



BETWEEN HPC AND ENTERPRISE

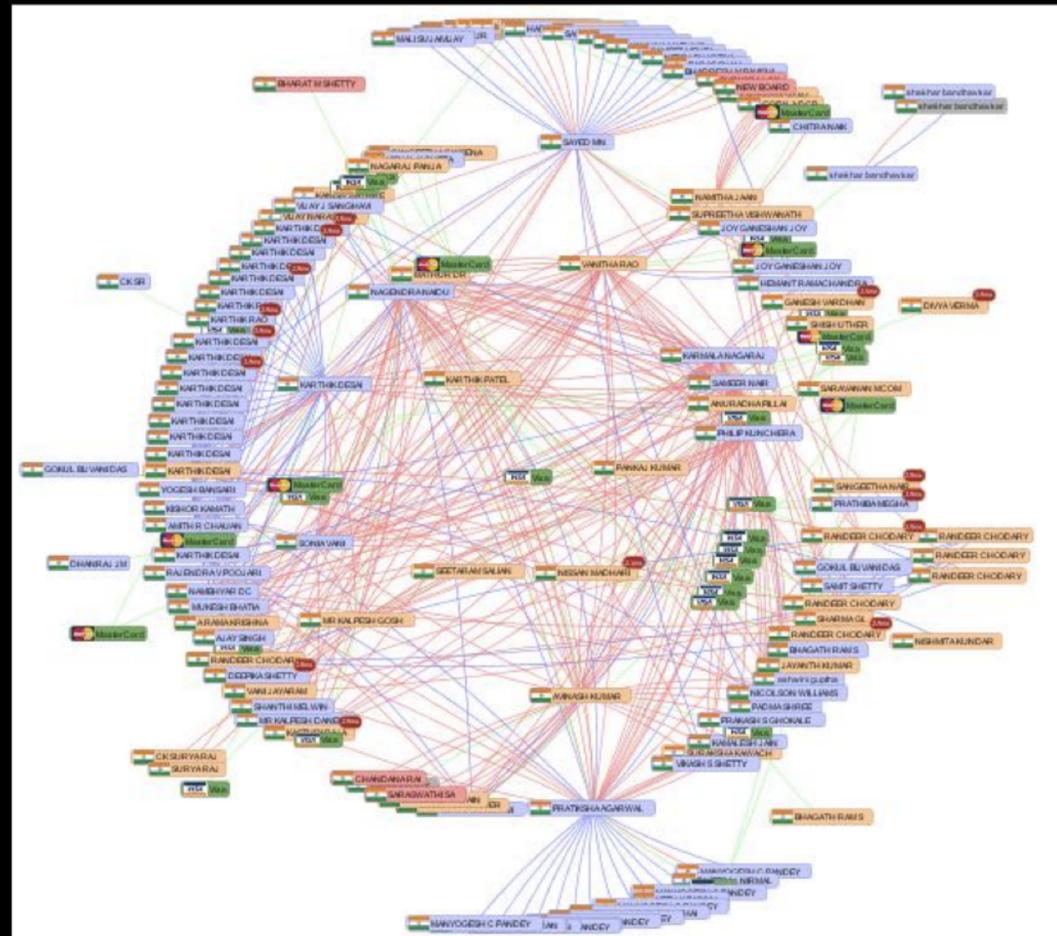
# NEW PARADIGMS FOR SYSTEMS ARCHITECTURE AND DESIGN

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PRINCIPAL ARCHITECT



WHY SUPERCOMPUTING?

It's not just the problems that are hard.

