Simulation of Apache web Server

CS 681

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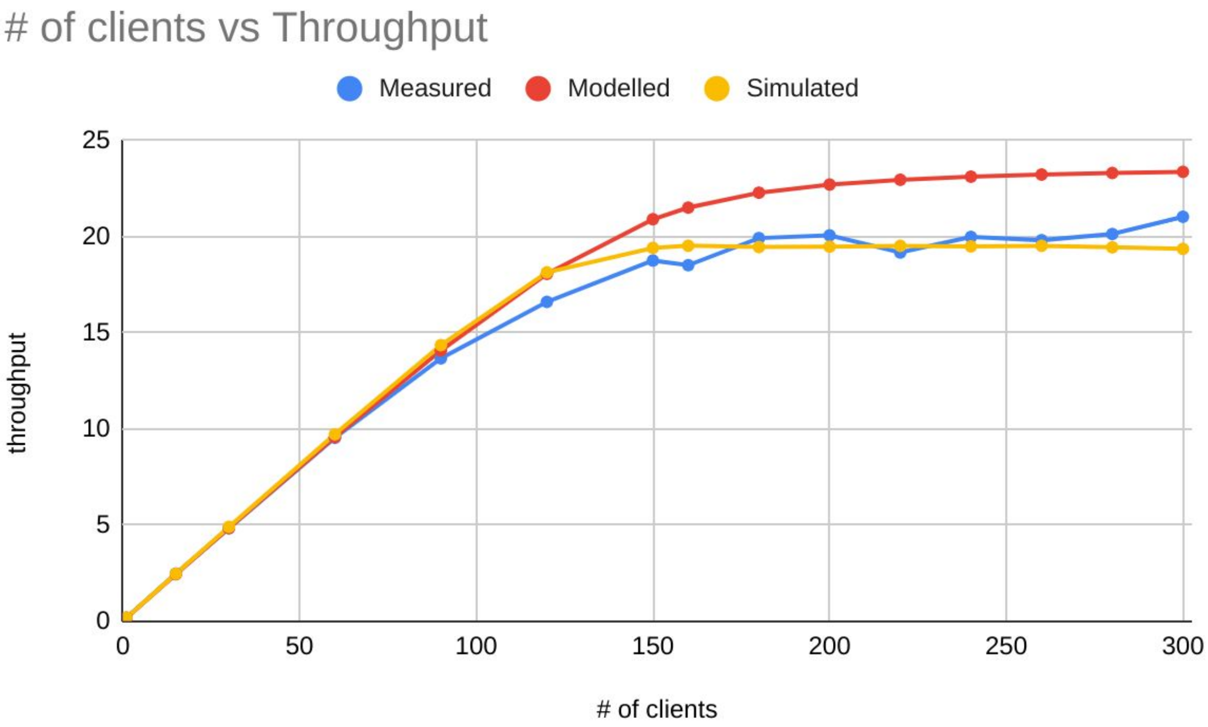
Simulation Configuration

- We have simulated apache server which we used for measurement.
  - Maintained no of threads as 150.
  - Set request buffer size to 70.
  - Set time quantum to 36.5 msec.
  - Set context switch overhead to 9 msec
  - Set mean service time to 168 msec
  - Set mean timeout to 9000 msec
  - Set simulation timer to 300000 msec
- We have used erlang distribution for timeout.

