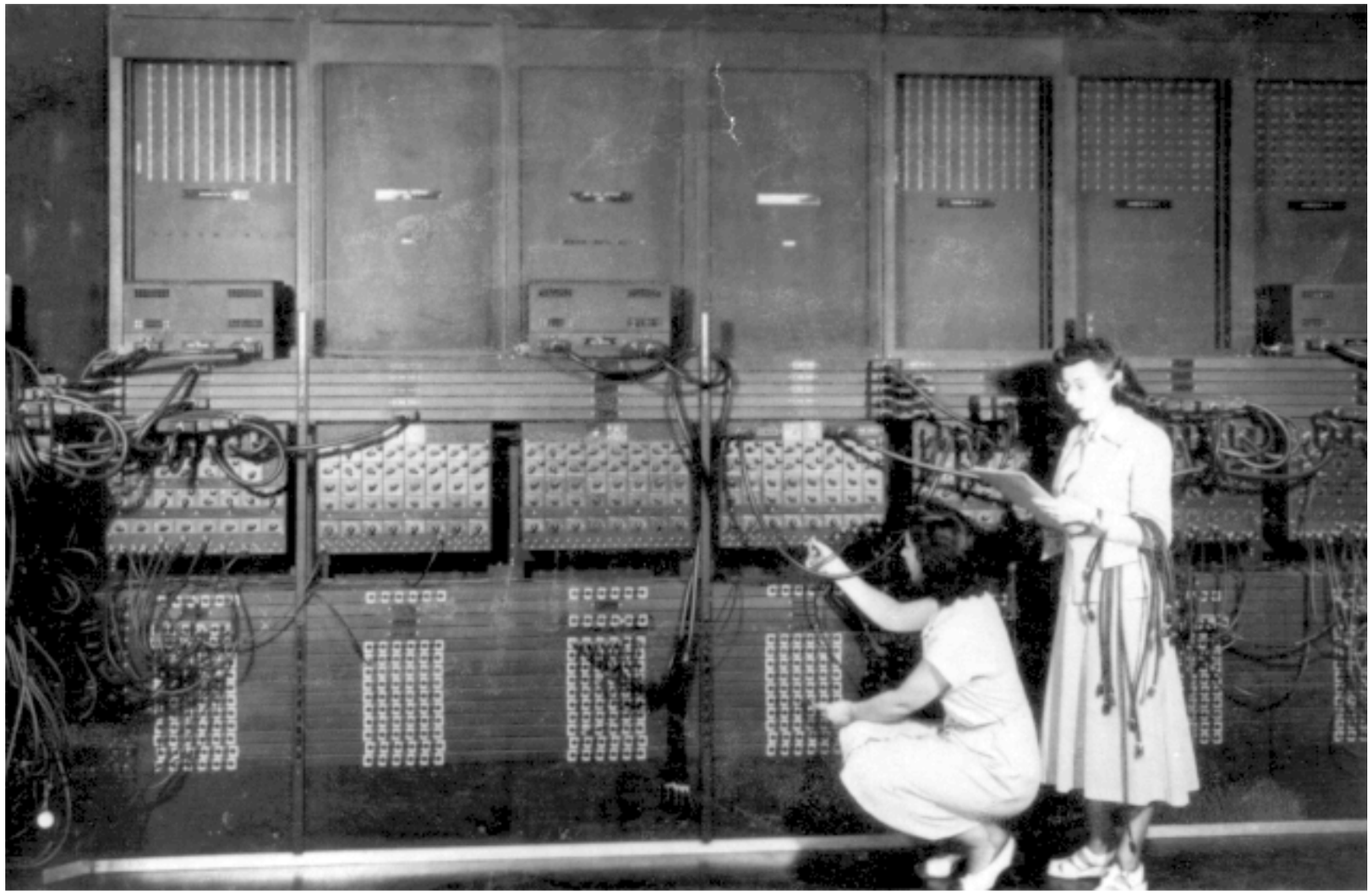
CSEE 3827: Fundamentals of Computer Systems

Course Introduction and Overview

Course website

http://www.cs.columbia.edu/~martha/courses/3827/sp10/

What does this ...



