



Power Grid Company of Bangladesh

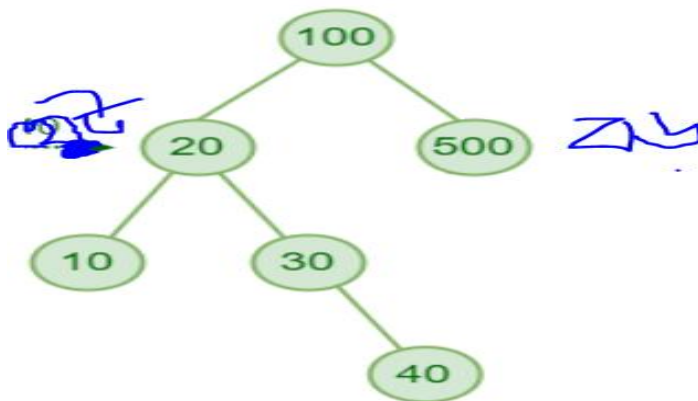
Assistant Engineer (CSE) Exam Taker: BUET Time: 10-11 AM Marks: 60 (Non)+Dept (40)

Total Question dept: 08 Date: 17.05.2024

1	<p>a) Insert the data into BST from given Nodes</p> <p>b) Print the tree in post order traversal of the BST</p> <p>c) Structure of the BST after deleting one node.</p>
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Suppose we have some values: 10, 100, 30, 20, 500, 40

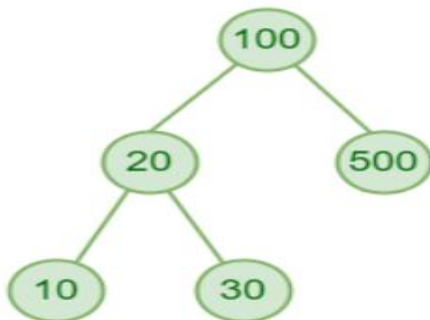
Then BST will look like:



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Post Order: 10 40 30 20 500 100

Suppose we want to delete 40 node:



2	<p>Write C code</p> <p>$x - x^3/3! + x^5/5! - x^7/7!.....$</p>
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```
#include <stdio.h>
```

```
#include <math.h>
```

```
// Function to calculate factorial
```



```
double factorial(int n) {
    double result = 1.0;
    for (int i = 1; i <= n; i++) {
        result *= i;
    }
    return result;
}

// Function to calculate sine using the series expansion
double sine_series(double x, int terms) {
    double sum = 0.0;
    for (int n = 0; n < terms; n++) {
        int sign = (n % 2 == 0) ? 1 : -1; // Alternating signs
        double term = pow(x, 2 * n + 1) / factorial(2 * n + 1);
        sum += sign * term;
    }
    return sum;
}

int main() {
    double x;
    int terms;

