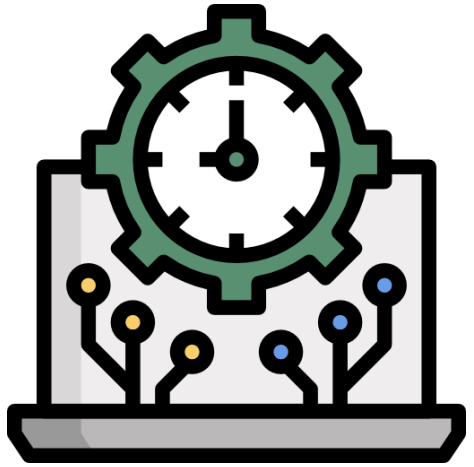
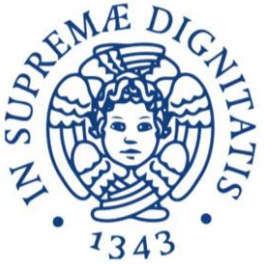
PERFORMANCE EVALUATION OF A DEFICIT SCHEDULER





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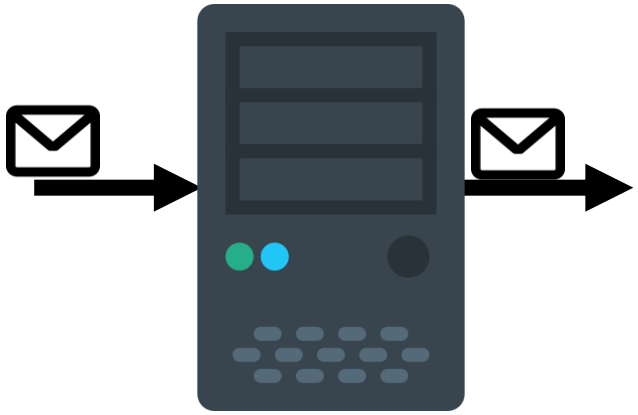
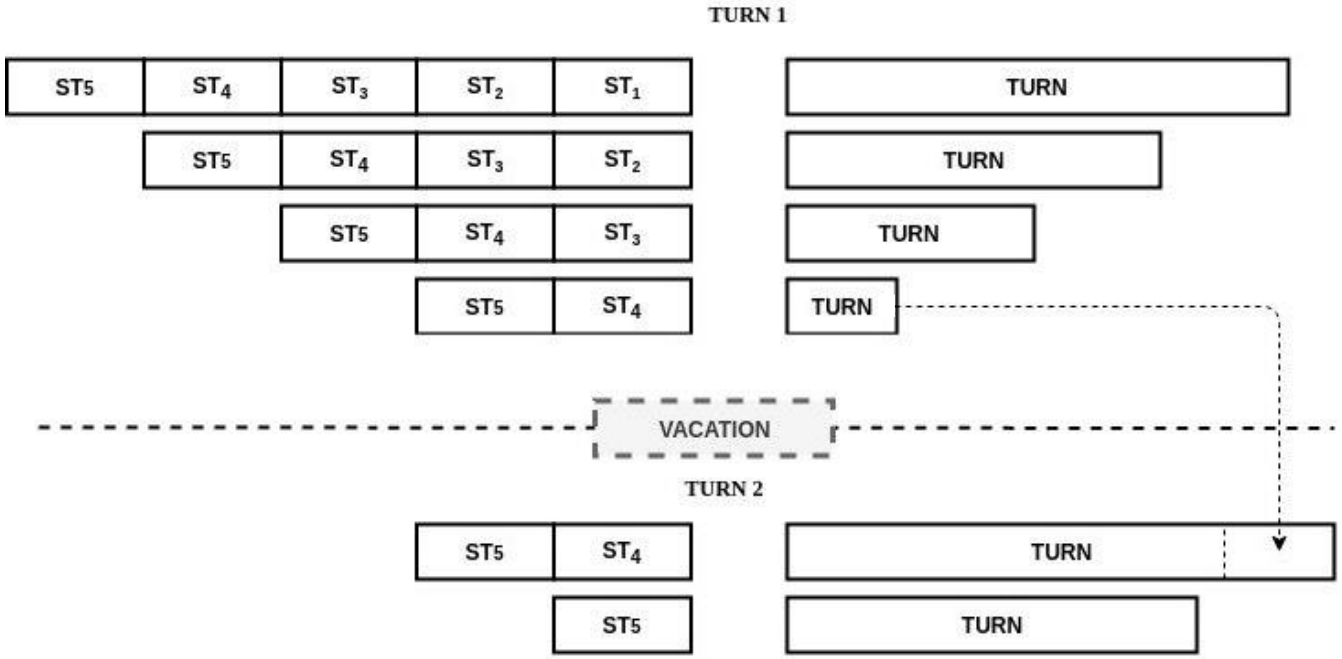
INTRODUCTION