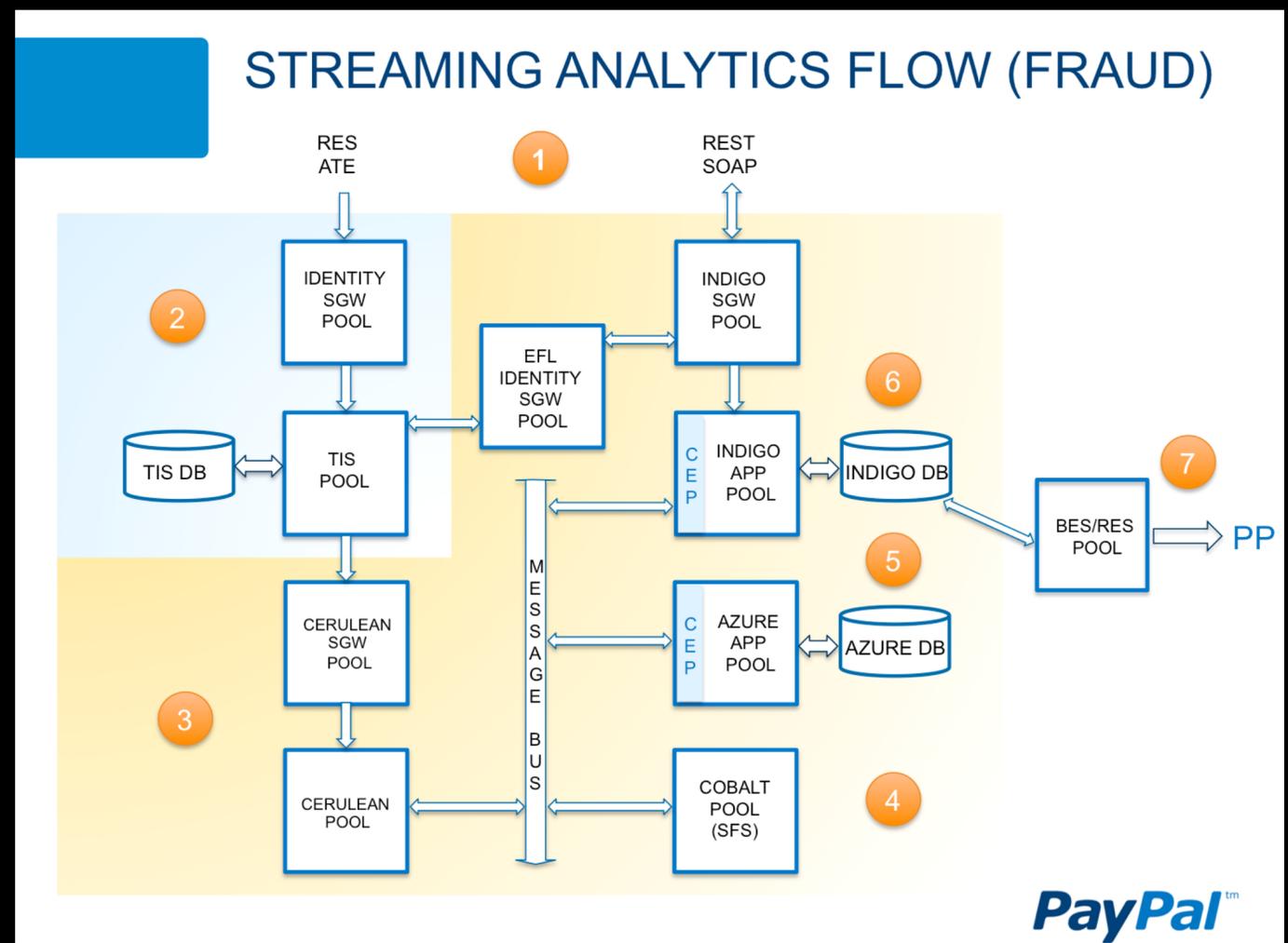


financial asset network (2008)

- 2008
  - 580M nodes, 696M edges
  - 3 dimensions
  - **3 levels, max 1k nodes/query@250ms**
- 2012
  - 4.3B nodes, 12.5B edges
  - 9 dimensions
  - **3 levels, max 1k nodes/query@250ms**
- 2013
  - 6B nodes, 41B edges
  - 13 dimensions
  - **3 levels, max 1k nodes/query@250ms**

