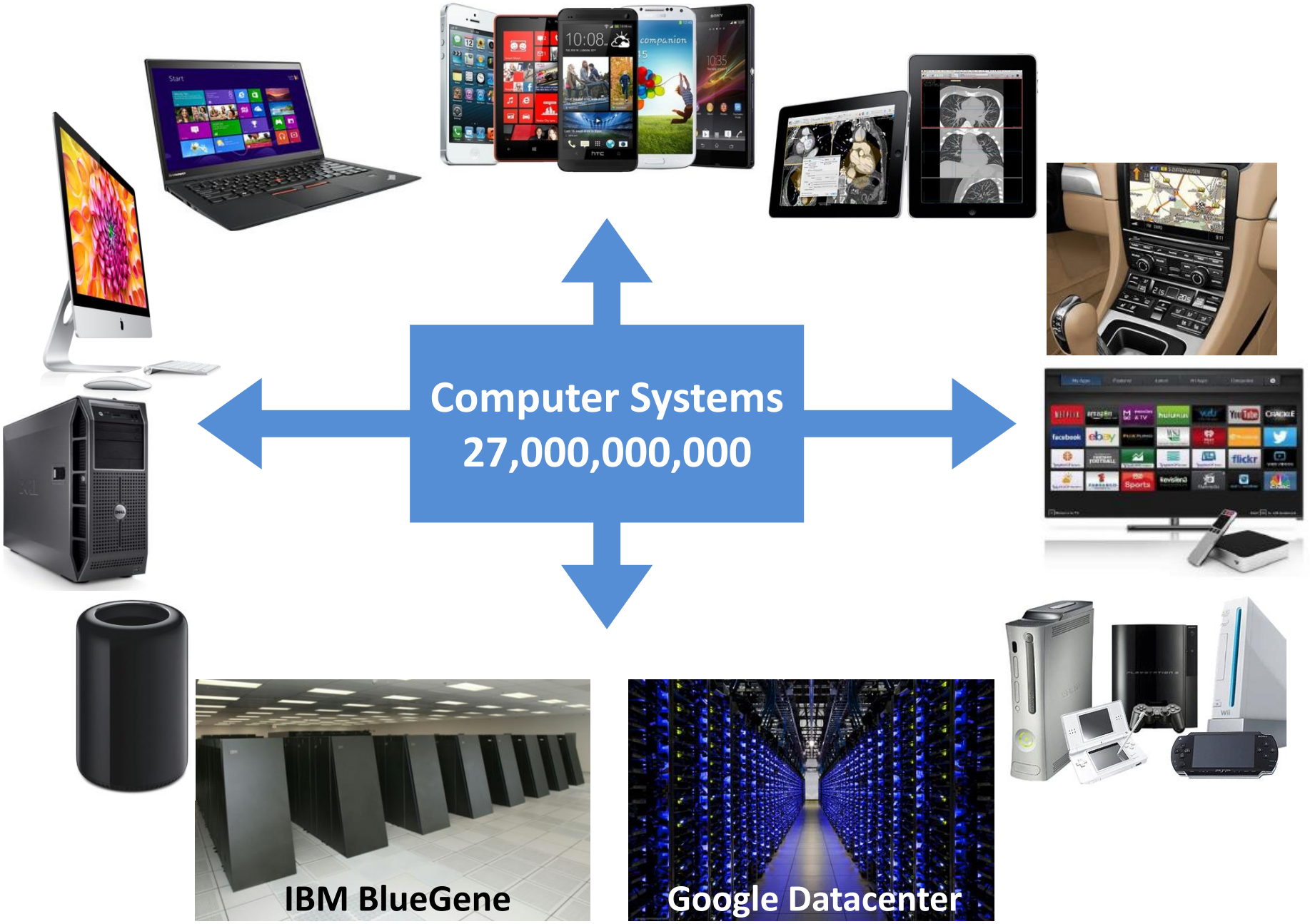
ECE/CS 472/572
Computer Architecture

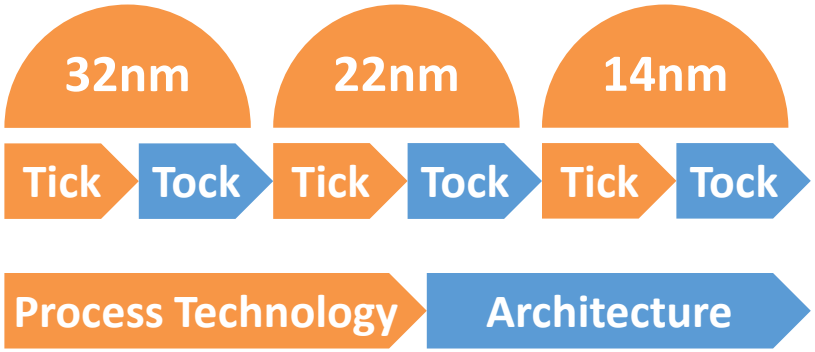
Prof. Lizhong Chen

Spring 2019


Computer Systems
27,000,000,000
IBM BlueGene
Google Datacenter

Impact of Computer Architecture

- Intel's Tick-Tock model



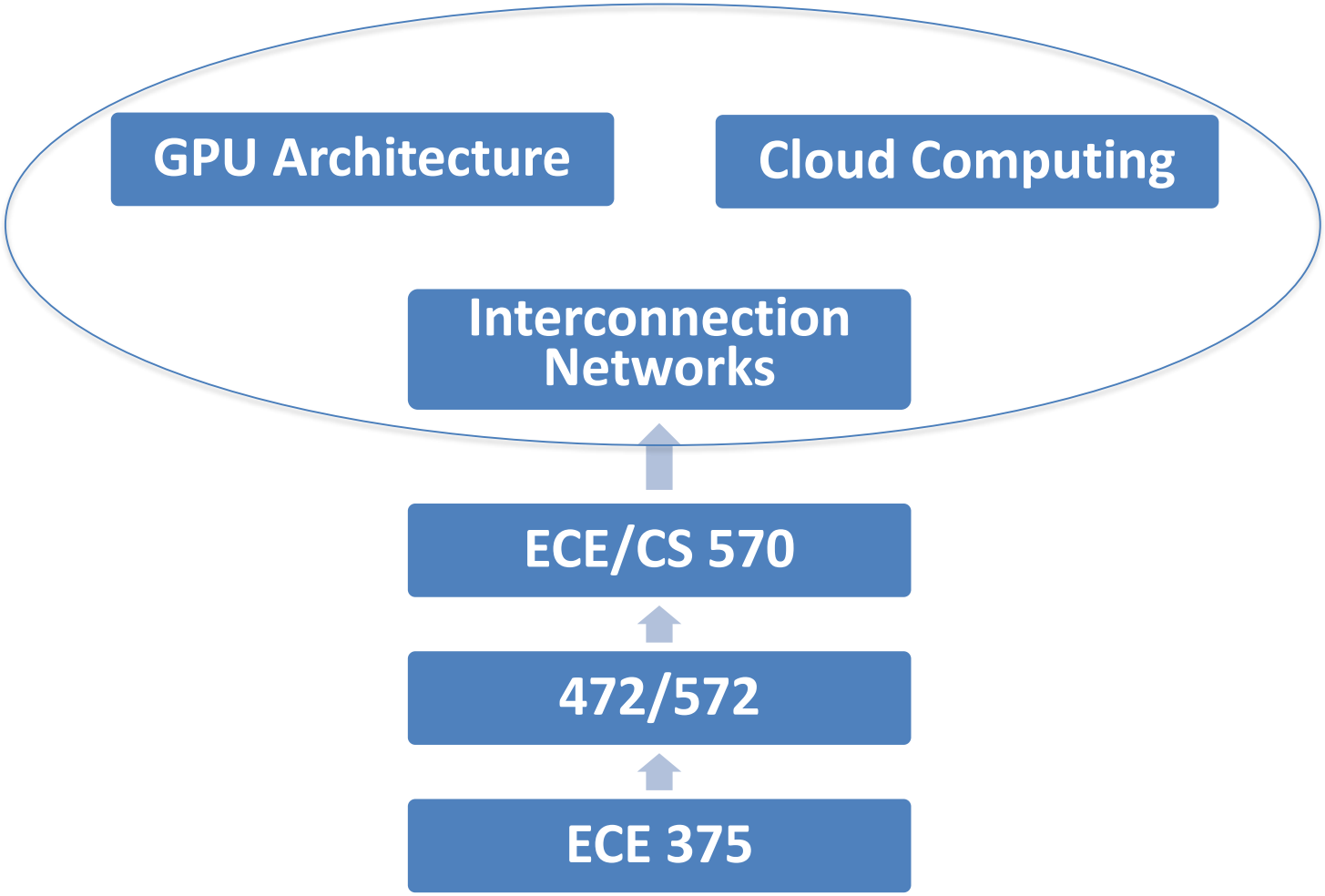
From 1994 to 2014
Supercomputer speedup

