

ThorBang MQ

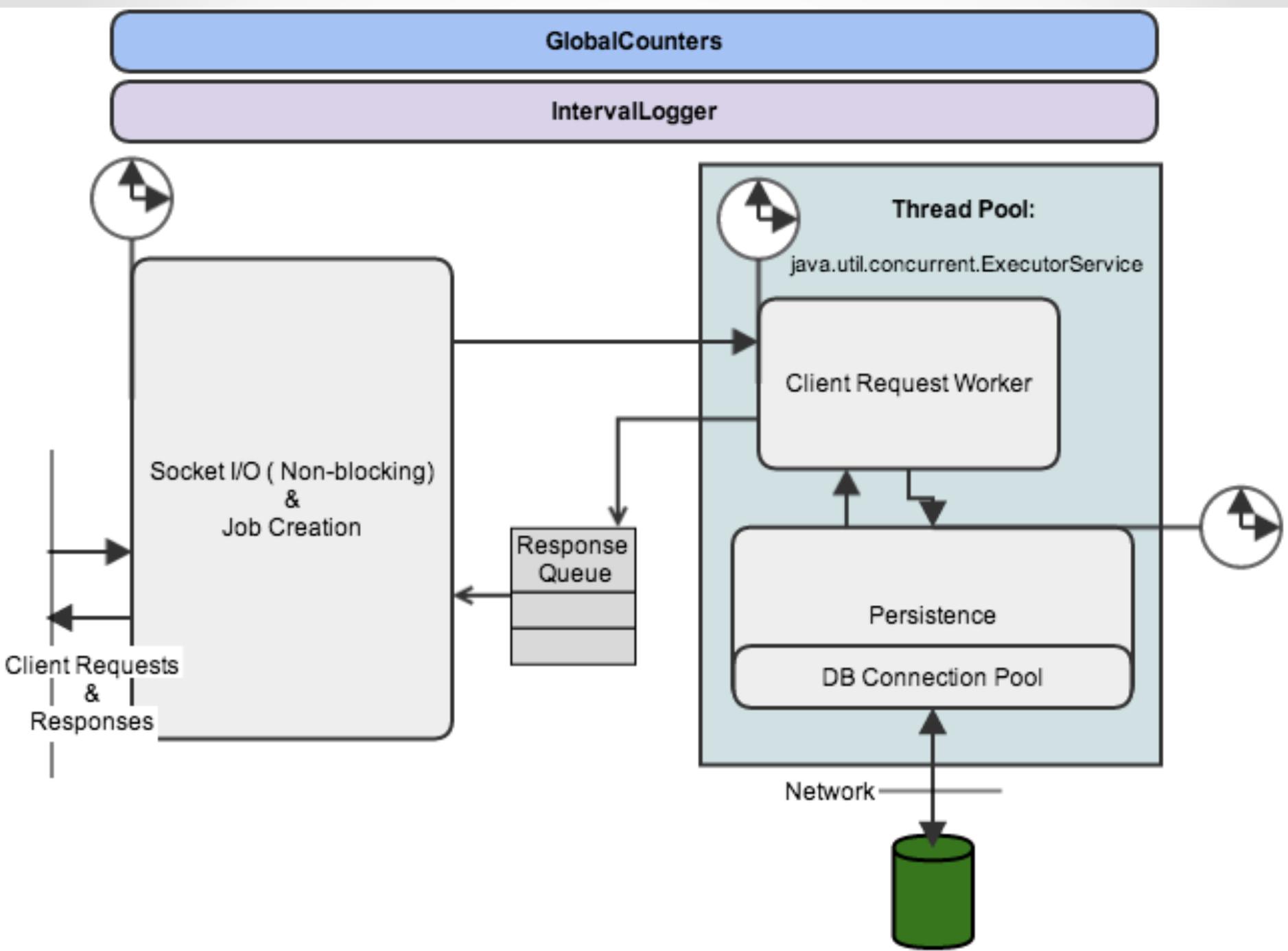
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michael BANG