It's not just the problems that are hard. **The solutions can be even harder.**

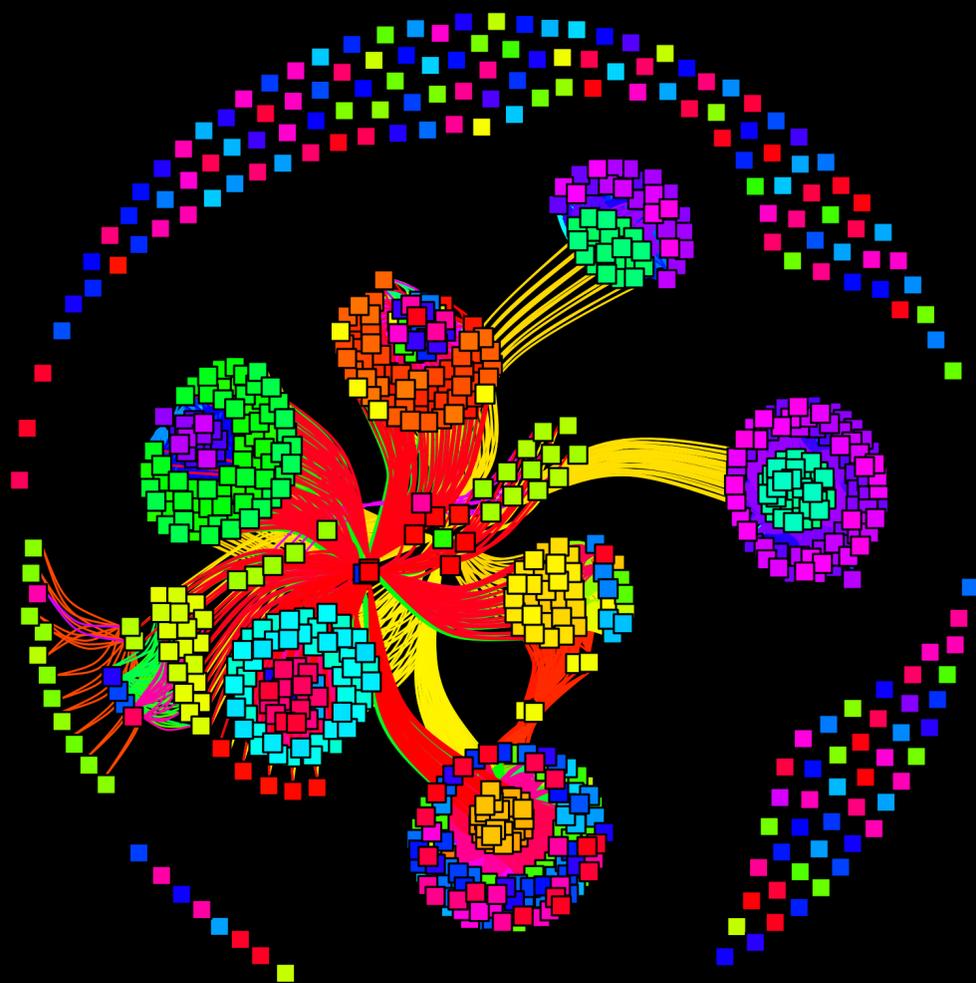
- 2011
  - 1B metric values
  - 147 metrics/event
  - **Messages/sec @ Size**
- 2012
  - 4B metric values
  - 350 metrics/event
  - **Messages/sec @ Size**
- 2013
  - 9B metric values
  - 508 metrics/event
  - **Messages/sec @ Size**



*real-enough* time metrics & scoring (2011)

- 2011
  - DDR IB for application transport
  - 96 logical/24 physical DB shards
  - Leaf+Spine IB and local storage
  - Scale-out clustering (app/db)
- 2012
  - +QDR application transport
  - +QDR database transport
  - +24 physical shards
- 2013
  - +FDR/QDR analytics
  - +hypercube IB storage