    // Input angle in radians and number of terms
    printf("Enter the value of x (in radians): ");
    scanf("%lf", &x);
    printf("Enter the number of terms: ");
    scanf("%d", &terms);
}
```

3	a) How many bits in IPv4 and IPv6 Address? b) Why doesn't NAT used in IPv6? c) Difference between https and http
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IPV4 = 32

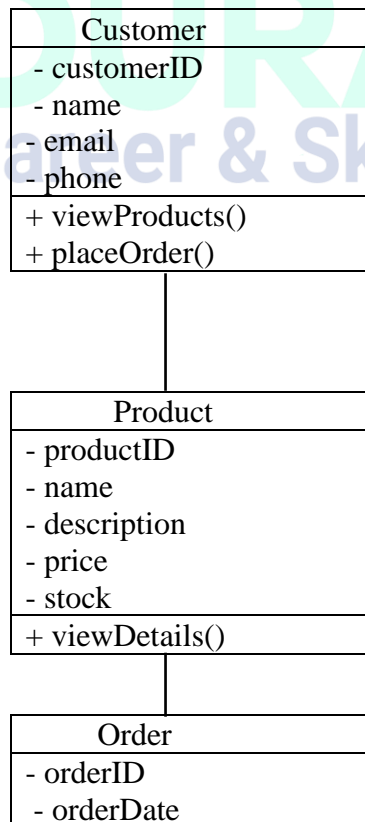
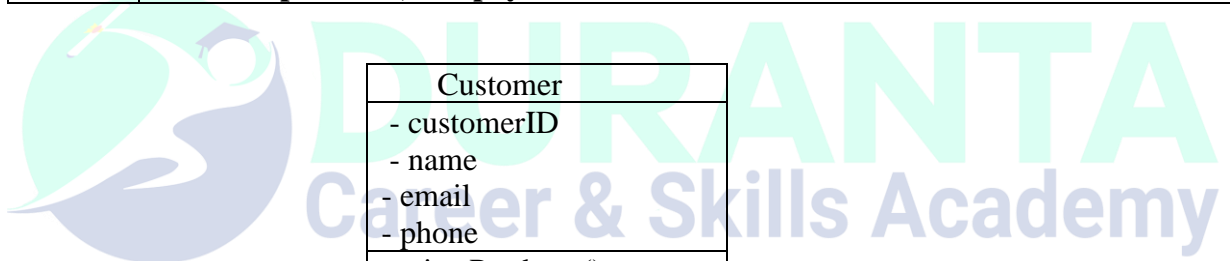
IPV6 = 128

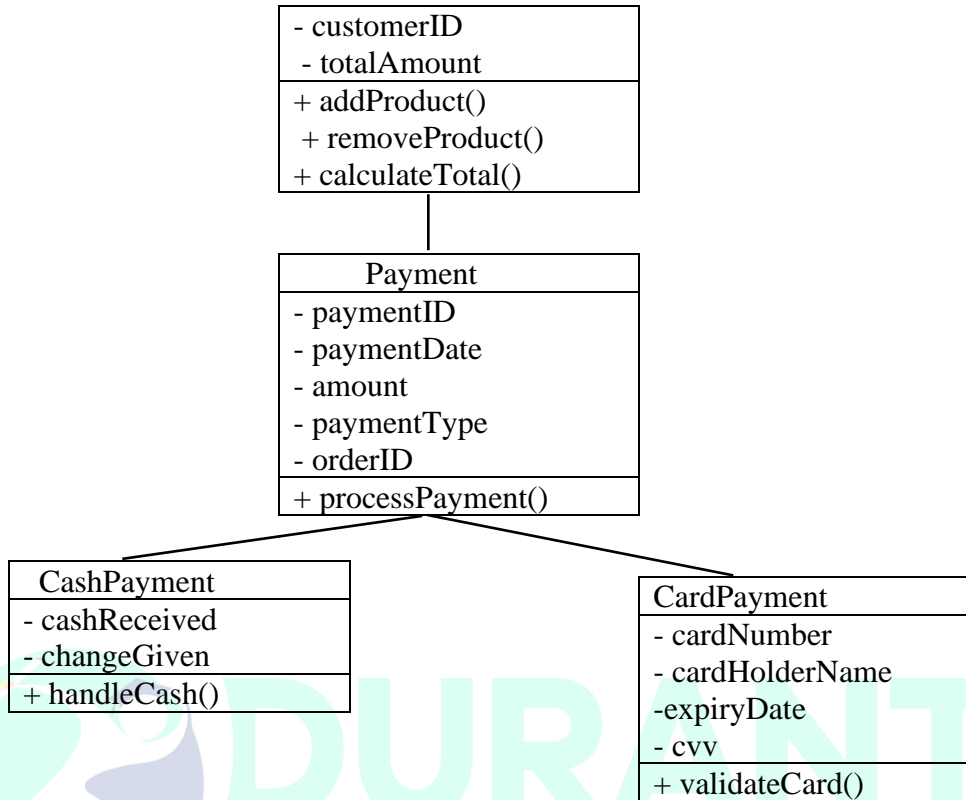
The primary reasons NAT is not used in IPv6 are the vast address space, which eliminates the need for address conservation, and the preservation of end-to-end connectivity, which simplifies network configuration and management. IPv6 was designed to overcome the limitations of IPv4 and to enable a more straightforward, scalable, and secure Internet.



Feature	HTTP	HTTPS
Security	Unsecured	Secured (using SSL/TLS)
Port Number	80	443
URL Prefix	http://	https://
Encryption	No	Yes
Certificate Required	No	Yes
Common Use Cases	General web browsing	Secure transaction

4. Draw a class diagram for a E commerce website where customer can view different products, can pay either card or cash.





5.	<p>Given, Hit- 1 nano second Miss- 25 ns 1% instruction miss 5% data miss Total input data 15% Find the avg. Access time</p>
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1. **Calculate Hit Rate:** Since miss rate is the opposite of hit rate, we can find the hit rate by subtracting the miss rate from 1 (100%).

Hit Rate = 1 - (Instruction Miss Rate + Data Miss Rate) Hit Rate = 1 - (1% + 5%) Hit Rate = 1 - 0.06 (converted percentages to decimals for calculation) Hit Rate = 0.94

2. **Calculate Access Times Weighted by Hit Rate and Miss Rate:**

Average Access Time = (Hit Rate * Hit Time) + (Miss Rate * Miss Time)

- Hit Time = 1 nanosecond (given)
- Miss Time (combined instruction and data miss) = 25 nanoseconds (given)
- Miss Rate = 1 - Hit Rate = 0.06 (calculated earlier)

Average Access Time = (0.94 * 1 ns) + (0.06 * 25 ns)

3. **Calculate Average Access Time:**

Average Access Time = 0.94 ns + 1.5 ns Average Access Time = 2.44 nanoseconds (rounded to two decimal places)

Therefore, the average access time for the system is approximately 2.44 nanoseconds

6.	Given DB table with Employee (NID, Company_id, Name, Mobile Number), Assume every record has a unique mobile number. Find the number of super key, candidate and give example of two candidate key.
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To find the number of super keys, candidate keys, and examples of candidate keys for the given table Employee(NID, Company_id, Name, Mobile Number), we need to understand the concepts of super keys and candidate keys.

Definitions

Super Key: A set of one or more columns (attributes) that can uniquely identify a row in the table.

Candidate Key: A minimal super key, which means it cannot be reduced further without losing the property of uniquely identifying a row.

Analysis

Given the table attributes:

NID (presumably a unique identifier for each employee)

Company_id (identifier for the company the employee works for)

Name (name of the employee)

Mobile Number (unique mobile number for each employee)

