

اللهم صلي وسلم وبارك علي سيدنا محمد  
وعلي اله وأصحابه أجمعين

**PROGRAMMING ADVICES** LEARN THE RIGHT WAY  
26+ Years of Experience  
**Mohammed Abu-Hadhoud**  
MBA, PMOC, PgMP®, PMP®, PMI-RMP®, CM, ITILF, MCPD, MCSD

لا تنسى الاشتراك في قناتنا على اليوتيوب ومشاركة القناة مع اصدقائك  
لتعم الفائدة للجميع وانقاذ الاف الناس من التشتت وجزاكم الله خيرا  
لا تنسونا من دعائكم وادعو لوالدي بالرحمة  
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## مهم جداً

هذا الملف للمراجعة السريعة واخذ الملاحظات عليه فقط ،لانه يحتوي على اقل من 20% مما يتم شرحه في الفيديوهات الاستعجال والاعتماد عليه فقط سوف يجعلك تخسر كميه معلومات وخبرات كثيره

**يجب عليك مشاهدة فيديو الدرس كاملا**

لاتنسى عمل لايك ومشاركة القناة لتعم الفائدة للجميع  
لا تنسونا من دعائكم

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اساسيات مهمه لكل مبرمج  
النظام السادس عشر  
Hexadecimal System



Mohammed Abu-Hadhoud

26+ Years of Experience

MBA, PMOC, PgMP®, PMP®, PMI-RMP®, CM, ITILF, MCPD, MCSd





Computer Foundations

# What is Hexadecimal System?

Mohammed Abu-Hadhoud

26+ Years of Experience

MBA, PMOC, PgMP®, PMP®, PMI-RMP®, CM, ITILF, MCPD, MCSB





# Decimal vs Binary vs Hexadecimal?



<u>Decimal</u>	<u>Binary</u>	<u>Hexadecimal</u>
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

# Why Hexadecimal?

# It's hard for human to read binary!

## What does this mean?

01001001 00100000 01001100 01101111 01110110 01100101  
00100000 01011001 01101111 01110101 00100001



I Love You!





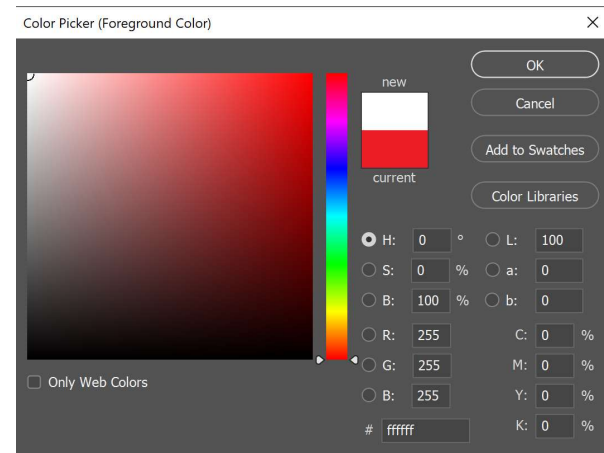
Hexadecimal System  
Provides a **human-friendly representation**

11010100 → D4

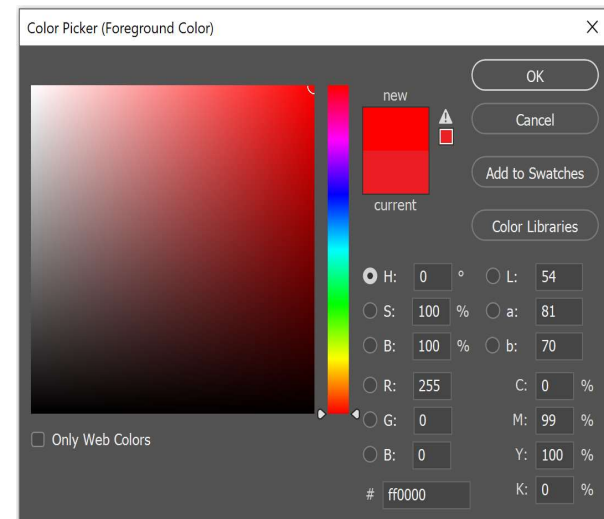
Each Byte is represented with 2 letters only.

# Examples:

- **11010100 → D4**
- **1111 1111 1111 1111 1111 → FFFFFFFF**
- Each Byte is represented with 2 letters only.



