Linnéuniversitetet
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Assignment

Performance Engineering

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Course name: Software Enginering Design

Contents

1 Introduction

This report uses the operational laws to calculate the Service Time D_k of each of the four service centers.

1.1 Calculations

Server	Service demand time (D)	Service rate (μ)
WebServer	0.05	20
ContentDeliveryServer	0.38	1.85
ContentUpdoadServer	0.9	3.3
SecurityAndLoggingServer	0.6	1.66

Calculations:
Observation time=200 minutes=12000seconds=T
Completion time=18000 requests.=C
X=C/T=X=18000/12000=
λk = Ak/T , the arrival rate=90 req/minutes=90/60=1.5req/s

WebServer
B_k =900s
Service Demand Law: $D_k=B_k/C=900/1800=0.05$
U= $B_k/T=0.075$

ContentDeliveryServer
B_k=6840
U=0.57
Utilization law
$U=X.D_k$
$D_k=U/X=0.57/1.5=3.8$
M=1/ServiceTime(S_k)

$C_k=70/100*18000=12600$
$Sk=B_k/C_K$
$U=B_k/T=0.075$
Bk=U*T=0.57

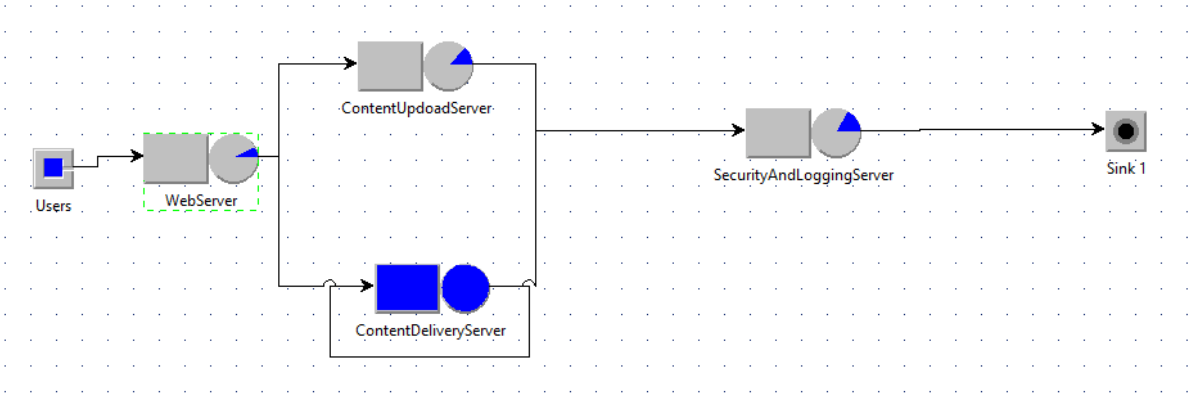
ContentUpdoadServer

$D_k=U/X=1.35 /1.5=0.9$

SecurityAndLoggingServer

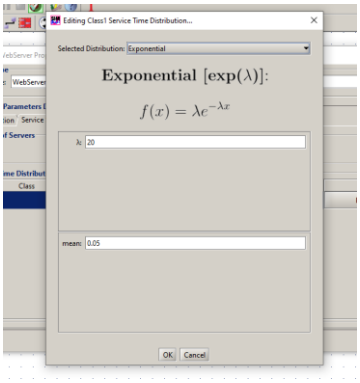
$D_k=U/X=0.09//1.5=0.6$

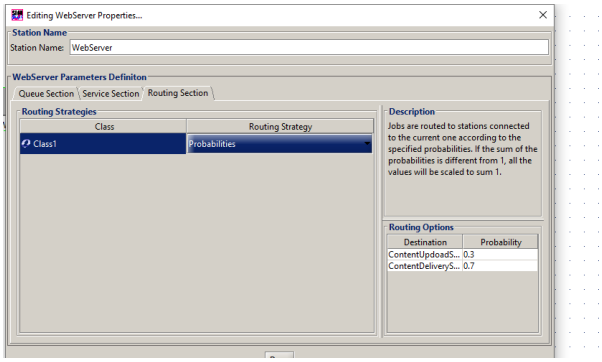
2 Model



3 Service Time

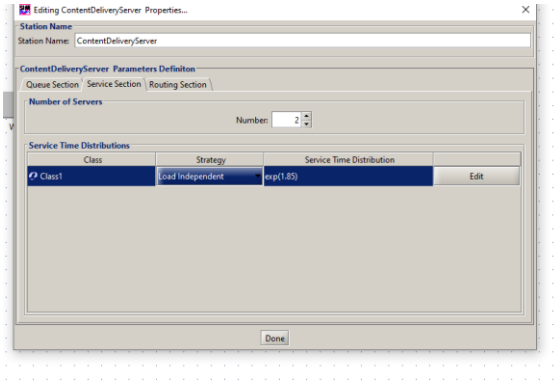
WebServer





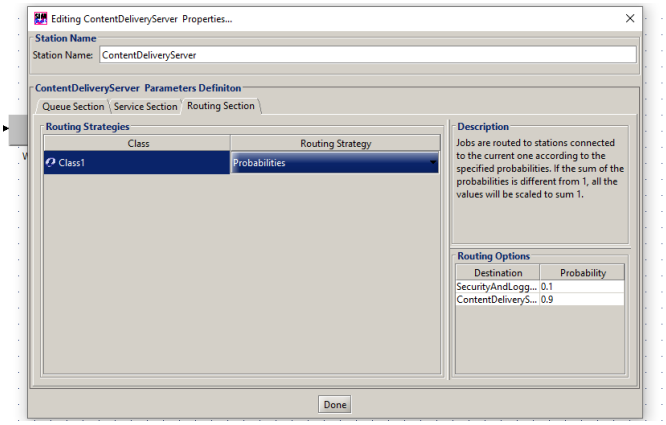
Routing the incoming requests to *ContentDeliveryServer* 70% which is 0.7 probability and 30% which is 0.3 probability to *ContentUpdoadServer*.

ContentDeliveryServer

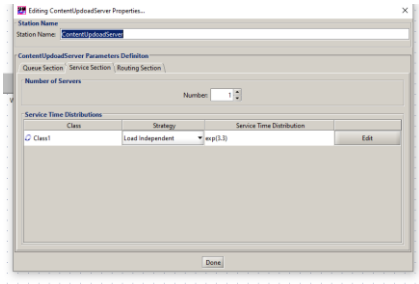


The request executed in the *ContentDeliveryServer* iterating 11 times its execution in this server (so, an average page has 11 images). And there are two resources for executing the *ContentDeliveryServer*

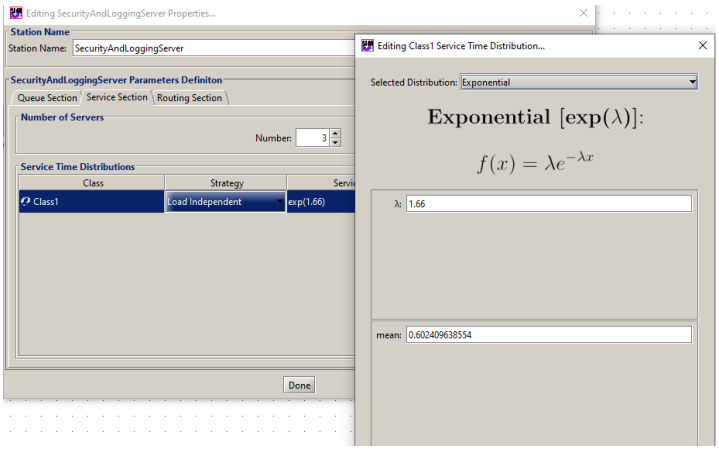
Routing for *ContentDeliveryServer* 11 times.



