[1] (a) Basic parts of computer,

→ Mother board (Circuit Board)
→ CPU — (Central processing unit - Brain)
→ GPU — [Graphics processing unit - (Display)]
→ RAM — (Random access memory - volatile memory)

→ Storage — SSD/HDD. — Storing data

1 b - 2018 - 1 (a)

1 (c) - algorithm (2019-8a)
    + algorithm of factorial

[2] (b) 2019 - 8a - range part   8 (a) ~~roll no~~
                                             বিকাৰ্ণ→
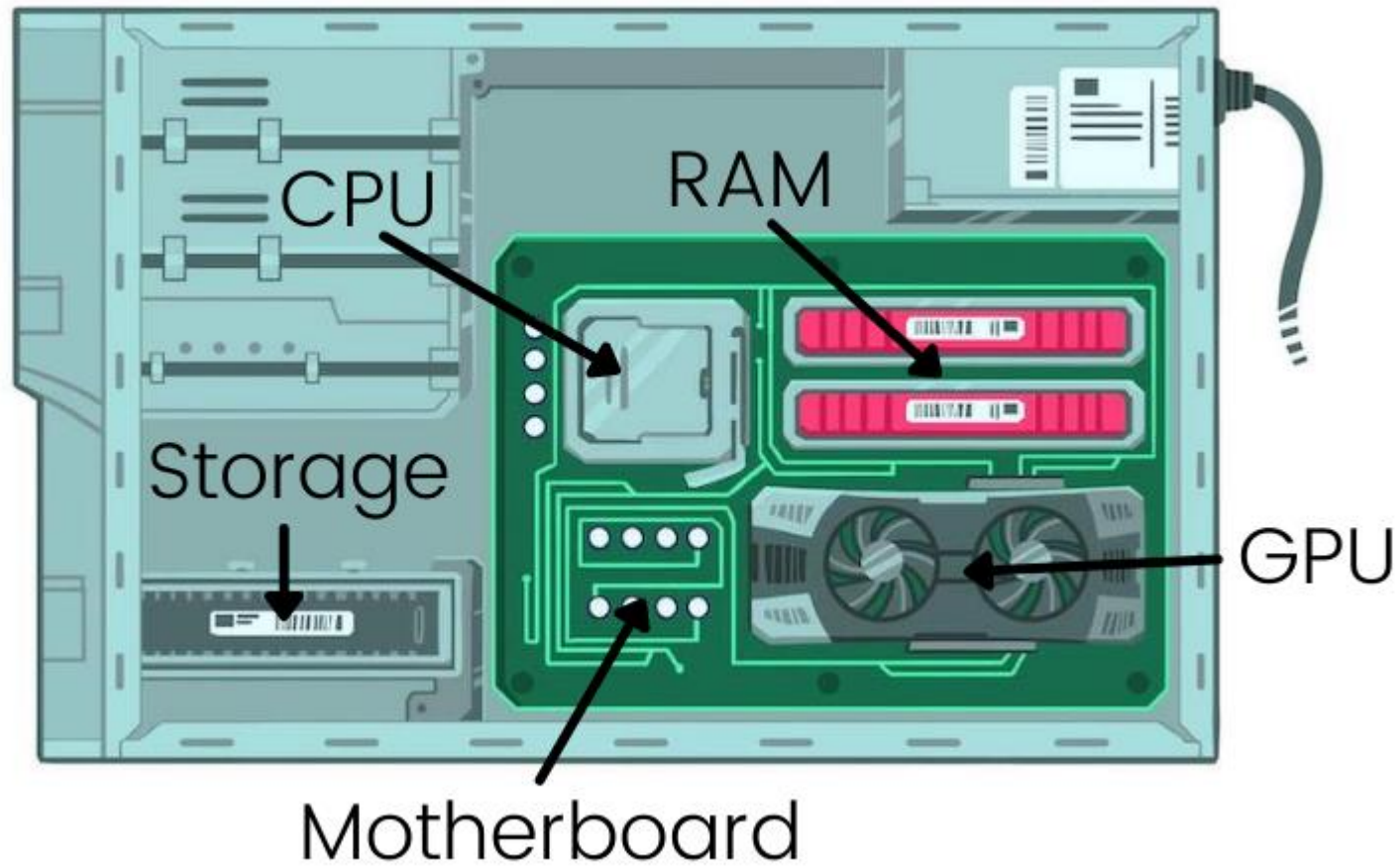3a — slide

3 (c) slide

4 (a) — slide

5 (a) - slide

6 (n) slide

7 (a) slide

2017 Q/A Slon

1. Motherboard

What it is: All components of a computer communicate through a circuit board called the motherboard.