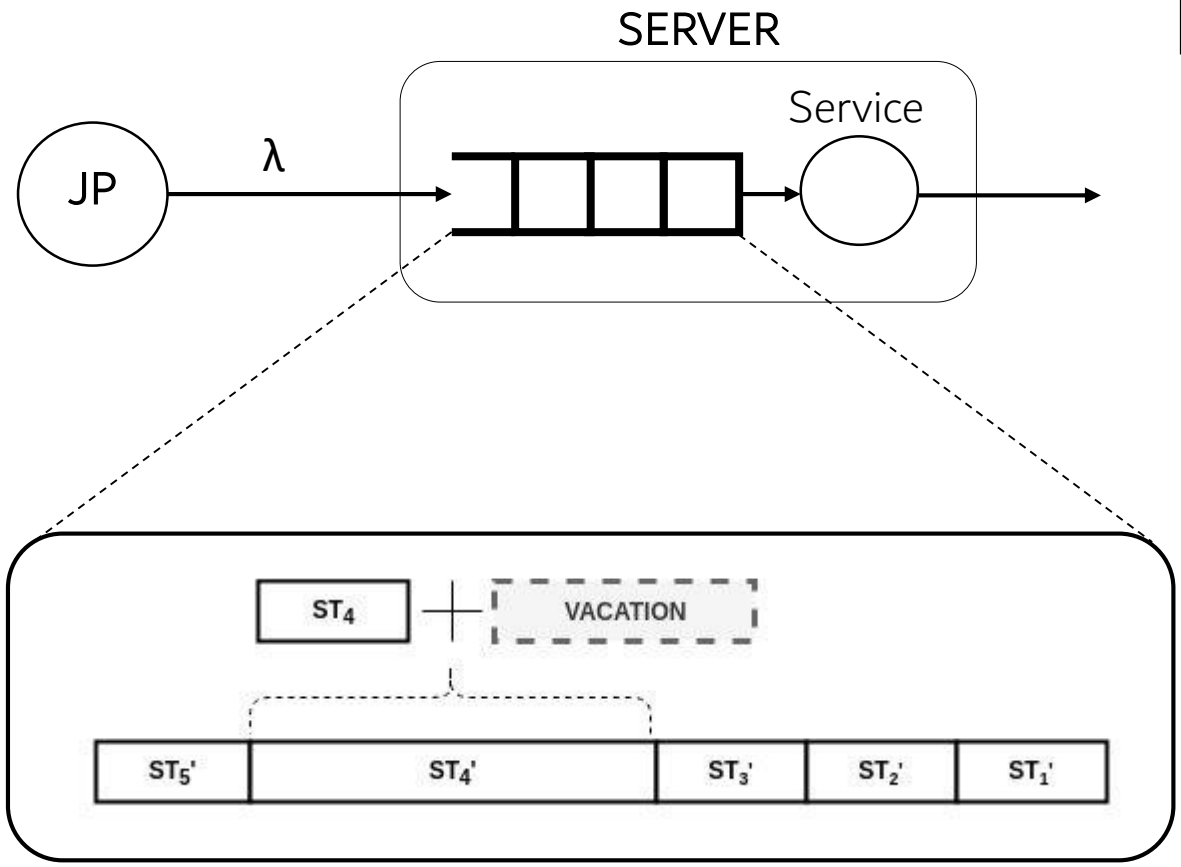
- General view:



- Description of the system:



MODEL



Model assumptions:

- Negligible delay between JP and SERVER
- FIFO queue has no losses
- Negligible time to enter/leave Vacation
- Negligible costs in queue management

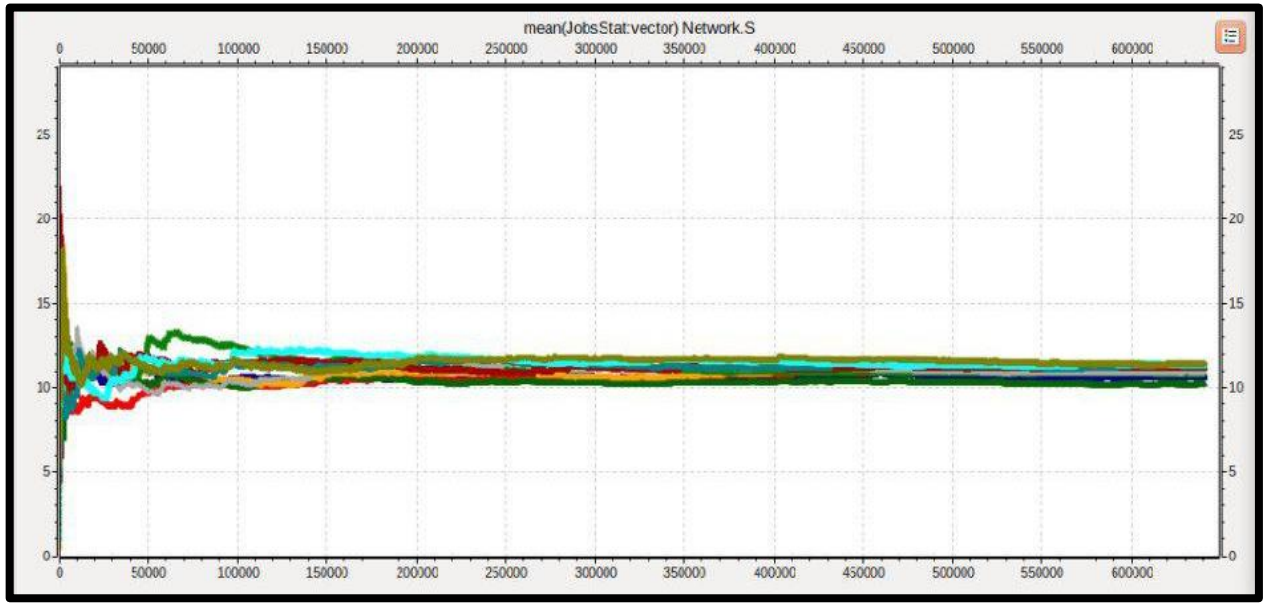
STABILITY

Thanks to the model we could state that:

$$\boldsymbol{E[ST'] = ST + \frac{ST}{Q} * V}$$

For the Exponential scenario:

$$\boldsymbol{E[ST'] = E[ST] + \frac{E[ST]}{Q} * E[V]}$$



According to this considerations we can formulate a simple stability condition:

