Octal integer literal
An integer value with base 8 is called octal integer
This integer is created using digits from 0-7
This integer is prefix with 0o or 0O

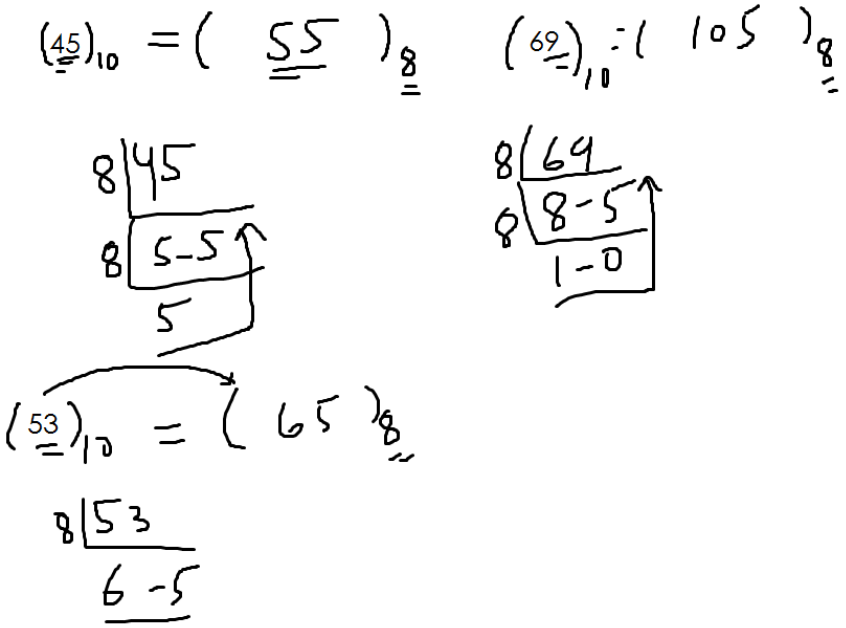
Applications of octal integers

1. Operating System uses octal system for representing file permissions
   Unix operating
   chmod 879

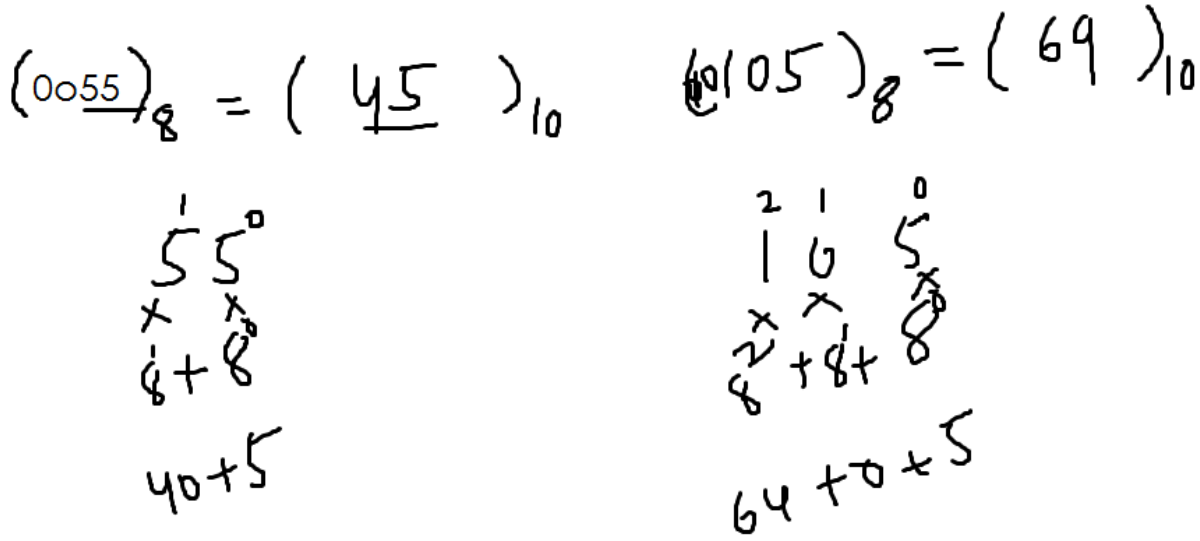
   owner → who create file naresh
   group → collection people suresh rajesh → G1
   others → rest of the people kishore,kiran,..
2. Encryption and Decryption is done using keys (private,public)
   These keys are represented in octal format

```
>>> n1=0o65
>>> n2=0o99
SyntaxError: invalid digit '9' in octal literal
>>> n3=065
SyntaxError: leading zeros in decimal integer literals are not permitted; use an 0o prefix for octal integers
>>> n3=0O67
>>> n1
53
>>> n3
55
```

