

# Load testing of distributed applications: the Signal case study

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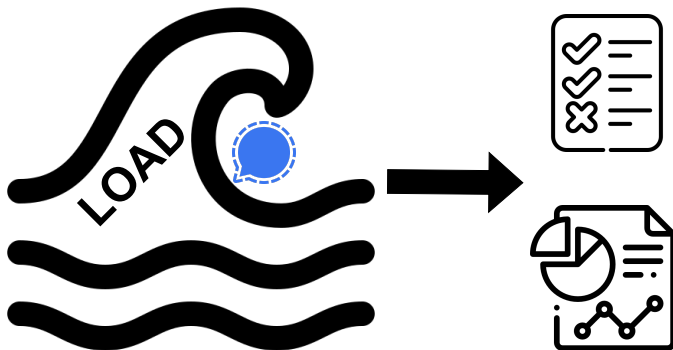


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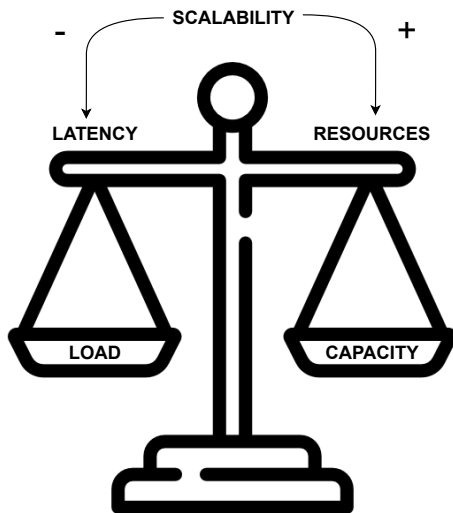
- 1 Problem statement
  - Scalability
- 2 Approach
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- 3 Results
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  - Experimental results
- 4 Conclusions

# Aim of the work

- Resources to study cloud-native execution behavior
- Load testing as a tool
-  as a case study application