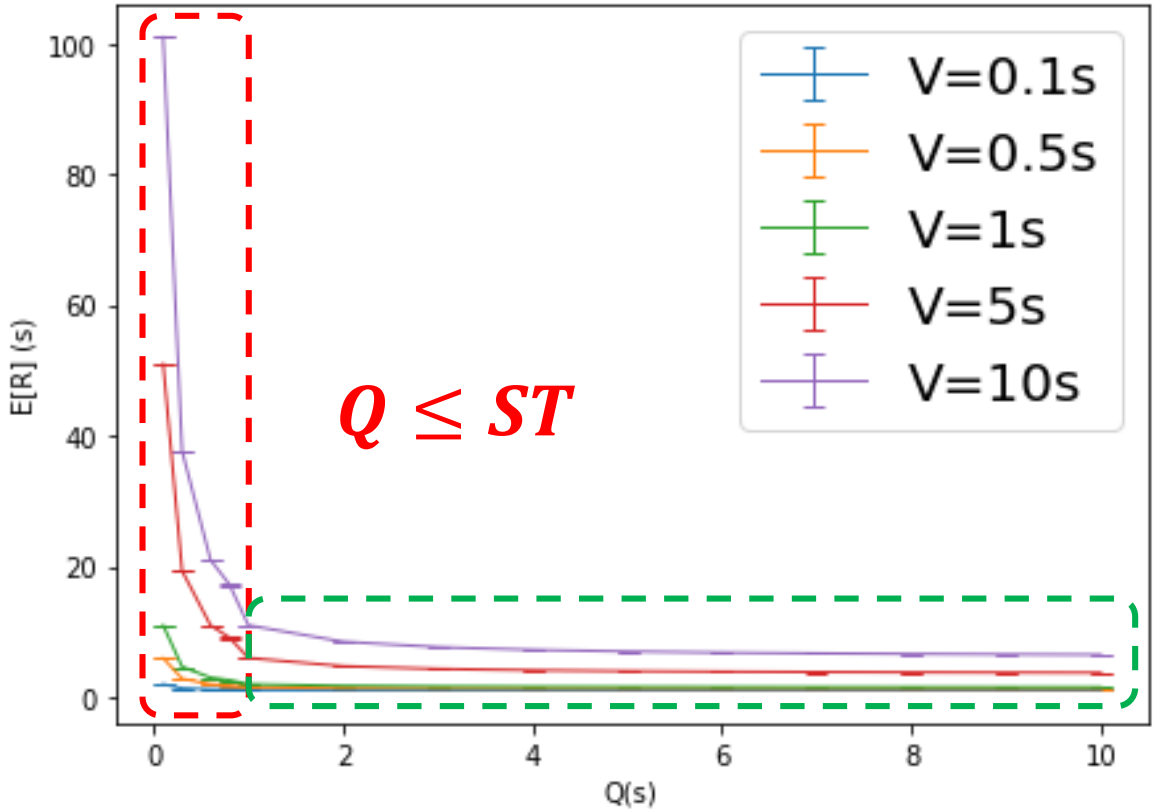
Constant scenario:

$$\boldsymbol{IT = E[ST']}$$

Exponential scenario:

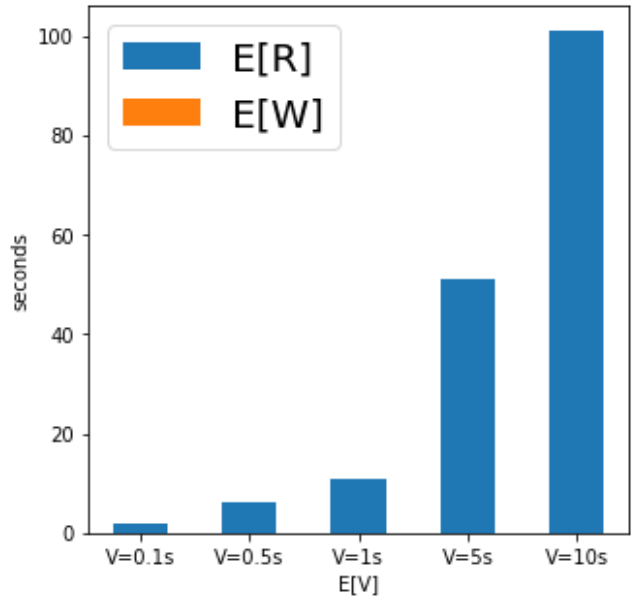
$$\boldsymbol{E[IT] = E[ST'] * 0,8}$$

CONSTANT SCENARIO

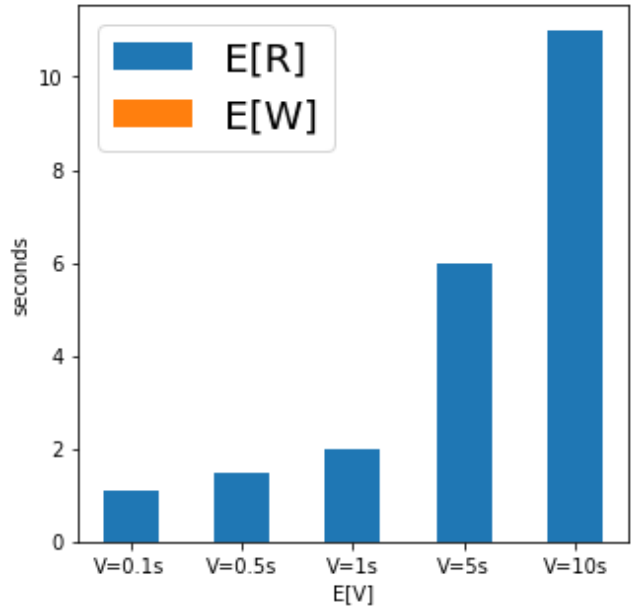


$$E[RT] = E[ST'] = ST + \frac{ST}{Q} * V$$

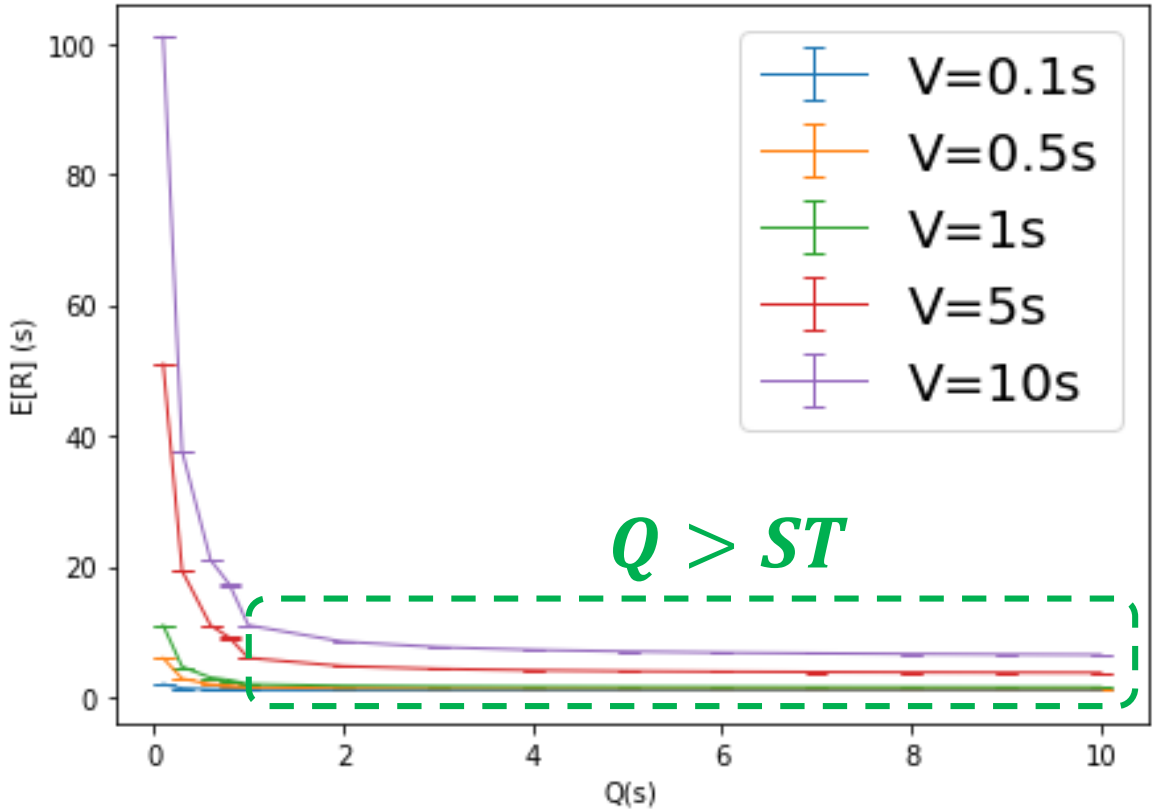
Q=0,1*ST



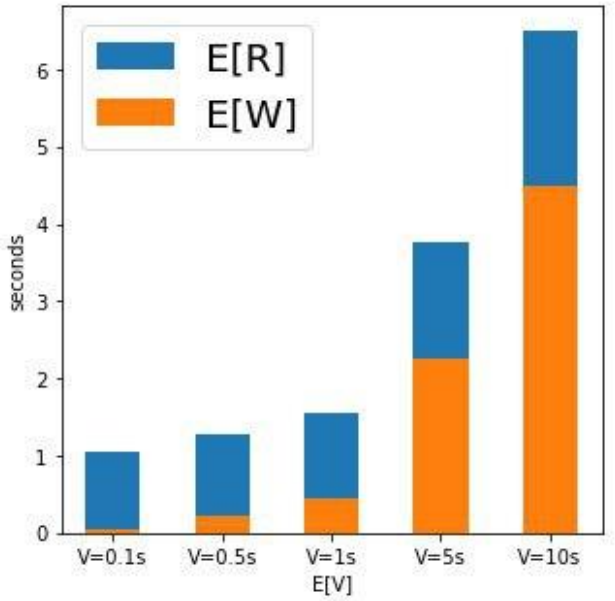
