18-640 Foundations of Computer Architecture

Exam 2: Prep Tips

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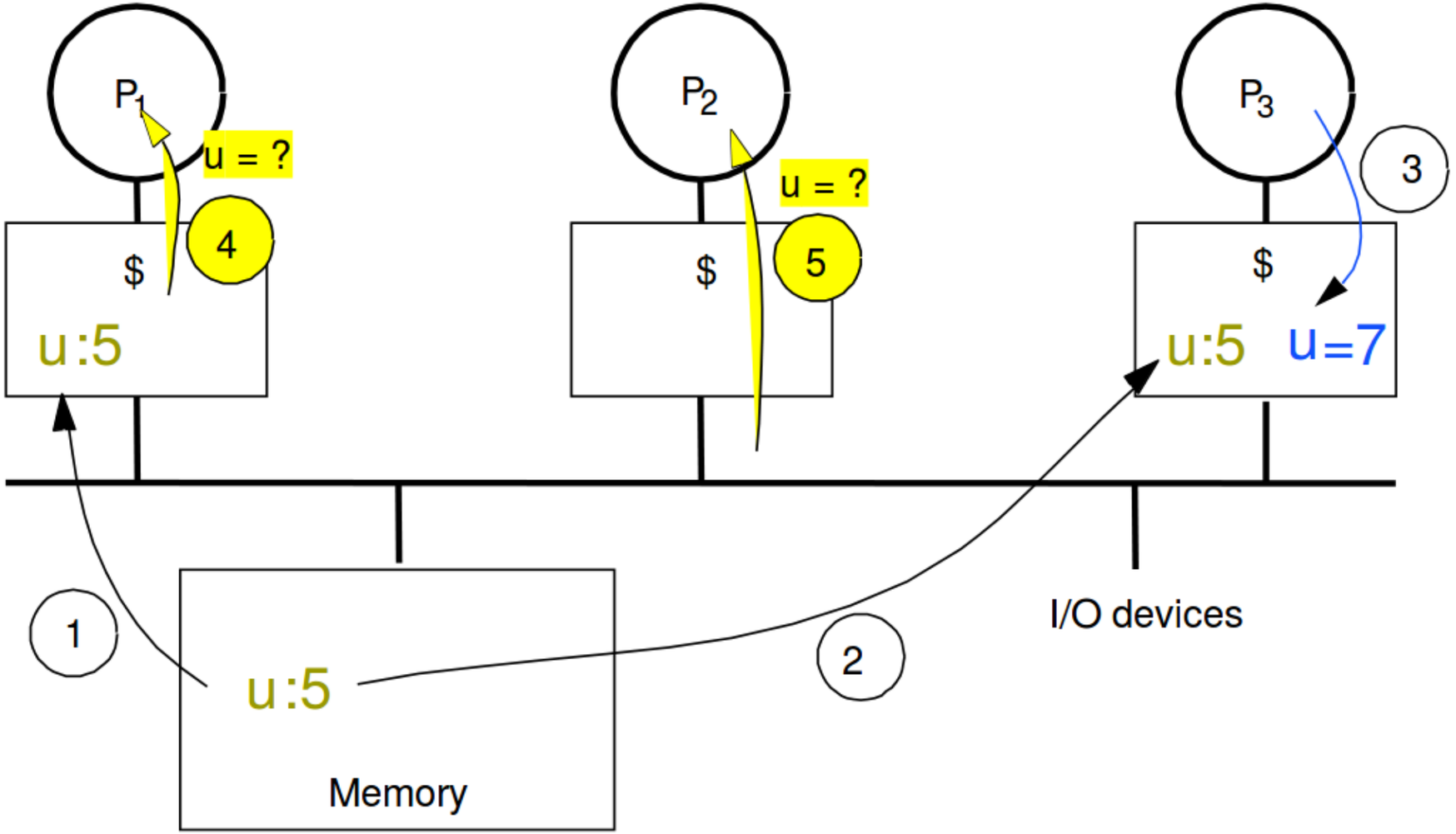
Topics Covered

