CS Short Note

2^{10}=1024, 1 bit= 8 byte, 4byte=1 nibble, QWERTY

OOP-11 DLD- 18 DS & ALG – 22 OOP WITH C++ - 27 C- 31

Database

In database systems, *ACID* (Atomicity, Consistency, Isolation, Durability) refers to a standard set of properties that guarantee database transactions are processed reliably.

Do: In database systems, ACID (Atomicity, Consistency, Isolation, Durability) refers to a standard set of properties that **guarantee database transactions are processed reliably**. ACID is especially concerned with how a database recovers from any failure that might occur while processing a transaction.

Atomicity

Atomicity means that you guarantee that either all of the transaction succeeds or none of it does. You don't get part of it succeeding and part of it not. If one part of the transaction fails, the whole transaction fails. With atomicity, it's either "all or nothing".

Consistency

This ensures that you guarantee that all data will be consistent. All data will be valid according to all defined rules, including any constraints, cascades, and triggers that have been applied on the database.

Isolation

Guarantees that all transactions will occur in isolation. No transaction will be affected by any other transaction. So a transaction cannot read data from any other transaction that has not yet completed.

Durability

Durability means that, once a transaction is committed, it will remain in the system – even if there's a system crash immediately following the transaction. Any changes from the transaction must be stored permanently. If the system tells the user that the transaction has succeeded, the transaction must have, in fact, succeeded.

https://database.guide/what-is-acid-in-databases/

Data Mining –analysis of data, Relationship of dataset
Two principle of relational Database model

I. Entity Integrity
II. Referential Integrity

Different Stage of data mining

- Initial exploration
- Model building or pattern identification with verification/validation
- deployment

The **Weak Entity** in DBMS does not have primary key and depend on parent entity.

OOP

When class declare then it take memory/ object create then takes memory

What are the main features of OOPs?

- Inheritance
- Encapsulation
- Polymorphism
- Data Abstraction
-

Over loading vs overriding

https://www.programiz.com/cpp-programming/function-overriding

Polymorphism

https://www.edureka.co/blog/interview-questions/oops-interview-questions/

What is an object?

An object is a real-world entity which is the basic unit of OOPs for example chair, cat, dog, etc. Different objects have different states or attributes, and behaviors.

6. What is a class?

A class is a prototype that consists of objects in different states and with different behaviors. It has a number of methods that are common the objects present within that class.

Object	Class
A real-world entity which is an instance of a class	A class is basically a template or a blueprint within which objects can be created
An object acts like a variable of the class	Binds methods and data together into a single unit
An object is a physical entity	A class is a logical entity
Objects take memory space when they are created	A class does not take memory space when created
Objects can be declared as and when required	Classes are declared just once

7. What is the difference between a class and a structure?

Class: User-defined blueprint from which objects are created. It consists of methods or set of instructions that are to be performed on the objects.

Structure: A structure is basically a user-defined collection of variables which are of different data types.

https://www.interviewbit.com/oops-interview-questions/

Procedural Oriented Programming	**OOP**
Top down approach	**Bottom up approach**
No access specifier	**Have access specifier (privae,public,protected)**
Overloading is not	**Overloading allow**
Function is more important than data	**Data is more important than function**
C,fortran, pascal	**C++, java, python, c# etc**

Java is not support multiple inheritense/ using interface for multiple inheritense

RAID stands for redundant array of independent disks. The technology combines two or more physical drives into a logical unit presented as a single hard drive to the operating system.

Key concepts

Mirroring is duplicating data to more than one disk. It can speed read times because the system can read data from more than one disk. But mirroring may slow write times if the system must confirm that data is correctly written to each disk

Striping is writing data across a number of disks in parallel, which speeds read/write performance.

What is parity? Parity error checking is where redundancy information is calculated for each piece of data stored. If a drive fails, the missing data can be reconstructed from the remaining data and the parity data. Error checking tends to slow the system because data from several locations must be read and compared.

RAID-0

RAID Level-0 is not redundant. Since no redundant information is stored, performance is very good, but the failure of any disk in the array results in data loss. A single record is divided into strips typically 512 bytes and is stored across all disks. The record can be accessed quickly by reading all disks at the same time, called as striping.

RAID-1

RAID Level-1 provides redundancy by writing all data into two or more drives. The performance is faster on reads and slower on writes compared to a single drive. If anyone drives fails, no data is lost. This method is called mirroring.

RAID-2

RAID Level-2 is used for Hamming error correction codes and is used with drives which do not have built-in error detection.

RAID-3

RAID Level-3 stripes data at a byte level across several drives, with parity stored on one drive. Byte-level stripping hardware supports efficient use.

