AggrePlay: Efficient Record and Replay of Multi-threaded Programs

**Speaker**
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**Date**
5 August 2019 (Monday)

**Time**
2:00 pm - 2:30 pm

**Venue**
CS Seminar Room, Y6405  
6th Floor, Yellow Zone  
Yeung Kin Man Academic Building  
City University of Hong Kong  
83 Tat Chee Avenue  
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**Abstract**
Deterministic replay presents challenges and often results in high memory and runtime overheads. Previous studies deterministically reproduce program outputs often only after several replay iterations or may produce a non-deterministic sequence of output to external sources. In this paper, we propose AggrePlay, a deterministic replay technique which is based on recording read-write interleavings leveraging thread-local determinism and summarized read values. During the record phase, AggrePlay records a read count vector clock for each thread on each memory location. Each thread checks the logged vector clock against the current read count in the replay phase before a write event. We present an experiment and analyze the results using the Splash2x benchmark suite as well as two real-world applications. The experimental results show that on average, AggrePlay experiences a better reduction in compressed log size, and 56\% better runtime slowdown during the record phase, as well as a 41.58\% higher probability in the replay phase than existing work.

This paper will be presented in the 27th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE 2019), August 26-30, 2019, Tallinn, Estonia.

**Supervisor:** Dr Ricky Chan

**Research interests:** Deterministic Replay, Concurrency Bugs, Software Testing

All are welcome!