Standard Elba Project

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Background

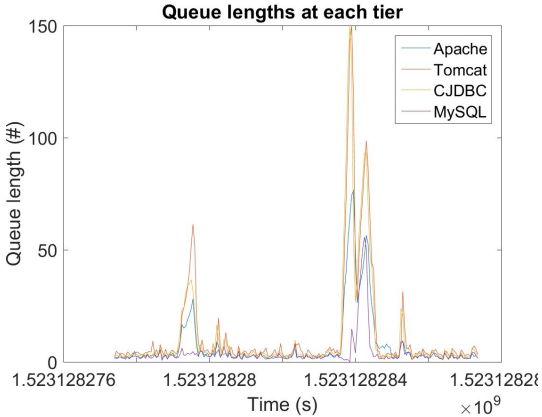
- Millibottlenecks are expensive (Amazon loses 1% of sales for every 100 ms increase in page loading time [1])
- Detecting millibottlenecks is a tedious task and requires high time resolution
- Short resource bottlenecks can propagate up to the different system components thereby amplifying the effects

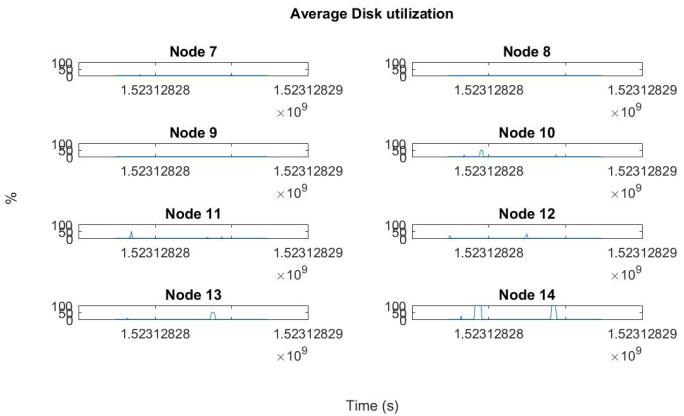
[1] R. Kohavi and R. Longbotham. “Online experiments: Lessons learned,” *IEEE Computer Society*., vol 40, pp. 103-105, Sept. 200

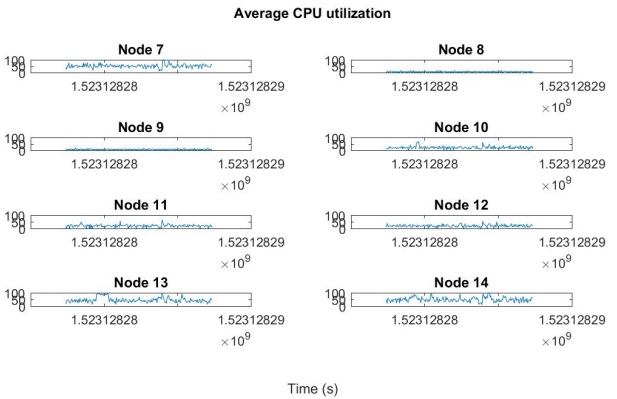
Methods

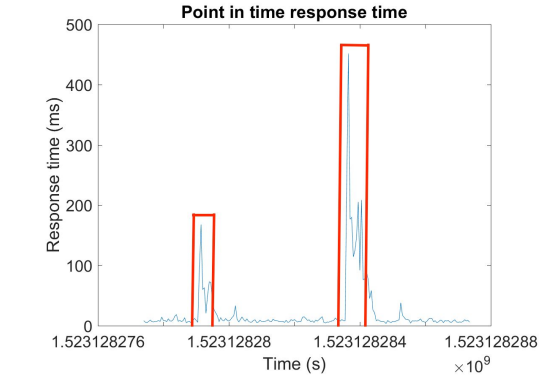
- Create and configure the experiment on Emulab
- Run the experiment on different workloads
- Parse the output to get the csv files
- Plot the graphs
- Look for overlapping peaks over the different graphs (point-in-time graph, response-time graph etc)

