CARROTS: Configurable and Reproducible Client for Open Speed Test - An update

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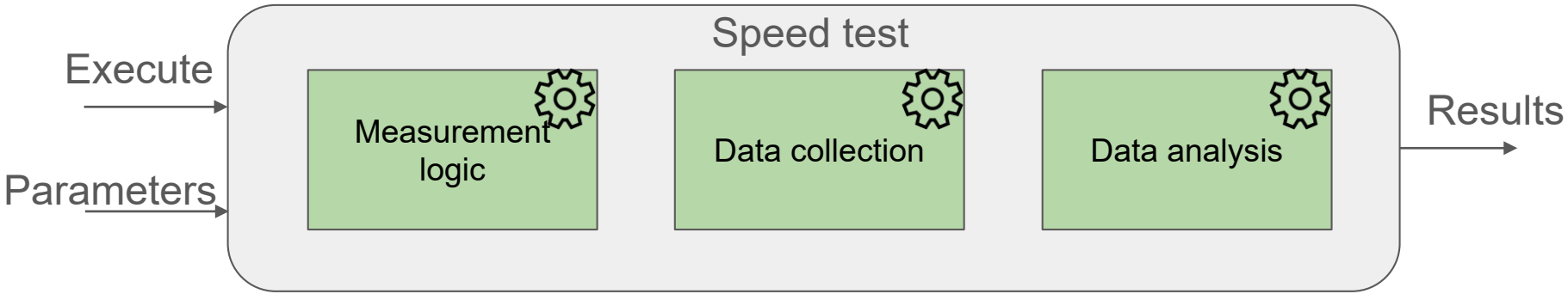
Recap: What is CARROTS?

A suite of headless browser-based tools that can decouple the elements of speed tests



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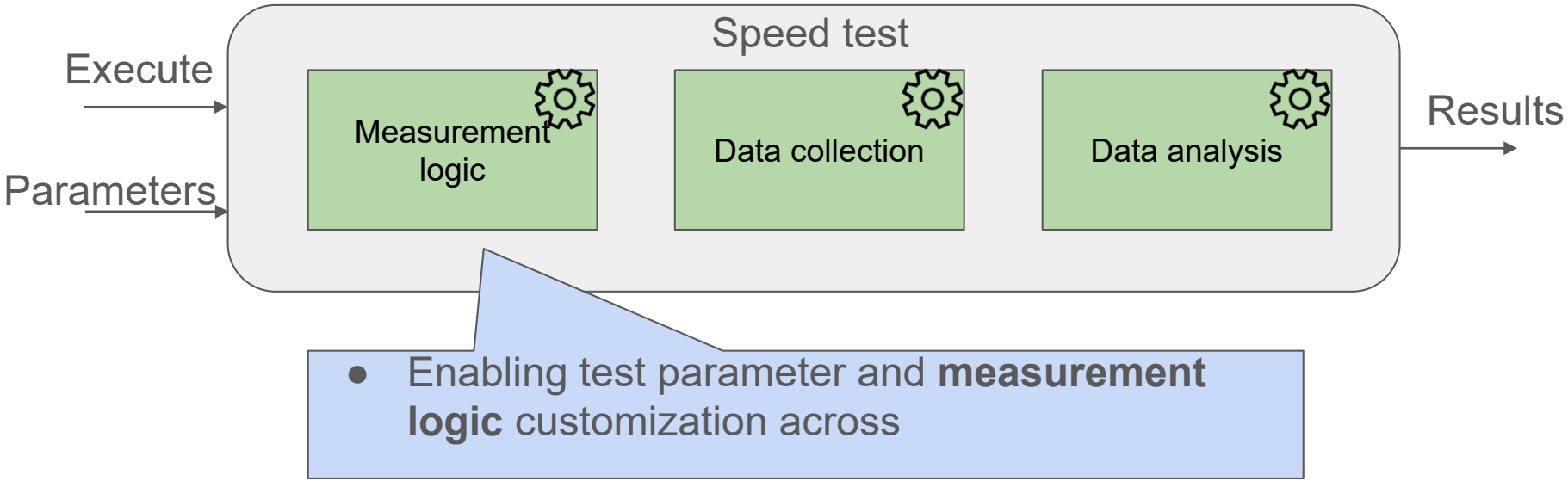

