

به نام خدا

گزارش تمرین شماره ۲ شبیه سازی JMT

حسام تاج بخش

۹۳۷۲۵۱۰۲

استاد: دکتر آنالویی

زمستان ۹۳

Part A:

Service demand of transaction at each resource:

jMVA Model Details

Classes

Name	Type	Population	Arrival Rate
Class1	closed	30	

Stations

Name	Type
Interactive	Delay - Infinite Server
cpu	Load Independent
disk1	Load Independent
disk2	Load Independent

Service Demands

	Class1
Interactive	5
cpu	0.05
disk1	0.1
disk2	0.12

System throughput and throughput of each resource:

Throughput

Throughput for each class at each station.

*	Aggregate	Class1
Aggregate	5.385964	5.385964
Interactive	5.385964	5.385964
cpu	5.385964	5.385964
disk1	5.385964	5.385964
disk2	5.385964	5.385964

Utilization of each resource:

Utilization
Utilization of a customer class at the selected station. The utilization of a delay station is the average number of customers in the station (it may be greater than 1)

*	Aggregate	Class1
-	-	-
Interactive	26.929818	26.929818
cpu	0.269298	0.269298
disk1	0.538596	0.538596
disk2	0.646316	0.646316

Residence time of transaction at each resource and system response time (aggregate response time) :

Residence Times
Total time spent by each customer class at each station. Note that the aggregate values are weighted by relative per-class throughput. The global aggregate is the system response time.

*	Aggregate	Class1
Aggregate	5.570034	5.570034
Interactive	5.000000	5.000000
cpu	0.067425	0.067425
disk1	0.202649	0.202649
disk2	0.299959	0.299959

Number of transaction at system and each resource:

Number of Customers
Average number of customers for each class at each station.

*	Aggregate	Class1
Aggregate	30.000000	30.000000
Interactive	26.929818	26.929818
cpu	0.363151	0.363151
disk1	1.091462	1.091462
disk2	1.615569	1.615569

Part B:

$$\begin{aligned} \text{Number of transaction is being served in cpu and disks} &= U_{cpu} + U_{disk1} + U_{disk2} = \\ &0.269 + 0.538 + 0.646 = 1.453 \end{aligned}$$

$$\begin{aligned} \text{Number of transaction is being served in the system} &= N_{cpu} + N_{disk1} + N_{disk2} = \\ &0.363 + 1.091 + 1.615 = 3.069 \end{aligned}$$

$$\begin{aligned} \text{Queue - length} &= N_i - U_i \Rightarrow Q - L_{cpu} = 0.363 - 0.269 = 0.094 , \\ Q - L_{disk1} &= 1.091 - 0.538 = 0.533 , \quad Q - L_{disk2} = 1.615 - 0.646 = 0.969 \end{aligned}$$

$$\begin{aligned} \text{Number of request is waiting to be served in th system} &= \sum Q - L_i = 0.094 + 0.533 + 0.969 \\ &= 1.596 \end{aligned}$$

$$\text{waiting time of requests at each resource} = \text{Residence} - \text{Demand} \Rightarrow$$

$$\text{waiting}_{cpu} = 0.067 - 0.05 = 0.012s , \quad \text{waiting}_{disk1} = 0.202 - 0.1 = 0.102s ,$$

$$\text{waiting}_{disk2} = 0.299 - 0.12 = 0.179s$$

$$\text{waiting time of requests at system} = \sum \text{Residence}_i - \sum \text{Demand}_i = 0.570 - 0.270 = 0.3s$$

$$\text{number of users that have submitted their request to the system} = 3.069$$

$$\text{number of users that want to submit their request to the system} = 30 - 3.069 = 26.931$$

Part C:

Scenario 1: Doubling the number of terminals:

Service demand:

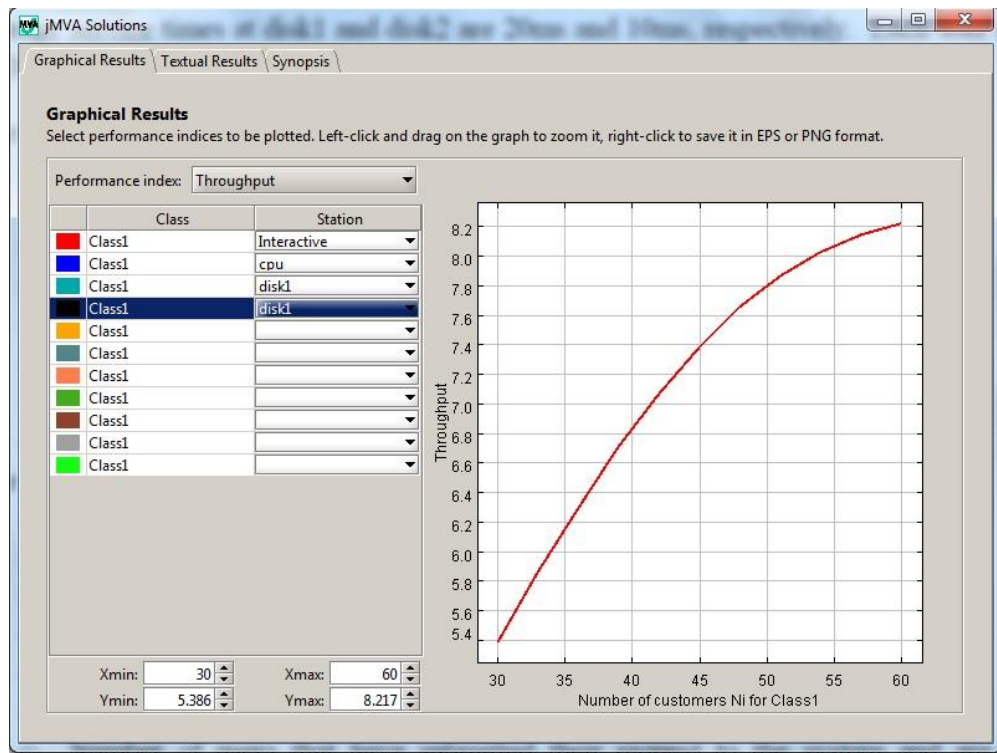
jMVA Model Details

Classes			
Name	Type	Population	Arrival Rate
Class1	closed	30	

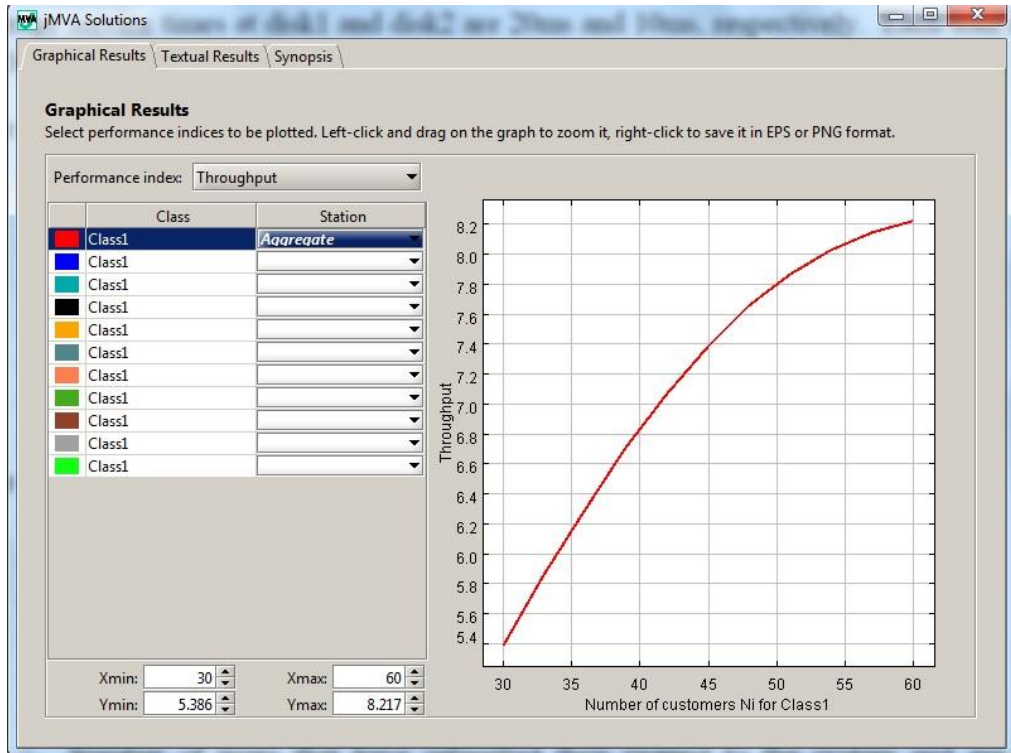
Stations	
Name	Type
Interactive	Delay - Infinite Server
cpu	Load Independent
disk1	Load Independent
disk2	Load Independent

Service Demands	
	Class1
Interactive	5
cpu	0.05
disk1	0.1
disk2	0.12

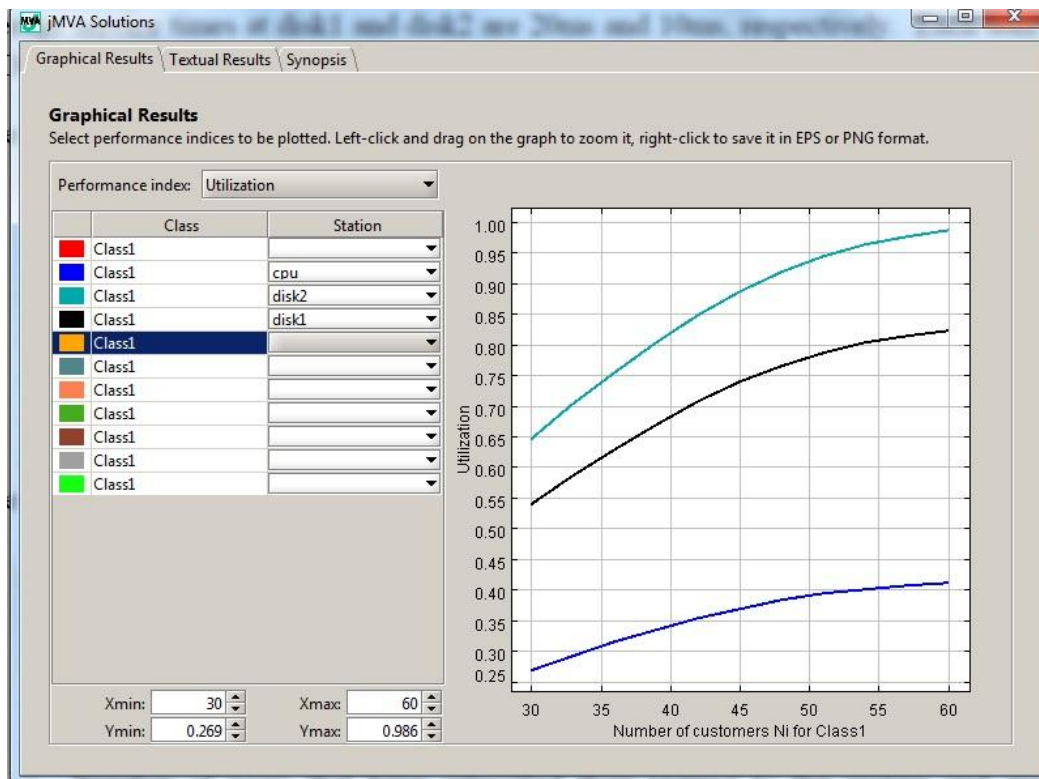
Throughput of each resource:



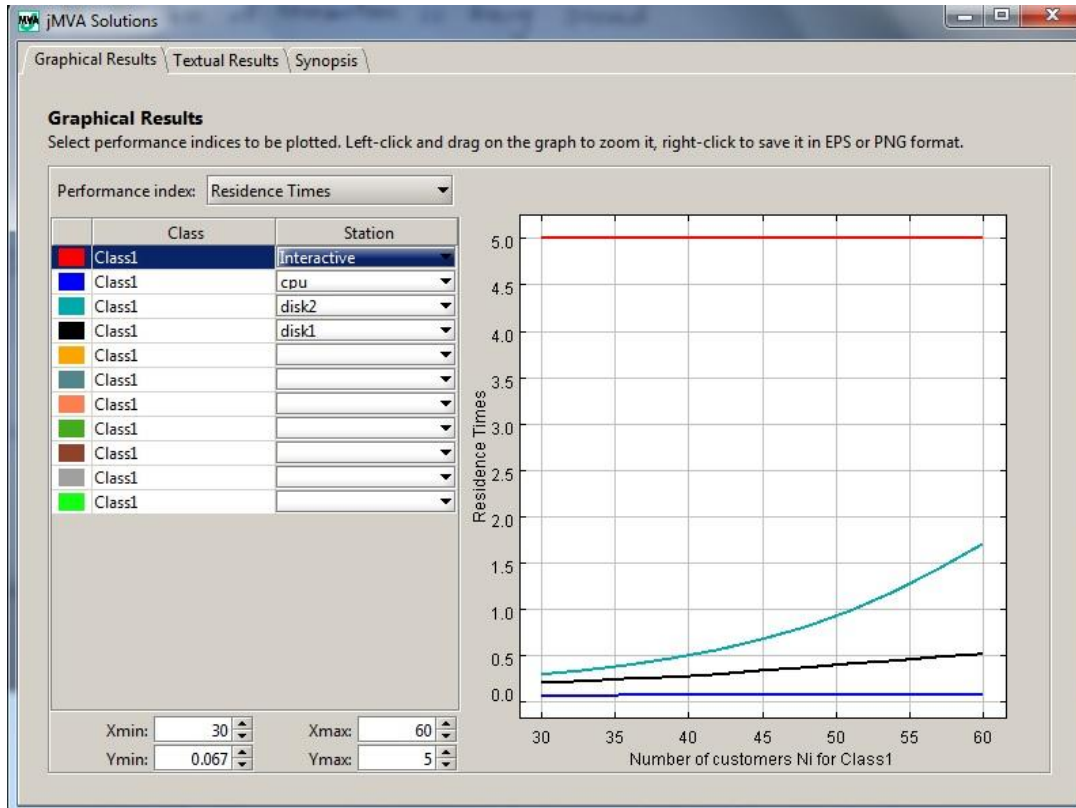
Throughput of system :



