The future of heterogeneous massive parallel systems   
Prof. Avi Mendelson – Technion, Israel Institute of Technology

"An order of magnitude quantitative change

is a qualitative change"

The main research and development focus of computer-based systems has gradually changed from focusing on the end-point; e.g. a core or processor, to focusing large systems; and from focusing on general-purpose, computational based systems to focusing on data centric, domain specific systems.

System and core architectures have significantly changed during the last decade; motivated by power and thermal limitations, core and system architectures are diverged into three main classes; (1) **big** cores; each of them aims to maintain best performance of a single thread, (2) **little** cores; the target is to “pack” as many cores per die as possible while sacrificing the performance of a single thread and (3) **heterogeneous processors** that use different types of processing elements as part of the same system.

This talk will start with short historical notes on what make heterogeneous systems so popular recently and continue with a discussion on the current trends on developing such systems. A special focus will be given to new SW/HW interfaces such as the use of shared virtual address space as proposed by the HSA consortium. I will conclude the talk by pointing out and discussing few hot research directions such as the impact of dark silicon, power and thermal and the potential impact of new technologies.

**Short Bio**

Avi Mendelson is a professor in the CS and EE departments Technion, Israel, and a member of the TCE (Technion Computer Engineering center). He earns his BSC and MSC degrees from the CS department, Technion, and got his PhD from University of Massachusetts at Amherst (UMASS)

Prof. Avi Mendelson has a blend of industrial and academic experience. As part of his industrial role, he worked 3 years for National Semiconductor, 11 years for Intel and 4 years for Microsoft. While in Intel, he served as a senior researcher and Principle engineer in the Mobile Computer Architecture Group, in Haifa. While in Intel he was the chief architect of the CMP (multi-core-on-chip) feature of the first dual core processors Intel developed.

His research interests span over different areas such as Computer architecture, operating systems, power management, reliability, fault-tolerance, cloud computing, HPC and GPGPU.