Q=ST



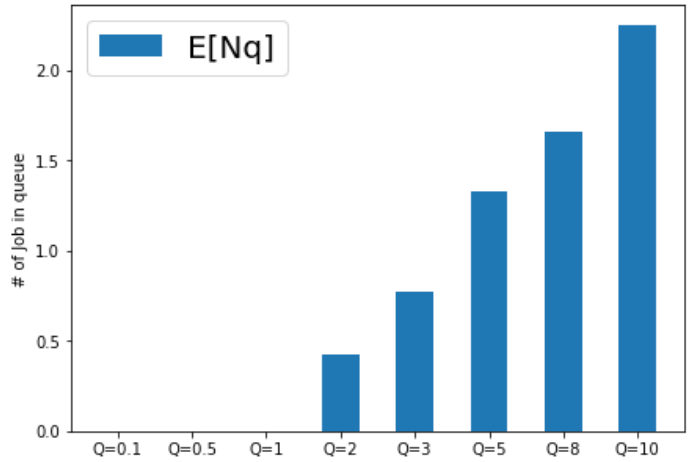
CONSTANT SCENARIO



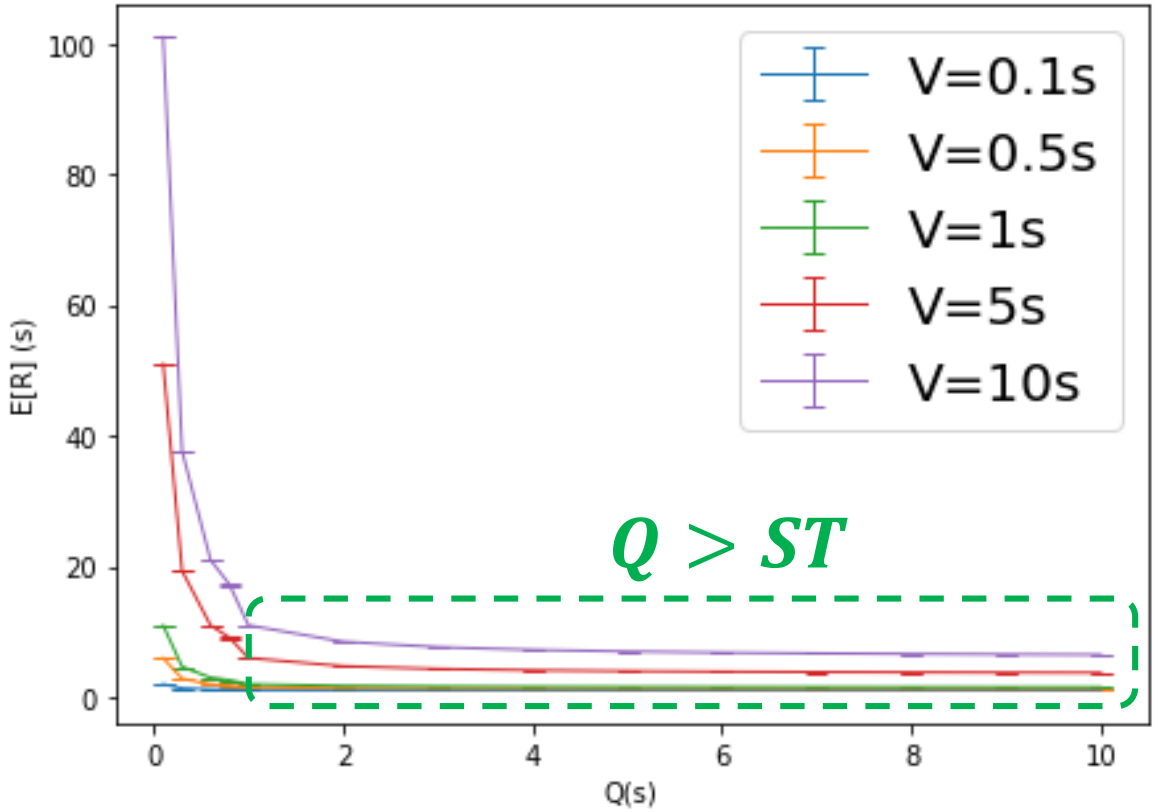
Q=10*ST



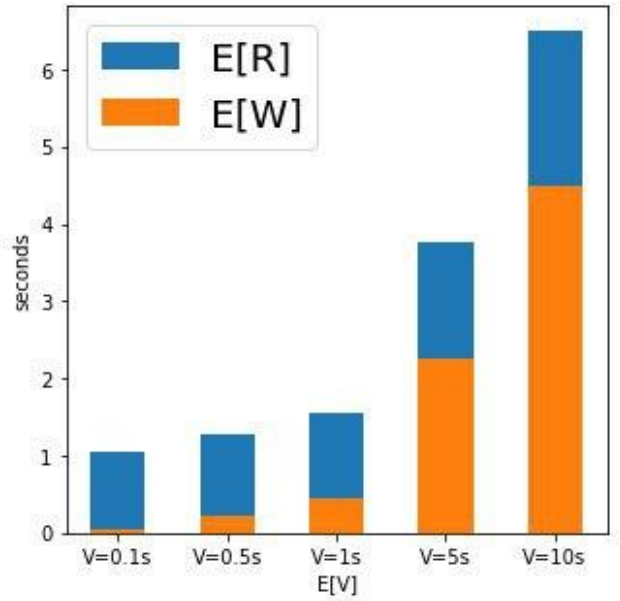
$$E[RT] = E[ST'] + E[W] \rightarrow E[W] \propto \left(E[N_q\,], E[ST'\,]\right)$$