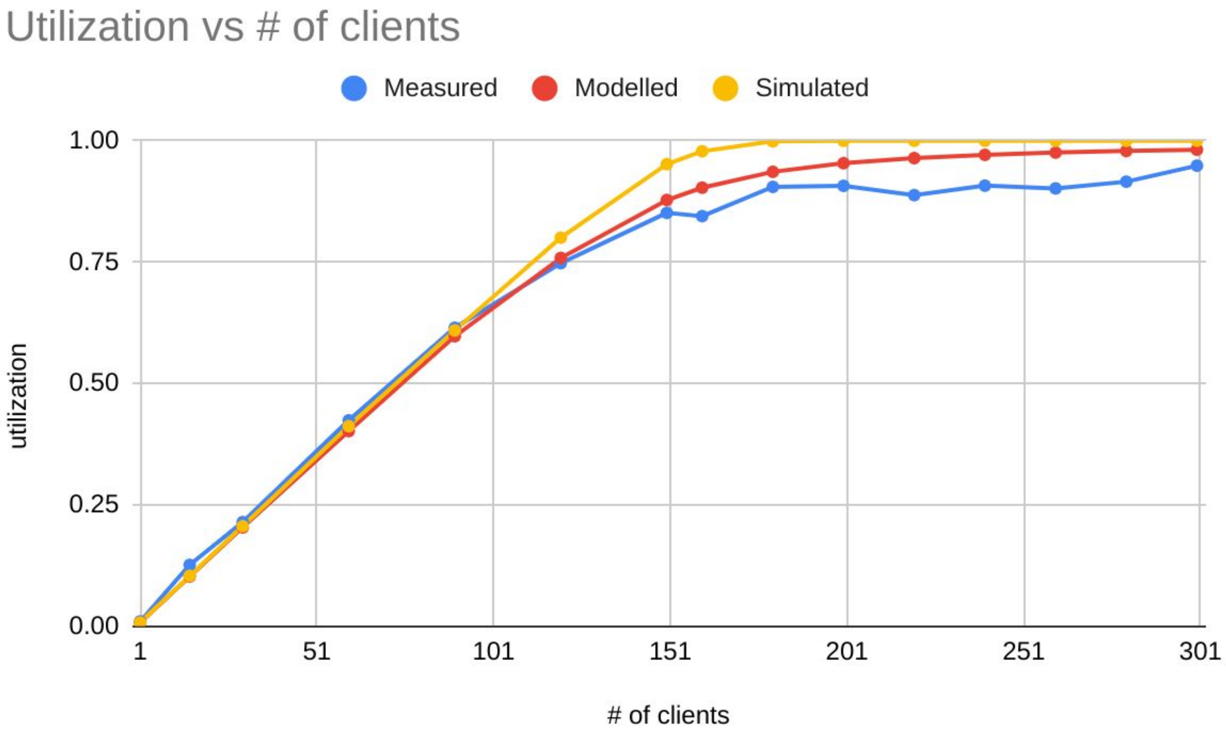
Service Time Distributions

- We have run our simulation on 3 different distributions of service time
    - Exponential.
        - https://docs.google.com/spreadsheets/d/1qbP_5zAiKbSovwLCSjb3Mei8JwGJn4BxJQgmGIq5gvg/edit?usp=sharing.
    - Uniform Random
        - https://docs.google.com/spreadsheets/d/152tlsSZ2hxds3WEH_Wscb7L-Sa0JhdOj0bVNDXjMKns/edit#gid=1251840463
    - Constant
        - https://docs.google.com/spreadsheets/d/1Yb8gIm1HWdYOWCgae8PbNbz8qon5WGG0pivDkZR5Du8/edit?usp=sharing

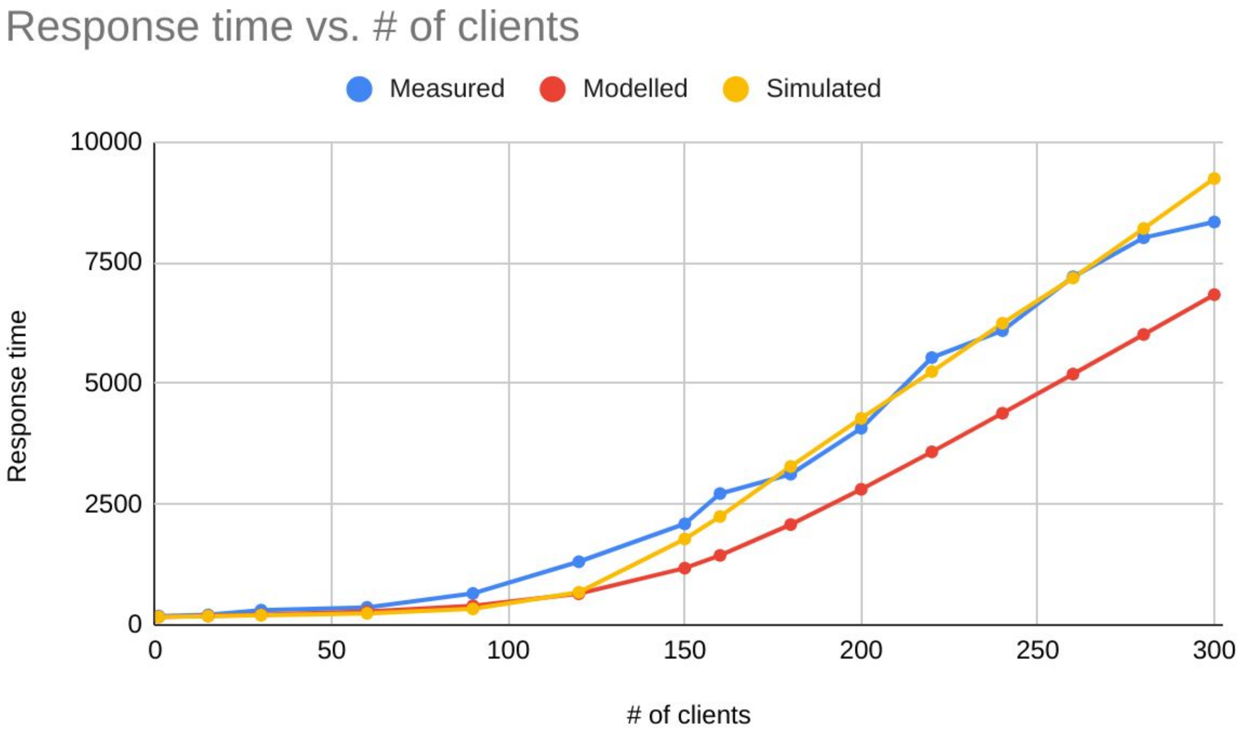
Throughput graphs(Exponential)



