



Innovation Matters

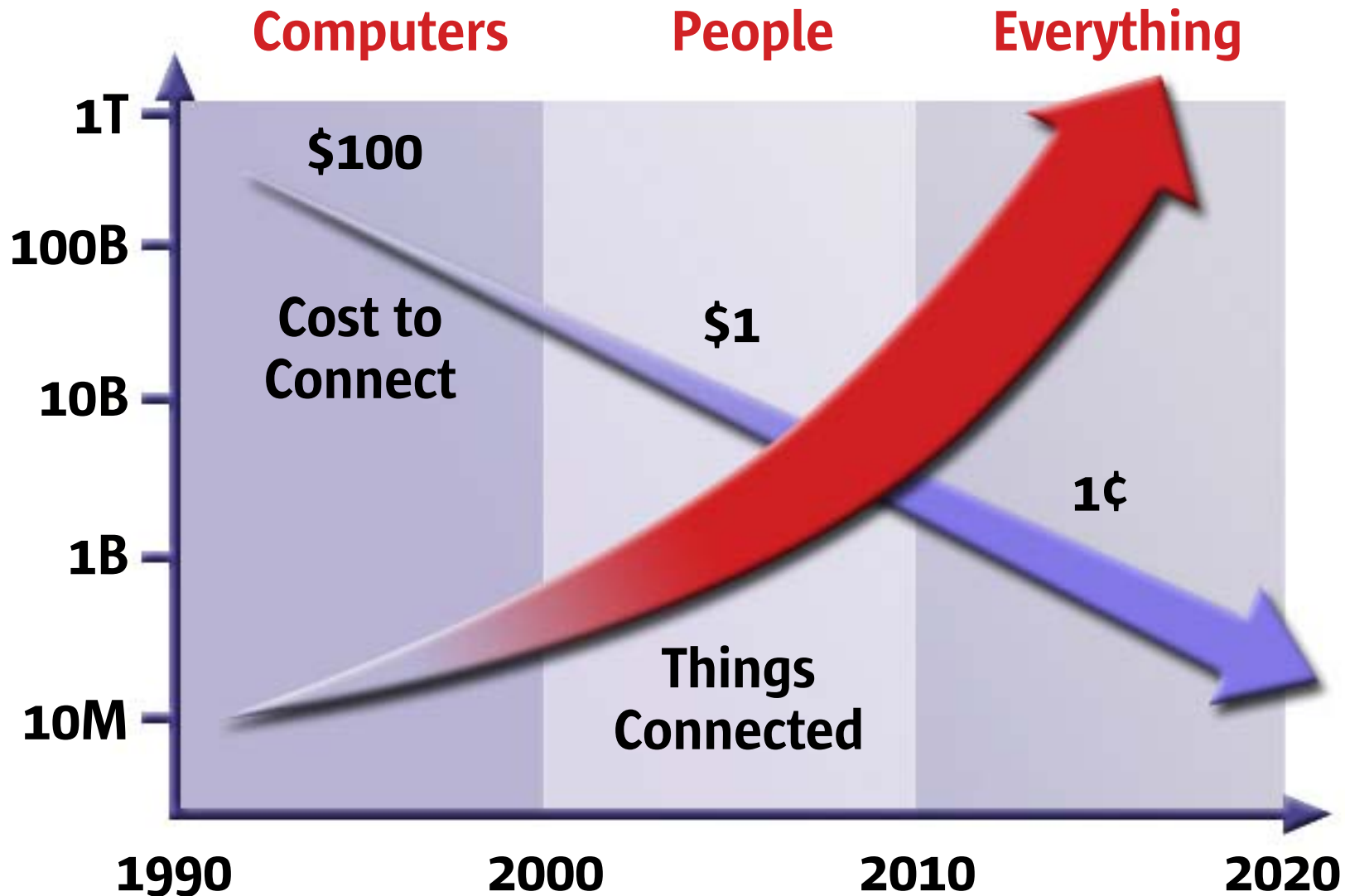
Greg Papadopoulos
EVP and CTO
Sun Microsystems, Inc.



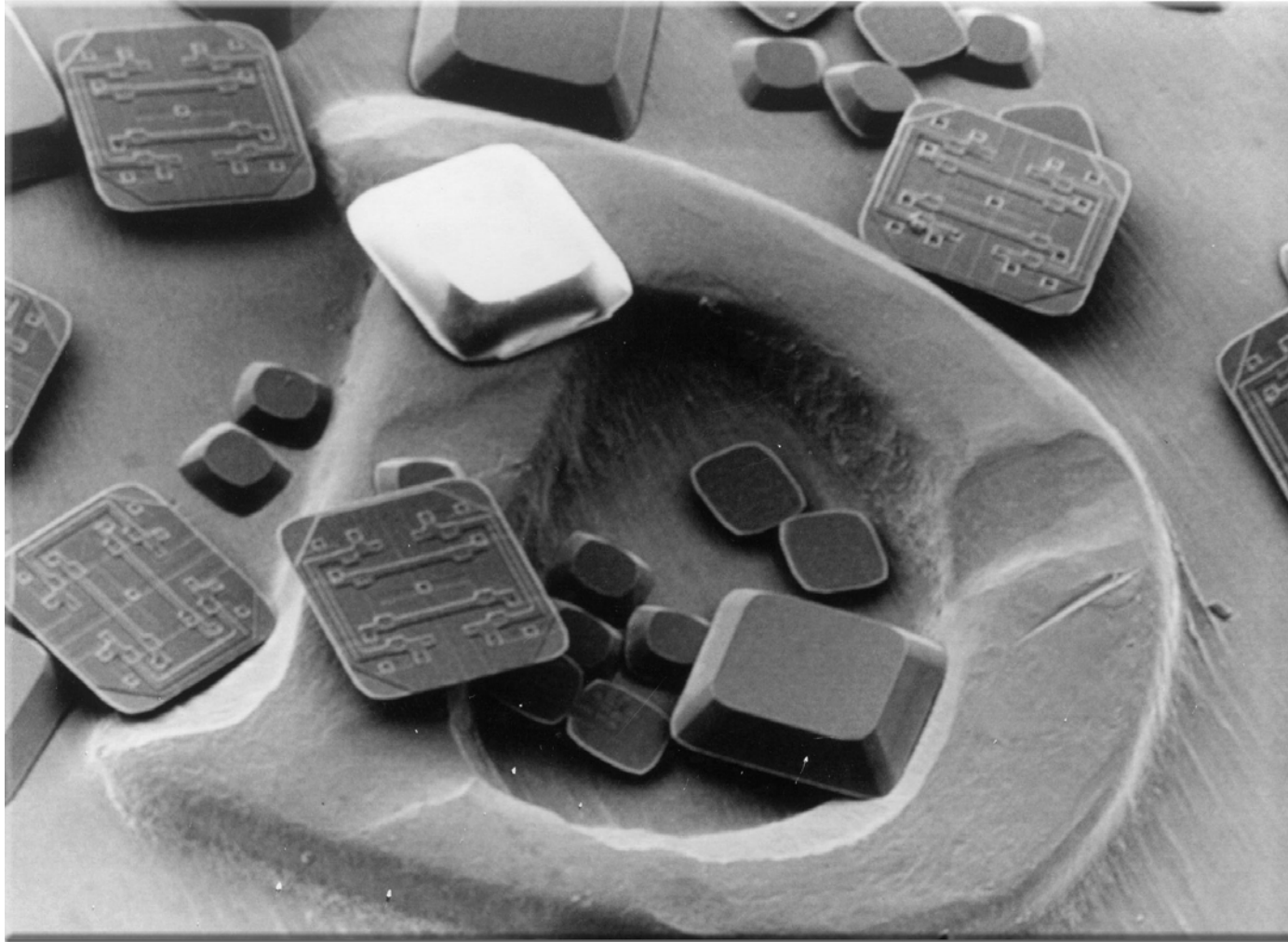
Takeaways

- Business demands fuel IT demand
 - Still in the first phases of network computing
- Decision point
 - Mask complexity through people or eliminate through engineering
- Innovation matters