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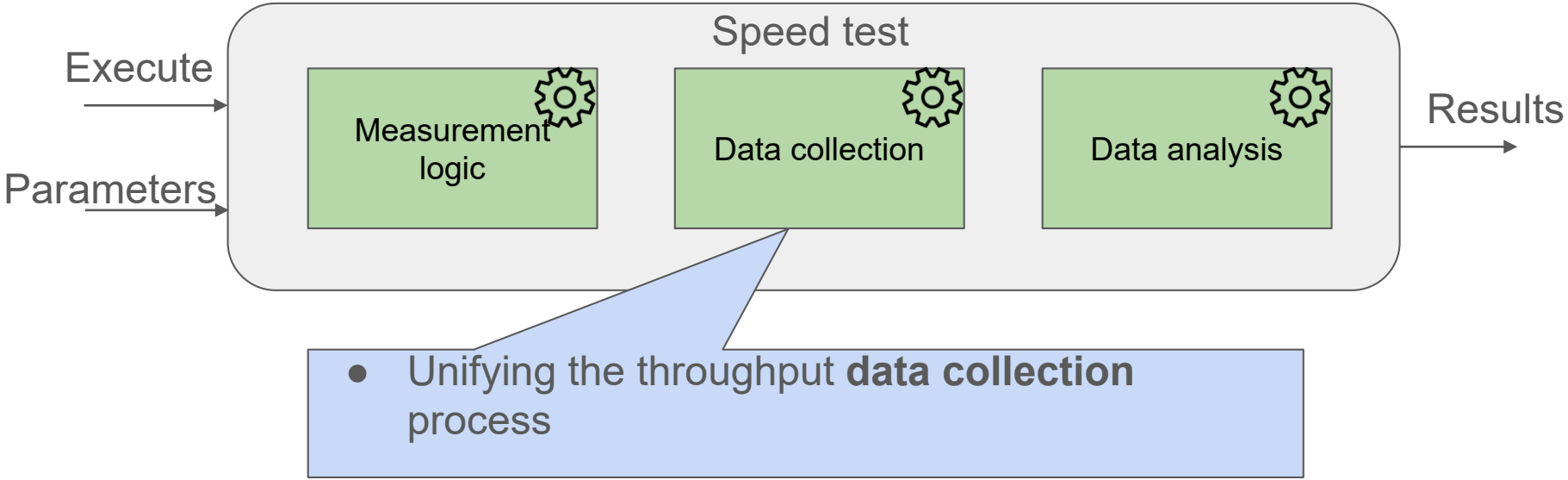

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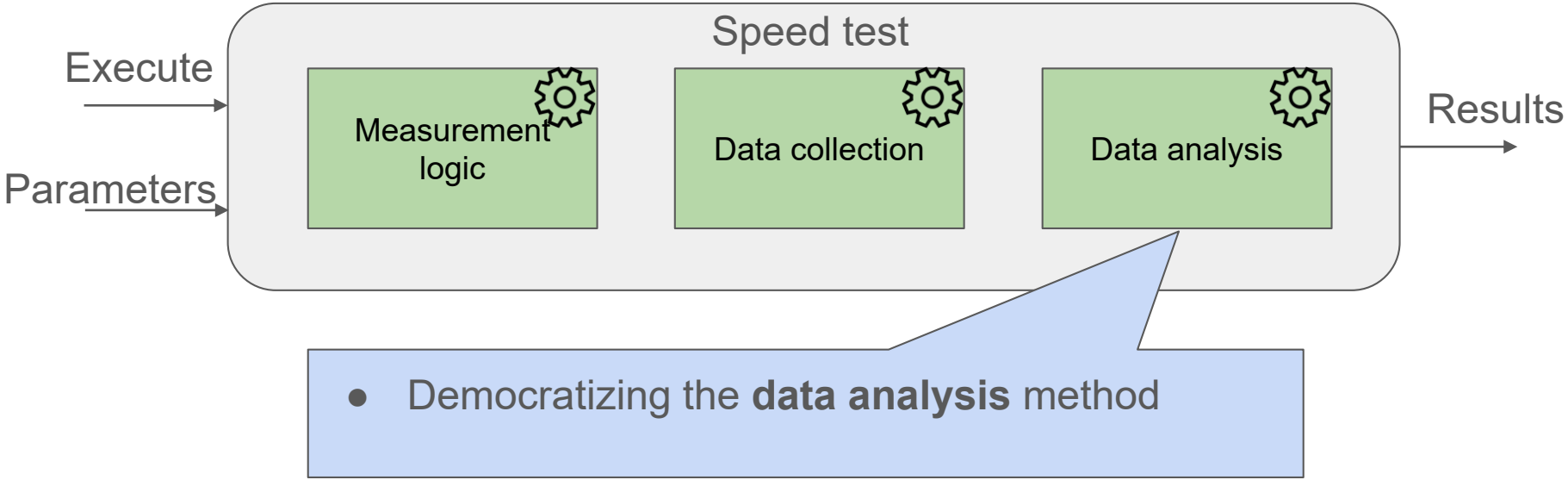


