Active-Routing: Compute on the Way for Near-Data Processing

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Sungkeun Kim, Rahul Boyapati, Ki Hwan Yum and EJ Kim

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Die-stacked memory and memory network

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Active-Routing for dataflow execution in memory network

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Near-data processing in memory and network

Active-Routing for dataflow execution in memory network

Exploit **memory throughput** and **network concurrency**

Active-Routing Three-Phase Processing

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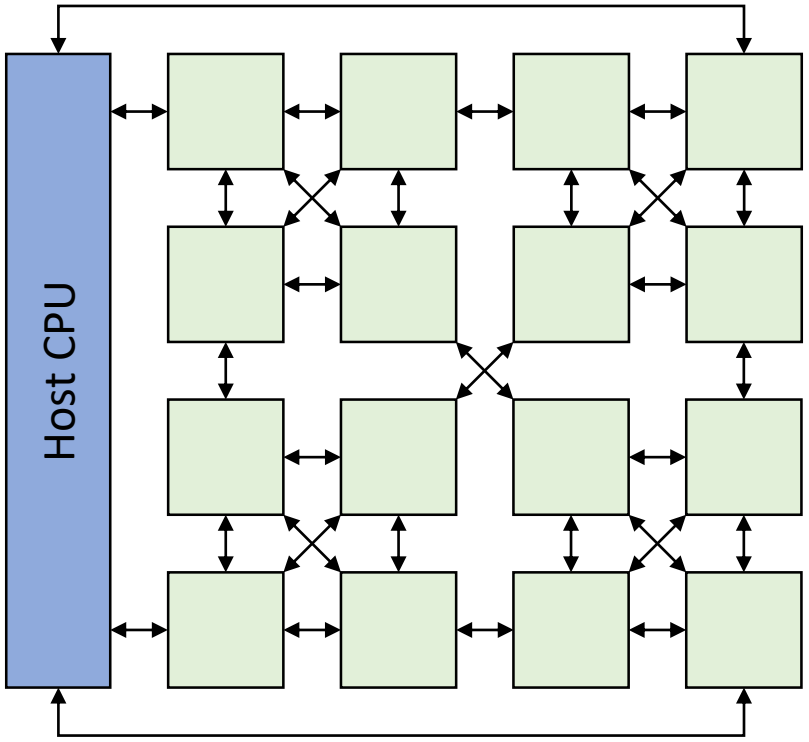
- Active-Routing Tree Construction



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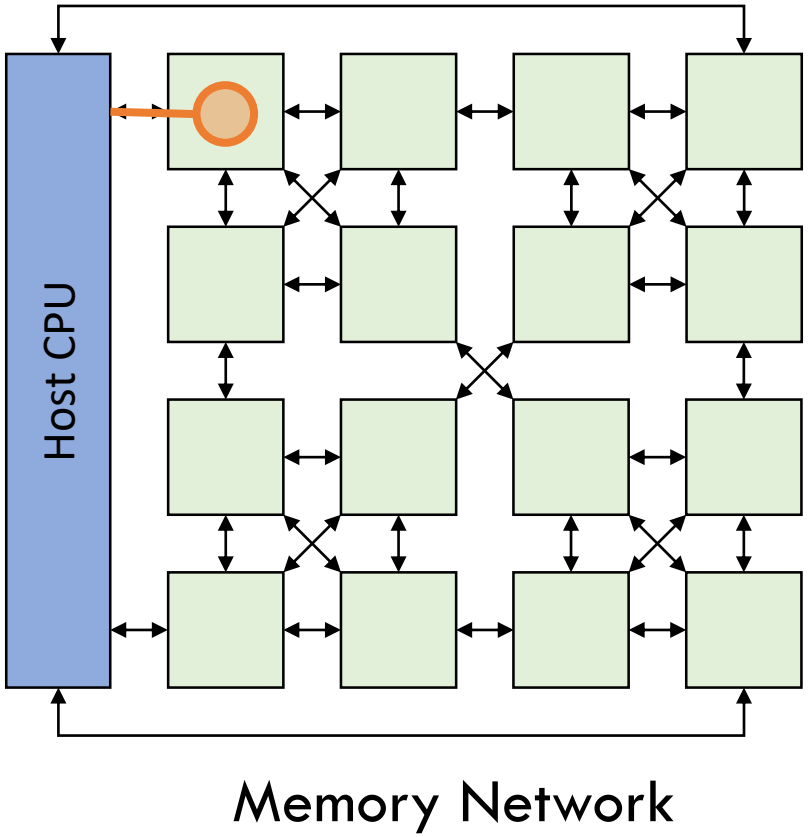

