JAVA ASSIGNMENT NUMBER: 01

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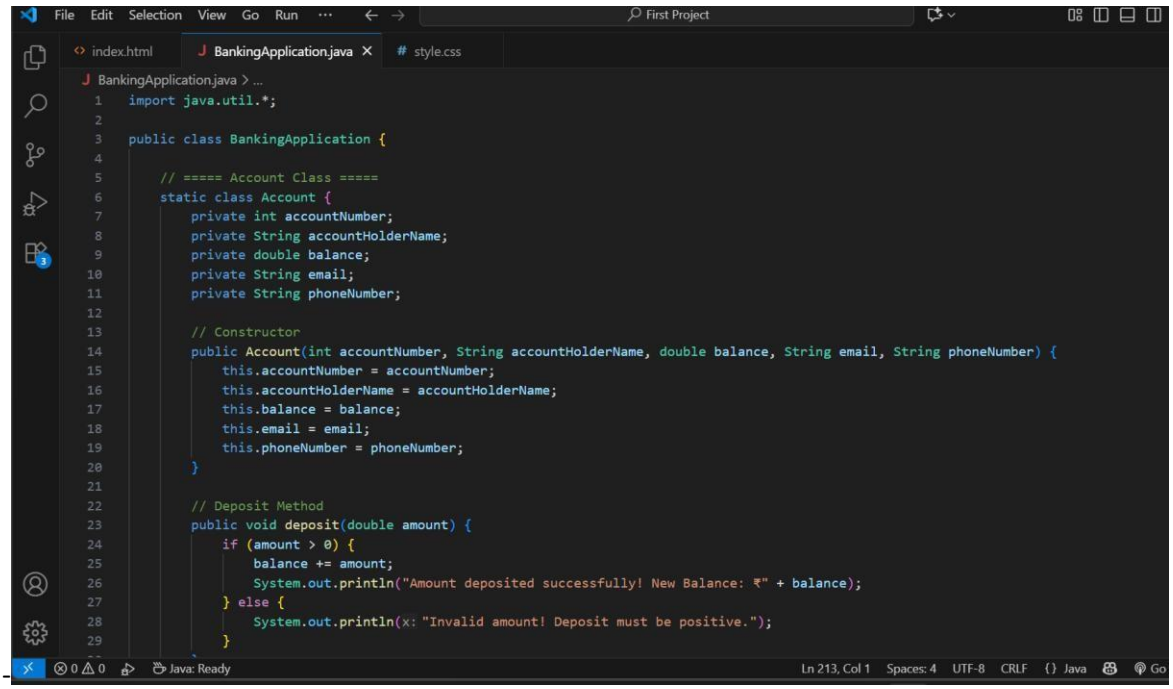
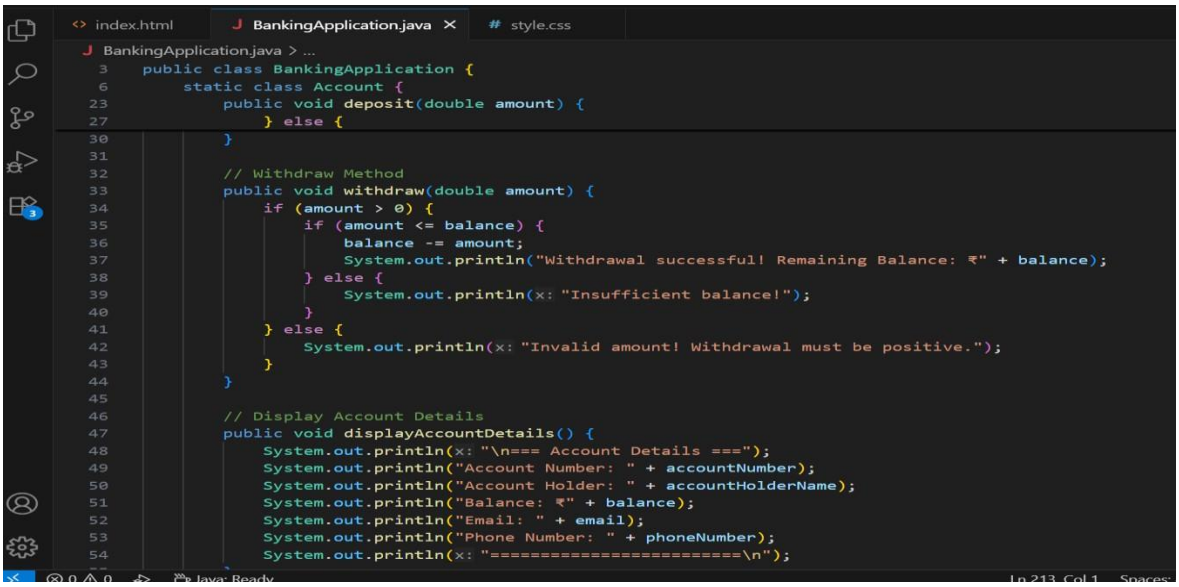
Course: **BCA (AI&DS)**

