# INTRODUCTION to COMPUTERS

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## Definition of Computers

- A general-purpose machine that processes data according to a set of instructions that are stored internally either temporarily or permanently.
  - Input
  - Aritmetic and logical prosesses
  - Output
  - Data Storage
  - Using Stored Data





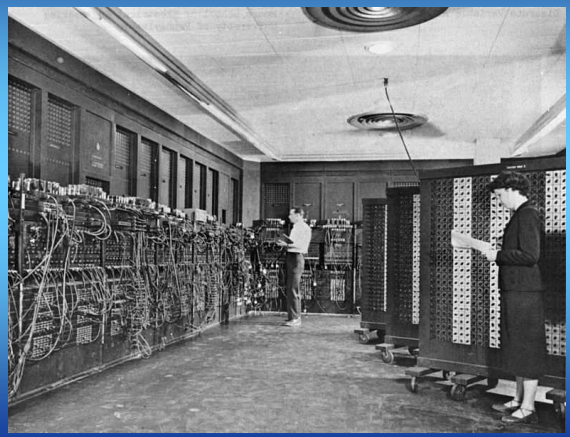
## Historical Development

- Ten Fingers
- Abacus
- Mechanic calculators (1642, Blaise Pascal)
- First electronic computer ENIAC (1945)
  - 18,000 electronic tube
  - 150 KWatt power
  - 30 tons of weight
  - 167 $m^2$ area
- First electronic digital computing device: Atanasoff-Berry Computer (1937)

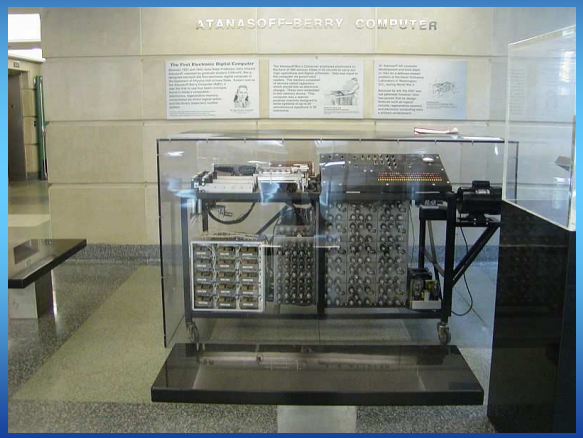




## ENIAC



## Atanasoff-Berry Computer








## Computer Generations

- First-generation computers, starting with the UNIVAC I in 1951, used vacuum tubes, and their memories were made of thin tubes of liquid mercury and magnetic drums.
- Second-generation systems (late 1950s) replaced tubes with transistors and used magnetic cores for memories. Size was reduced and reliability was significantly improved.
- Source: Computer Desktop Encyclopedia





## Computer Generations

- Third-generation computers, (mid-1960s) used the first integrated circuits and the first operating systems and DBMSs. Online systems were widely developed, although most processing was still batch oriented using punch cards and magnetic tapes.
- Source: Computer Desktop Encyclopedia





## Computer Generations

- The fourth generation (mid-1970s) brought us computers made entirely of chips. It spawned the microprocessor and personal computer. It introduced distributed processing and office automation. Query languages, report writers and spreadsheets put large numbers of people in touch with the computer for the first time. Even with the hundreds of millions of people using computers every day, we are still in the fourth generation. Some skill is still required to use the computer even if only to surf the Web and send e-mail.
- Source: Computer Desktop Encyclopedia

## Computer Generations

- The fifth generation implies faster hardware and more sophisticated software that uses artificial intelligence (AI) routinely. Natural language recognition is a major component of the fifth generation. When you can have a reasonably intelligent conversation with the average computer, you will be in the fifth generation, perhaps in the 2015-2020 time frame.

