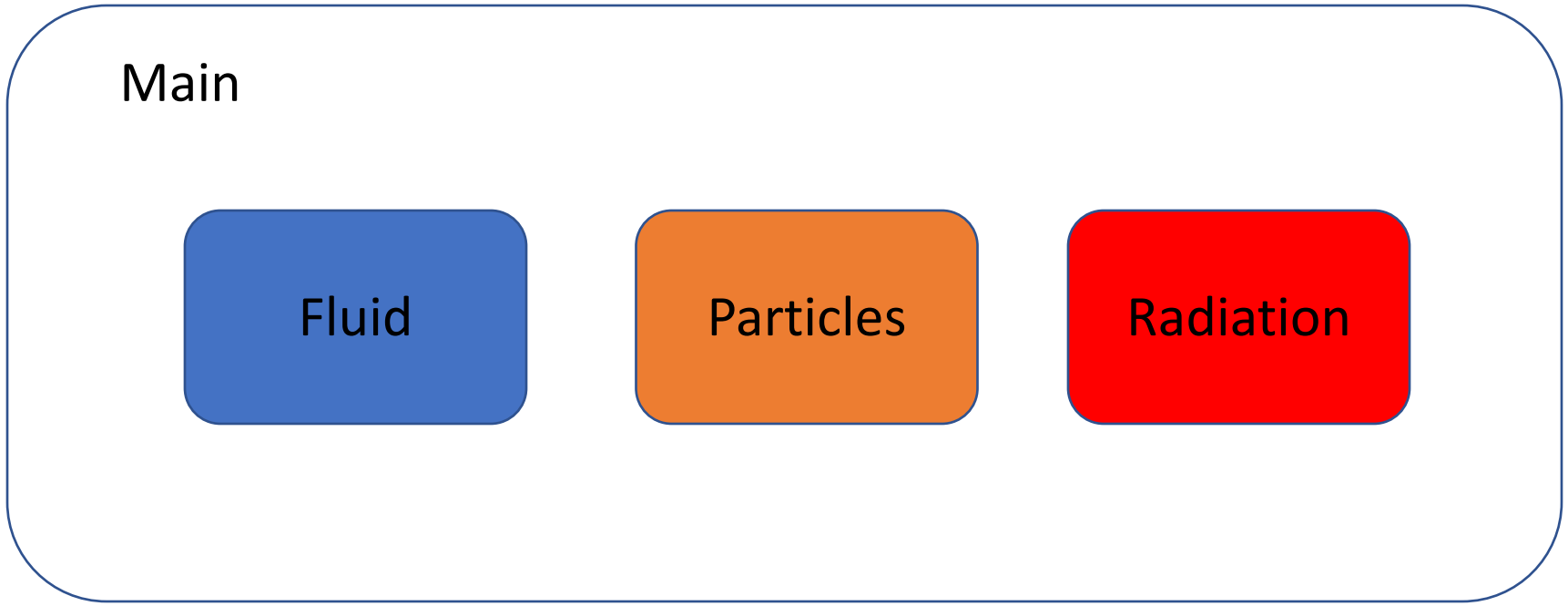
PAW Panel

Alex Aiken

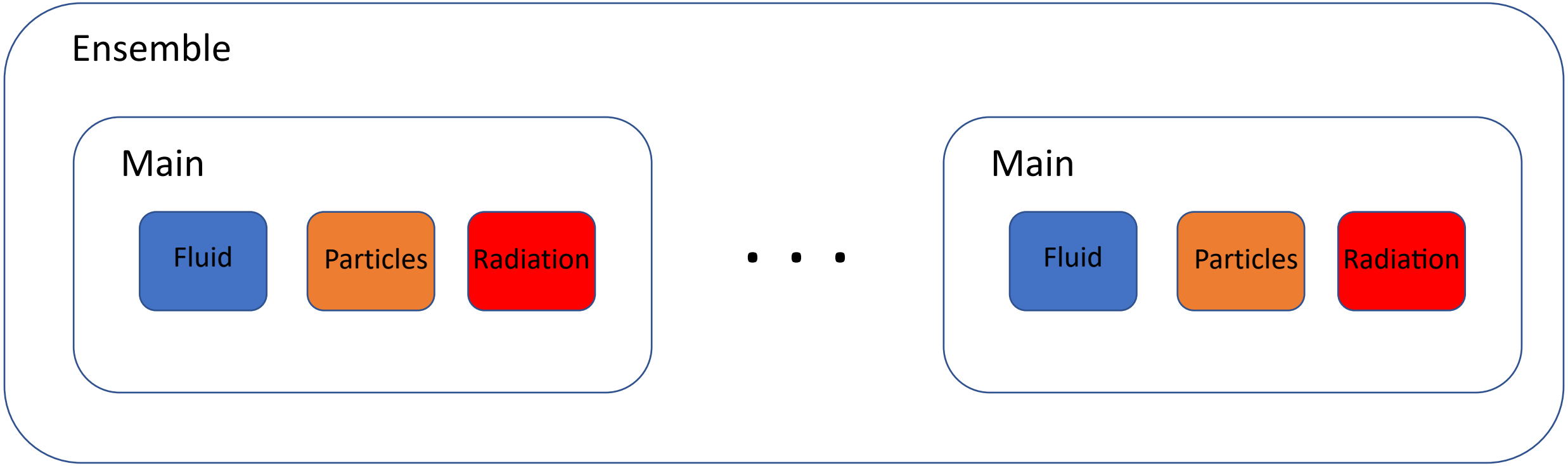
Focus

- Legion
- Task-based programming model
- What ideas have been key?
  - Compositionality
  - Partitioning & Mapping
  - Control Replication
  - And their combination …