[Source: http://ftp.arl.army.mil/~mike/comphist]

... have in common with this?

growth in performance = growth in raw resources + system design innovation

---

ENIAC (1946)		
5,000 operations per second		
8.5’ x 3’ x 80’ (2040 ft^3)		
$500,000		

growth in performance = growth in raw resources + system design innovation

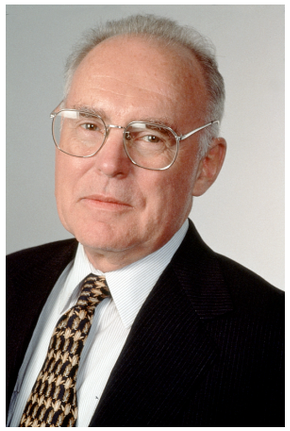
ENIAC (1946)	Intel Larrabee (projected 2010)	
5,000 operations per second	2,000,000,000,000 operations per second	
8.5’ x 3’ x 80’ (2040 ft^3)	49.5 mm^2	
$500,000	~$300	

growth in performance = growth in raw resources + system design innovation

ENIAC (1946)	Intel Larrabee (projected 2010)	
5,000 operations per second	2,000,000,000,000 operations per second	400,000,000x faster
8.5’ x 3’ x 80’ (2040 ft^3)	49.5 mm^2	1,167,000,000x smaller
$500,000	~$300	1666x cheaper

