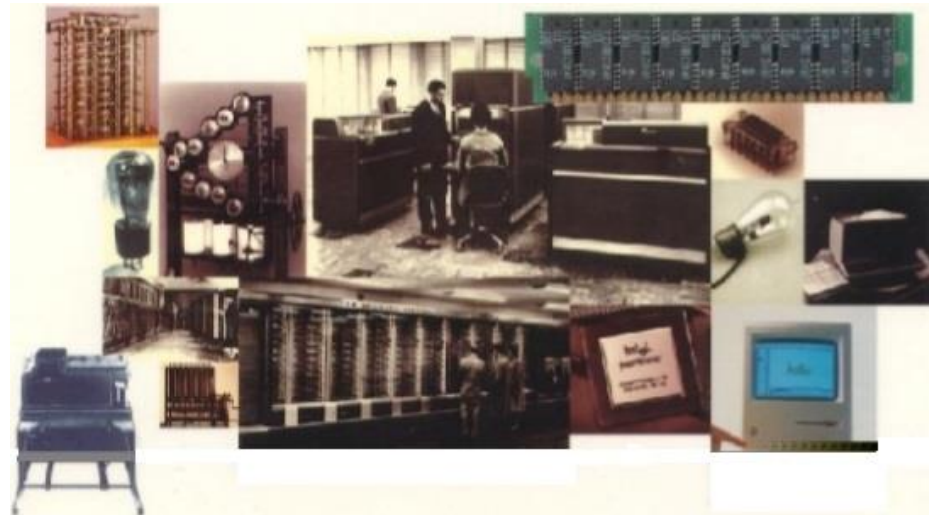# زبان و ساختار کامپیوتر

فصل اول

مقدمه: تصویری از گذشته و حال

Copyright Notice

Parts (text & figures) of this lecture are adopted from:

- A. Tanenbaum, "Structured Computer Organization", 5th Ed., Pearson, 2006

- D. Patterson & J. Hennessey, "Computer Organization & Design, The Hardware/Software Interface", 5th Ed., MK publishing, 2014
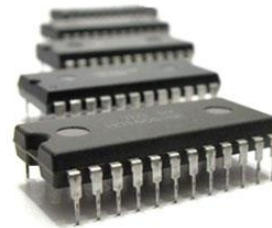
- Internet!

ساختار و زبان کامپیوتر

The First Calculating Tool

Computer Generations

- *The Zeroth G: Mechanical Computers (1642–1945)*

- *The 1st G: Vacuum Tubes (1945–1955)*

- *The 2nd G: Transistors (1955–1965)*

- *The 3rd G: Integrated Circuits (1965–1980)*

- *The 4th G: Very Large Scale Integration (1980-present)*

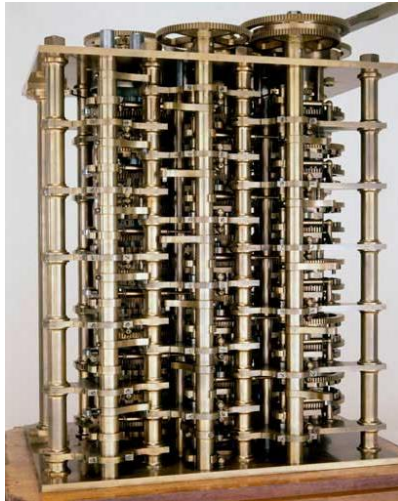- *The 5th G: Low-Power and Invisible Computers*