What it does: Think of the motherboard as the glue that holds everything else together.

The motherboard's video card and Central Processing Unit are contained in an integrated (built-in) chipset

2. Central Processing Unit (CPU)

What it is: The CPU is often called the "brain" of a computer, thanks to its direct plug connection to the motherboard, and communication with all of the computer's other components.

What it does: Whenever you write a line of code (in python,java,c++ etc PL), it's broken down into assembly language—which is a language that the processor can understand. It fetches, decodes, and executes these instructions.

And that's where the CPU comes in—all the processes a computer handles are taken care of by the CPU.

3. Graphics Processing Unit (GPU)

What it is: It's not uncommon to hear gamers obsess over the next new graphics card, as these graphic cards make it possible for computers to generate high-end visuals like those found in the many games.

In addition to video games, though, good graphics cards also come in handy for those who rely on images in order to execute their craft, like 3D modelers using resource-intensive software.

What it does: Graphics cards often communicate directly with the display monitor, meaning a $1,000 graphics card won't be of much use if there isn't a high-end monitor connected to it.

4. Random Access Memory (RAM)

What it is: RAM, also known as volatile memory, stores data regarding frequently accessed programs and processes. (It's called volatile memory because it gets erased every time the computer restarts.)

What it does: RAM helps programs and games start up and close quickly.

5. Storage

What it is: All computers need somewhere to store their data. Modern computers either use a Hard Disk Drive (HDD) or Solid State Drive (SSD).

What it does: HDDs are made of an actual disk onto which data is stored. The disk is read by a mechanical arm. (HDDs are cheaper than SSDs, but are slowly becoming more and more obsolete.) SSDs (think SIM cards) have no moving parts and are faster than a hard drive, because no time is spent waiting for a mechanical arm to find data on a physical location on the disk.

EXAMPLE OF SYSTEMSOFWare

•Windows. The Windows Operating System is perhaps one of the most well-known system software. ...

•Mac OS. The Mac Operating System, along with Windows, is one of the most popular operating systems. ...

•Chrome OS. ...

•Ubuntu. ...

•Android. ...

•iOS. ...

•Blackberry. ...

•PlayStation System Software.

Algorithm for Finding Factorial of a Number

What is Factorial of a number?
Product of all consecutive Integer numbers up to n is called Factorial of a Number and is denoted by n!
For Example, the value of 5! is 120.
Mathematically it is written as,
n! = 1 * 2 * 3 * 4 * ... * (n-1) * n
For example, the factorial of 5 is,
5! = 1 * 2 * 3 * 4 * 5 = 120

algo
Step 1: Start
Step 2: Declare Variable n, fact, i
Step 3: Read number from User
Step 4: Check wether positive number or not, if not warn
Step 5: Initialize Variable fact=1 and i=1
Step 6: Repeat Until i<=number
6.1 fact=fact*i
6.2 i=i+1
Step 7: Print fact
Step 8: Stop

Conditional(?: ternery operator) [Condition] ? Choice1:Choice2 *vs* if-else statements

As we know that the behavior of conditional operator and 'if-else' is similar but they have some differences. Let's look at their differences.

•A conditional operator is a single programming statement, while the 'if-else' statement is a programming block in which statements come under the parenthesis.

•A conditional operator can also be used for assigning a value to the variable, whereas the 'if-else' statement cannot be used for the assignment purpose.

•It is not useful for executing the statements when the statements are multiple, whereas the 'if-else' statement proves more suitable when executing multiple statements.

•The nested ternary operator is more complex and cannot be easily debugged, while the nested 'if-else' statement is easy to read and maintain.

