



University of Stuttgart

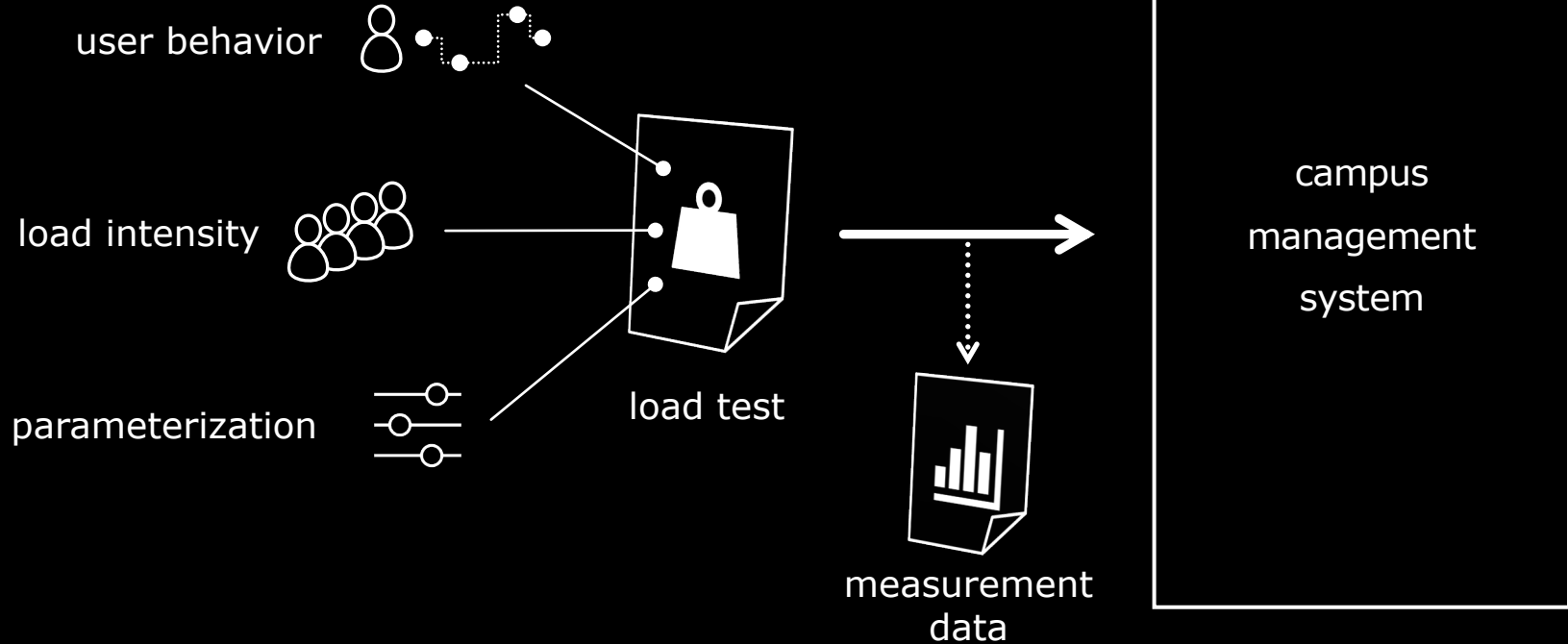


Automated Generation of Tailored Load Tests for Continuous Software Engineering

Henning Schulz | Nov. 12, 2020

Load tests detect load-related problems

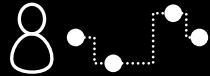
(Jiang and Hassan, 2015)



Load tests detect load-related problems

(Jiang and Hassan, 2015)