Converting Decimal Integer to Octal Integer



Octal integer to Decimal integer




```
>>> type(n1)
<class 'int'>
>>> type(n3)
<class 'int'>
```

Base conversion functions

These functions are used to convert base of one integer to another integer.

1. Oct()
2. Hex()
3. Bin()

oct()
this function returns octal equal of integer value

```
>>> n1=0o45
>>> print(n1)
37
>>> print(oct(n1))
0o45
>>> n2=37
>>> print(oct(n2))
0o45
```

Hexadecimal integer
An integer value with base 16 is called hexadecimal integer
This integer is created using digits from 0-9, a-f/A-F
This integer is prefix with 0x or 0X
Larger values are represented in hexadecimal format

Applications of hexadecimal integers

1. Color values
2. Memory Addresses
3. Register addresses
4. Unicode

0 1 2 3 4 5 6 7 8 9 a b c d e f
10 11 12 13 14 15

$(26)_{10} \rightarrow (0x1a)_{16}$ $(46)_{10} = (0x2e)_{16}$

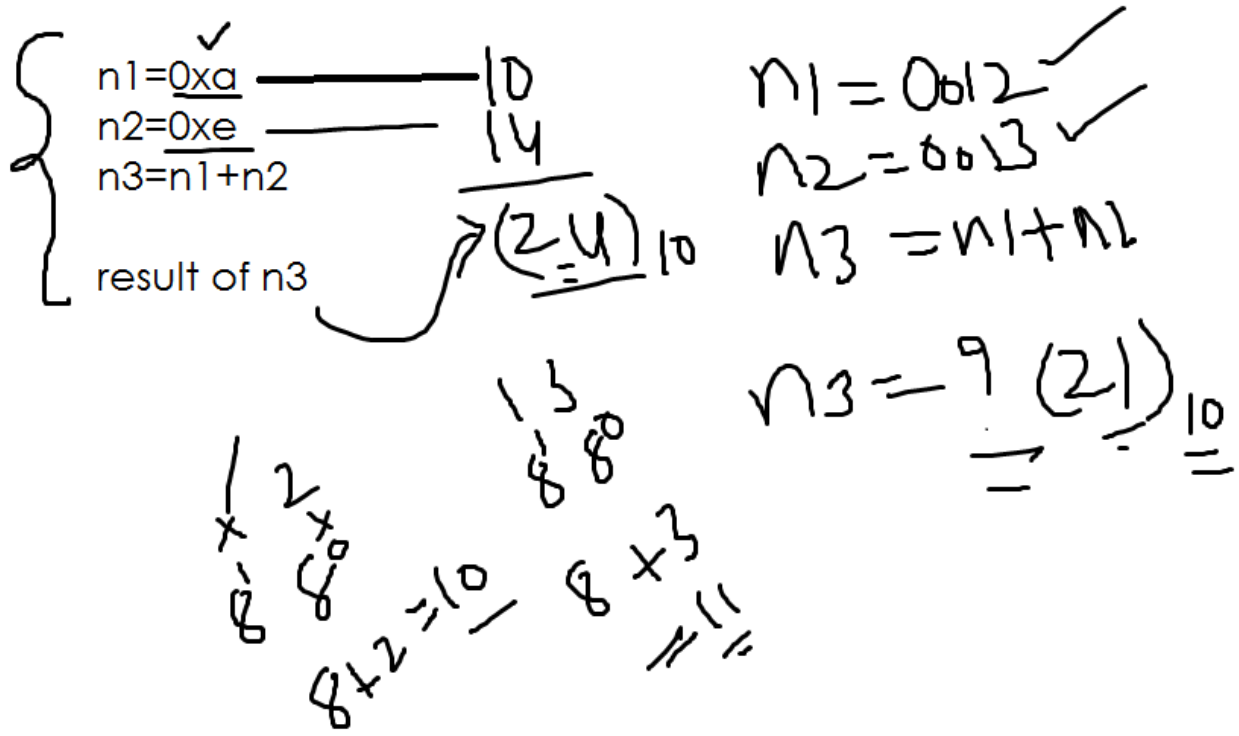
16 | 26
1 - 10

16 | 46
2 - 14

$(0x1a)_{16} = (26)_{10}$ $(0x2e)_{16} = (46)_{10}$

$1a^0$
$16 + 10$
$16 + 10$

$2e_x$
$16^1 + 16^0$
$32 + 14$




```
>>> n1=0xa
>>> n2=0xe
>>> n3=n1+n2
>>> print(n1,n2,n3)
10 14 24
>>> print(hex(n1),hex(n2),hex(n3))
0xa 0xe 0x18
>>> a=0xabba
>>> print(a)
43962
>>> print(hex(a))
0xabba
>>> n1=0xgood
SyntaxError: invalid hexadecimal literal
>>> n2=0xbad
>>> print(n2)
2989
>>> print(hex(n2))
0xbad
```

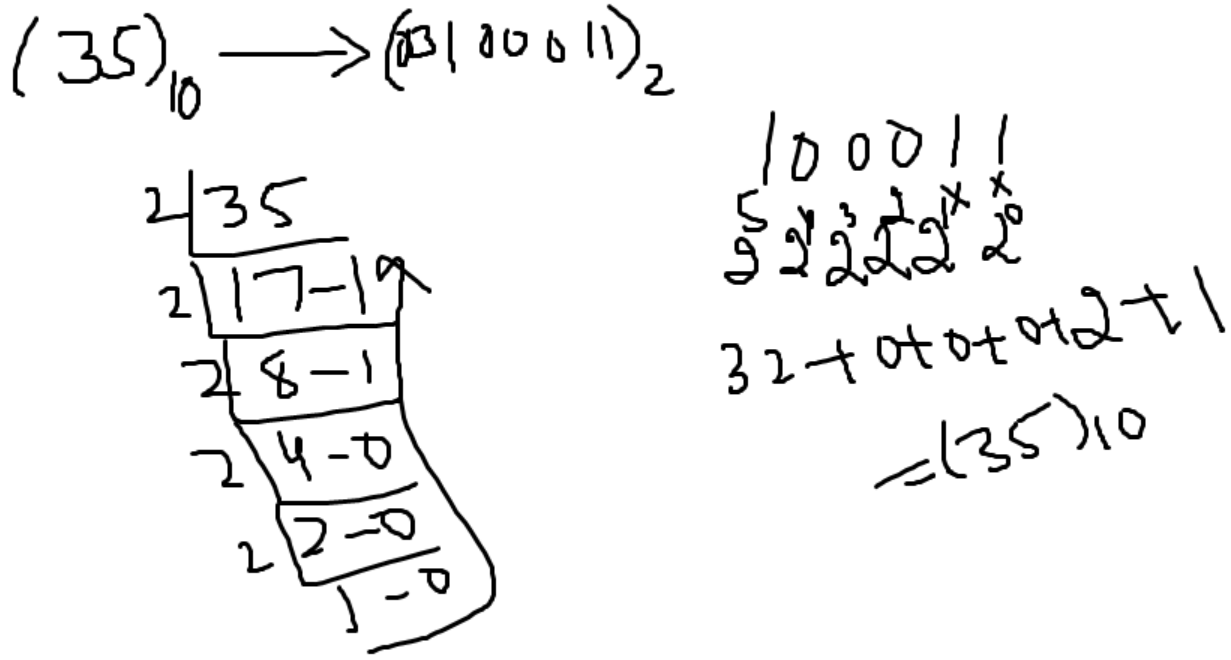
Binary integer

An integer value with base 2

This integer is created using two digits 0 and 1
This integer is prefix with 0b or 0B