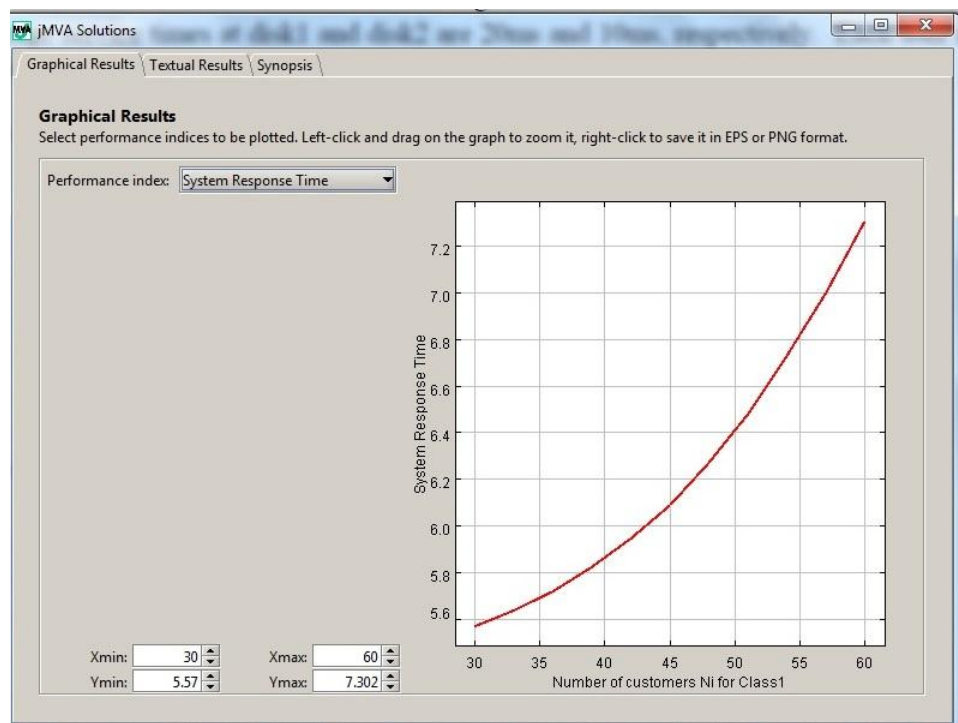
Utilization of each resource:



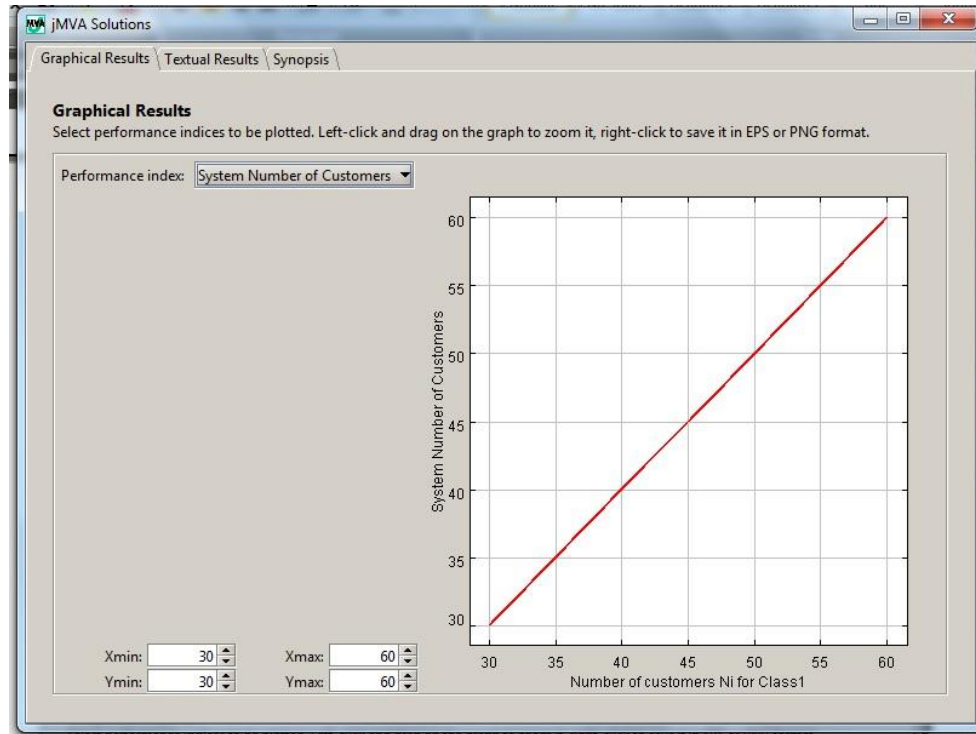
Residence time of transaction at each resource:



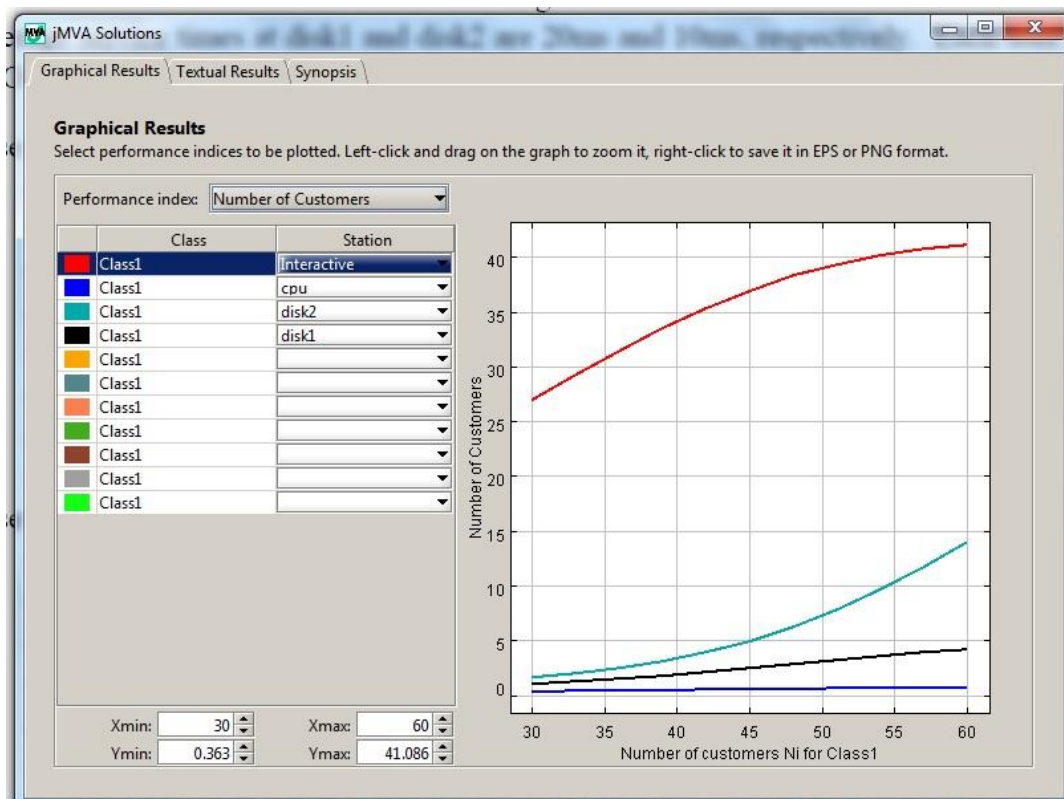
System response time:



Number of user's transaction in the system:



Number of user's transaction in each resource:



Scenario 2:

Scenario 1: Decreasing of think time by 50%

Service demand:

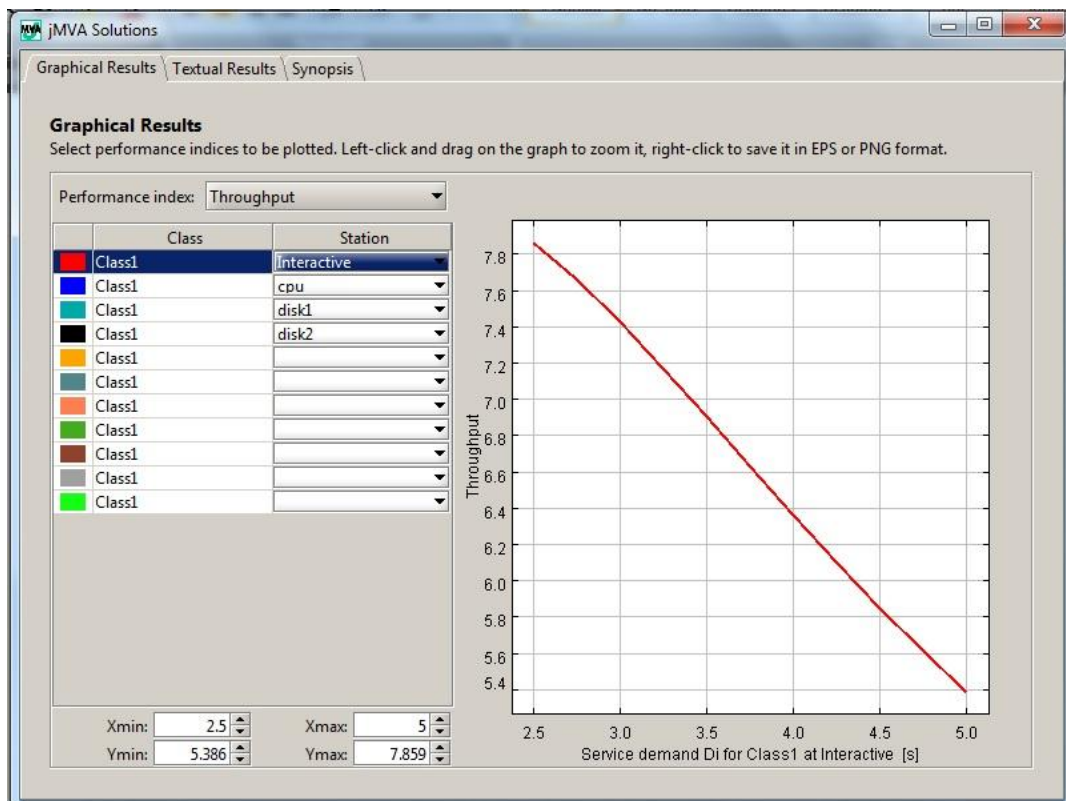
jMVA Model Details

Classes			
Name	Type	Population	Arrival Rate
Class1	closed	30	

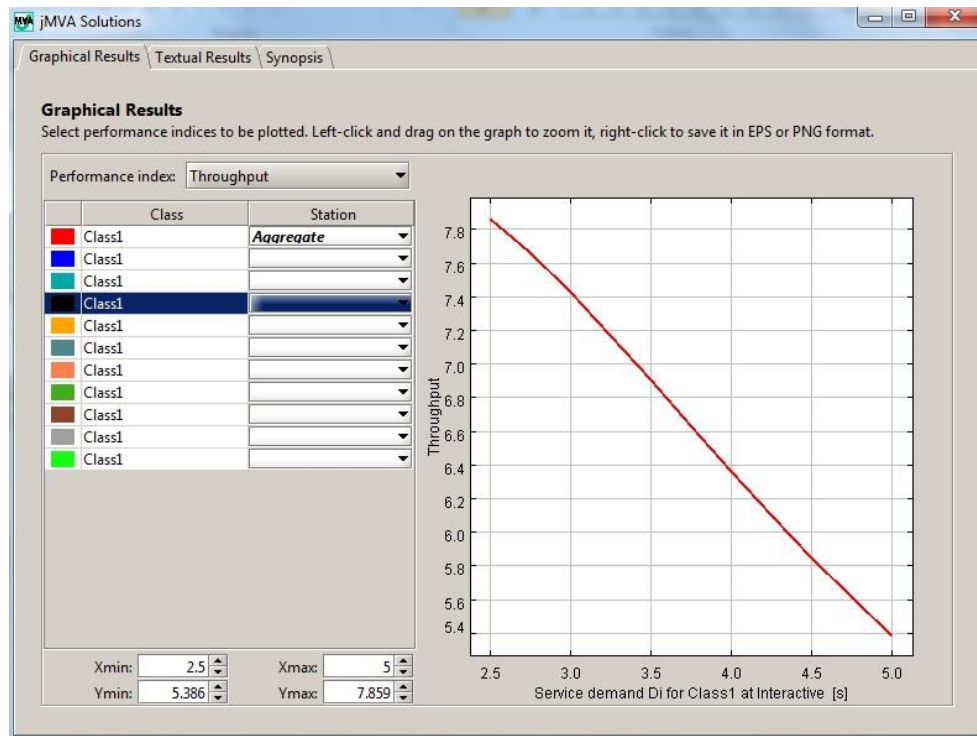
Stations	
Name	Type
Interactive	Delay - Infinite Server
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disk1	Load Independent
disk2	Load Independent