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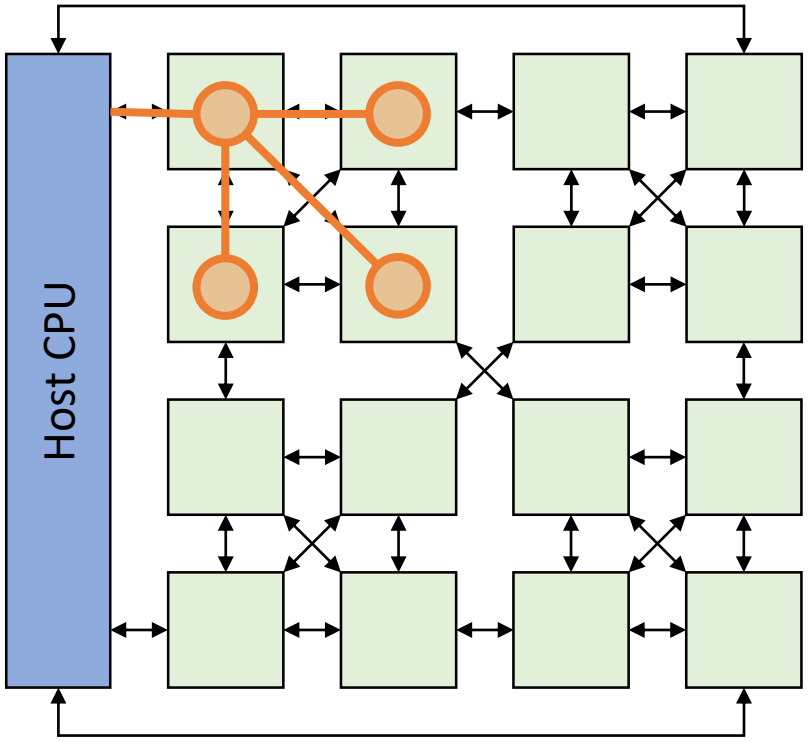

