Extracting Reusable Service Demands for TeaStore

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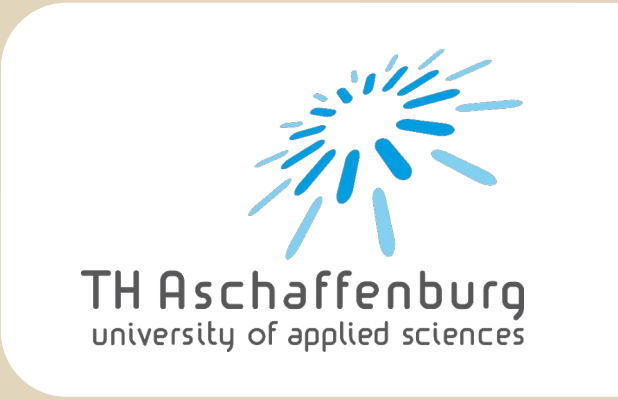
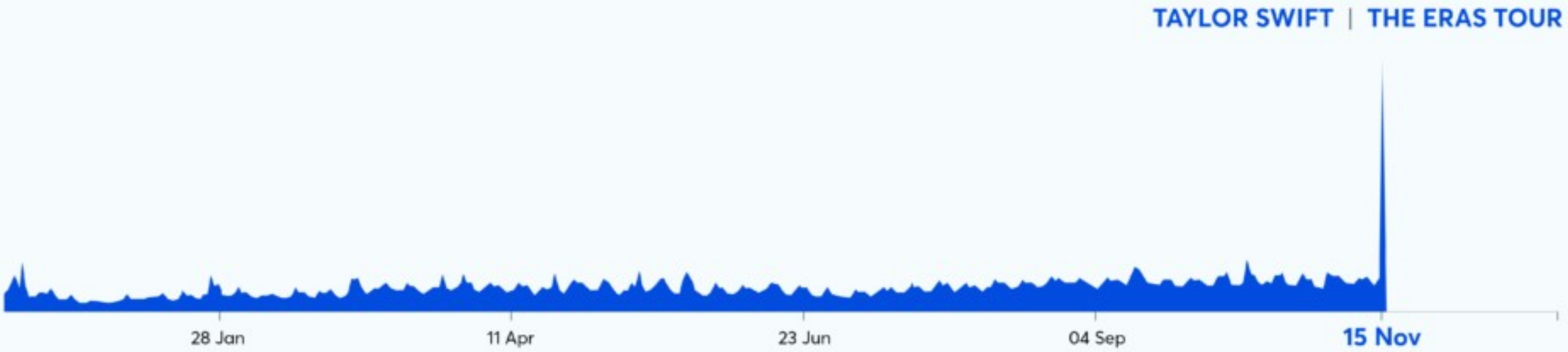




AVERAGE TRAFFIC TO TICKETMASTER.COM

ticketmaster

ticketmaster Concerts Sports Arts & Theater Family More Sign In Sell Gift Cards Help

We're sorry!

Something went wrong on our end and we need to start over.

Broken things are a drag – our team is on it so it doesn't happen again.

Let's try another search

Resilience Experiments (a.k.a. controlled Chaos Experiments)

- Generate artificial workload
- Cause system failures

Drawbacks

- Effort for implementation and execution
- Requires an isolated testing environment

Simulation as an Alternative

- No running system required to execute
- Evaluate a lot of different chaos scenarios in a short time
- Experiment with different system architectures