Service Demands	
	Class1
Interactive	5
cpu	0.05
disk1	0.1
disk2	0.12

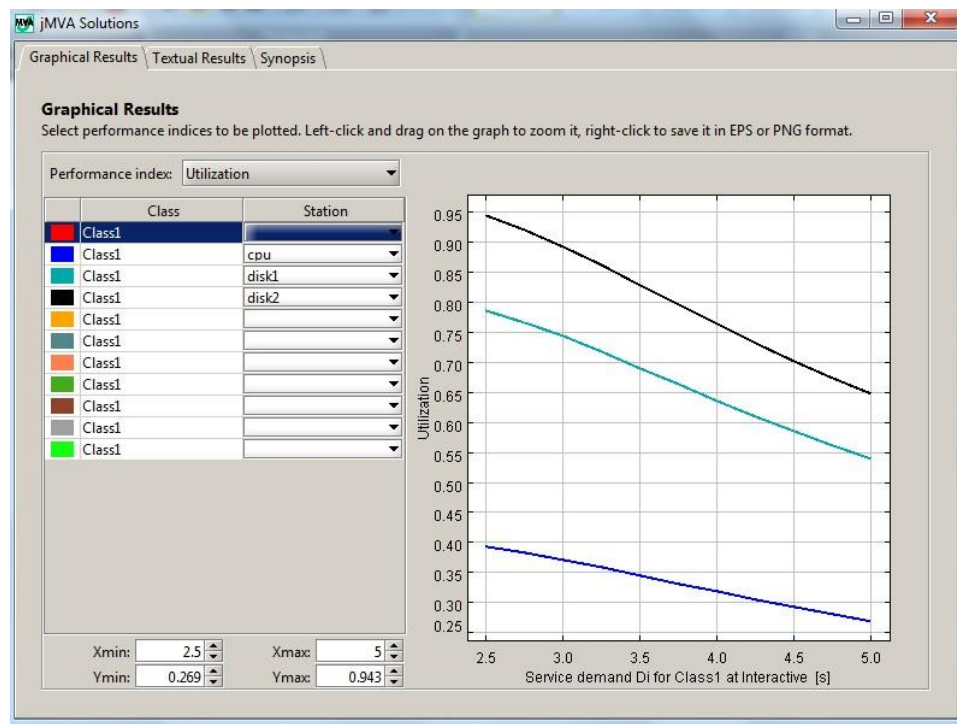
Throughput of each resource:

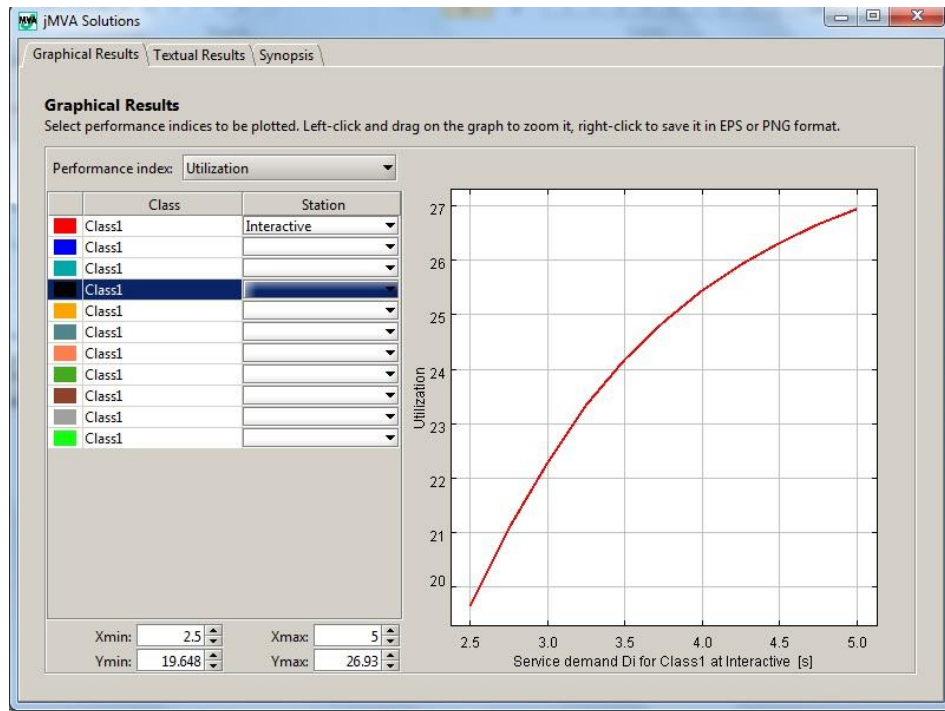


Throughput of system :

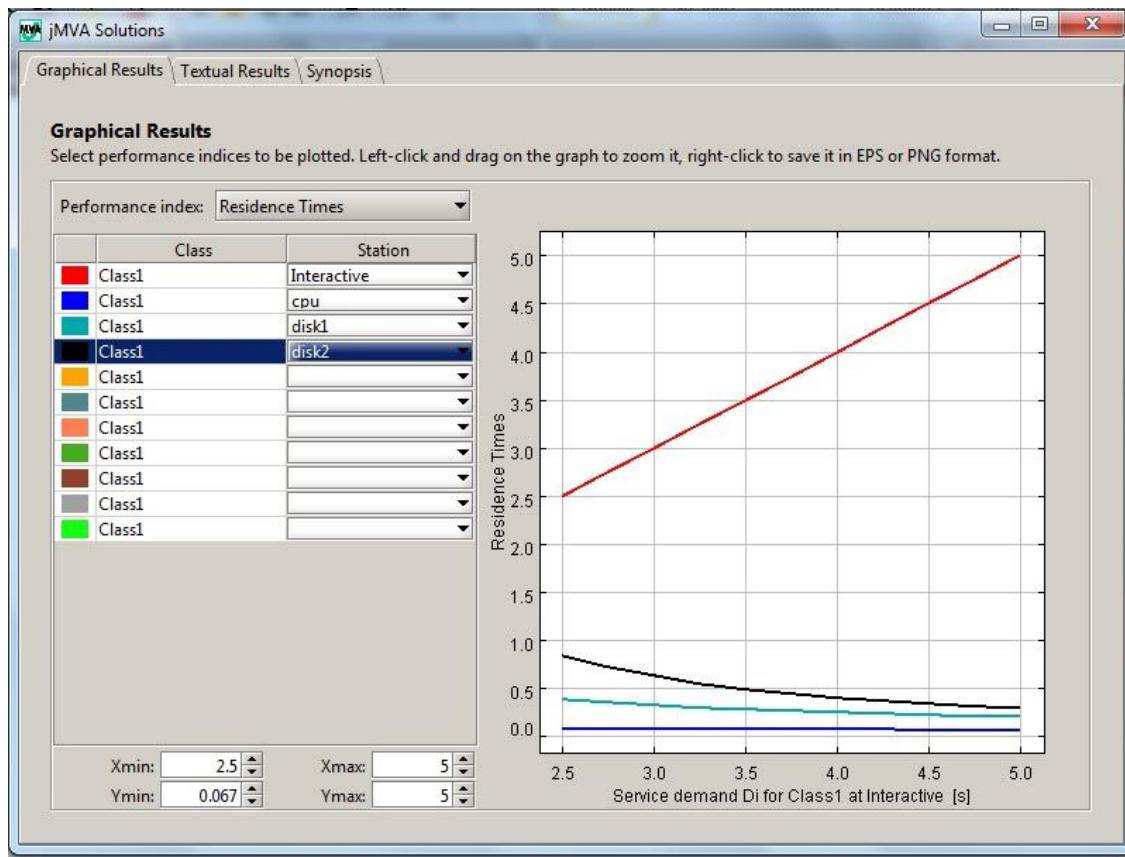


Utilization of each resource:

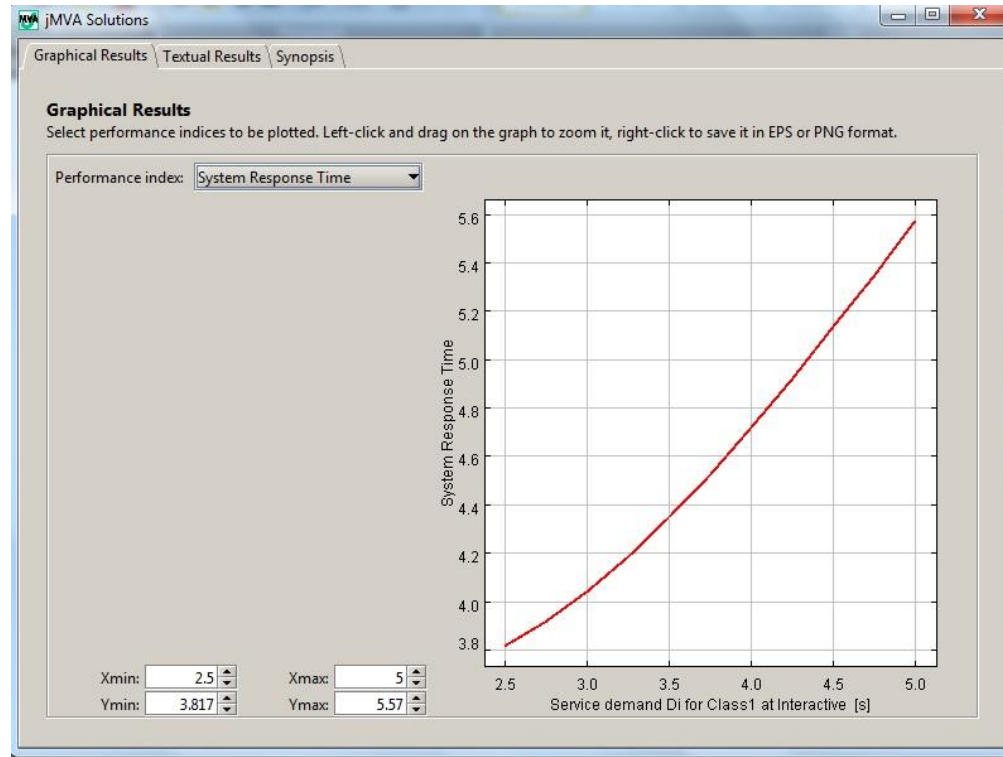




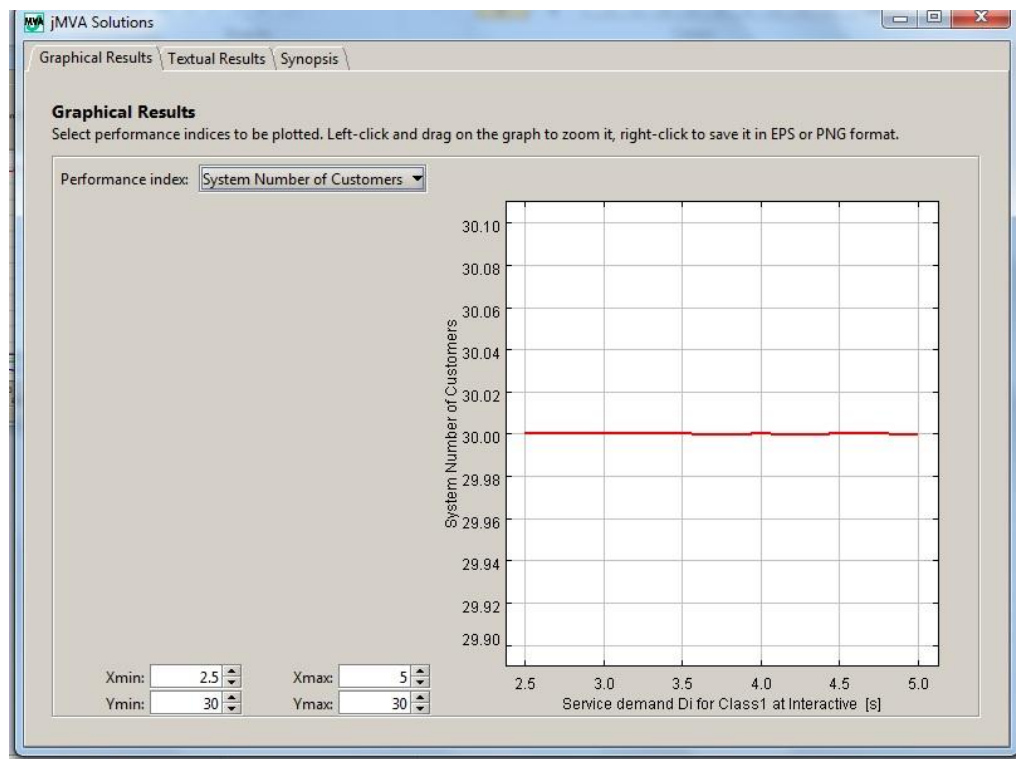
Residence time of transaction at each resource:



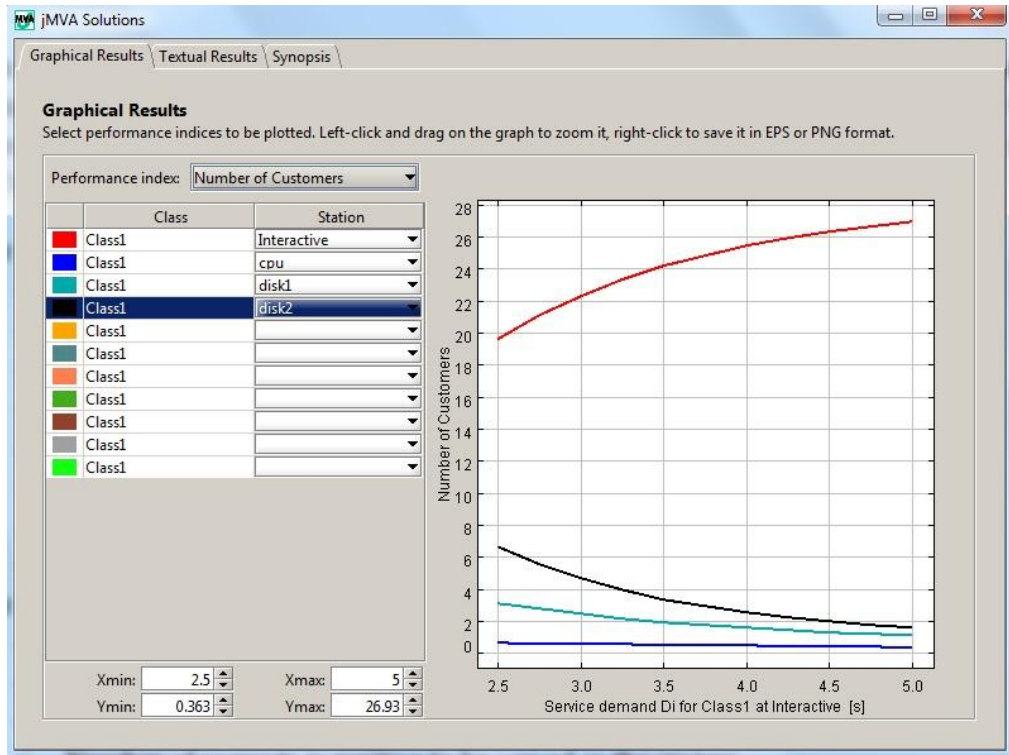
System response time:



Number of user's transaction in the system:



Number of user's transaction in each resource:



Scenario 3: using faster resource:

Service demand:

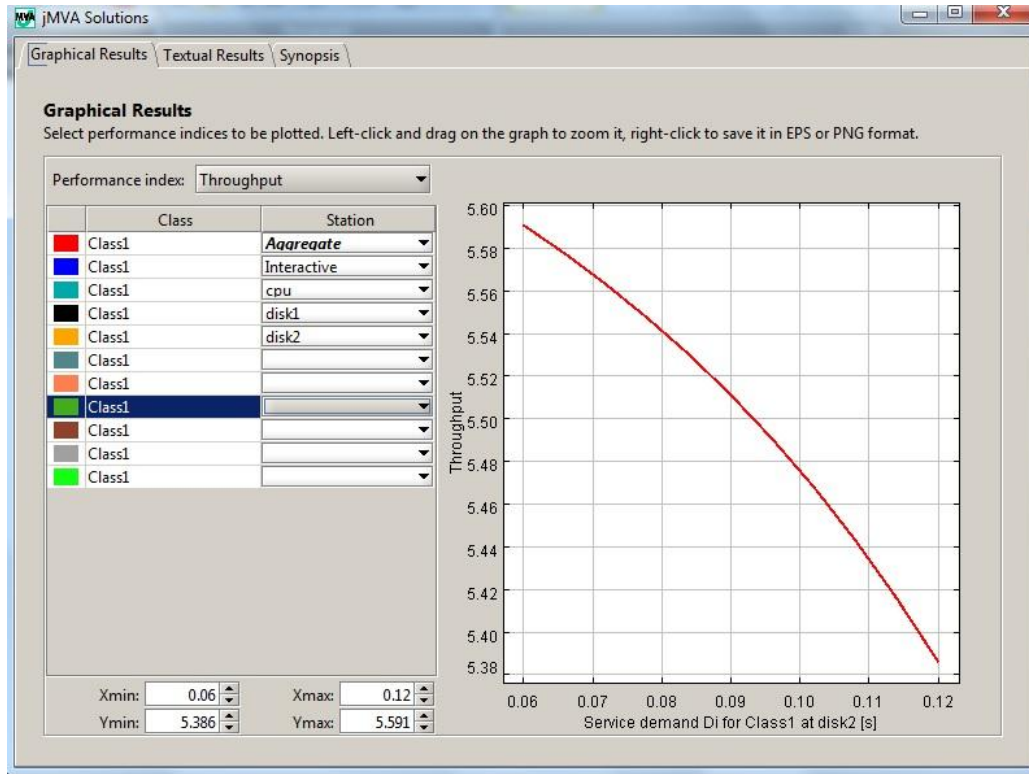
jMVA Model Details

Classes			
Name	Type	Population	Arrival Rate
Class1	closed	30	

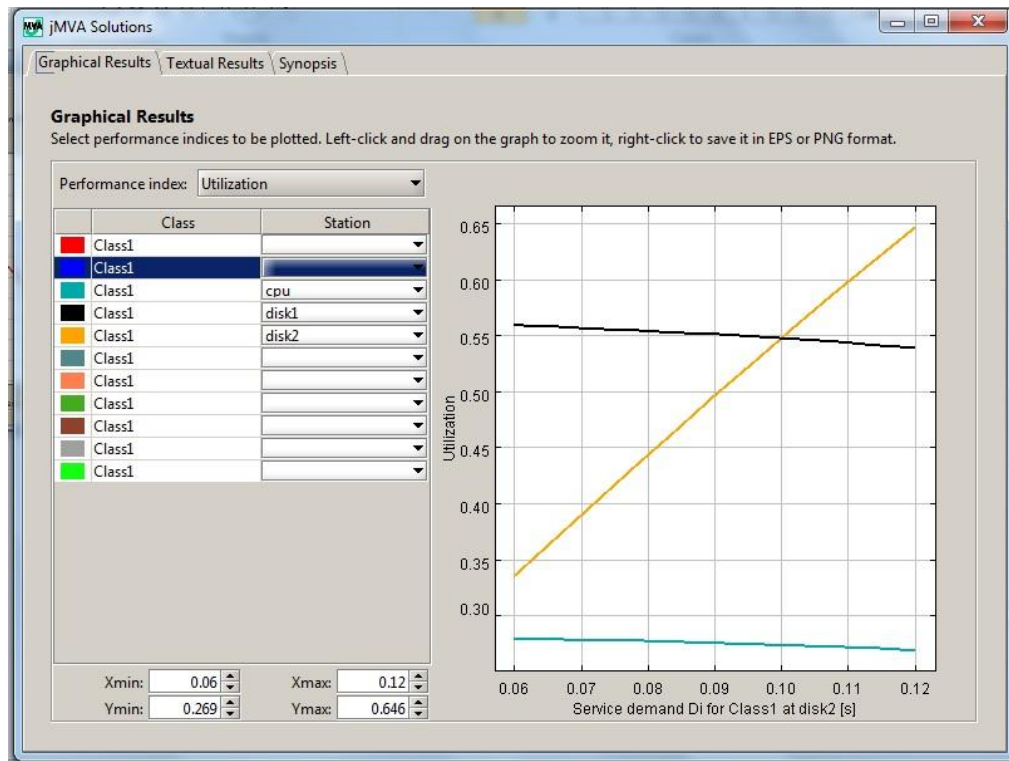
Stations	
Name	Type
Interactive	Delay - Infinite Server
cpu	Load Independent
disk1	Load Independent
disk2	Load Independent