**11111111111111111111 → FFFFFFFF**



**111111110000000000000000 → FF0000**

# Examples:

Color	CSS Color Name	Hex Code #RPGGBB	Decimal Code (R,G,B)
	Red	#FF0000	rgb (255,0,0)
	Orange	#FFA500	rgb (255,165,0)
	Yellow	#FFFF00	rgb (255,225,0)
	Green	#008000	rgb (0,128,0)
	Cyan	#00FFFF	rgb (0,255,225)
	Blue	#0000FF	rgb (0,0,225)
	Purple	#800080	rgb (128,0,128)
	Pink	#FFC0CB	rgb (255,192,203)
	Gray	#808080	rgb (128,128,128)
	Brown	#A52A2A	rgb (165,42,42)



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# Hexadecimal Prefex

Mohammed Abu-Hadhoud

26+ Years of Experience

MBA, PMOC, PgMP®, PMP®, PMI-RMP®, CM, ITILF, MCPD, MCSB





# Prefix:

<u>Technology/Language</u>	<u>Prefix</u>	<u>Example</u>
HTML & CSS	#Code	#FFFFFF
C,C++,Java..etc	0xCode	0xC2A4
XML	&#Code	&#C2A4
Unicode	U+Code	U+C2A4

باختصار هيا بتخزن البيانات بشكل منظم بتوصف كتاب مثلا هيبقي في عنوان ومؤلف وصفحات  
يعني من الاخر بتتعامل مع الداتا ممكن تبحث تاخذ فكره عنها ومتعلقكش هنتشرح في ليفل 2 ان شاء الله



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# How Hexadecimal works?

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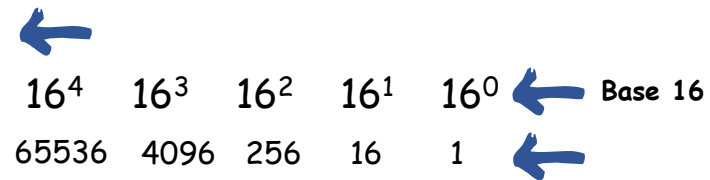
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# Remember that binary was base 2.

$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$	← Base 2
128	64	32	16	8	4	2	1	← Doubling

# Hexadecimal is base 16.



$16^4$	$16^3$	$16^2$	$16^1$	$16^0$	← Base 16
65536	4096	256	16	1	←





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# Convert Decimal to Hex.

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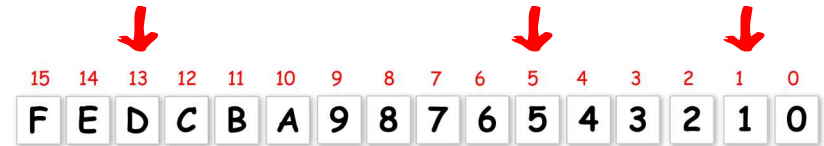
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# Remember..

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

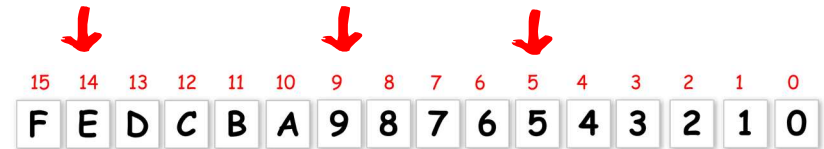
# Convert 469 to Hex



<u>Number / 16</u>	<u>Result</u>	<u>Integer</u>	<u>Fraction</u>	<u>Remainder</u>		<u>Hex</u>
469 / 16 =	29.3125	29	0.3125	16 × 0.3125 =	5	→ 5
29 / 16 =	1.8125	1	0.08125	16 × 0.08125 =	13	→ D
1/16 =	--	--	--		1	→ 1

469<sub>10</sub> → 1D5<sub>16</sub>

# Convert 1513 to Hex

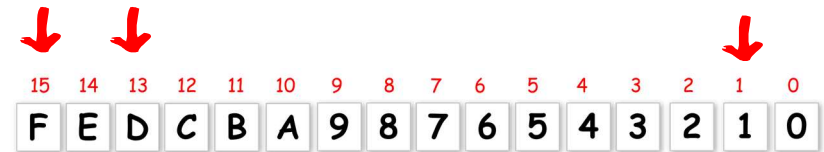


<u>Number / 16</u>	<u>Result</u>	<u>Integer</u>	<u>Fraction</u>	<u>Remainder</u>	<u>Hex</u>
1513 / 16 =	94.5625	94	0.5625	16 × 0.5625 = 9	9
94 / 16 =	5.875	5	0.875	16 × 0.875 = 14	E
5 / 16 =	--	--	--	5	5

1513<sub>10</sub> → 5E9<sub>16</sub>



# Convert 479 to Hex



<u>Number / 16</u>	<u>Result</u>	<u>Integer</u>	<u>Fraction</u>	<u>Remainder</u>	<u>Hex</u>
479 / 16 =	29.9375	29	0.9375	16 × 0.9375 = 15	F
29 / 16 =	1.8125	1	0.8125	16 × 0.8125 = 13	D
1/16 =	--	--	--	1	1

479<sub>10</sub> → 1DF<sub>16</sub>



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# Convert Hex to Decimal.

