

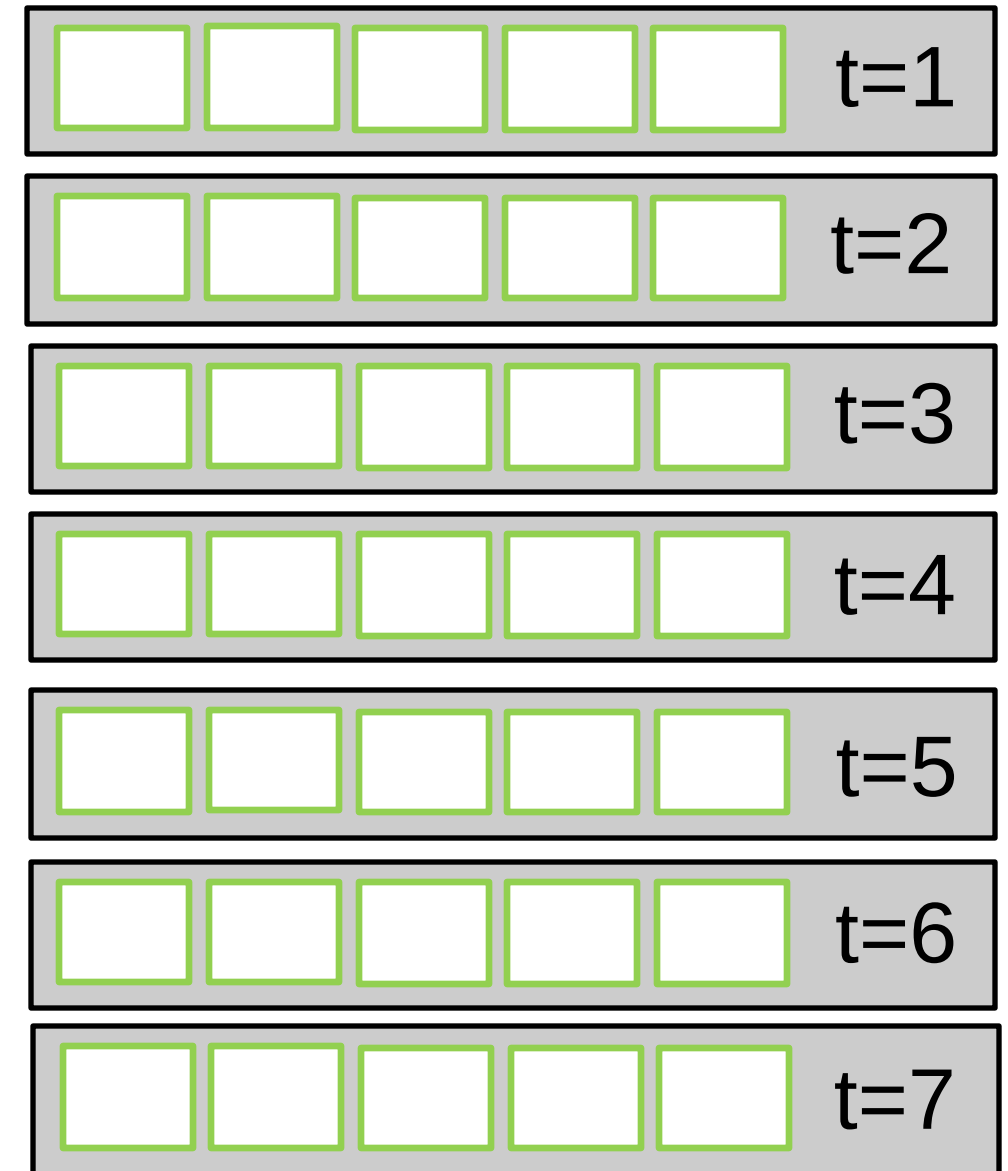
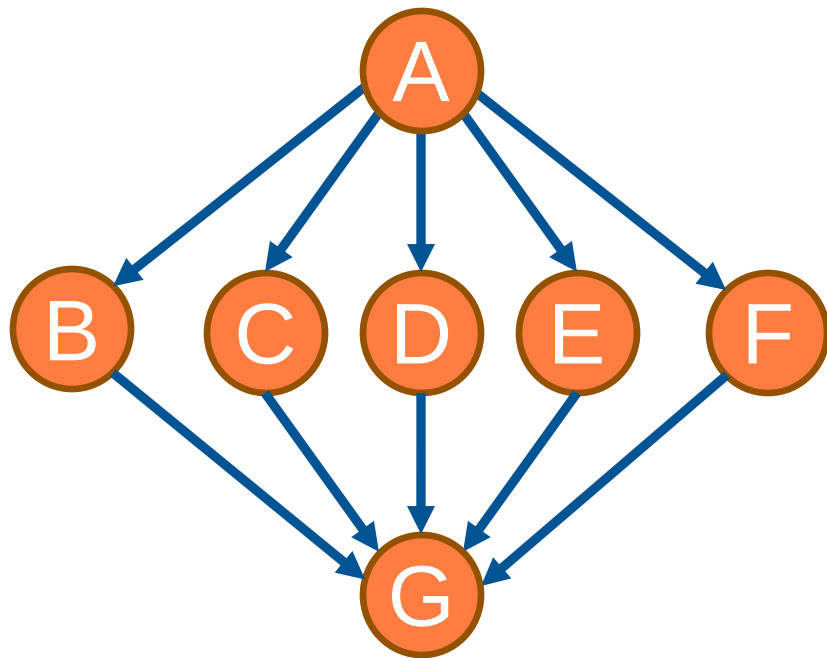
Harmony: Co-Optimizing Parallelism and Locality to Bound Performance

