Information and Communication Technologies (ICT)

The role of ICT in key sectors of the development of society. Standards in the field of ICT

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Students are forbidden to:

- submit any tasks after the deadline.
- cheat. Plagiarized papers shall not be graded;
- be late for classes;
- retake any tests, unless there is a valid reason for missing them;
- chew gum in class
- Starting meeting in Teams channel without teacher permission

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LECTURES

1 **The role of ICTs in key sectors of society. ICT Standards.**

2 Introduction into computer systems. Architecture of computer systems.

3 Software. OS.

4 Human-computer interaction.

5 Database systems.

6 Data analysis. Data management.

7 Networks and Telecommunications.

8 Cyber safety.

9 Internet technologies.

10 Cloud and Mobile technologies.

11 Multimedia technologies

12 Smart technology.

13 E-technology. E-business. E-learning. E-government.

14 Information technology in the professional sphere. Industrial ICT.

15 ICT Development Prospects

✔ **The course provides** an overview of the **major conceptual** paradigms of **Information and Communication Technologies**, from their **theoretical foundations** to **practical implementation**

✔ Topics will include

- **Architecture of Computer Systems**
- **Operating systems** and **software**
- **Network technologies** and **telecommunications**
- **ICTs** in the **professional field**
- **Perspective trends** of **ICTs**

What technologies?

- What do you understand by Information and Communication Technologies?

ICT refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums.

IN WHICH INDUSTRIES IS ICT USED?

Number Systems

Data Representation refers to the form in which **data** is stored, processed, and transmitted.

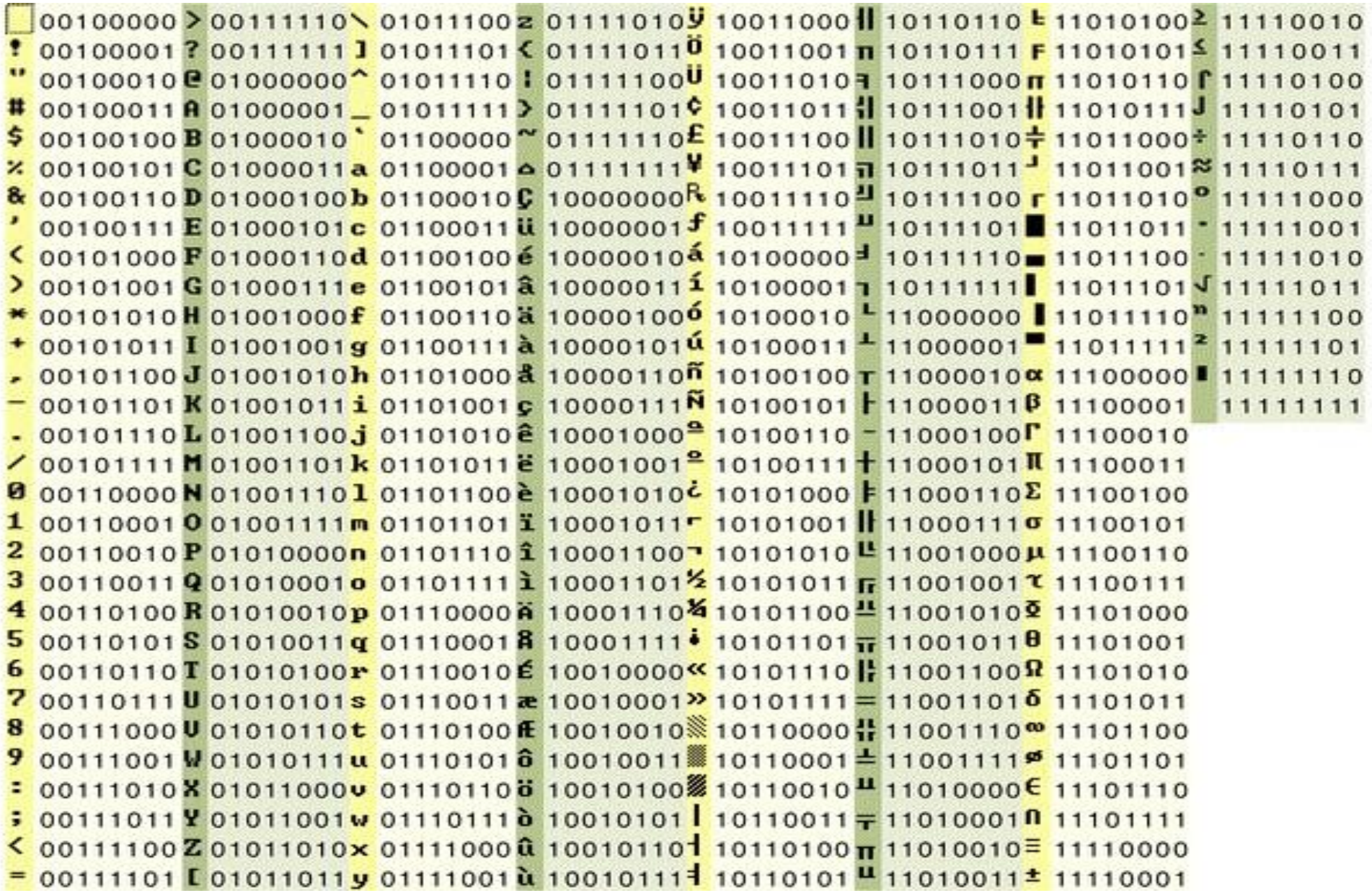
Four number systems:

- Decimal (10)
- Binary (2)
- Octal (8)
- Hexadecimal (16)

General information

- A piece of data, such as an alphabet letter, may be represented using a sequence of binary digits- 0's and 1's. There are several types of codes used to represent character data. For example, using extended ASCII (America Standard Code for Information Interchange) code, the alphabet letter "a" can be represented using a series of eight binary digits, "01100001." Each binary digit is called a **bit**. And, eight bits is one **byte**.

ASCII code


00100000 00111110 01011100 01111010 10011000 10110110 11010100 11110010
00100001 00111111 01011101 01111011 10011001 10110111 11010101 11110011
00100010 01000000 01011110 01111100 10011010 10111000 11010110 11110100
00100011 01000001 01011111 01111101 10011011 10111001 11010111 11110101
00100100 01000010 01100000 01111110 10011100 10111010 11011000 11110110
00100101 01000011 01100001 01111111 10011101 10111011 11011001 11110111
00100110 01000100 01100010 10000000 10011110 10111100 11011010 11111000
00100111 01000101 01100011 10000001 10011111 10111101 11011011 11111001
00101000 01000110 01100100 10000010 10100000 10111110 11011100 11111010
00101001 01000111 01100101 10000011 10100001 10111111 11011101 11111011
00101010 01001000 01100110 10000100 10100010 11000000 11011110 11111100
00101011 01001001 01100111 10000101 10100011 11000001 11011111 11111101
00101100 01001010 01101000 10000110 10100100 11000010 11100000 11111110
00101101 01001011 01101001 10000111 10100101 11000011 11100001 11111111
00101110 01001100 01101010 10001000 10100110 11000100 11100010
00101111 01001101 01101011 10001001 10100111 11000101 11100011
00110000 01001110 01101100 10001010 10101000 11000110 11100100
00110001 01001111 01101101 10001011 10101001 11000111 11100101
00110010 01010000 01101110 10001100 10101010 11001000 11100110
00110011 01010001 01101111 10001101 10101011 11001001 11100111
00110100 01010010 01110000 10001110 10101100 11001010 11101000
00110101 01010011 01110001 10001111 10101101 11001011 11101001
00110110 01010100 01110010 10010000 10101110 11001100 11101010
00110111 01010101 01110011 10010001 10101111 11001101 11101011
00111000 01010110 01110100 10010010 10110000 11001110 11101100
00111001 01010111 01110101 10010011 10110001 11001111 11101101
00111010 01011000 01110110 10010100 10110010 11010000 11101110
00111011 01011001 01110111 10010101 10110011 11010001 11101111
00111100 01011010 01111000 10010110 10110100 11010010 11110000
00111101 01011011 01111001 10010111 10110101 11010011 11110001

Binary → Decimal

$$1101 = 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$
$$= 1 \times 8 + 1 \times 4 + 0 \times 2 + 1 \times 1$$
$$= 8 + 4 + 0 + 1$$

$$(1101)_2 = (13)_{10}$$

1, 2, 4, 8, 16, 32, 64, 128, 256, 512, ...