growth in performance = growth in raw resources + system design innovation

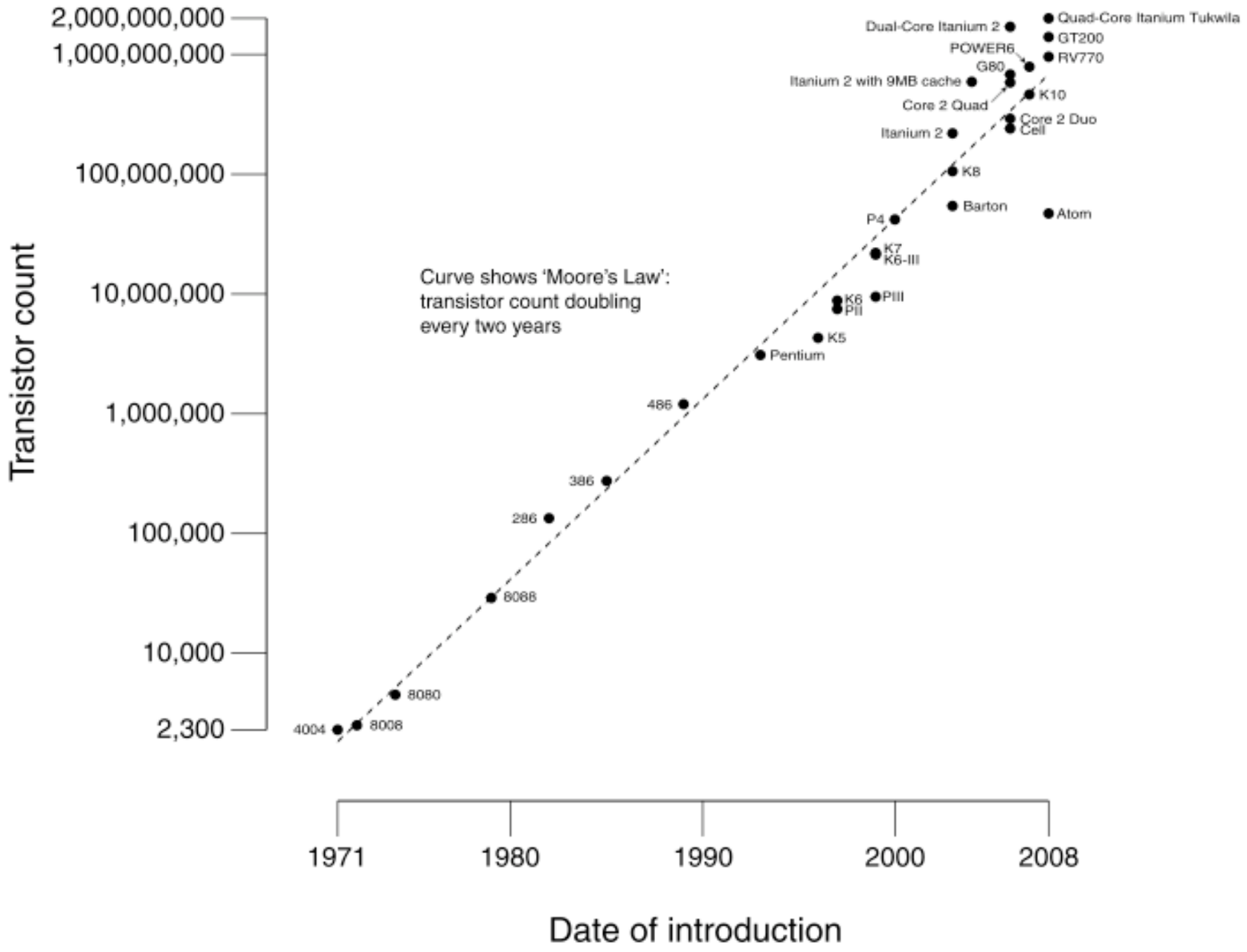
---



Gordon Moore
co-founder of Intel

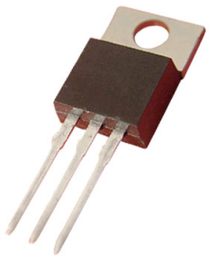
Moore's Law:
Density of transistors
doubles every two years

CPU Transistor Counts 1971-2008 & Moore's Law



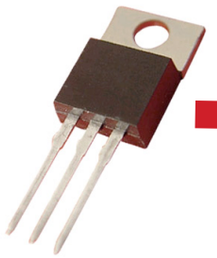
growth in performance = growth in raw resources + system design innovation