A Tale of Simulation …

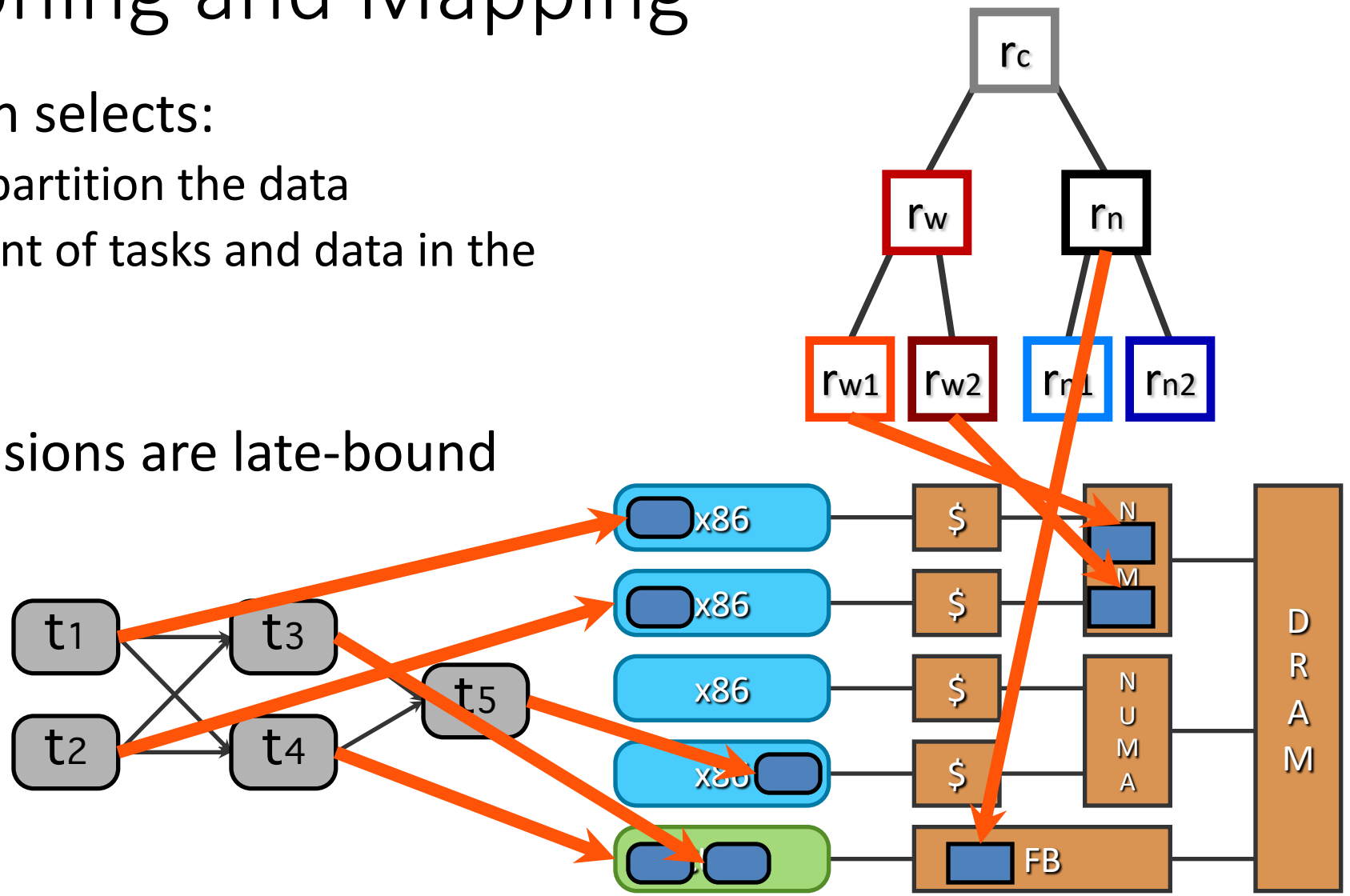


A Tale of Simulation …



Partitioning and Mapping

- Application selects:
  - How to partition the data
  - Placement of tasks and data in the machine
- These decisions are late-bound



Control Replication

- Sequential semantics
  - Very important for users!
- Implies a potential sequential bottleneck
  - Logically a single thread of control
  - Parallelism discovered dynamically
- Control replication distributes that control thread

Applications

Key: Composition, Mapping & Partitioning, Control Replication

- Soleil-X C, M&P, CR
- S3D (7X vs MPI-Fortran) C, M&P, CR
- Graph analytics (10X vs other distributed implementations) M&P
- GNNs (> 10X) M&P
- CANDLE (15X vs TensorFlow) M&P,CR
- Legate (10-100X vs Numpy-DASK) C,M&P,CR