Summary
Compiler optimization Scalar value communication between 
speculative threads
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1 To be completed before class
What are the problems solved by this paper? (50 words)
Thread level speculation (TLS) has been successfully used to parallelize programs that cannot be 
parallelized by conventional parallelization techniques. One of the major overhead in TLS execution is
the frequent squashes occurring due to mis-speculation. There are some dependences that can be easily
predicted. If we synchronize on these dependences, we can easily reduce the number of mis-speculations.
One problem with synchronization is it sometimes can serialize execution. This paper tries to reduce
the number of mis-speculations and at the same time reduce the effect of synchrononization (by reducing
the critical forwarding path).

What are the approaches attempted by this paper? (50 words)
The paper uses compiler dataflow algorithms to identify the scalar variables that needs to be syn-
chronized. Then it inserts signal and wait to implement the synchronization. This will prevent the
mis-speculation caused due to the dependence. But it can effectively serialize the execution. So the
paper also tries to push the wait instruction downwards in the program. Similarly the signal is pushed
up. Along with pushing the wait and signal, the instructions are also scheduled to reduce the critical
forward path. Also aggressive scheduling is done using control speculation and data speculation. The
resulting code will prevent frequent mis-speculations without serializing the execution.

What are the main conclusions of this paper? (50 words)
The compiler techniques implemented improve the performance by 6.2-28.5% in many applications.
The effect of hardware techniques was also studied and compared with the compiler technique. It is
showed that the compiler techniques can outperform hardware techniques. Also good performance is
showed when hardware and compiler techniques are used together. The study shows that compiler
scheduling is very important to remove the bottlenecks in TLS.

2 To be completed after class
Did this paper address an important issue? Explain. (100 words)

Are the proposed approaches valid? Describe its strength and weakness. (100 words)
Do the results support the conclusions? Explain. (100 words)

Describe the potential future works? (100 words)