---

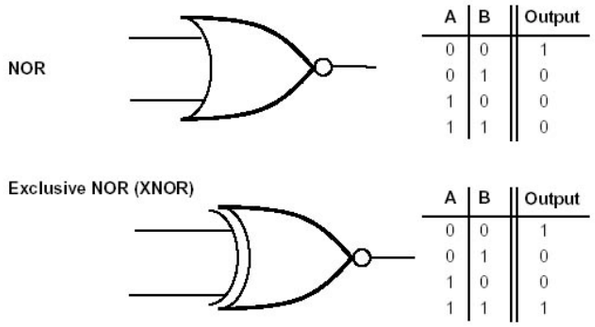


transistors

growth in performance = growth in raw resources + system design innovation

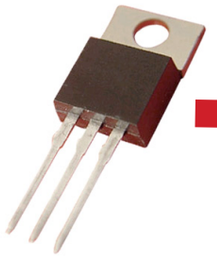


transistors

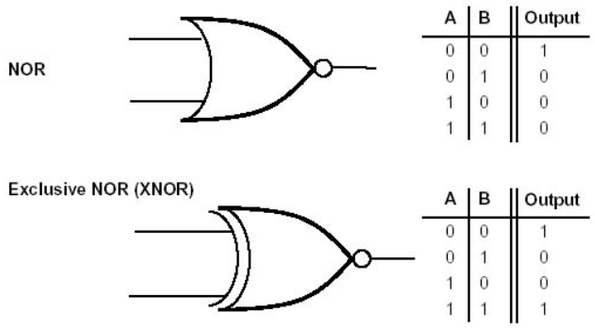


logic gates

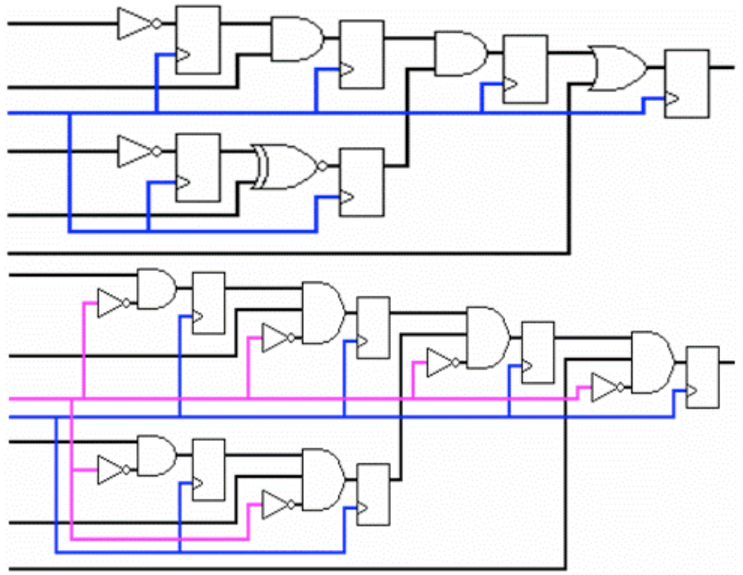
growth in performance = growth in raw resources + system design innovation



transistors

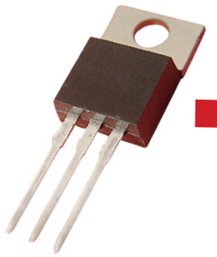


logic gates

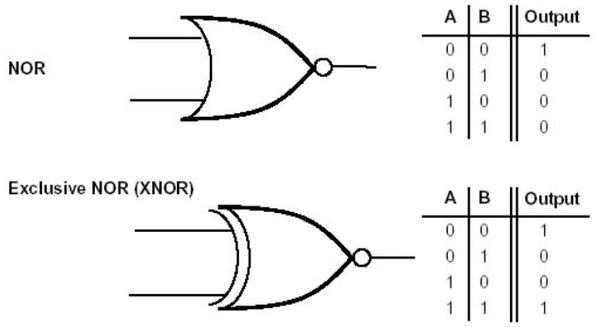


logic circuits

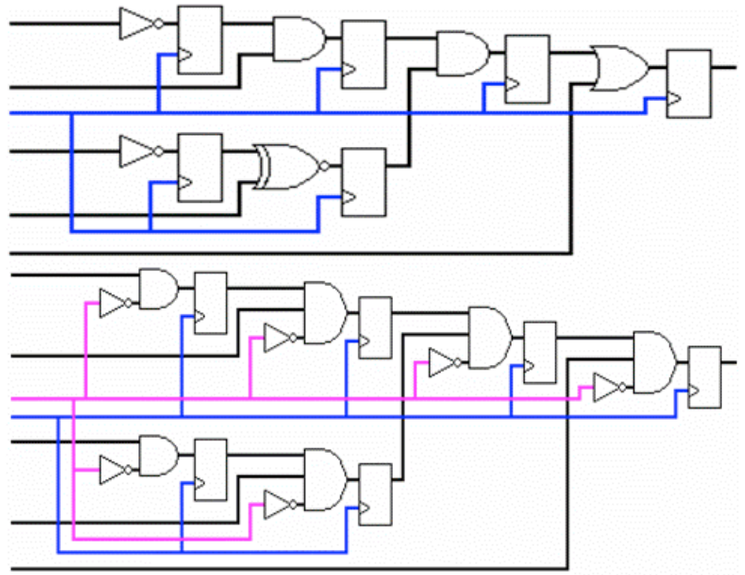
growth in performance = growth in raw resources + system design innovation



