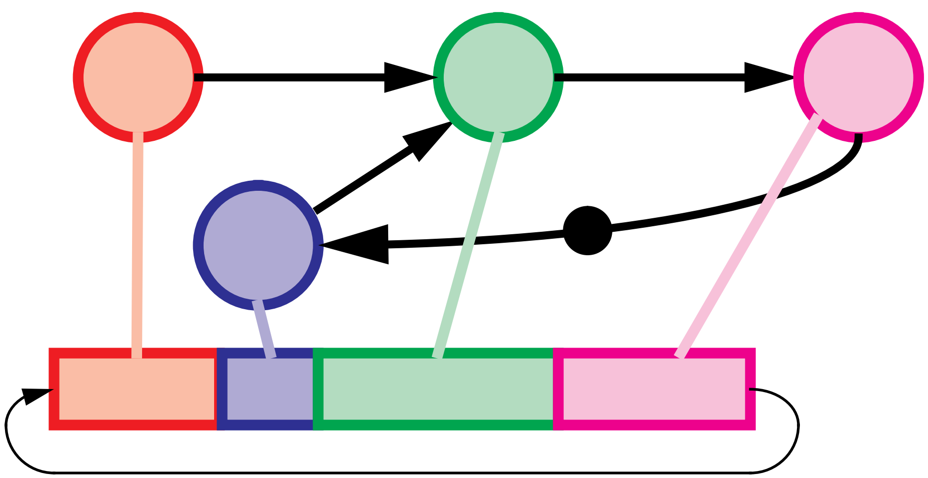
Execution Models for Dataflow Processes

- Concurrent processes at one per actor
- Static dataflow machines
- Dynamic dataflow machines
- Demand- or data driven interpreters
- Compiled single process
- Compiled concurrent processes

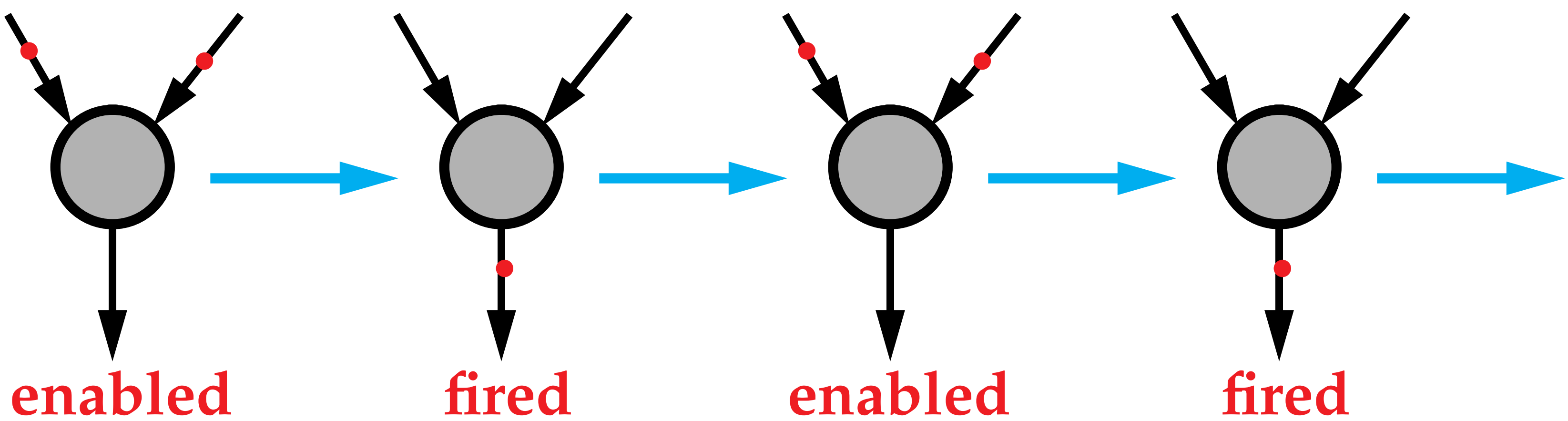
The last two are most useful for real-time signal processing.



Dataflow and Kahn Process Networks

Dataflow:

- A *signal* is a sequence of *tokens*.
- An *actor* maps input tokens onto output tokens.
- A set of *firing rules* specify when an actor can fire.
- A firing *consumes* input tokens and *produces* output tokens.
- A sequence of firings is a *dataflow process*.

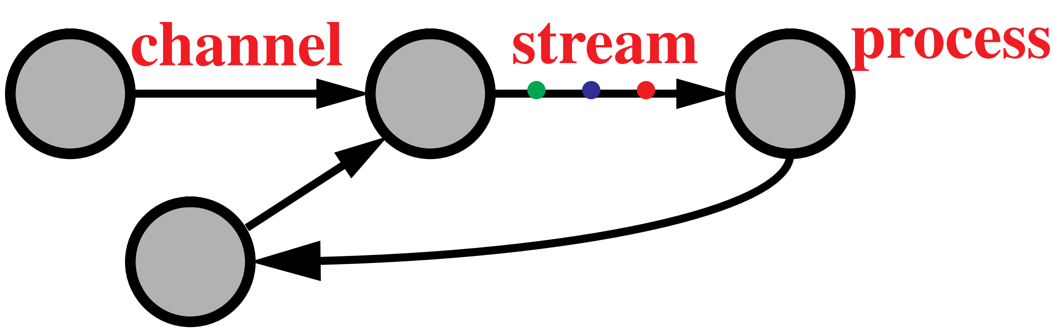


Kahn Process Networks — The Unifying Model

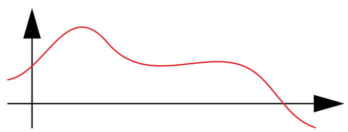
Network of:

- concurrent sequential processes
- that communicate through one-way FIFO channels ,
- where channels have unbounded capacity
- and one producer and one consumer,
- writes to the channels are non-blocking, and
- reads from channels are blocking.

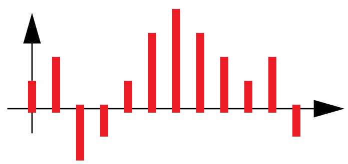
A process in the Kahn model is a mapping from one or more input sequences to one or more output sequences.



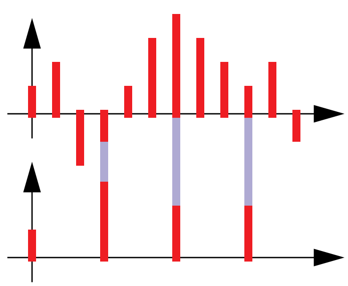
A Taxonomy of Discrete-Event Systems



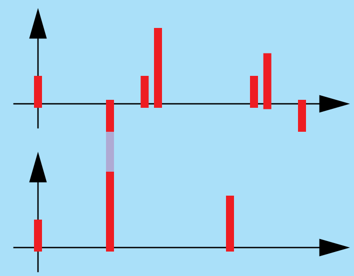
continuous time



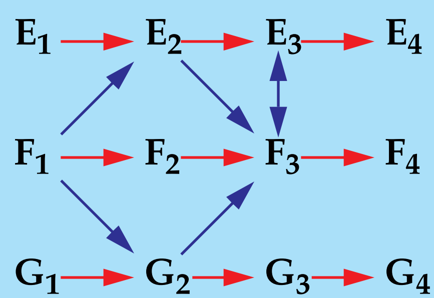
discrete time



multirate discrete time

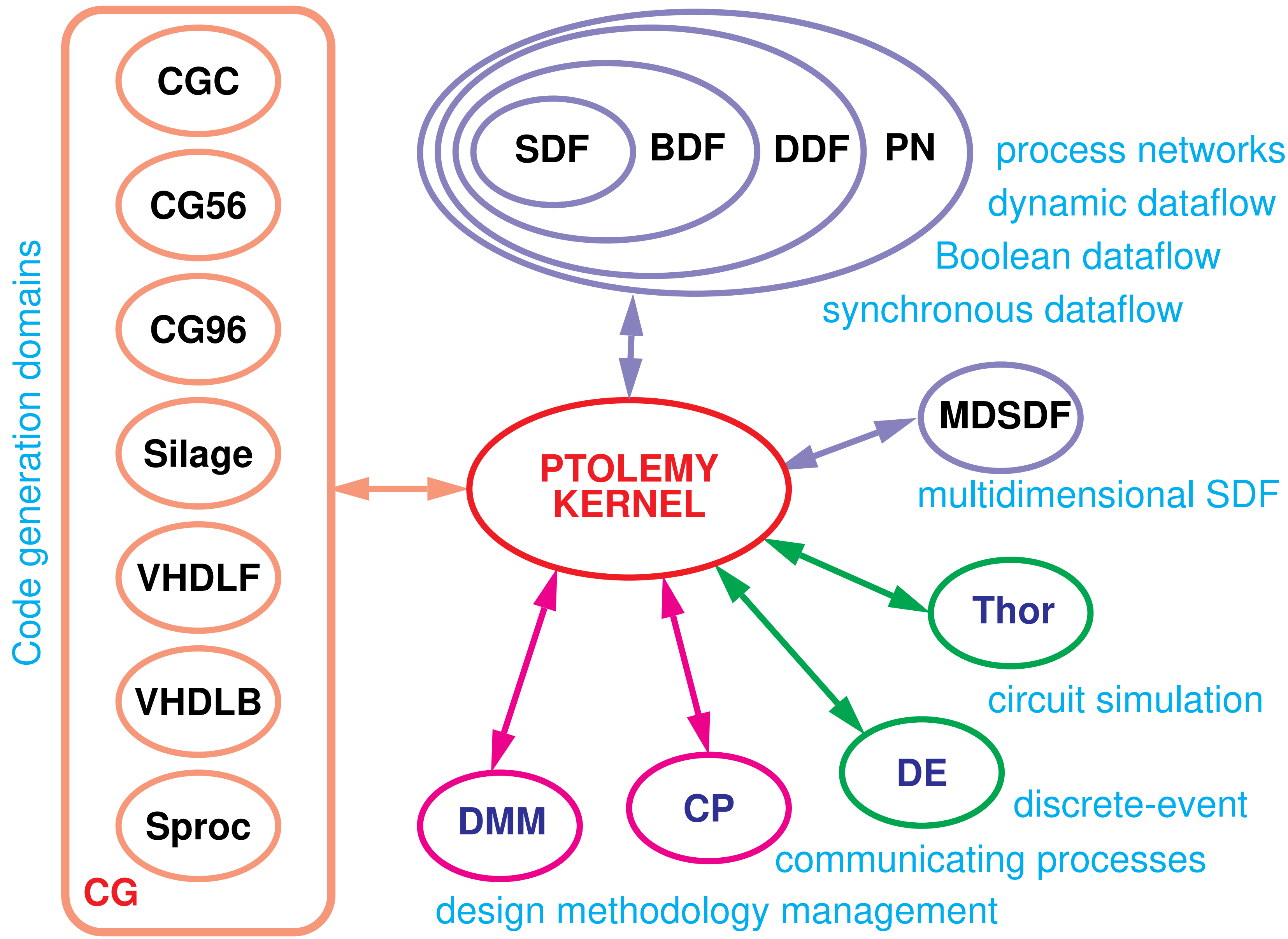


totally-ordered discrete events



partially-ordered discrete events

Domains in Ptolemy



Dataflow Models of Computation

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