- Source: Computer Desktop Encyclopedia





## First Personal Computer: IBM 5150 PC

- 12 August 1981
- 1565 $ (2006 price app. 4000 $)
- Monitor: single color green
- Processor: 4.77 MHz
- Memory: 16 KB





## Commodore 64





## Working Principles of Computers

- Close Curciut / Current Passing / Electricity ➔ 1
- Open Curciut / No Current / No Electricity ➔ 0

Vacuum Tube


Transistor

## The Base-2 System

- Only 0 and 1 exist.
- Binary digits

- 0 = 00000000
- 1 = 00000001
- 2 = 00000010
- ...
- 254 = 11111110
- 255 = 11111111





## Bit and Byte

- Bit: The word **bit** is a shortening of the words "Binary digIT."
  - ❖Smallest data storage unit.
- Byte: Bits are rarely seen alone in computers. They are almost always bundled together into 8-bit collections, and these collections are called **bytes**.
  - ❖8 bits = 1 byte

- Source: http://www.howstuffworks.com/bytes1.htm





## ASCII Character Set

- Bytes are frequently used to hold individual characters in a text document.
- In the **ASCII character set**, each binary value between 0 and 127 is given a specific character.
- Most computers extend the ASCII character set to use the full range of 256 characters available in a byte.

- Source: http://www.howstuffworks.com/bytes2.htm





## ASCII Character Set

| Dec | Hx | Oct | Char | Dec | Hx | Oct | Html | Chr | Dec | Hx | Oct | Html | Chr | Dec | Hx | Oct | Html | Chr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 000 | NUL (null) | 32 | 20 | 040 |   | Space | 64 | 40 | 100 | @ | @ | 96 | 60 | 140 | ` | ` |
| 1 | 1 | 001 | SOH (start of heading) | 33 | 21 | 041 | ! | ! | 65 | 41 | 101 | A | A | 97 | 61 | 141 | a | a |
| 2 | 2 | 002 | STX (start of text) | 34 | 22 | 042 | " | " | 66 | 42 | 102 | B | B | 98 | 62 | 142 | b | b |
| 3 | 3 | 003 | ETX (end of text) | 35 | 23 | 043 | # | # | 67 | 43 | 103 | C | C | 99 | 63 | 143 | c | c |
| 4 | 4 | 004 | EOT (end of transmission) | 36 | 24 | 044 | $ | $ | 68 | 44 | 104 | D | D | 100 | 64 | 144 | d | d |
| 5 | 5 | 005 | ENQ (enquiry) | 37 | 25 | 045 | % | % | 69 | 45 | 105 | E | E | 101 | 65 | 145 | e | e |
| 6 | 6 | 006 | ACK (acknowledge) | 38 | 26 | 046 | & | & | 70 | 46 | 106 | F | F | 102 | 66 | 146 | f | f |
| 7 | 7 | 007 | BEL (bell) | 39 | 27 | 047 | ' | ' | 71 | 47 | 107 | G | G | 103 | 67 | 147 | g | g |
| 8 | 8 | 010 | BS (backspace) | 40 | 28 | 050 | ( | ( | 72 | 48 | 110 | H | H | 104 | 68 | 150 | h | h |
| 9 | 9 | 011 | TAB (horizontal tab) | 41 | 29 | 051 | ) | ) | 73 | 49 | 111 | I | I | 105 | 69 | 151 | i | i |
| 10 | A | 012 | LF (NL line feed, new line) | 42 | 2A | 052 | * | * | 74 | 4A | 112 | J | J | 106 | 6A | 152 | j | j |