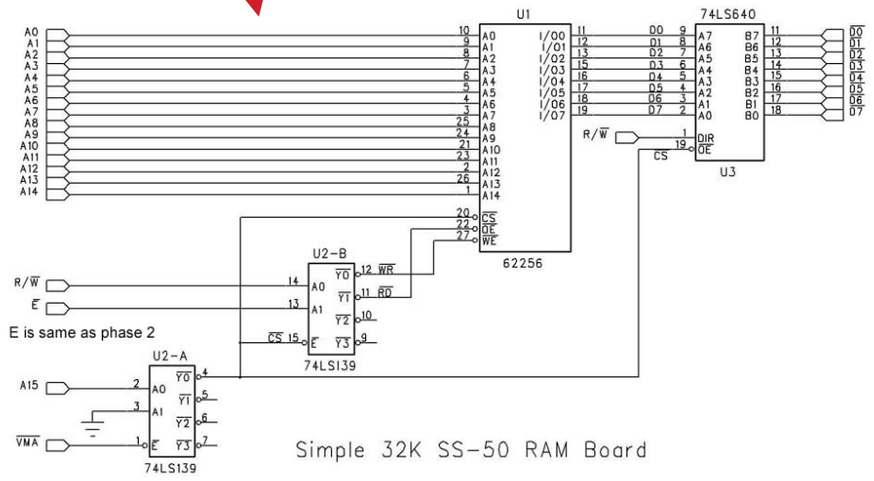
transistors



logic gates

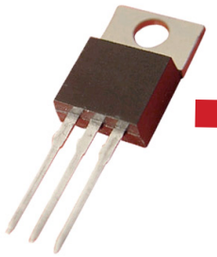


logic circuits

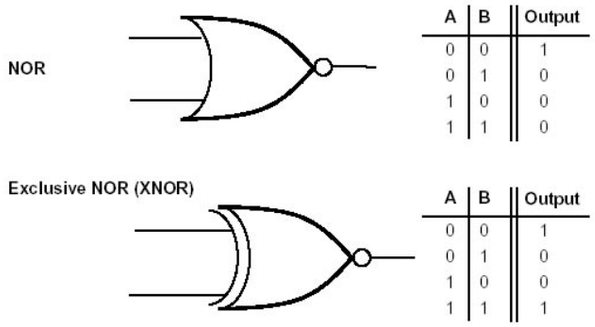


memory

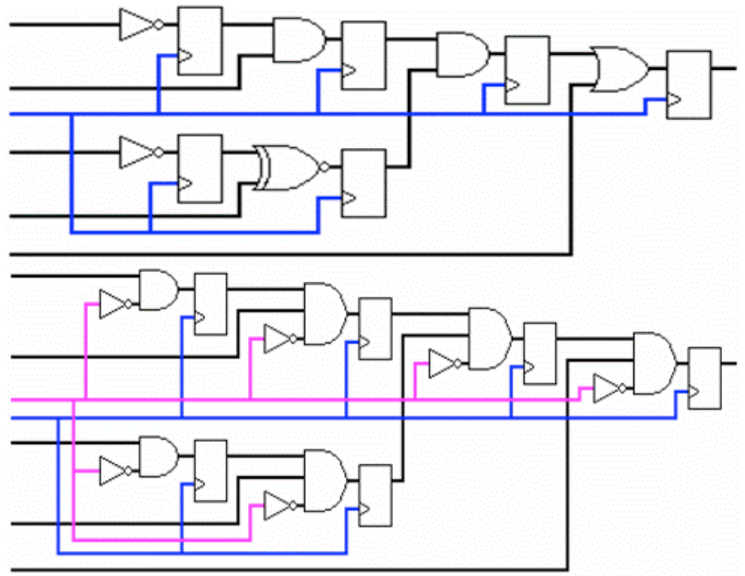
growth in performance = growth in raw resources + system design innovation