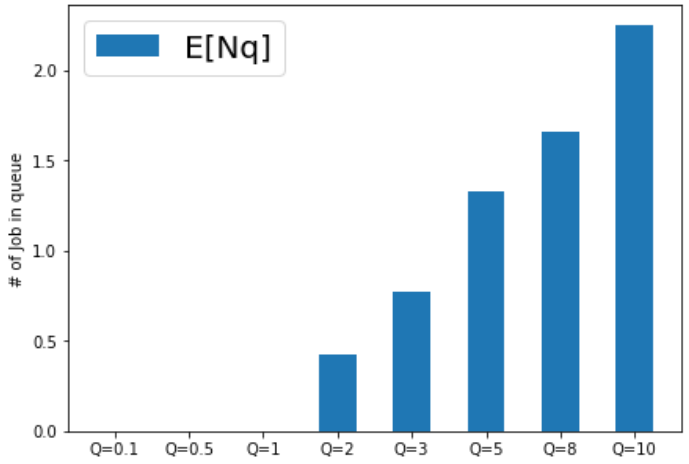


CONSTANT SCENARIO



Q=10*ST



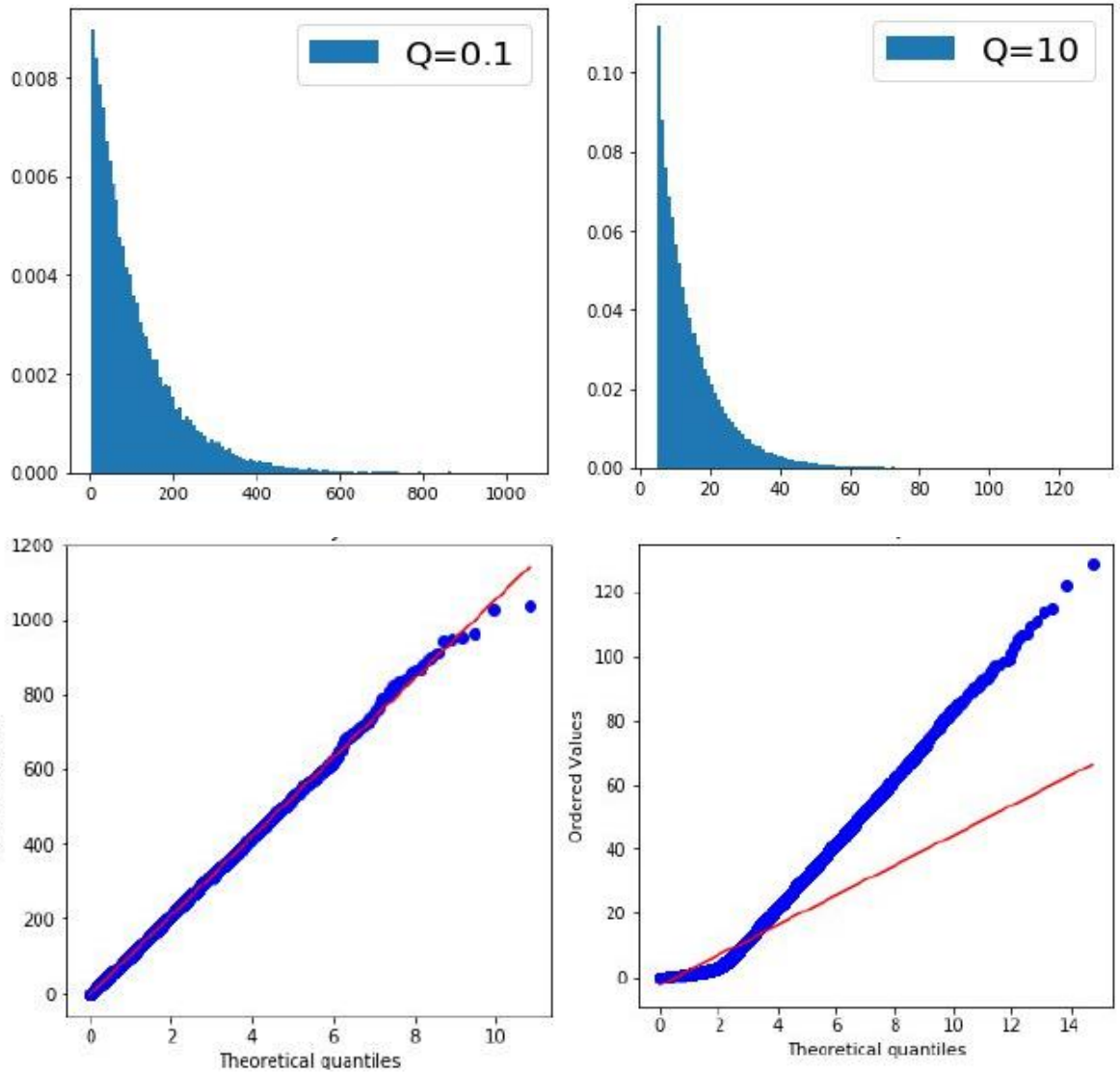


For any value of V the system does not obtain large improvements in terms of RT if it is guarateed that each turn serves at least one job.

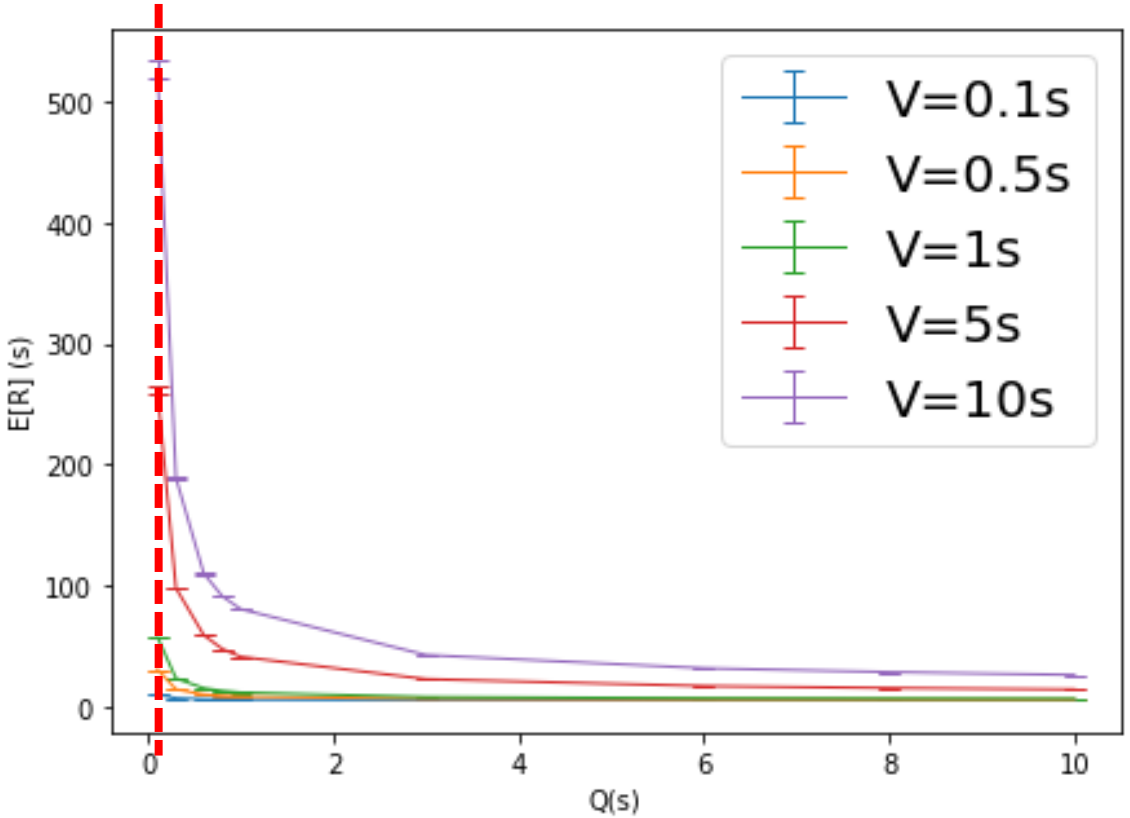
ST' DISTRIBUTION STUDY

- Histograms
- QQ-Plots
- CoVs varying the Q value

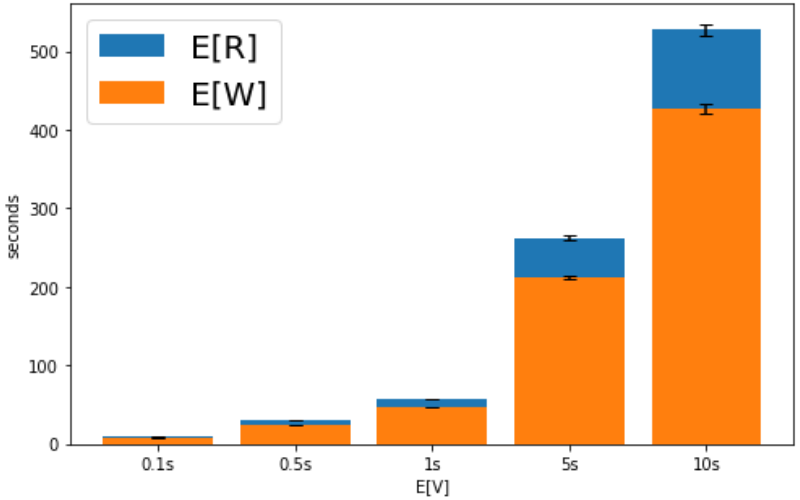
Q/ST	CoV
0,1	1,0375
0,3	1,1125
0,6	1,2087
1	1,333
3	1,765
6	2,084
10	2,2413