user behavior



load int

Amazon's website crashed as soon as Prime Day began

By Nick Statt | @nickstatt | Jul 16, 2018, 3:16pm EDT



parameterization



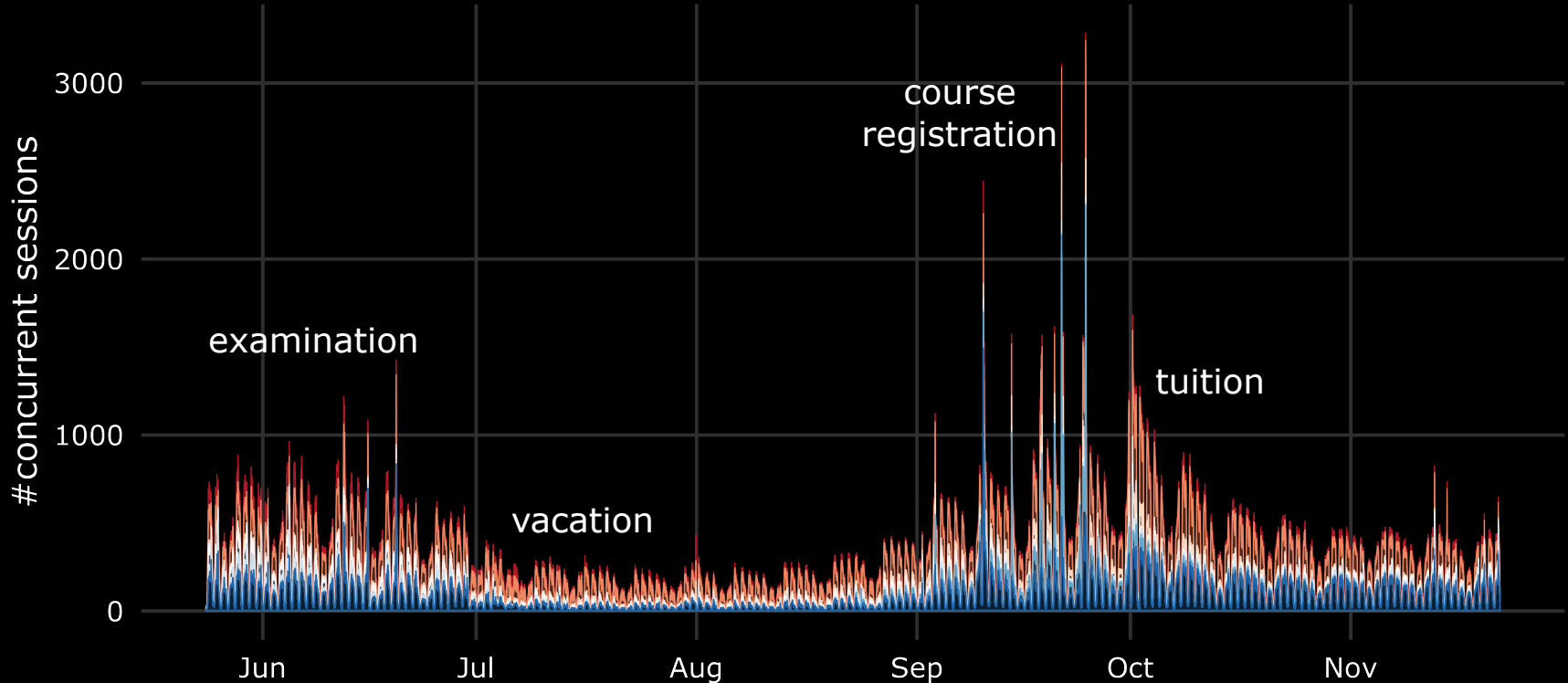
load test



measurement data

campus
management
system

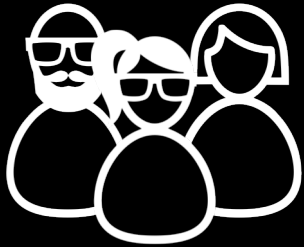
“The main objective in selecting a workload should always be representativeness” (Ferrari, 1972)



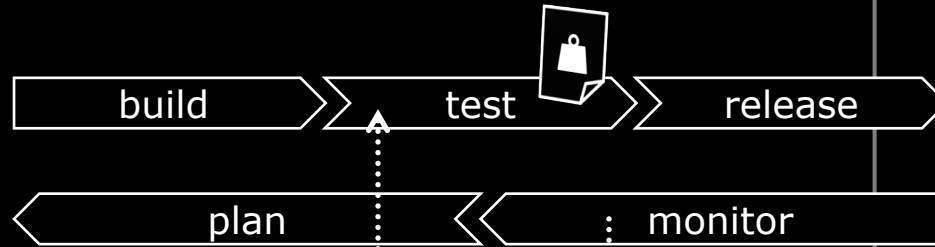
Modern software engineering is continuous

Bezemer et al., 2019

Eismann et al., 2020



DevOps team

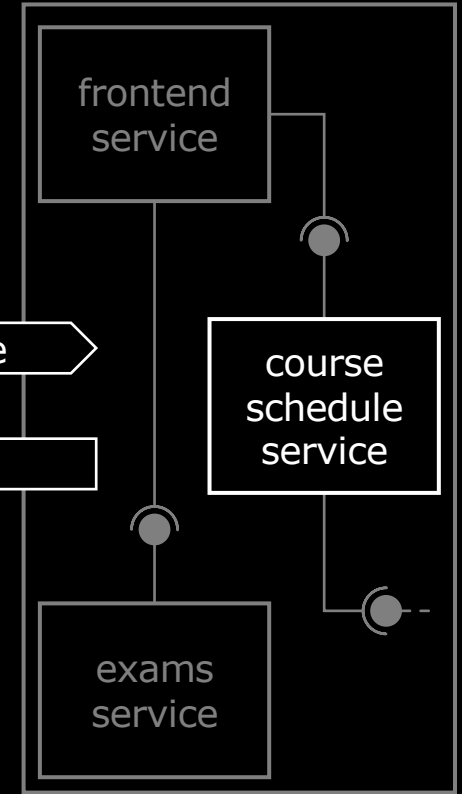


session logs

Menascé et al., 1999

Krishnamurthy et al., 2006

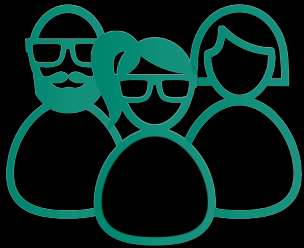
Vögele et al., 2018



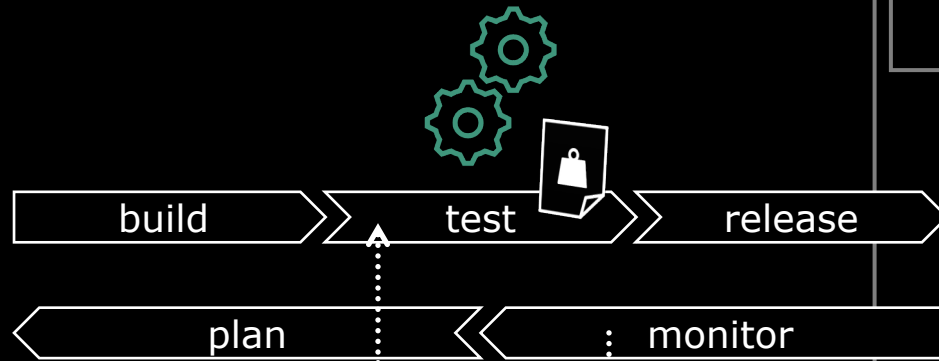
Modern software engineering is continuous