RAID-4

RAID Level-4 that stripes data at a block level across several drives, with parity stored on one drive. Parity information allows recovery from the failure of any single drive. The performance of the level-4 array is good for reads.

Writes, however, require that parity data be updated each time. Because only one drive in the array stores redundant data. The cost per megabyte is low.

RAID-5

RAID Level-5 is similar to level 4, but distributes parity among the drives. This can speed up small writes in the multiprocessing system. The performance for reads is lower than a level-4 array. The cost per megabyte is the same as level-4.

Summary

Given below is the summary of all the types of RAID −

Levels	Summary
RAID-0	It is the fastest and most efficient array type but offers no fault-tolerance.
RAID-1	It is the array of choice for a critical, fault tolerant environment.
RAID-2	It is used today because ECC is embedded in almost all modern disk drives.
RAID-3	It is used in single environments which access long sequential records to speed up data transfer.
RAID-4	It offers no advantages over RAID-5 and does not support multiple simultaneous write operations.
RAID-5	It is the best choice in a multi-user environment. However, at least three drives are required for the RAID-5 array.

RAID 0	Striping
RAID 1	Mirroring
RAID 5	Striping with pirity
RAID 6	Striping with double pirity
RAID 10	Combine Striping and mirroring

Classfull address:

Class	Net	Host	IP-v4
A= 0-127	8	24	32
B=128-190	16	16	32
C=191-223	24	8	32
D=224-240	*	*	32
E=241-255	*	*	32

Network: 179.249.0.0

Subnet required: 78 $<2^7$

1111 1111. 1111 1111. 1111 1110. 0000 0000

Subnet Musk: 255.255.254.0

Network address ,Host ID/Address=0

Broadcast Address=1

Host $=2^{16-2}$

Network	Subnet	host
16	7	9

Conversion Binary

128	64	32	16	8	4	2	1

1st host address= 179.249.0000 0000.0000 0001=179.249.0.1

Last host Address=179.249.0000 0001.1111 1110=179.249.1.254

Broadcast Address=179.249.1.255

Default mask: network address=1,host=0

Subnet musk: network, subnet=1, host=0

Classless address

32.70.111.133/21

32.70.111.133/21

Net id, sub net id= as it is , host is=0 for calculate network address

128	64	32	16	8	4	2	1
0	1	1	0	1	1	1	1

Network address: 32.70.0110 1000.0000 0000=32.70.104.0

Broadcast id: net id=as it is, host it=1 for calculate Broadcast address

32.70.0110 1111. 1111 1111=32.70.111.255

Subnet mask- network id, subnet id=1, host=0 for calculating subnet musk

1111 1111.1111 1111 1000.0000 0000=255.255.248.0

II)88.9.150.232/24

Network address= 88.9.150.0

Broadcast address:88.9.150.255

Subnet Musk=255.255.255.0

**Question:172.16.2.1/22 application for 50 PCs & 23 PCs.*

Given IP Address: 172.16.2.1/22

Here Network Bit=22, Host Bit=(32-22)=10

So Total IP=2^{10}=1024 and Total usable IP=2^{10}-2=1022

(2=Network IP + Broadcast IP)

Subnet mask=255.255.252.0

Subnet IP or Network IP=172.16.0.0 and Broadcast IP=172.16.3.255

For 50 PCs= IP range 172.16.0.0/**26** to 172.16.0.63/26 *Because 2^6=64.*

First usable IP:172.16.0.1 Last usable IP:172.16.0.6

Broadcast IP:172.16.0.63

For 23 PCs= IP range 172.16.0.64/**27** to 172.16.0.95/27 *Because 2^5=32.*

First usable IP:172.16.0.65 Last usable IP:172.16.0.94

Broadcast IP:172.16.0.95

Port number: identify sender & receiver of message in computer networking

Network Interface Identification

**Question:192.168.10.0/23*

Subnet musk: 1111 1111.1111 1111.1111 1110.0000 0000 [32-23=9, 2^9-2=510]

=255.255.254.0

First host=192.168.11.1

Last host=192.168.11.254

Broadcast address= 192.168.11.255

OS- Operating System

OS Scheduling Algorithm math

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

FCFS(First Come First Serve)

Completion Time= Burst Time+ Add Next Burst Time,

Waiting Time= Turn Around Time- Burst Time

Process	Arrival Time	Burst Time	Completion Time	Turn Around Time	Waiting Time
P1	0	10	10	10	0
P2	0	1	11	11	10
P3	0	2	13	13	11
P4	0	1	14	14	13
P5	0	5	19	19	14