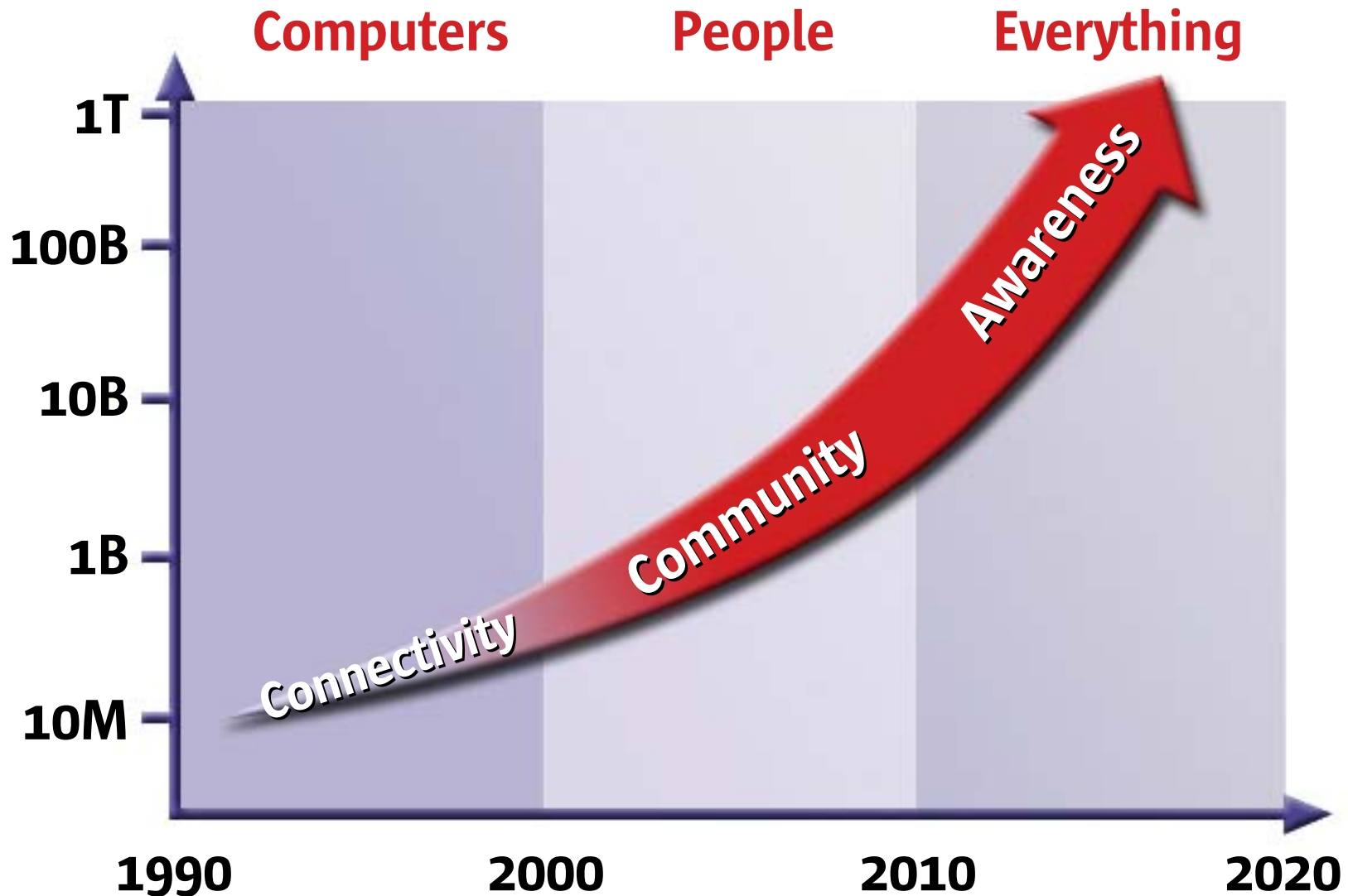
The Revolution



RFID



The Revolution



Bottom Line

- Still in the first phases of networking
 - Expect the number of networked things to grow by another factor of 1M
 - New value from automating still-manual processes
- Expect radical transformation of SW and systems
 - Systems, in particular, are at a watershed
 - Mask complexity through people or eliminate through engineering