Applications of binary integer

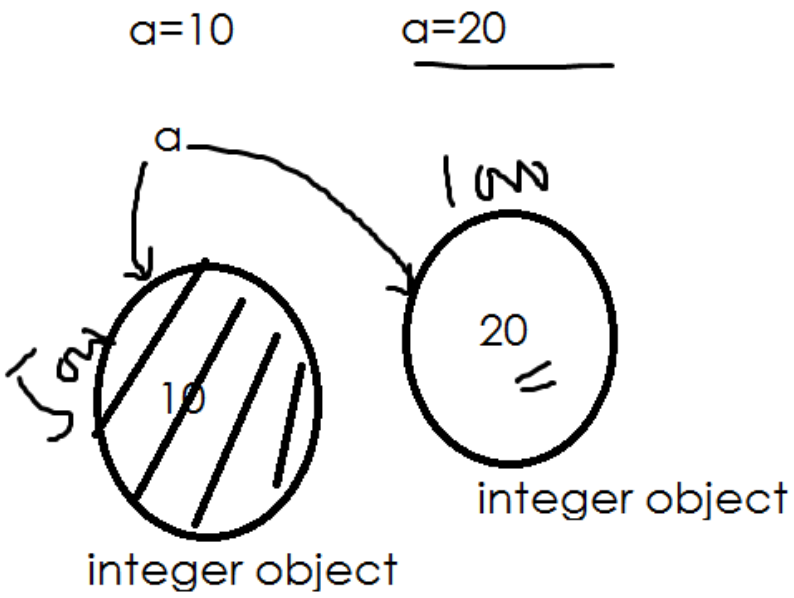
1. Logic Gates
2. Operating system uses to represent data in memory
3. Machine Language

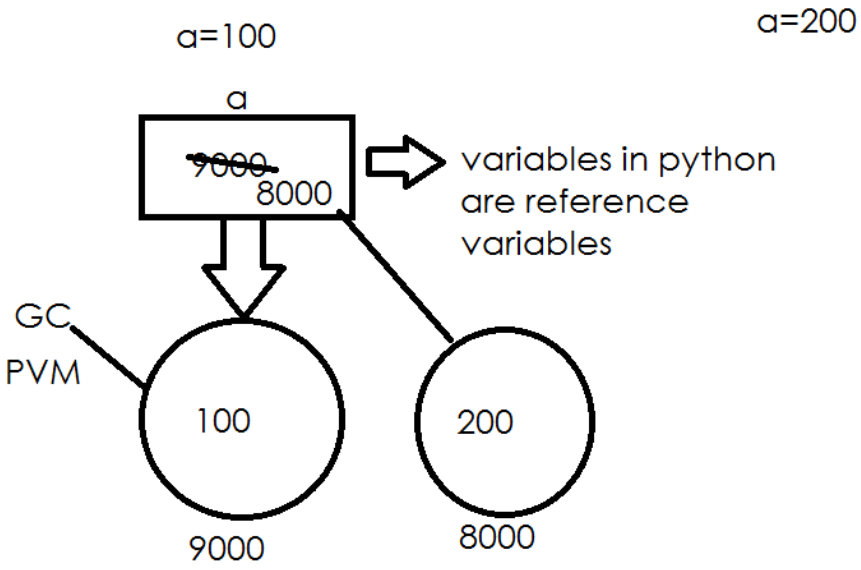



```
>>> a=0b101
>>> b=0b100
>>> print(a,b)
5 4
>>> print(bin(a),bin(b))
0b101 0b100
>>> print(bin(0o12))
0b1010
>>> print(bin(0xe))
0b1110
>>> print(oct(0b101))
0o5
>>> c=0b102
SyntaxError: invalid digit '2' in binary literal
```

Q: How many integer data types are exists in python?
Ans: 1 → int
Q: How many formats integer value is represented in python?
Ans: 4 (decimal,octal,hexadecimal,binary)

Integers are immutable
After creating integer object we cannot update or modify value
If we are modify or updating value, it will create new object.




a=100
a
9000
8000
variables in python
are reference
variables
GC
PVM
100
9000
200
8000
a=200