Decimal → Binary

2	13	1
2	6	0
2	3	1
2	1	1
	0	

$$(13)_{10} = (1101)_2$$

Decimal → Octal

8	95	7
8	11	3
8	1	1
	0	

$$(95)_{10} = (137)_8$$

Octal → Decimal

$$137 = 1 \times 8^2 + 3 \times 8^1 + 7 \times 8^0$$

$$= 1 \times 64 + 3 \times 8 + 7 \times 1$$

$$= 64 + 24 + 7$$

$$(137)_8 = (95)_{10}$$

- Digits used in Octal number system – 0 to 7

Hex → Decimal

$$BAD = 11 \times 16^2 + 10 \times 16^1 + 13 \times 16^0$$

$$= 11 \times 256 + 10 \times 16 + 13 \times 1$$

$$= 2816 + 160 + 13$$

$$(BAD)_{16} = (2989)_{10}$$

A = 10, B = 11, C = 12, D = 13, E = 14, F = 15

Decimal → Hex

16	2989	13
16	186	10
16	11	11
	0	

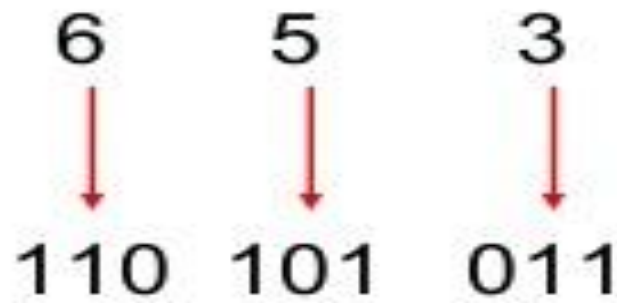
$$(2989)_{10} = (BAD)_{16}$$

Octal to Binary Conversion

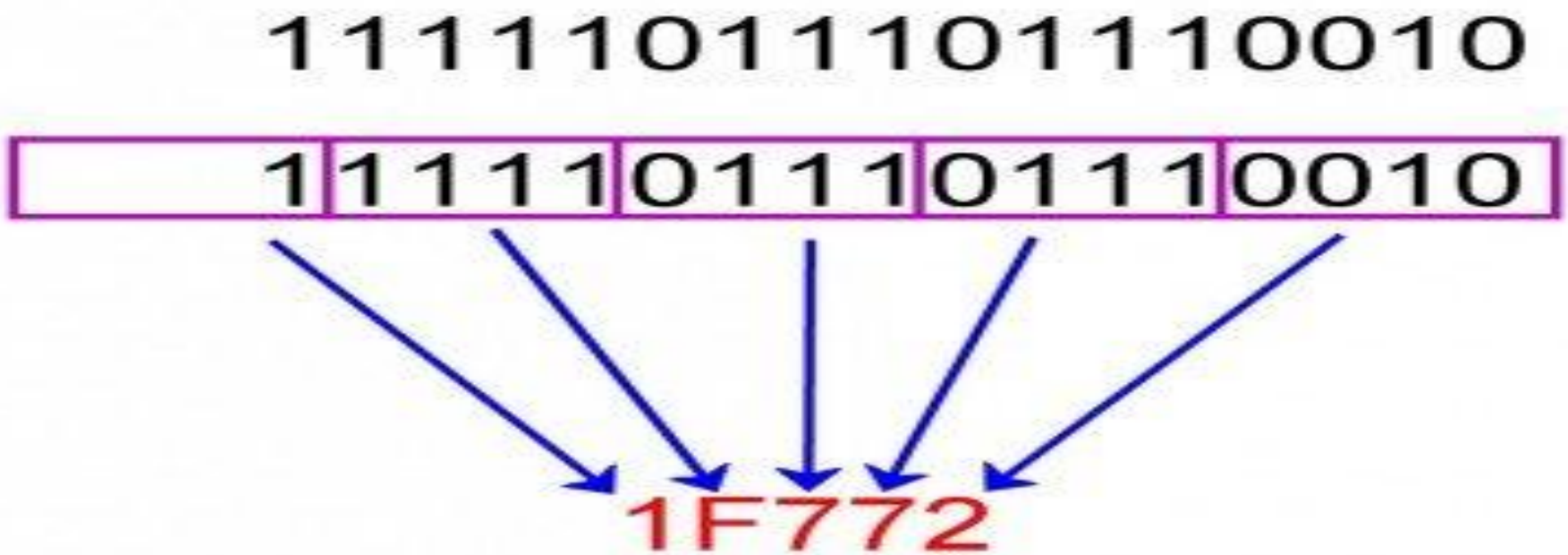
Each octal number converts to 3 binary digits