ContentUploadServer



SecurityAndLoggingServer



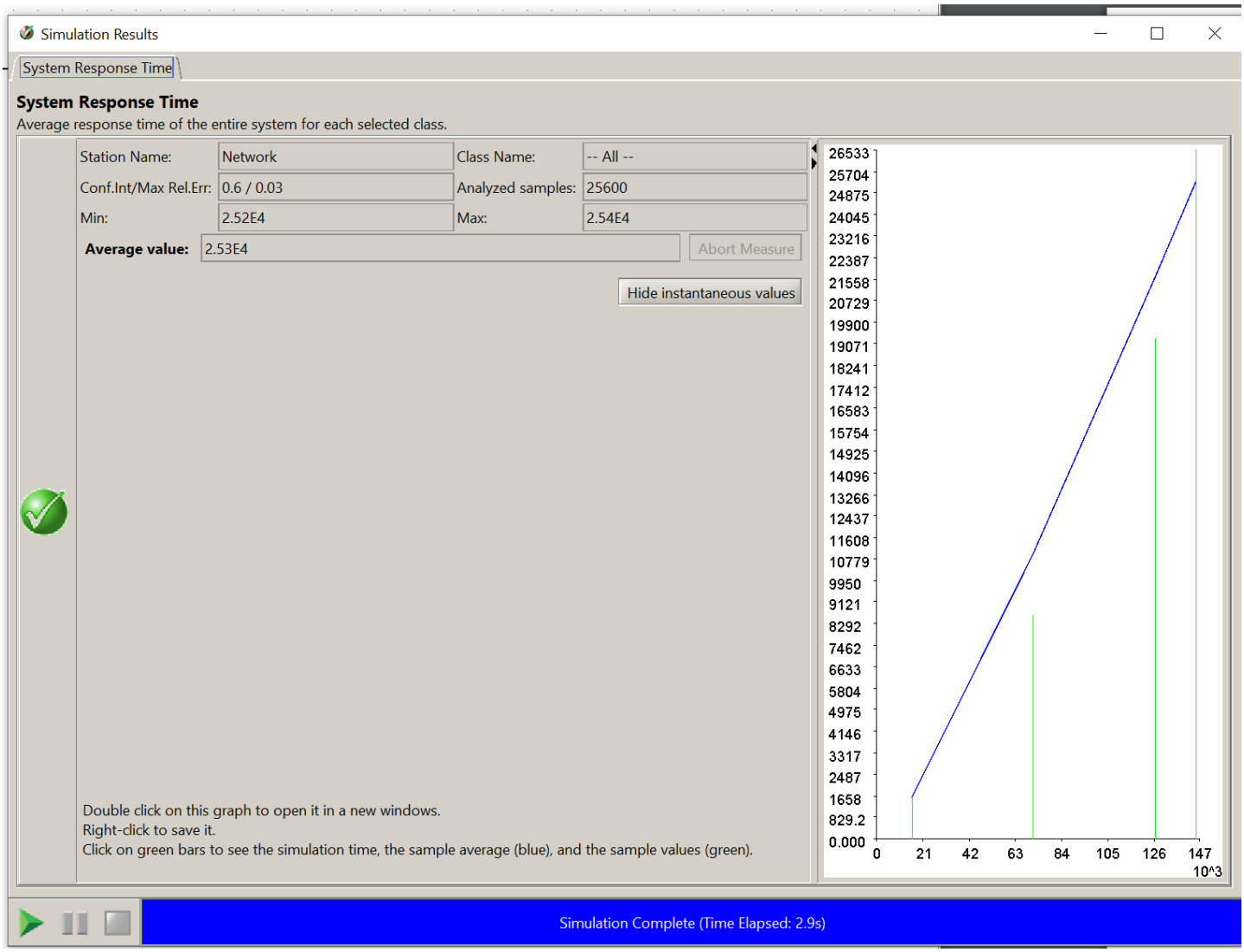
The updated SecurityAndLoggingServer by adding 2 more resources to it. Therefore, the total is 3 resourse.

Note: *ContentDeliveryServer* had 2 resources and SecurityAndLoggingServer had one resource. After the upgrade of the system, the power of SecurityAndLoggingServer has been incremented by adding 2 extra resources. The total resources in SecurityAndLoggingServer are now 3.