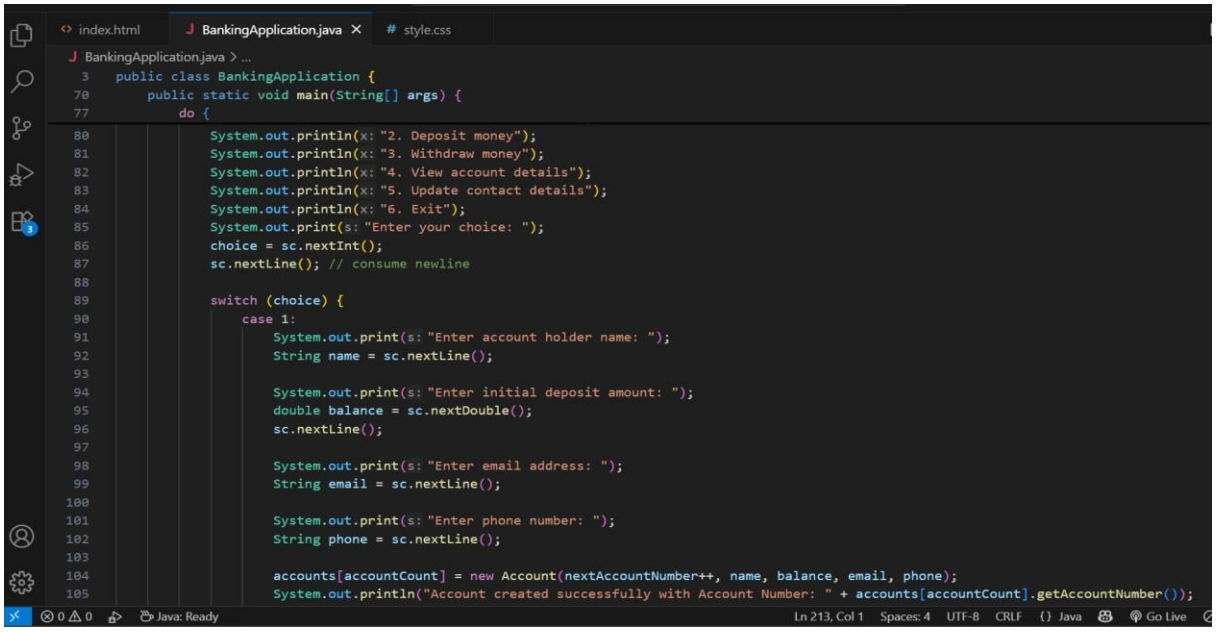
INPUT

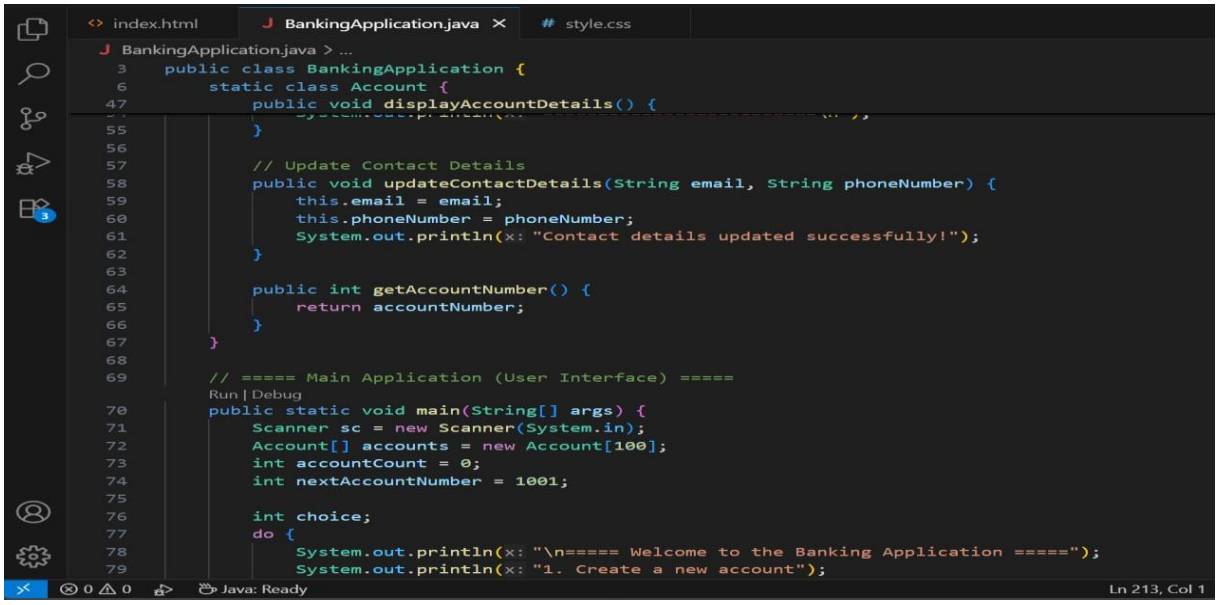


```java
import java.util.*;

public class BankingApplication {

    // ===== Account Class =====
    static class Account {
        private int accountNumber;
        private String accountHolderName;
        private double balance;
        private String email;
        private String phoneNumber;

        // Constructor
        public Account(int accountNumber, String accountHolderName, double balance, String email, String phoneNumber) {
            this.accountNumber = accountNumber;
            this.accountHolderName = accountHolderName;
            this.balance = balance;
            this.email = email;
            this.phoneNumber = phoneNumber;
        }

        // Deposit Method
        public void deposit(double amount) {
            if (amount > 0) {
                balance += amount;
                System.out.println("Amount deposited successfully! New Balance: ₹" + balance);
            } else {
                System.out.println(x: "Invalid amount! Deposit must be positive.");
            }
```



```java
        public void deposit(double amount) {
            } else {
        }

        // Withdraw Method
        public void withdraw(double amount) {
            if (amount > 0) {
                if (amount <= balance) {
                    balance -= amount;
                    System.out.println("Withdrawal successful! Remaining Balance: ₹" + balance);
                } else {
                    System.out.println(x: "Insufficient balance!");
                }
            } else {
                System.out.println(x: "Invalid amount! Withdrawal must be positive.");
            }
        }

        // Display Account Details
        public void displayAccountDetails() {
            System.out.println(x: "\n=== Account Details ===");
            System.out.println("Account Number: " + accountNumber);
            System.out.println("Account Holder: " + accountHolderName);
            System.out.println("Balance: ₹" + balance);
            System.out.println("Email: " + email);
            System.out.println("Phone Number: " + phoneNumber);
            System.out.println(x: "========================\n");
```


index.html
BankingApplication.java
style.css
BankingApplication.java > ...
3 public class BankingApplication {
70 public static void main(String[] args) {
77 do {
80 System.out.println(x: "2. Deposit money");
81 System.out.println(x: "3. Withdraw money");
82 System.out.println(x: "4. View account details");
83 System.out.println(x: "5. Update contact details");
84 System.out.println(x: "6. Exit");
85 System.out.print(s: "Enter your choice: ");
86 choice = sc.nextInt();
87 sc.nextLine(); // consume newline