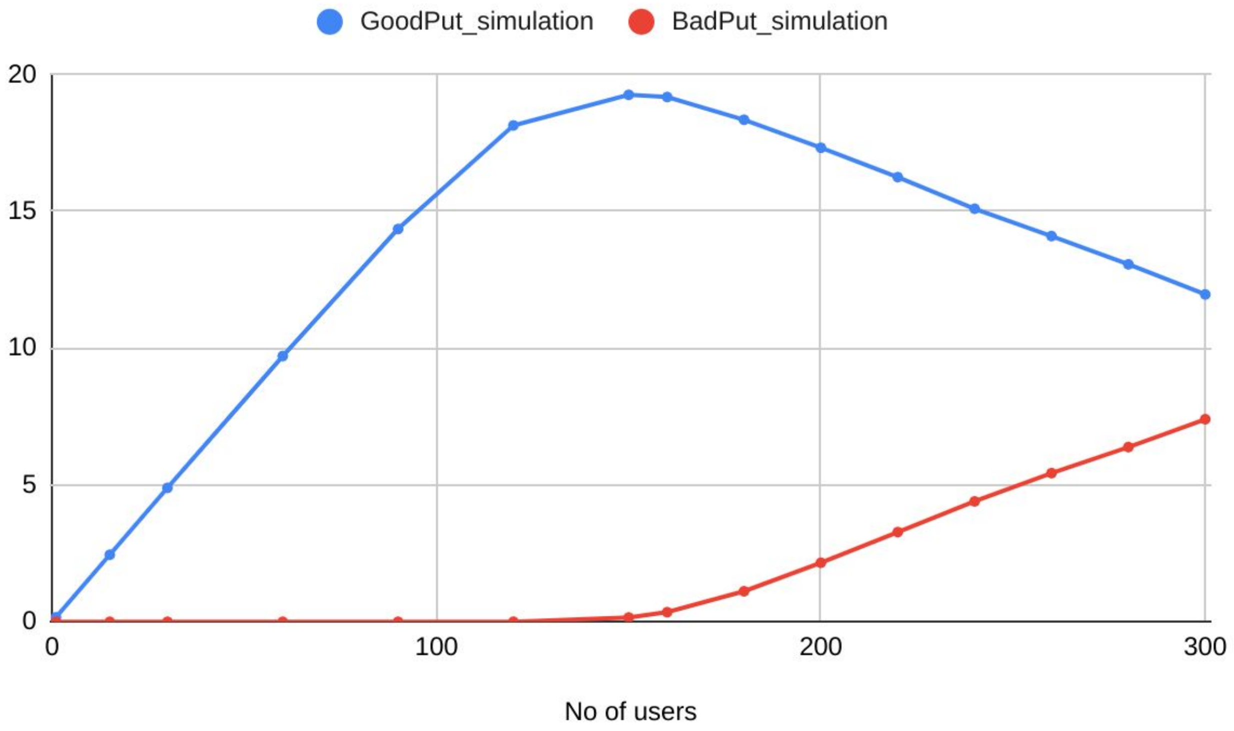
Utilization graphs(Exponential)