Mechanical Computers

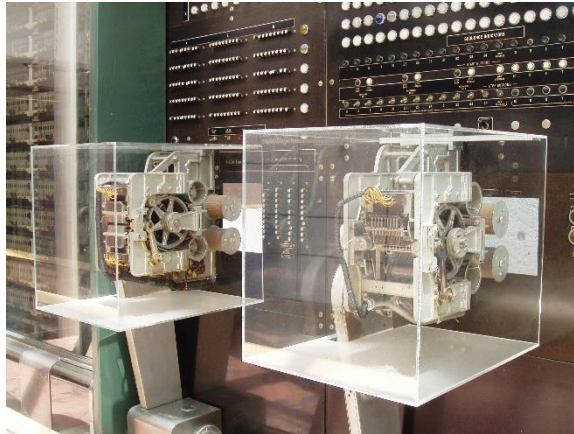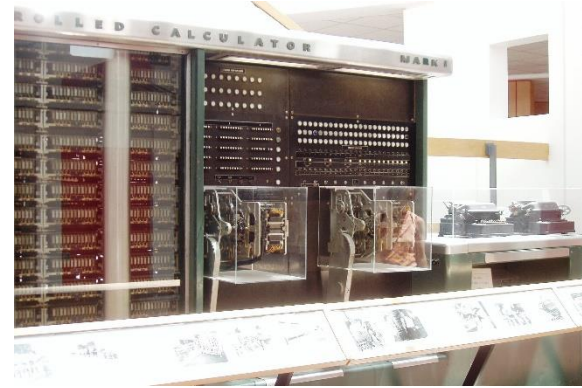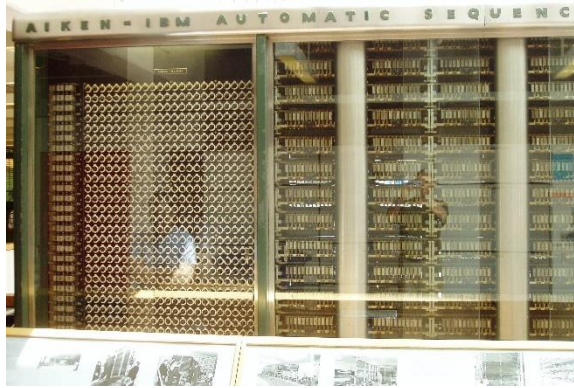*Pascal's Machine (1642)*

Ada Lovelace

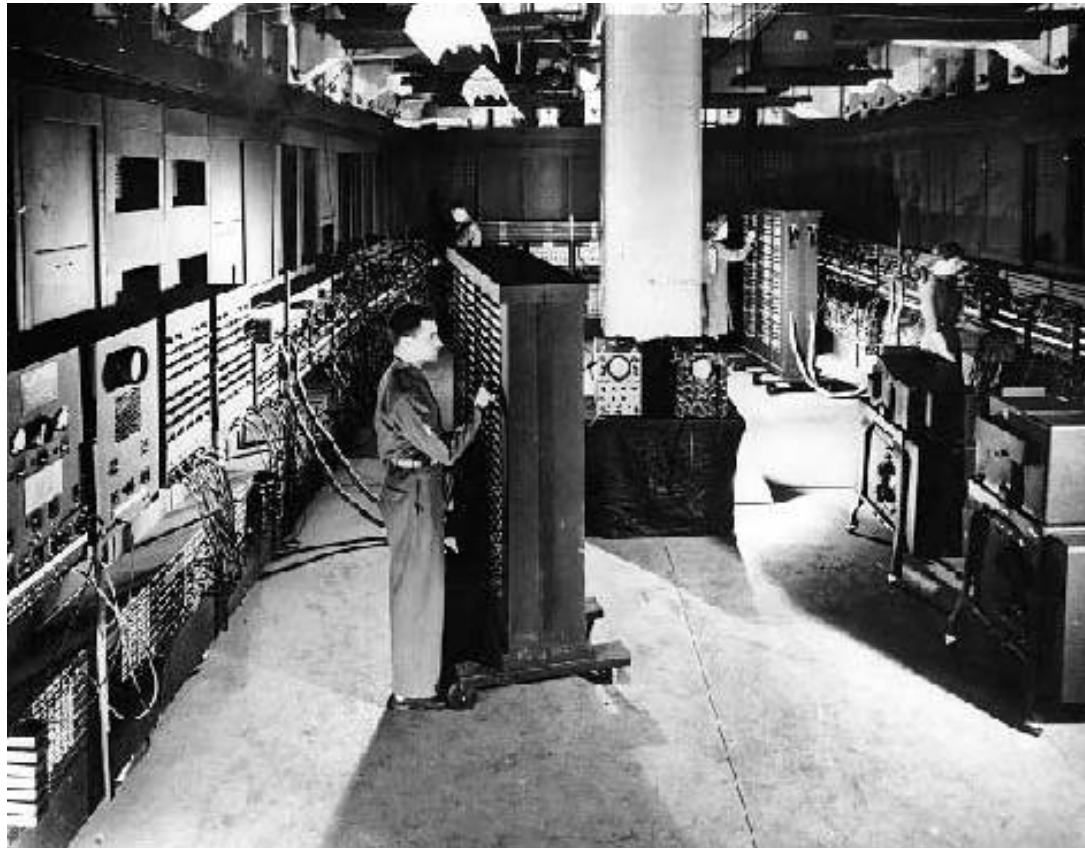*A part of the Analytical Engine, built by Charles Babbage (1832)*