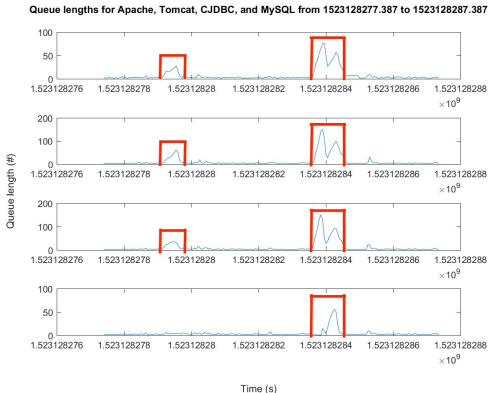
Graphs plotted by Matlab script



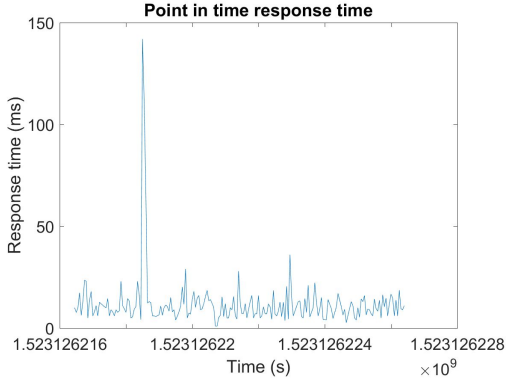




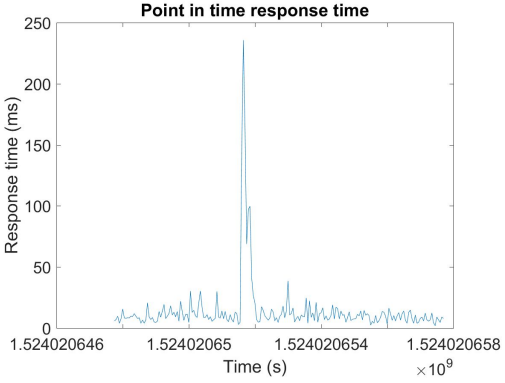




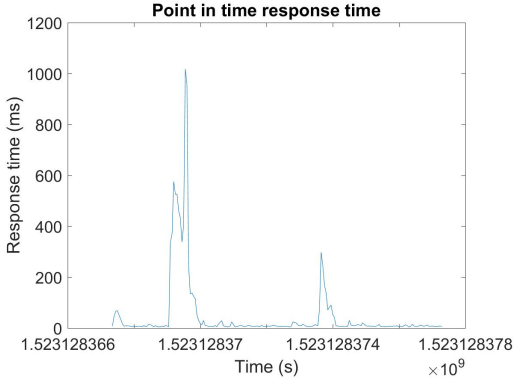
