Higher Diploma in Computer Science

Computer Systems & Networks

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Ireland's European Structural and Investment Funds Programmes 2014-2020
Co-funded by the Irish Government and the European Union

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SETU
Ollscoil Teicneolaíochta an Oirdheiscirt
South East Technological University

1) Memory was something that you lost with age
2) An application was for employment
3) A program was a TV show
4) A cursor used profanity
5) A keyboard was a piano!
6) A web was a spider's home
7) A virus was the flu!
8) A CD was a bank account
9) A hard drive was a long trip on the road
10) A mouse pad was where a mouse lived

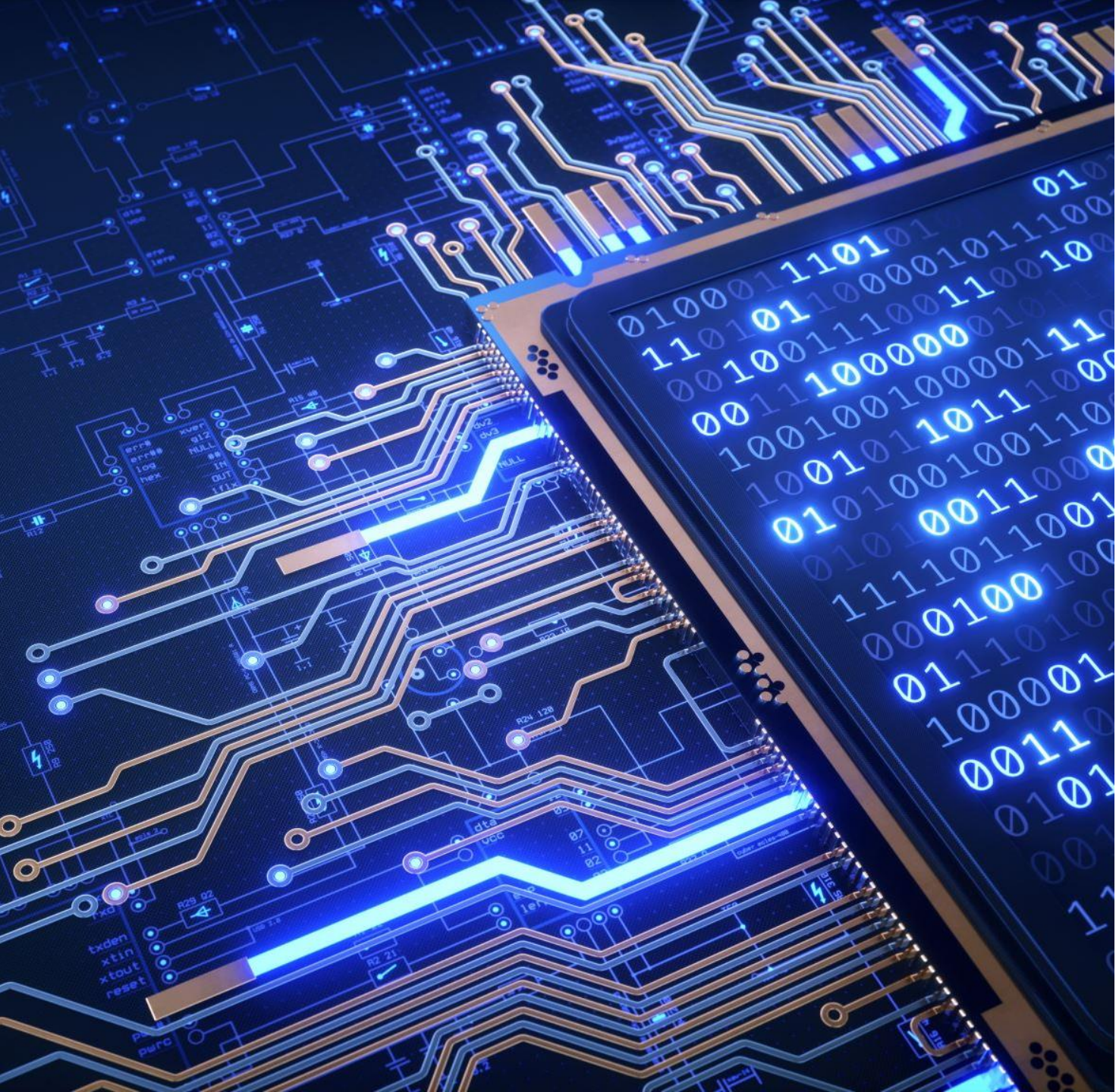
Numbering Systems in Computing

- There are basically four major types of number systems that are namely
-
  1. binary (base2),
- 2. decimal (base10),
- 3. octal (base8) and
- 4. hexadecimal (base16)


Number bases

Number Bases in Computer Systems

Decimal (base 10)	Binary (base 2)	Octal (base 8)	Hexadecimal (base 16)
00	0000	00	0
01	0001	01	1
02	0010	02	2
03	0011	03	3
04	0100	04	4
05	0101	05	5



Binary

1 inputs: binary

- For 1 input there are 2^1 possible outputs
- Represents either being on/off

INPUT 1: Light	POSSIBLE OUTPUTS:
0	Light off
1	Light on

(1) NUMBER BASE: Binary

- a base-2 numeral system that uses two symbols (typically represented as) 0 and 1, to represent numeric values

	Column 8	Column 7	Column 6	Column 5	Column 4	Column 3	Column 2	Column 1
$Base^{exp}$	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Weight	128	64	32	16	8	4	2	1

Sample Storage amounts:

1 TB

512 GB

256 GB

128 GB

64 GB

16 GB

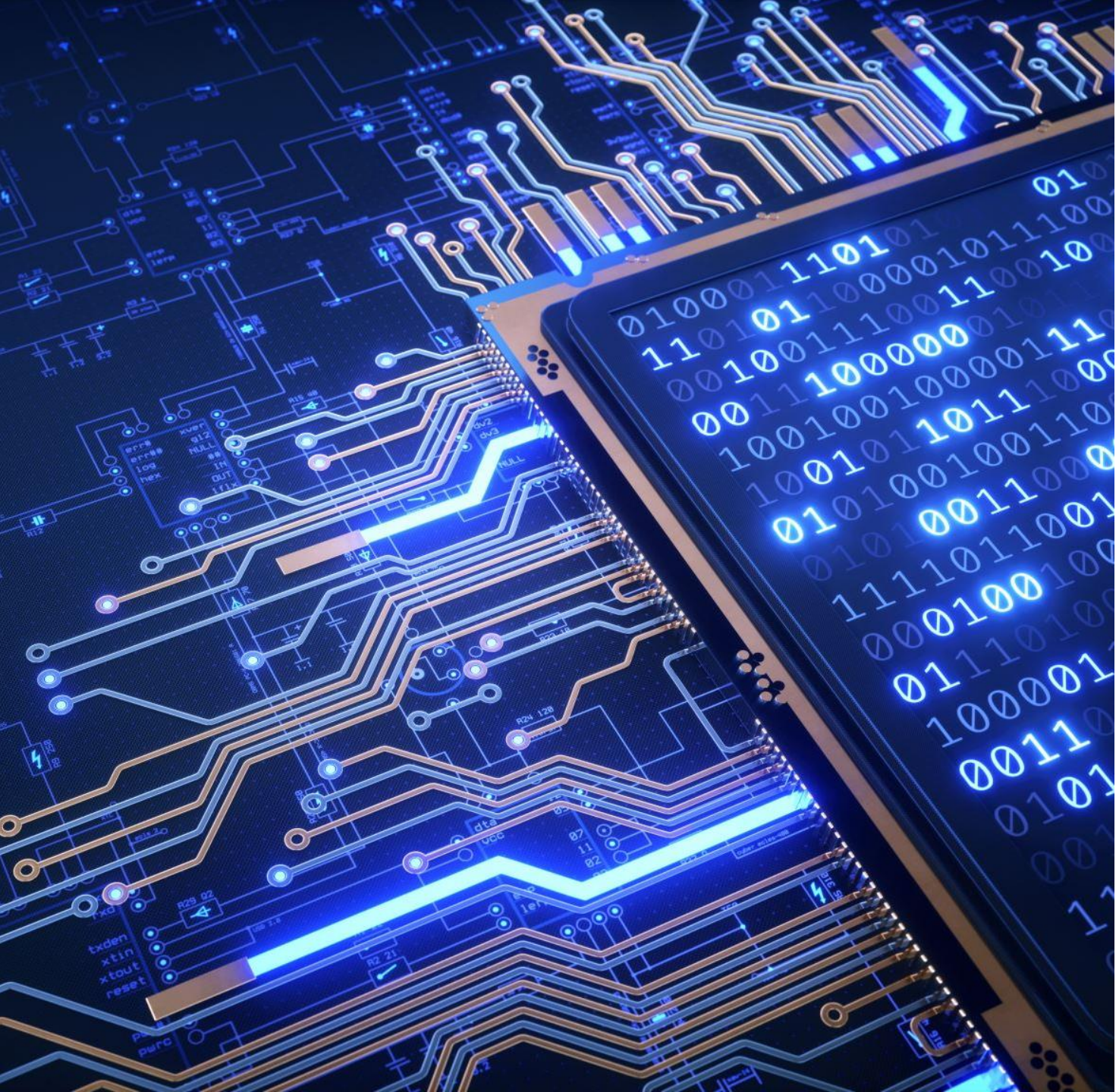
32 GB

	Column 8	Column 7	Column 6	Column 5	Column 4	Column 3	Column 2	Column 1
$Base^{exp}$	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Weight	128	64	32	16	8	4	2	1

EXER: Convert 101101_2 to $decimal_{10}$

Binary Number	Decimal Number
0	0
1	1
10	2
11	3
100	4
101	5
110	6
111	7
1000	8
1001	9
1010	10
1011	11

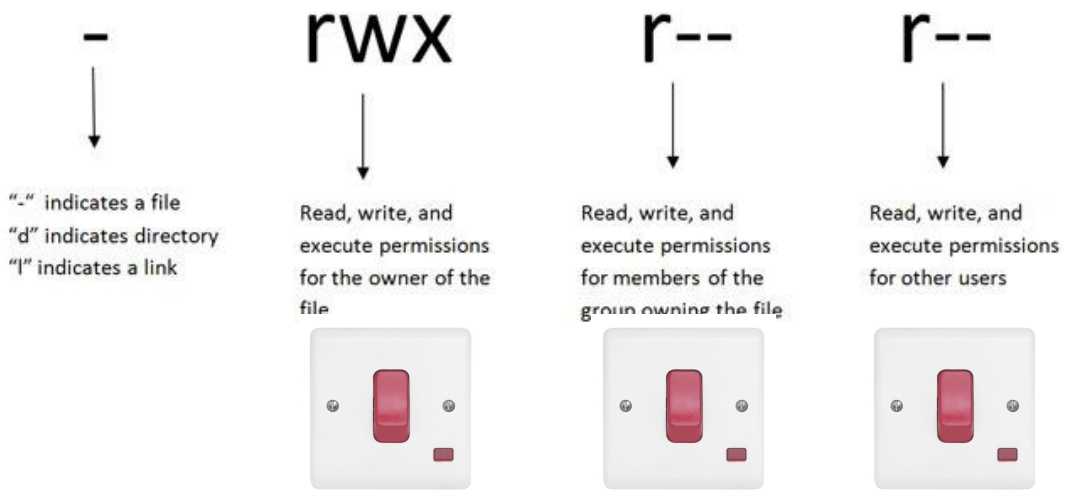
	Column 8	Column 7	Column 6	Column 5	Column 4	Column 3	Column 2	Column 1
$Base^{exp}$	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Weight	128	64	32	16	8	4	2	1



Octal

Octal Representation

0	000	-	-	-	No permissions
1	001	-	-	x	Only Execute
2	010	-	w	-	Only Write
3	011	-	w	x	Write and Execute
4	100	r	-	-	Only Read
5	101	r	-	x	Read and Execute
6	110	r	w	-	Read and Write
7	111	r	w	x	Read, Write and Execute

