ECE 695R: System-on-Chip Design

Module 3: Behavioral Synthesis
Lecture 3.17: Scheduling with Speculative Execution

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Scheduling with Speculative Execution

• Speculation can be realized through behavioral transformations

• Problem
  – Do not know whether you have the resources or not
  – Better to do it on-demand, i.e., during scheduling

Scheduling with Speculative Execution

• Example:

Constraints:

(>), (++), (+), (M): 1 cycle, (*): 2 cycles
1 (++) , 1 (+), 1 (>), 2 pipelined (*)

What is the fastest schedule possible for this CDFG?
Example: Schedule without Speculative Execution

- Loop throughput constrained by control and data dependencies

Constraints:
- (>), (++), (+), (M): 1 cycle
- (*): 2 cycles
- 1 (++), 1 (+), 1 (>), 2 pipelined (*)

8 cycles/iter.
Scheduling with Speculative Execution

• Example:

Constraints:

(>) (++) (+) (M): 1 cycle, (*): 2 cycles
1 (++) 1 (+) 1 (>) 2 pipelined (*)

What is the fastest schedule possible for this CDFG?
Example: Schedule with Speculative Execution

- In the steady state, the loop throughput is constrained only by data dependencies and resource constraints.