Point-in-time response time



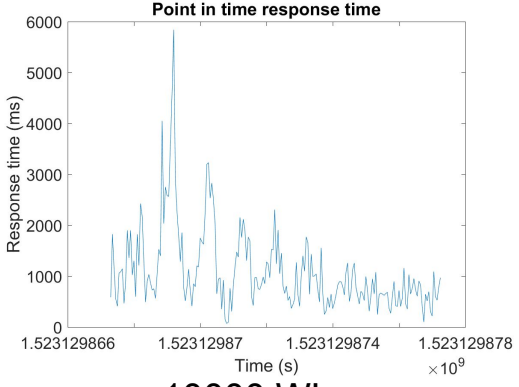
1000 WL



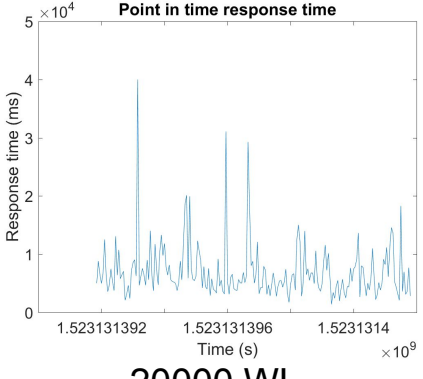
1500 WL



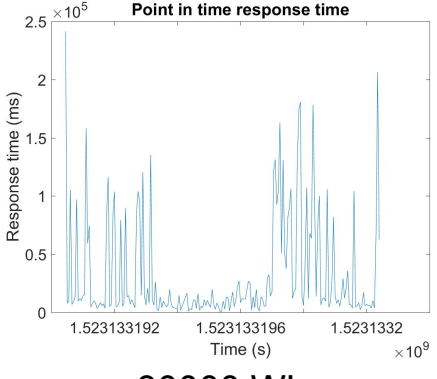
5000 WL



10000 WL

