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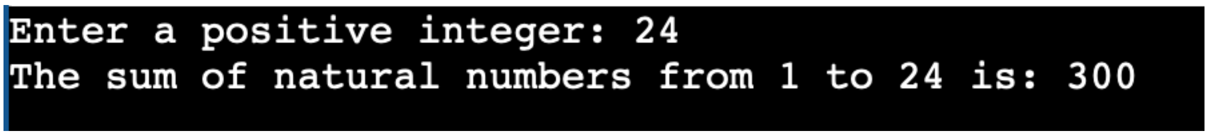
Section-KPIT-901’B’

Q1- Sum of Natural Numbers up to N

CODE-

```
#include <iostream>
using namespace std;
int main() {
   int n;

   cout << "Enter a positive integer: ";
   cin >> n;

   if (n > 0) {
      int totalSum = n * (n + 1) / 2;
      cout << "The sum of natural numbers from 1 to " << n << " is: " << totalSum
<< endl;
   } else {
      cout << "Please enter a positive integer." << endl;
   }
   return 0;
}
```

Output-

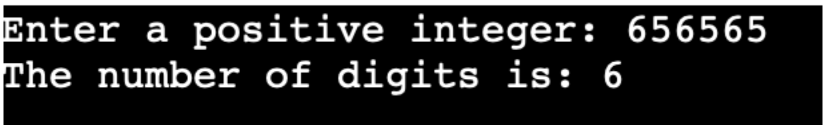


```
Enter a positive integer: 24
The sum of natural numbers from 1 to 24 is: 300
```

Q2- Count Digits in a Number

```
#include <iostream>
using namespace std;
int main() {
   int n;
   int count = 0;
   cout << "Enter a positive integer: ";
   cin >> n;
   if (n <= 0) {
      cout << "Please enter a positive integer." << endl;
      return 0;
   }
   while (n != 0) {
      n = n / 10;
      count++;
   }
   cout << "The number of digits is: " << count << endl;
   return 0;
}
```

Output-

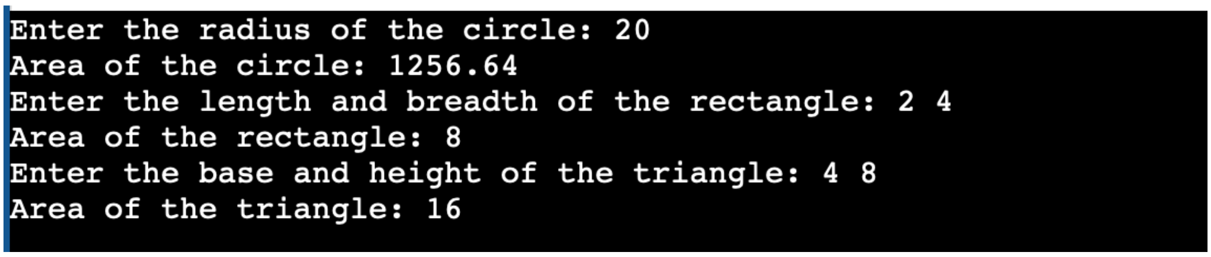


```
Enter a positive integer: 656565
The number of digits is: 6
```

Q3- Function Overloading for Calculating Area

```
#include <iostream>
#include <cmath>
using namespace std;

double calculateArea(double radius) {
   return M_PI * radius * radius;
}
double calculateArea(double length, double breadth) {
   return length * breadth;
}
double calculateArea(double base, double height, bool isTriangle) {
   return 0.5 * base * height;
}

int main() {
   double radius;
   cout << "Enter the radius of the circle: ";
   cin >> radius;
   cout << "Area of the circle: " << calculateArea(radius) << endl;

   double length, breadth;
   cout << "Enter the length and breadth of the rectangle: ";
   cin >> length >> breadth;
   cout << "Area of the rectangle: " << calculateArea(length, breadth) << endl;

   double base, height;
   cout << "Enter the base and height of the triangle: ";
   cin >> base >> height;
   cout << "Area of the triangle: " << calculateArea(base, height, true) << endl;

   return 0;
}
```

