Master's Thesis

Memory Profiling Analysis for .NET

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Dynatrace is a performance monitoring tool supporting, among many others, .NET. Many .NET applications suffer from high GC times, GC spikes, or high object churn. Symptoms of these these problems are easy to identify, but root causes are usually very hard to diagnose. Recently, Dynatrace has released a new feature aiming to find the root cause for both high GC counts as well as high GC times. This feature samples allocations in an unbiased fashion and observes the allocated objects' lifetimes. Unfortunately, this feature only supports Java for the moment.

The goal of this master thesis is to build a prototype component in the Dynatrace .NET OneAgent to provide the same data that the Dynatrace Java OneAgent is already providing, so that the server-side and UI infrastructure can be reused. The prototype should enable Dynatrace to evaluate if the same data as in Java can be produced and if so, what the performance impact would be compared to Java. It should also enable Dynatrace to monitor allocations during testing to automatically detect regressions in allocations or GC behavior. Finally, since parts of the .NET CLR are open source now, the thesis should describe and suggest possible improvements to the CLR to enable better performance.

The written thesis must contain both a quantitative and qualitative evaluation based on several different real-world applications and benchmarks as well as a comparison to the Java implementation. The written thesis must be handed in within one year after start.

Memory Profiling Blog Post: https://www.dynatrace.com/news/blog/java-memoryoptimizations-3x-jenkins-performance-improvement-with-dynatrace/

The progress of the thesis should be discussed on regular basis with the supervisors. A time schedule with milestones must be presented 3 weeks after the work starts. This schedule will be continuously refined as the work progresses. The final thesis should be submitted not later than September 30, 2021.