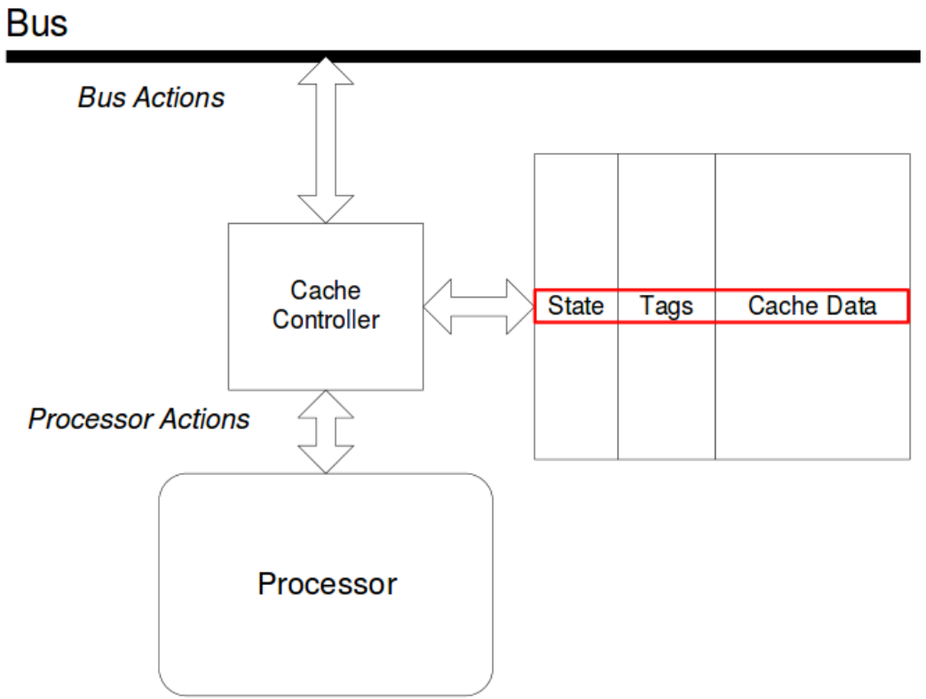
- Cache Coherency
- Multi level Caches
- Multithreading Synchronization
- SIMD Computation
- Conceptual Questions

