Programming Basics - I

M T W T F S S
Page No.:
Date:
YOUVA

⇒ `int main()` → main function from where code will execute or start.

⇒ `#include<iostream>` ← implementation is included in this.
inbuilt/standard
or
user created file.

⇒ `using namespace std;`

→ In every namespace a function eg cout has different implementation.
→ We need "using namespace std" to use the current implementation in our code.

⇒ `<<` → when we want to display on standard output.

⇒ `endl` → new line.

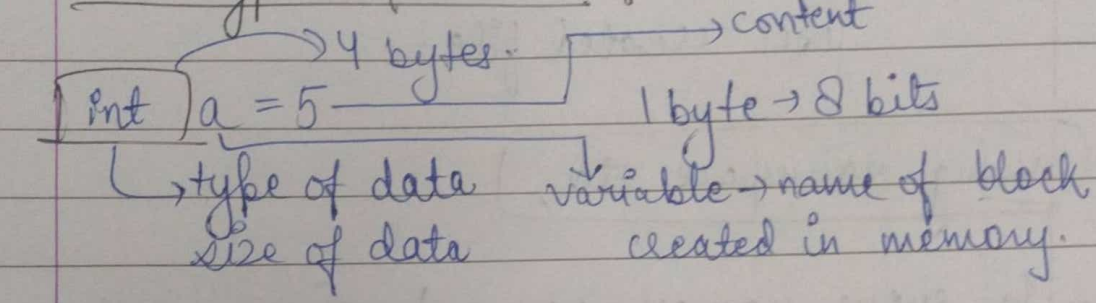
H/w → ① Can I create custom header file?

② Can I create our own namespace?

③ What all other namespace present instead of std?

(9) Can we print without/other than "<<"?

Data Types & Variable?



bool a = true;

↓

1 byte → smallest addressable size.

float f = 1.2;

↓

4 byte

double d = 1.23

↓

8 byte

Double → has better precision.

Variable naming convention -

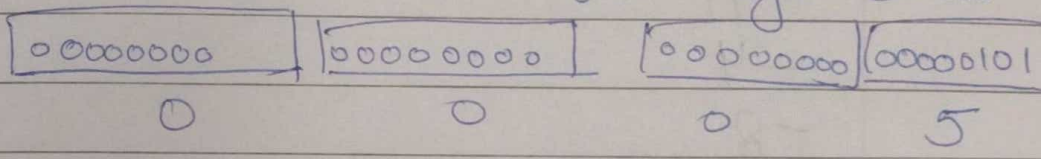
→ small, capital letters. {abc}
→ include numbers. {babbar1}
→ {a-b} underscore allowed.
→ cant include a no. in start {1abc}

H/W explore about short and long?

How are contents stored in memory?

int a = 5
↳ binary → 101

variable → a
byte → int
size → 4 byte → 32 bits



This is applicable for + numbers only.

⇒ How -ve numbers are stored in memory?

int x = -5

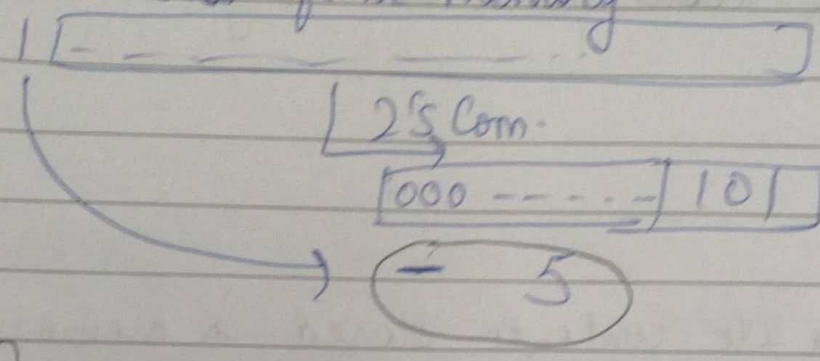
Algorithm –
↳ ignore -ve sign
↳ Convert into Binary rep.
↳ take 2's Compliment

5
↓
0000 101
32 bit

2's Compliment
↳ take 1's Compliment (+1)
↓
flip all bits
0 → 1
1 → 0

00000000 00000000 00000000 00000101
↓ 1's C ↓ 1's C ↓ 1's C ↓ 1's C
11111111 11111111 11111111 11111010
+ 1
11111111 11111111 11111111 11111011

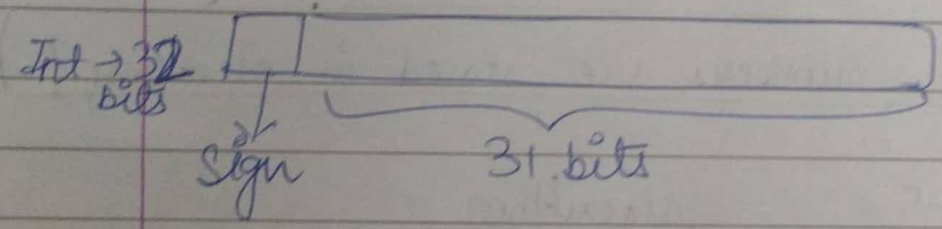
To access from memory →



H/W.