EXPONENTIAL SCENARIO



Q=0,1*ST

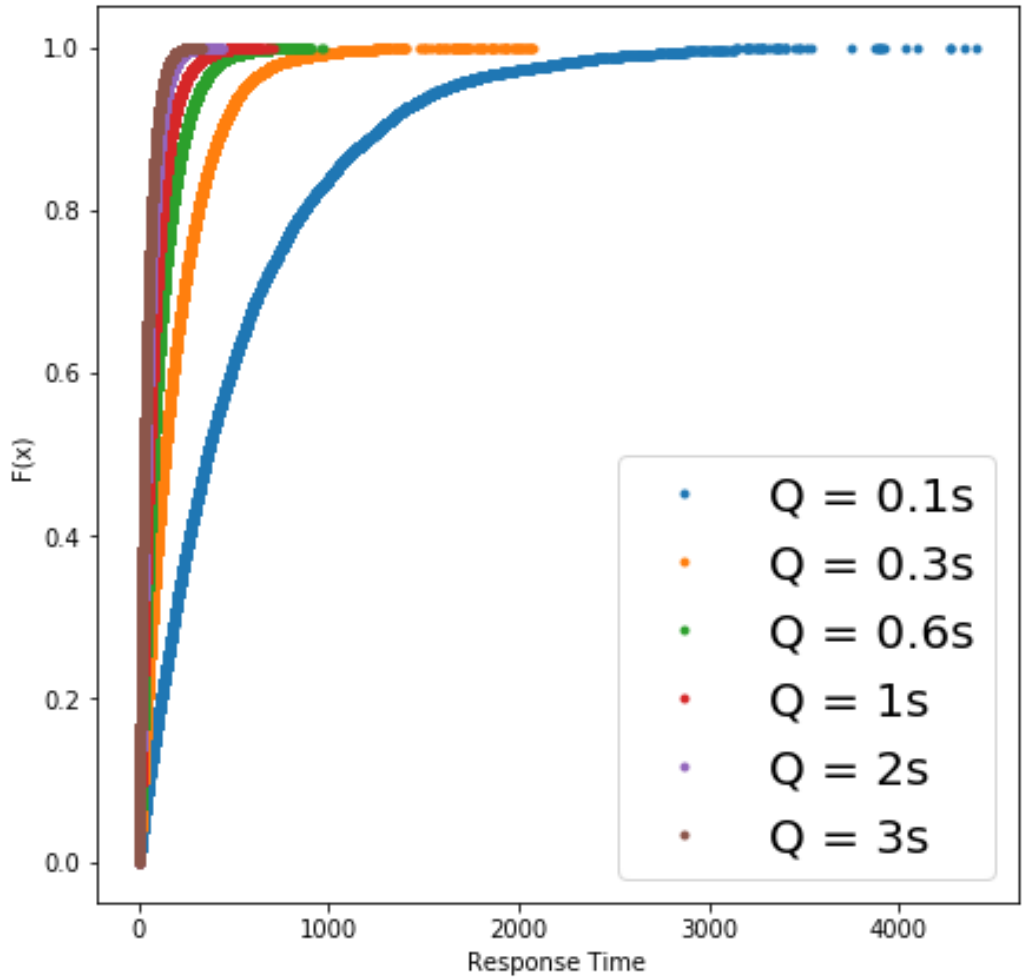


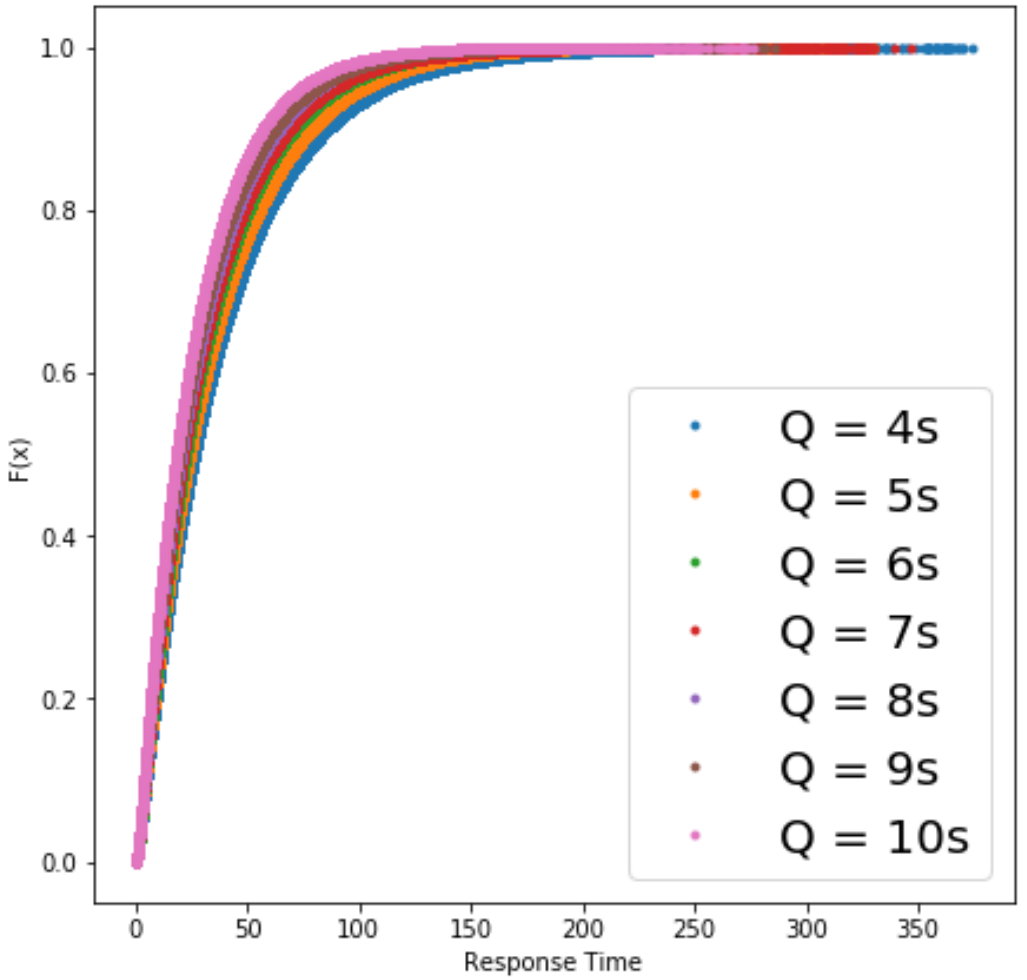
Q	K	N	$\hat{p}$	CI 99% for $\hat{p}$	P$\{ST \leq Q\}$
0,1s	94544	1000000	0,09544	[0.0949, 0.0962]	0,09516
0,3s	257328	1000000	0,257328	[0.2562, 0.25845]	0,2591
0,6s	445717	1000000	0,445717	[0.444, 0.447]	0,4511
1s	622907	1000000	0,622907	[0.6217, 0.62415]	0,6321
2s	852784	1000000	0,852784	[0.8519 ,0.8537]	0,8646
3s	937981	1000000	0,937981	[0.9374, 0.9386]	0,9502
4s	969223	1000000	0,969223	[0.9688, 0.9697]	0,9816
5s	980842	1000000	0,980842	[0.9805, 0.9812]	0,9932
6s	985125	1000000	0,985125	[0.9848, 0.9854]	0,9975

