Python Bootcamp & Masterclass

Number Systems

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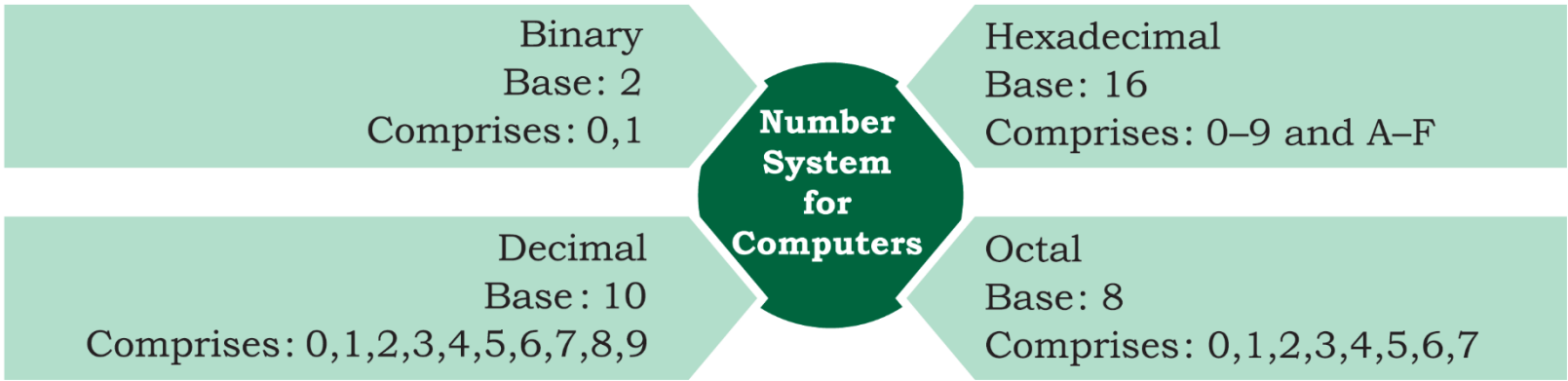
Integrated Circuits in a computer are made up of billions of transistors that are activated by the electronic signals (low/high) they receive. The ON/high and OFF/low state of a transistor is represented using the two digits 1 and 0, respectively. These two digits 1 and 0 form the binary number system. This system is also called base - 2 system as it has two digits only.



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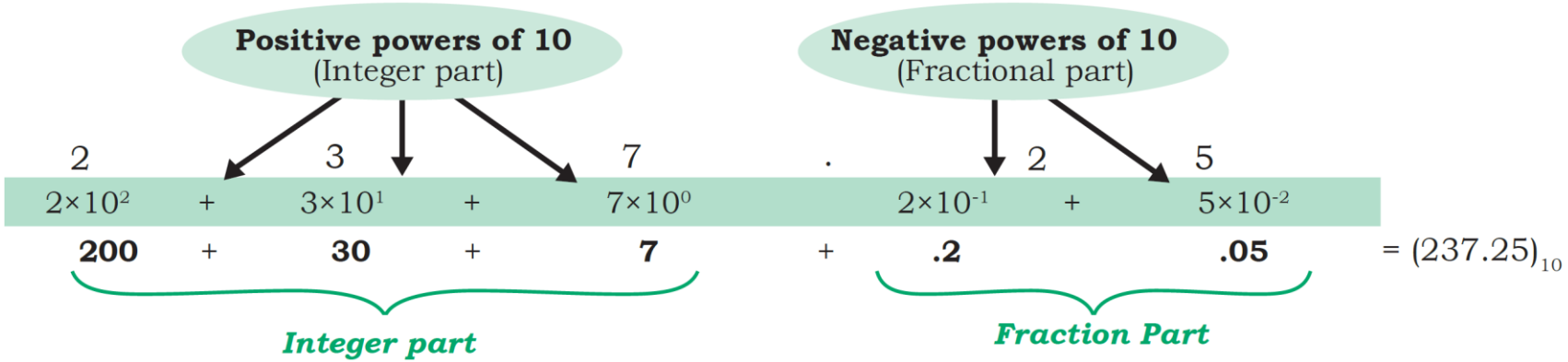
Decimal Number System

We, humans, use decimal number system in our day-to-day life. It is known as base - 10 system since 10 digits (0 to 9) are used.



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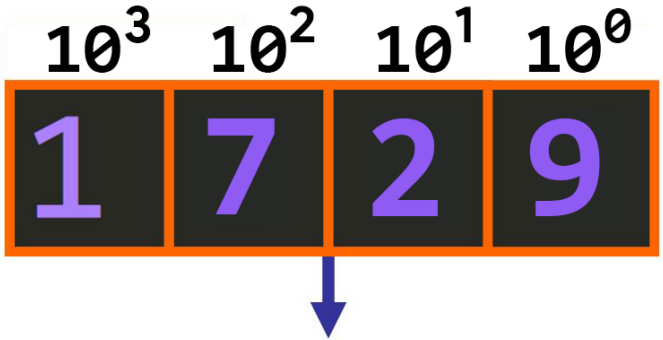