Konrad Zuse and the world's 1st relay-based programmable computer (1935)

Electro-Mechanical Computers

Harvard Mark I (1937)

The First Electronic Computer

Electronic Numerical Integrator and Computer (ENIAC)

Second Generation Computers

Control Data Cyber 70 (CDC 70)

Sharif University of Technology – Computer Site

Third Generation Computers

DEC PDP-11/70

Fourth Generation Computers

Fifth Generation Computers

GRiDPad (1989)

Apple Newton (1993)

Smart Phones

Invisible Computers!

The History Of Microprosessors

Moore's Law

Transistor count doubles every 18 to 24 months
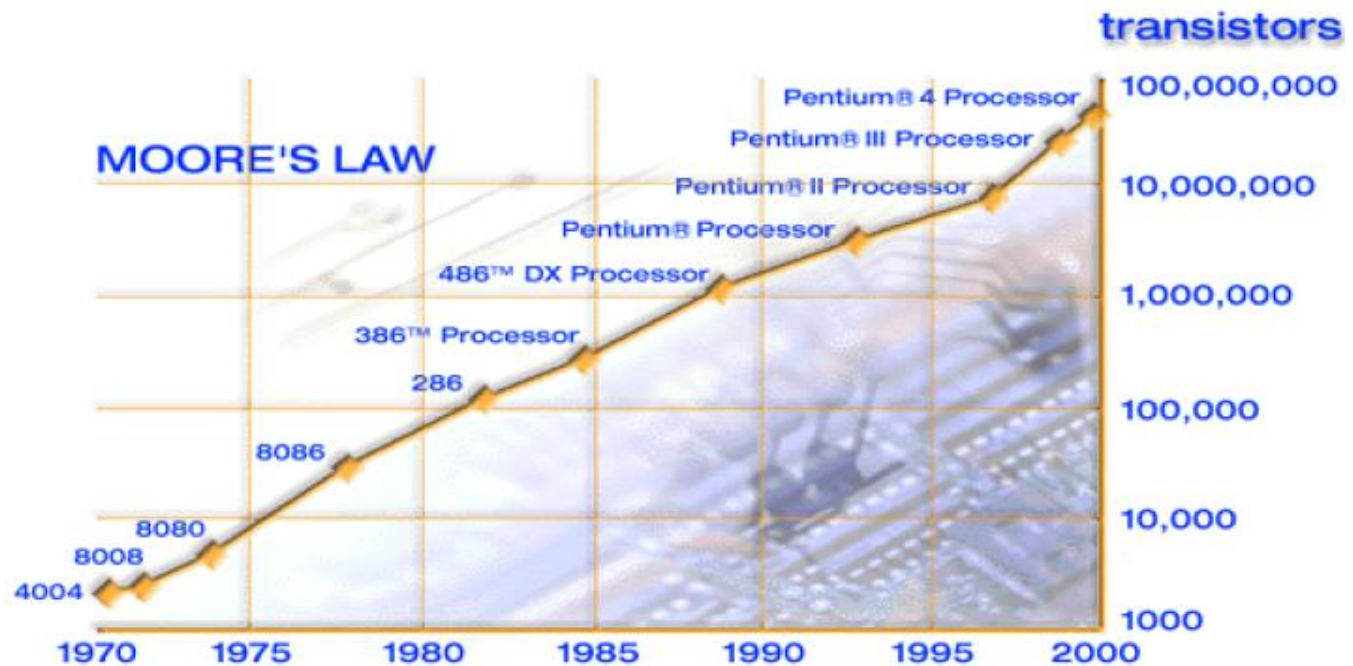
Corollaries of Moore's Law