Support multiple test platforms

Reverse engineering of speed test platforms

- Unify (CLI) interface to execute tests
- Enable customization of test parameters
- Perform tests that the platforms did not support
- Collect more fine-grained data

Ookla Original vs CARROTS

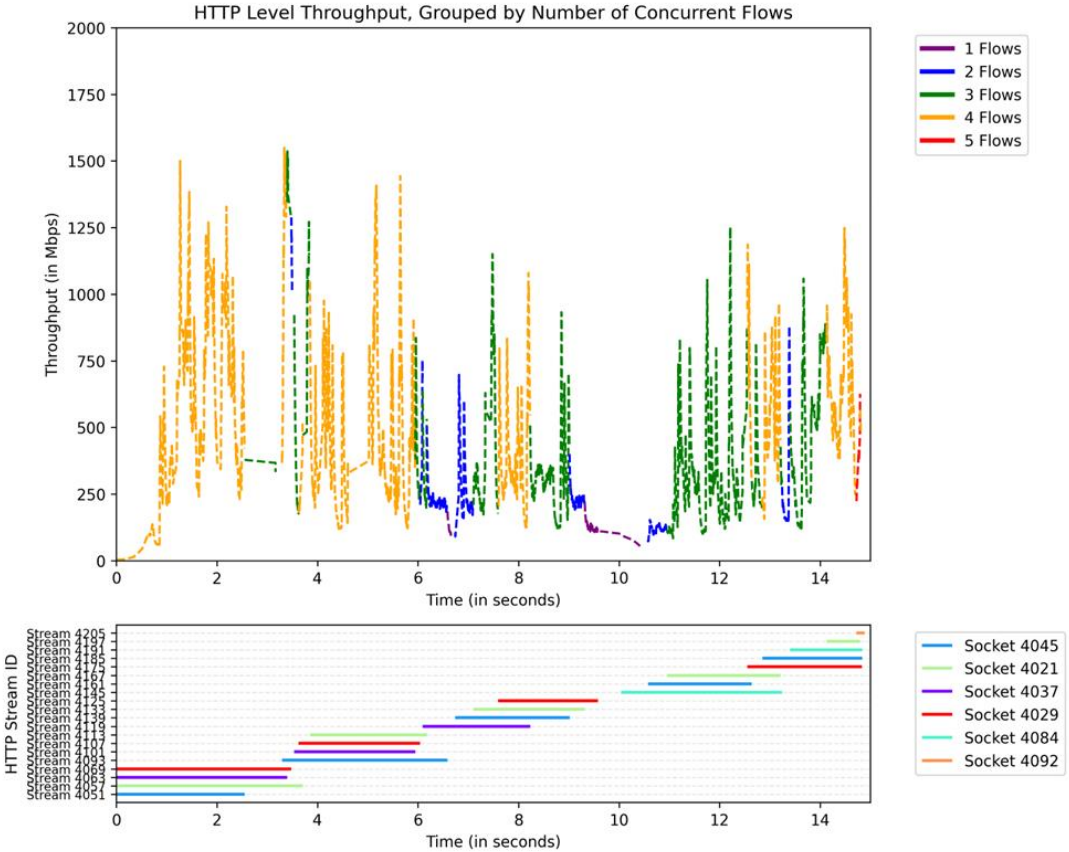
	Original (Web)	**Original (CLI)**	**CARROTS**
Server selection	Search by city	Specify by server ID	Specify by city + network name
Throughput tests	Single(1)/multi(6) flows; auto-config object sizes	Not configurable; auto-config object sizes	Original test/1-6 flows (download/upload-only or both); configurable object size
Latency	Unloaded/loaded over websocket using 10 packets	Unloaded/loaded latency	Unloaded/loaded over websocket/HTTP with configurable frequency and number of probes
Output	Aggregated throughput and latency values	Aggregated throughput, latency, and jitter values	JSON formatted output containing per-flow traffic statistics

