

Using the SimOS Machine Simulator to Study Complex Computer Systems

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SimOS is an environment for studying the hardware and software of computer systems. SimOS simulates the hardware of a computer system in enough detail to boot a commercial operating system and run realistic workloads on top of it. This paper identifies two challenges that machine simulators such as SimOS must overcome in order to effectively analyze large complex workloads: handling long workload execution times and collecting data effectively. To study long-running workloads, SimOS includes multiple interchangeable simulation models for each hardware component. By selecting the appropriate combination of simulation models, the user can explicitly control the tradeoff between simulation speed and simulation detail. To handle the large amount of low-level data generated by the hardware simulation models, SimOS contains flexible annotation and event classification mechanisms that map the data back to concepts meaningful to the user. SimOS has been extensively used to study new computer hardware designs, to analyze application performance, and to study operating systems. We include two case studies that demonstrate how a low-level machine simulator such as SimOS can be used to study large and complex workloads.