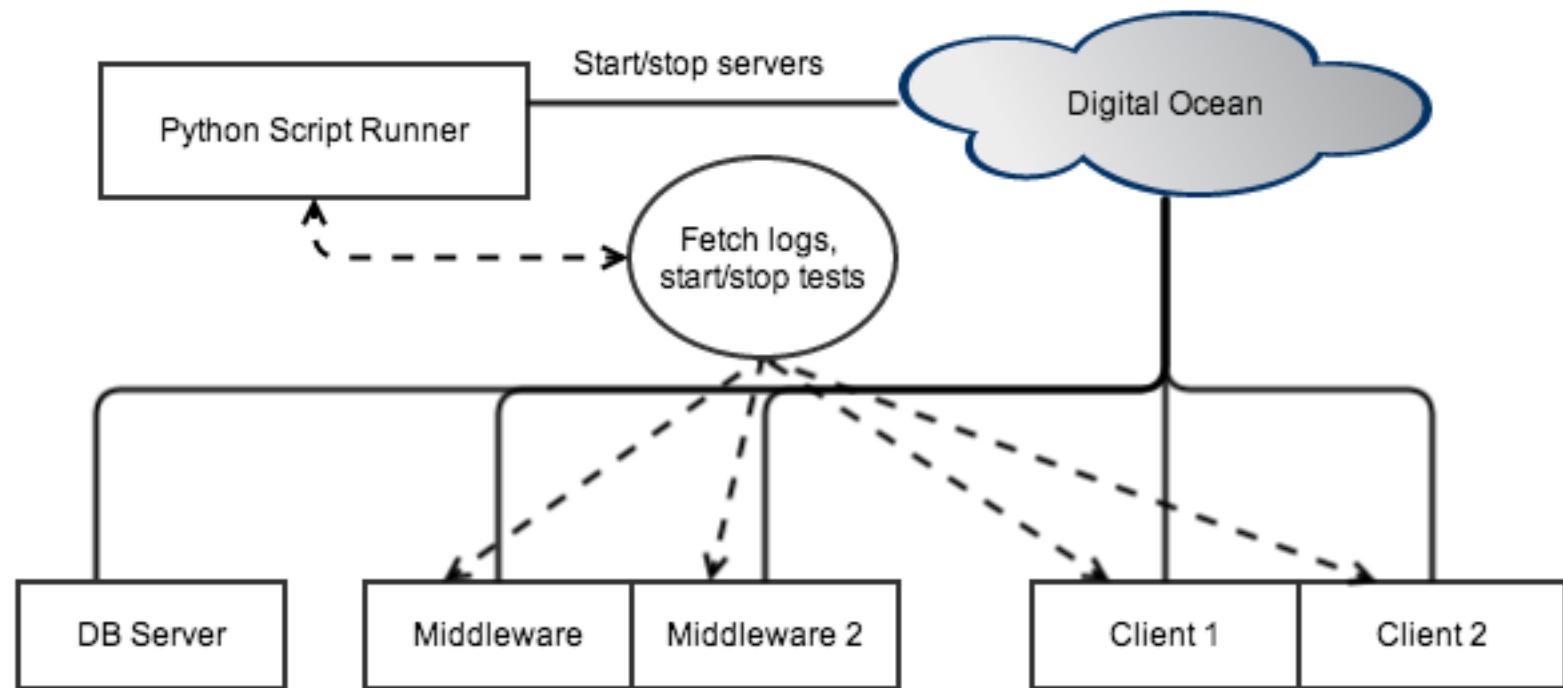
ASL Milestone 1

Agenda

- Design of System
- Design of Testing Setup
- Summary of Experiments
- 4h trace
- Things Learned



Design of Testing Setup



Design of System

Produced Log Files

1. Time since server start
2. Push Requests
3. Pop / Peek Requests
4. Total Requests
5. Total Think Time in Socket I/O and job creation
6. Total Think Time in Request Worker
7. Total Think Time in Persistence-component