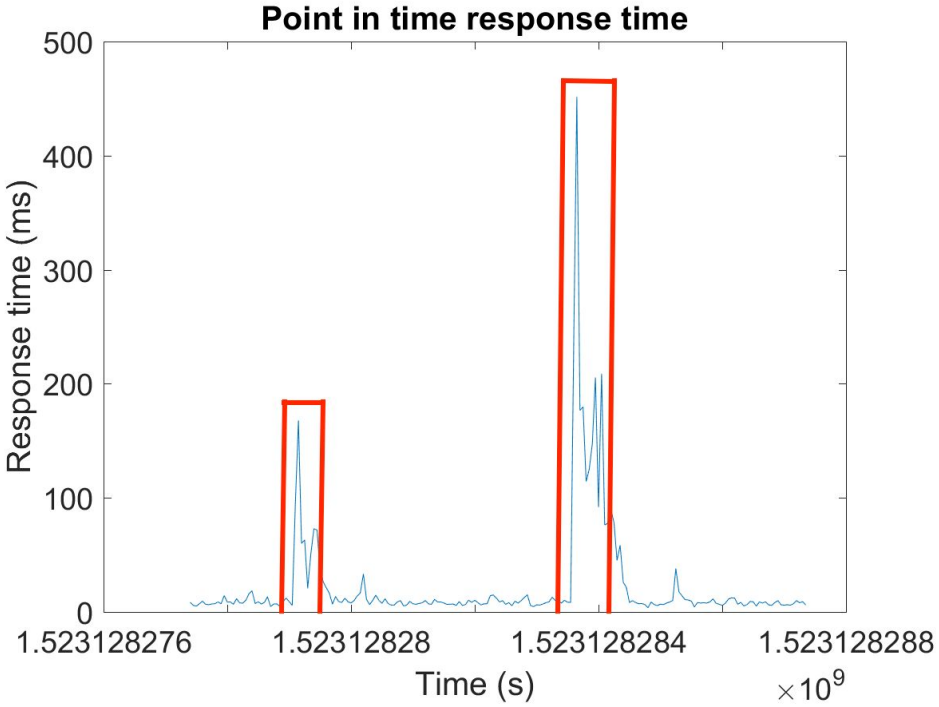


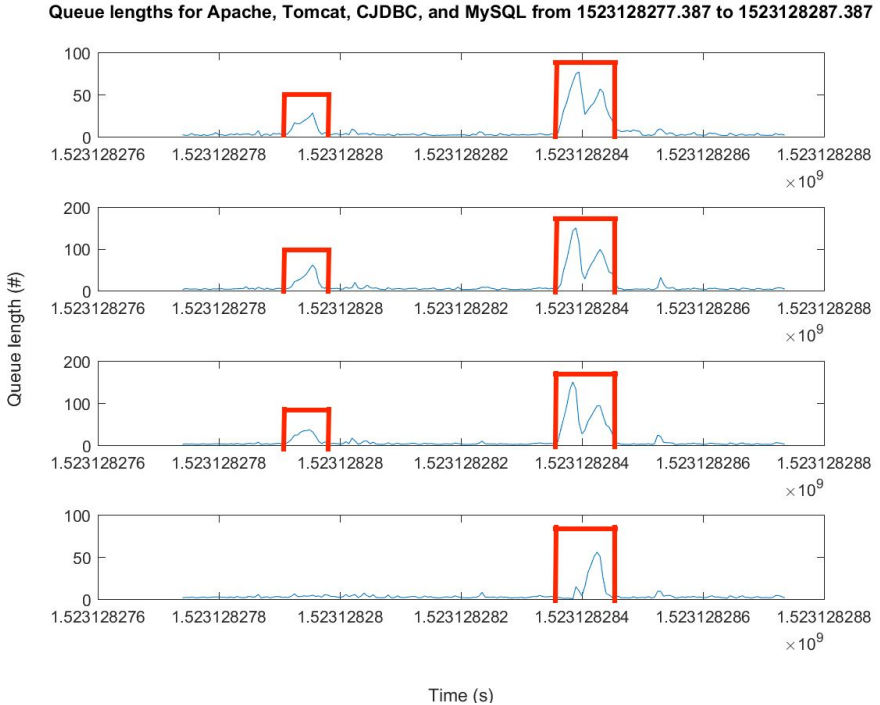
20000 WL



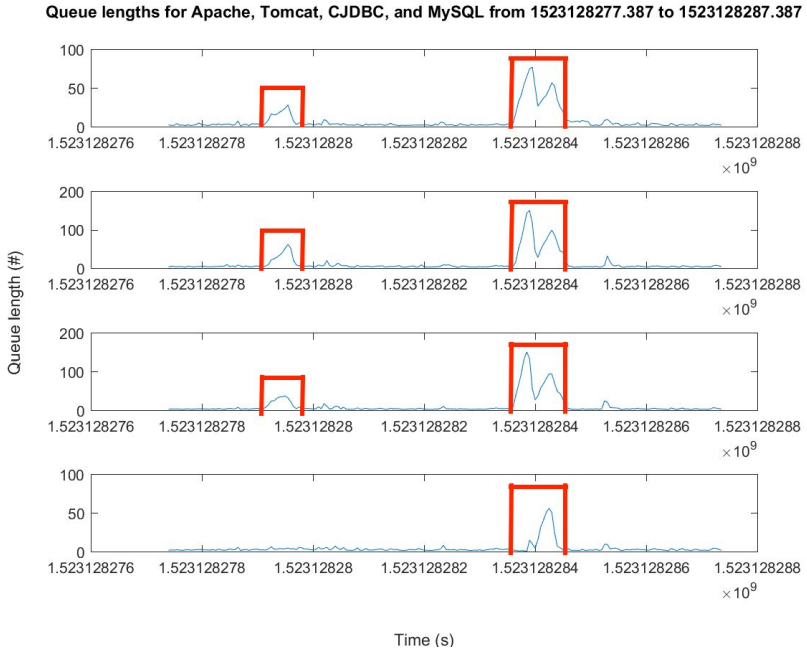
30000 WL

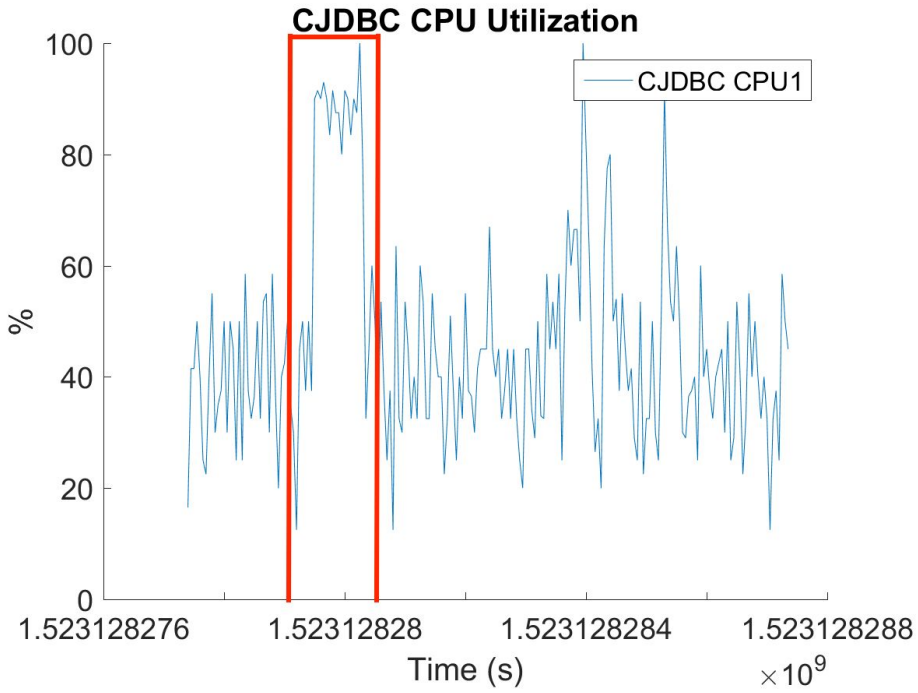
Millibottleneck in focus (1)



