Performance Engineering Roles in Industry

Challenges and Knowledge/Skills/Experience Required to meet them

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ABSTRACT

In this extended abstract, the author highlights the various roles as a performance engineer in the industry. Based on his experience, some of the important tasks to perform in each role is listed. Also listed along with it a set of skills to be acquired for each role. It is hoped that these will help bridge the gap between academic course and industrial requirements in performance engineering in performance engineering. The structure of the presentation will closely follow that of this paper.

CCS CONCEPTS

• Computing Industry • Computing Education • Computing Profession

KEYWORDS

Performance Engineering, Performance Testing, Performance Tuning, Performance Modeling Capacity Planning

1 Introduction

Performance Engineering is one of the most satisfying professions in Computer Science. Most of the concepts learnt in an undergraduate course in Computer Science / Computer Engineer finds its use here. Nevertheless, when a graduate computer engineer joins the industry, they are in for a shock given the complexity of large-scale industrial applications. Unlike as in academia lapses in any of the performance engineering roles can prove very expensive to the enterprise.

Performance testing is the most common first role of a performance engineer. This is a very important role, as in the course of performance testing he looks at the application as a whole and understands the value of application performance to the business. The next role is that of a performance test strategist. Performance testing complex applications require a lot of planning prior to execution. Many of these planning skills come from performance testing experience. The paper then discusses tasks for other roles like performance assessment, performance tuning and capacity planning. [3] and [5] offer many insights and references in practical performance engineering across the software development lifecycle.

The rest of the sections highlight challenges and skill required to meet them in each of the roles, with the final section concluding the paper.

ICPE '19 Companion, April 7–11, 2019, Mumbai, India

ACM ISBN 978-1-4503-6286-3/19/04…$15.00
https://doi.org/10.1145/3302541.3311524

2 Performance Test Engineer

One of the tasks of the performance test engineer is to keep the workload and conditions of the test extremely close to production. Some of the challenges that need to be resolved are

- Keeping the end user context
- Emulating data access footprint & concurrency as in the real workload
- Determining how long to run a performance test
- Ensuring appropriate amount of data in the system
- Emulating production conditions in test environment
- Verifying success of user interactions

Recommended skills

- Performance Engineering basics - Little's law etc.
- A performance testing & analysis project/lab work
- Basic Understanding of TCP/IP and application protocols
- Experience with performance testing tools
- Communication and other soft skills

The author has been part of a performance testing training exercise for a large organization. Details of this exercise has been compiled in [1]

3 Performance Test Strategist

One of the tasks of the performance test engineer is to keep the workload and conditions of the test extremely close to production. More details on this subject are present in [2]. Some of the challenges that need to be resolved are

- Understanding boundaries of system in scope and interfaces
- Determining appropriate workload per interface
- Determining how to emulate each interface
- Plan for extrapolation of performance test results
- Emulating production conditions in test environment
- Determining performance test scenarios

Recommended skills/knowledge
- Systems Engineering
- Software architectures and design patterns
- Design of experiments
- Basic performance modeling, MVA, simulation
- Database query processing

4 Performance Analyzer/Troubleshooter

Challenges
- Understanding boundaries of system in scope and interfaces
- Determining appropriate workload per interface
- Determining how to emulate each interface
- Plan for extrapolation of performance test results
- Emulating production conditions in test environment
- Determining performance test scenarios
- Detect the presence of software aging

Recommended skills/knowledge
- Operating Systems - processes, threads, IPC, virtual memory, networking
- Software development experience
- Database management systems
- Log parsing skills - sed, awk, perl etc
- Interpreting packet dumps

5 Performance Tuning/Optimization

Challenges
- Determining the best performing configuration
- Redesign/Re-engineer for performance
- Check suitability of new hardware
- Evaluate software rejuvenation strategies

Recommended skills/knowledge
- Parallelization frameworks
- Processor, Network and storage architectures, in-depth
- Algorithm complexity analysis
- Availability modeling

6 Capacity Planning

Challenges
- Determining hardware capacity during requirements stage
- Projecting hardware requirements based on business growth
- Using performance model results to guide business decisions

Recommended skills/knowledge
- Advanced performance modeling techniques
- Business process / Enterprise modeling (desirable)
- Experience with building and validating performance models
- Correlating application logs, resource monitoring logs and business data

[4] is a good reference for performance engineers to get started on capacity planning.

7 Conclusion

The paper has listed various roles in performance engineering and has listed skills/knowledge and experience required for the same. It presumes an implicit progression in terms of roles as the knowledge, skills and experience in the next role is assumed to be accumulated from the previous roles. This need not be always the case – it depends on individual maturity and experience, business requirements in context.

The reader has to be cautioned that these lists are no means exhaustive list. Nevertheless, it is hoped that it will help restructuring academic performance engineering courses for meeting industrial requirements. While it is known that there is no substitute to experience, the author feels that a graduate program in computer science specializing in performance engineering will help cut down time to maturity of performance engineers in the industry.

ACKNOWLEDGMENTS

The author would like to thank Dr. Rajesh Mansharamani who has been a supervisor, mentor and guide to the author during his formative years in performance engineering.

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