Cache Coherence Problem - Recap



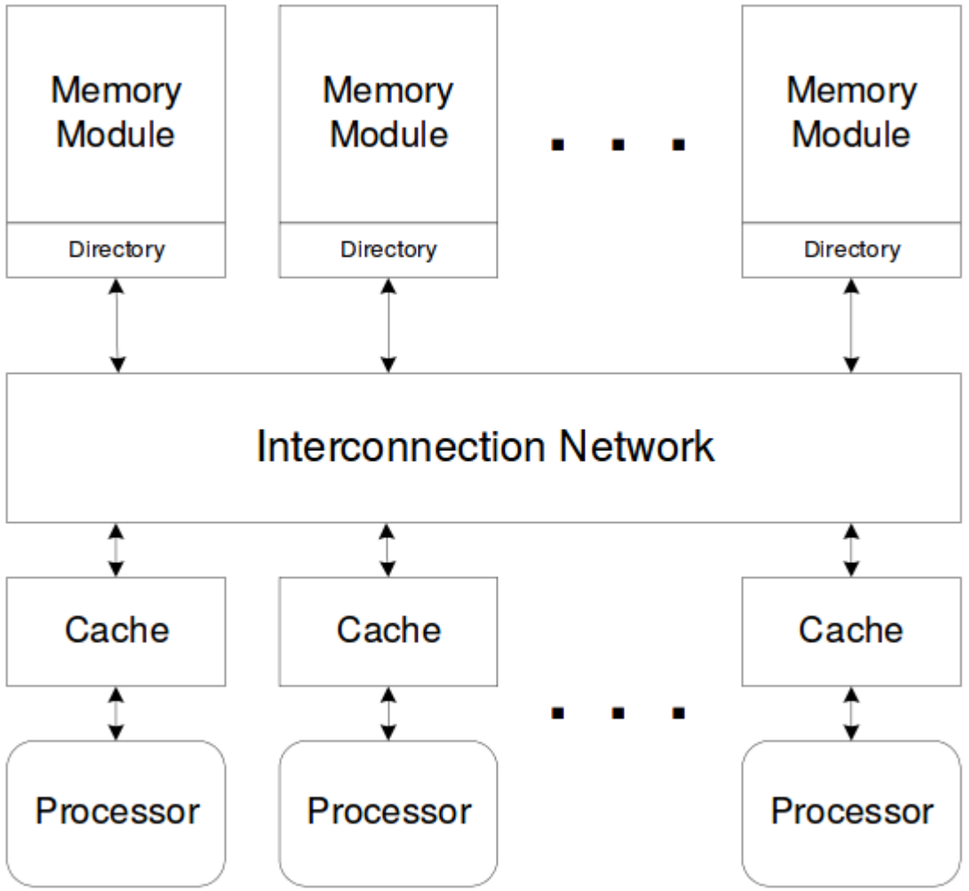
Snoopy Cache Coherence

- All requests are broadcast on a bus
- All processors and memory snoop and respond
- Cache blocks writeable at one processor or read-only at several
- Single-writer protocol

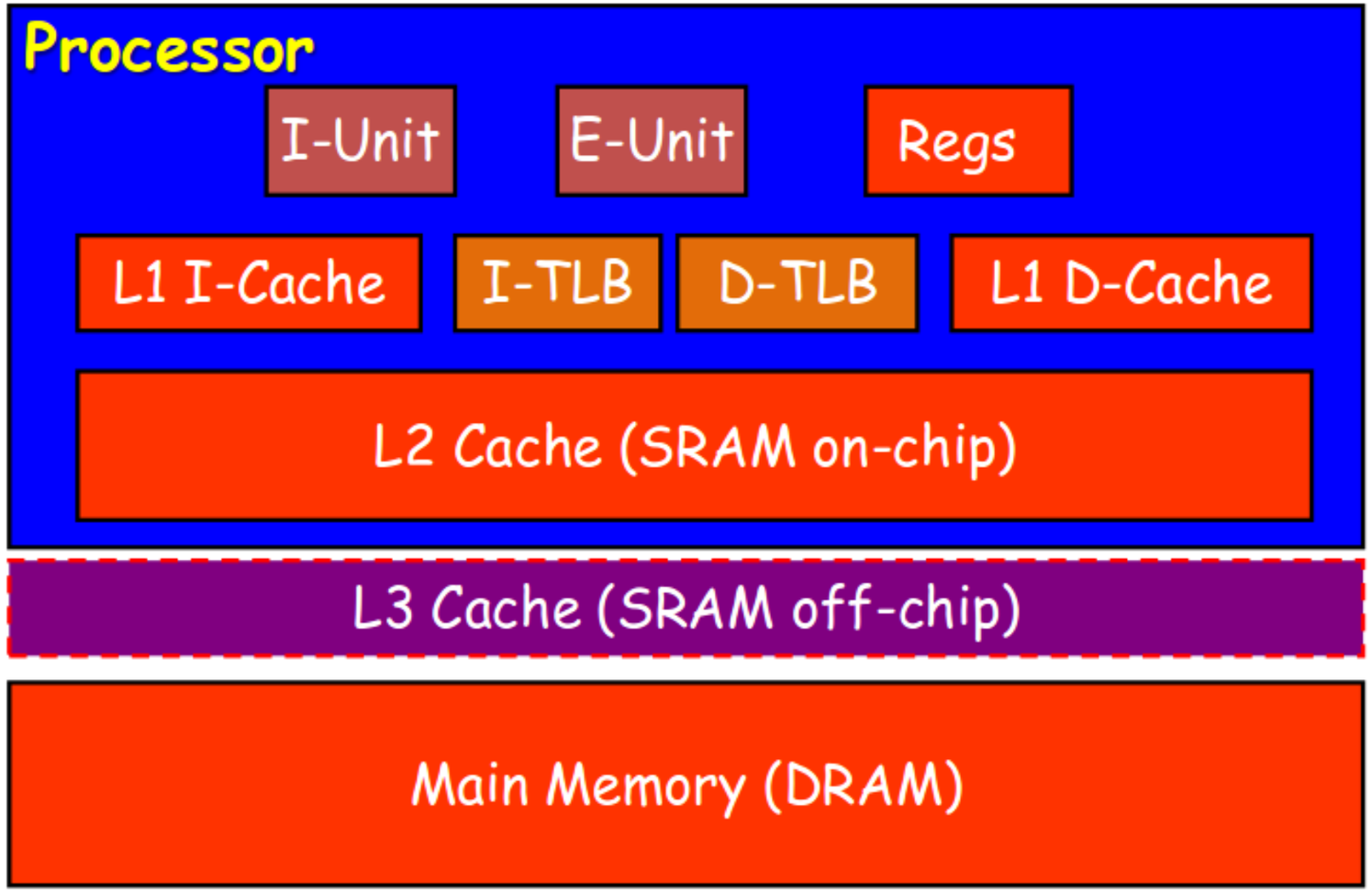


Directory based Cache Coherence

- An alternative for large, scalable MPs
- Can be based on any of coherence protocols
- Memory controller becomes an active participant
- Sharing info held in memory directory
- Use point-to-point messages
- Network is not totally ordered



