



LABORATORY FOR CONCURRENT COMPUTING SYSTEMS

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Pipelining and the Δ Throttle

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Abstract:

Conventional wisdom was that the amount of exploitable concurrency in applications is limited and as a consequence dynamic dataflow architectures were developed which fully unravelled all available concurrency; this wisdom was based on analysis of FORTRAN codes and the small model benchmark codes used for performance analysis. These architectures are now faced with serious problems of throttling real applications which in general have a surfeit of concurrency. Even with throttling a penalty is paid for the tag manipulation primitives, necessary in dynamic architectures, which caused the excess of concurrency. The CSIRAC II architecture at compile time generates dynamic unravelling code where necessary, principally in outer loops, and pipelined code in a static queued model where full unravelling is not required. This is coupled with a run time throttling scheme which permits rapid buildup of machine load when recovering from near sequential execution regions while damping load as the machine reaches capacity.