Modeling and simulation of Heterogeneous Multikernel Architecture

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Abstract

The work of this thesis models and simulates a simplified Multikernel architecture. The work extends the initial approach of uniform kernels and system images for all cores to non-uniform kernels and system images for each core. In addition, the concept of calling kernel system-calls from other kernels and their applications has also been modeled to shift Multikernel from single system image to new hybrid system. As the Multikernel is more scalable compared to other contemporary architectures, the proposed model adds a number of benefits to this types of architectures. For instance, non-uniform kernels in Multikernel model allow existing mature kernels, such as Linux, to co-exist with modern and specialized kernels on a single machine. Based on experimental tests on ARMv7-A architecture, it was shown that each kernel in the developed model was able to provide inter-kernel system-calls to local applications with insignificant overhead cost compared to local system-calls.