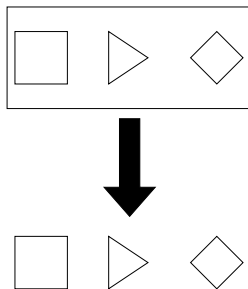


# What is scalability

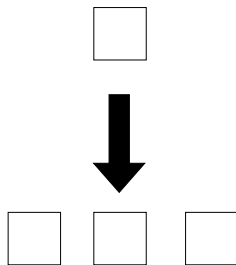


# Scalability dimensions

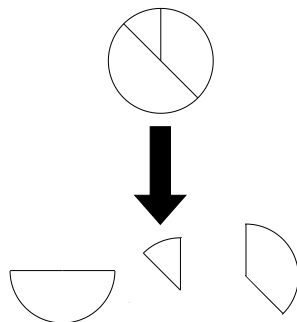
Functional  
decomposition



Horizontal replication



Data partitioning



# Signal architectures' comparison

## Signal 4.97

- Outage case study - January 2021
- More self-contained components

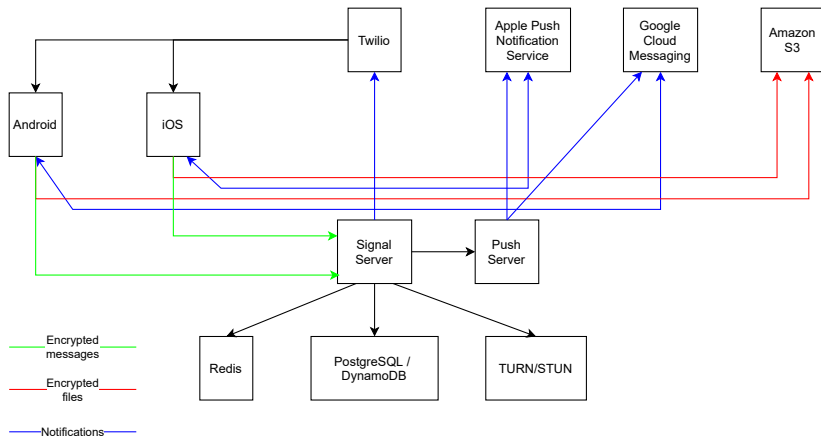


## Signal 6.13

- Most recent version - July 2021
- More AWS components

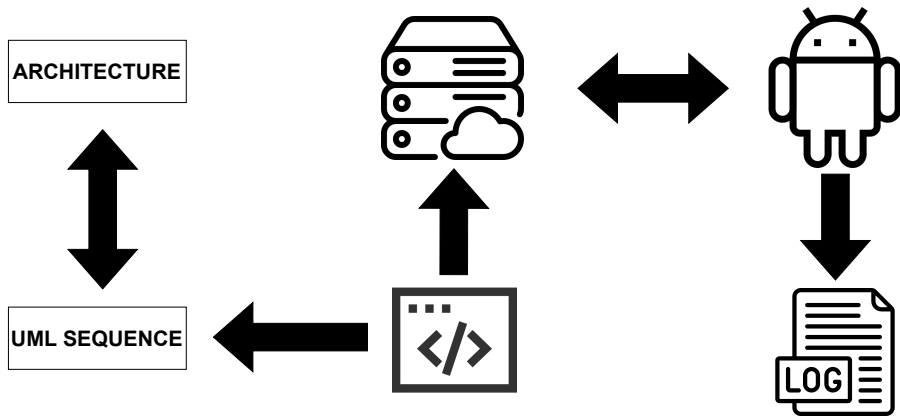


# Server general architecture



<https://sorincocorada.ro/signal-messenger-architecture/>

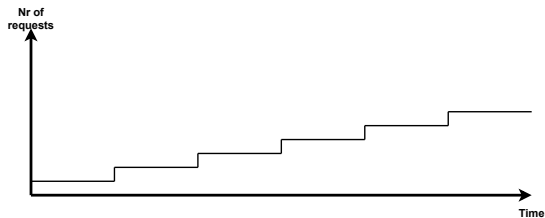
# Involved components and calls order



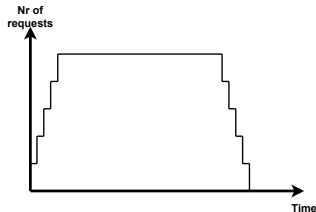


# Kind of experiments

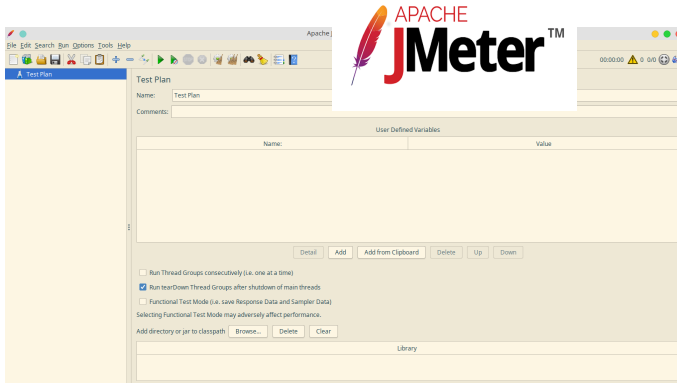
## Steady load



## Peak load



# Tools



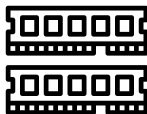
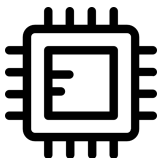
# Request metrics

- average response time (ms)
- median response time (ms)
- 90th, 95th and 99th percentile response time (ms)

Request	#Samples	Response times (ms)							Network (KB/s)	
		Average	Min	Max	Median	90th pct	95th pct	99th pct	Received	Sent
GET /v1/profile	48665	2083.32	23	130681	3032.00	3785.00	9200.95	35696.04	63.51	36.36
GET /v2/keys/+391234567890/*	48442	1920.06	17	129352	2989.00	3691.00	6656.70	10982.99	37.58	9.93
PUT /v1/messages	48300	2227.99	20	130654	3063.50	6985.40	9446.95	38666.65	19.67	31.07

# Performance metrics

- percentage of CPU used per second
- percentage of memory used per second
- network I/O (B/s)



# Environment characteristics

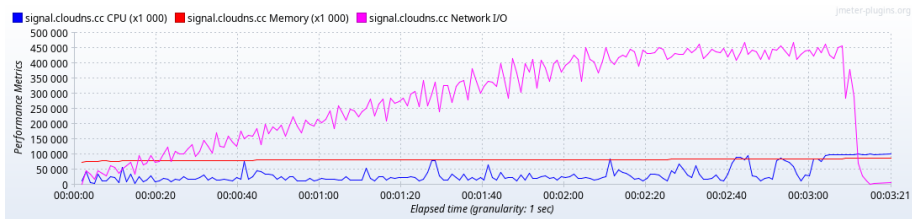
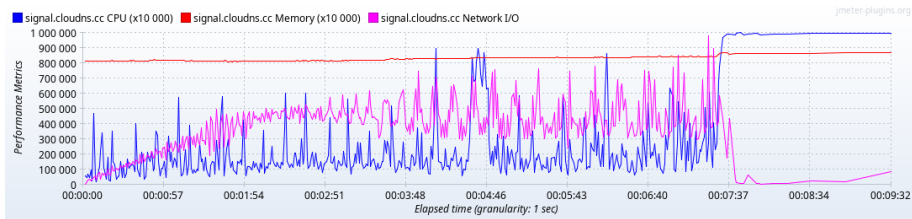