- Moore's Law: 6,000X
- Actual speedup: 134,000X

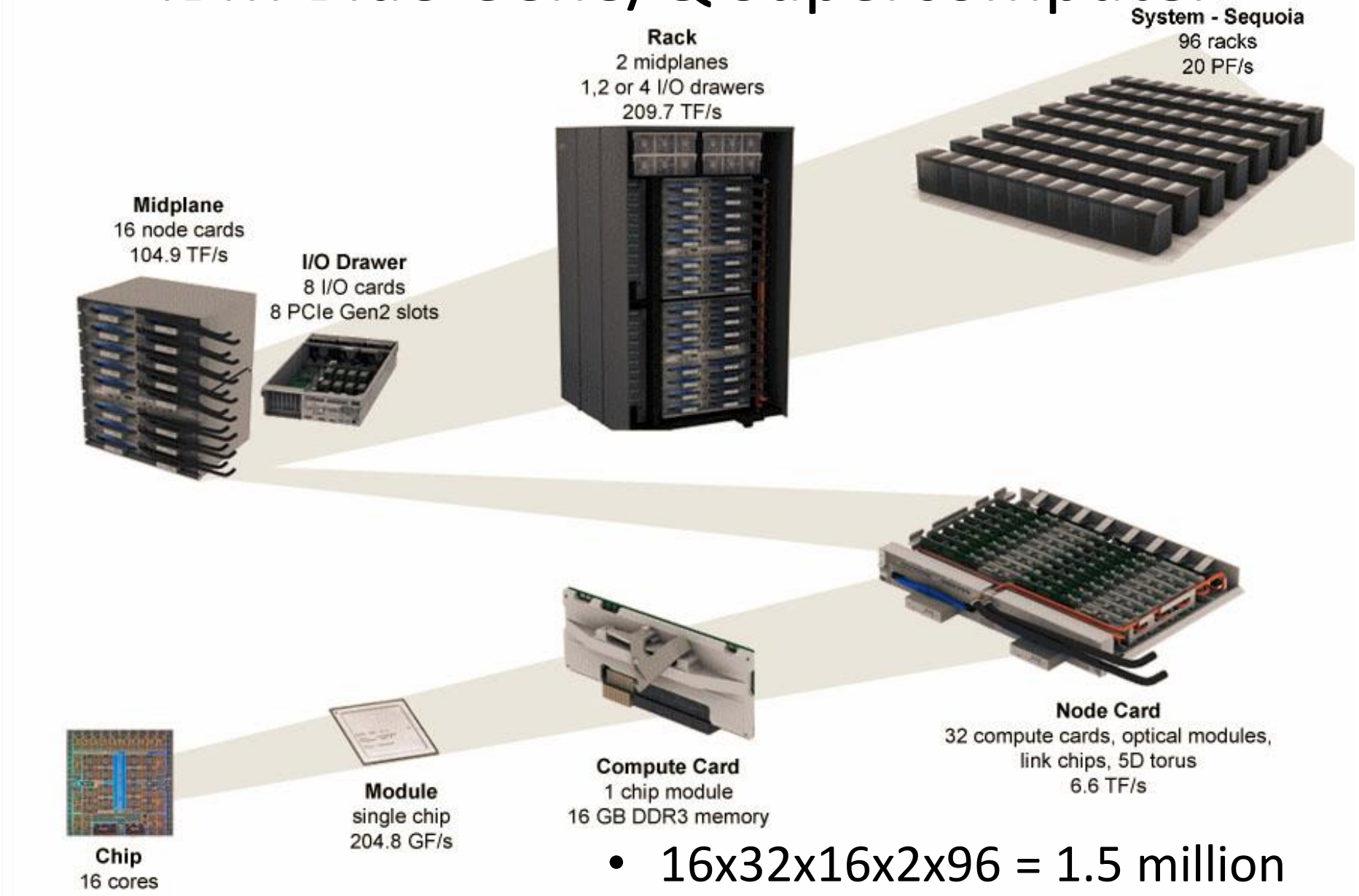
- As Moore's Law is ending, computer architecture becomes more important than ever!
  - 28nm Maxwell architecture => 16nm Pascal architecture: 12X speedup

    => Large potential for architecture research!

The Course “Ladder”



IBM Blue Gene/Q Supercomputer



- 16x32x16x2x96 = 1.5 million

Source: https://computing.llnl.gov/tutorials/bgq/

Research at the STAR Lab

(System Technology and Architecture Research)

- Energy efficiency of HPCs and data centers
- Many-core architecture for post-Moore era
- GPU architectures
- Accelerators for AI and deep learning
- AI/ML for optimizing architecture
- Wearable architecture