2) Software:

Software is a set of instruction, data on programs used to operate computer and execute specific tasks. Its the opposite of hardware, which describe the physical aspect of a computer. More on internet.....

There are two types of software,

① Application Software
② System Software.

The relationship between hardware and software are:

- Hardware and software both are interdependent on each other. Each of them should work along to form computer produce a helpful output.
- The software can not be used if there is no support of any hardware device.
- When there is no proper instructions given, the hardware cannot be used and is useless.
- To get a selected job done on the pc, the relevant software package has to be loaded into the hardware.
- Hardware could be a former expense.
- Software development is incredibly pricey and could be a continued expense.
- The different software package can be loaded on hardware to run totally different jobs.
- The software acts as an associate interface between the user and therefore the hardware.
- We can say the hardware and software are the heart and soul of a digital computer.

2.2 RELATIONSHIP BETWEEN HARDWARE AND SOFTWARE

In order to complete any job/task and to produce meaningful output both hardware and software are necessary and must work together. It is simply that hardware is idle without a software and software cannot be utilized without a supporting hardware. Therefore, both hardware and software are complementary to each other. Software is held in physical medium, maybe on disk storage unit, and is composed of programs structure and data arranged in logical structures (not physical structures). The major difference between the two is that different sets of software applications may be used on a particular type of hardware configuration . Thus, hardware expenses is a one time expense and software is a continuous expense. The relationship between hardware and software can be seen in **Fig.2.2.**

User

Application Software

System Software

Hardware

Computer software

The computer software is nothing but a set of well-written instructions or programmes written in different programming languages like JAVA, C++, Python etc. These set of instructions or programs govern the operation of a computer system and make the hardware run. The software can be classified into mainly two categories –

- System Software
- Application Software

(a) System Software

System software is the programs used to handle the computer hardware and to execute the application software. The operating systems and language processors (Assembler, interpreter, Compiler etc) are also system software.

(b) Application Software

They are the software designed to solve specific tasks or problems like MS Office, AutoCAD, MATLAB etc. So, this type of software is specified to one specific application.

So. we have already discussed the computer hardware and software in details. From this, you might already notice the basic relationship exists between hardware and software. Now let's point out the important relationship between hardware and software in details.

Difference between EPROM and EEPROM

EPROM (Erasable Programmable Read Only Memory) is also the type of ROM is read and written optically. To write associate EPROM, its storage cells should stay within the same initial state. EPROM provides reduced storage permanency as compared to PROM as a result of the EPROM is receptive to radiation and electrical noise. in the construction of EPROM, MOS transistors are used.
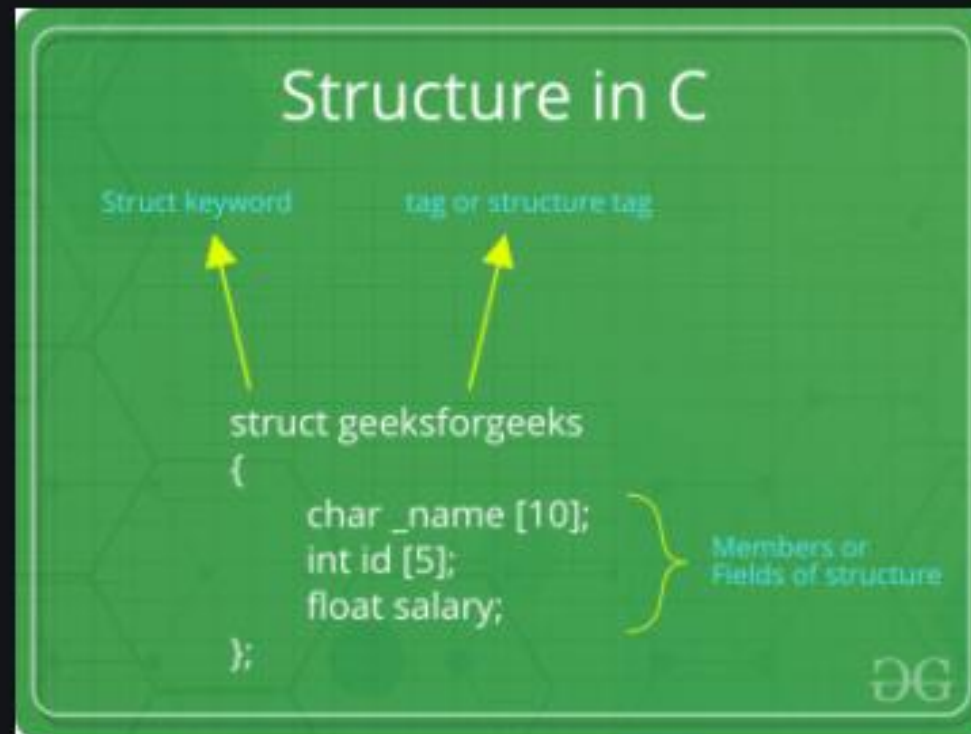
In **EEPROM** (Electrically Erasable Programmable Read-Only Memory) electric signal is used to erase the EEPROM's contents. EEPROM may be a non-volatile memory that retains its content notwithstanding the ability is shifted. It stores the little quantity of information used for laptop/computer BIOS. it absolutely was a replacement for the PROM as well as EPROM.