Bezemer et al., 2019

Eismann et al., 2020



DevOps team



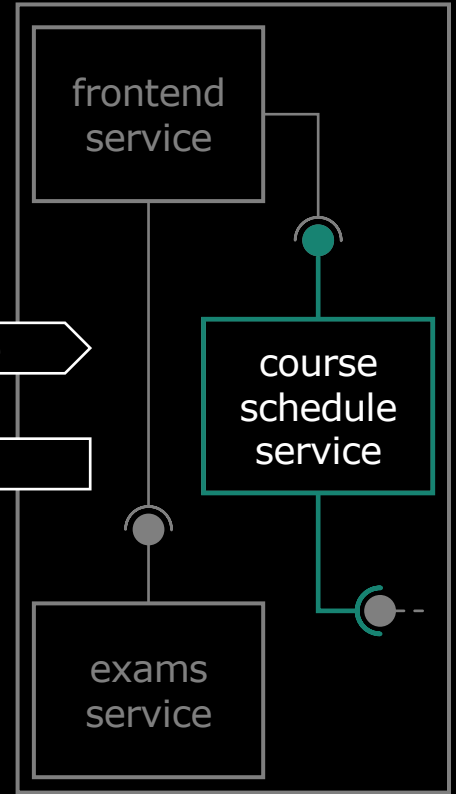
Menascé et al., 1999

Krishnamurthy et al., 2006

Vögele et al., 2018



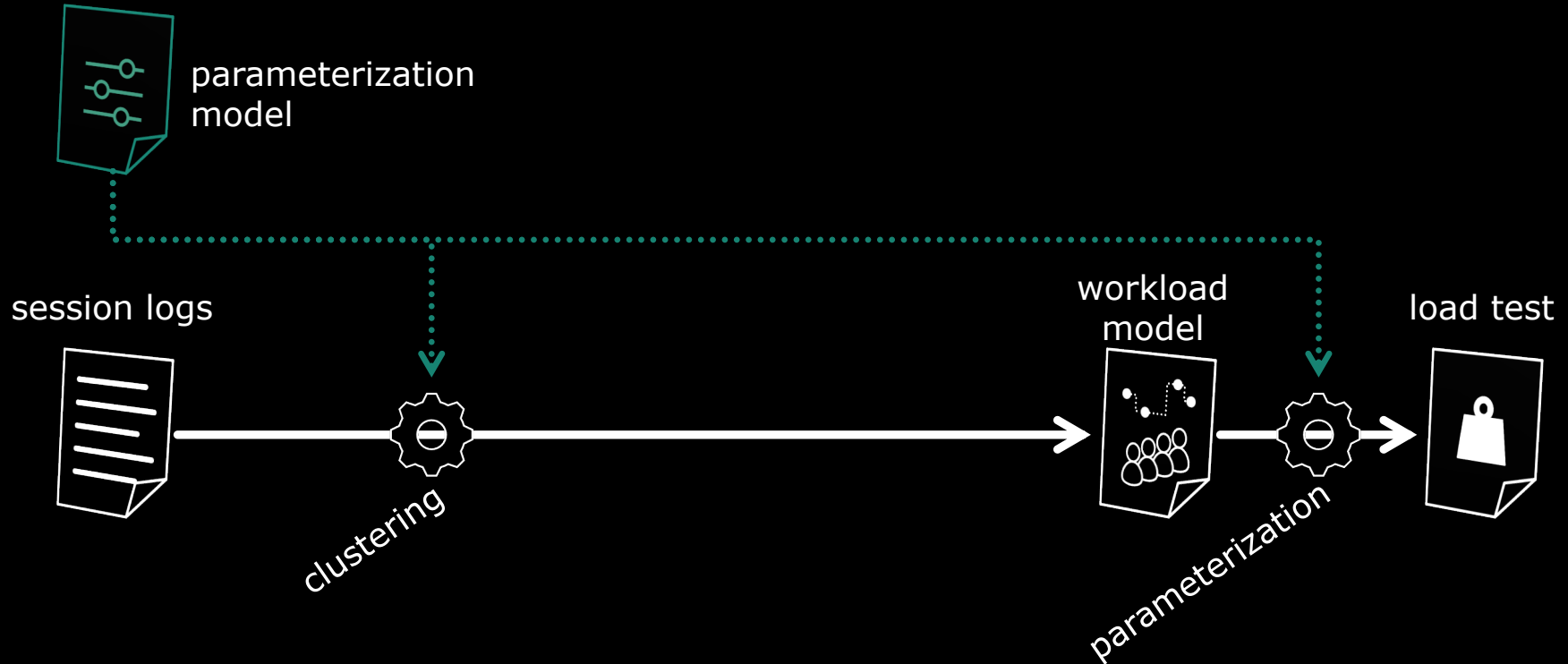
session logs



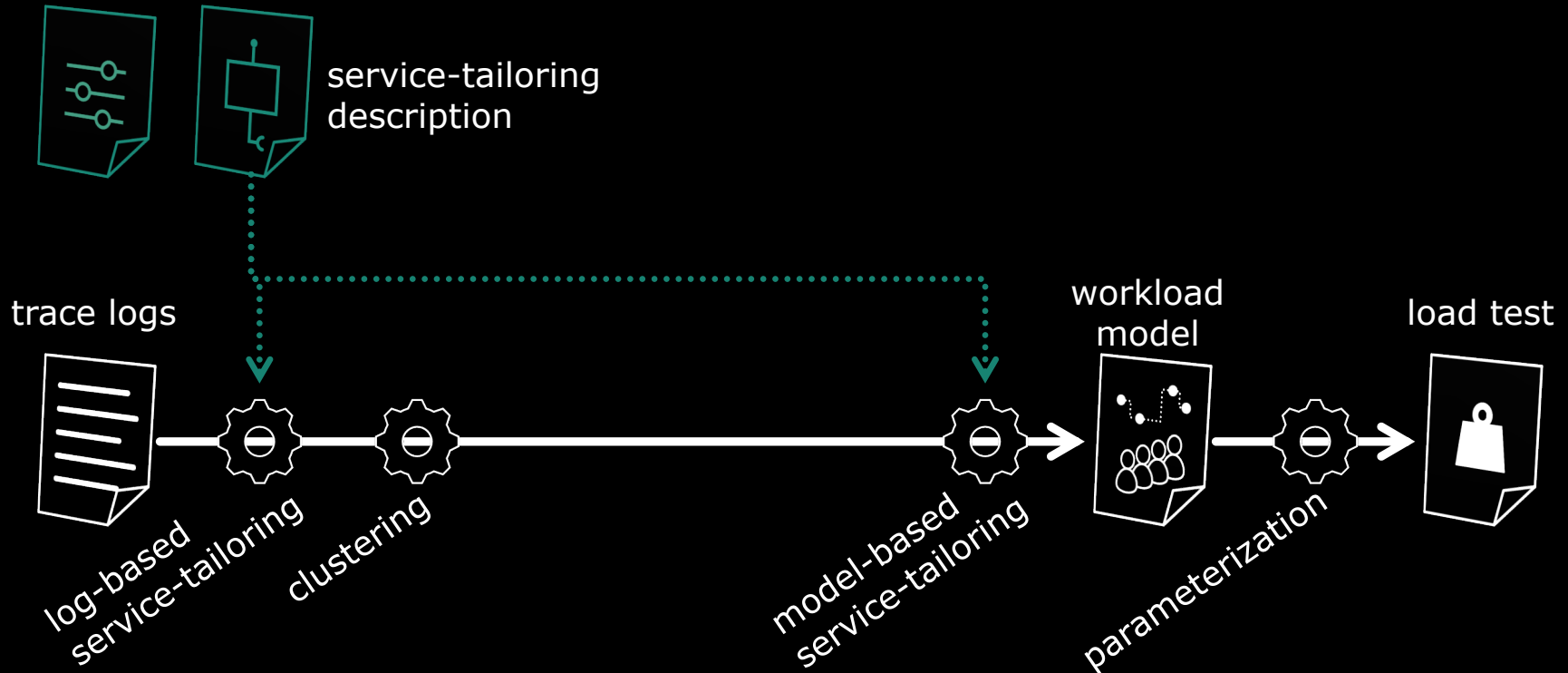
Existing load test generation process



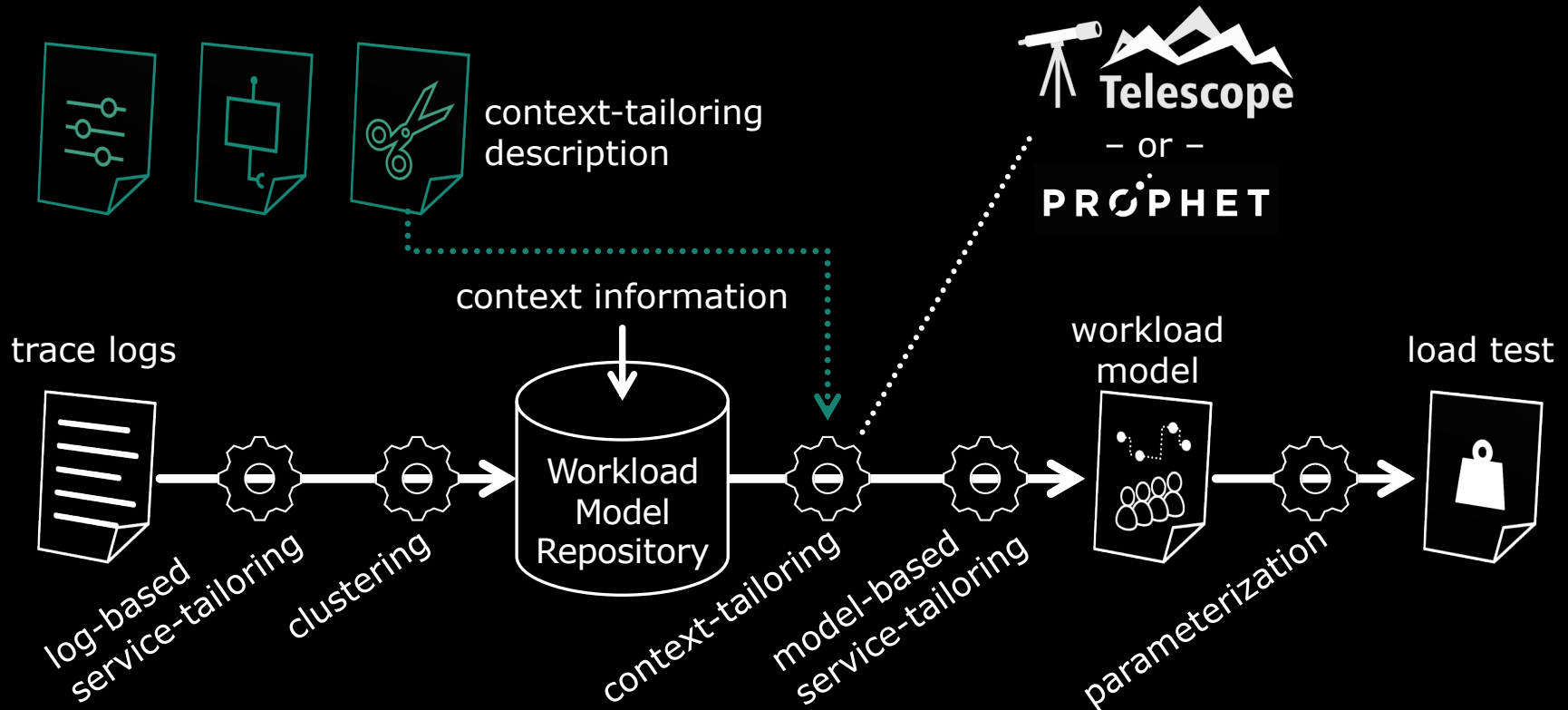
Our contribution (I): automation



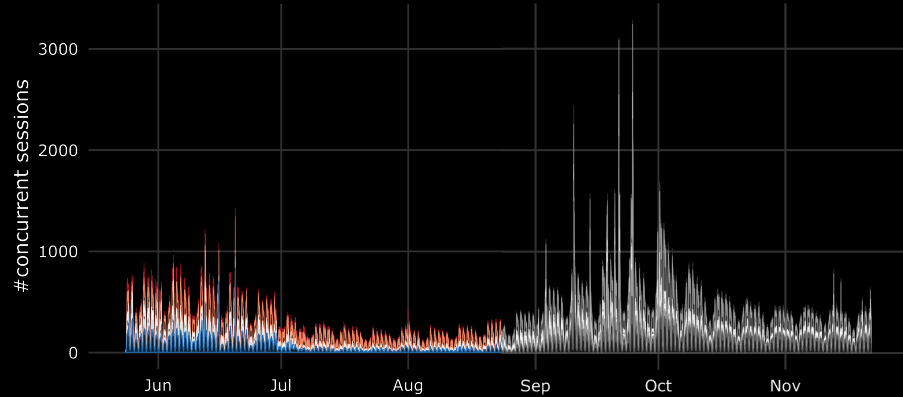
Our contribution (2): service-tailoring



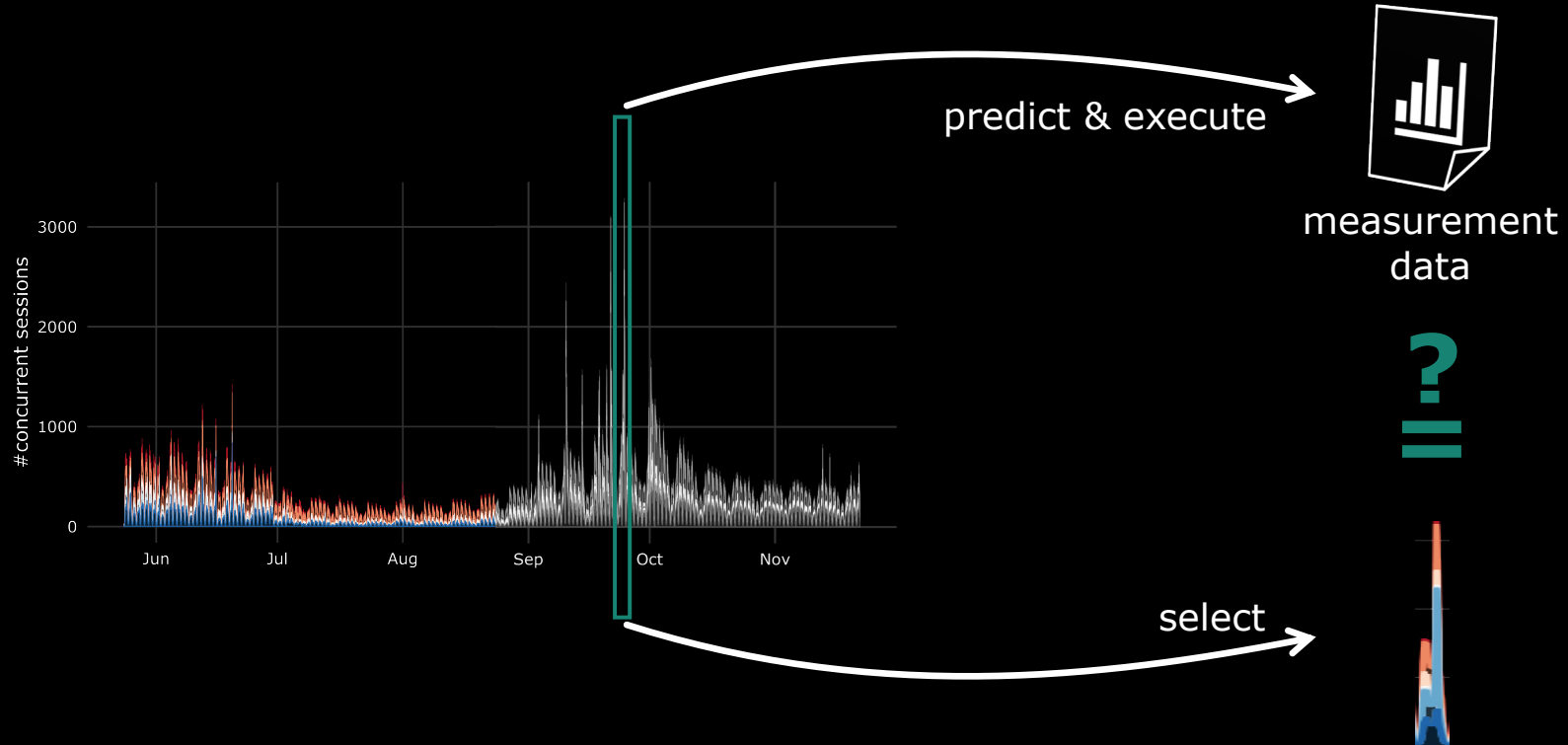
Our contribution (III): context-tailoring