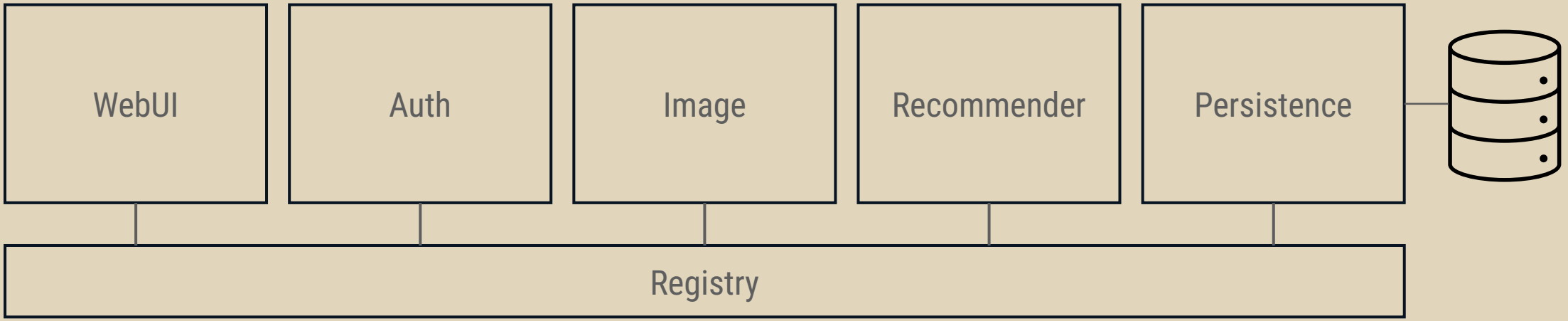
MiSim

- Resilience- and performance simulator
- Specialized on microservice applications

Our Goal:

- Use MiSim for resilience simulation

Reference Application: TeaStore



Parameters for Simulation

- Performance metrics of the system
- Required parameters depend on the model

MiSim

- Architectural description
  - Service demand per operation

Service Demand

- Amount of a resource needed to serve one request
- CPU resource is mostly used as performance metric
- Cannot be measured directly

Related Work

Service Demand Estimation

- Eismann et al. “Modeling of Parametric Dependencies for Performance Prediction of Component-Based Software Systems at Run-Time”
- Grohmann et al. Detecting Parametric Dependencies for Performance Models Using Feature Selection Techniques
- Spinner et al. “LibReDE: a library for resource demand estimation”

Comprehensive Work

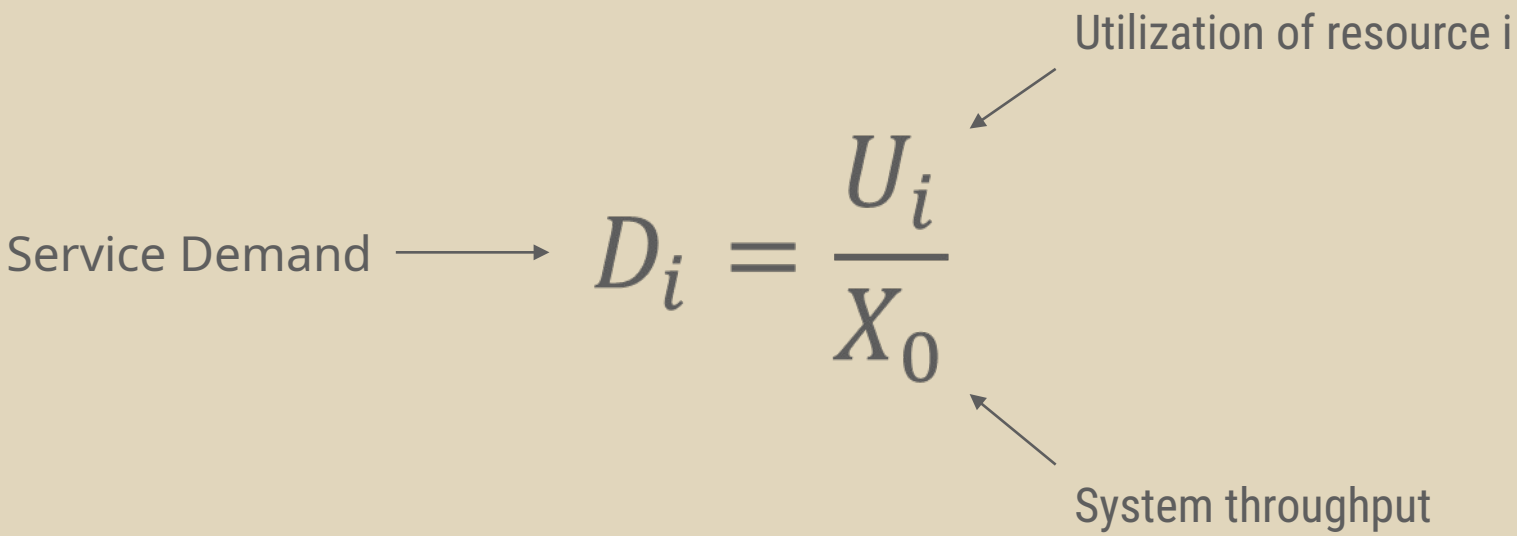
- Spinner et al. „Evaluating approaches to resource demand estimation”