- Computer *performance* doubles every 24 months

  - Per unit cost

- *Power consumption* doubles every 18 months

  - Per unit area

- Hard disk & RAM *storage capacity* doubles every 24 months

Memory Capacity Growth

Moore's law for (Intel) CPU chips

Gordon Moore *(a co-founder of Intel)*
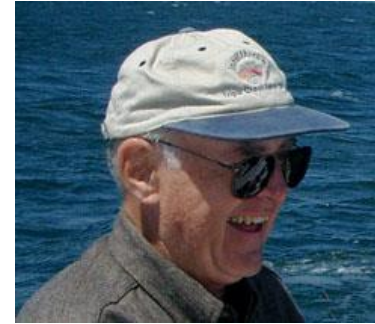
Computer Science Fiction

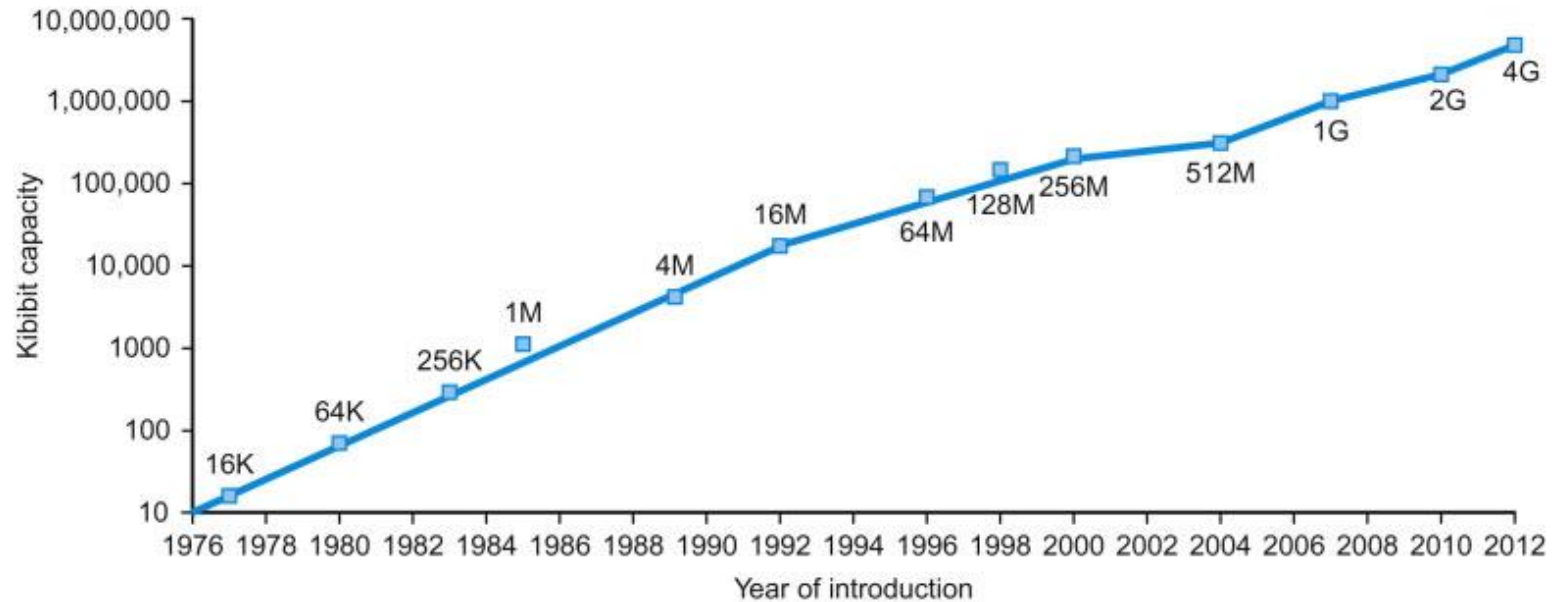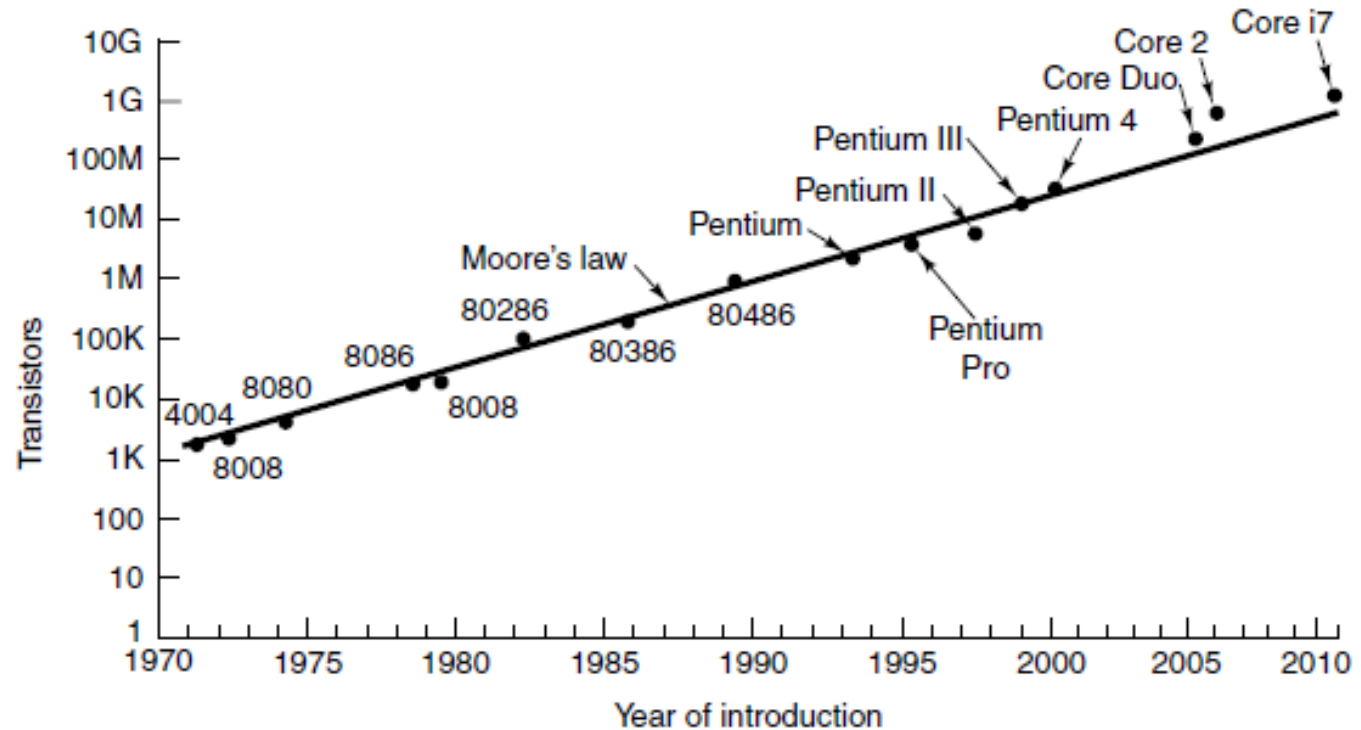*Applications that were economically infeasible have become practical at present*

- Computers in automobiles (thanks to µcontrollers)

- Cell phones (thanks to µcontrollers)

- Human genome project (thanks to the supercomputers)

- World Wide Web (thanks to the Internet)

- Search engines (thanks to ?)

ساختار و زبان کامپیوتر

Computer Systems Classes

○ Desktops

○ Servers

○ Embedded Systems

Desktop Computers

○ *General purpose computers*

○ *Variety of software*

○ *Designed for use by* *individuals*

○ *PCs, Notebooks*

Servers

○ *High-end computing systems*

  ● *Consists of several CPUs*

○ *Used by multiple users*

○ *Networked based*

○ *High capacity, performance, reliability*

○ *Range from small servers to building sized*

○ *Supercomputers highest performance servers*

  ● *hundreds of CPUs, TBs of memory, PBs of storage*

Servers *(cont.)*

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Embedded Computers

- *Designed to perform one or a few dedicated functions*

- *Specific Constraints*
  - *Real-time response*
  - *High reliability*
  - *Low power*
  - *Low cost*
  - *Small size/weight*