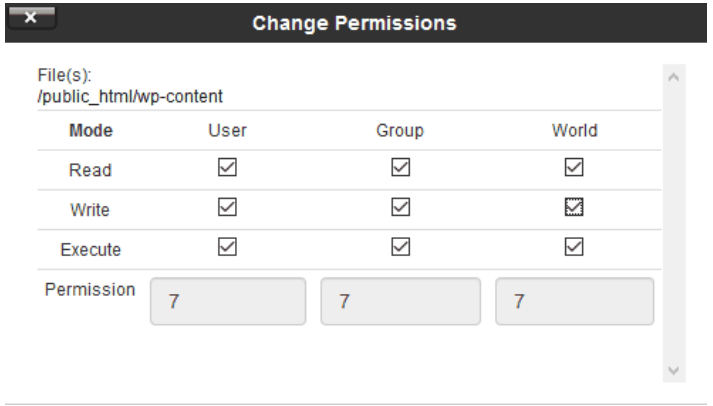


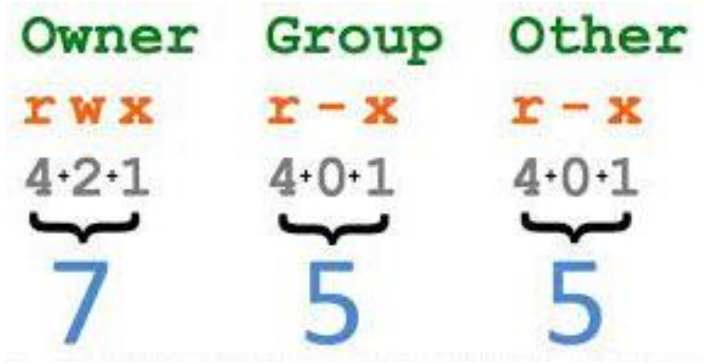
(2) NUMBER BASE: Octal

- base-8 numeral system
  - uses eight symbols, typically represented as digits 0 through 7, to represent numeric values
- Each digit's position in an octal number represents a power of 8
- distinct value of between $000_2(0_8)$ and $111_2(7_8)$ …. Why?

$chmod 755 <<*filename*>>

Octal	***7***	***5***	***5*** (base8)
≡Binary	**111**	**101**	**101** (base2)
	Owner	Group	Others





Binary	Octal
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	10
1001	11
1010	12
1011	13
1100	14

File Permissions

- In the octal representation, each permission is represented by a digit:

4 for Read,

2 for Write, and

1 for Execute

Why?