4 Simulation Results

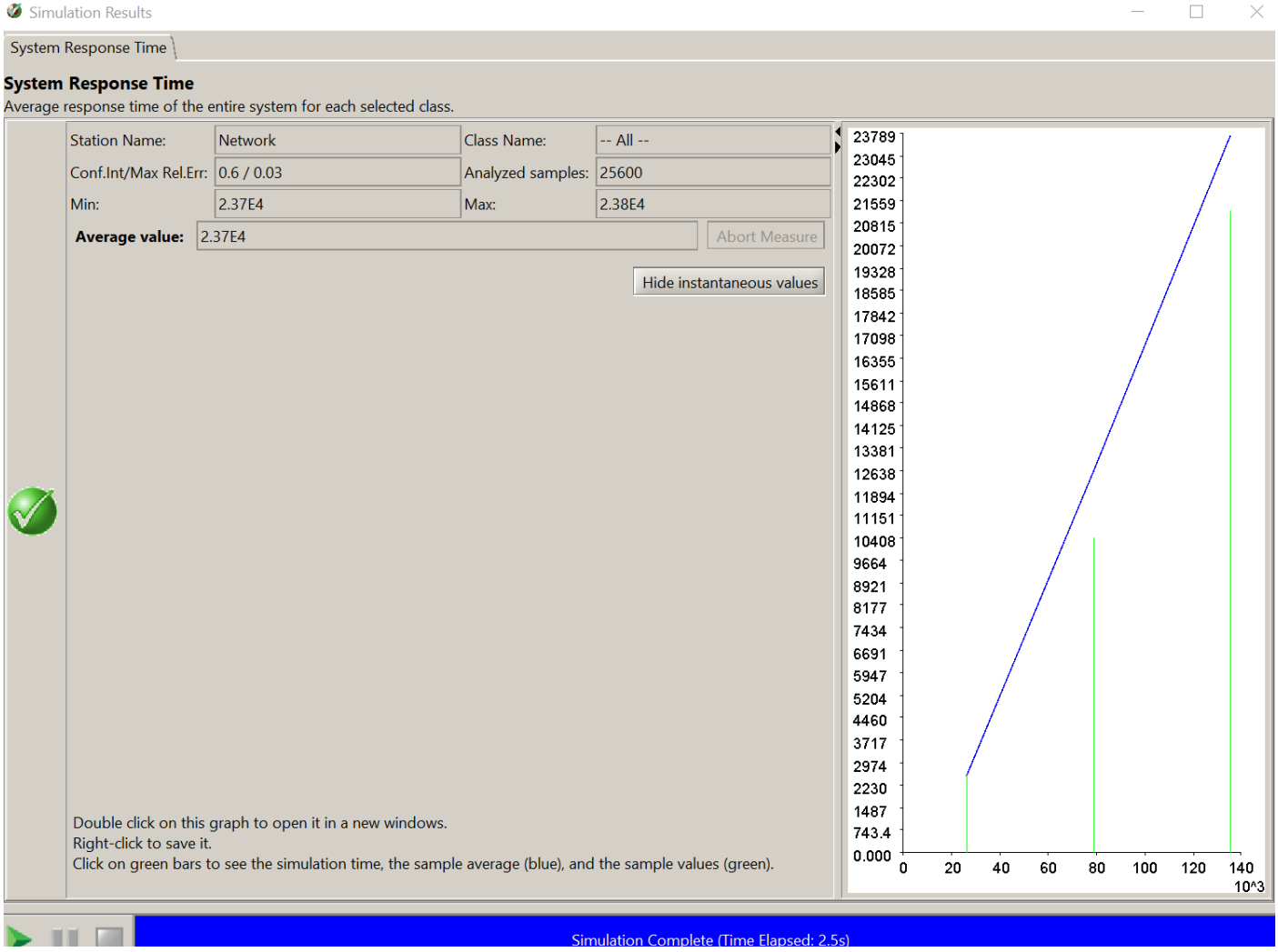
4.1 System response time before upgrading the model

The simulation results before upgrading the Model SecurityAndLoggingServer



4.2 System response time before upgrading the model

The simulation results after upgrading the SecurityAndLoggingServer.



5 Activity Diagram