Jennifer Brana (CMU)

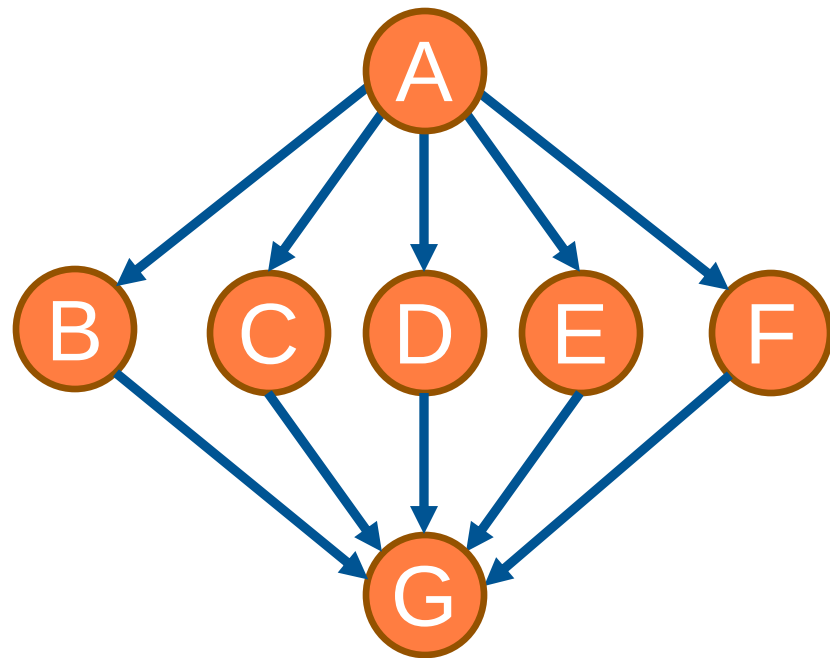
Nathan Beckmann (CMU)