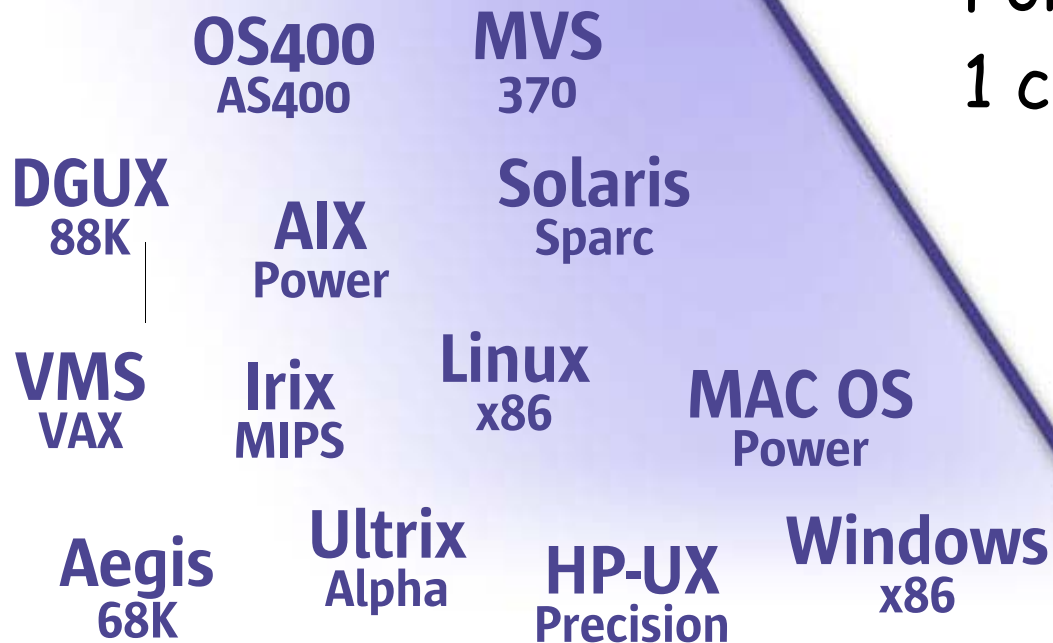
The New Software

Shrink-Wrap

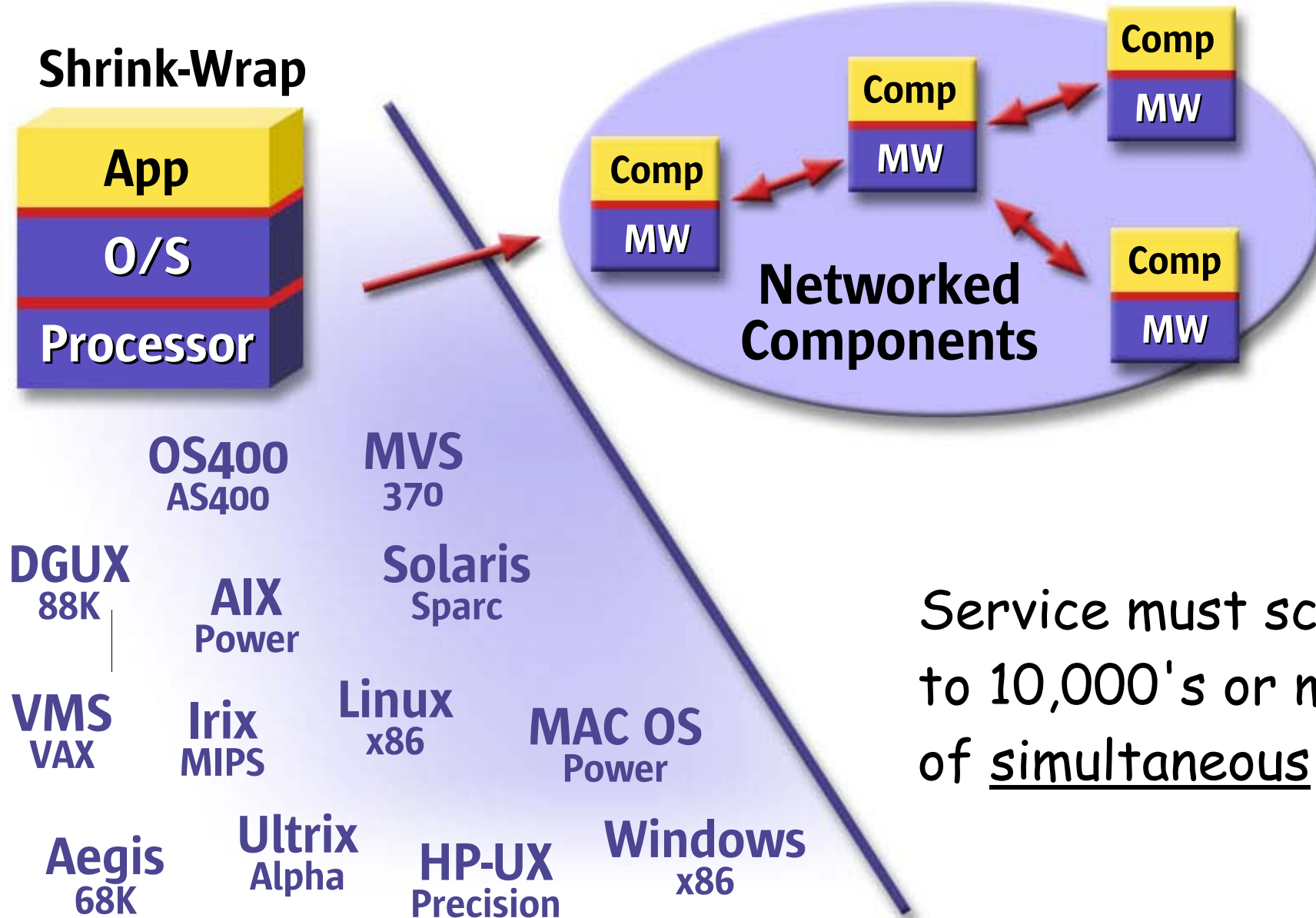


Application scales from 1
to perhaps 100's of users

For Desktop:
1 copy SW = 1 copy HW

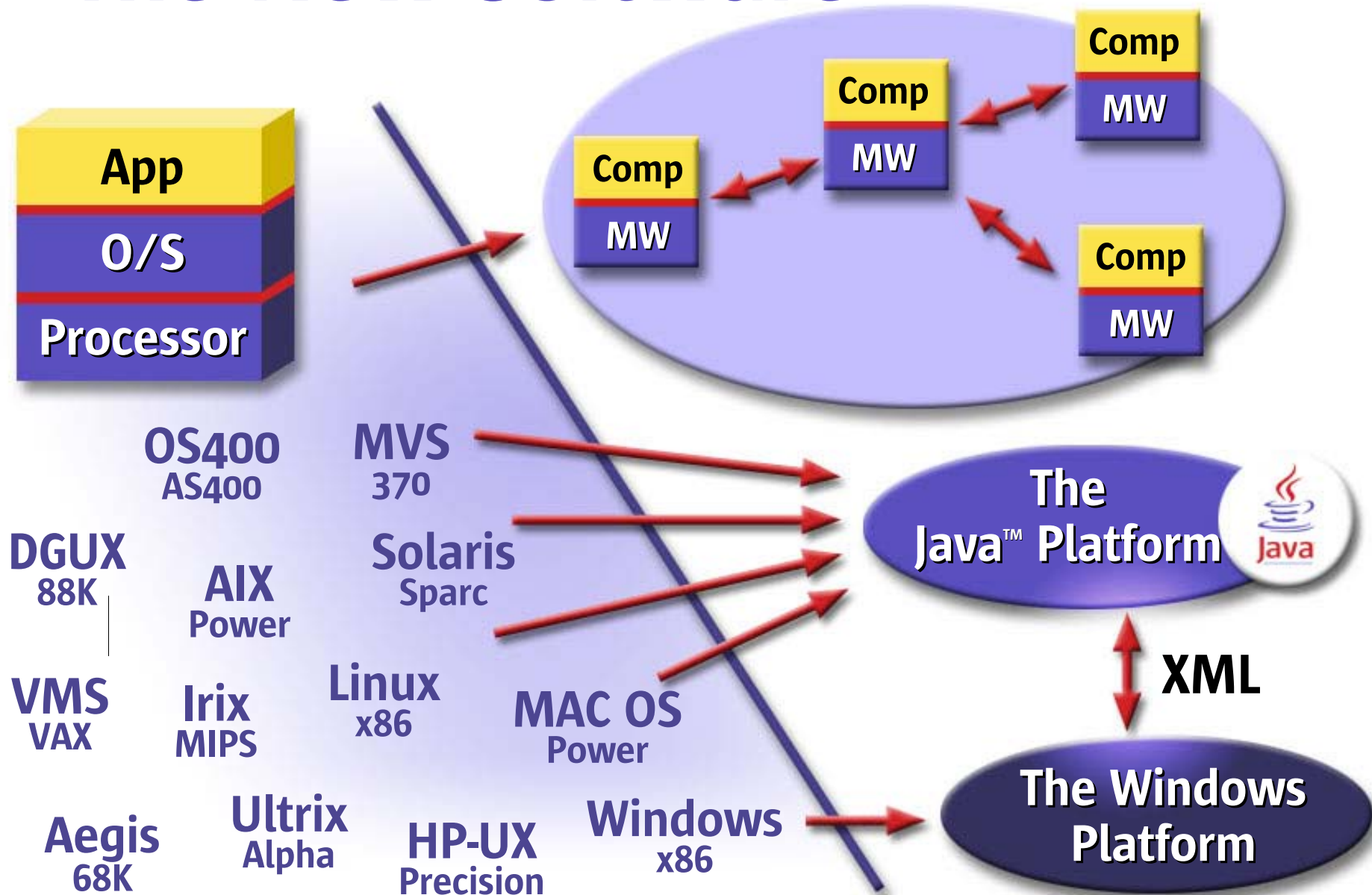


The New Software



Service must scale
to 10,000's or millions
of simultaneous users!

The New Software



The Operations Challenge

Was...

- Availability
- Performance
- Scale

**Price/
Performance**

The Operations Challenge

Was...

- Availability
- Performance
- Scale

**Price/
Performance**

Becoming...