593135,1101,1090,2191,47713665384,29913823472,29510444900
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↑
`System.nanoTime()`

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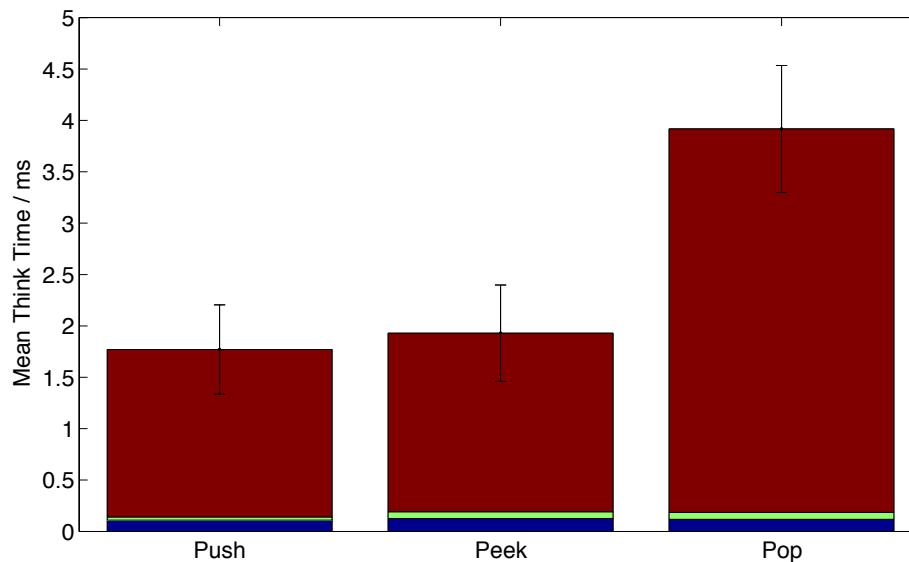


Experiments conducted

- **Micro-benchmarks**
- **Total number of clients**
- **Number of middleware instances**
- **Number of database connections**
- **Number of worker threads**
- **Frequency of requests**
- Size of messages
- Impact of using database vs. no storage at all
- Size of dataset
- Client threads per client machine
- Number of queues used
-