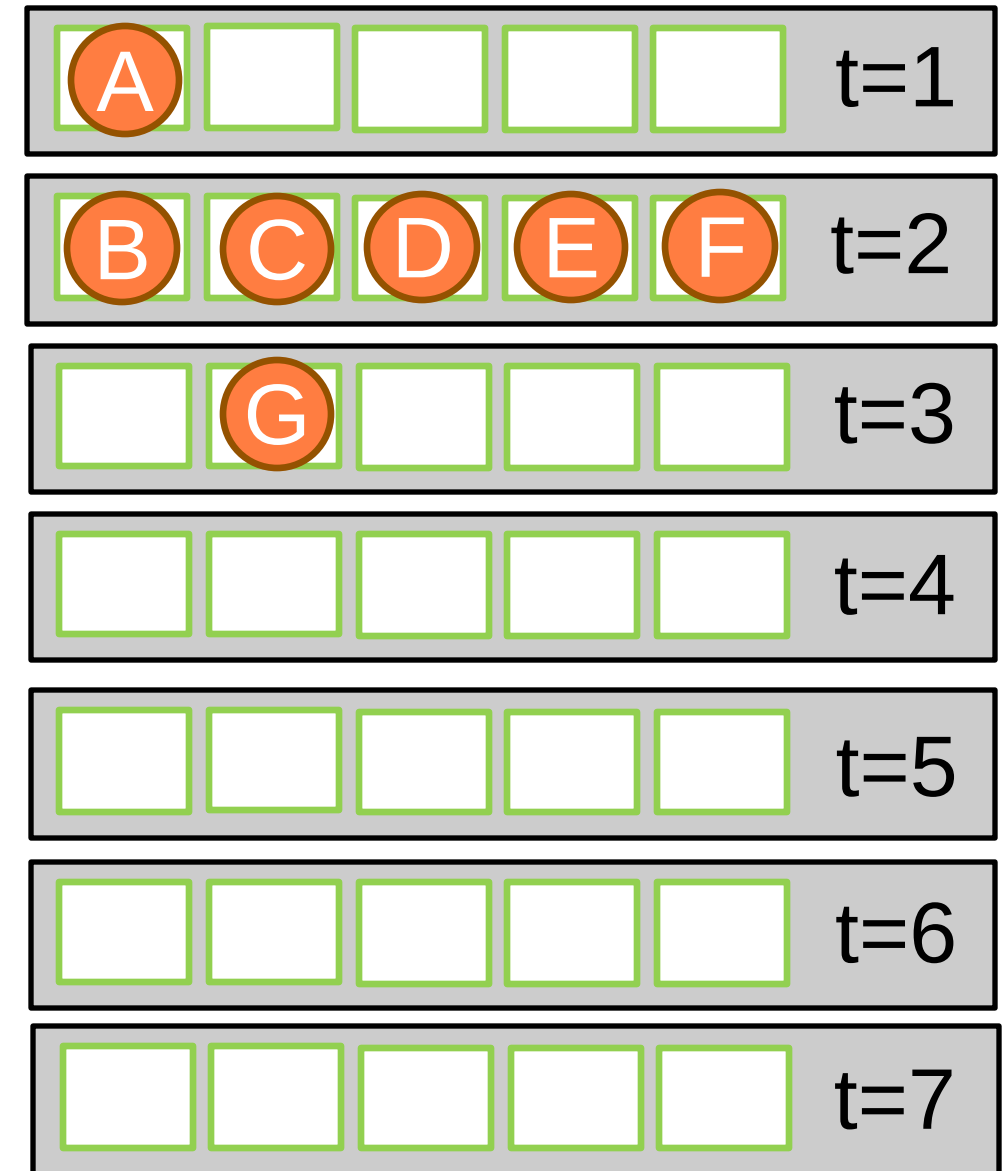
Parallelism-Locality Tradeoff for Performance



