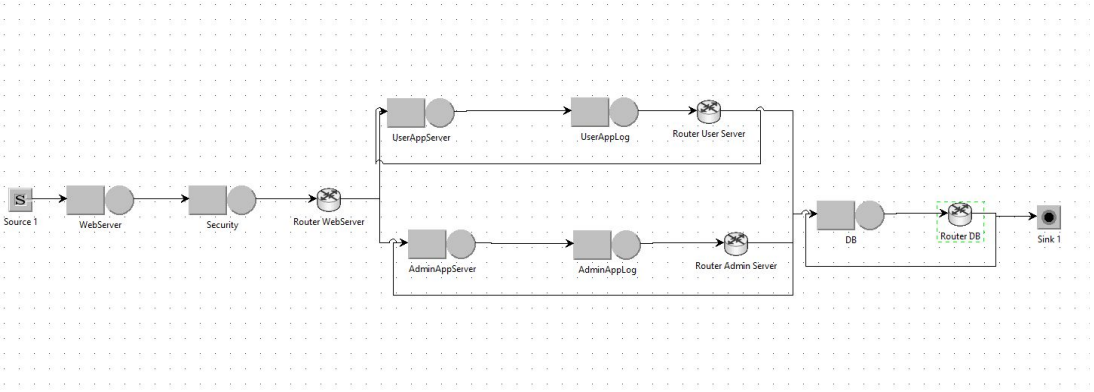
In order to check that the results of JMT were correct, I calculated the throughput and service time of the security check.