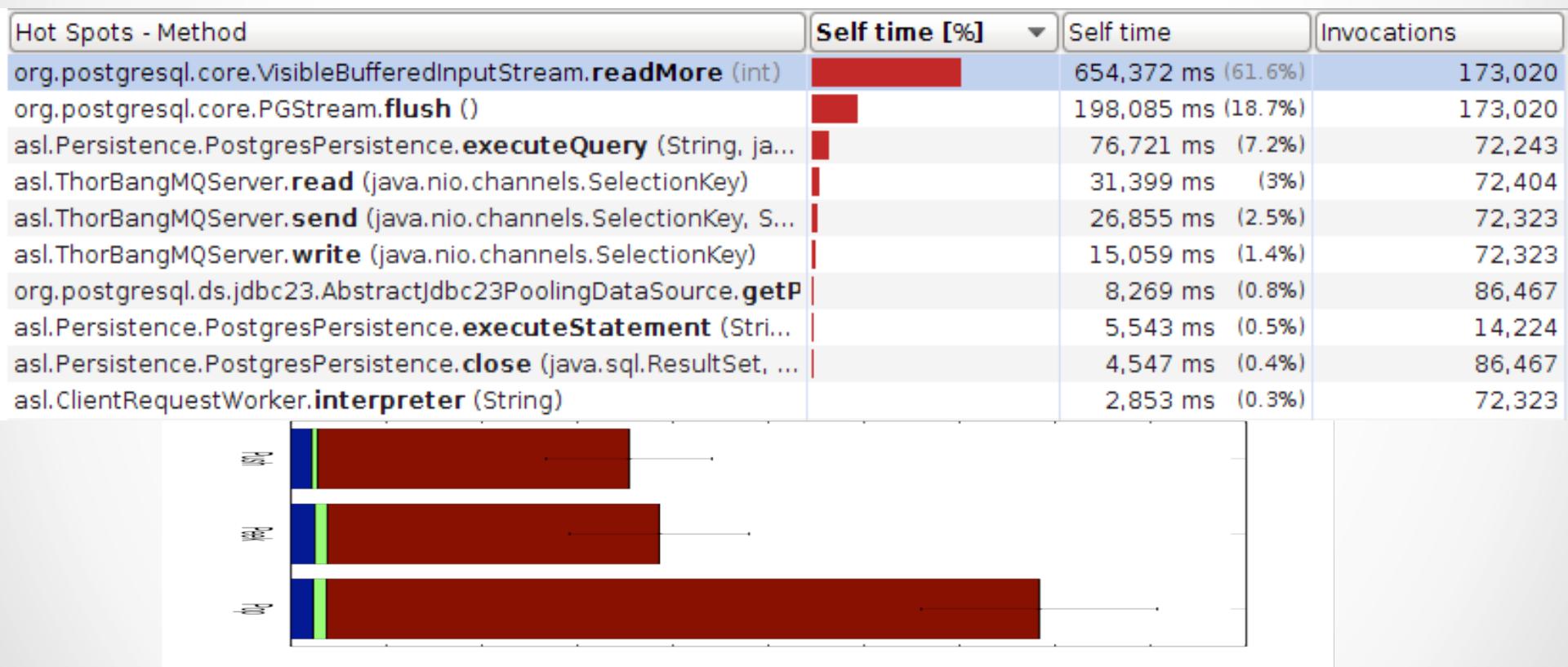
Results Of Experiments Conducted

Type of Request	Response Time [ms]
Push Message	$1.86 \pm [-0.57, 0.61]$
Peek Queue	$2.02 \pm [-0.67, 0.70]$
