

Information and Communication Technologies (ICT)

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

**Aigerim Kairatovna Aitim
Senior-Lecturer of IS department
Master of Technical Sciences
E-mail: a.aitim@iitu.edu.kz**

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



A circular badge with a serrated black border and a white center. A red ribbon banner is draped across the center, containing the text "Course Overview" in white. The text "Course" is on the top line and "Overview" is on the bottom line, both in a bold, sans-serif font.

Course Overview

- ✓ **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?

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

0	00100000	>	00111110	\	01011100	z	01111010	ÿ	10011000		10110110	£	11010100	z	11110010
!	00100001	?	00111111]	01011101	<	01111011	ö	10011001	n	10110111	F	11010101	z	11110011
"	00100010	@	01000000	^	01011110	!	01111100	ü	10011010	3	10111000	π	11010110	Γ	11110100
#	00100011	A	01000001	_	01011111	>	01111101	ç	10011011		10111001		11010111	J	11110101
\$	00100100	B	01000010	`	01100000	~	01111110	É	10011100		10111010	†	11011000	÷	11110110
%	00100101	C	01000011	a	01100001	△	01111111	¥	10011101	π	10111011	J	11011001	Σ	11110111
&	00100110	D	01000100	b	01100010	Ç	10000000	℞	10011110	π	10111100	r	11011010	°	11111000
'	00100111	E	01000101	c	01100011	ü	10000001	ƒ	10011111	μ	10111101	■	11011011	·	11111001
<	00101000	F	01000110	d	01100100	é	10000010	á	10100000	3	10111110	■	11011100	·	11111010
>	00101001	G	01000111	e	01100101	â	10000011	í	10100001	7	10111111		11011101	√	11111011
*	00101010	H	01001000	f	01100110	ä	10000100	ó	10100010	L	11000000		11011110	³	11111100
+	00101011	I	01001001	g	01100111	à	10000101	ú	10100011	L	11000001	■	11011111	²	11111101
,	00101100	J	01001010	h	01101000	ä	10000110	ñ	10100100	T	11000010	α	11100000	■	11111110
-	00101101	K	01001011	i	01101001	ç	10000111	Ñ	10100101	†	11000011	β	11100001	■	11111111
.	00101110	L	01001100	j	01101010	ê	10001000	ª	10100110	-	11000100	Γ	11100010		
/	00101111	M	01001101	k	01101011	ë	10001001	º	10100111	†	11000101	Π	11100011		
0	00110000	N	01001110	l	01101100	è	10001010	¿	10101000	†	11000110	Σ	11100100		
1	00110001	O	01001111	m	01101101	ï	10001011	ƒ	10101001		11000111	σ	11100101		
2	00110010	P	01010000	n	01101110	î	10001100	ª	10101010		11001000	μ	11100110		
3	00110011	Q	01010001	o	01101111	ì	10001101	½	10101011	π	11001001	τ	11100111		
4	00110100	R	01010010	p	01110000	ñ	10001110	¾	10101100		11001010	ϙ	11101000		
5	00110101	S	01010011	q	01110001	ß	10001111	¿	10101101		11001011	θ	11101001		
6	00110110	T	01010100	r	01110010	É	10010000	«	10101110		11001100	Ω	11101010		
7	00110111	U	01010101	s	01110011	æ	10010001	»	10101111	=	11001101	δ	11101011		
8	00111000	V	01010110	t	01110100	€	10010010	☰	10110000		11001110	∞	11101100		
9	00111001	W	01010111	u	01110101	ô	10010011	☱	10110001		11001111	∞	11101101		
:	00111010	X	01011000	v	01110110	ö	10010100	☲	10110010	μ	11010000	€	11101110		
;	00111011	Y	01011001	w	01110111	ò	10010101		10110011	†	11010001	π	11101111		
<	00111100	Z	01011010	x	01111000	û	10010110	†	10110100	π	11010010	≡	11110000		
=	00111101	[01011011	y	01111001	ù	10010111	†	10110101	μ	11010011	±	11110001		

Binary \rightarrow Decimal

$$\begin{aligned}1101 &= 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 \\ &= 1 \times 8 + 1 \times 4 + 0 \times 2 + 1 \times 1 \\ &= 8 + 4 + 0 + 1\end{aligned}$$

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

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

Decimal \rightarrow Binary

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

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

Decimal \rightarrow Octal

8		95	7
8		11	3
8		1	1
		0	



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

Octal \rightarrow Decimal

$$\begin{aligned}137 &= 1 \times 8^2 + 3 \times 8^1 + 7 \times 8^0 \\ &= 1 \times 64 + 3 \times 8 + 7 \times 1 \\ &= 64 + 24 + 7\end{aligned}$$

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

- Digits used in Octal number system – 0 to 7

Hex \rightarrow Decimal


$$\begin{aligned} \text{BAD} &= 11 \times 16^2 + 10 \times 16^1 + 13 \times 16^0 \\ &= 11 \times 256 + 10 \times 16 + 13 \times 1 \\ &= 2816 + 160 + 13 \end{aligned}$$