Unique Attributes

NID is unique.

Mobile Number is unique.

Candidate Keys

Candidate keys are minimal sets of attributes that can uniquely identify a row. Based on the unique attributes:

1. NID (since it's unique and minimal)
2. Mobile Number (since it's unique and minimal)

Thus, the candidate keys are:

NID

Mobile Number

Super Keys

Super keys include all candidate keys and any superset of candidate keys. For the given table:

All candidate keys themselves are super keys.

Any combination of the attributes that includes a candidate key is also a super key.

Number of Super Keys

To calculate the total number of super keys, we need to consider all possible combinations of attributes that include at least one candidate key (NID or Mobile Number).

Given the attributes: NID, Company_id, Name, Mobile Number, let's calculate the combinations:

1. **Single Attribute Super Keys:**

NID

Mobile Number

2. **Two Attribute Super Keys:**

NID, Company_id
 NID, Name
 NID, Mobile Number (already a candidate key)
 Mobile Number, Company_id
 Mobile Number, Name
 Mobile Number, NID (already a candidate key)

3. **Three Attribute Super Keys:**

NID, Company_id, Name
 NID, Company_id, Mobile Number
 NID, Name, Mobile Number
 Mobile Number, Company_id, Name
 Mobile Number, Company_id, NID
 Mobile Number, Name, NID

4. **Four Attribute Super Key:**

NID, Company_id, Name, Mobile Number

Total Number of Super Keys

If we count all the combinations above, we get:

2 (single attribute super keys)
 4 (two attribute super keys excluding duplicates)
 4 (three attribute super keys excluding duplicates)
 1 (four attribute super key)
 Total = 2 + 4 + 4 + 1 = 11 super keys

Summary

Number of Super Keys: 11

Number of Candidate Keys: 2

Examples of Candidate Keys:

NID
 Mobile Number

7. a)	Difference between Alfa, Beta, Gamma testing.
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Aspect	Alpha Testing	Beta Testing	Gamma Testing
Conducted by	Internal team (developers, QA testers)	Selected group of external users (beta testers)	Select group of users (similar to beta testing)
Environment	Controlled internal environment	Real-world environment	Controlled but real-world environment

Aspect	Alpha Testing	Beta Testing	Gamma Testing
Focus	Functional and non-functional testing	Usability, functionality, reliability	Final verification, readiness for release
Purpose	Identify early bugs and issues	Gather user feedback, identify real-world issues	Ensure no critical issues, final acceptance
Outcome	Stable enough for beta testing	Refined based on user feedback	Ready for production deployment

b) What is Demilitarized Zone (DMZ) and sanbox for security test ?

A DMZ or demilitarized zone is a perimeter network that protects and adds an extra layer of security to an organization's internal local-area network from untrusted traffic.

Sandboxes serve as a development testing environment, enabling organizations to run applications in a secure space before they are introduced into the production stage. This safe space ensures that any damaging issues are addressed without compromising or slowing down critical resources.

**8 F1 = A+B F2 = AB
Create the functions using NAND and NOR gate**

Solution:

