Ph.D. in Information Technology
Thesis Defense

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Room Seminari "Nicola Schiavoni"

Stefano CEREDA – XXXIII Cycle

CONSTRAINT-AWARE PERFORMANCE AUTOTUNING IN LIVE PRODUCTION ENVIRONMENT

Supervisor: Prof. **Paolo Cremonesi**

Abstract:

Modern IT systems offer hundreds of tunable knobs that impact their performances.

Manually finding a well-performing configuration is a daunting task, especially when considering that the performance associated with a knob configuration varies with the workload to which the system is exposed.

Hence, many machine-learning-based approaches have been proposed to find optimized configurations.

However, they usually target a specific application, need huge knowledge bases (which must be updated periodically) or perform many performance tests to find well-performing configurations.

Usually, these performance tests are run in a performance test environment, where we can evaluate as many configurations as we desire.

In many situations, this is not feasible, as the test environment is not available, and we must evaluate the configurations directly in the production environment while exposed to the real live workload, over which we have no control.

This thesis proposes a configuration tuning methodology addressing these issues based on Bayesian Optimisation.

In particular, the proposed approach is generic and holistic in that it is not tailored around a specific application and considers multiple layers of the IT stack.

We model the external working conditions (such as the workload) via Contextual Gaussian Processes.

We use a forecasting module to decide when to schedule performance testing experiments in the production environment.

Finally, we give special consideration to satisfying service level agreement (SLA) constraints.

We evaluate the approach on various tunable systems, such as database management systems and java web applications.

PhD Committee
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