Pop Queue	$3.99 \pm [-0.79, 1.17]$



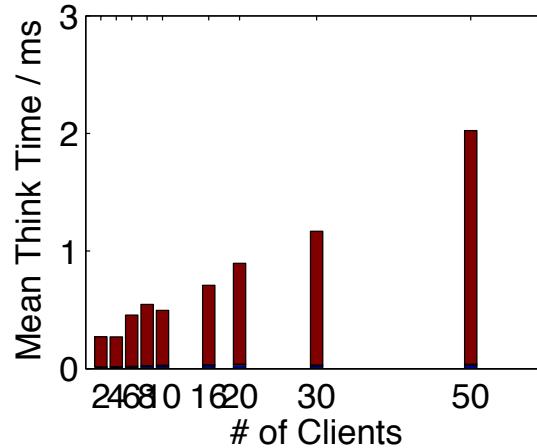
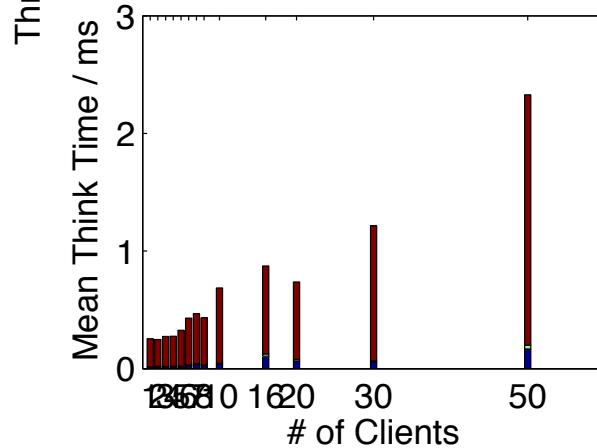
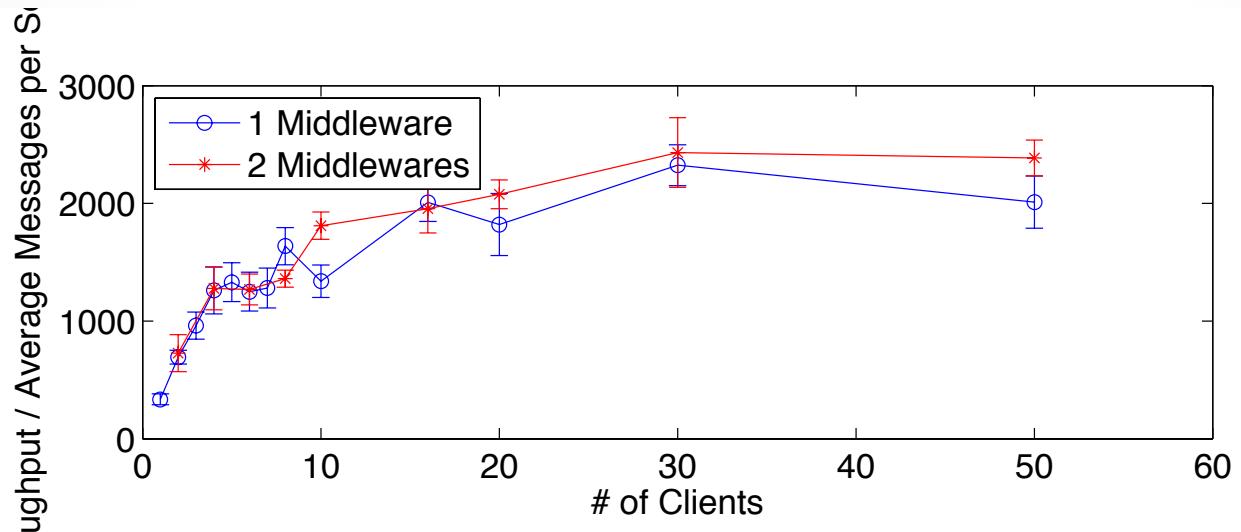
50 db-connections
50 worker threads