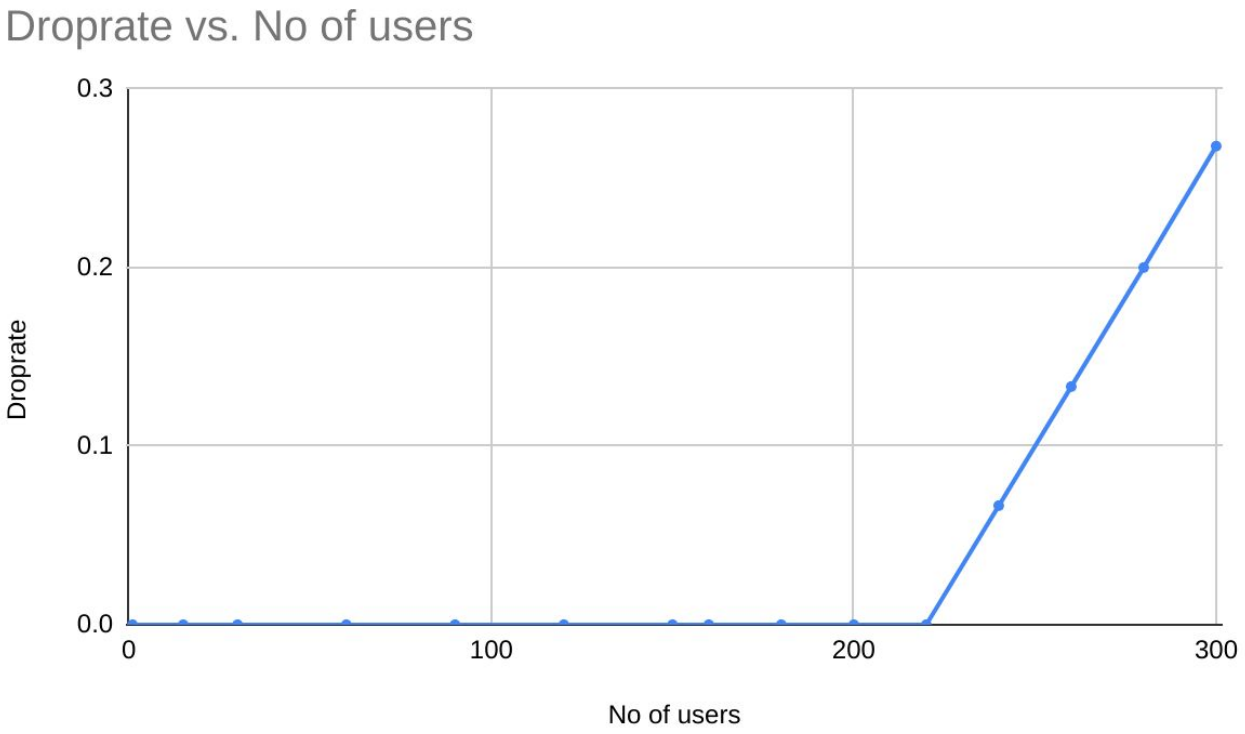
Response Time graphs(Exponential)



Goodput,Badput graphs(Exponential)



Drop Rate graphs(Exponential)