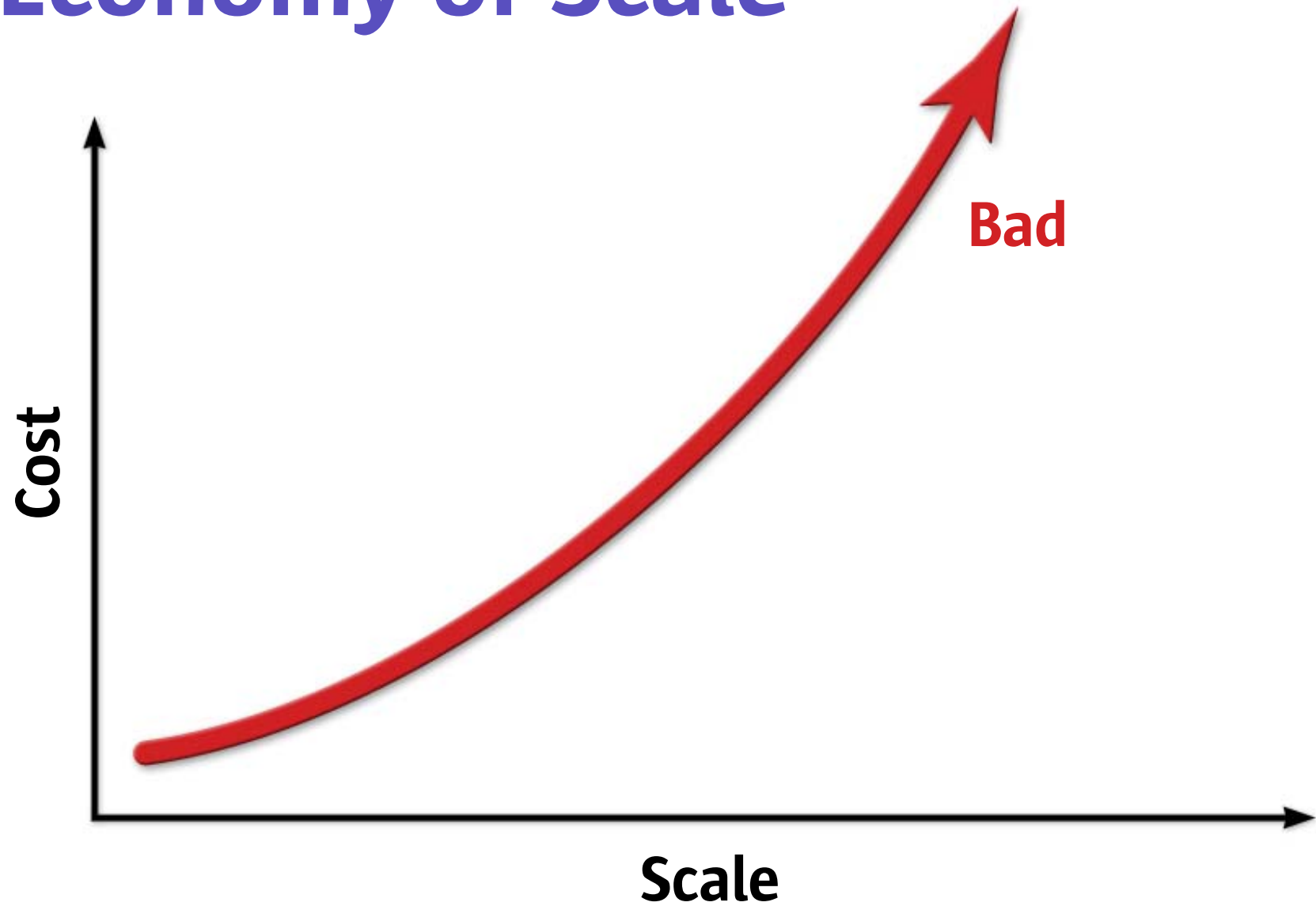
- Service Level
- Efficiency
- Security

**Total Cost of
Service Level**

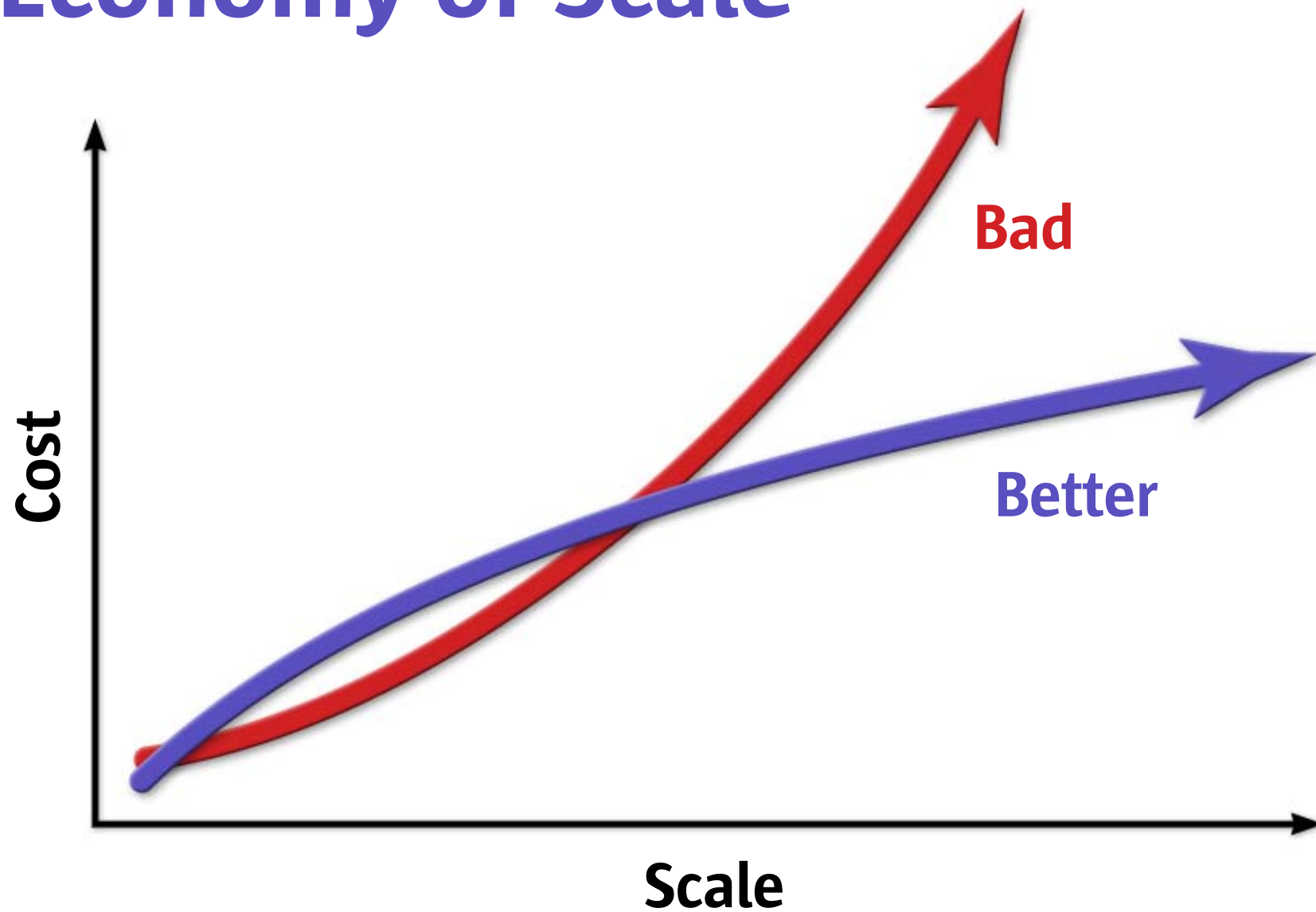
The Emperor Has No Clothes

- Network computing is wildly complex: no discernible economy of scale
- 75+% of IT budgets going to people + operations
- 15–20% typical utilization
- Out of the \$2.4T WW ICT spending only a tiny fraction goes to HW/SW systems