- Intel(R) Core(TM) i3-4005U CPU @ 1.70GHz
- 4GB of RAM
- Ubuntu 21.04
- Apache JMeter 5.4.1

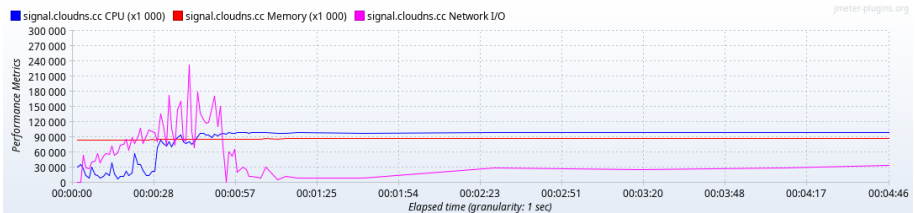
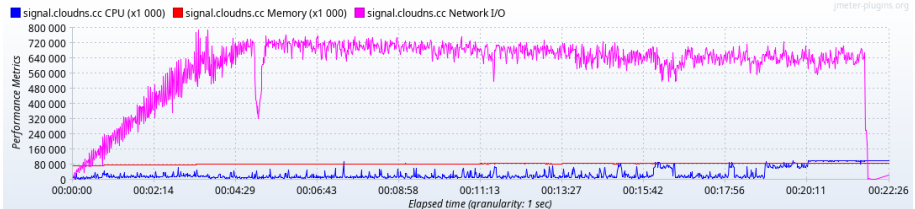


- 2 vCPUs of burstable type
- 1 GB of RAM
- Ubuntu 20.04.3 LTS
- Dropwizard 2.0.13 / 2.0.22
- Redis server v=5.0.7
- PostgreSQL 12.9
- Nginx 1.18.0

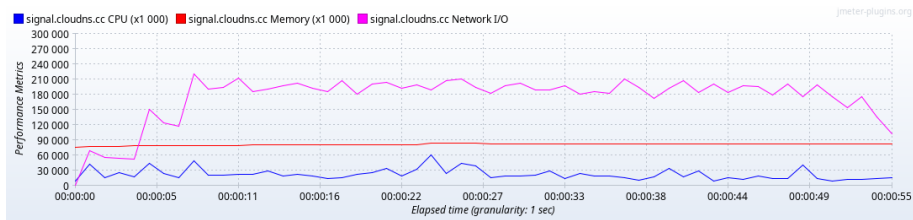
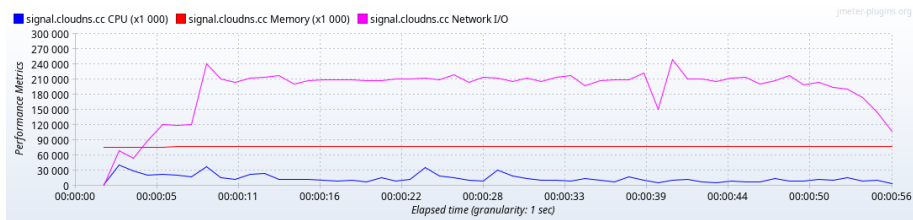
# Account creation - steady load



# Message sending - steady load

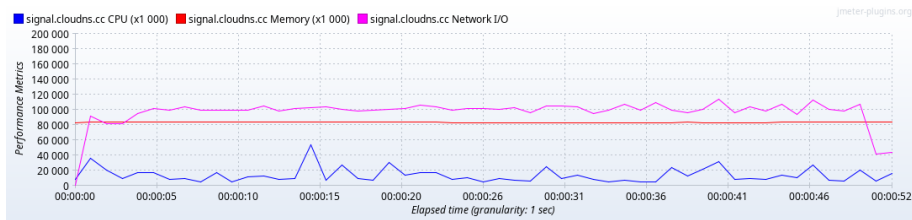
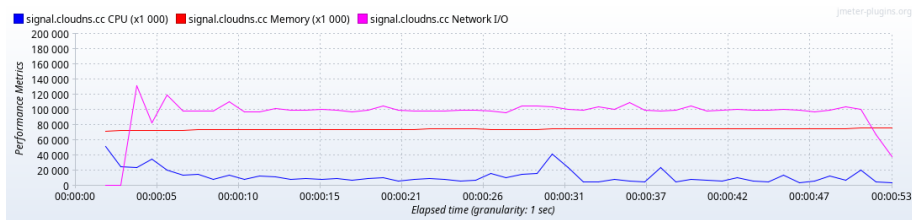


# Account creation - peak load





# Message sending - peak load



# Observations and outlook

- Real examples → load experiments
- Steady load → Signal 4.97 wins
- Peak load → Signal 6.13 wins
- Test of similar kind of applications
- Test with other load on components (not only black box tests)
- Expand the tests to other Signal functionalities (video/audio calls)
- Test in real world environment