Reinforcement Learning-based Optimization of SSD Design

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**VENUE**  CS Seminar Room, Y6405  
6th Floor, Yellow Zone  
Yeung Kin Man Academic Building  
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**ABSTRACT**

Machine learning techniques can improve the existing storage system because they can make better use of system information, e.g., the history of storage system, than the conventional ad-hoc solutions.

In this talk, we present a case study of applying reinforcement learning (RL) to the long tail latency problem in the solid state disk (SSD).

First, we show that a simple Q table-based solution can give shorter long tail latency than the state-of-the-art solution.

Then, we present an approach called Q table cache which applies the traditional cache concept to Q table management thereby allowing us to benefit from fine-grained states, i.e., shorter latency, at small cost.

Finally, we explain how to improve the Q table cache by exploiting long-term system history, i.e., performing online training of a Q value prediction network (QP-Net) which predicts the initial Q value of new entry to the Q table cache.

**BIOGRAPHY**

Prof Sungjoo Yoo received Ph.D. from Seoul National University in 2000. From 2000 to 2004, he was researcher at system level synthesis (SLS) group, TIMA laboratory, Grenoble France. From 2004 to 2008, he led, as principal engineer, system-level design team at System LSI, Samsung Electronics. From 2008 to 2015, he was associate professor at POSTECH. In 2015, he joined Seoul National University and is now full professor. In 2018, he did sabbatical at Facebook. His research interests include software/hardware co-design of neural networks and machine learning-based optimization of computer architecture.

All are welcome!

In case of questions, please contact Dr XUE Chun Jason at Tel: 3442 9815, E-mail: jasonxue@cityu.edu.hk, or visit the CS Departmental Seminar Web at [http://www.cs.cityu.edu.hk](http://www.cs.cityu.edu.hk).