Base 10

(0, 1, 2, 3, 4,
5, 6, 7, 8, 9)

$$10^3 \times 1 + 10^2 \times 7 + 10^1 \times 2 + 10^0 \times 9$$

$$1000 \times 1 + 100 \times 7 + 10 \times 2 + 1 \times 9 = 1729$$

```
int(1729)
int(25.75)
```

```
1729

25
```

```
int(6/2 * 4 + 3%1 - 5**0)
```

```
11
```

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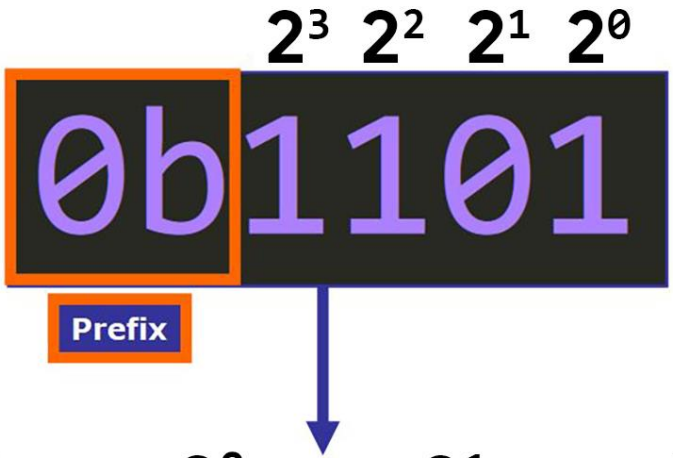
Binary Number System

```
int(0b1101)
int(0b1101 + 0b101 + 1729 + 0x2481)
```

```
13

11092
```

```
bin(1729)              # decimal to binary
bin(0x2481)            # hexadecimal to binary
bin(0o5671)            # octal to binary
```

```
'0b11011000001'

'0b10010010000001'

'0b101110111001'
```



Base 2

(0 , 1)

$$2^3 \times 1 + 2^2 \times 1 + 2^1 \times 0 + 2^0 \times 1$$

$$8 \times 1 + 4 \times 1 + 2 \times 0 + 1 \times 1 = 13$$

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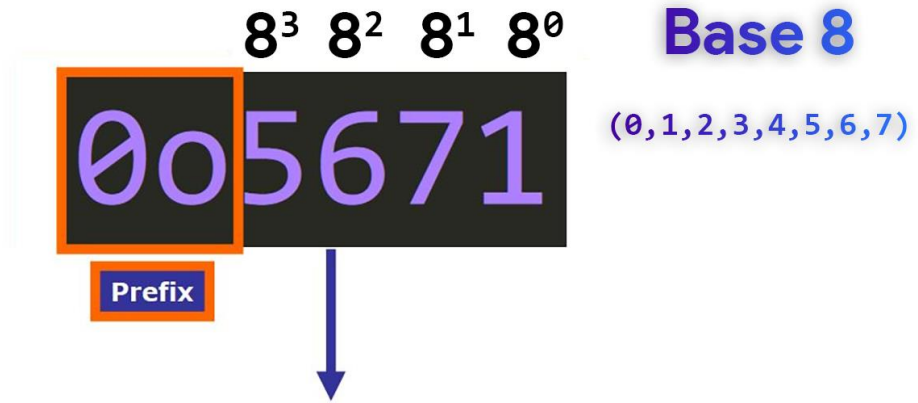
Octal Number System




```
oct(3001)              # decimal to octal
oct(0x2481)            # hexadecimal to octal
oct(0b1101)            # binary to octal
```

```
'0o5671'

'0o22201'

'0o15'
```

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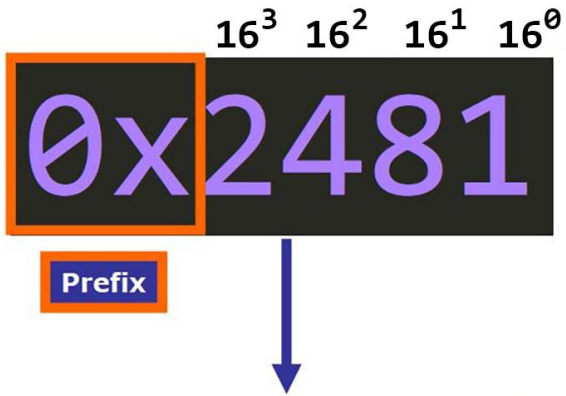
Hexadecimal Number System



Base 16

(0,1,2,3,4,5,6,7,
8,9,A,B,C,D,E,F)

$$16^3 \times 2 + 16^2 \times 4 + 16^1 \times 8 + 16^0 \times 1$$

$$4096 \times 2 + 256 \times 4 + 16 \times 8 + 1 \times 1 = 9345$$

```
hex(9345)              # decimal to hex
hex(0o5671)            # octal to hex
hex(0b1101)            # binary to hex
```

```
'0x2481'

'0xbb9'

'0xd'
```

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Online Resources

For best python resources, please visit:

gknxt.com/python/

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