Output-



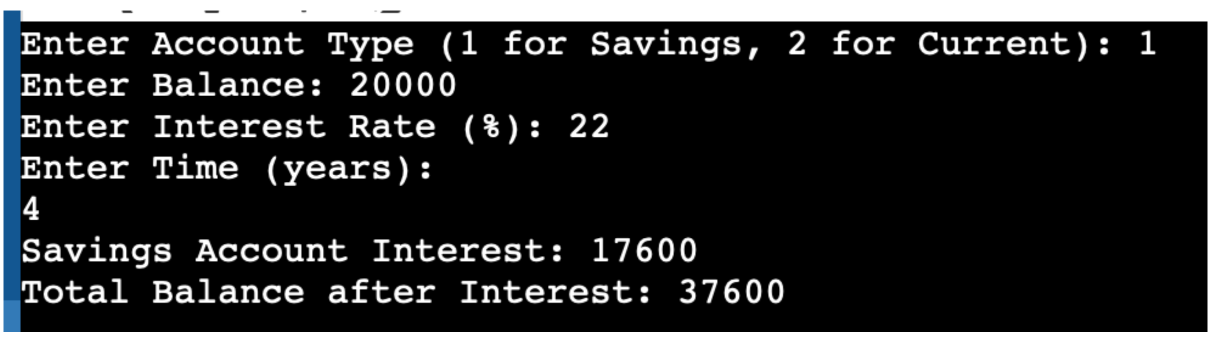
```
Enter the radius of the circle: 20
Area of the circle: 1256.64
Enter the length and breadth of the rectangle: 2 4
Area of the rectangle: 8
Enter the base and height of the triangle: 4 8
Area of the triangle: 16
```

Q4- Implement Polymorphism for Banking Transactions

```
#include <iostream>
using namespace std;

class Account {
protected:
   double balance;

public:
   Account(double bal) : balance(bal) {}
   virtual void calculateInterest() = 0;
   virtual ~Account() {}
};

class SavingsAccount : public Account {
   double rate;
   int time;
public:
   SavingsAccount(double bal, double r, int t) : Account(bal), rate(r), time(t) {}

   void calculateInterest() override {
      double interest = balance * (rate / 100) * time;
      cout << "Savings Account Interest: " << interest << endl;
      cout << "Total Balance after Interest: " << (balance + interest) << endl;
   }
};

class CurrentAccount : public Account {
   double maintenanceFee;

public:
   CurrentAccount(double bal, double fee) : Account(bal), maintenanceFee(fee)
{}

   void calculateInterest() override {
      double finalBalance = balance - maintenanceFee;
      cout << "Current Account Maintenance Fee: " << maintenanceFee << endl;
      cout << "Final Balance after Fee Deduction: " << finalBalance << endl;
   }
};
```

```
int main() {
    int accountType;
    cout << "Enter Account Type (1 for Savings, 2 for Current): ";
    cin >> accountType;

    if (accountType == 1) {
        double balance, rate;
        int time;
        cout << "Enter Balance: ";
        cin >> balance;
        cout << "Enter Interest Rate (%): ";
        cin >> rate;
        cout << "Enter Time (years): ";
        cin >> time;

        SavingsAccount savings(balance, rate, time);
        savings.calculateInterest();
    } else if (accountType == 2) {
        double balance, maintenanceFee;
        cout << "Enter Balance: ";
        cin >> balance;
        cout << "Enter Monthly Maintenance Fee: ";
        cin >> maintenanceFee;

        CurrentAccount current(balance, maintenanceFee);
        current.calculateInterest();
    } else {
        cout << "Invalid account type entered." << endl;
    }

    return 0;
}
```

Output-



```
Enter Account Type (1 for Savings, 2 for Current): 1
Enter Balance: 20000
Enter Interest Rate (%): 22
Enter Time (years):
4
Savings Account Interest: 17600
Total Balance after Interest: 37600
```