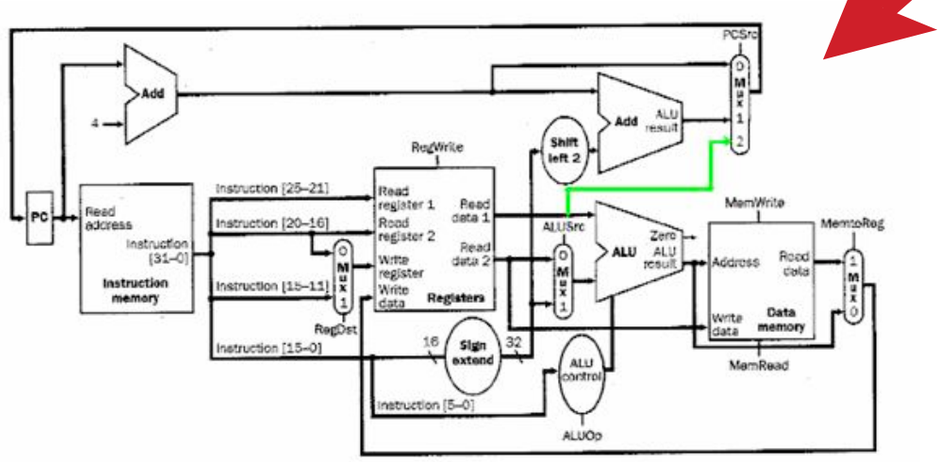
transistors



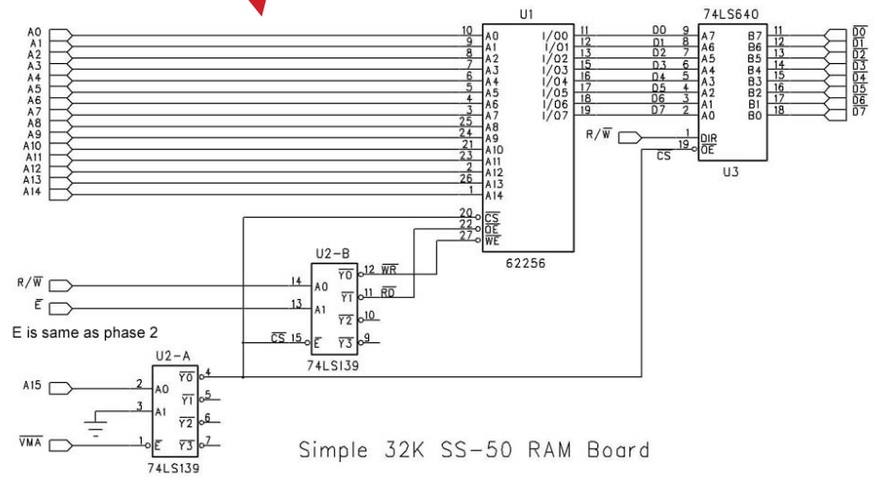
logic gates



logic circuits

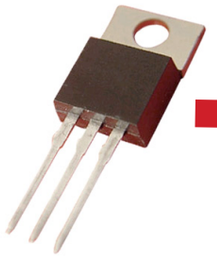


processor

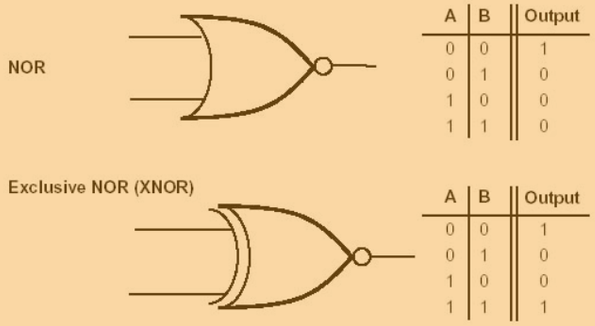


memory