Economy of Scale



Economy of Scale



Decision Point

**Mask Complexity
or
Engineer It Away**

Old Systems Are Components in the New One

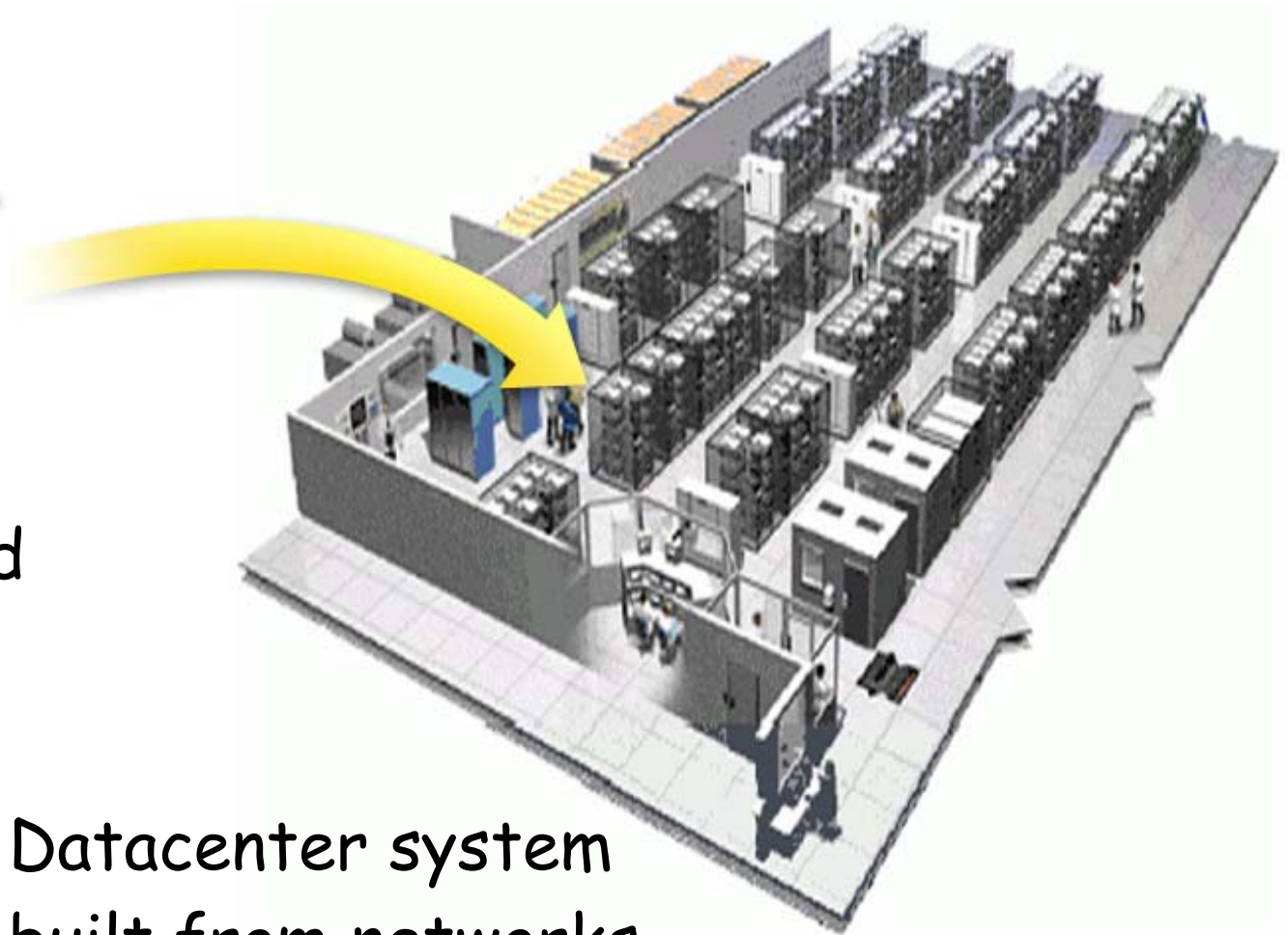


Server connected
to networks

Old Systems Are Components in the New One



Server connected
to networks

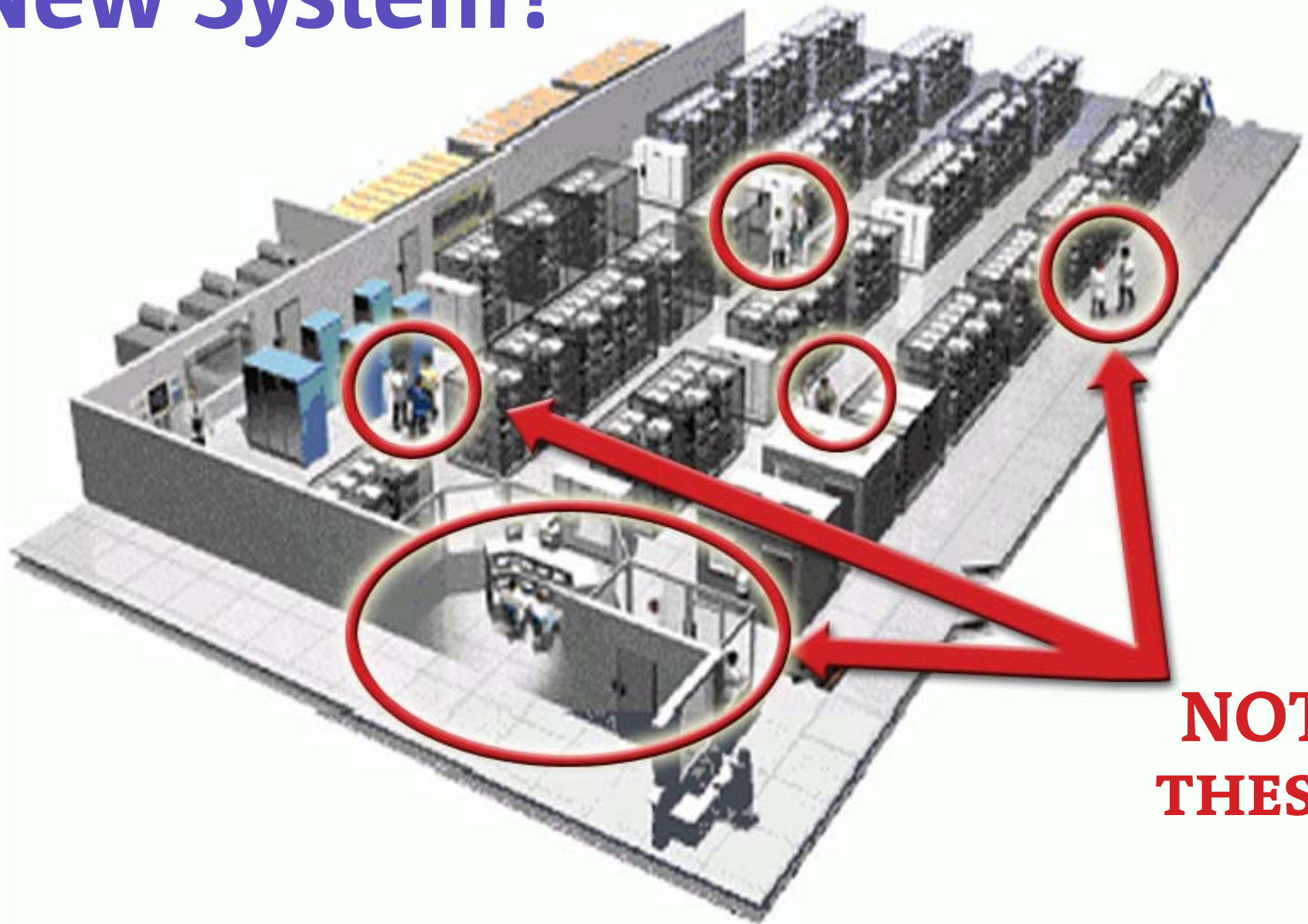


Datacenter system
built from networks

What Is O/S for This New System?



What Is O/S for This New System?



**NOT
THESE!**

A large, bold, blue stylized letter 'n' with a white negative space cutout in the middle. To its right is the trademark symbol 'TM' in a smaller blue font.

nTM



Grid Computing Today at Sun

**13,500 CPUs in 3 cities
for processor design**

- SPARC microprocessor design facilities in Sunnyvale, Austin, Burlington
- Sites use a departmental Cluster Grid approach normally
- Workload is distributed across all sites in an Enterprise Grid approach to meet peak load requirements

**22 years compute time/day
98% average CPU usage 24/7/365**



THROUGHPUT COMPUTING

- New design approach for the UltraSPARC® processor family
- Eclipses throughput of today's processors by a magnitude of up to 15–30x
- Quantum reduction in the cost of network computing — without software disruption

The Big Bang Is Happening — Four Converging Trends

Network Computing Is Thread Rich

Web services, Java™ applications, database transactions, ERP . . .

Moore's Law

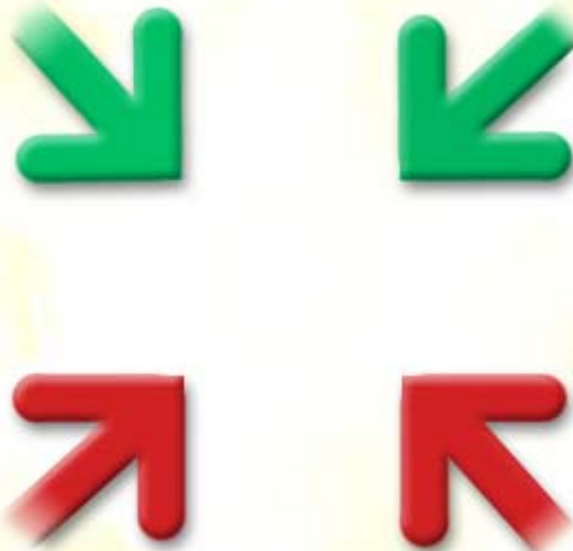
A fraction of the die can already build a good processor core; how am I going to use a billion transistors?

Worsening Memory Latency

It's approaching 1000s of CPU cycles! Friend or foe?