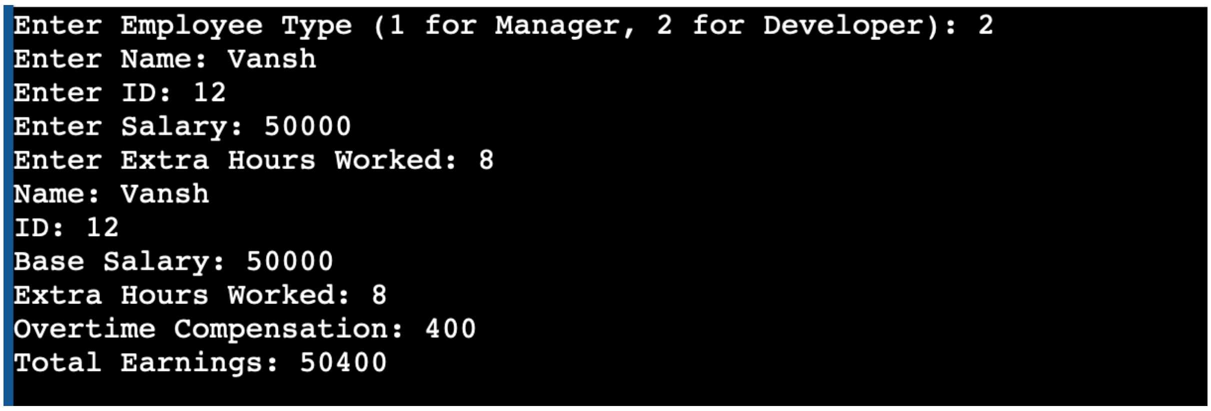
Q5- Hierarchical Inheritance for Employee Management System

```
#include <iostream>
#include <string>
using namespace std;

class Employee {
protected:
    string name;
    int id;
    double salary;

public:
    Employee(string empName, int empId, double empSalary)
        : name(empName), id(empId), salary(empSalary) {}

    virtual void calculateEarnings() = 0;
    virtual void displayDetails() {
        cout << "Name: " << name << endl;
        cout << "ID: " << id << endl;
        cout << "Base Salary: " << salary << endl;
    }

    virtual ~Employee() {}
};

class Manager : public Employee {
    int performanceRating;
```

```
public:
   Manager(string empName, int empId, double empSalary, int rating)
      : Employee(empName, empId, empSalary), performanceRating(rating) {}

   void calculateEarnings() override {
      double bonus = 0;
      switch (performanceRating) {
         case 5: bonus = salary * 0.2; break;
         case 4: bonus = salary * 0.15; break;
         case 3: bonus = salary * 0.1; break;
         default: bonus = 0; break;
      }
      cout << "Performance Rating: " << performanceRating << endl;
      cout << "Bonus: " << bonus << endl;
      cout << "Total Earnings: " << (salary + bonus) << endl;
   }
};

class Developer : public Employee {
   int extraHours;

public:
   Developer(string empName, int empId, double empSalary, int hours)
      : Employee(empName, empId, empSalary), extraHours(hours) {}

   void calculateEarnings() override {
      double overtimeCompensation = extraHours * 50;
      cout << "Extra Hours Worked: " << extraHours << endl;
      cout << "Overtime Compensation: " << overtimeCompensation << endl;
      cout << "Total Earnings: " << (salary + overtimeCompensation) << endl;
   }
};

int main() {
   int employeeType;
   cout << "Enter Employee Type (1 for Manager, 2 for Developer): ";
   cin >> employeeType;

   string name;
   int id;
```

```
    double salary;

    cout << "Enter Name: ";
    cin >> name;
    cout << "Enter ID: ";
    cin >> id;
    cout << "Enter Salary: ";
    cin >> salary;

    if (employeeType == 1) {
        int performanceRating;
        cout << "Enter Performance Rating (1-5): ";
        cin >> performanceRating;

        Manager manager(name, id, salary, performanceRating);
        manager.displayDetails();
        manager.calculateEarnings();
    } else if (employeeType == 2) {
        int extraHours;
        cout << "Enter Extra Hours Worked: ";
        cin >> extraHours;

        Developer developer(name, id, salary, extraHours);
        developer.displayDetails();
        developer.calculateEarnings();
    } else {
        cout << "Invalid Employee Type!" << endl;
    }

    return 0;
}
```

Output-



```
Enter Employee Type (1 for Manager, 2 for Developer): 2
Enter Name: Vansh
Enter ID: 12
Enter Salary: 50000
Enter Extra Hours Worked: 8
Name: Vansh
ID: 12
Base Salary: 50000
Extra Hours Worked: 8
Overtime Compensation: 400
Total Earnings: 50400
```