$$S_7 = 0.3 \quad C_7 = 6000$$

$$X_7 = \frac{6000}{7200} = 0.83$$

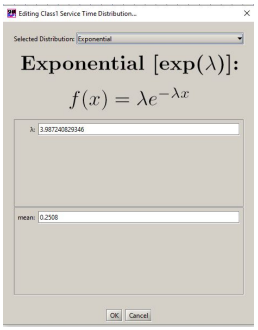
$$U_7 = 0.83 \cdot 0.3 = 0.25$$

Model

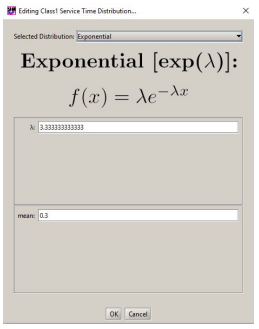


Service Time

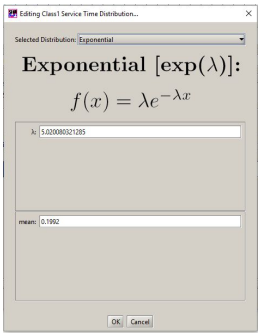
Web Server



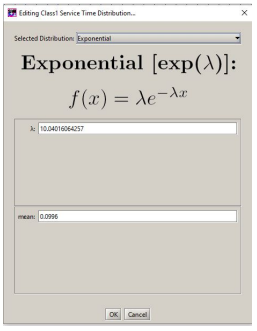
Security Check



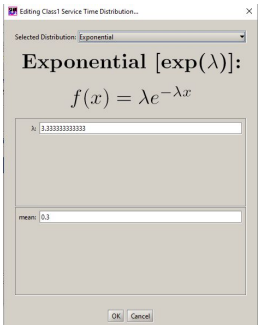
User App Server



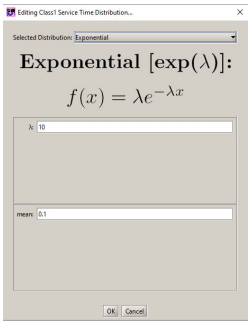
User App Log



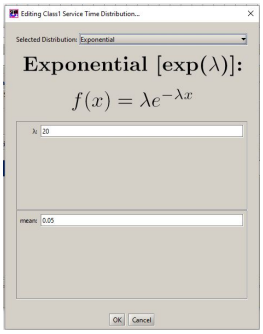
Admin App Server