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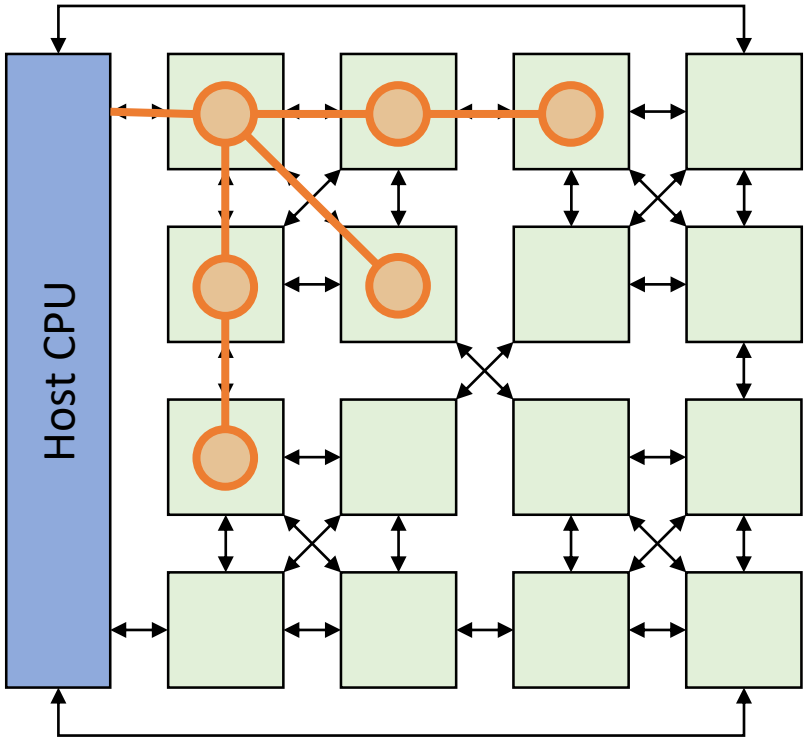
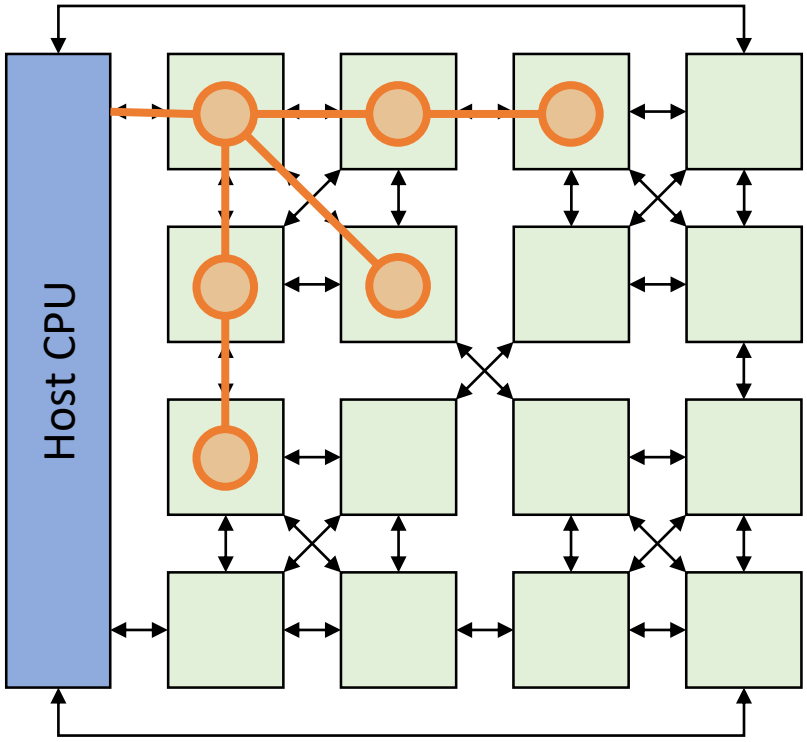


Active-Routing Three-Phase Processing

- Active-Routing Tree Construction
- Update Phase for data processing



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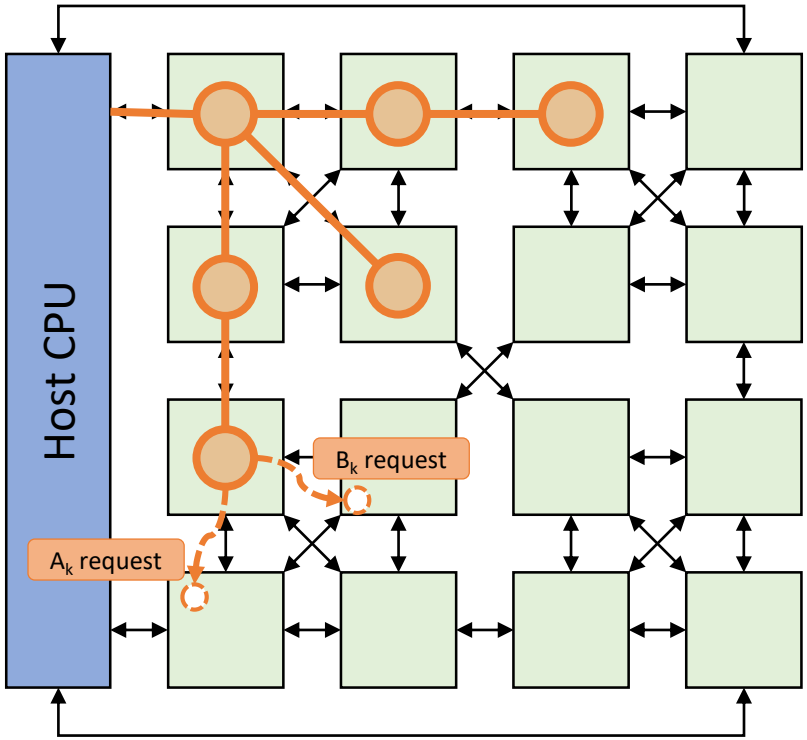

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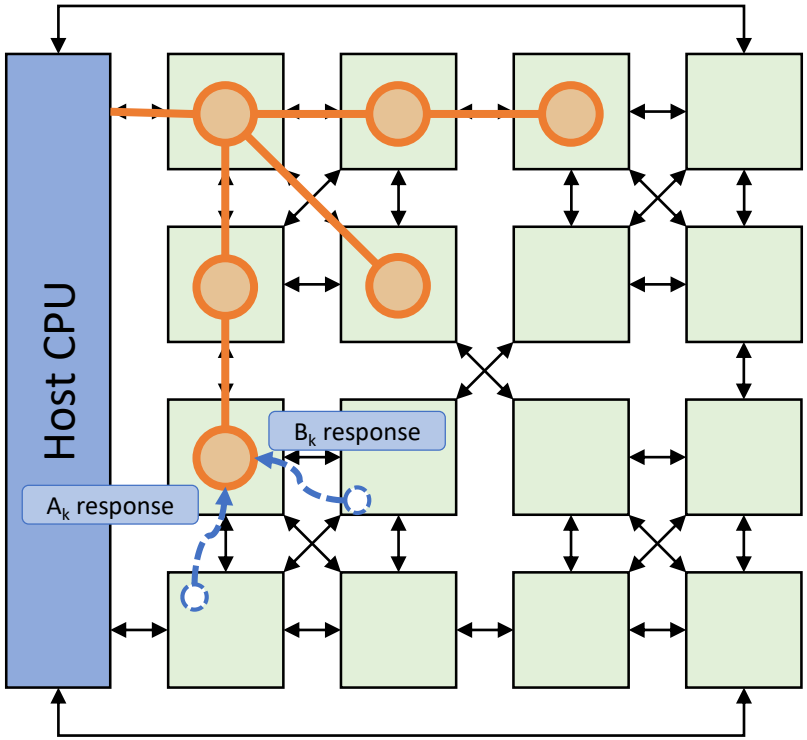