Here Gantt chart is given below

	P1	P2	P3	P4	P5
0	10	11	13	14	19

SJF(Shortested Job First)

Completion Time= Burst Time+ Add Next Burst Time,

Waiting Time= Turn Around Time- Burst Time

Here Gantt chart is given below

	P2	P4	P3	P5	P1
0	1	2=(1+1)	4=(2+2)	9=(4+5)	19=(9+10)

Process	Arrival Time	Burst Time	Completion Time	Turn Around Time	Waiting Time
P1	0	10	19	19	9
P2	0	1	1	1	0
P3	0	2	4	4	2
P4	0	1	2	2	1
P5	0	5	9	9	4

RR(Round Robin) [Quantum Time=1]

Completion Time= Burst Time+ Add Next Burst Time,

Waiting Time= Turn Around Time- Burst Time

Here Gantt chart is given below

P1	P2	P3	P4	P5	P1	P3	P5	P1	P5	P1	P5	P1	P5	P1	P1	P1	P1	P1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

P_2=2 P_4=4 P_3=7 P_5 =14 P_1=19

Process	Arrival Time	Burst Time	Completion Time	Turn Around Time	Waiting Time
P1	0	10	19	19	9
P2	0	1	2	2	1
P3	0	2	7	7	5
P4	0	1	4	4	3
P5	0	5	14	14	9

Component of OS

- Kernel
- Process Execution
- Interrupt
- Memory Management
- Multitasking
- Networking
- Security
- User Interface
-

Processor Speed in CPU

Processor Speed in CPU

- Multicore
- Cache Memory
- Clock Speed
- Word Length
- Address Bus Width
- Data Bus Width

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SQL

- Select distinct customer_name from deposit where customer_name not in (Select distinct customer_name form borrow)
- 12% Commission
  Select A.name, A.address from customer AS A JOIN salesman AS B ON A.sales_id=B.sales.id where B.commission>.12;
- Count Order
  Select order_id,date,COUNT(*) from order GROUP BY order_id,date;
- Select substr(name,1,3) form Employee;
- Only Dublicate value show
  Select *from student where stdid in (Select stdid from student groupby stdid having count(*)>1)
- Text file show in database? No
- Even Number select * from order where mod(order_id,2)=0;
- All customer name who have account but no loan
  select distinct customer_name from deposit where customer_name not in (select distinct customer_name from borrow)
  borrow(c_name, loan)
  depositor(c_name, account)

When compare then use any.
Primary key are also apply in uniquely identify of data.

Two principles of relational database model

- Entity integrity
- Referential integrity (data store & use consistently)

Computer Security/Virus

- Trojon Horse-Hijaking Web camera & watching you
- Malicious spyware-Keyloger , Keyboard monitoring (Kid, employee, internet user etc)
- Ransomware- crypto virus, file lock, Encript your file than pay for decript
- Rootkit- Keylogger, bank credentials steals, password stealers, anti virus, disablers and boot for DDoS Attacks.
- Bootkit- Malicious infection which target the master boot record on physical motherboard of the computer.
- DoS-Denial-of-service attack
- DDos-Distribute Denial-of-service attack

Whitelisting- defensive measure. process of identifying & permitting safe content.
Blacklisting- not allow a certain service. Unauthorized access to a system resource.
Anti-Virus Software

- Comodo free antivirus
- Avira
- Avast
- AVG
- Bitdefender
- Microsoft windows defender
- Sophos Home free Anti virus

ML & AI

Supervised Learning

- Classification-category (red, blue)
- Regression-Real Value (doller, weight)

Unsupervised Learning

- Clustering
- Association

Data Communication

Asymmetric key encryption process, key used to encrypt public key.

Public Key Encryption is a Asymmetric Encryption.
Digital Signature- Authentication, Encryption, Data Integrity, non-repudiation
Bangla Email Software - Ekushy

ss
Digital Signature- Authentication, Encryption, Integrity
Bangla Email Software – Ekushy Da

Analog to Digital signal-
Analog⇨Sampling(Digital Value)⇨Quantizing(max-min amplitude)⇨Encodinng⇨Digital Data

IP TO MAC Address coming protocols- ARP (Address Resolution Protocol)

Compared to CISC>RISC processor faster
(Complex Instruction Set Computers , Reduced Instruction Set Computers).

Programming

Infinite loop

```
For( ; ; )
```

```
#include<stdio.h>
int main()
{

   int a=10,b,c;
   c=(a=90)?b=11:20;
   printf("a=%d c=%d",a,c);
        return 0;
} output:90,11
```

DFS is faster than BFS.