Results Of Experiments Conducted

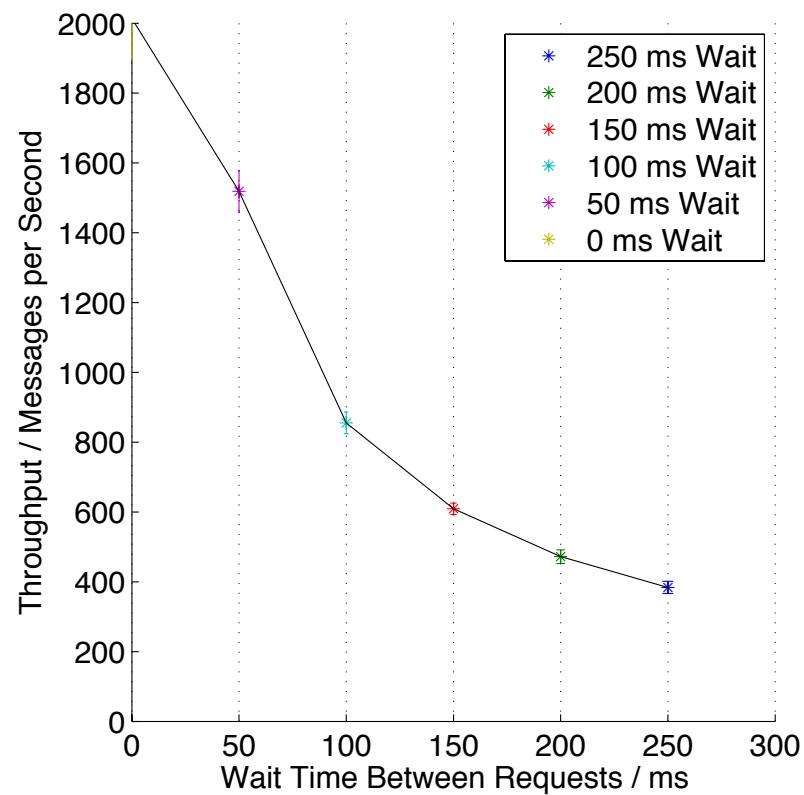
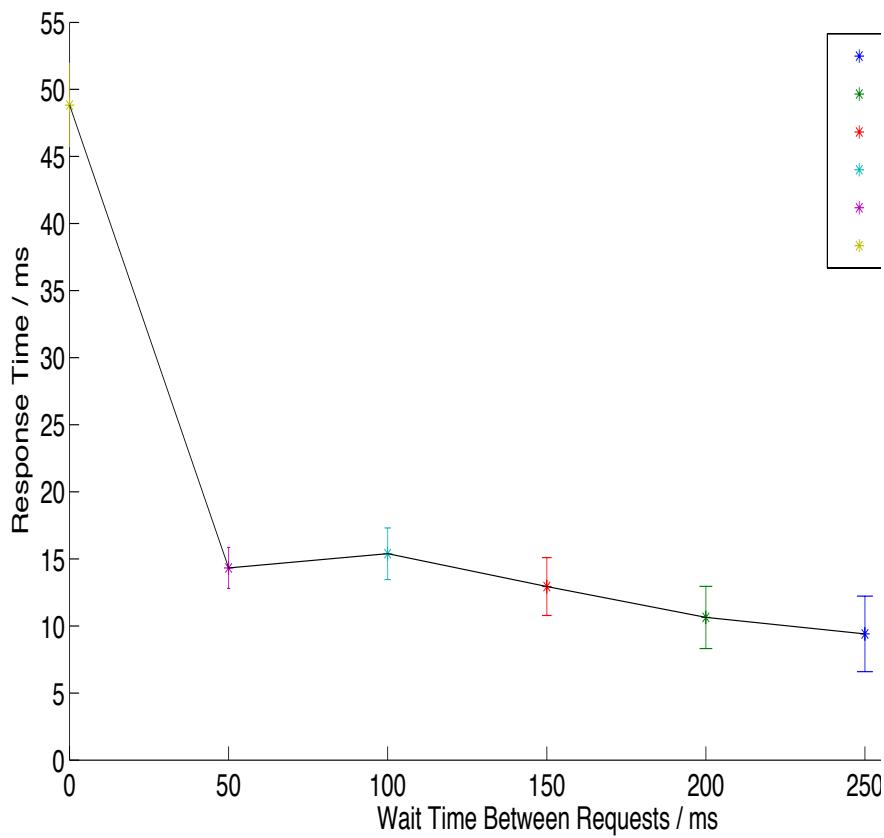