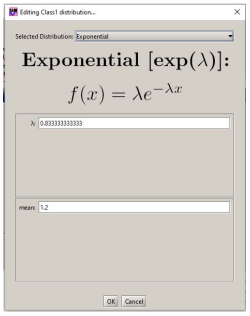
Admin App Log



Database

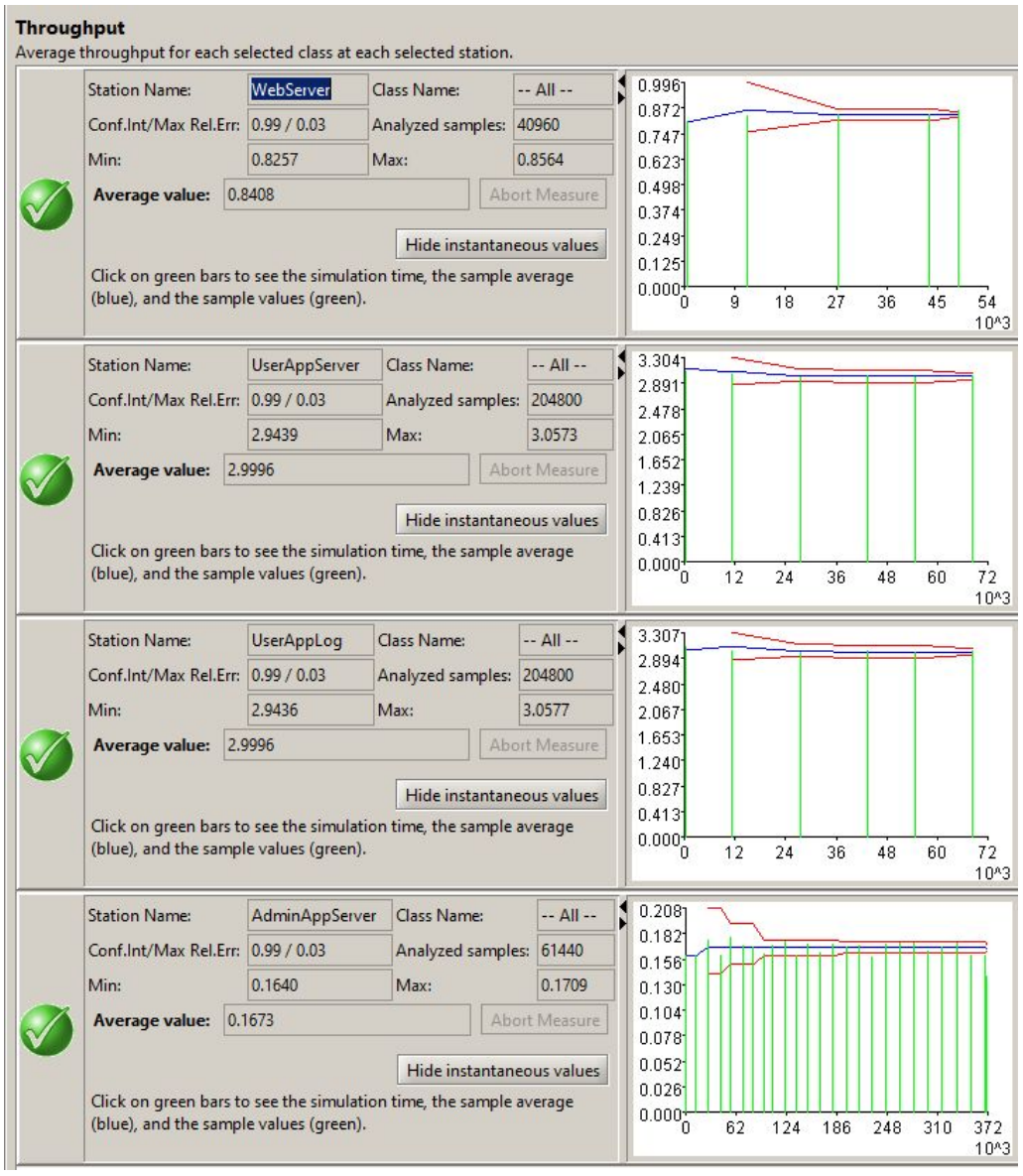


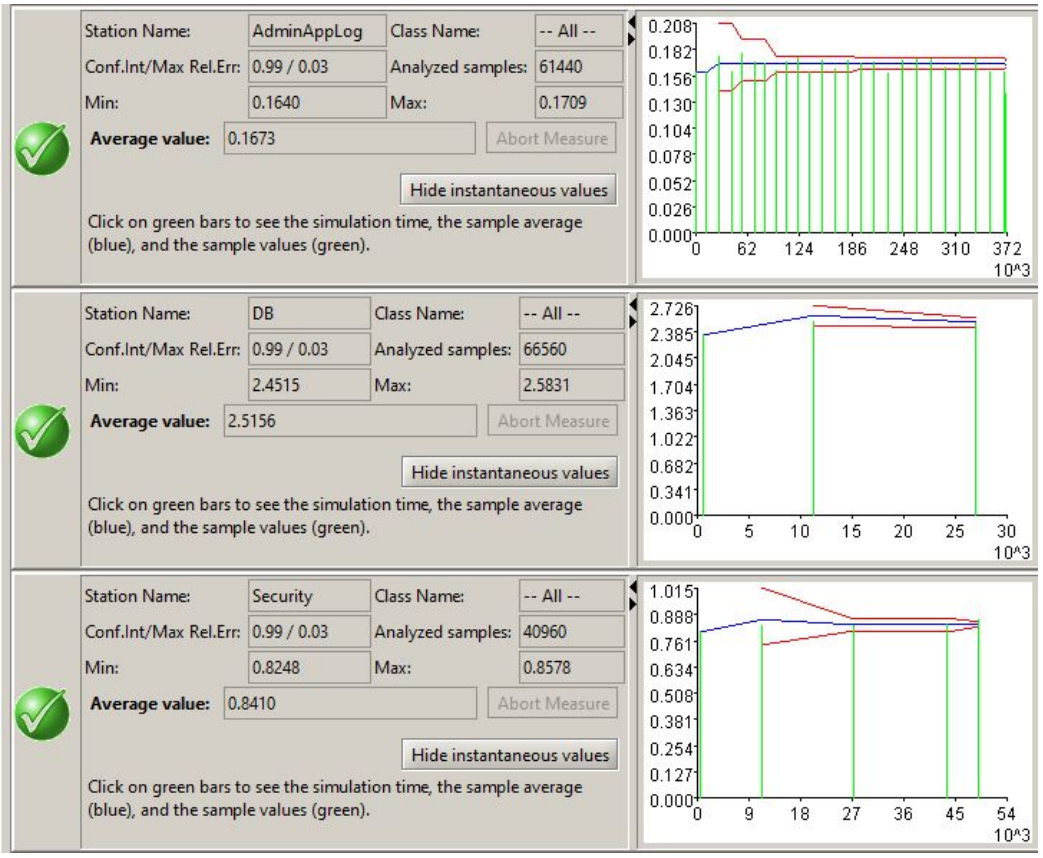
Class Arrival Rate



Arrival Rate

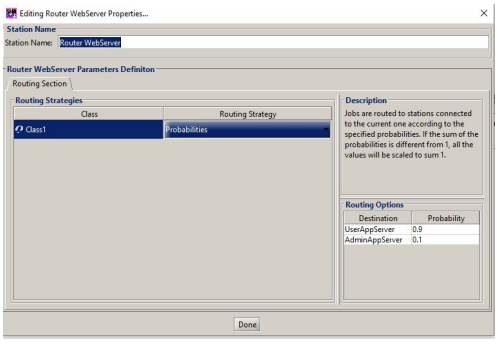
In this particular place, where all the jobs are completed, the arrival rate is the same that the throughput. All the received requests are the same that all the completed requests. Different tests has been performed and the results are always close enough to the mathematical proof to be accurate.