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

$$\text{A} = 10, \text{B} = 11, \text{C} = 12, \text{D} = 13, \text{E} = 14, \text{F} = 15$$

Decimal \rightarrow Hex

16		2989	13
16		186	10
16		11	11
		0	



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

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:

6 5 3
↓ ↓ ↓
110 101 011

Converting Binary to Hex

11111011101110010

1111 1011 1011 0010

1F772

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

Write down the hex value of each block

$11111011101110010_2 = 1F772_{16}$

Given hexadecimal number = $A2B_{16}$

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

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

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

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

$$= 2560 + 43$$

$$= 2603(\text{Decimal number})$$

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

$$\begin{array}{r} 2 \mid \underline{2603} \\ 2 \mid \underline{1301} \text{ -- } 1 \\ 2 \mid \underline{650} \text{ -- } 1 \\ 2 \mid \underline{325} \text{ -- } 0 \\ 2 \mid \underline{162} \text{ -- } 1 \\ 2 \mid \underline{81} \text{ -- } 0 \\ 2 \mid \underline{40} \text{ -- } 1 \\ 2 \mid \underline{20} \text{ -- } 0 \\ 2 \mid \underline{10} \text{ -- } 0 \\ 2 \mid \underline{5} \text{ -- } 0 \\ 2 \mid \underline{2} \text{ -- } 1 \\ 2 \mid \underline{1} \text{ -- } 0 \\ 2 \mid \underline{0} \text{ -- } 1 \end{array}$$

The binary number obtained is 101000101011_2

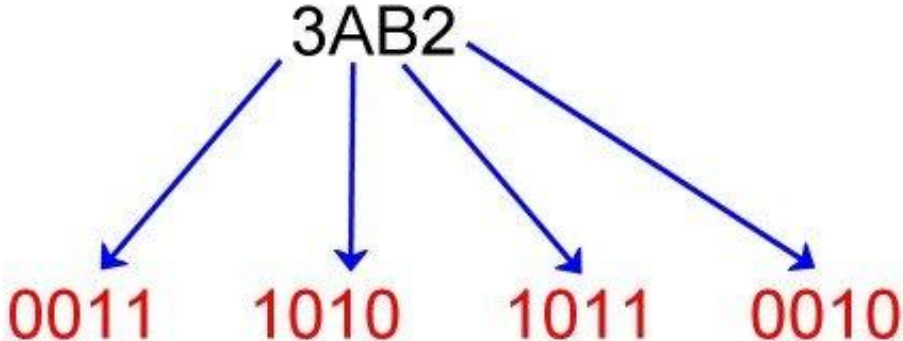
Hence, $A2B_{16} = 101000101011_2$

Converting Hex to Binary

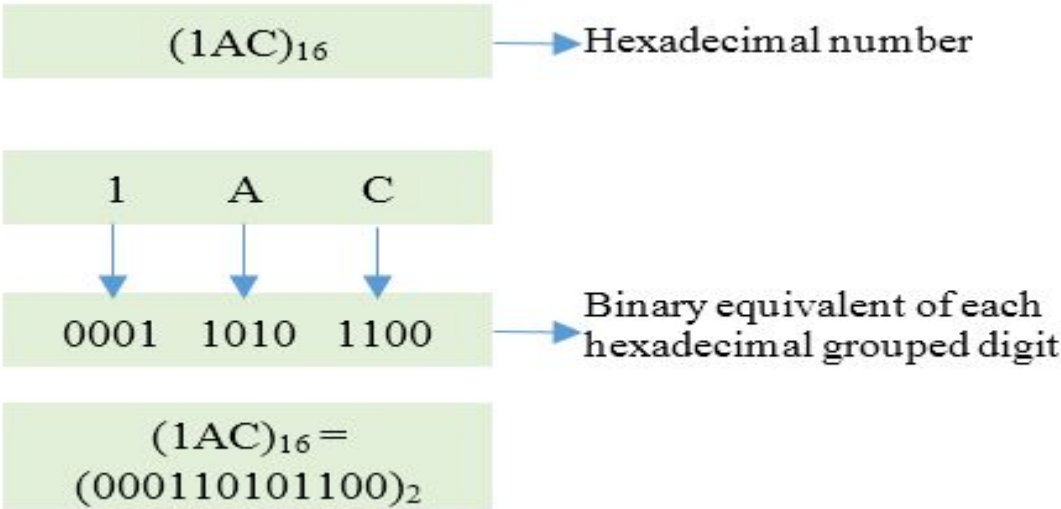
How to convert from hex to binary

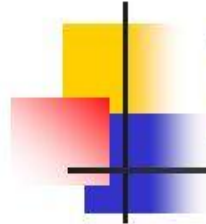
Convert each hex digit to 4 binary digits according to this table:

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



$$3AB2_{16} = 11101010110010_2$$





Hex to Octal Conversion

Octal->hex

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 $E8A_{16} = 7212_8$

Step 1:
Octal to Binary Conversion

7	5	2
111	101	010

So the binary equivalent is 111101010

Step 2:
Binary to Hex Conversion

<u>0001</u>	<u>1110</u>	<u>1010</u>
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!!!**