Show that $7_8 \equiv 7_{10}$

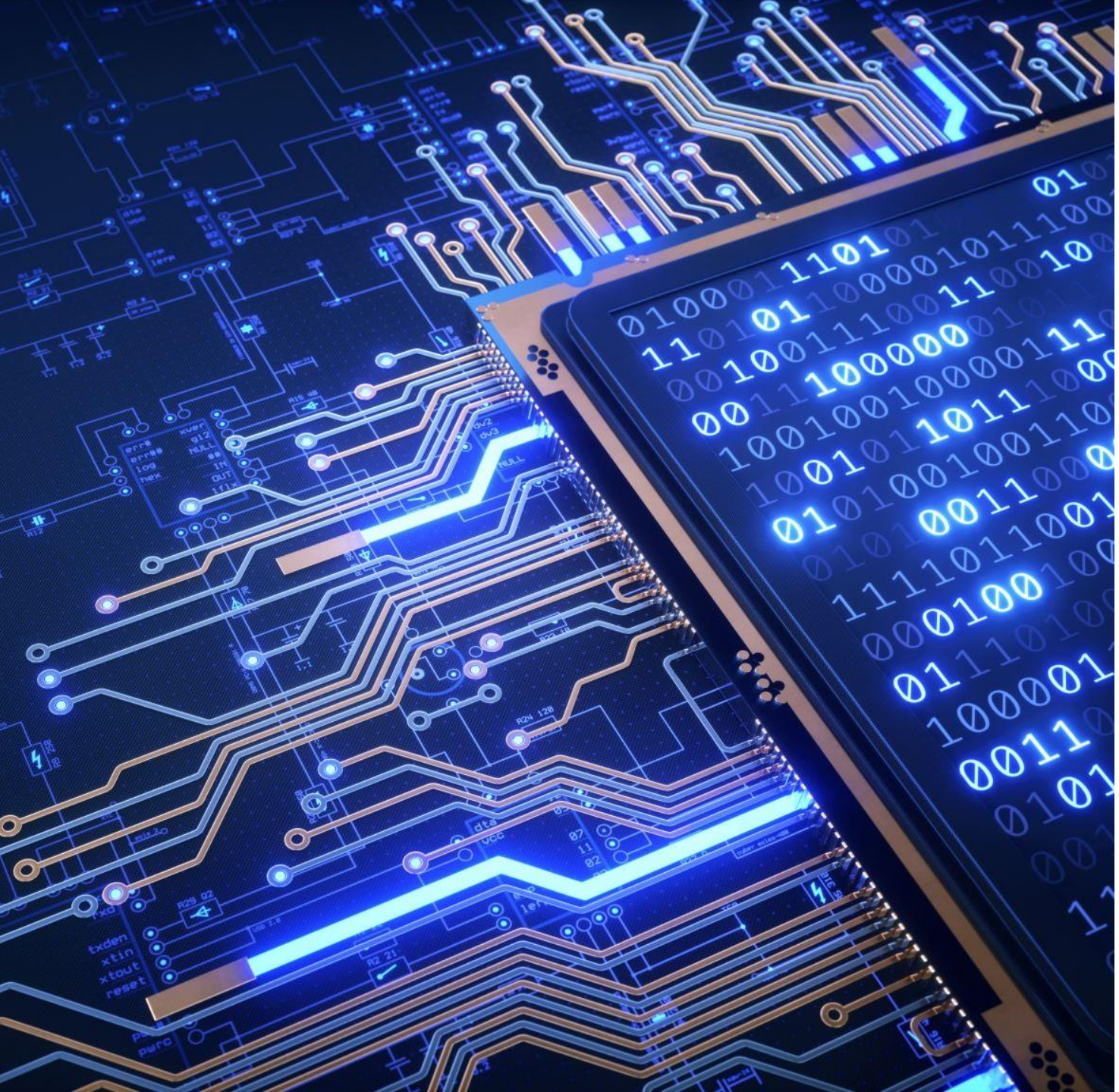
Weighting	8^3	8^2	8^1	8^0
=	512	64	8	1
			No. to Convert:	7_8
				$+(7*8^0)$ $+7*1$ $+7$
				$7_8 = 7_{10}$

chmod is used to change permissions of a file

CHMOD is used to change permissions of a file.

PERMISSION			COMMAND
U	G	W	
rwx	rwx	rwx	chmod 777 filename
rwx	rwx	r-x	chmod 775 filename
rwx	r-x	r-x	chmod 755 filename
rw-	rw-	r--	chmod 664 filename
rw-	r--	r--	chmod 644 filename
User	Group	World	

r = Readable
w = Writable
x = Executable
- = None



Hexadecimal

(3) NUMBER BASE: Hexadecimal (later in sem)

- Longer binary numbers are what computers use at the hardware level which is not human-user-friendly.

- Hex uses 16 symbols to represent its value:

Hexadecimal Symbol	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Decimal Value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Uses of Hex

- HTML colour references

- Hexadecimal is a Multiplier of Binary → computer can process each chunk at a time

Color Name	Color Code
Red	#FF0000
Cyan	#00FFFF
Blue	#0000FF
DarkBlue	#0000A0

In Summary

File Permissions

- You were introduced to the Octal numbering system that is used for file permissions

- Permissions can be checked via the

  ls -l command

- Permissions can be amended via the `chmod XXX` command
  - where the three X's represent the permission granted to each of the three categories of users of a file

In Summary

- **Three categories of file user**
- Owner = permissions represented in the first octal digit
- Group = permissions represented in the second octal digit
- Others = permissions represented in the third octal digit