Fine-grained view of the Ookla test

Download throughput:

240.47Mbps

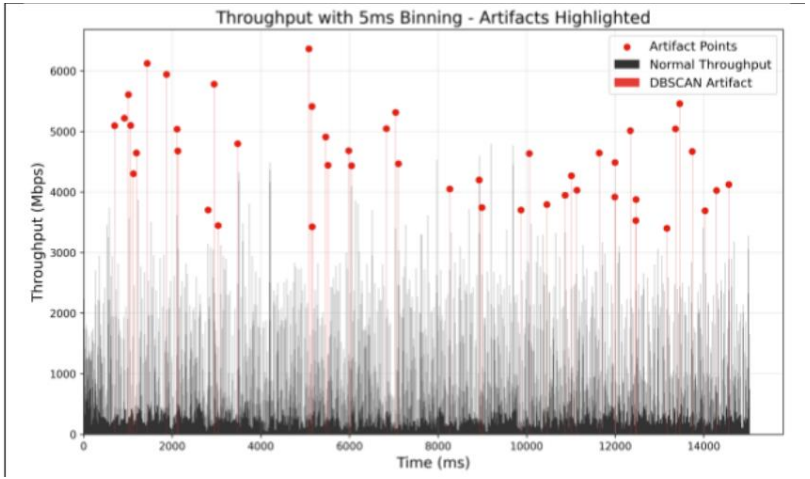
- The capacity seems to be much higher
- The number of “transferring flows” fluctuates during the test