S.NO	EPROM	4 a	EEPROM
1.	In EPROM, UV light is used to erase the EPROM's content.		In EEPROM, electric signal is used to erase the EEPROM's contents.
2.	EPROM includes a rock crystal crystal window at the top.		EEPROM area unit wholly sheathed in an opaque plastic case.
3.	Relative size of cell in EPROM is one.		The relative size of cell in EEPROM is 3.
4.	EPROM is modern version of PROM.		EEPROM is the modern version of EPROM.
5.	EPROM is the external programming.		EEPROM is the external programming.
6.	Once EPROM memory is erased then it can be reprogrammed.		EEPROM is also reprogrammed after erasing like EPROM.
7.	The transistor used in EPROM consumes 12.5 volt.		The transistor used in EEPROM consumes 5 volt.
8.	In EPROM, hot electron injection programming technique is used.		In EEPROM, tunnel effect is used as programming technique.
9.	In EPROM, an erasure consumes 15 to 20 minute for erasing contents.		In EEPROM, an erasure consumes 5 millisecond time for erasing contents.
10.	EPROM chip has got to be off from the computer circuit to erase and reprogram the computer's BIOS.		EEEPROM chip will be erased and reprogrammed within the electrical circuit to erase and reprogram the content of computer's BIOS.

Structures in C

What is a structure?

A structure is a user defined data type in C/C++. A structure creates a data type that can be used to group items of possibly different types into a single type.

Structure in C

Struct keyword   tag or structure tag

```
struct geeksforgeeks
{
    char _name [10];
    int id [5];         } Members or
    float salary;         Fields of structure
};
```

	STRUCTURE	UNION
Keyword	The keyword **struct** is used to define a structure	The keyword **union** is used to define a union.
Size	When a variable is associated with a structure, the compiler allocates the memory for each member. The size of structure is **greater than or equal to the sum of sizes of its members.**	when a variable is associated with a union, the compiler allocates the memory by considering the size of the largest memory. So, size of **union is equal to the size of largest member.**
Memory	Each member within a structure is assigned unique storage area of location.	Memory allocated is shared by individual members of union.
Value Altering	Altering the value of a member will not affect other members of the structure.	Altering the value of any of the member will alter other member values.
Accessing members	Individual member can be accessed at a time.	Only one member can be accessed at a time.
Initialization of Members	Several members of a structure can initialize at once.	Only the first member of a union can be initialized.

Similarities between Structure and Union

- Both are user-defined data types used to store data of different types as a single unit.

- Their members can be objects of any type, including other structures and unions or arrays. A member can also consist of a bit field.

- Both structures and unions support only assignment = and sizeof operators. The two structures or unions in the assignment must have the same members and member types.

- A structure or a union can be passed by value to functions and returned by value by functions. The argument must have the same type as the function parameter. A structure or union is passed by value just like a scalar variable as a corresponding parameter.

- '.' operator is used for accessing members.

Increment & Decrement Operators

C++ provides various different types of Operators in order to compute mathematical and logical statements and expressions in the program. Increment Operator and Decrement Operator are one such type of Unary Operators in C++ which are used to add or subtract the value of 1 from the operand respectively. This article focuses on and tries to explain the in-depth concept of these 2 Unary operators.

