

Chapter 1 - Introduction

Aims:

- ▶ Outline of the history of the computer.
- ▶ Contrasting hardware and software.
- ▶ Definition of basic terms.
- ▶ Contrasting data and information
- ▶ Contrast differing processing methods



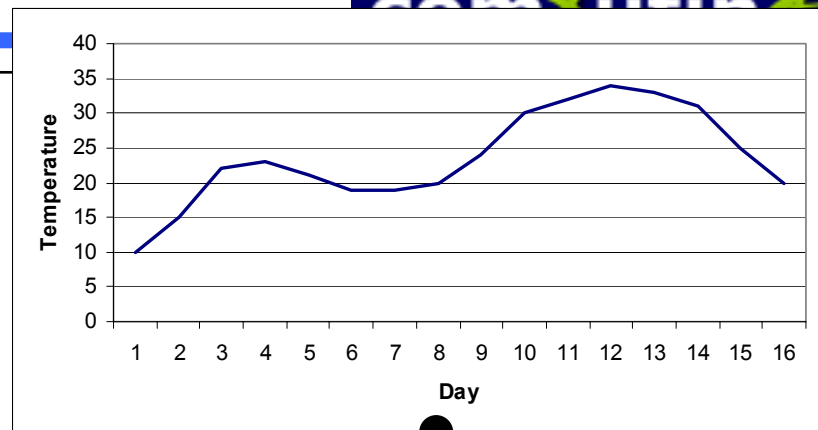
- ▶ **1st generation.** Valves (ENIAC). 1950s.
- ▶ **2nd generation.** Transistors (PDP-1). 1960s.
- ▶ **3rd generation.** Integrated circuits/time-sharing (IBM System/360). 1970s.
- ▶ **4th generation.** Large-scale integration (ZX81). 1980s.
- ▶ **5th generation.** Systems-on-a-chip (Pentium-based PCs). 1990s.
- ▶ **6th generation.** Mobile computing/embedded Internet/parallel processing. 2000 and beyond.

- ▶ Allows for easy updates, as a change of software updates the functionality.
- ▶ Allows easier development, as software can be more easily changed than hardware can.
- ▶ Allows software codes to be generated from a high-level programming language, which is easier to understand than electronic circuit diagrams. This high-level programming language is defined in a form which is similar to written English form.

- ▶ **b (Bit)**. A bit is a single binary digit of information, which can either be a zero (0) or a one (1). Computers can only understand binary information. Sometimes, to differentiate the unit from a byte (B), it is written as a bit without a space after the value (such as 8bit, as apposed to 8B, for 8 bytes).
- ▶ **Bps (Bits per second)**. The number of bits transferred between one place and another, per second.
- ▶ **B (Byte)** A byte is a group of 8 bits. Computers normally operate on multiples of 8 bits, such as 8 bits, 16 bits, 32 bits, 64 bits, and so on.
- ▶ **KB (Kilobyte)**. One thousand bytes. In binary, one thousand bytes is actually 1,024 bytes.
- ▶ **KB/s (Kilobyte/second)**. The number of KBs transferred per second.
- ▶ **MB (Megabyte)** One million (1,048,576 or 1024 K) bytes.
- ▶ **MB/s (Megabyte/second)**.The number of MBs transferred per second.
- ▶ **GB (Gigabyte)**. One billion (1,073,741,824 or 1024 M) bytes.

- ▶ **Data** is the raw form that is used to create information, such as a weather forecaster may gather measurements of air pressure and temperature over a given time period and then create a trend graph to show how these varied over time.
- ▶ The air pressure and temperature measurements would be taken as data, while the trend graph would be the information. Then, based on these trends the forecaster might predict into the future. This generates new data.
- ▶ With this data the forecaster might produce a weather chart which converts the temperatures into colours, and the pressure data into isobars. This has converted data into information.
- ▶ **Information** thus involves some sort of processing of the data, such as converting temperature values into colours on a map, or points on a graph (as illustrated next).