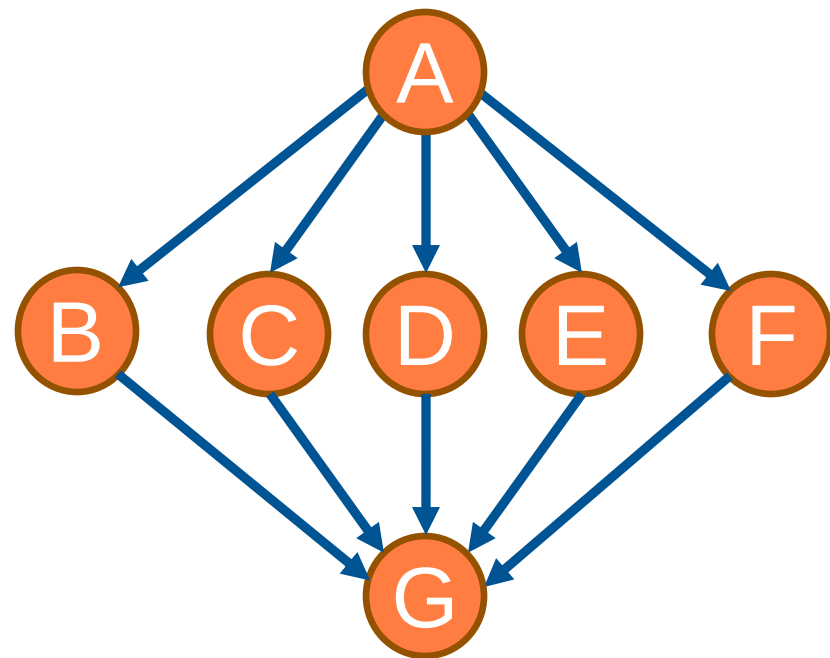
Exploiting parallelism can improve performance...