- *Hidden as components of systems*

Embedded Computers *(cont.)*

○ *Widest range of applications!*

- *Telecommunications systems: routers, ...*

- *Consumer electronics: cell phones, PDAs, MP3 players, digital cameras, printers, fax machines, ...*

- *Transportation systems: cars (ABS, airbag controller, ...), aircrafts, ...*
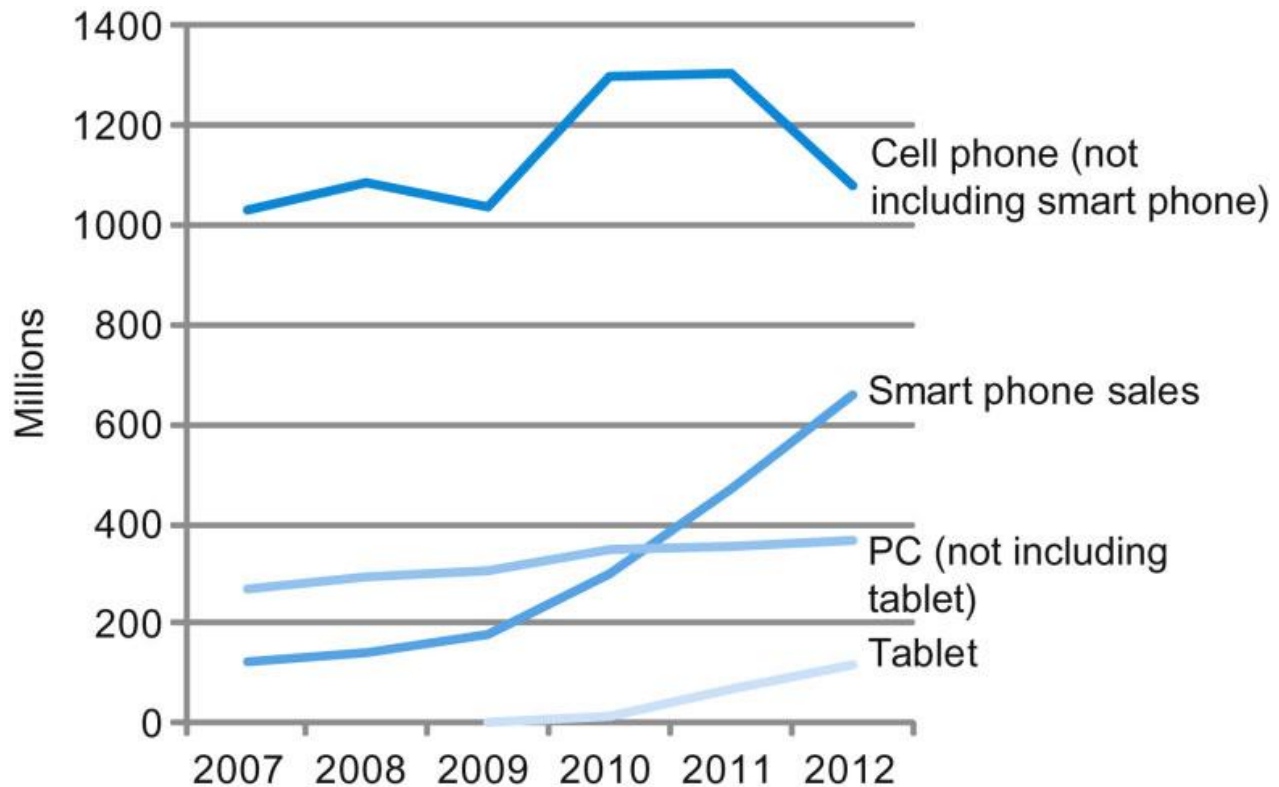
- *Medical equipment*