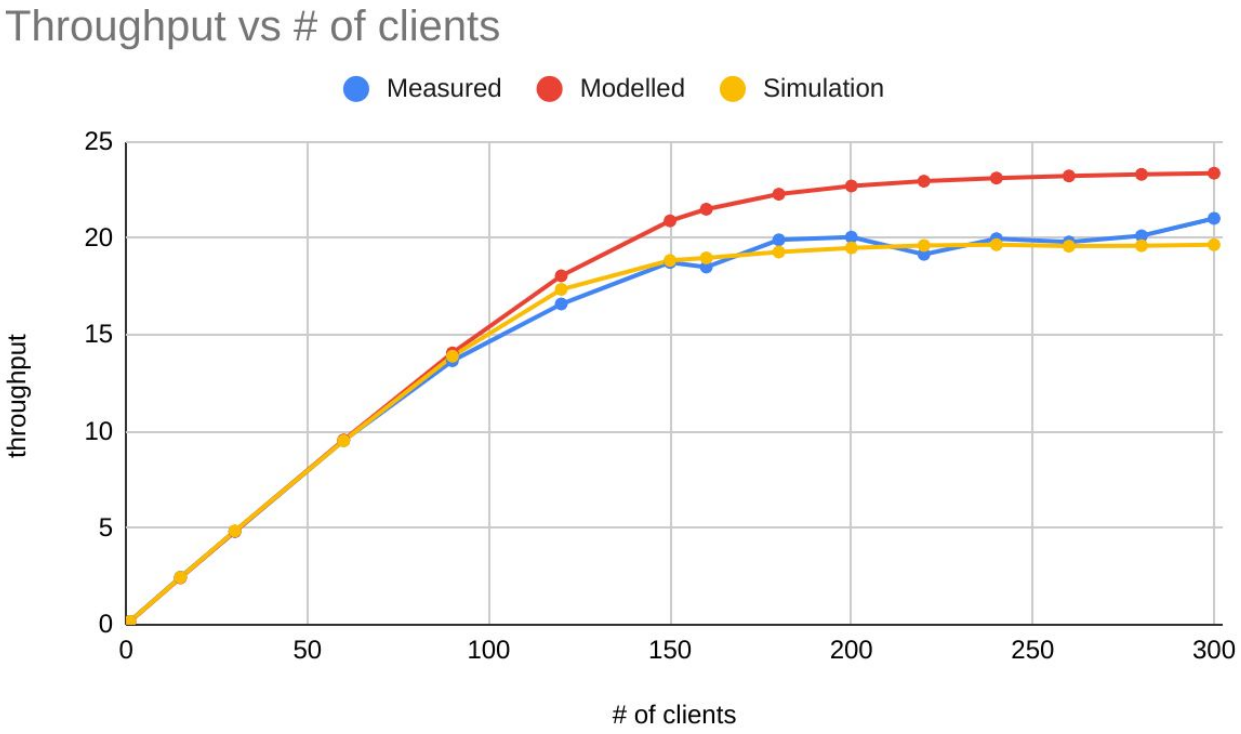
Observations

- Decreasing buffer size, increases drop rate.
- Decreasing time out,increases badput.
- Increasing context switch overhead,increases response time.
- Decreasing no of threads increases response time.
- Increasing time quantum to some extent decreases response time,after which response time increases i.e becomes close to FIFO.
- By observing graphs,we can say our kleinrock heuristic was around 150 which we have claimed while measurement.