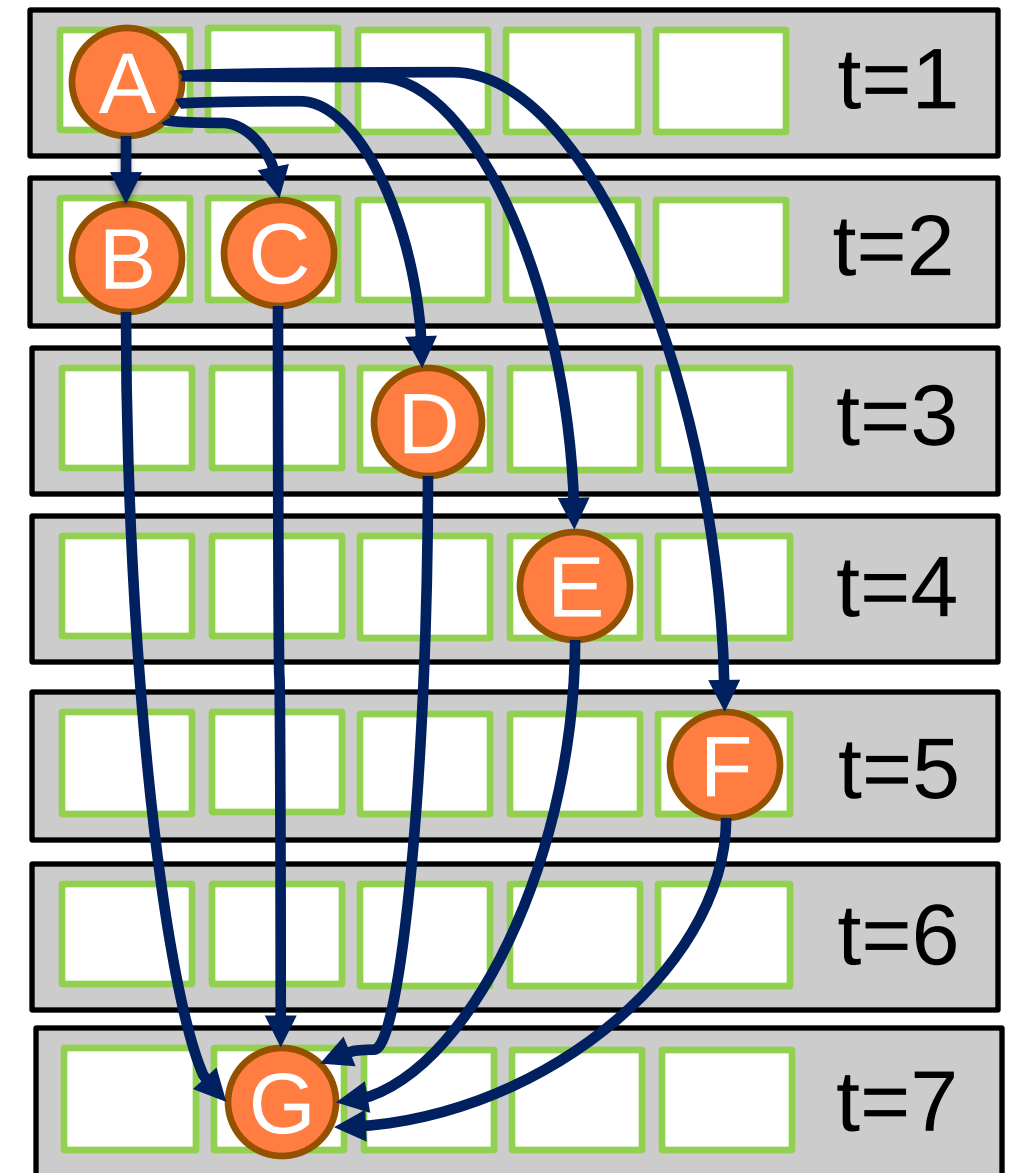
Optimizing for
parallelism



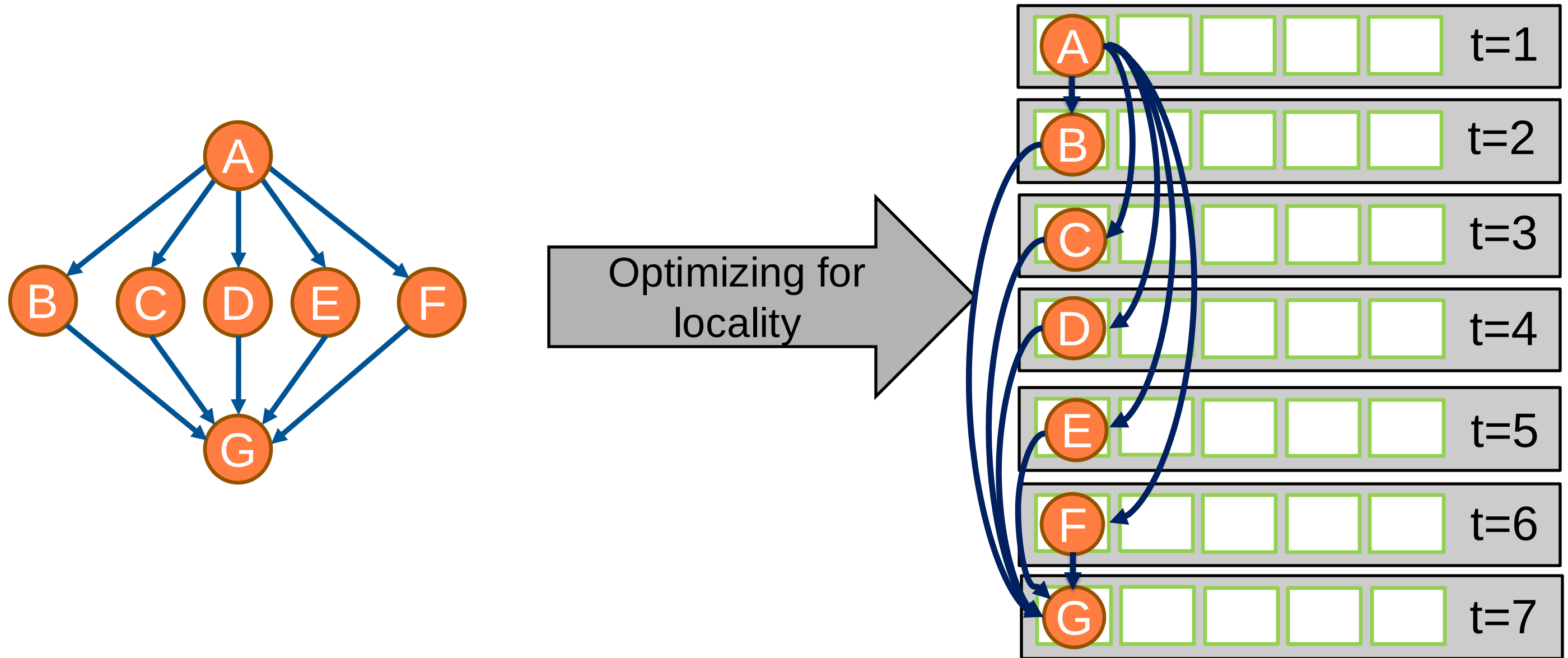
As parallelism scales, data movement dominates