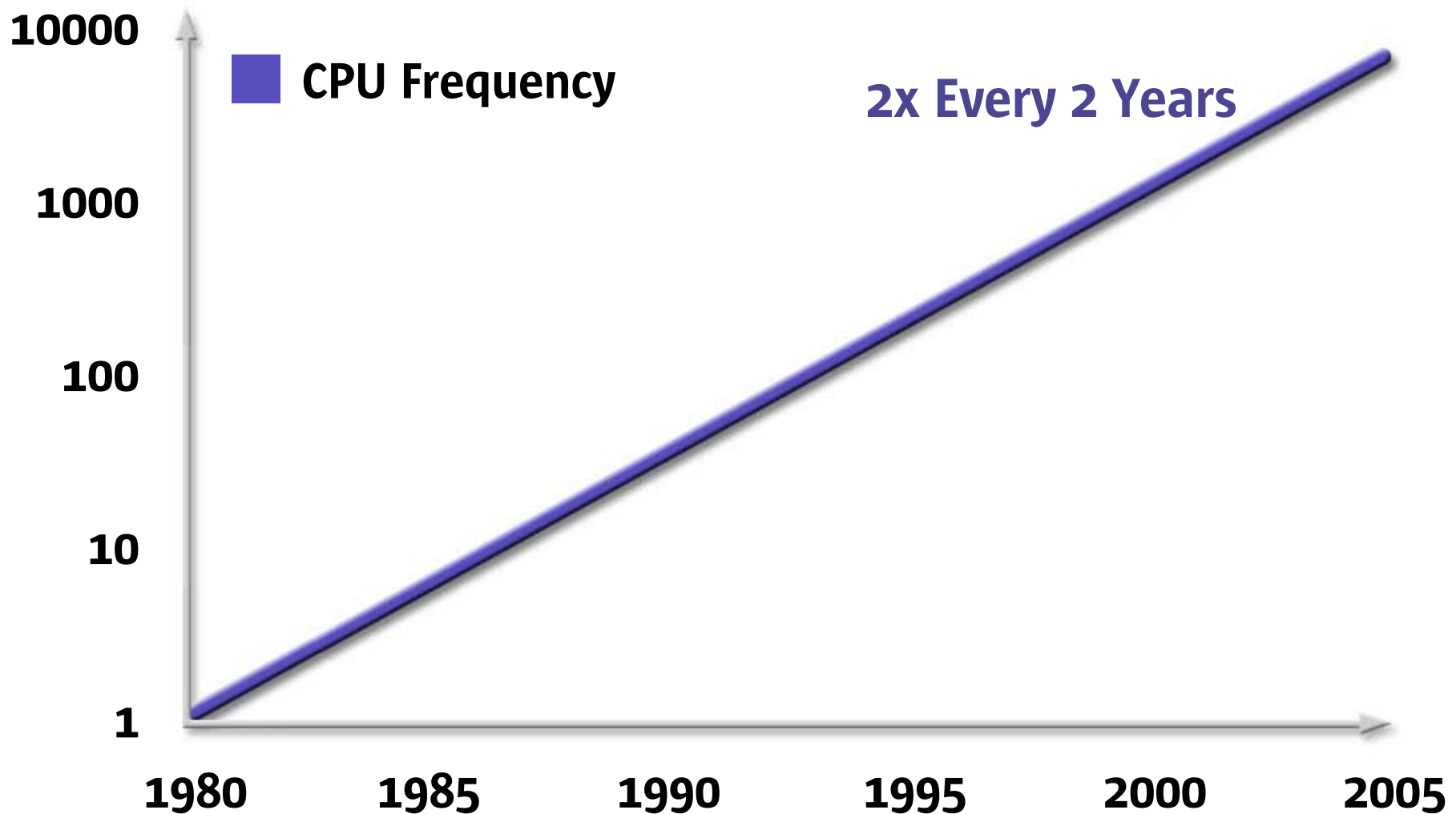
Growing Complexity of Processor Design

Forcing a rethinking of processor architecture – modularity, less is more, time-to-market