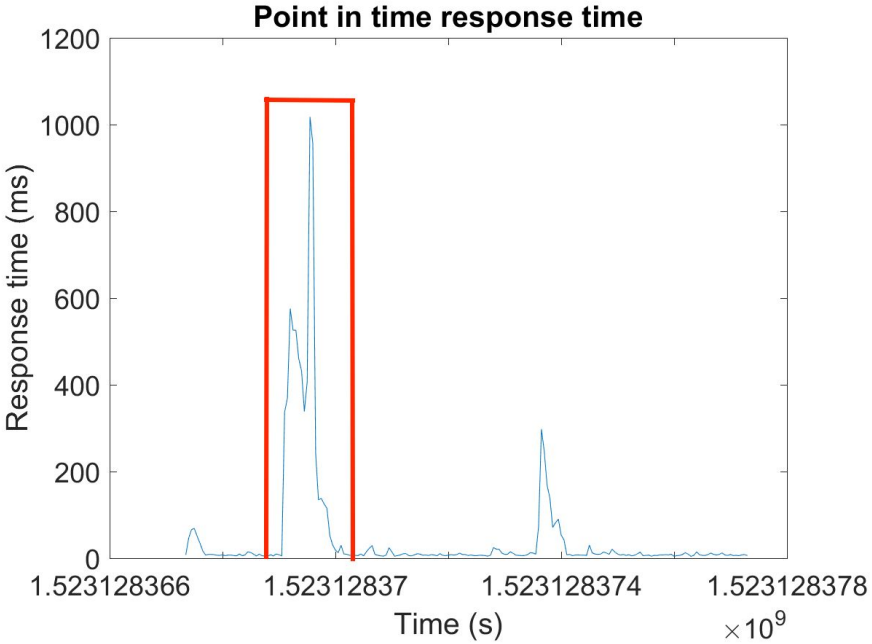


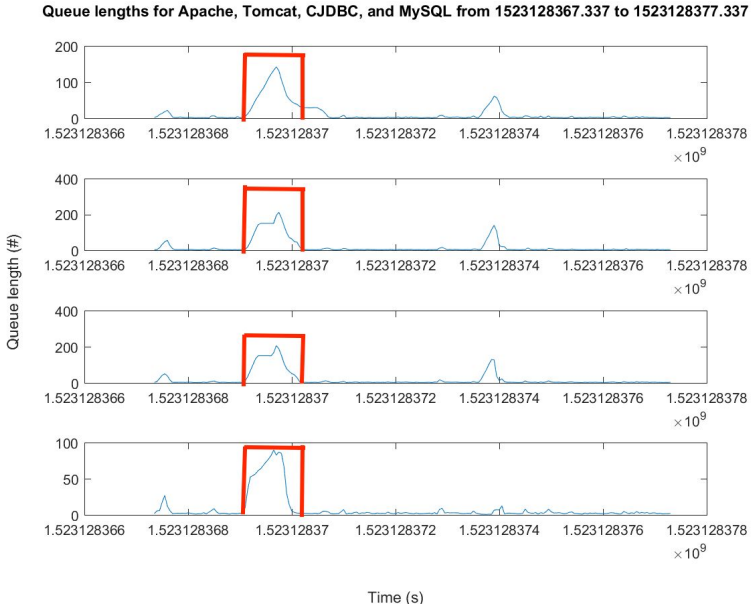
CJDBC CPU utilization