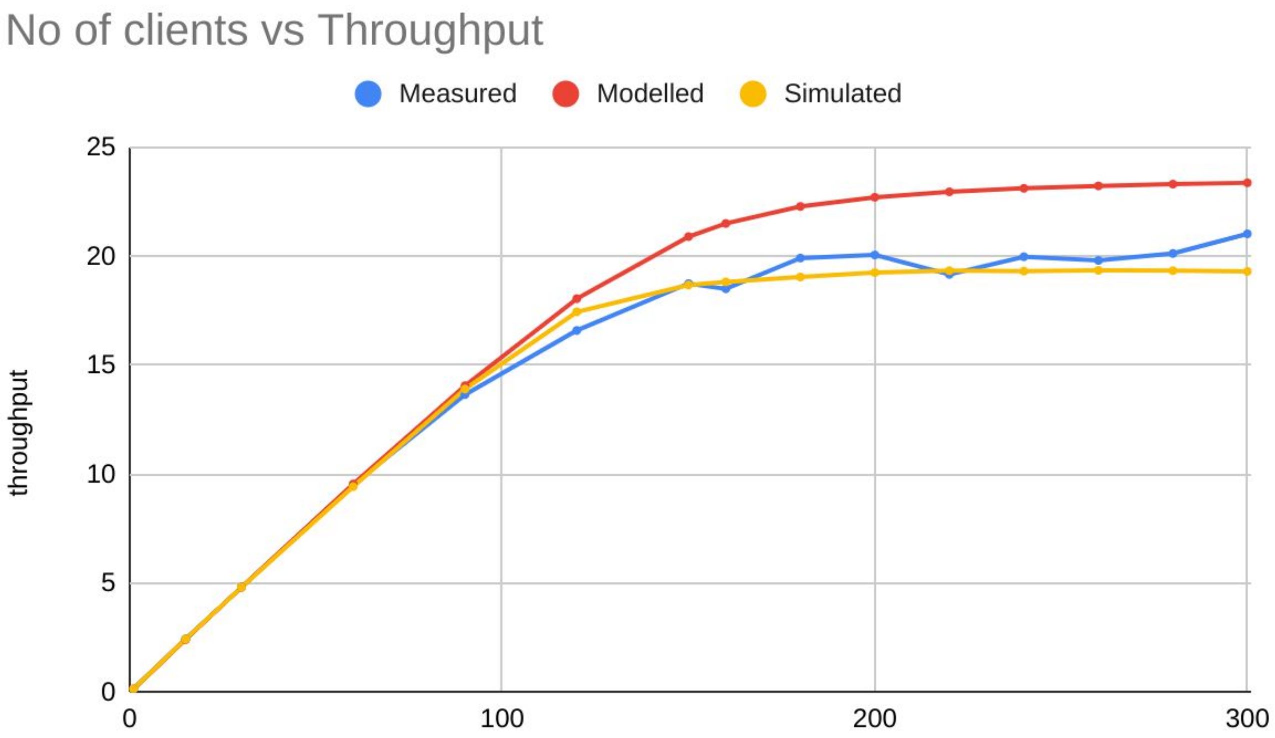
Conclusions

- Using simulation we can study behaviour of system for any required configuration easily.
  - Using normal measurements it will be difficult to study behaviour of system under certain circumstances.
- Using simulation we can easily find what type of system configuration needed to support given number of clients

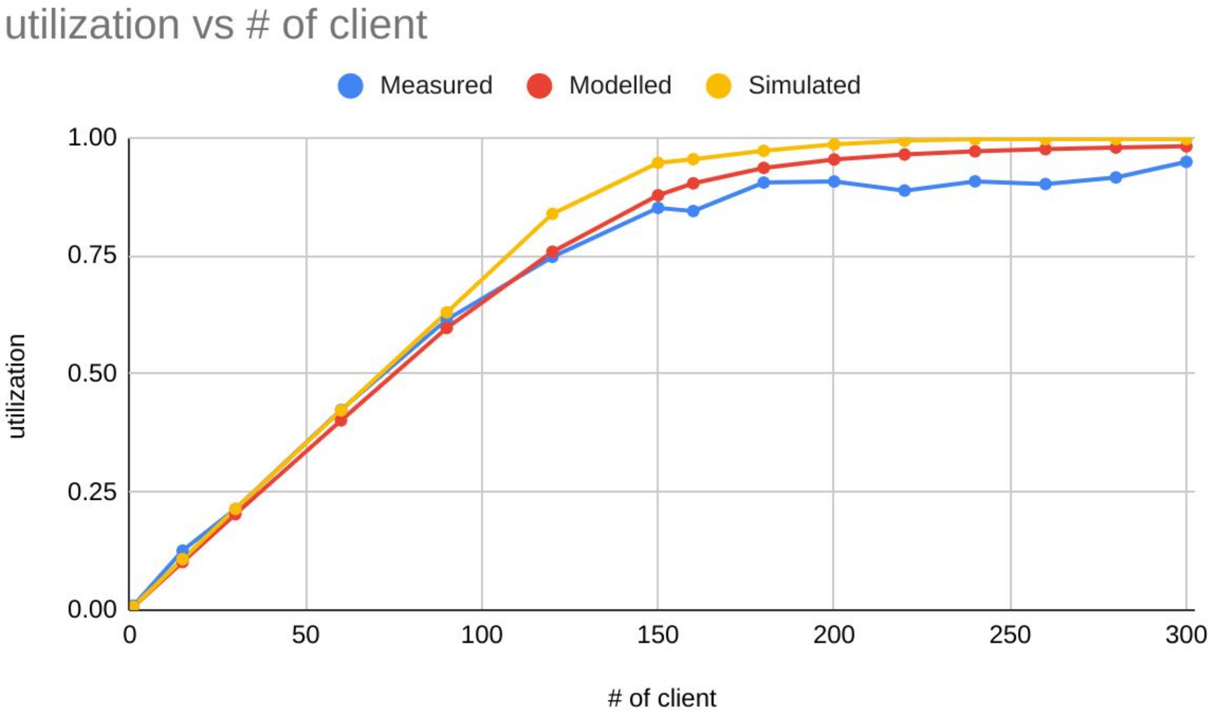
Throughput graphs(Uniform Random)