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# Convert 1D5 to Decimal

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

↑

$16^2$   $16^1$   $16^0$   
↑ ↑ ↑  
1D5

$$5 \times 16^0 = 5 \times 1 = 5 +$$

$$D \times 16^1 = 13 \times 16 = 208 +$$

$$1 \times 16^2 = 1 \times 256 = 256$$

---

469

# Convert 5E9 to Decimal

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

↑

$$\begin{array}{ccc} 16^2 & 16^1 & 16^0 \\ \swarrow & \uparrow & \nearrow \\ & 5E9 & \end{array}$$

$$\begin{array}{rcll} 9 \times 16^0 & = & 9 \times 1 & = 9 + \\ E \times 16^1 & = & 14 \times 16 & = 224 + \\ 5 \times 16^2 & = & 5 \times 256 & = 1280 \\ \hline & & & 1513 \end{array}$$



# Convert 1DF to Decimal

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

$16^2$   $16^1$   $16^0$   
↑ ↑ ↑  
1DF

$$F \times 16^0 = 15 \times 1 = 15 +$$

$$D \times 16^1 = 13 \times 16 = 208 +$$

$$1 \times 16^2 = 1 \times 256 = 256$$

---

479



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# Convert Hex to Binary.

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# How to Convert Hexa to Binary?

- Two steps:
  1. Convert hexa to decimal.
  2. Convert decimal to binary.

That's it.

# Convert 1D5 to Binary

- Two steps:
  1. Convert 1D5 to decimal.
  2. Convert results to binary.

That's it.

Step1:

Convert **1D5** to Decimal

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

↑

$16^2$   $16^1$   $16^0$   
↑ ↑ ↑  
**1D5**

$$5 \times 16^0 = 5 \times 1 = 5 +$$

$$D \times 16^1 = 13 \times 16 = 208 +$$

$$1 \times 16^2 = 1 \times 256 = 256$$

**469**



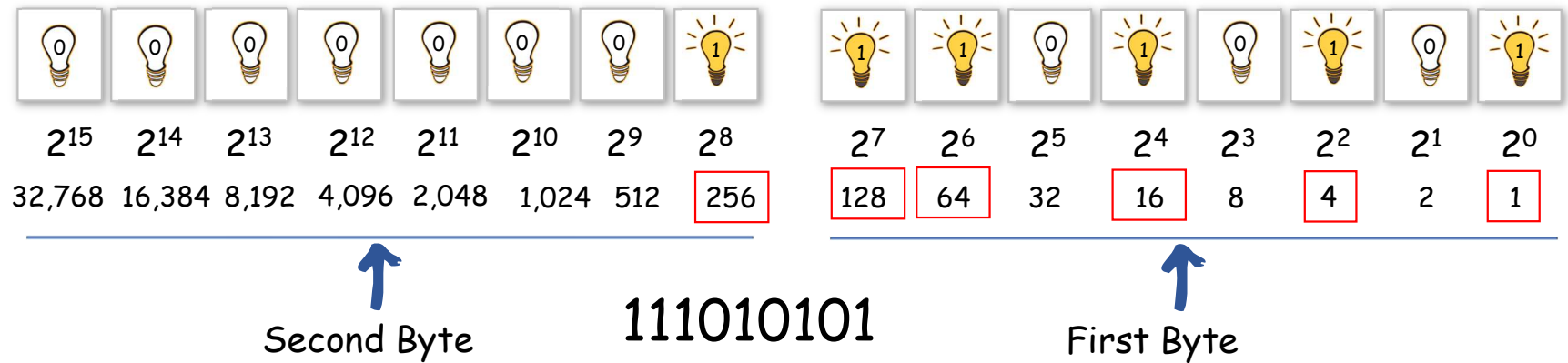
Now convert  
this to binary



Step 2:

Convert this in binary...

469





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# Convert Binary to Hexa.

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# How to Convert Binary to Hexa?

- Two steps:
  1. Convert Binary to Decimal.
  2. Convert Decimal to Hexa.

That's it.



# Homework



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## 1- Convert those Hexadecimal numbers to Decimal:

- 12A4
- 1C35
- 100
- 115C

يلا حل



2- Convert those **decimal** numbers to **hexadecimal** :

- 4722
- 7221
- 256
- 4444

### 3- Convert those **Hexadecimal** numbers to **Binary**:

- 13B4
- A5

متبصش ع الحل تحت الا لما تخلص حل

# Solution Homework



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## Solutions:

1:

- 12A4 → 4772
- 1C35 → 7221
- 100 → 256
- 115C → 4444

2:

- 4722 → 1272
- 7221 → 1C35
- 256 → 100
- 4444 → 115C

3:

- 13B4 → 0001001110110100
- A5 → 10100101

Thank You 😊

54 68 61 6E 6B 20 59 6F 75 20 3A 29