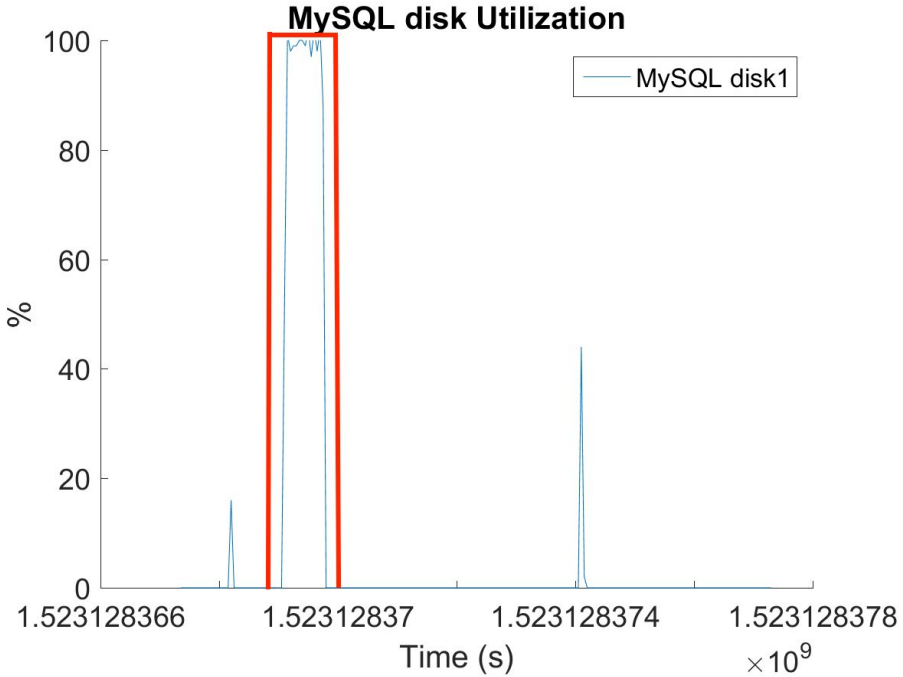


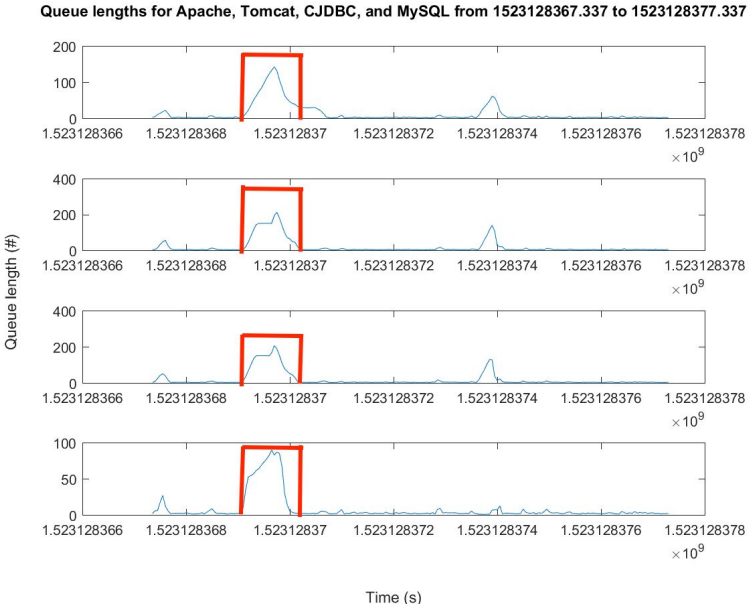
Millibottleneck in focus (2)