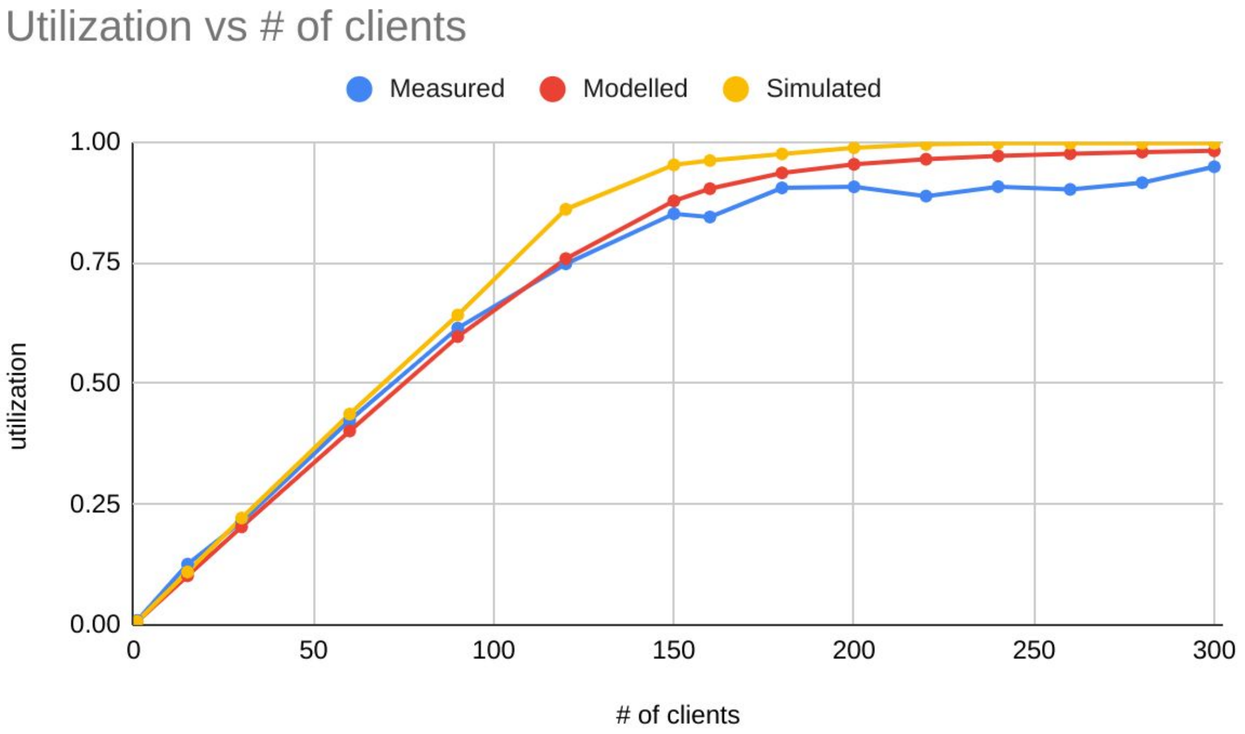
Throughput graphs(Constant)



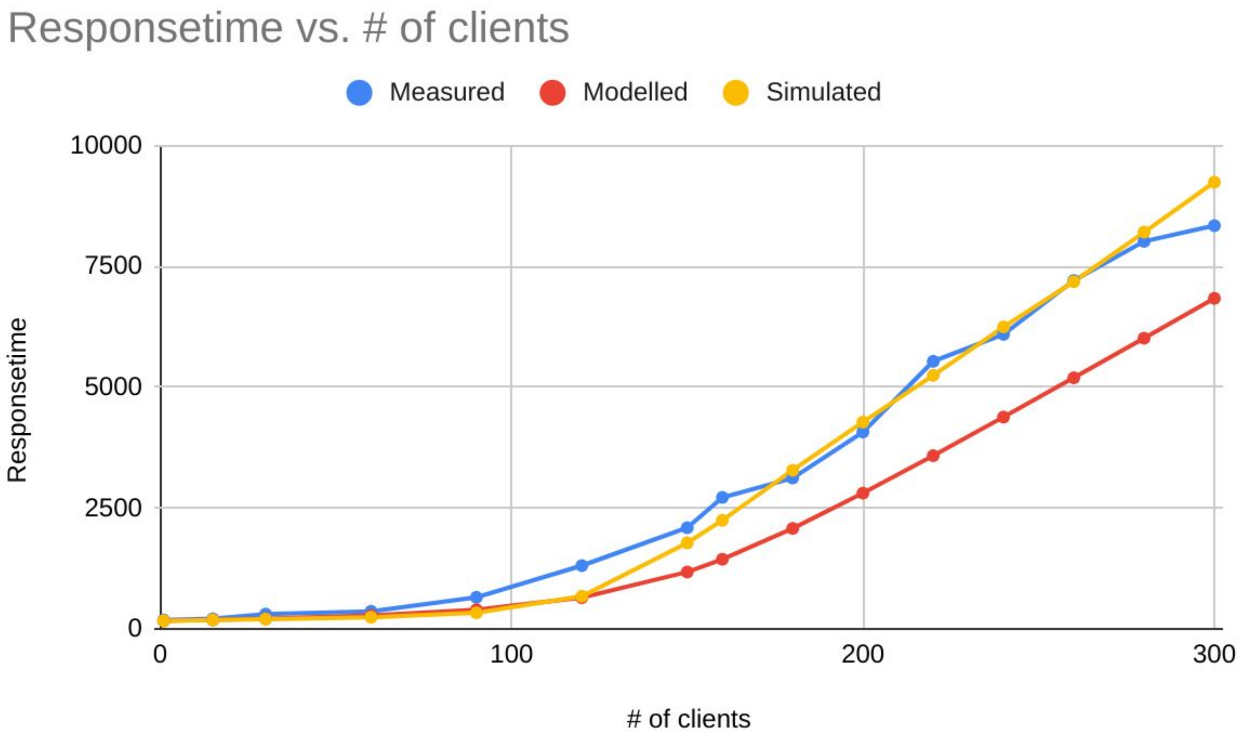
Utilization graphs(Uniform Random)



