Defense Announcement

DESIGN AND ANALYSIS OF HARDWARE-BASED SCHEDULER AND MULTI-PHOTON QUANTUM CRYPTOGRAPHY PROTOCOL

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Quantum cryptography is emerging and gaining attention in recent years. In this dissertation, a multi-photon quantum cryptography method is analyzed to take into account the fiber loss and collective-rotation noise. Compared with single photon protocols, the multi-photon protocol has longer transmission distance with better noise tolerance.

Scheduling overheads in multiprocessor systems are typically ignored. However, as the number of processors in systems increases dramatically, they can potentially become the performance bottleneck in practical systems. In this dissertation, a new hardware-based scheduling algorithm is proposed for multiprocessor task scheduling. The proposed algorithm has O(1) runtime complexity and can be scaled to schedule hundreds or thousands of processors.

In addition, this dissertation develops analytical models for hardware-based algorithms. The proposed models can be used not only to evaluate existing hardware implementations, but also to guide the design and optimization for new hardware implementations. Two datacenter-oriented hardware schedulers are designed as case studies to demonstrate the effectiveness of the proposed hardware-based analytical models, which help to better understand the hardware algorithm resource cost and further improve hardware design schemes.