➔ We chose to directly apply the Service Demand Law

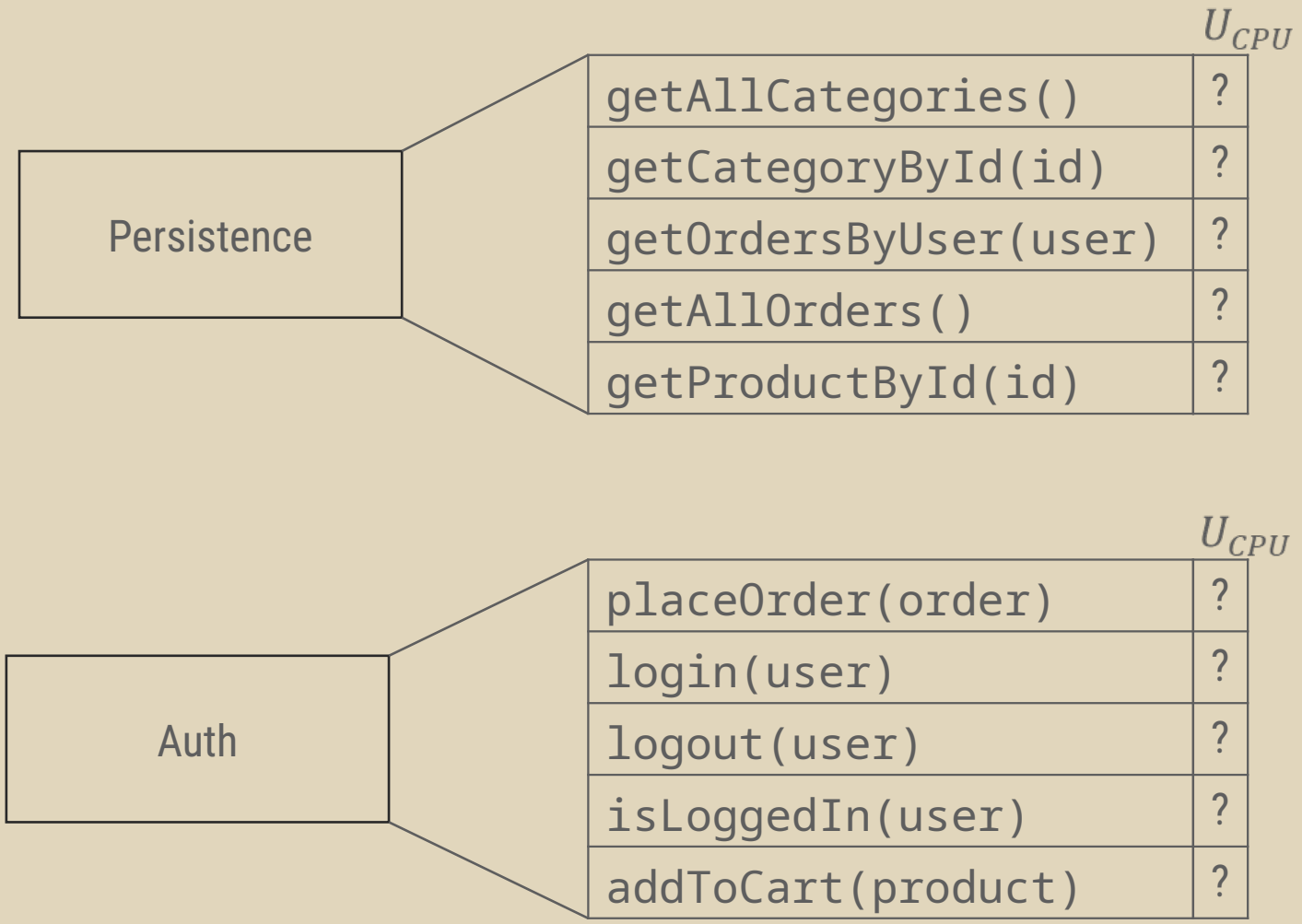
Get the Service Demands

https://doi.org/10.5281/zenodo.16959789