A complete graph n node than $\frac{n(n-1)}{2}$ edges

Static function/class/variable?

1.414F or 1.414f best way to convert floating data type.

Set & Reset **| &**

A program in the execution is called a Process. Process is more than a program code.

Sub class- Derived Class

Supper Class- Base Class

ARP-Address Resolution Protocol

BIOS- Basic Input Output System

CAD- Computer Aided Design (2D, 3D Design)

CAL-Computer Aided Learning

CIRS-Complex Instruction Set Computers
DHCP-Dynamic Host Configuration Protocols
DVD- Digital Versatile Disc
EGA-Enhanced Graphics Adapter
EPIC- Explicitly Parallel Instruction completing
GMS-Global System for Mobile Communications
IMAP-Internet Message Transfer Protocols
JPEG-Joint Photographic Experts Group
LTE-Long Term Evolution
MICR- Magnetic Ink Character Reader
MIRC-Microsoft Internet Relay Chat
OSPF- Open short path file
PDF-Portable Document format
QR Code- Quick Response Code
RAID-Redundant array independent disk
RAM-Volatile Memory (volatile memory)
RFID-Radio Frequency Identification
RICS-Reduce Instruction Set Computers
ROM- Non-volatile Memory (non-volatile memory)
SNTP-Simple Network Transfer protocols
SSH- Shell Secure
URL-Uniform Resource Locator
VGA-Video Graphics Array
VIRUS- Vital information resource under seize
VOID- Voice Over Internet Protocol
VPN- Virtual Private Network
WiFi- Wireless Fidelity

Computer Monitor called – VDU.

Real Time operating system- RT Linux

Throw replace return

Primary key also apply in uniquely identify of data

Over

A finite Automation is composed of five component.

- A finite set of state
- A set of symbols, called alphabet
- Q is transition function
- Q_0 Starting state
- Final state F.

Clouding Computing Model

- ❖ Infrastructure as a Service (IaaS)
- ❖ Platform as a Service(PaaS)
- ❖ Software as a Service (SaaS)

Software pre-release version **alpha-version** (developing efficient, accurate, bug free s/w program)

Final Product is **Beta version.** Design change often as a result.

Multi Tasking vs Multi Programming vs Multi processing

Big Data **Characteristics-** Volume, Variety, Velocity, Variability

Big Data **Component-** Power, Cooling, Security, Fail safe measures, room for growth

First(1^{st}) Internet Opening 1969.

CPU(Memory+CU+ALU)

TDM is used to transmiting digital signals.

Bridge- Data Link Layer

IP address-Network layer (03)

IP Address to MAC Address – ARP(Address Resolution Protocols)

Select id,sum(work_hour) from employee where work_hour>06 group by ID;

PERT- Program Evaluation & Review Technique

$\{PERT - Program\ Evaluation\ \&Review\ Technique, CPM - Critical\ Path\ Method\}$ Project Scheduling Method

CPM-Critical Path Method

A derived class inheritances attributes from a super class.

Multiple inheritance in java implemented by interface.

Source code is a list of commands.

Email Protocols- Application layers

Real Time OS- RT Linux, VRTX and Linux.

RPC- Remote Procedure Call

Previous step for calculation- Dynamic Programming

Linked list can be implemented- Pointer+Array

Microprocessor is first used 4^{th} Generation Computer.

Three Main type of programming Language

- Machine Language
- Assembly Language
- High Level Language

Bit- Binary Digit

OSPF-Open Shortest Path First(Metric used Bandwidth)

FTP Port- 20,21

Select Count(*) from Employee.Employee.Employee;

Array Access-Sequence Random

IP Address+Port Number= Socket Address

Stack+ Queue=Deque

Bug- Logical error in program.

Maximum Bit Rate=2*Bandwidth(Hz)*$\log_2 2$=2*3000*$\log_2 2$=6000bps

Bandwidth of 3Khz, 3 Signal Level

Analog Circuit vs Digital Circuit

Stataful & stateless protocols

Different type of MAC address (Unicast, Broadcast, Multicast)

also address finding

Binary Tree (Full Binary, Binary Tree, al

Linear search is a finding an element with in a list sequentially.

MAC- data link layer

RFID- access control, animal monitoring, transportation, automatic control, medical application, material control, quality tracking, secure application

Data Mining- data purification, data integration, data selection, data transformation, data mining, data pattern evaluation, knowledge representation.

Select name, hire_date from employ yee where to_char(hire_date,'YYYY') between 2002 and 2005 order by hire_date.

Select name ,avg(grate) as gpa from tablename group by std_id

order by gpa limit 10

fetch- decode- execute