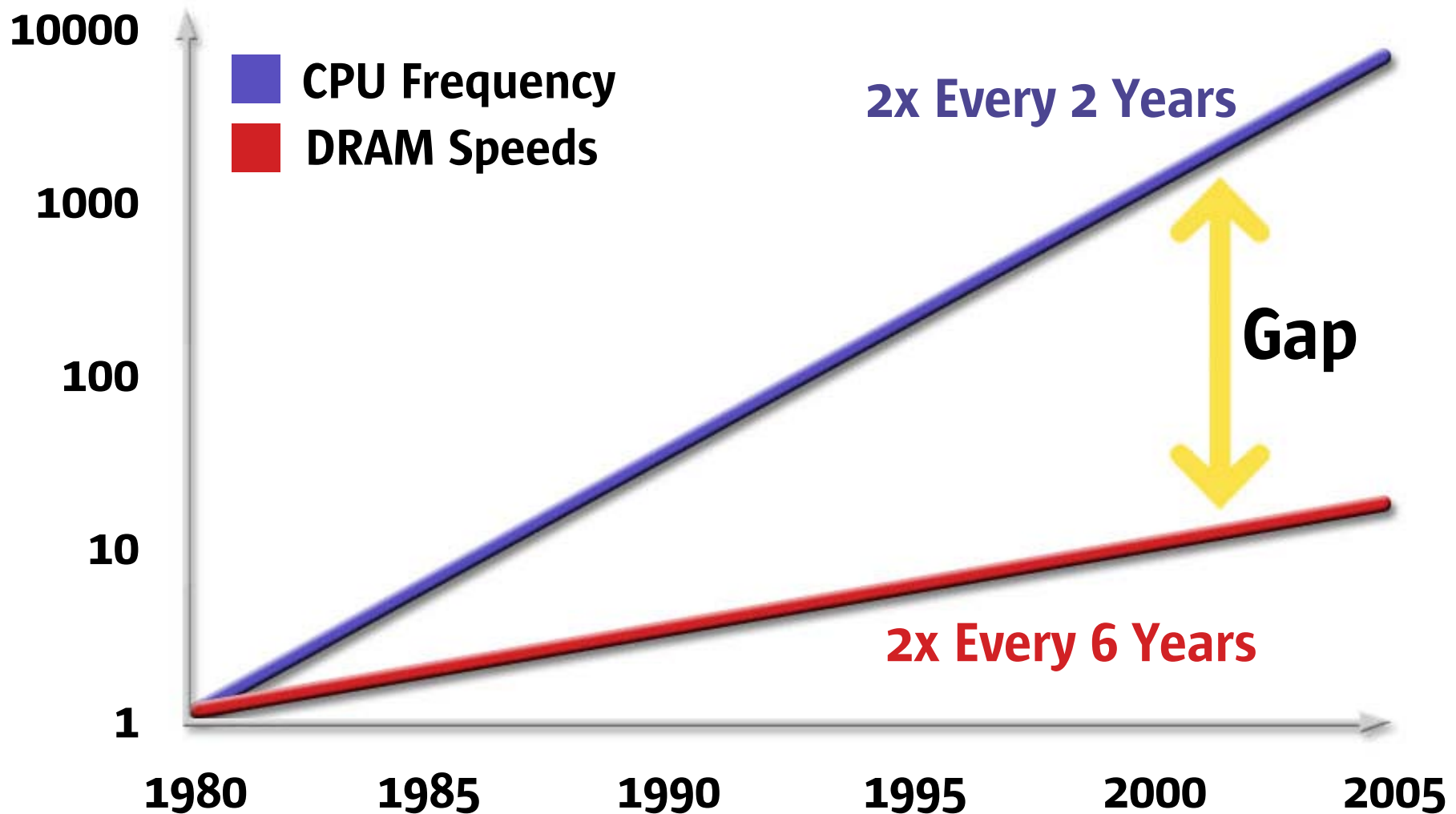
Memory Bottleneck

Relative Performance

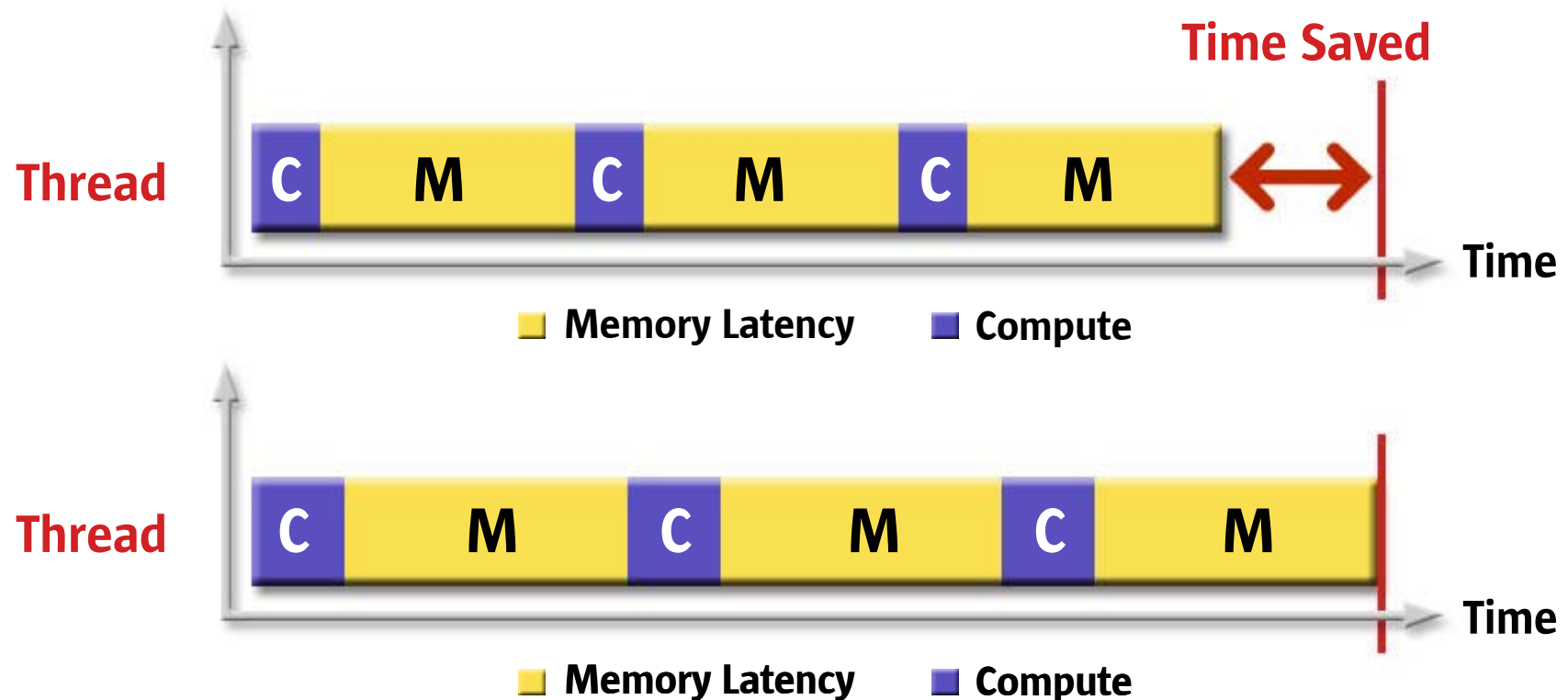


Memory Bottleneck

Relative Performance



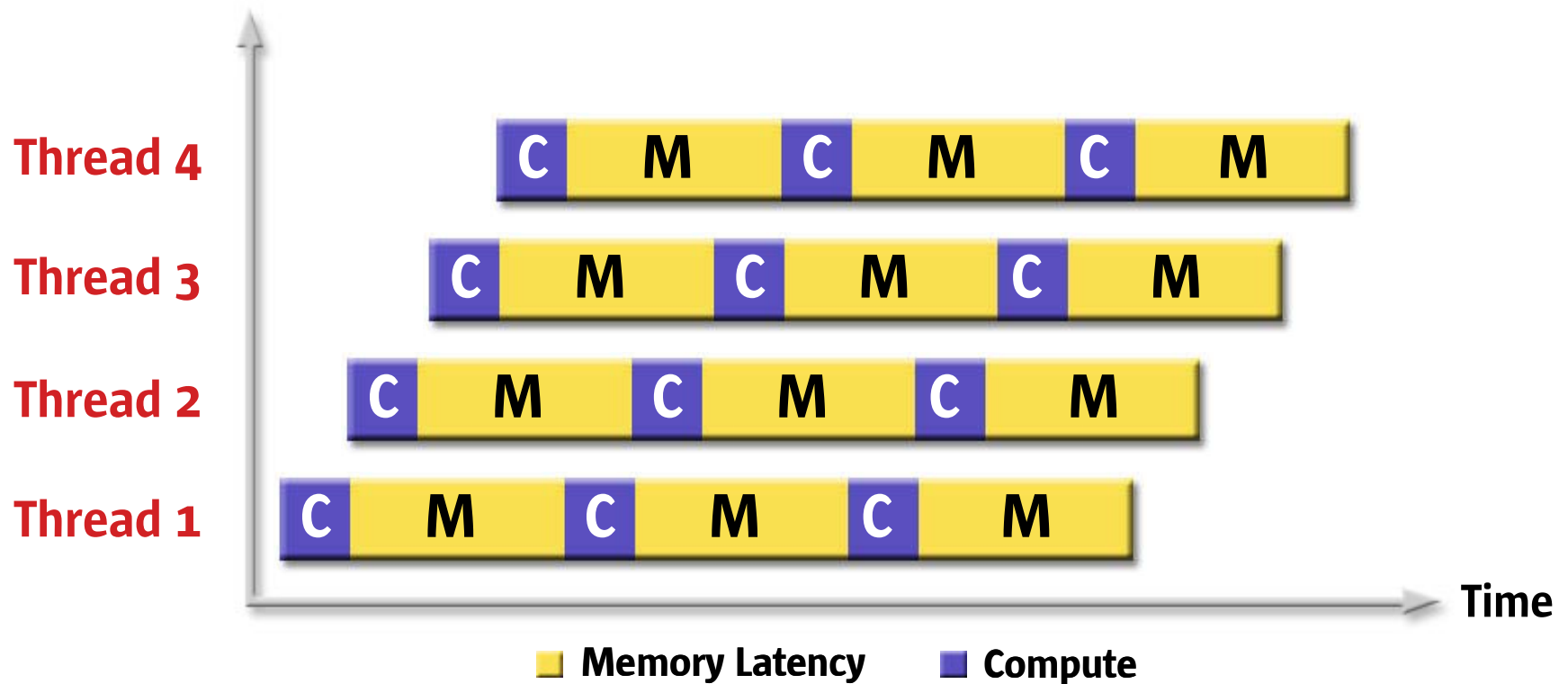
Typical Complex High Frequency Processor