Using relative frequency:

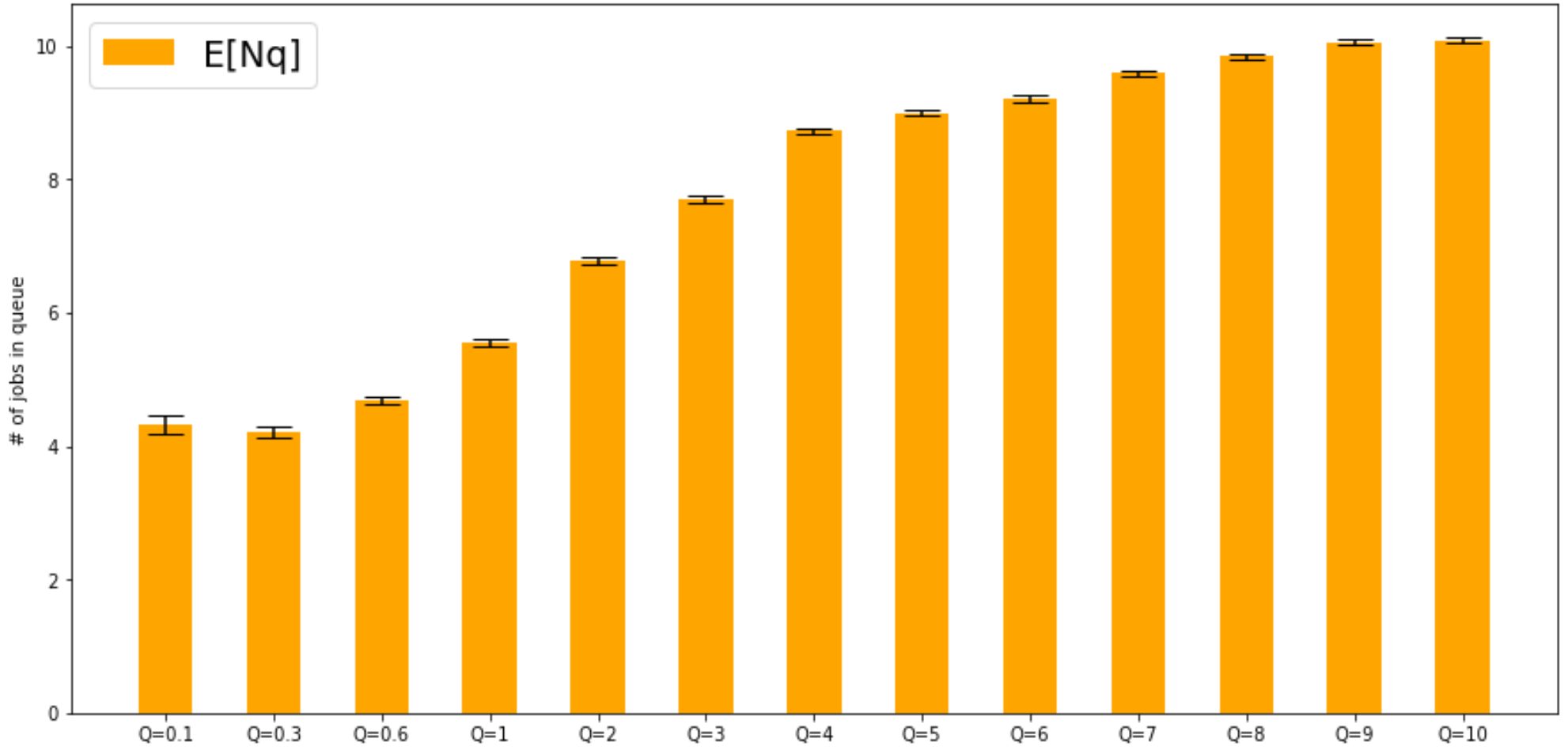
$$\hat{p} = \frac{k}{N}$$

EXPONENTIAL SCENARIO





$E[N_q]$


E[Nq]
# of jobs in queue
0
2
4
6
8
10
Q=0.1
Q=0.3
Q=0.6
Q=1
Q=2
Q=3
Q=4
Q=5
Q=6
Q=7
Q=8
Q=9
Q=10

CONCLUSIONS

From our analysis we can state that increasing too much Q w.r.t. ST:

- RT does not reach tangible benefits as Q increases
- Number of Jobs in queue increases with Q

- Number of served Jobs increases


Thank you