Top 3 methods make up 87.5% of processing time for middleware

Results Of Experiments Conducted



Results Of Experiments Conducted



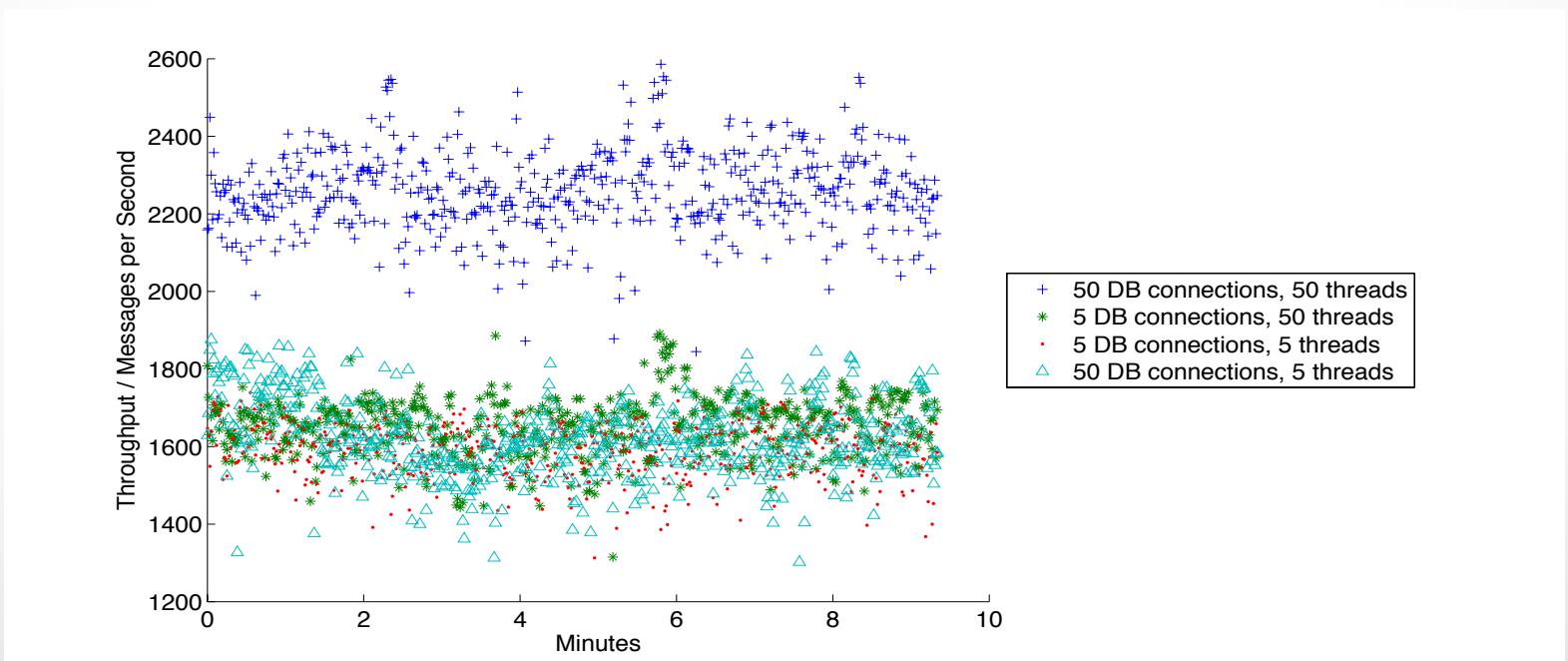
Results Of Experiments Conducted

Configuration	Mean Throughput	Response Time [ms]
10 Middlewares	2476.3 ± 2.2	11.5 ± 0.01
1 Middleware	2406.8 ± 19.1	445.51 ± 4.96
From 1 → 10	+3% increase	30x decrease

- 1000 one-way clients (total)
- 500 two-way clients (total)
- 30 db connections (per mw)
- 30 worker threads (per mw)