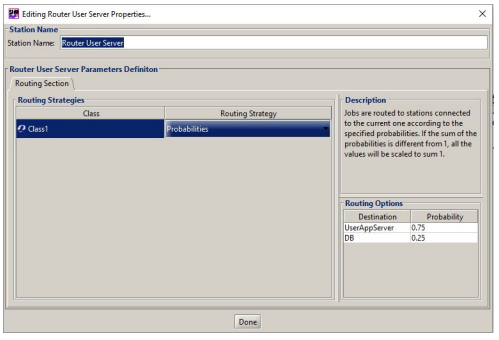


Routing

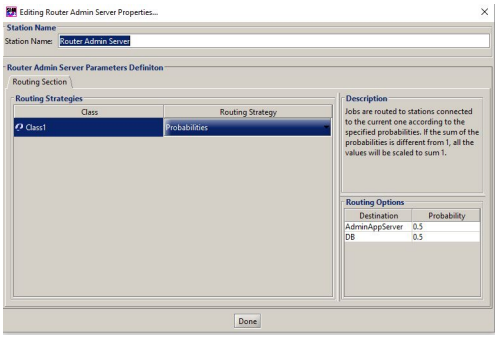
Web Server router



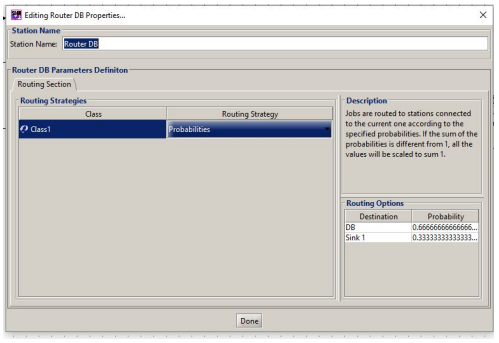
Users router



Admin router

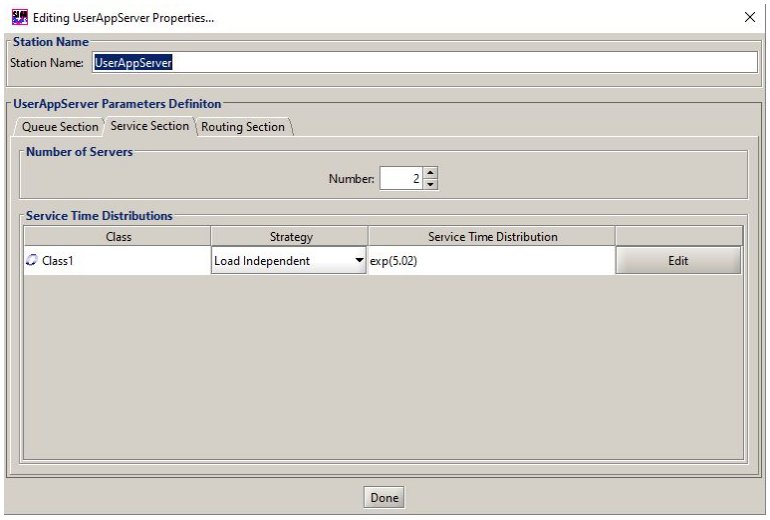


DB router

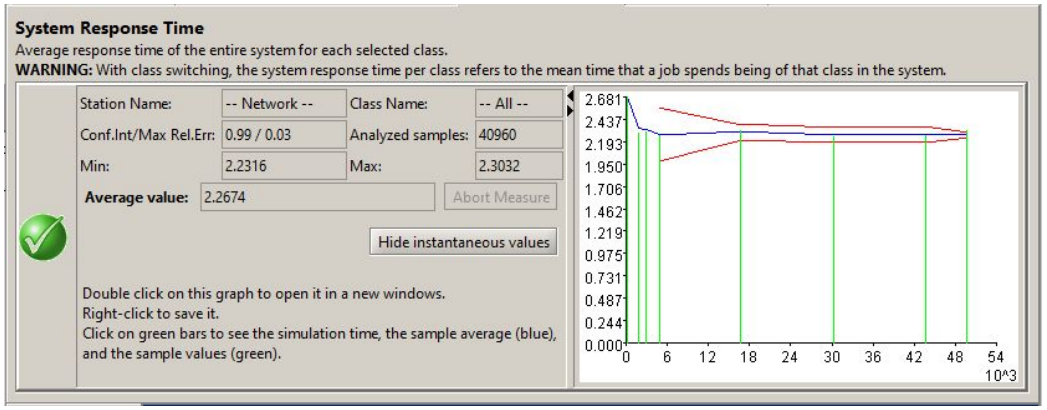


Resources

All the servers have only one resource except User App Server.

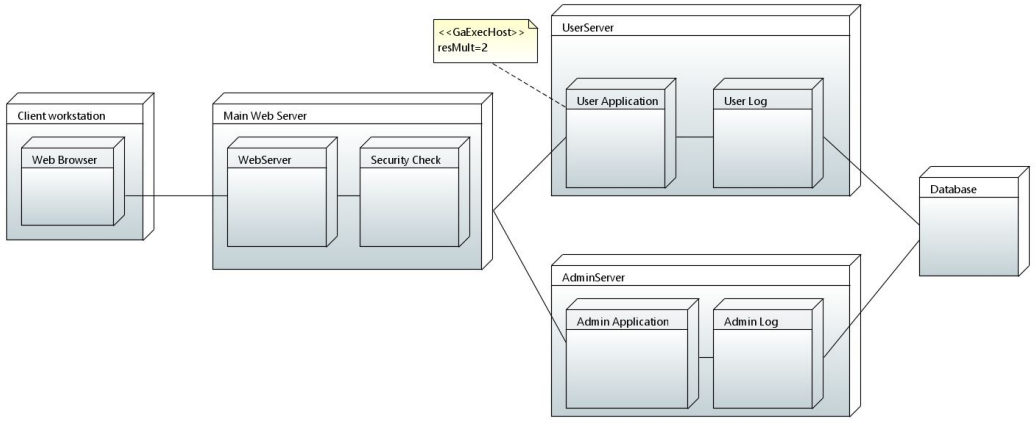


System Response Time



UML

Deployment Diagram



Activity Diagram