Service Demand Law



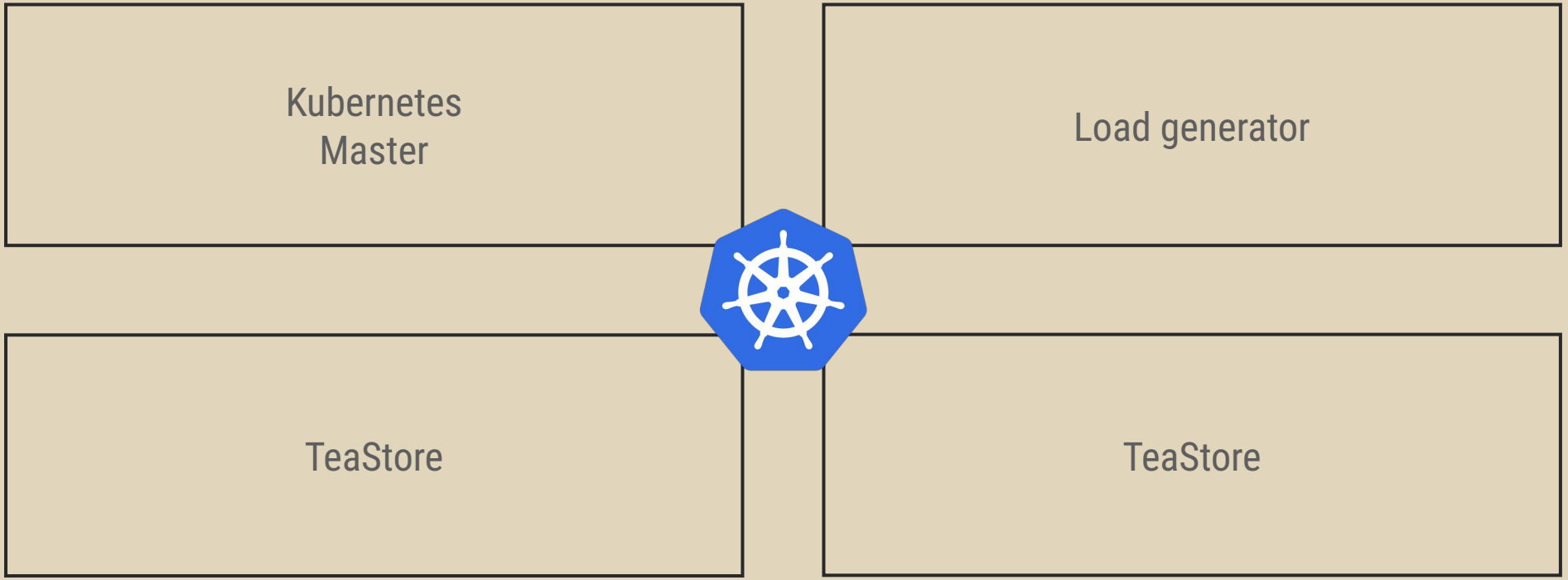
Operations



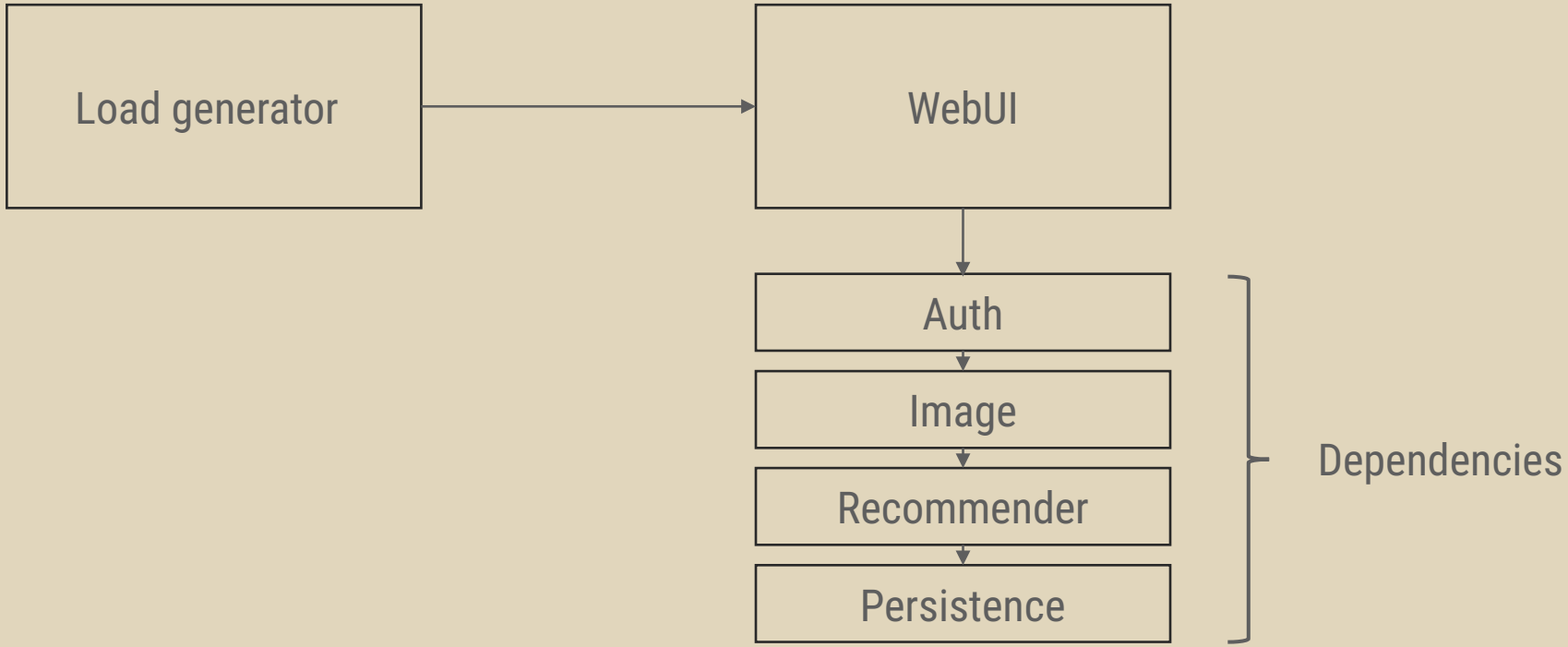
32

Operations in total

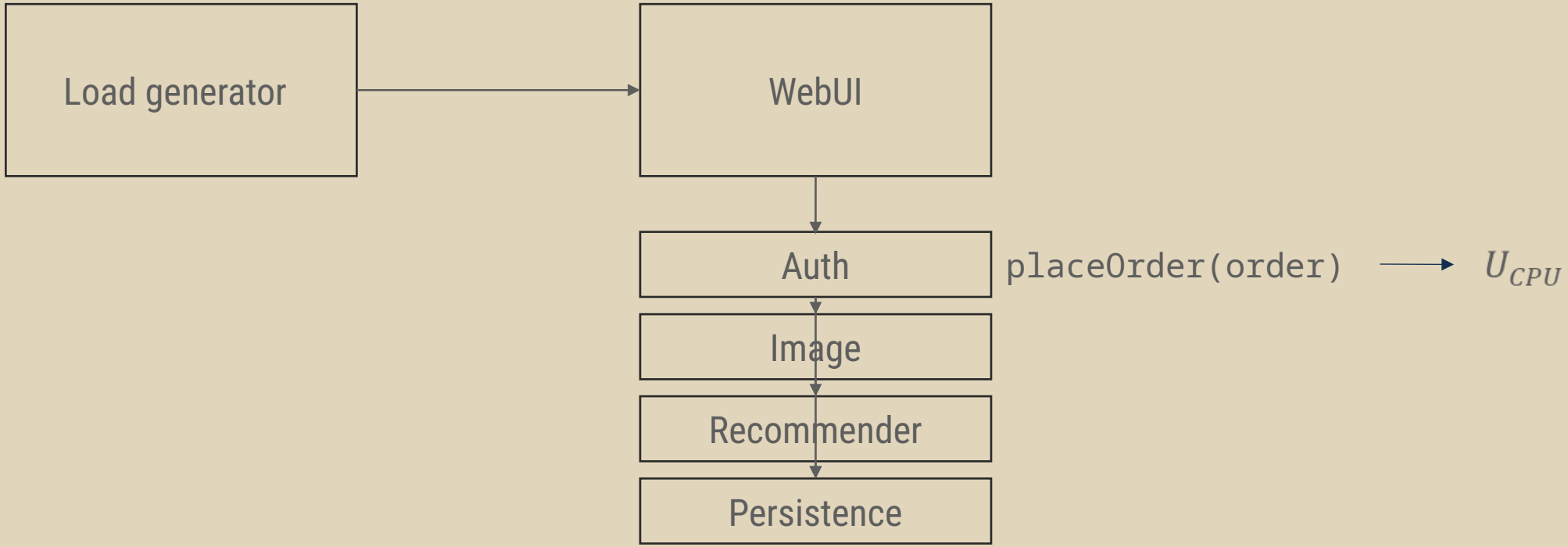