| 11 | B | 013 | VT (vertical tab) | 43 | 2B | 053 | + | + | 75 | 4B | 113 | K | K | 107 | 6B | 153 | k | k |
| 12 | C | 014 | FF (NP form feed, new page) | 44 | 2C | 054 | , | , | 76 | 4C | 114 | L | L | 108 | 6C | 154 | l | l |
| 13 | D | 015 | CR (carriage return) | 45 | 2D | 055 | - | - | 77 | 4D | 115 | M | M | 109 | 6D | 155 | m | m |
| 14 | E | 016 | SO (shift out) | 46 | 2E | 056 | . | . | 78 | 4E | 116 | N | N | 110 | 6E | 156 | n | n |
| 15 | F | 017 | SI (shift in) | 47 | 2F | 057 | / | / | 79 | 4F | 117 | O | O | 111 | 6F | 157 | o | o |
| 16 | 10 | 020 | DLE (data link escape) | 48 | 30 | 060 | 0 | 0 | 80 | 50 | 120 | P | P | 112 | 70 | 160 | p | p |
| 17 | 11 | 021 | DC1 (device control 1) | 49 | 31 | 061 | 1 | 1 | 81 | 51 | 121 | Q | Q | 113 | 71 | 161 | q | q |
| 18 | 12 | 022 | DC2 (device control 2) | 50 | 32 | 062 | 2 | 2 | 82 | 52 | 122 | R | R | 114 | 72 | 162 | r | r |
| 19 | 13 | 023 | DC3 (device control 3) | 51 | 33 | 063 | 3 | 3 | 83 | 53 | 123 | S | S | 115 | 73 | 163 | s | s |
| 20 | 14 | 024 | DC4 (device control 4) | 52 | 34 | 064 | 4 | 4 | 84 | 54 | 124 | T | T | 116 | 74 | 164 | t | t |
| 21 | 15 | 025 | NAK (negative acknowledge) | 53 | 35 | 065 | 5 | 5 | 85 | 55 | 125 | U | U | 117 | 75 | 165 | u | u |
| 22 | 16 | 026 | SYN (synchronous idle) | 54 | 36 | 066 | 6 | 6 | 86 | 56 | 126 | V | V | 118 | 76 | 166 | v | v |
| 23 | 17 | 027 | ETB (end of trans. block) | 55 | 37 | 067 | 7 | 7 | 87 | 57 | 127 | W | W | 119 | 77 | 167 | w | w |
| 24 | 18 | 030 | CAN (cancel) | 56 | 38 | 070 | 8 | 8 | 88 | 58 | 130 | X | X | 120 | 78 | 170 | x | x |
| 25 | 19 | 031 | EM (end of medium) | 57 | 39 | 071 | 9 | 9 | 89 | 59 | 131 | Y | Y | 121 | 79 | 171 | y | y |
| 26 | 1A | 032 | SUB (substitute) | 58 | 3A | 072 | : | : | 90 | 5A | 132 | Z | Z | 122 | 7A | 172 | z | z |
| 27 | 1B | 033 | ESC (escape) | 59 | 3B | 073 | ; | ; | 91 | 5B | 133 | [ | [ | 123 | 7B | 173 | { | { |
| 28 | 1C | 034 | FS (file separator) | 60 | 3C | 074 | < | < | 92 | 5C | 134 | \ | \ | 124 | 7C | 174 | | | \| |
| 29 | 1D | 035 | GS (group separator) | 61 | 3D | 075 | = | = | 93 | 5D | 135 | ] | ] | 125 | 7D | 175 | } | } |
| 30 | 1E | 036 | RS (record separator) | 62 | 3E | 076 | > | > | 94 | 5E | 136 | ^ | ^ | 126 | 7E | 176 | ~ | ~ |
| 31 | 1F | 037 | US (unit separator) | 63 | 3F | 077 | ? | ? | 95 | 5F | 137 | _ | _ | 127 | 7F | 177 | &#127; | DEL |

Source: www.LookupTables.com

## Byte Prefixes

- 0 or 1 ➔ 1 bit (b)
- 8 bits = 1 byte (B)
- 1024 bayt = 1 kilobytes (KB)
- 1024 KB = 1 megabytes (MB)
- 1024 MB = 1 gigabytes (GB)
- 1024 GB = 1 terabytes (TB)
- 1024 TB = 1 petabytes (PB)
- 1024 PB = 1 exabytes
- 1024 exa bytes = 1 zetta bytes
- 1024 zetta bytes = 1 yotta bytes