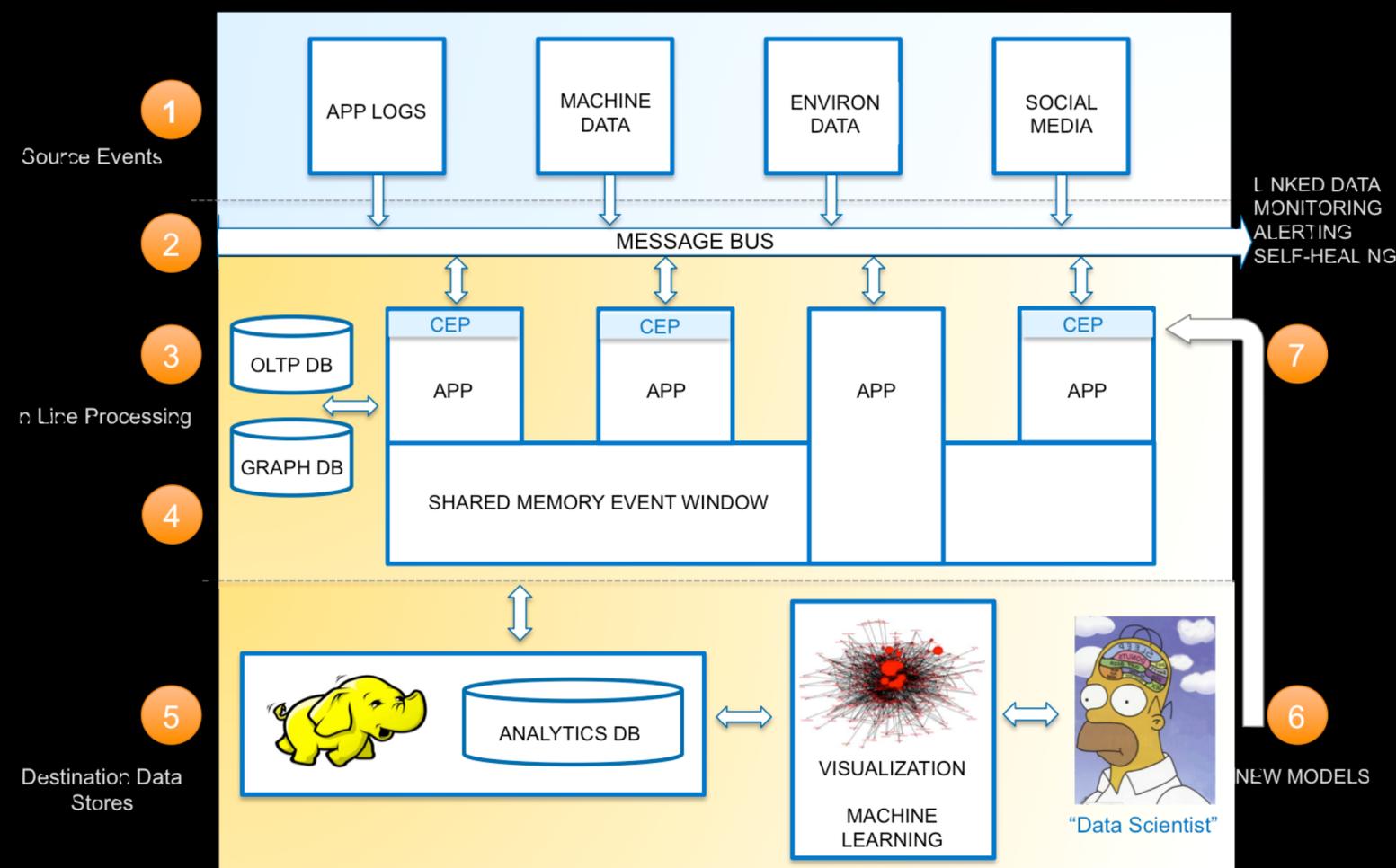
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app logs network (2013)

