

Methods for Retrieving and Investigating Performance Factors in ASP.NET Web Applications

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New frameworks and programming environments were released to aid the development of complex web applications. These new languages, programming models and techniques are proliferated nowadays, thus, developing such applications is not the only issue anymore: operating, maintenance and performance questions have become of key importance. One of the most important factors is performance, because network systems face a large number of users, they must provide high-availability services with low response time, while they guarantee a certain level of throughput. These performance metrics depend on many factors. Several papers have investigated various configurable parameters, how they affect the performance of a web application. Statistical methods and hypothesis tests are used in order to retrieve factors influencing the performance. An approach [1] applies analysis of variance.

Today one of the most prominent technologies of distributed systems and web applications is Microsoft .NET. An ASP.NET application server has several settings which can affect the performance [2]. Our primary goal was to investigate factors influencing the response time, because it is the only performance metric to which the users are directly exposed. We tested a web application with concurrent user sessions [3], focusing on the effect of the different thread pool properties, the global queue limit and the application queue limit on performance. The results are analyzed in a qualitative manner which is followed by using statistical methods with the help of MATLAB: independence tests [4] to investigate which factors influence principally the performance. Our experiments have shown that the *maxWorkerThreads*, *maxIOThreads*, *minFreeThreads*, *minLocalRequestFreeThreads*, *requestQueueLimit*, and *appRequest-QueueLimit* properties are performance factors. In addition, we have determined the distribution of the response time as a function of the thread pool attributes settings. The normality has been intuitively founded by graphically methods, and has been proven with hypothesis tests [5]. Finally, optimal settings according to the performance-related requirements are determined as a function of client workload.

References

- [1] M. Sopitkamol and D.A. Menascé. A Method for Evaluating the Impact of Software Configuration Parameters on E-Commerce Sites, In *Proceedings of the ACM 5th International Workshop on Software and Performance*, Spain, 2005, pp. 53-64.
- [2] J.D. Meier, S. Vasireddy, A. Babbar, and A. Mackman. Improving .NET Application Performance and Scalability, *Patters & Practices*, Microsoft Corporation, 2004.
- [3] J. Aldous and L. Finnel. Performance Testing Microsoft .NET Web Applications, *Microsoft Press*, 2003.
- [4] C. H. Brase and C. P. Brase. Understandable Statistics, *D. C. Heath and Company*, 1987.
- [5] R. Jain. The Art of Computer Systems Performance Analysis, *John Wiley and Sons*, 1991.