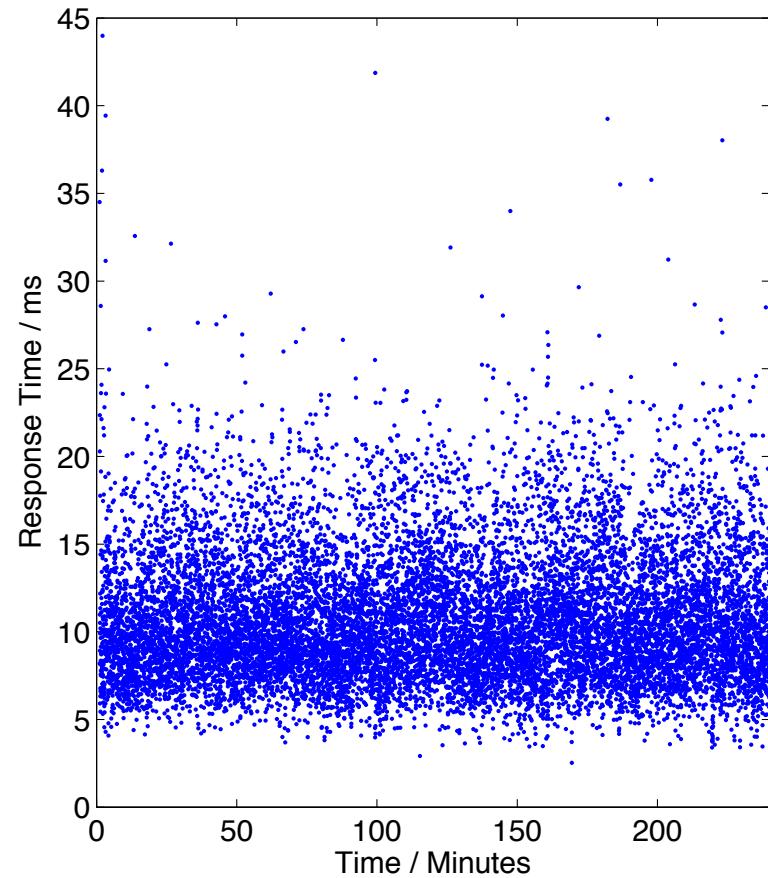
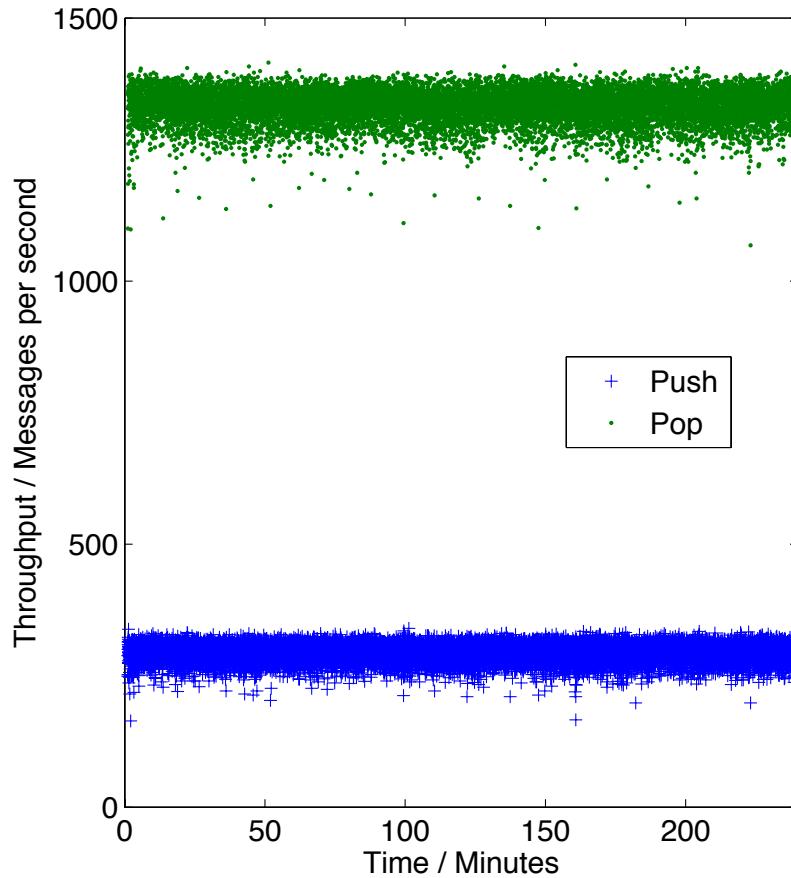
Results Of Experiments Conducted

- Throughput is bounded by the minimum of the two parameters: worker threads and db-connections.
- With enough db-connections: performance is bounded by db



50 db-connections
50 worker threads
300 clients

4 Hour Trace



Mean push:	$293.91 \pm [-28.91, 21.09]$
Mean pop:	$1331.73 \pm [-53.73, 42.27]$
Mean resp. time:	$10.66 \pm [-4.54, 7.06]$

Things Learned

- Good Parameters
 - Worker Threads and db-connection 1:1 ratio
 - Worker Threads: ~40
 - When throughput hits 1500 consider adding middleware
- The database is the bottleneck
 - Thus increasing middlewares won't increase throughput
- Maximum Throughput
 - Standard Test: ~ 2800 req/s
 - Send And Pop: ~2000 req/s
 - Bounded by the database