Setup



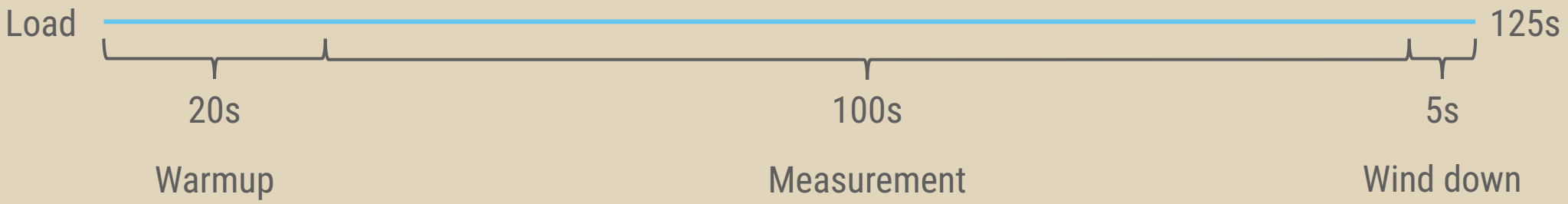
Measurement



Isolation of Operations



Load period



Load intensity

- Ideally 50% CPU utilization
- Must be determined individually for each operation

Reality

- Reached only 25% CPU utilization
- High utilization of other resources were the limiting factor