Embedded Computers *(cont.)*

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کامپیوتر
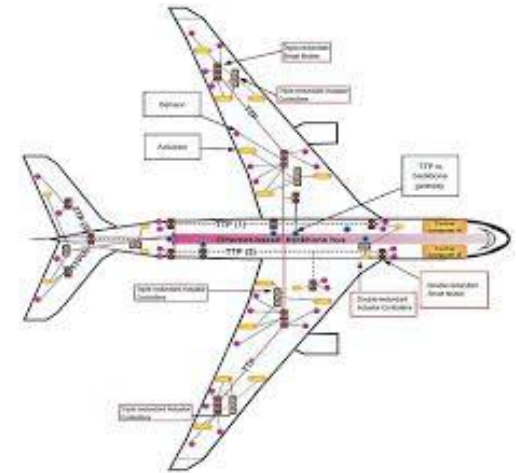
Market Share (before 2007)
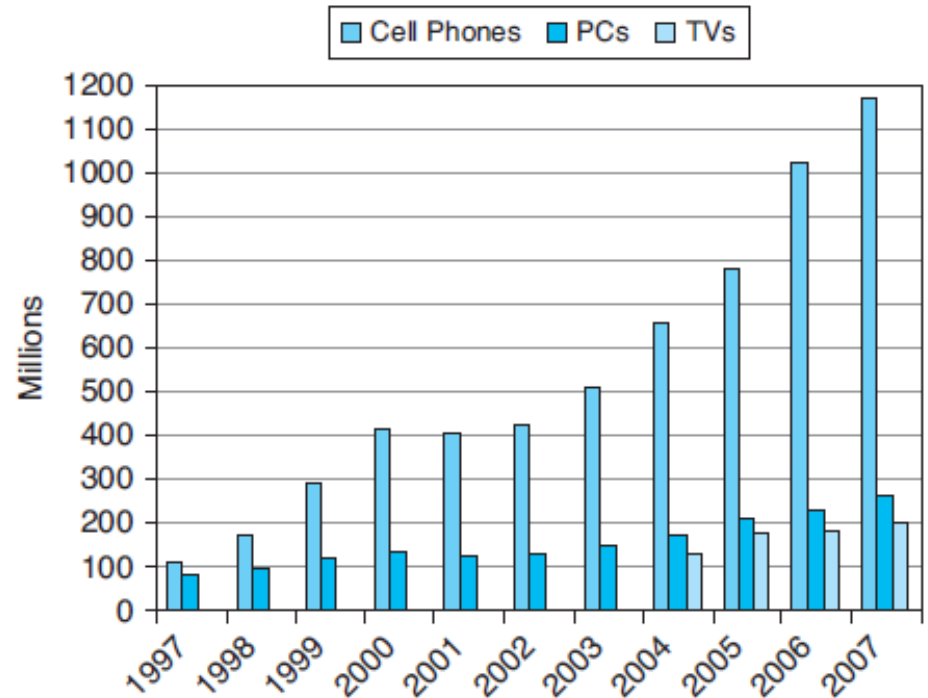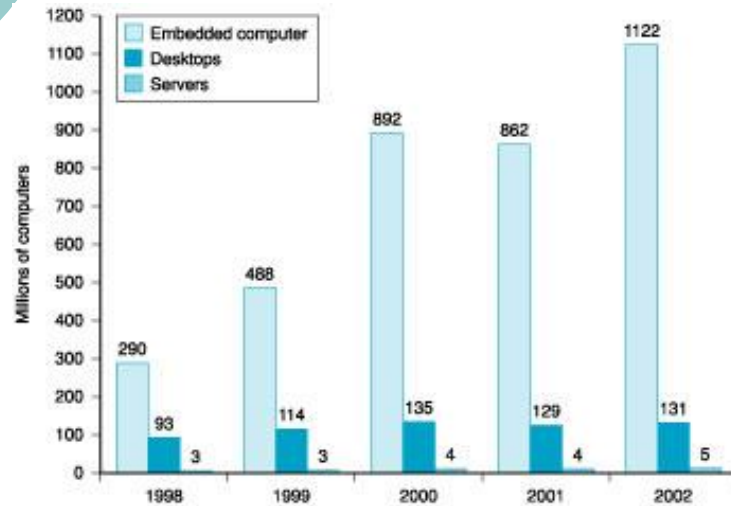
Post-PC Era (After 2007)

What About the Future ...