CS 201 Final Term Preparation
Lec # 19

Files are used in programming languages to store bulk data.
We can create and edit any file. We can read or write file.
Reading file is known as output.
Writing file is known as input.
There are two methods of using files.

1. **Sequential**
    a. means reading or writing data in a file in specific order from beginning to end.
2. **Random**
    a. Unlike sequential files, random accessing files allow you to jump to any part of file to read or write data

Positing in file: It refers to specific location or **offset** in the file where operations like reading or writing begin. It shows where you are currently in the file.
Seekp() , seekg() are the functions to set the position of pointer.
Tellg() tells the current pointer position.
Getline() used to read one line at a time.
Strlen() gives the exact number of characters in a string
Always close the file after usage.
Use binary mode for better control over files.
tellg(), seekg(), tellp() and seekp() functions are used for random movement (backward and forward) in a file

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Lec # 20

Normal data types : int , float , boolean , string , long , double , short

A **structure** is a user defined data type in c++ that groups different Type of data into a single unit.

Use **struct** to define a structure.

The **sizeof** operator gives the size(in bytes) of a structure.

Difference between Initialization and declaration?

Initialization means that we have created a variable but not given any value to it.

Declaration means that we have created a variable and given value to it as well.

Structures can be passed to function by value or reference.

Functions: A block of code that we can reuse. To avoid complexity and copy and paste in our code. We can call the function wherever we need it.

By Value : original value unchanged.

By Reference : original value changed.

Structures can be used to create arrays.

Union: A union is similar to structure but it uses the same memory location for all its members. Only one member can hold value at a time.

Structure: all members have separate memory

Union: all members share same memory

Chap # 21

Bit Manipulation: it involves working directly with binary representation of numbers (0s & 1s). it is a way to perform operations at the bit level to save time and memory.

Operaotrs: And , OR , Xor , Not , Shift operator.

Operator	Operator Sign
Bitwise **AND** Operator	&
Bitwise **OR** Operator	|
Bitwise Exclusive OR Operator	^
NOT Operator	~
Left Shift Operator	<<
Right Shift Operator	>>

And Operator:

If both bits are 1 , then output will be 1 otherwise 0.

Or Operaotor:

If any of the input is 1 , the output will be 1. When both inputs inputs are 0 then output will be zero.

Xor Operator:

If bits are different then output will be 1.

If bits are same then output will be zero.

Not operator:

It converts zero to one, one to zero.

Bit Flags: A technique which is used to track multiple true/false using bits. Each bit represents a flag.
1 = true, 0 = false

1	1	0	0
flag 4	flag 3	flag 2	flag 1
true	true	false	false

Masking

Masking is a process of **extracting or modifying specific bits** in a number using bitwise operators and a "mask" (a predefined binary pattern)
And Masking : To keep certain bits and set others to 0.
OR Masking : To set certain bits to 1.
Example:
Number : 01010101
Mask : 000001000
Number & Mask = 01010101 & 00000100 = 00000100

Unsigned Integers:
Unsigned integers are number that can only be positive or zero (non-negative number).
8 bits = values ranges from 0 to 255
32 bits = values ranges from 0 to 4 , 294 , 967 , 295

Shift Operators:

Shift operators are used to move the bits of a number either to **left or right .**

There are two types of operators:

- **Left Shift (<<)**
- **Right Shift (>>)**

Left Shift

This moves all the bits to the left and add 0s at the empty spaces.