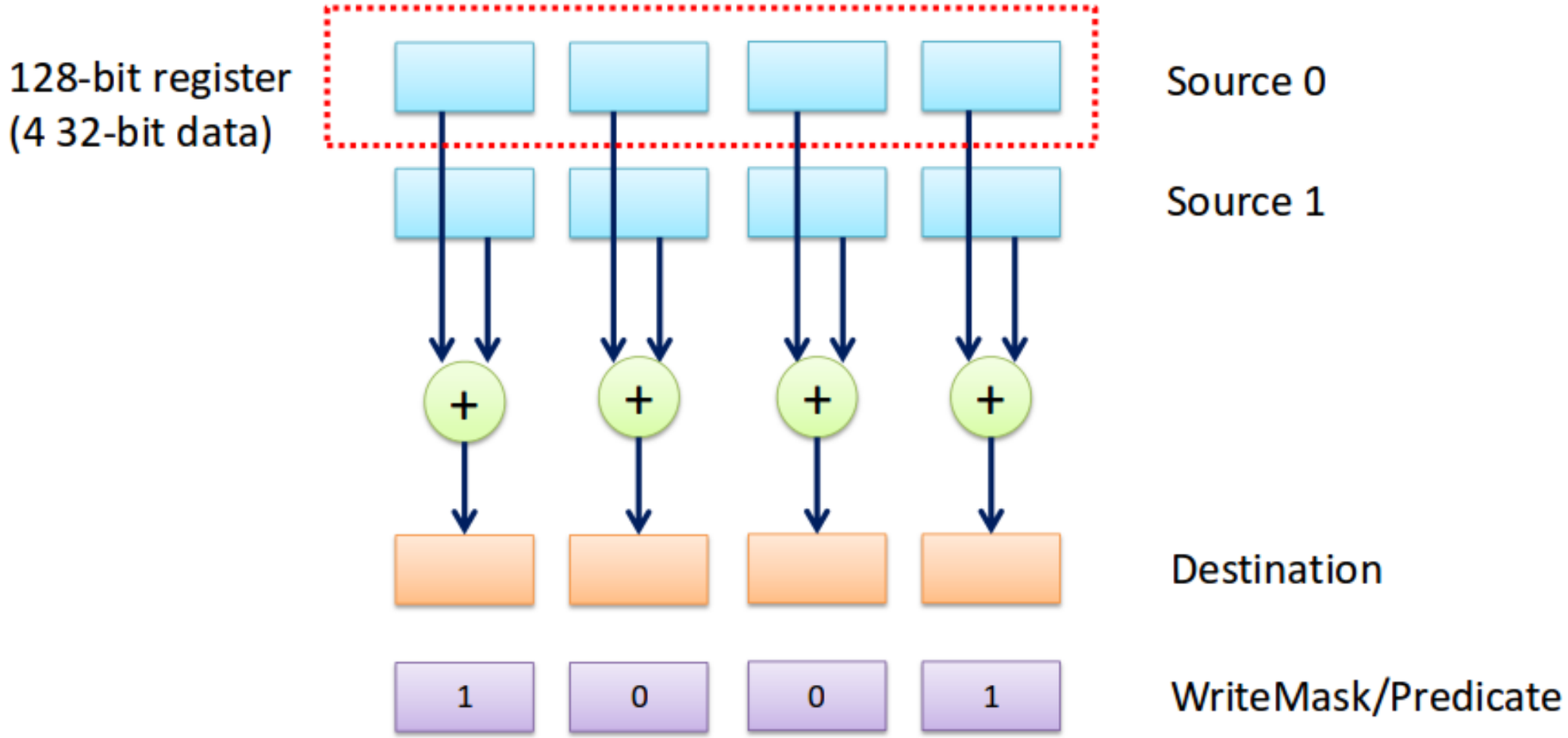
Multi-level cache



Multithreading

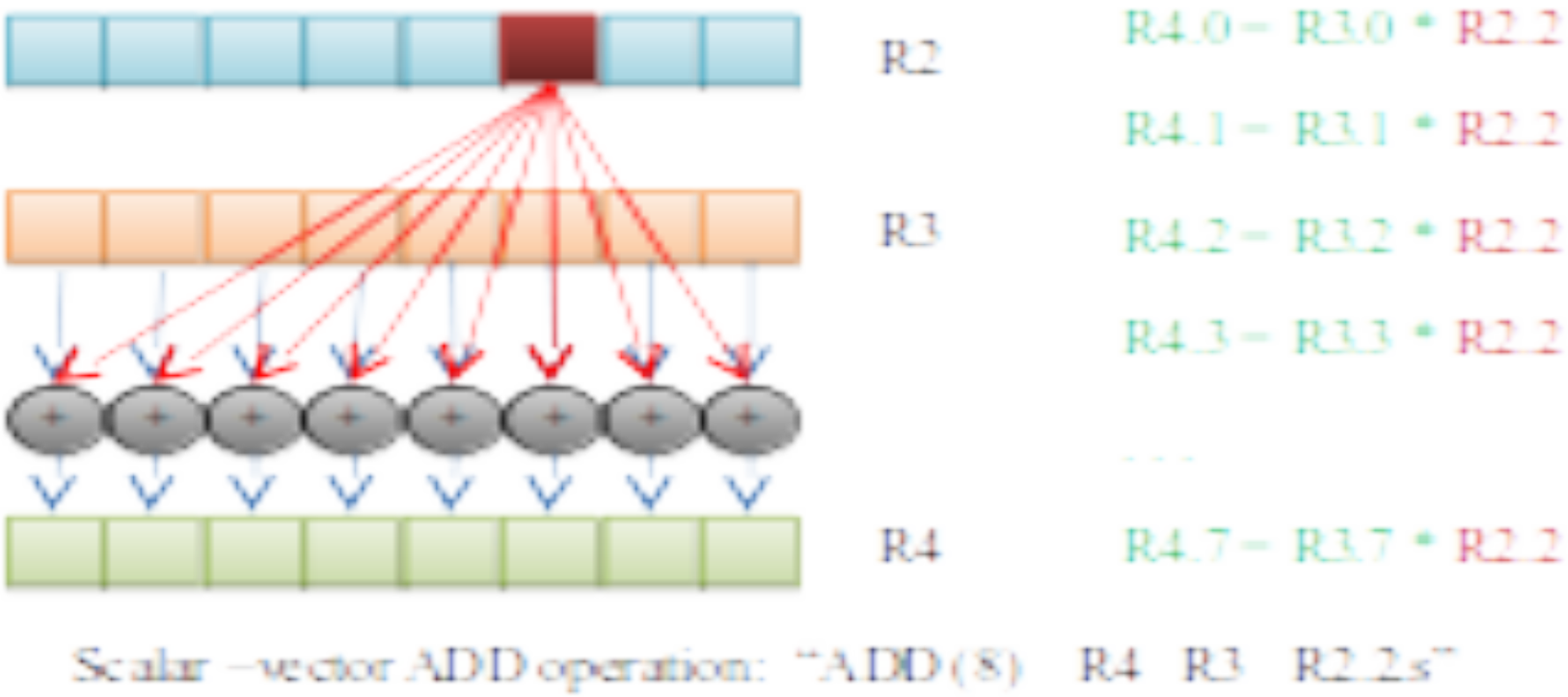
- ➔ Types of multithreading
- ➔ Thread-level parallelism
- ➔ Synchronization primitives

SIMD - Recap


128-bit register
(4 32-bit data)
Source 0
Source 1
+
+
+
+
Destination
1
0
0
1
WriteMask/Predicate

SIMD Computation - Example

Sample SIMD Instruction: ADD(simd size) dst src1 src2



Conceptual Questions - Compare and Contrast

- Multi core processors
- Cache Coherency
- Virtual Machines
- Multithreading
- Cloud computing etc

Resources

- Modern Processor Design: *Fundamentals of Superscalar Processors* [John Paul Shen, Mikko H. Lipasti]
- Parallel Computer Organization and Design [Michel Dubois, Murali Annavaram, Per Stenström]
- Lecture Notes