Calculation of the Service Demands

Service Demand (CPU) $\longrightarrow D_{CPU} = \frac{U_{CPU}}{X_0}$

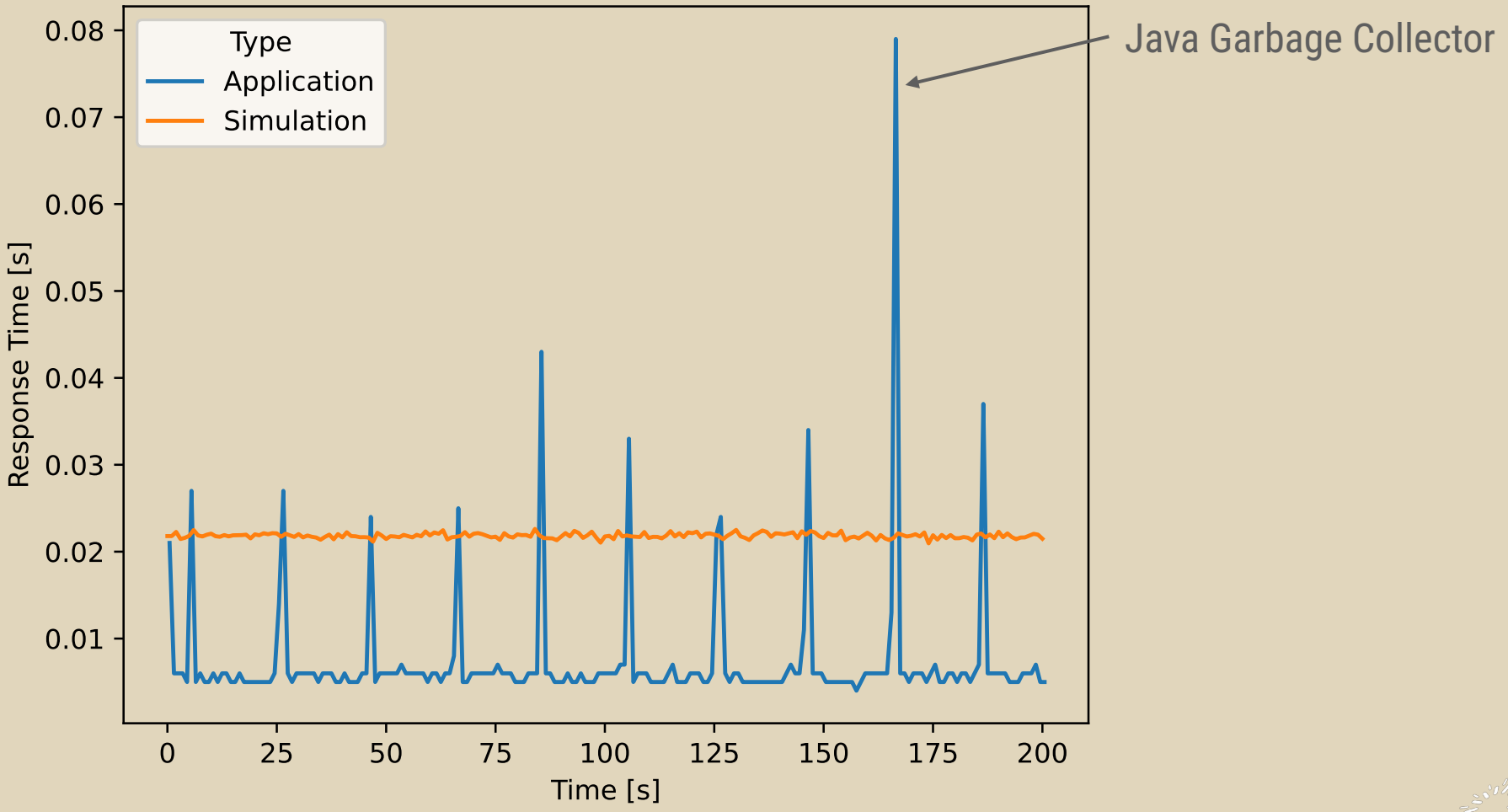
CPU Utilization (measured)

System throughput

Comparing Experiment

- Simulation with MiSim vs. load experiment on TeaStore
- Constant, medium load
- Period of 200s

Result



Future Work

- Extract service demands of TeaStore for other resources
- Long term: Evaluate and improve MiSim's prediction capabilities

Get the Service Demands

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