Modular throughput estimation algorithm

Artifact filtering

- Remove extreme values in instantaneous throughput
  - DBSCAN



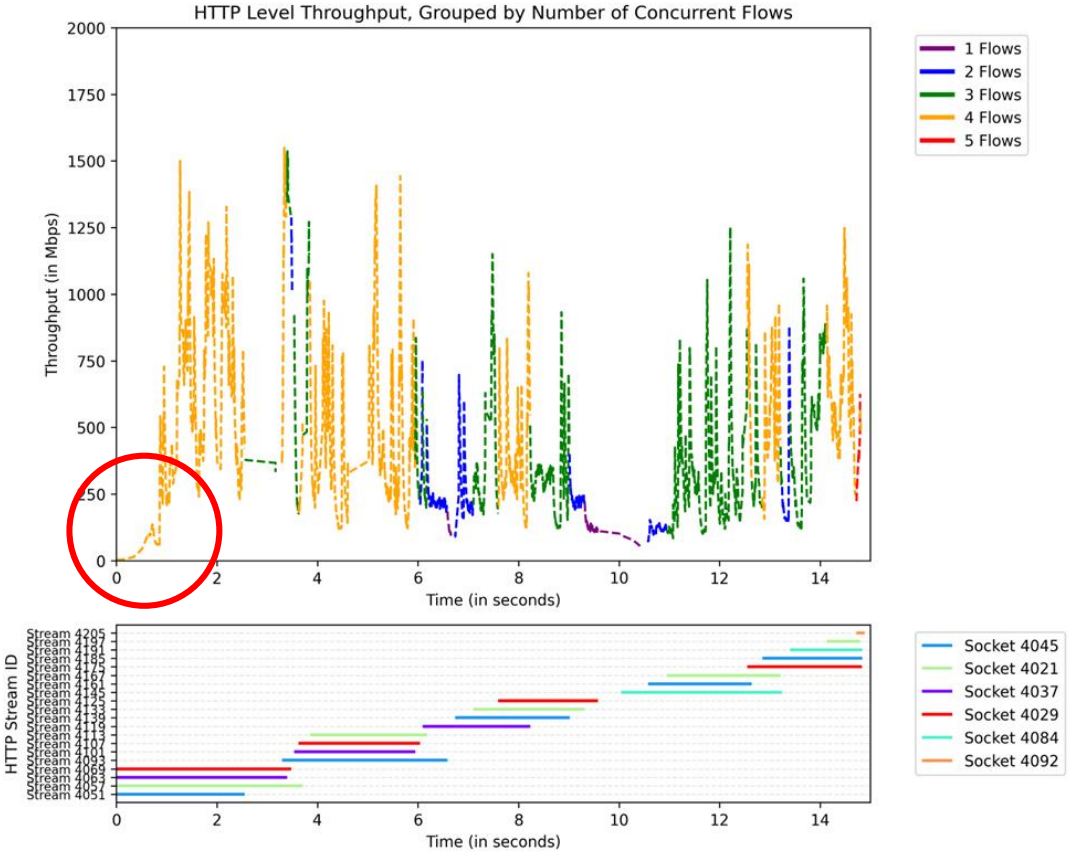
Modular throughput estimation algorithm

TCP Slow-start filtering

- Remove low throughput values in the beginning of tests

Data filtering

- Only include throughput values collected from >n flows



Modular throughput estimation algorithm

“Binning” /aggregating throughput values

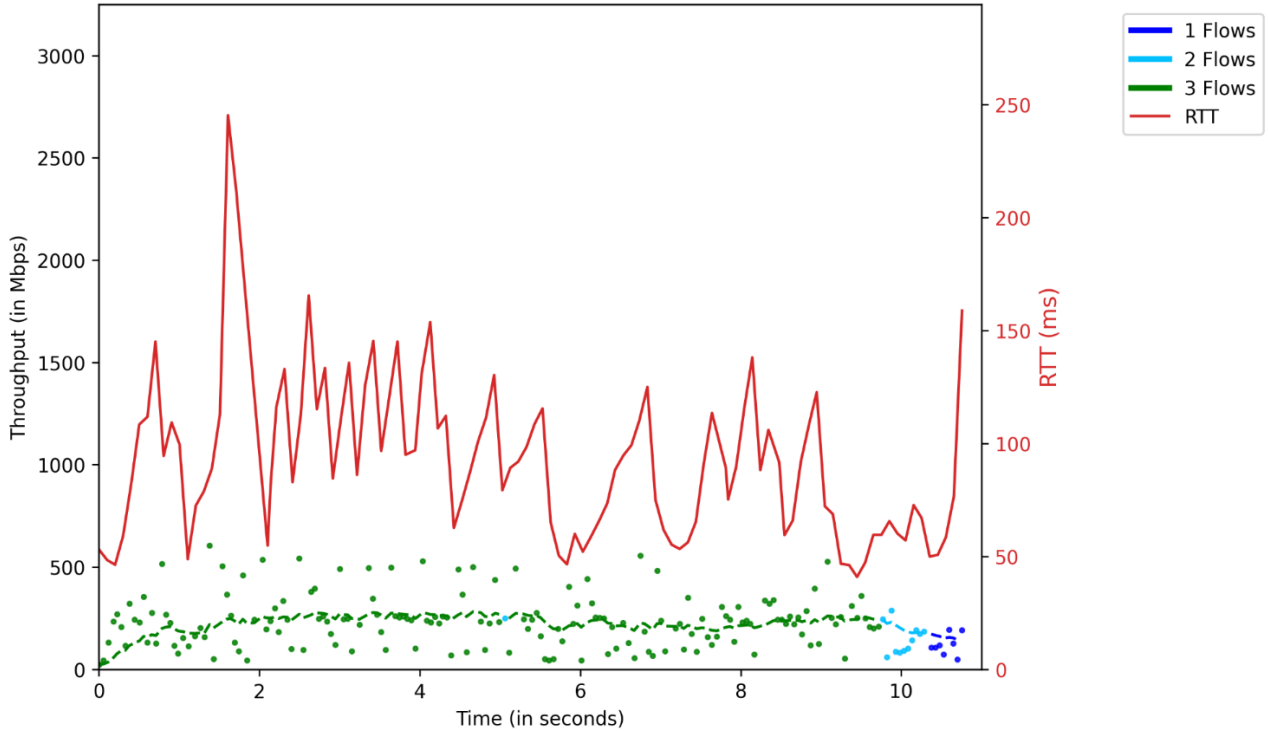
- Up to 1ms bins
- Javascript: 50ms

Throughput computation

- Various statistical tools

New opportunities brought by CARROTS

Overlaying instantaneous (50ms resolution) throughput with (loaded) latency



Conclusion

With CARROTS, you are the boss of the test

- Configurable and reproducible speed tests across multiple platforms
- Collect fine-grained data supporting:
  - Test diagnosis
  - Modular data analysis for throughput estimation