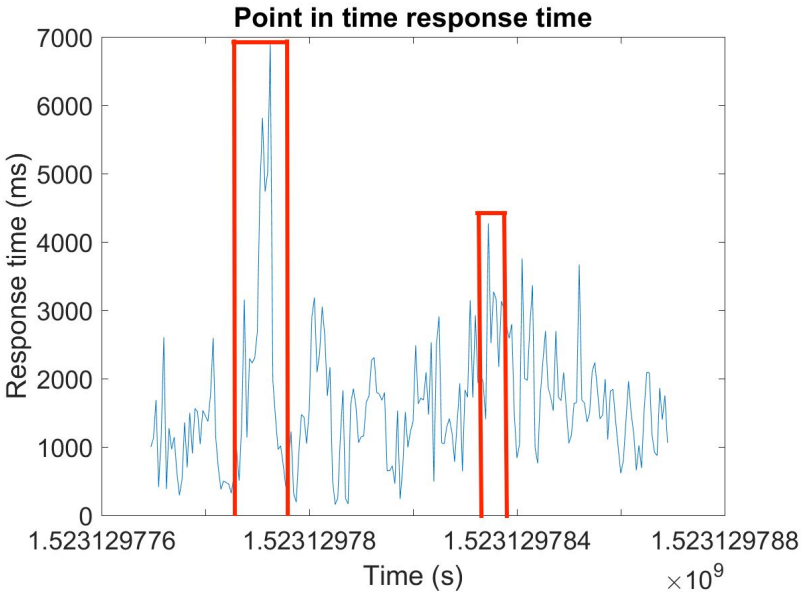


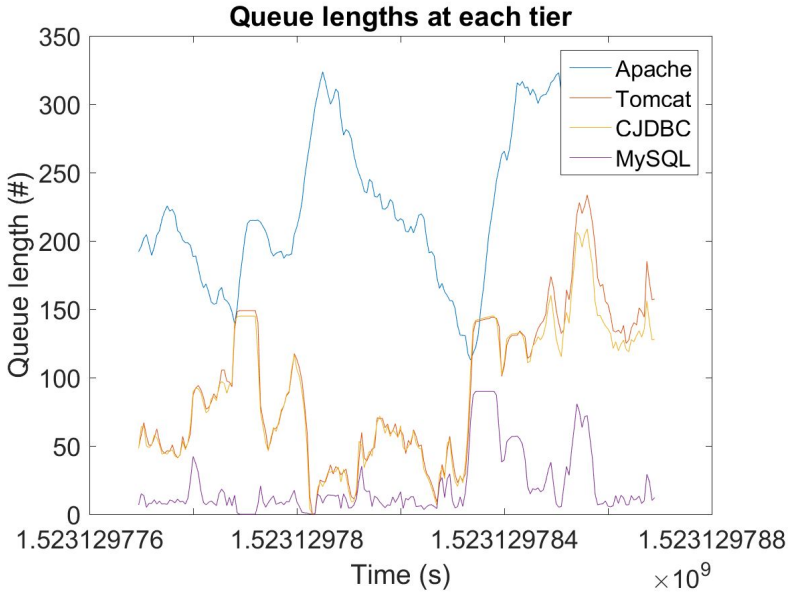
MySQL Disk utilization



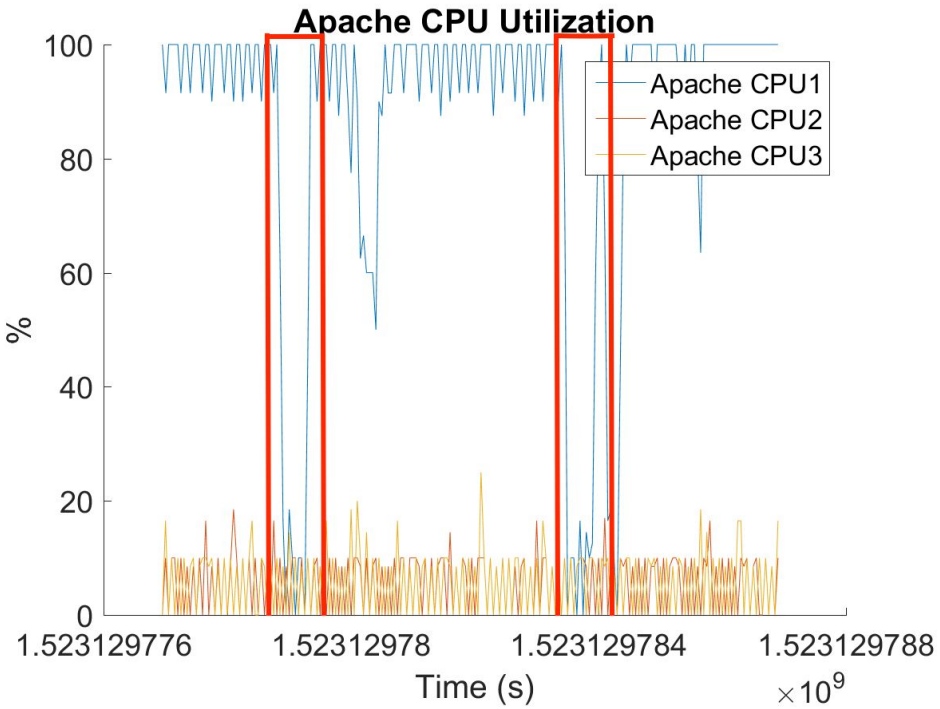


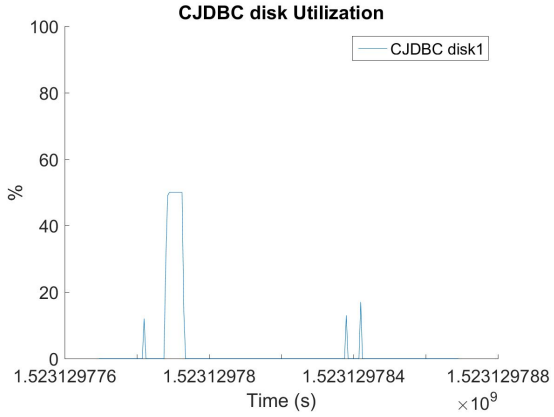
Millibottleneck in focus (3)

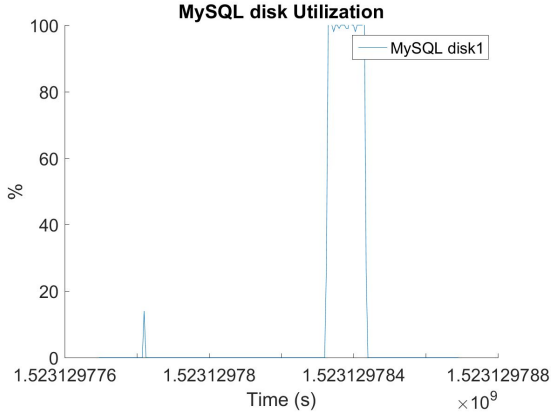




Apache CPU utilization







Issues

- Data parser bugs
  - Parsers were updated by Josh
  - File paths were different for different operating systems
- Missing output files
  - An earlier patch introduced bugs in the RUBBoS configuration files. These causes were found too late
- Finding causes of peaks in response time
  - Find coincident peaks in queue length and resource utilization graphs

Evaluation

- Use a non-trivial topology at various workloads
- Plot point-in-time response time, queue length, and resource utilization graphs
- Find five instances of millibottlenecks and plot five sets of graphs

Conclusion

- Very short millibottlenecks result in significant performance bugs
- Due to the short durations of millibottlenecks, we need instruments capable of monitoring resources at a fine-time granularity
- Automating the process of detecting millibottlenecks would go a long way in easing the process of finding the root cause of millibottlenecks

Questions?