UNC GREENSBORO | Department of Computer Science

Department of Computer Science--Colloquium Series

Using Simultaneous Multithreading to Support Real-Time Scheduling

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Abstract:
The goal of real-time scheduling is to find a way to schedule every program in a specified system without unacceptable deadline misses. If doing so on a given hardware platform is not possible, then the question to ask is "What can be changed?" Simultaneous multithreading (SMT) is a technology that allows a single computer core to execute multiple programs at once, at the cost of increasing the time required to execute individual programs. SMT has been shown to improve performance in many areas of computing, but SMT has seen little application to the real-time domain. Reasons for not using SMT in real-time systems include the difficulty of knowing how much execution time a program will require when SMT is in use, concerns that longer execution times could cause unacceptable deadline misses, and the difficulty of deciding which programs should and should not use SMT to share a core. In this talk, I discuss how these problems can be overcome so that SMT can be used to support real-time scheduling in both hard real-time (HRT) systems, where deadline misses are never acceptable, and soft real-time (SRT) systems, where deadline misses are undesirable but tolerable. As part of doing so, I give a general overview of both real-time systems and SMT.

Biography:
Sims Osborne completed her master's degree at UNC-Greensboro in 2017. Following her graduation from UNC-Greensboro, she joined UNC-Chapel Hill's Ph.D. program as part of Dr. Jim Anderson's real-time systems group. In August 2023, she joined Elon University as an Assistant Professor in Computer Science. She is currently continuing her research in SMT and real-time systems and is seeking to expand the scope of her research to include timing analysis work and the broader field of contention-sensitive scheduling.