Definition
•**Increment Operator** is used to increase the value of the operand by 1 whereas the **Decrement Operator** is used to decrease the value of the operand by 1.
•In C++, the value of the variable is increased or decreased by 1 with the help of the Increment operator and the Decrement Operator

Increment and Decrement Operators are used only with Integer Variables and Operands having Numerical values. They cannot be used with a Variable containing the values of a Character or String. The Increment Operator and Decrement Operator can be used in both the **Prefix** and the **Postfix position** of the operand. The Position used by the Increment/Decrement Operator in the program statement decides how the operator will function.

The Postfix Operator position has a higher precedence level than the Prefix Operator position. Postfix Operators are evaluated from left-to-right associativity and the Prefix Operators are evaluated from right-to-left associativity.

Increment operators are used to increase the value of the variable by one and decrement operators are used to decrease the value of the variable by one in C programs.

1. **Increment Operators:** The increment operator is used to increment the value of a variable in an expression. In the Pre-Increment, value is first incremented and then used inside the expression. Whereas in the Post-Increment, value is first used inside the expression and then incremented.

Syntax:

```
// PREFIX
++m


// POSTFIX
m++


where m is a variable
```

2. **Decrement Operators:** The decrement operator is used to decrement the value of a variable in an expression. In the Pre-Decrement, value is first decremented and then used inside the expression. Whereas in the Post-Decrement, value is first used inside the expression and then decremented.

Syntax:

```
// PREFIX
--m


// POSTFIX
m--


where m is a variable
```

Differences between Increment And Decrement Operators:

Increment Operators	Decrement Operators
Increment Operator adds 1 to the operand.	Decrement Operator subtracts 1 from the operand.
Postfix increment operator means the expression is evaluated first using the original value of the variable and then the variable is incremented(increased).	Postfix decrement operator means the expression is evaluated first using the original value of the variable and then the variable is decremented(decreased).
Prefix increment operator means the variable is incremented first and then the expression is evaluated using the new value of the variable.	Prefix decrement operator means the variable is decremented first and then the expression is evaluated using the new value of the variable.
Generally, we use this in decision making and looping.	This is also used in decision making and looping.

Random Access Memory (RAM) is used to store the programs and data being used by the CPU in real-time. The data on the random access memory can be read, written, and erased any number of times. RAM is a hardware element where the data being currently used is stored. It is a volatile memory. Types of RAM:

1. **Static RAM**, or (SRAM) which stores a bit of data using the state of a six transistor memory cell.
2. **Dynamic RAM**, or (DRAM) which stores a bit data using a pair of transistor and capacitor which constitute a DRAM memory cell.

Read Only Memory (ROM) is a type of memory where the data has been prerecorded. Data stored in ROM is retained even after the computer is turned off ie, non-volatile. Types of ROM:

1. **Programmable ROM**, where the data is written after the memory chip has been created. It is non-volatile.
2. **Erasable Programmable ROM**, where the data on this non-volatile memory chip can be erased by exposing it to high-intensity UV light.
3. **Electrically Erasable Programmable ROM**, where the data on this non-volatile memory chip can be electrically erased using field electron emission.
4. **Mask ROM**, in which the data is written during the manufacturing of the memory chip.

Difference	RAM	ROM
Data retention	RAM is a volatile memory which could store the data as long as the power is supplied.	ROM is a non-volatile memory which could retain the data even when power is turned off.
Working type	Data stored in RAM can be retrieved and altered.	Data stored in ROM can only be read.
Use	Used to store the data that has to be currently processed by CPU temporarily.	It stores the instructions required during bootstrap of the computer.
Speed	It is a high-speed memory.	It is much slower than the RAM.
CPU Interaction	The CPU can access the data stored on it.	The CPU can not access the data stored on it unless the data is stored in RAM.
Size and Capacity	Large size with higher capacity.	Small size with less capacity.
Used as/in	CPU Cache, Primary memory.	Firmware, Micro-controllers
Accessibility	The data stored is easily accessible	The data stored is not as easily accessible as in RAM
Cost	Costlier	cheaper than RAM.