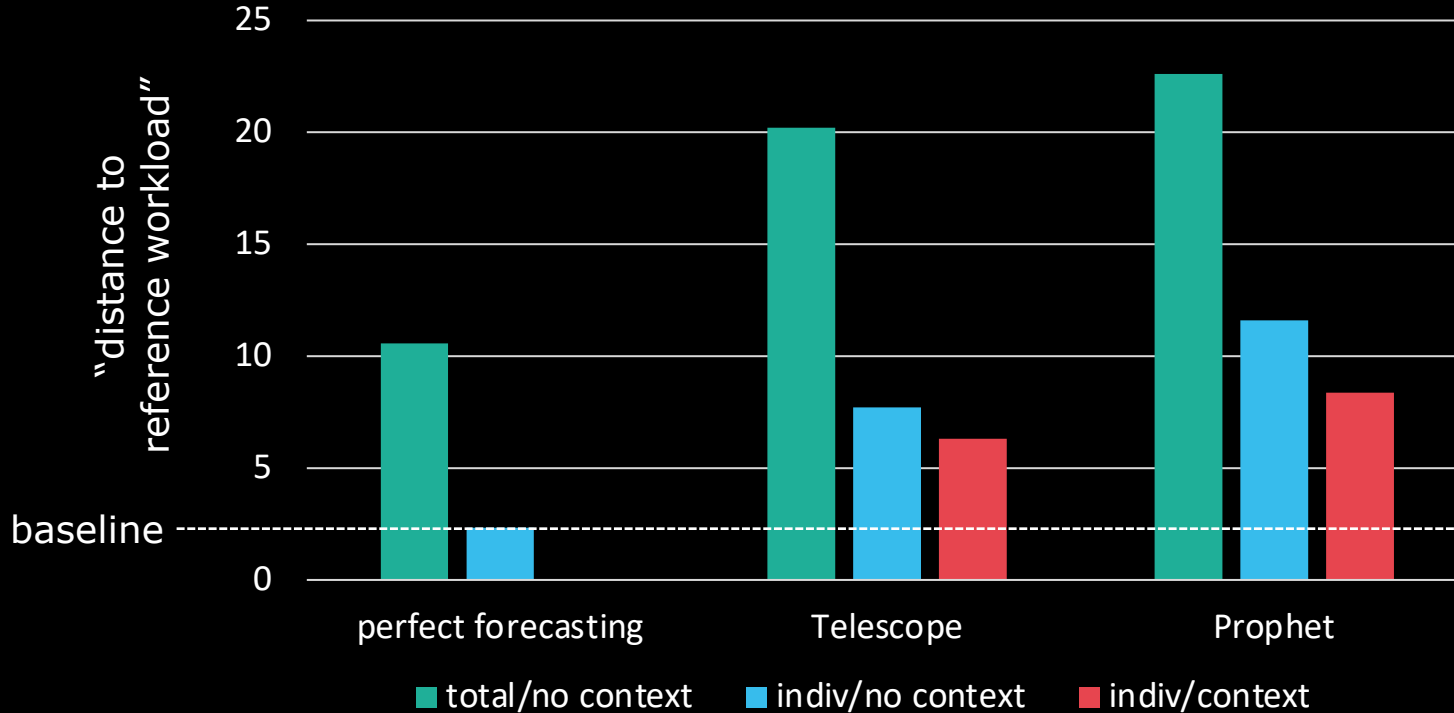
We generated and executed 44 load tests



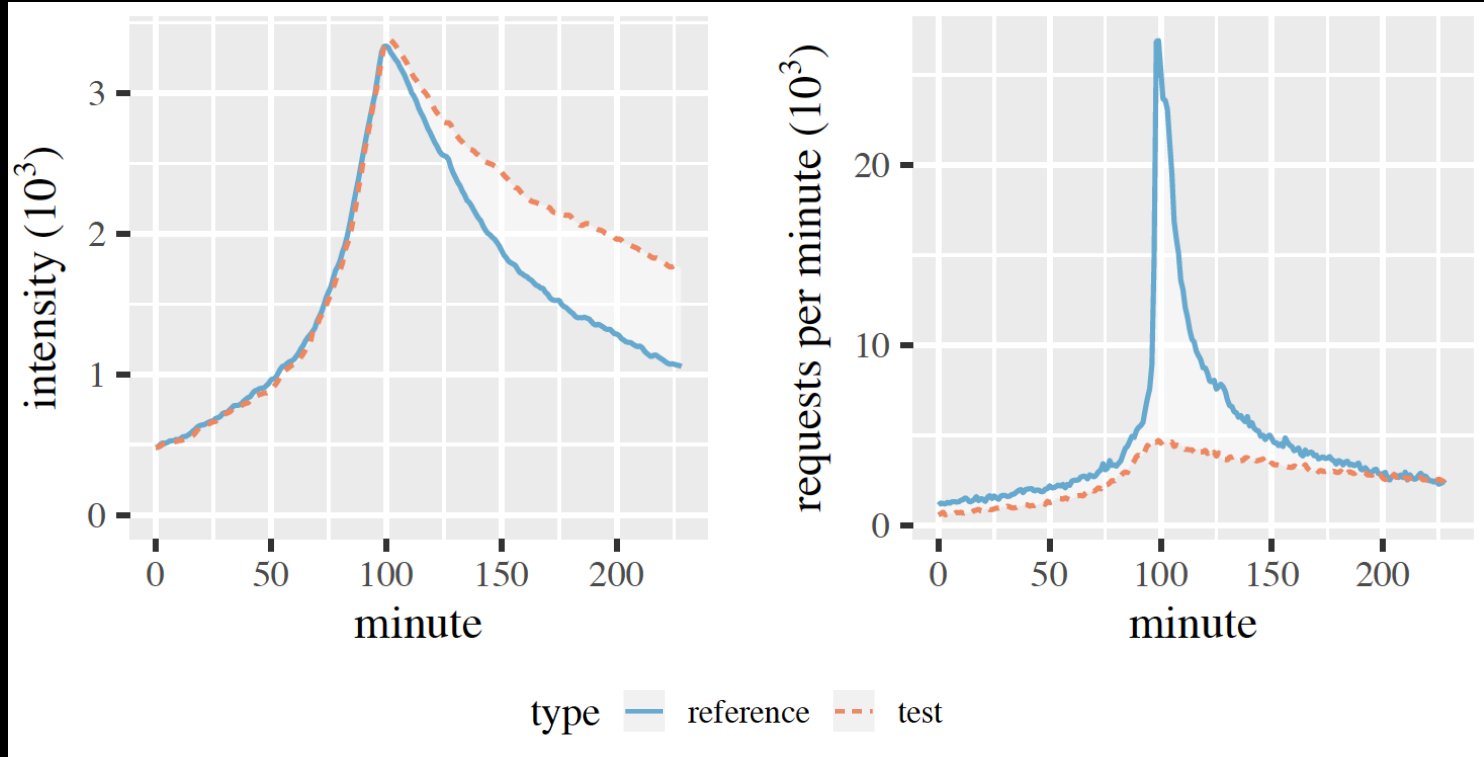
We generated and executed 44 load tests



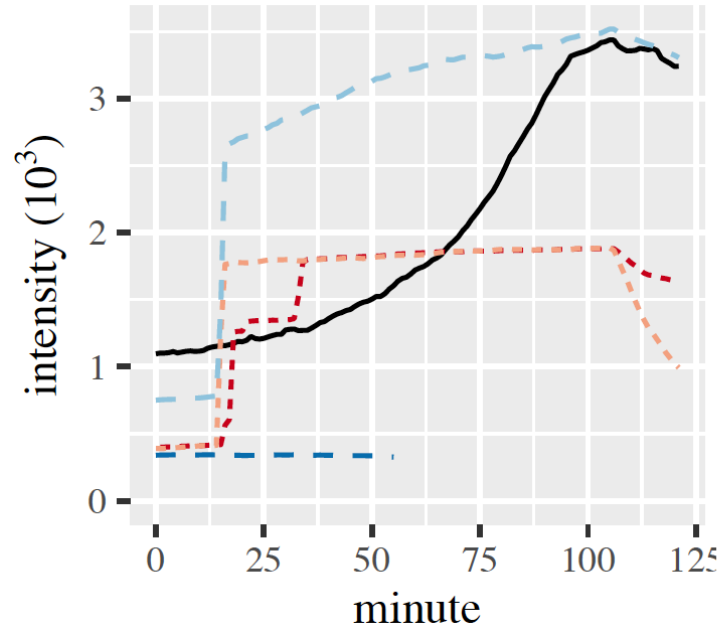
Clustering and context improve accuracy



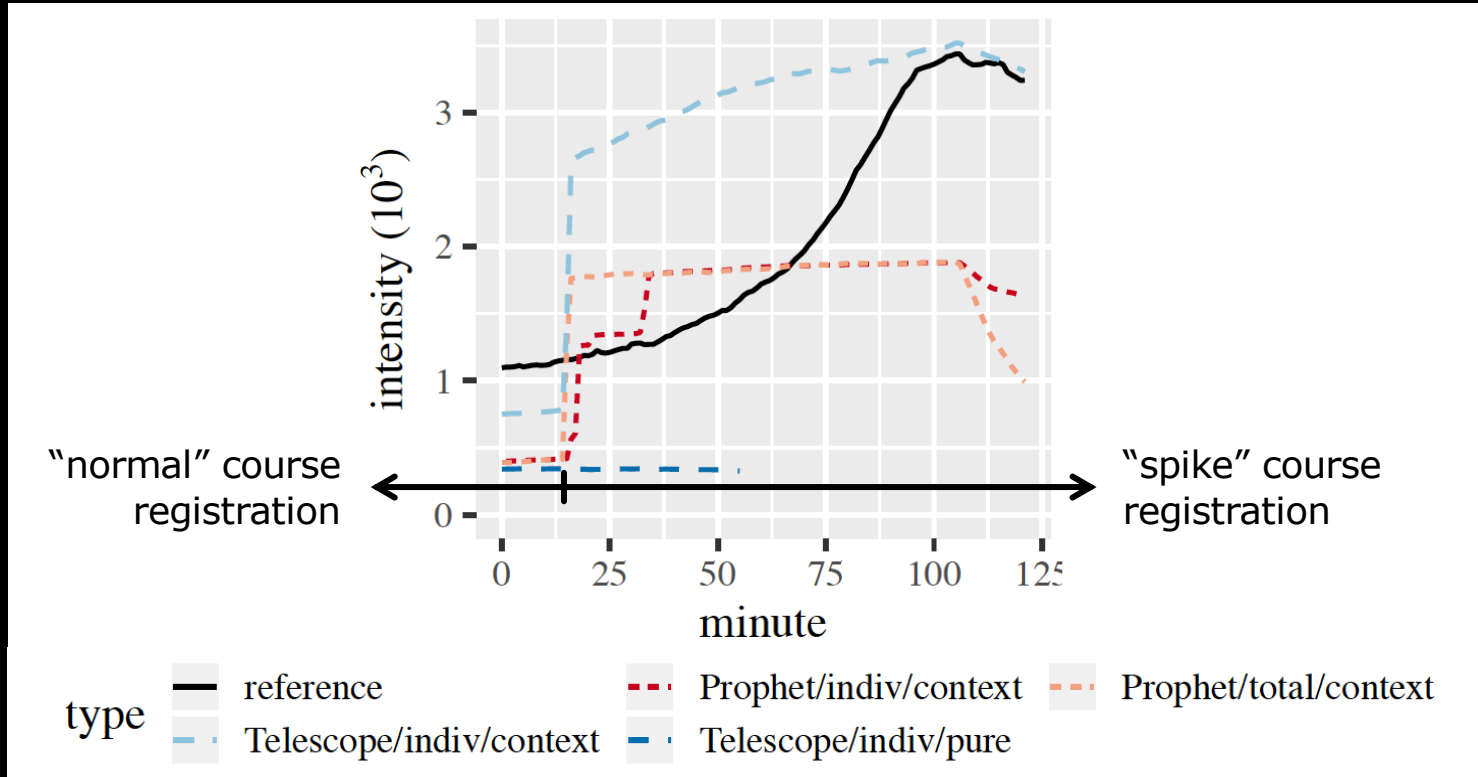
Issue #1: the user behavior changes



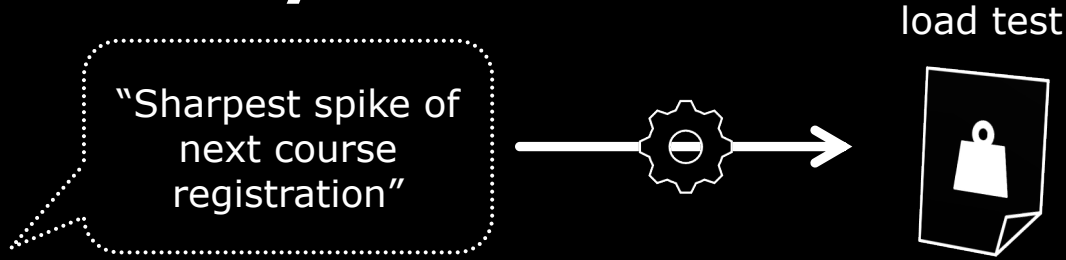
Issue #2: forecasting has sharp jumps



Issue #2: forecasting has sharp jumps



We can generate tailored load tests automatically...



... but the existing workload characterization & forecasting methodologies are not (fully) ready for this

1. think times not integrated into clustering
2. missing prediction of curve shape

References (I)

A Survey on Load Testing of Large-scale Software Systems

Z. M. Jiang and A. E. Hassan

IEEE Transactions on Software Engineering, vol. 41, no. 11, 2015

Workload characterization and selection in computer performance measurement

D. Ferrari

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Microservices: a performance tester's dream or nightmare?

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D. Krishnamurthy, J. A. Rolia, and S. Majumdar

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Reducing the Maintenance Effort for Parameterization of Representative Load Tests Using Annotations

Henning Schulz, André van Hoorn, and Alexander Wert

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Microservice-tailored Generation of Session-based Workload Models for Representative Load Testing

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Proceedings of the 27th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2019)

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