Service Demands	
	Class1
Interactive	5
cpu	0.05
disk1	0.1
disk2	0.12

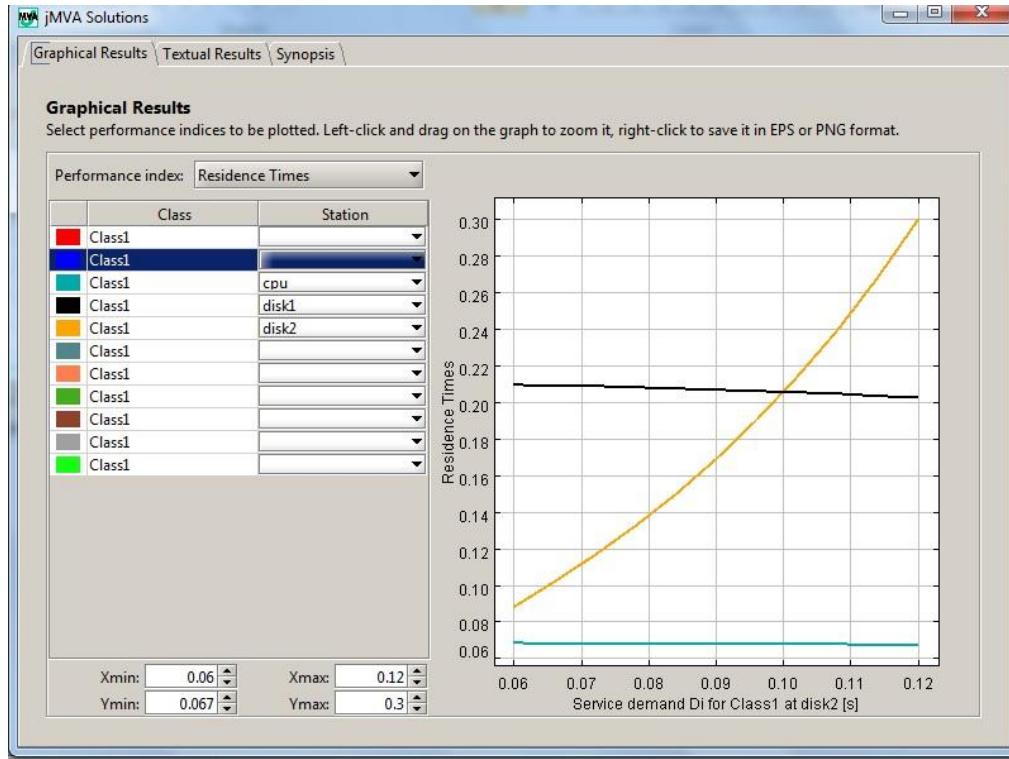
Throughput of each resource and system:



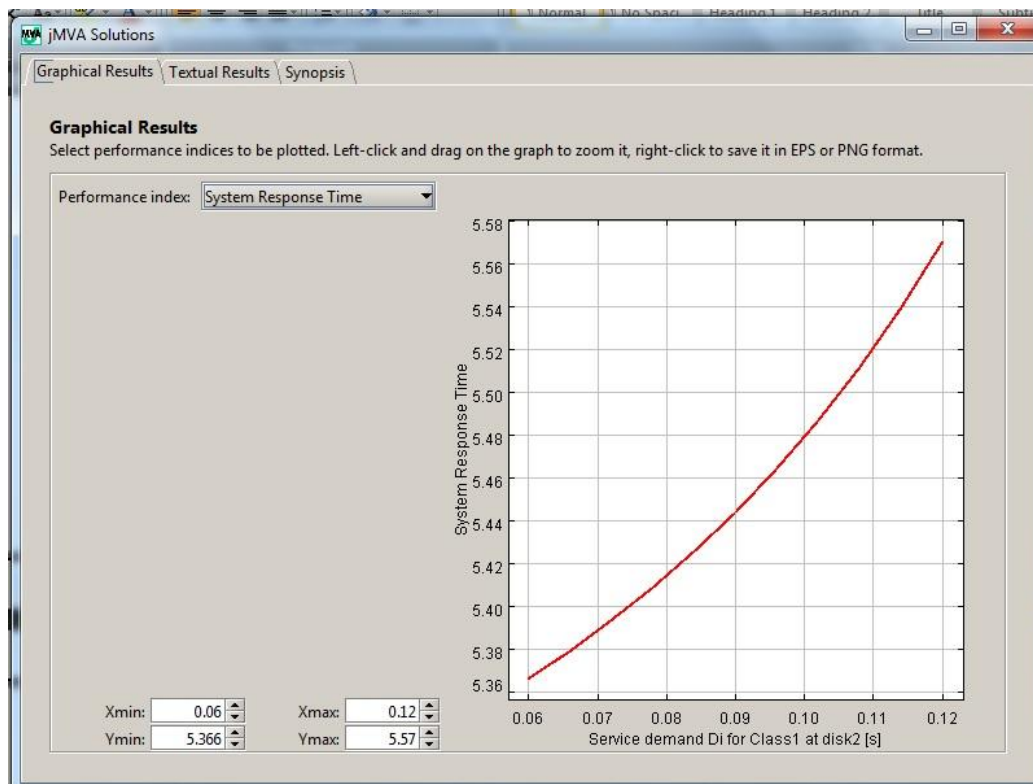
Utilization of each resource:



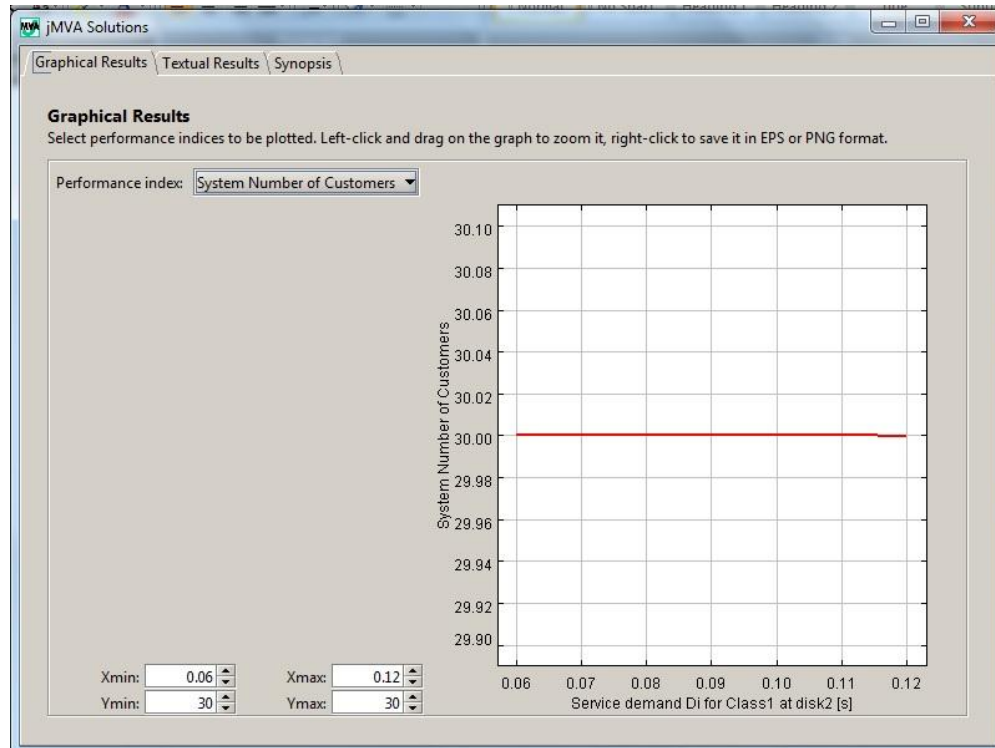
Residence time of transaction at each resource:



System response time:



Number of user's transaction in the system:



Number of user's transaction in each resource:

