The Challenge
As real-time computer application systems become larger and more complex, it is becoming imperative that such applications be implemented on multiprocessor platforms rather than on uniprocessor ones. Furthermore, it is often the case that these implementation platforms are not completely homogeneous, but are comprised of several different kinds of processors and other resources. We are studying the fundamental scheduling-theoretic questions that arise in the design and specification, implementation, and formal verification of real-time applications upon such heterogeneous multi-resource platforms.

The Approach
We are studying the problem from several different perspectives:

• It is known that no on-line scheduling algorithm can be optimal upon multiprocessors. We are studying these inherent limitations, and are exploring techniques (such as resource augmentation) that can be used to bypass these limitations to achieve acceptable performance.

• We are exploring the computational complexity of determining whether real-time systems specified in certain popular models (e.g., the periodic task model) can be scheduled to meet all deadlines upon specified uniform multiprocessor platforms.

• The earliest deadline first scheduling algorithm (EDF) is very commonly used in uniprocessor real-time systems. We are developing the algorithms and analysis tools necessary to be able to apply EDF to uniform multiprocessor systems.

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Selected Publications


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