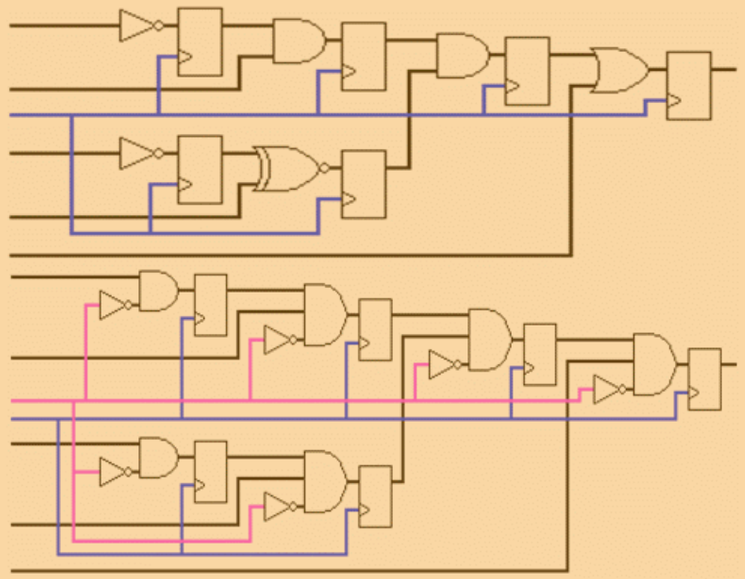
growth in performance = growth in raw resources + system design innovation



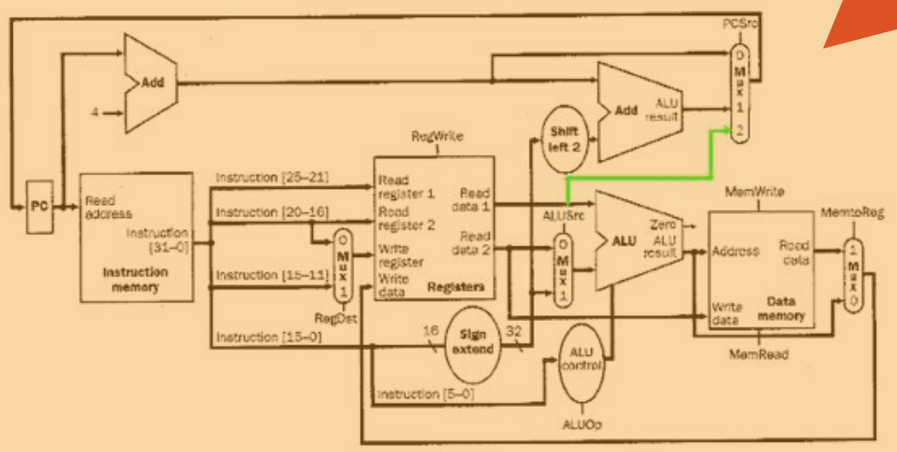
transistors



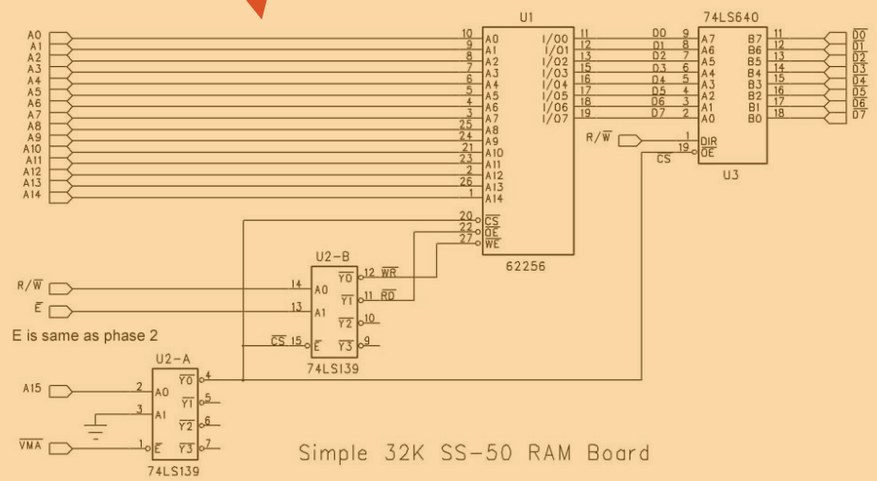
logic gates



logic circuits



processor



memory