88
89 switch (choice) {
90 case 1:
91 System.out.print(s: "Enter account holder name: ");
92 String name = sc.nextLine();
93
94 System.out.print(s: "Enter initial deposit amount: ");
95 double balance = sc.nextDouble();
96 sc.nextLine();
97
98 System.out.print(s: "Enter email address: ");
99 String email = sc.nextLine();
100
101 System.out.print(s: "Enter phone number: ");
102 String phone = sc.nextLine();
103
104 accounts[accountCount] = new Account(nextAccountNumber++, name, balance, email, phone);
105 System.out.println("Account created successfully with Account Number: " + accounts[accountCount].getAccountNumber());
Java: Ready
Ln 213, Col 1
Spaces: 4
UTF-8
CRLF
Java
Go Live


index.html
BankingApplication.java
style.css
BankingApplication.java > ...
3 public class BankingApplication {
6 static class Account {
47 public void displayAccountDetails() {
55 }
56
57 // Update Contact Details
58 public void updateContactDetails(String email, String phoneNumber) {
59 this.email = email;
60 this.phoneNumber = phoneNumber;
61 System.out.println(x: "Contact details updated successfully!");
62 }
63
64 public int getAccountNumber() {
65 return accountNumber;
66 }
67 }
68
69 // ===== Main Application (User Interface) =====
Run | Debug
70 public static void main(String[] args) {
71 Scanner sc = new Scanner(System.in);
72 Account[] accounts = new Account[100];
73 int accountCount = 0;
74 int nextAccountNumber = 1001;
75
76 int choice;
77 do {
78 System.out.println(x: "\n===== Welcome to the Banking Application =====");
79 System.out.println(x: "1. Create a new account");
Java: Ready
Ln 213, Col 1

```java
public class BankingApplication {
    public static void main(String[] args) {
        do {
            switch (choice) {
                case 5:

                    Account accUpdate = null;
                    for (int i = 0; i < accountCount; i++) {
                        if (accounts[i].getAccountNumber() == accNoUpdate) {
                            accUpdate = accounts[i];
                            break;
                        }
                    }

                    if (accUpdate != null) {
                        System.out.print("Enter new email address: ");
                        String newEmail = sc.nextLine();

                        System.out.print("Enter new phone number: ");
                        String newPhone = sc.nextLine();

                        accUpdate.updateContactDetails(newEmail, newPhone);
                    } else {
                        System.out.println("Account not found!");
                    }
                    break;

                case 6:
                    System.out.println("Thank you for using the Banking Application!");
```