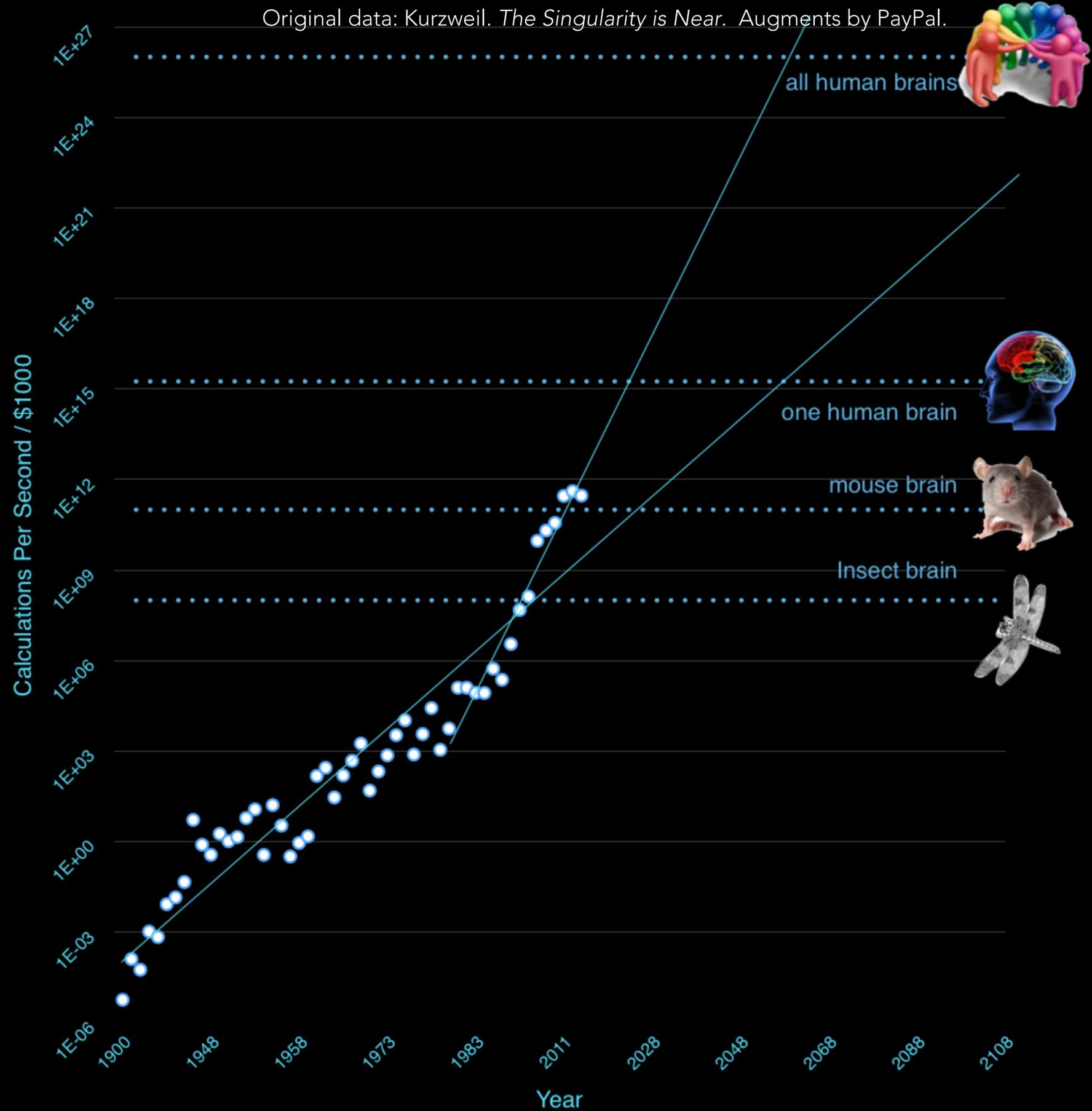
- 3M msgs/sec
- 56,000+ dimensions (for only one dataset)
- real-time analytics and modeling