## Bit and Byte Examples

- Pressing a key from keyboard ➔ 1 byte
- Text only e-mail ➔ 3-5 KB
- Ordinary word file ➔ 20-50 KB
- High density floppy ➔ 1.38 MB
- CD capacity ➔ 650 / 700 (80 minutes) / 800 MB
- DVD capacities
  - DVD (single side, single layer) ➔ 4.7GB (133 minutes)
  - DVD (single side, double layer) ➔ 8.5GB (240 minutes)
  - DVD (double side, single layer) ➔ 9.4GB (266 minutes)
  - DVD (double side, double layer) ➔ 17.0GB (481 minutes)





## Bit and Byte Examples

- Blu-ray capacities
  - Blu-ray (single side, single layer) ➔ 25 GB (4.5 hours)
  - Blu-ray (double side, single layer) ➔ 50 GB (9 hours)
  - Blu-ray (single side, dual layer) ➔ 50 GB (9 hours)
- HDD / SSD capacities ➔… 320 / 500 / 750 GB … 1 / 2 TB …





## Computer Types

- Super Computers

  (Scientific researchs, meteolorgical forecasts, internet search engines etc…)

- Medium Size Computers

  (Many user can connect at the same time)

- Personal Computers (PC)

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## Columbia Supercomputer - NASA Advanced Supercomputing Facility


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## Computer Types

- Personal Computers (PC)
  - Desktop
  - Laptop (Notebook - Netbook - Ultrabook)
  - Palm PC / Pocket PC / Tablet PC

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## Laptop


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## Tablet PC

# Personal Computers

- PC is a general computing device with these characteristics:
  - designed for use by one person at a time
  - runs an operating system to interface between the user and the microprocessor
  - has certain common internal components like a CPU and RAM
  - runs software applications designed for specific work or play activities
  - allows for adding and removing hardware or software as needed
- Source: http://computer.howstuffworks.com/pc.htm





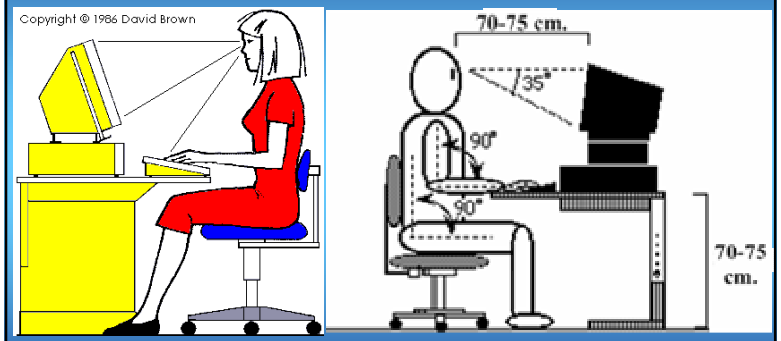
# Important Issues During Personal Computer Usage

- Dust
- Sunlight
- Impacts
- Grounding
- Correct siting position
- Computer ergonomics





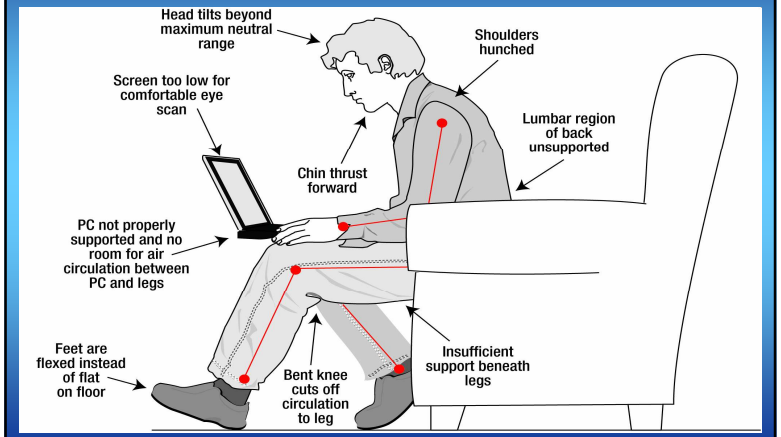
# Correct siting position








# Wrong seating



# Computer Ergonomics