Dry Run →

-11
-4
-8
-5



If I have 31 bits, how much no.'s I can create with this ?

Range → $-2^{31} \longrightarrow 2^{31} - 1$

→ char → 1 byte → 8 bits

$2^8 \rightarrow 256$

char is stored in the form of ASCII values.

Every character is associated to an integer number and int is stored in memory in the form of binary.

Q How are we going to differentiate b/w int or char in memory, since both get stored as 0 or 1?

Ans Datatype tells whether its a char or int.

Range of -
→ float →
→ double →
→ long →
→ short →

Operators :

① Arithmetic Operators - +, -, *, /, %
mathematical operations.

int ans = a/b ← int/int
↑ it will store int value.

float → 5.0/3 → 1.6 (storing in int) → int ans → 1.
int

int ans = 5.0/3; ← (X)
cout << ans;

X = 1

cout << (5.0/3); ← (Y)

Y = 1.... {in decimal}
↳ float → float
to int

int → int
int

float → float
int

double → double
int

Typecasting → ① Implicit - Compiler automatically converts into required datatype.

② Explicit - forcefully converted.

```
char ch = 'a';
int num = (int) ch ;
```
output: 97
↳ ascii value of 97

```
char ch = 'b';
int num = (int) ch;
```
output: 98

② Relational Operator:

== > < >= <= !=

== → comparison

a == b
false / true

bool b =
0 ← (x == y)
false

x = 5, y = 3

= → assignment operator

(3) Logical Operators:

&& AND
|| OR
! NOT

(&&) → both conditions should satisfy (true) to get true.

bool ans = ( ) && ( )

T	→	T	T
F	→	F	T
F	→	T	F
F	→	F	F

(||) → any one condition needs to be true.

bool ans = ( ) || ( ) || ( )

T T F F

(!) → compliments the value.

1 → 0
0 → 1

(4) Bitwise operators:

↳ Bit level → &

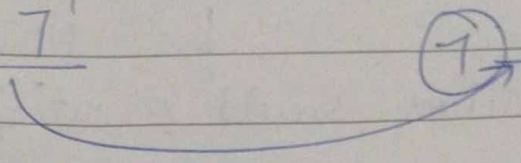
(i) &

int a = 5 → 101
int b = 6 → 110

```
101
110
---
100 → 4
```

int ans = a & b
↳ 4

ii) OR → | a=5 101
ans = a|b b=6 110
ans = 7 111



iii) NUT → tilda
↳ 0 → 1
1 → 0

(iv) XOR → Exclusive OR → very important

(A)

x	y	O/P
0	0	0
0	1	1
1	0	1
1	1	0

H/W — Arithmetic, Logical, Relational, Bituise } Experiment, Code, Explore } On code editor

→ Left Shift operator :-

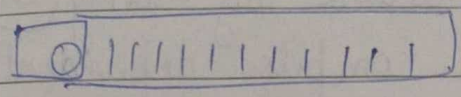
5<<1 → shift 5, by 1 bit

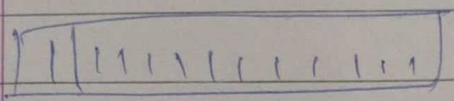
00000000101 5<<1 → 10
00000001010
↳10

5<<2
shift 5 by 2 bits
00000 0101 ← 2
000001010 00 ← 20

whenever we shift a no. by left shift, we are multiplying it by 2 (but not always).

1 → 10 , 2 → 20





↳ -ve (as gye)

→ Right shift operator :- number / 2 → but not always.

5 >> 1

00000101

00000010 → 2

5/2 → 2

5 >> 2

00000101 → 1

$\frac{5}{2 \times 2} = \frac{5}{4} \rightarrow 1$

00000001 → 1

Q/w : How << and >> work on -ve numbers?

In left shift, we add a zero on right side → this is called padding.

→ +ve no. → padding is done by adding 0.
→ -ve → padding is compiler dependent.