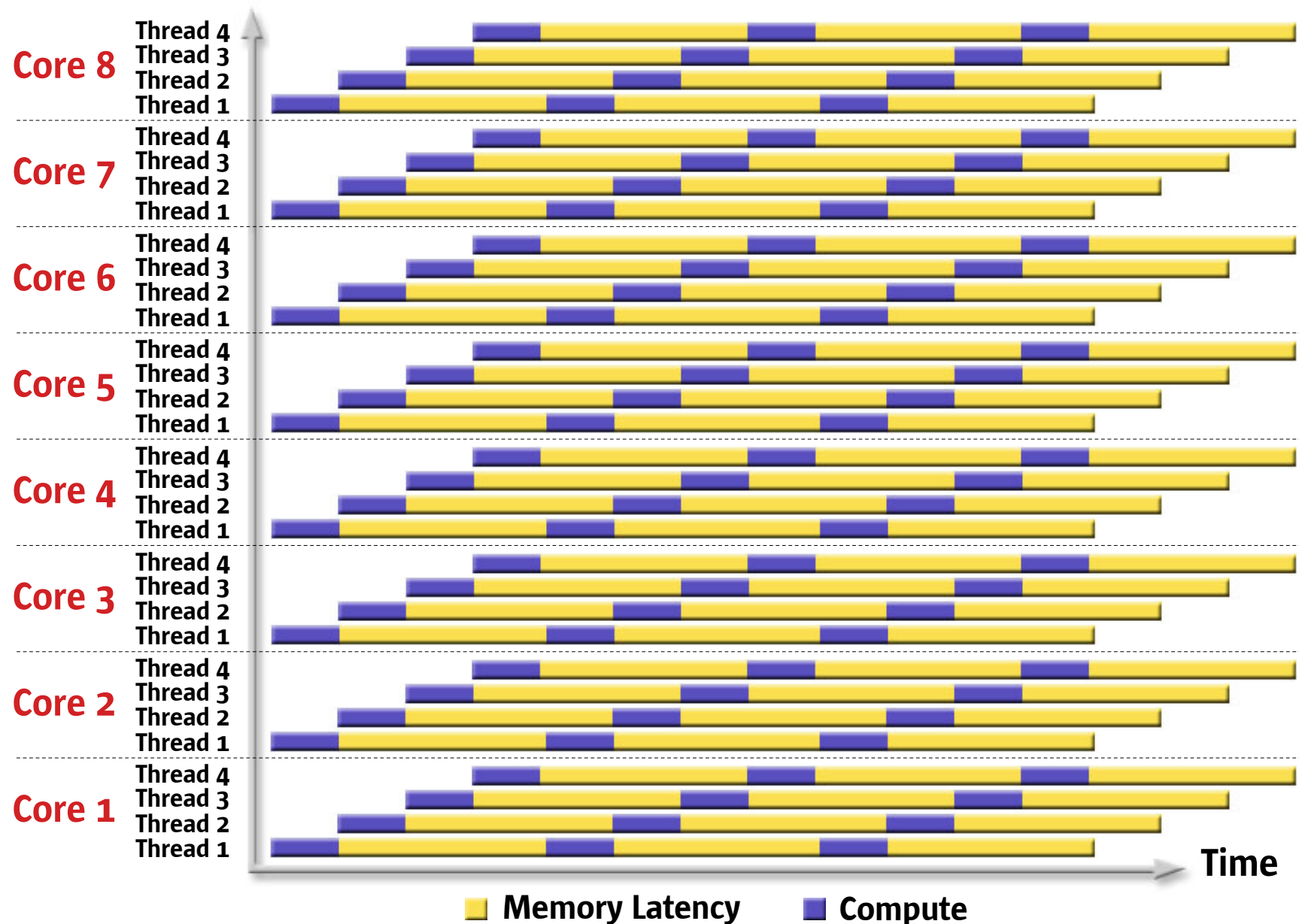
**HURRY
UP AND
WAIT!**

Note: Up to 75% Cycles Waiting for Memory

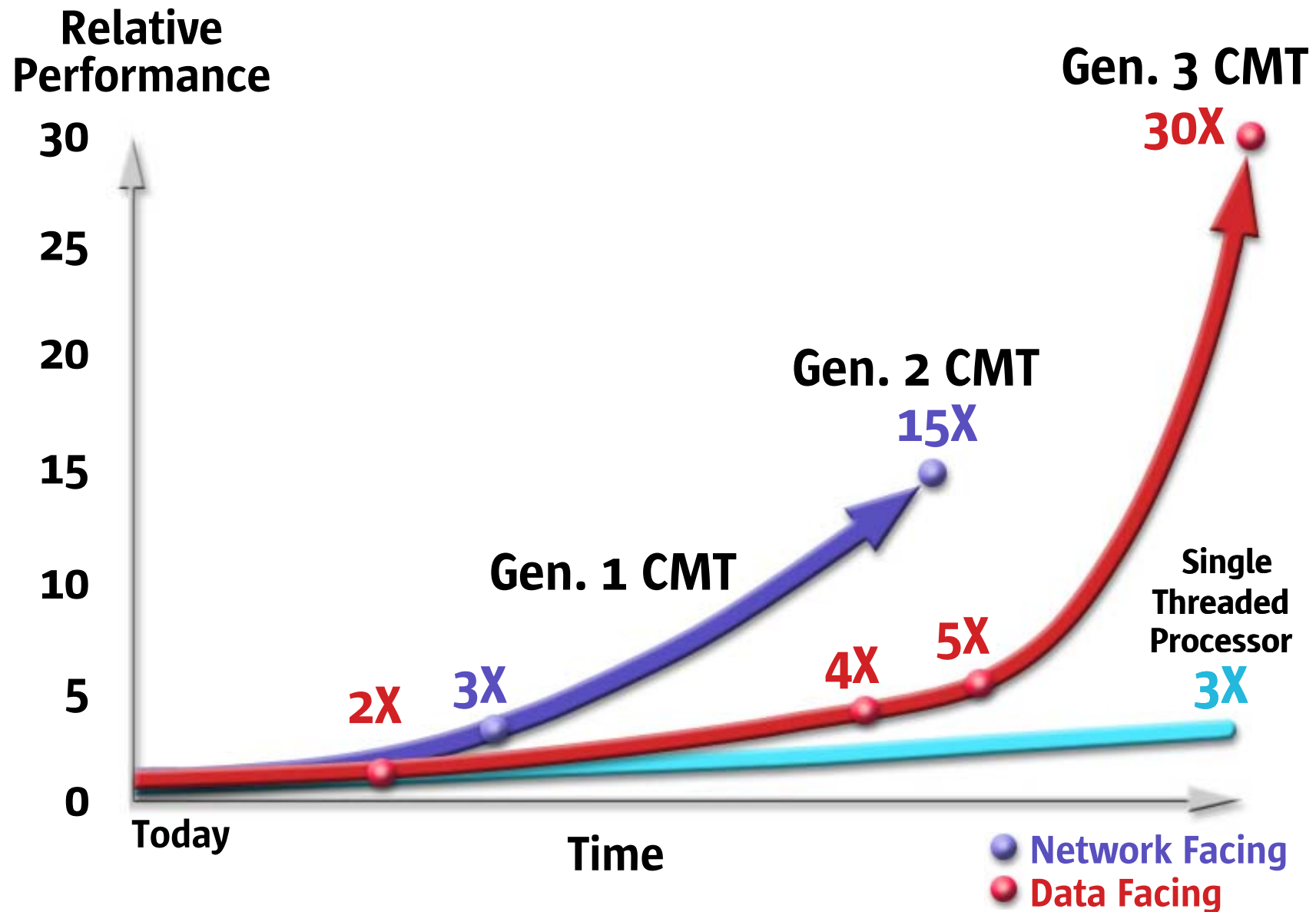
Chip Multithreading (CMT)



CMT—Multiple Multithreaded Cores



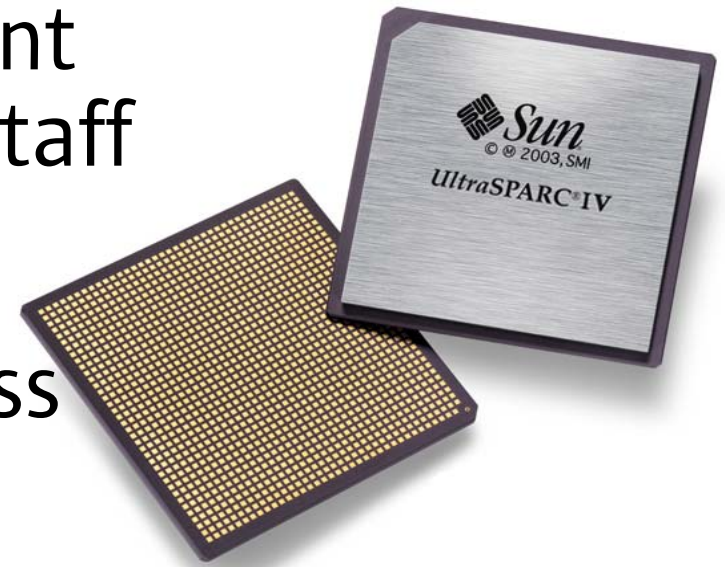
Throughput Computing



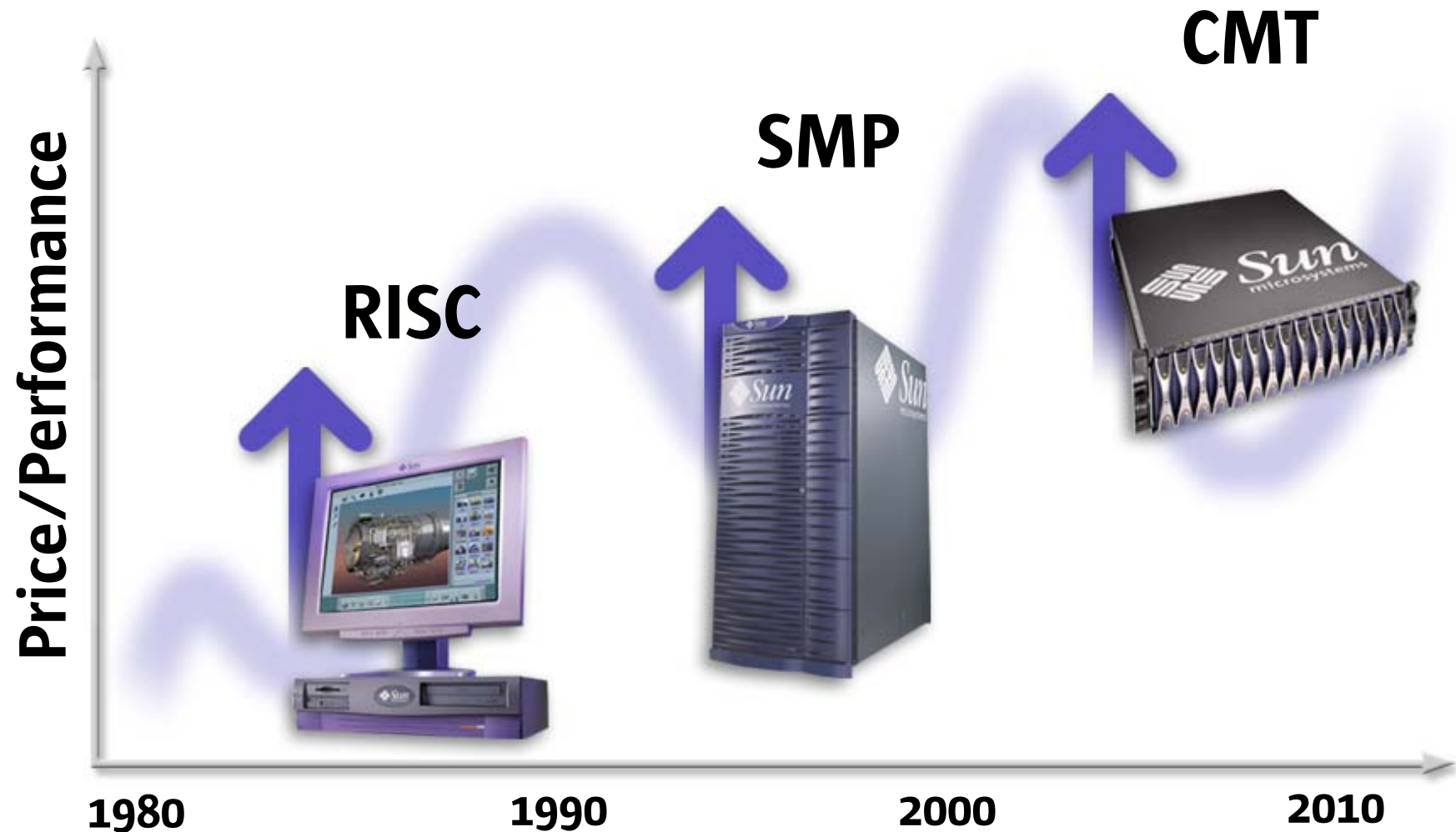
UltraSPARC[®] IV

1st GENERATION CMT PROCESSOR FOR MID/HIGH END SYSTEMS

- First milestone in Sun's Throughput Computing roadmap
- Up to twice the throughput of today's UltraSPARC III processor
- Protects customer investment in hardware, software and staff
 - Upgrade path
 - Binary compatibility across time and product line



The Three Waves of SPARC Innovation



Takeaways

- Business demands fuel IT demand
 - Exponential demand as everything becomes connected
- Decision point
 - Eliminate complexity through engineering
- Innovation from Sun
 - In Software
 - In Systems



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