	A	B
1	Day	Temperature
2	1	10
3	2	15
4	3	22
5	4	23
6	5	21
7	6	19
8	7	19
9	8	20
10	9	24
11	10	30
12	11	32
13	12	34
14	13	33
15	14	31
16	15	25
17	16	20



Data

Information

Processing

- Thresholding.
- Filtering.
- Prediction.
- Mathematical.
- Presentation.

Convert to other forms

	A	B	C
1	Day	Temp (C)	Temp (F)
2	1	10	50
3	2	15	59
4	3	22	72

Information can then be used as data for other information sources

- ▶ **Mathematical processing.** The processing determines the average value (in Microsoft Excel this is defined with `=AVERAGE(B2:B17)`) and the standard deviation (in Microsoft Excel this is defined with `=STDEV(B2:B17)`) of temperature over each of the days.
- ▶ **Threshold processing.** The processing displays the value of 'Cool' if the temperature is 20°C, or below, else it will show the value of 'Warm' (in Microsoft Excel this is defined in the form of `=IF(B2>20,"Warm","Cool")`).
- ▶ **Filtering/ordering processing.** The processing displays the temperature values in a number of temperature frequency bins. In this case the bins are set between 0 –10, 11–15, 16–20, and so on (in Microsoft Excel this is defined in the form of `=FREQUENCY(B2:B17,G25:K25)`).

- ▶ **Prediction processing.** The processing determines a forecasted formula for future days, using a basic average of the previous three days (in Microsoft Excel this is defined in the form of `=AVERAGE(B9:B11)`).
- ▶ **Presentation processing.** The processing displays the temperature values in the form of a bar chart. Most people prefer to view temperature trending in the form of a bar or a line graph, rather than as values.

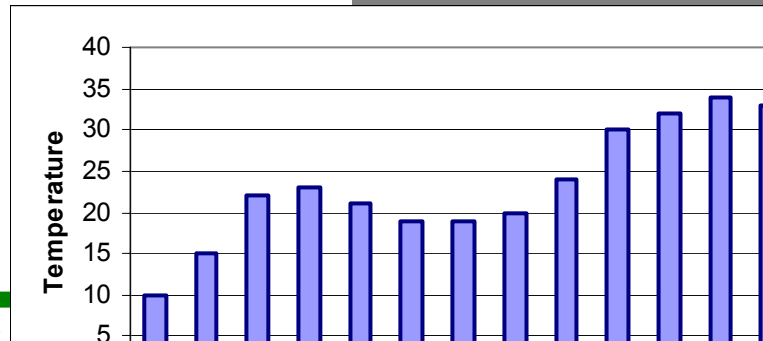
Day	Temperature
1	10
2	15
3	22
4	23
5	21
6	19
7	19
8	20
9	24
10	30
11	32
12	34
13	33
14	31
15	25
16	20

Day	Temp (C)	Threshold
1	10	Cool
2	15	Cool
3	22	Warm
4	23	Warm
5	21	Warm
6	19	Cool
7	19	Cool
8	20	Cool
9	24	Warm
10	30	Warm
11	32	Warm

Day	Temp (C)
14	31
15	25
16	20
17	25
18	23
19	23
8	20
9	24
10	30
11	32
12	34
13	33
14	31
15	25
16	20
Average	23.6
Std. Dev.	6.8

Range	Frequency
0-10	1
11-15	1
16-20	4
21-25	5
26-29	1
30-34	4

- ## Processing
- Thresholding.
 - Filtering.
 - Prediction.
 - Mathematical.
 - Presentation.



Left/right wing

Data

Smith, A	10,010	(49.5%)
Arnold, B	5,432	(26.9%)
Sinkly, C	4,211	(20.8%)
Spoilt papers	555	(2.7%)

Unspoilt papers	19,653	(97.3%)
Spoilt papers	555	(2.7%)

Spoilt/unspoilt



Greenwell	10,806	(53.5%)
Colinton	3,333	(16.5%)
Uptown	5,648	(27.9%)
Downtown	421	(2.1%)

Left-wing party	9,643	(49.1%)
Right-wing party	10,010	(50.9%)