Optimizing for
parallelism



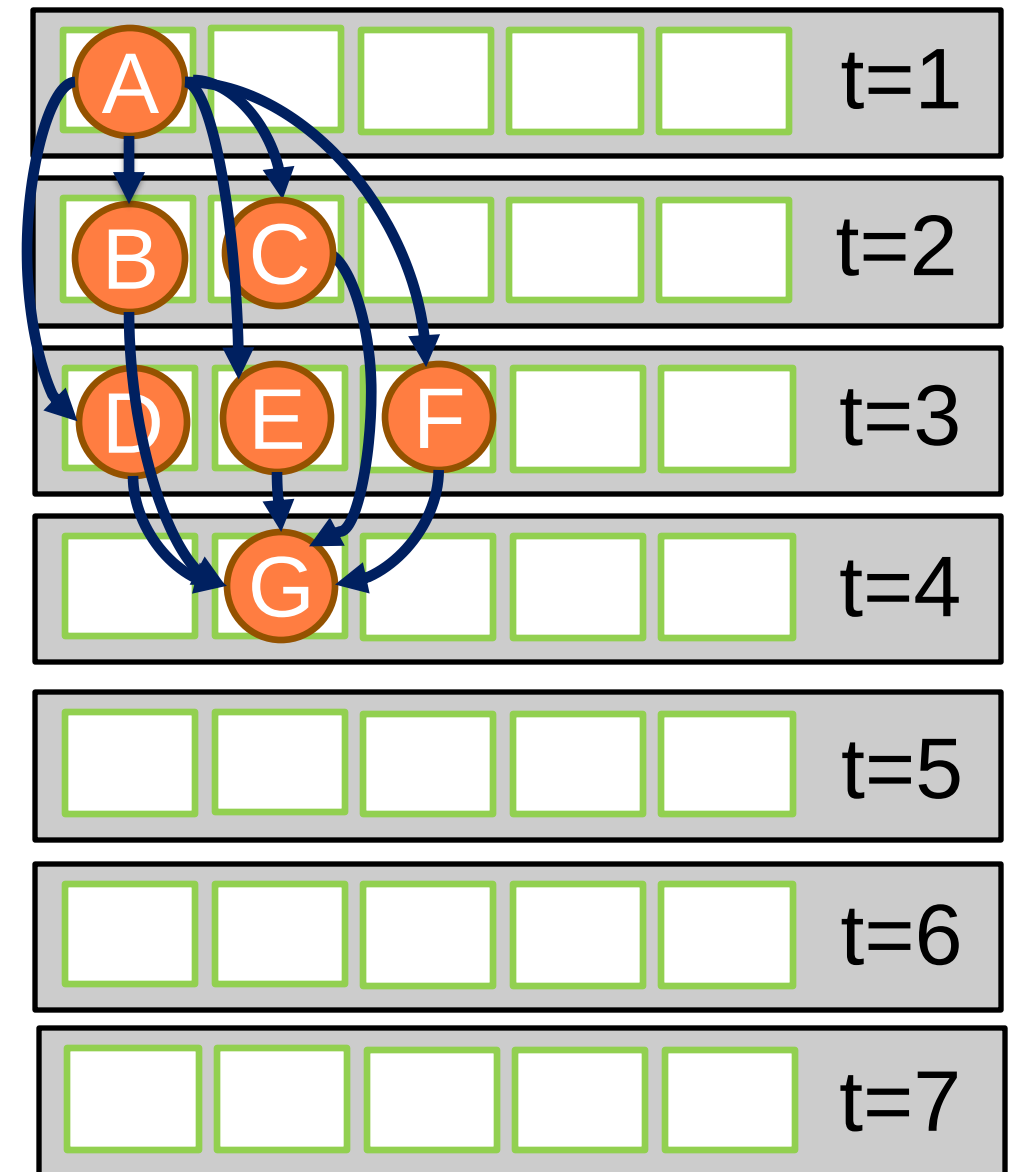
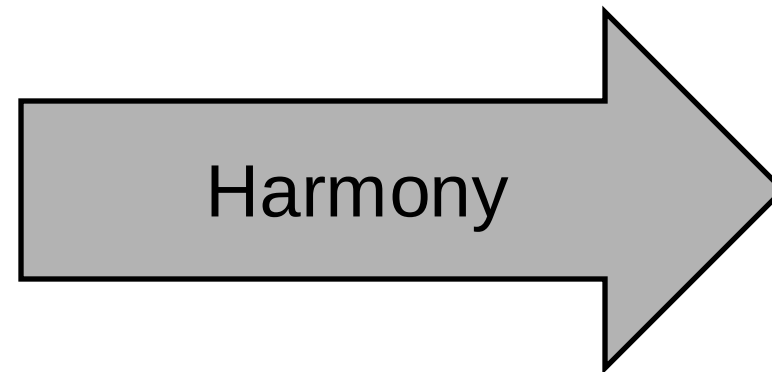
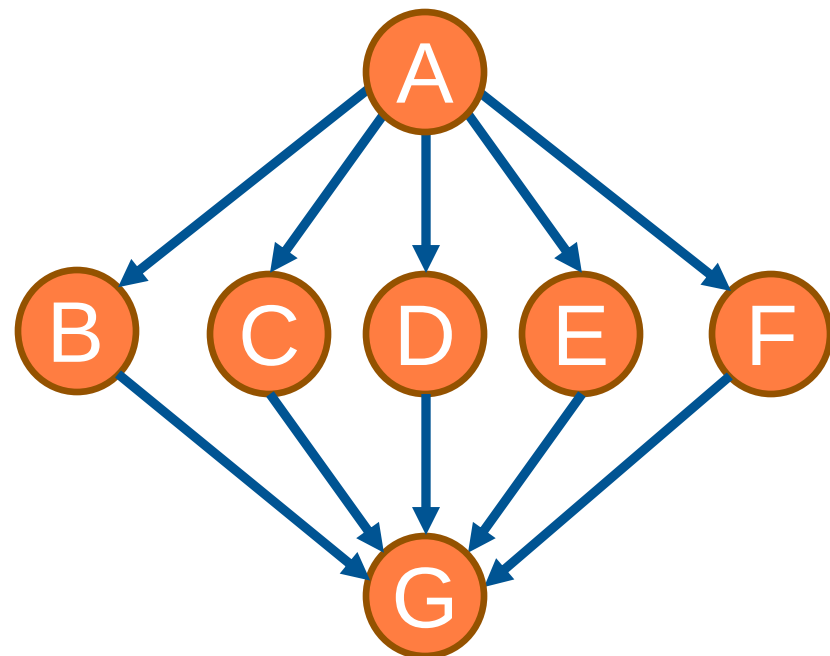
Locality limits data movement but serializes compute



To study the parallelism-locality tradeoff

- ...we propose the ***Chaos*** processor model to exploit parallelism and locality in a single framework
 - ***Chaos*** incorporate the dynamism of OoO scheduling to throttle parallelism
 - ***Chaos*** presents a spatial execution model to expose control of dataflow and instruction locality
 - Parallelism and locality in ***Chaos*** are controlled by online instruction scheduling methods
- ...we introduce ***Harmony***, a placement capable of exploiting parallelism without sacrificing locality

Harmony: Achieving the best of both worlds



Harmony: Co-Optimizing Parallelism and Locality to Bound Performance

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