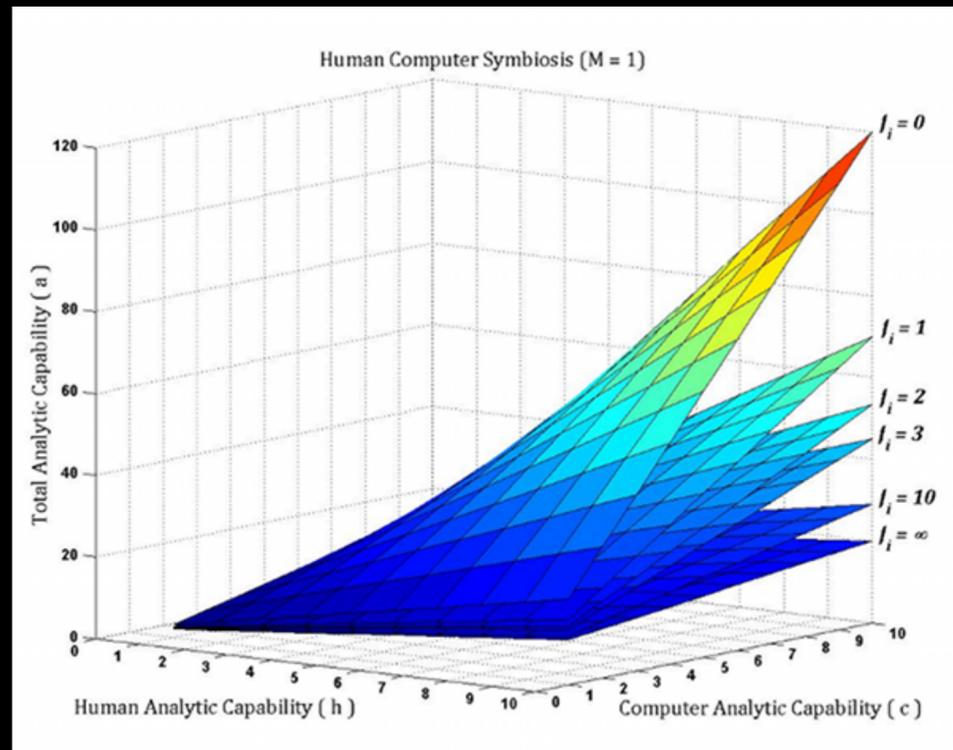
## SI – SYSTEM FLOW



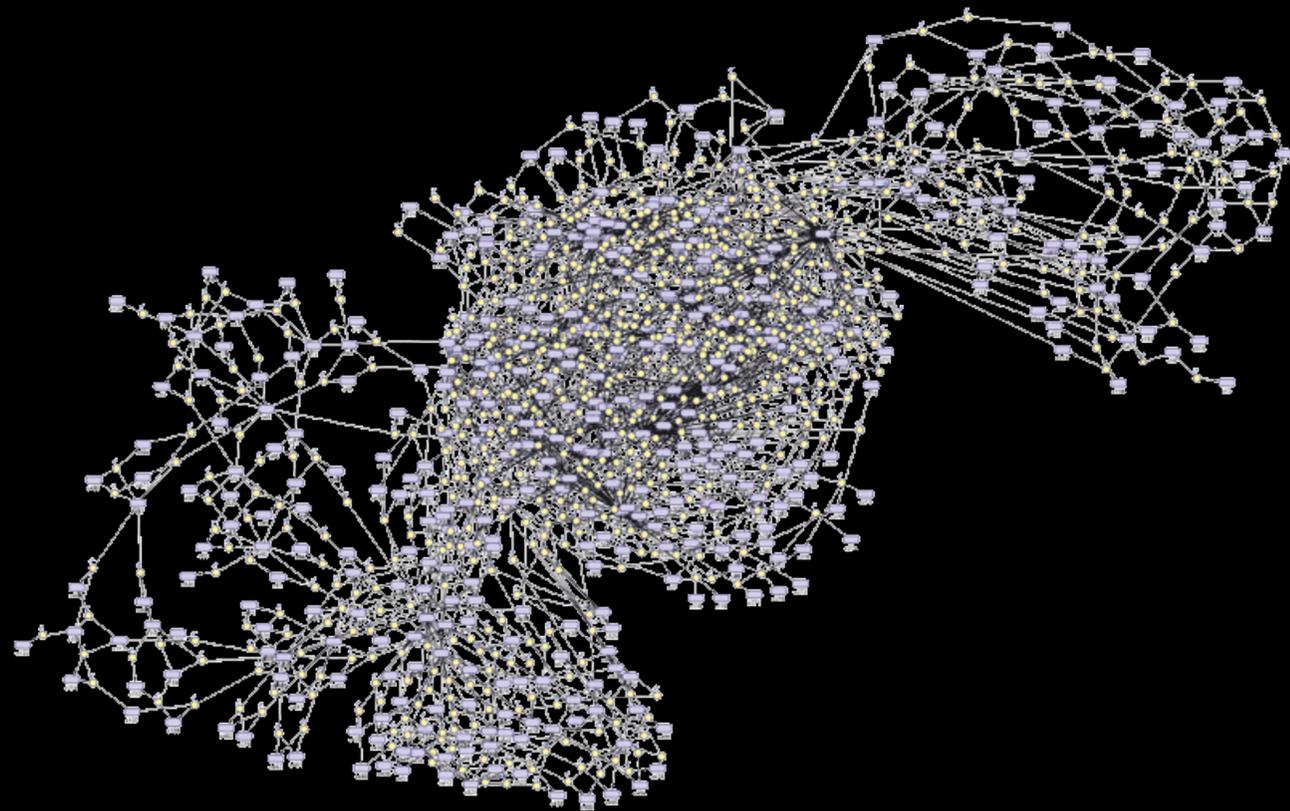
- FDR/QDR IB (transport, storage)
- Coherent shared memory
- Clustered filesystem w/ tiered storage topologies (SATA, SAS, SSD)
- RDMA-enabled apps and databases

Computational power for the individual, enterprise, society increases at (double) exponential rates.





Friction between human analytic capacities and comprehension capabilities result in inefficient design, lost opportunity, reduced system efficacy, and higher costs.



We must comprehend, model, and design for human capabilities in the system. This requires new paradigms from our shared experience and expertise.

Blending HPC insights and enterprise resiliency and manageability can deliver unprecedented paradigms for systems design, scalability, performance, and efficiency.

LET'S START TALKING...



ecology-modeled command+control (2014+)