Code
0 - 000
1 - 001
2 - 010
3 - 011
4 - 100
5 - 101
6 - 110
7 - 111

To convert 653_8 to binary, just substitute code:



Converting Binary to Hex



Starting from the right, divide up into blocks of 4 digits

Write down the hex value of each block

$$1111101111010110010_2 = 1F772_{16}$$

Given hexadecimal number = $A2B_{16}$

First, convert the given hexadecimal to the equivalent decimal number.

$A2B_{16} = (A \times 16^2) + (2 \times 16^1) + (B \times 16^0)$

$= (A \times 256) + (2 \times 16) + (B \times 1)$

$= (10 \times 256) + 32 + 11$

$= 2560 + 43$

$= 2603$(Decimal number)

Now we have to convert 2603_{10} to binary

2 | 2603
2 | 1301 -- 1
2 | 650 -- 1
2 | 325 -- 0
2 | 162 -- 1
2 | 81 -- 0
2 | 40 -- 1
2 | 20 -- 0
2 | 10 -- 0
2 | 5 -- 0
2 | 2 -- 1
2 | 1 -- 0
2 | 0 -- 1

The binary number obtained is 101000101011_2

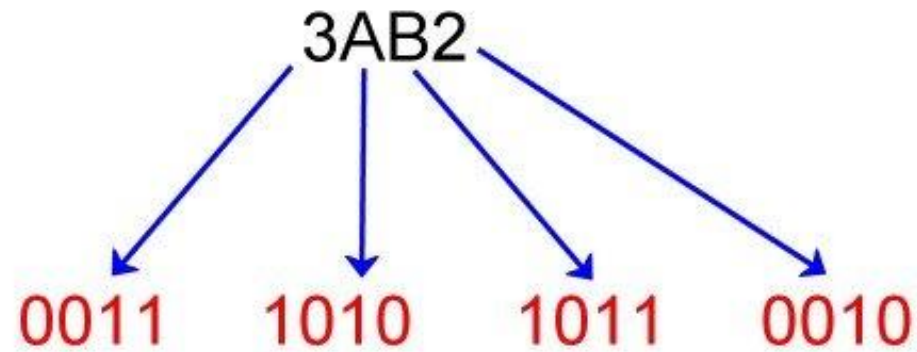
Hence, $A2B_{16} = 101000101011_2$

Converting Hex to Binary

How to convert from hex to binary

Convert each hex digit to 4 binary digits according to this table:

Hex	Binary
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111



$3AB2_{16} = 1110101011001 0_2$

$(1AC)_{16}$ → Hexadecimal number

1 A C

0001 1010 1100 → Binary equivalent of each hexadecimal grouped digit

$(1AC)_{16} = (000110101100)_2$

Hex to Octal Conversion

Ex : Convert $E8A_{16}$ to octal

First convert the hex to binary:

$1110\ \ 1000\ \ 1010_2$

111 010 001 010 and re-group by 3 bits (starting on the right)

Then convert the binary to octal:

7 2 1 2

So $E8A_{16} = 7212_8$

Octal->hex

Step 1:

Octal to Binary Conversion

7	5	2
111	101	010

So the binary equivalent is 111101010

Step 2:

Binary to Hex Conversion

0001	1110	1010
1	D	9

Number system conversion table from 1 to 15

Decimal Number Base-10	Binary Number Base-2	Octal Number Base-8	Hexadecimal Number Base-16
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

HOMETASK for the next week

1) Be ready to Defense your 1 Lab
2) Be ready to answer questions from the lecture & labs
3) be able to solve problems (ex. Decimal->binary etc)
4) Upload lab1 before deadline

THANK YOU FOR YOUR ATTENTION!!!