“Virtutech Simics–a Virtual Computer”

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Abstract

A target computer system typically runs a mixture of operating system and application code, which interact in a complex, fine-grained manner with the hardware interfaces. This interaction between operating system, application, and the underlying hardware, today constitutes a difficult domain in computer science and engineering. The overall performance of a system is largely determined by this interaction, and it is required to function correctly to provide a stable platform.

To explore this interaction in any detail is difficult, especially since designers are frequently interested in not just understanding an existing system, but to explore alternatives. A fully simulation-based approach has the advantage of being able to model any architecture and gather any statistic. The approach of system level instruction set simulation addresses issues at the software level in general, and in the interaction between software and key hardware resources in particular.

In this presentation I will present Virtutech Simics, a simulator acting as a virtual workstation or server. Simics can today model a variety of processor types and computer systems—both workstations and multiprocessor servers. Simics fully virtualizes the target, allowing multiple processors or multi-node systems to be modeled, with arbitrary memory and device configuration, regardless of the host system.

All versions of Simics can boot and run unmodified operating systems, including various versions of Linux, Solaris, and Windows NT. To accomplish this, we implemented binary-compatible simulators for several devices, including SCSI, console, interrupt, timers, EEPROM, and Ethernet. The Ethernet simulation hooks into the host and allows the virtual server to appear on the local network with full services available (NFS, NIS, rsh, etc).

Simics is more than just a simulator; it is also a platform for designing specialized simulation-based tools. Simics supports user-developed modules for devices, data cache and instruction cache simulation, and execution profiling of all code, provides a symbolic and performance debugging environment for operating systems and applications, and can be extended using scripting languages.

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About the Speaker

Previously head of the Computer Architecture Simulation group at the Swedish Institute of Computer Science (SICS), Peter Magnusson is now the CEO of Virtutech AB. Peter Magnusson has been researching and implementing simulation techniques and has published several papers on the topic since 1991. He is the original architect of Simics, the first academic simulator capable of booting an unmodified commercial SMP operating system.

Other than his operating duties at Virtutech, Peter Magnusson is currently a scientific advisor to the CNA lab at SICS, a columnist for the leading Swedish computer magazine “Datateknik”, and strategic advisor to SalusAnsvar Öhman’s mutual fund “IT-Fond”, the first pure-play IT fund in Sweden. He has been an invited speaker on a variety of current topics including digital payments, Internet trends, and ergonomics. Peter Magnusson studied computer science (MSc) at the Royal Institute of Technology in Stockholm, Sweden, and business administration (MBA) at the Stockholm School of Economics.

About the Company

Virtutech is the world leader in simulation of high performance computer systems. We develop tools that are used to design systems such as database servers and telephone switches. Our customers include Sun Microsystems, Hewlett-Packard, and Ericsson. We have research collaborations with a number of universities in Sweden and the United States.

Virtutech was founded in 1998 as the first spin-off from the Swedish Institute of Computer Science (SICS) and has eleven employees. We are situated in downtown Stockholm.

Virtutech Simics, our principal product, is used for developing future generation microprocessors, memory hierarchies, and system software. Our users need to run unmodified software, including operating systems, which puts high demands on performance, functionality, and stability.

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