OUTPUT

```
210         sc.close();

PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

1. Create a new account
2. Deposit money
3. Withdraw money
4. View account details
5. Update contact details
6. Exit
Enter your choice: 1
Enter account holder name: aman
Enter initial deposit amount: 1000
Enter email address: amanuoadhaya0521@gmail.com
Enter phone number: 7675454241
Account created successfully with Account Number: 1001
```

Explanation —

1) High-level design

- The application models bank accounts with an `Account` class and provides a console menu (create, deposit, withdraw, view, update, exit).
- Data storage: a `Map<Integer, Account>` (`HashMap`) stores accounts keyed by account number for fast lookup.
- Money is represented with `BigDecimal` (not `double`) to avoid floating-point rounding errors.
- Input/validation is centralized in helper methods to keep the `main` loop clean and robust.

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2) `Account` class — data & behavior

Key fields:

- `private final int accountNumber;` — immutable account id once created. `private final String accountHolderName;` — holder name set once.
- `private BigDecimal balance;` — monetary balance stored precisely with `BigDecimal`.
- `private String email;` and `private String phoneNumber;` — contact info editable.

Constructor:

- Accepts `BigDecimal` initial balance and sets scale (`setScale(2, RoundingMode.HALF_EVEN)`) to represent currency with two decimal places and a standard rounding mode.

Behavior methods:

- `deposit(BigDecimal amount)`: checks `amount > 0` using `compareTo`, adds to `balance`, re-applies scale, prints confirmation.
- `withdraw(BigDecimal amount)`: checks positivity and sufficient funds (`amount.compareTo(balance) <= 0`), subtracts, re-applies scale, prints result; otherwise prints errors.
- `displayAccountDetails()`: prints account fields (safe console display).
- `updateContactDetails(String, String)`: updates email/phone. `getAccountNumber()`: accessor for map key operations.

Why `BigDecimal`?

- `double` is binary floating point and can't exactly represent many decimal monetary values → rounding errors. `BigDecimal` stores exact decimal values and is the right tool for financial arithmetic.

Why `final` on some fields?

- `final` provides immutability guarantees for `accountNumber` and `accountHolderName`, preventing accidental reassignment after construction.

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3) Input & validation helpers

Helpers centralize parsing and validation so `main` stays readable:

- `readAmount(String prompt)`: loops until user enters a valid decimal number; returns `BigDecimal` with scale 2. Handles bad formats (catches `NumberFormatException`) rather than crashing.
- `readInt(String prompt)`: safely parses integers (menu choice, account numbers) using a loop and `Integer.parseInt`.
- `readNonEmpty(String prompt)`: enforces non-empty strings for name/email/phone.
- `isValidEmail(String)` and `isValidPhone(String)`: simple regex checks (not perfect but prevents obvious bad input). Phone accepts 7–15 digits; email uses a `\S+@\S+\.\S+`-style pattern.

Benefits:

- Centralized validation reduces duplicated code and the chance of inconsistent checks.
  - Defensive reading prevents `InputMismatchException` and makes the UX friendlier.

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4) Storage: `Map<Integer, Account>` (HashMap)

- Accounts are stored in a `HashMap` keyed by `accountNumber`.
- Lookup complexity: average O(1) to get an account by account number (`accounts.get(accNo)`).
- Contrast with previous array + linear search (O(n)): map makes deposit/withdraw/view/update operations scale much better.

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5) Main loop & operations

- Menu loop reads a user choice (safe via `readInt`) and `switch`es on it.
- Create account:
  - Read name, initial deposit, email, phone with validation.
  - Build `Account` with `nextAccountNumber` and `accounts.put(nextAccountNumber, acc)`.
  - Increment `nextAccountNumber`. Deposit / Withdraw / View / Update:
  - Read account number with `readInt`.
  - `accounts.get(accNo)` returns the `Account` or `null`. o If found, call the relevant `Account` method (deposit/withdraw/display/update).
  - If not found, print `"Account not found!"`.
- Exit closes scanner and ends loop.