Abstract

The amount of instruction level parallelism available in most benchmarks is very high. With the advances in VLSI technology, the microprocessor industry is heading towards building highly superscalar microprocessors. This thesis deals with characterizing the vulnerability of this high level of parallelism to resource constraints.

We have considered slack, which can informally be defined as the number of clock cycles in which an instruction without increasing the execution time of the program, as a measure of vulnerability and found that slack does not accurately predict the vulnerability. We have defined, load, a property of the program which measures the load on a clock cycle. We have also considered \( \sigma(L_x) \), where \( L_x \) is the load on cycle \( x \), as a measure of vulnerability and found that this is also not an accurate measure.

We have considered various measures as candidate measures of vulnerability. Each measure makes a prediction about the program which is more vulnerable. Prediction rate is the percentage of cases in which a prediction is made. It has been observed that Accslk-Load has a prediction accuracy of about 85%, the prediction rate is only 42%. On the other hand, even though the prediction accuracy of \( \sigma(L_x) \), the standard deviation in the load, is lesser, there is a prediction in all the cases.