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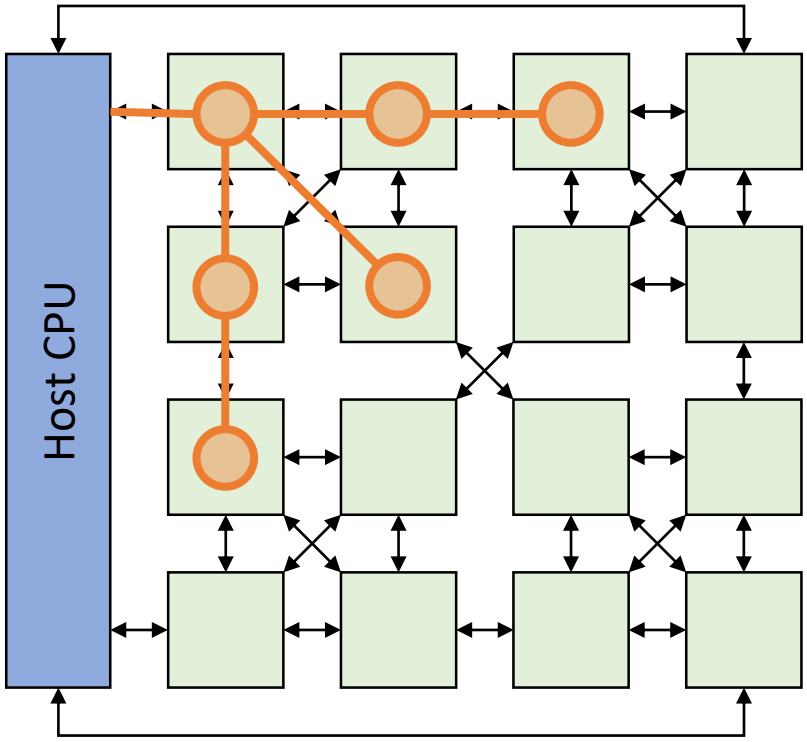
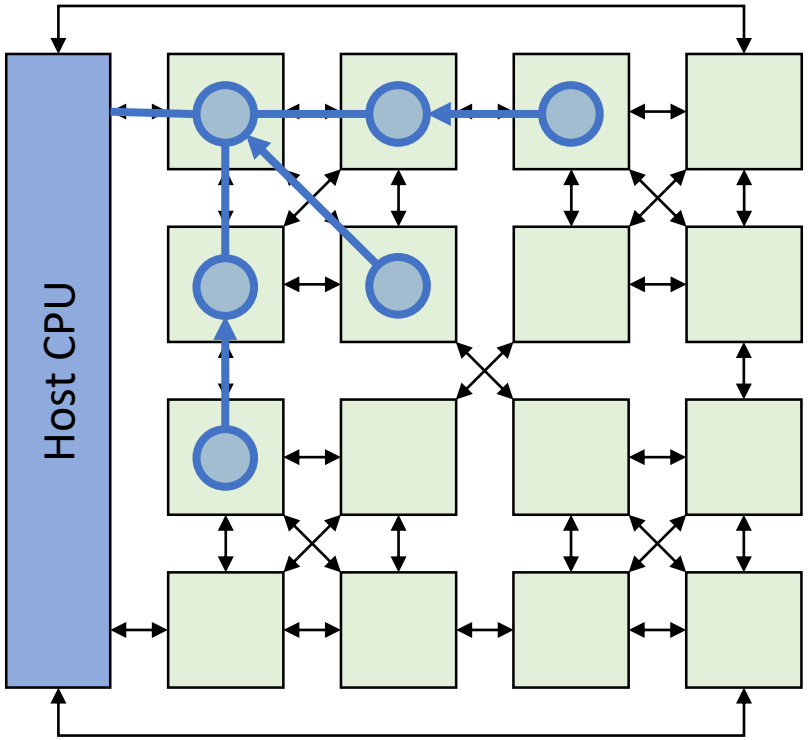


Active-Routing Three-Phase Processing

- Active-Routing Tree Construction
- Update Phase for data processing
- Gather Phase for tree reduction



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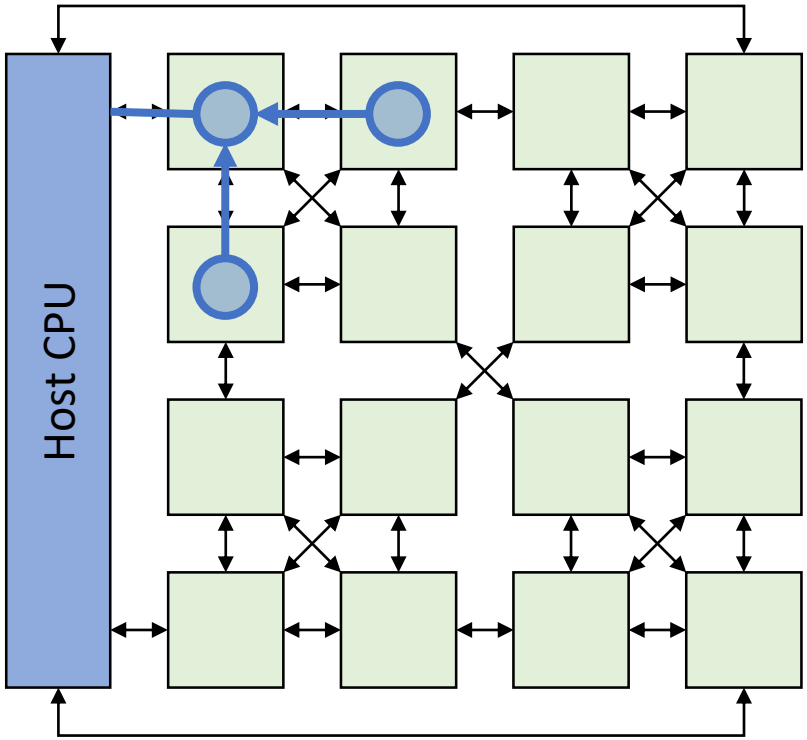

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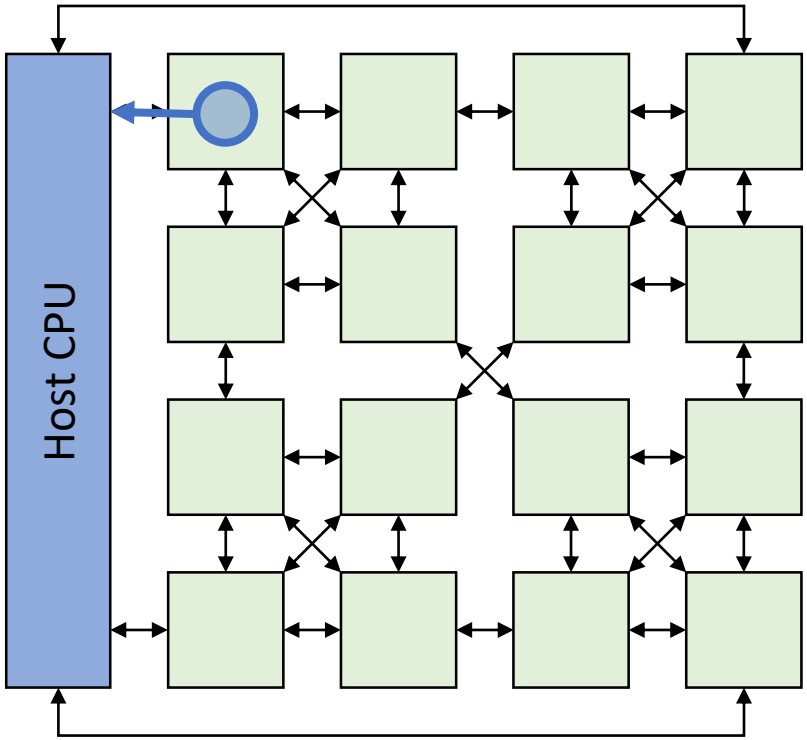

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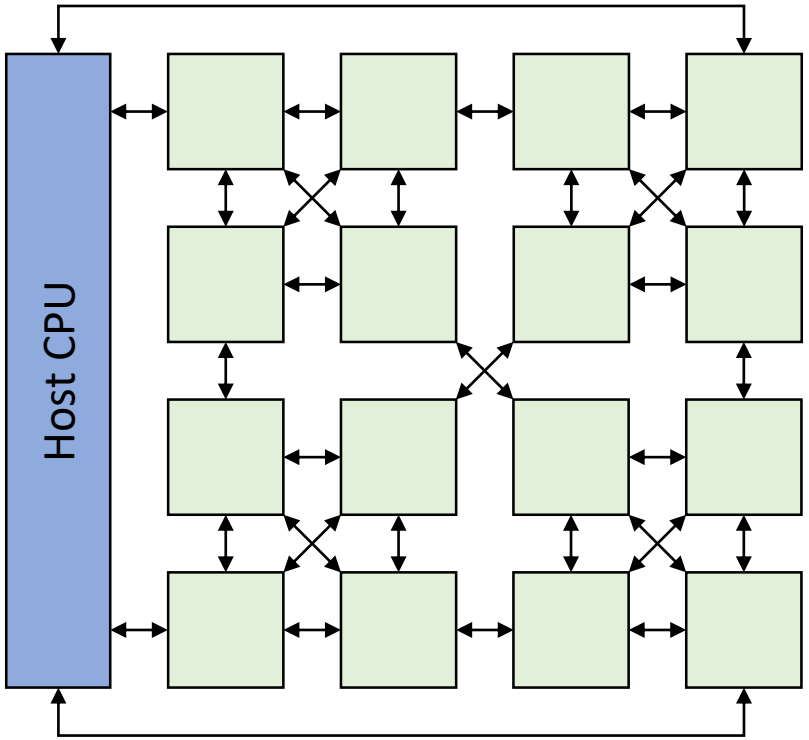

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Up to 7x speedup and improves 60% on average
reduce average energy-delay product by 80%

Wednesday, 12:10am-12:35pm, Session 9A-3