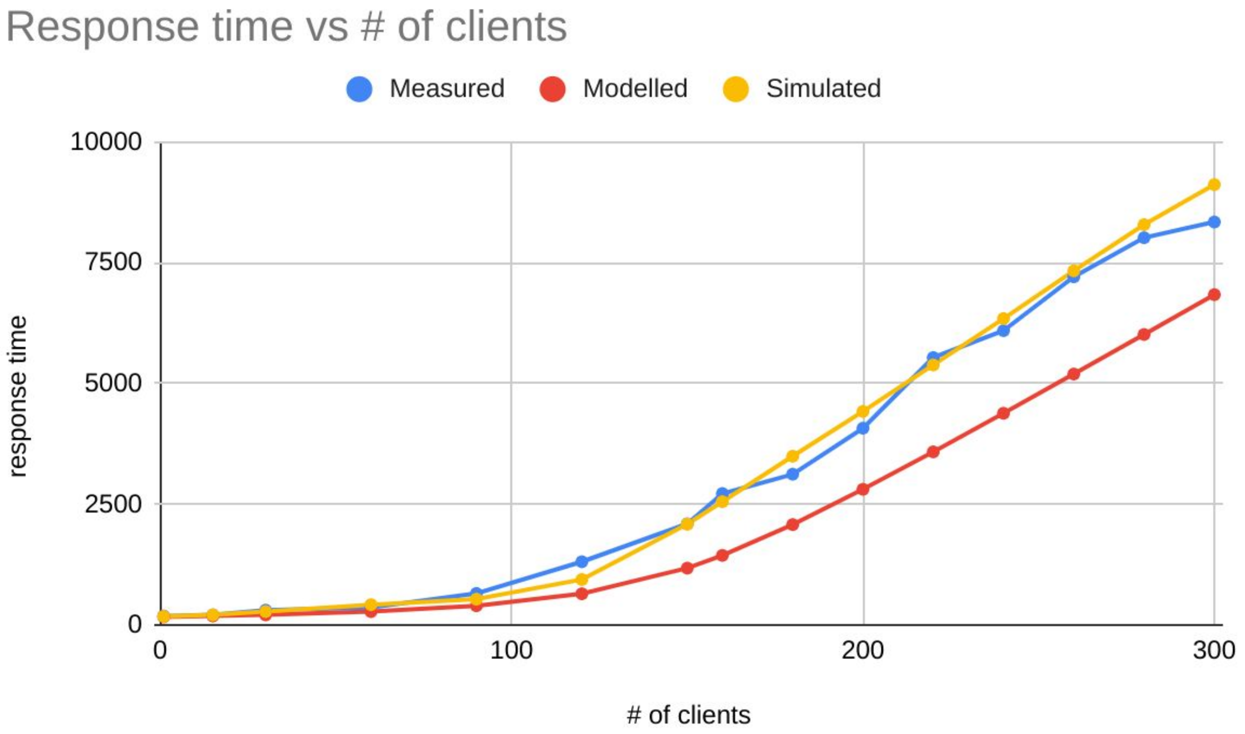
Utilization graphs(Constant)



Response Time graphs(Uniform Random)



Response Time graphs(Constant)


Response time vs # of clients
● Measured
● Modelled
● Simulated
response time
# of clients