Supporting the Comprehension of System Behaviour Under Load

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How To Understand ULS Systems?

Ultra-large-scale (ULS) systems dominate the fields of e-commerce and telecommunications.

- Highly concurrent and highly distributed.
- Complex architectures built on complex sub-architectures

Behaviour is hard to understand!

We propose:

- an iterative methodology
- for automatically identifying and ranking deviating behaviour
- based on the level of dissimilarity between the resource usage metrics of threads.

Iterative Methodology

1. Metric Abstraction
2. Distance Calculation
3. Hierarchical Clustering
4. Ranking

Case Study: Thread Pools

Threads pools face a variety of challenges:

- Synchronization errors
- Resource thrashing
- Deadlock
- Thread leakage

Thorough understanding of the system is needed to address these challenges.

The subject system in our case study was a commercial ULS system that implemented the typical thread pool architecture.

Conclusions and Future Work

Our methodology has enabled us:

- Develop a better understanding of the subject system
- Identify and rank similar and deviating behaviour
- Tackle different problems where resource usage metrics are collected

Future work:

- More systems
- More design patterns and architectural styles
- Improved ranking algorithm (e.g. load testing)