

# JAVA ASSIGNMENT NUMBER: 01

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

## INPUT

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File Edit Selection View Go Run ... First Project
index.html BankingApplication.java # style.css

J BankingApplication.java > ...
1 import java.util.*;
2
3 public class BankingApplication {
4
5     // ===== Account Class =====
6     static class Account {
7         private int accountNumber;
8         private String accountHolderName;
9         private double balance;
10        private String email;
11        private String phoneNumber;
12
13        // Constructor
14        public Account(int accountNumber, String accountHolderName, double balance, String email, String phoneNumber) {
15            this.accountNumber = accountNumber;
16            this.accountHolderName = accountHolderName;
17            this.balance = balance;
18            this.email = email;
19            this.phoneNumber = phoneNumber;
20        }
21
22        // Deposit Method
23        public void deposit(double amount) {
24            if (amount > 0) {
25                balance += amount;
26                System.out.println("Amount deposited successfully! New Balance: ₹" + balance);
27            } else {
28                System.out.println("Invalid amount! Deposit must be positive.");
29            }
30        }
31
32        // Withdraw Method
33        public void withdraw(double amount) {
34            if (amount > 0) {
35                if (amount <= balance) {
36                    balance -= amount;
37                    System.out.println("Withdrawal successful! Remaining Balance: ₹" + balance);
38                } else {
39                    System.out.println("Insufficient balance!");
39                }
34            } else {
35                System.out.println("Invalid amount! Withdrawal must be positive.");
36            }
37
38        // Display Account Details
39        public void displayAccountDetails() {
40            System.out.println("\n==== Account Details ===");
41            System.out.println("Account Number: " + accountNumber);
42            System.out.println("Account Holder: " + accountHolderName);
43            System.out.println("Balance: ₹" + balance);
44            System.out.println("Email: " + email);
45            System.out.println("Phone Number: " + phoneNumber);
46            System.out.println("=====\n");
47        }
48    }
49}
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Ln 213, Col 1 Spaces: 4 UTF-8 CRLF {} Java Go
```

```
File Edit Selection View Go Run ... First Project
index.html BankingApplication.java # style.css

J BankingApplication.java > ...
3 public class BankingApplication {
6     static class Account {
23         public void deposit(double amount) {
27             if (amount > 0) {
28                 balance += amount;
29                 System.out.println("Amount deposited successfully! New Balance: ₹" + balance);
30             } else {
31                 System.out.println("Invalid amount! Deposit must be positive.");
32             }
33
34             // Withdraw Method
35             public void withdraw(double amount) {
36                 if (amount > 0) {
37                     if (amount <= balance) {
38                         balance -= amount;
39                         System.out.println("Withdrawal successful! Remaining Balance: ₹" + balance);
40                     } else {
41                         System.out.println("Insufficient balance!");
42                     }
43                 } else {
44                     System.out.println("Invalid amount! Withdrawal must be positive.");
45                 }
46
47             // Display Account Details
48             public void displayAccountDetails() {
49                 System.out.println("\n==== Account Details ===");
50                 System.out.println("Account Number: " + accountNumber);
51                 System.out.println("Account Holder: " + accountHolderName);
52                 System.out.println("Balance: ₹" + balance);
53                 System.out.println("Email: " + email);
54                 System.out.println("Phone Number: " + phoneNumber);
55                 System.out.println("=====\n");
56             }
57         }
58     }
59 }
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Ln 213, Col 1 Spaces:
```

The screenshot shows a Java IDE interface with the following details:

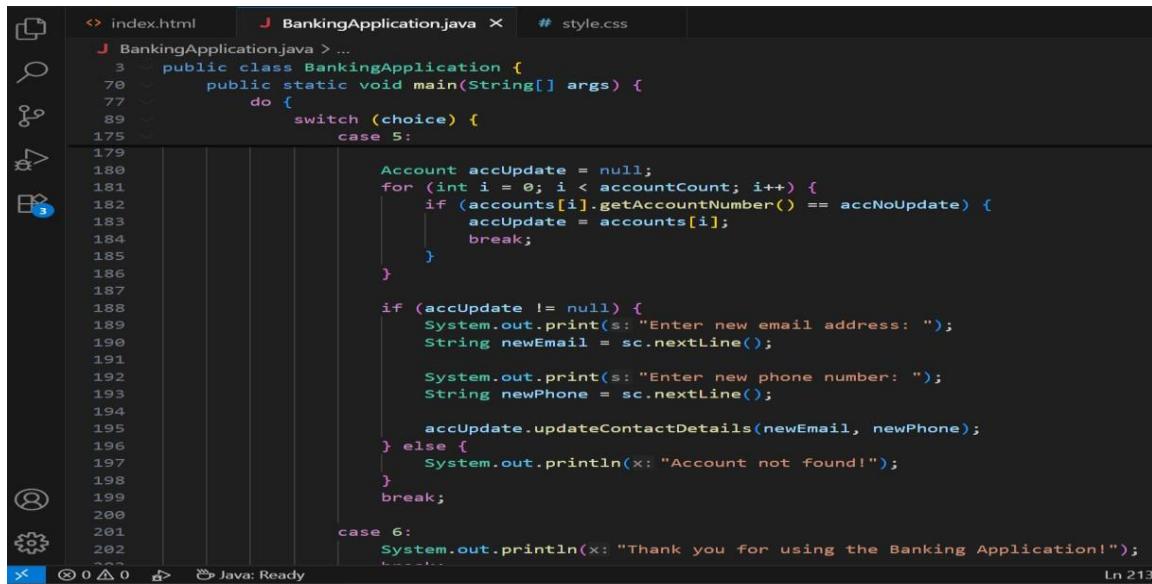
- File Tabs:** index.html, BankingApplication.java (active), # style.css
- Code Content:**

```
 3  public class BankingApplication {
 70     public static void main(String[] args) {
 71         do {
 80             System.out.println("1. Create a new account");
 81             System.out.println("2. Deposit money");
 82             System.out.println("3. Withdraw money");
 83             System.out.println("4. View account details");
 84             System.out.println("5. Update contact details");
 85             System.out.println("6. Exit");
 86             System.out.print("Enter your choice: ");
 87             choice = sc.nextInt();
 88             sc.nextLine(); // consume newline
 89
 90             switch (choice) {
 91                 case 1:
 92                     System.out.print("Enter account holder name: ");
 93                     String name = sc.nextLine();
 94
 95                     System.out.print("Enter initial deposit amount: ");
 96                     double balance = sc.nextDouble();
 97                     sc.nextLine();
 98
 99                     System.out.print("Enter email address: ");
100                    String email = sc.nextLine();
101
102                     System.out.print("Enter phone number: ");
103                     String phone = sc.nextLine();
104
105                     accounts[accountCount] = new Account(nextAccountNumber++, name, balance, email, phone);
106                     System.out.println("Account created successfully with Account Number: " + accounts[accountCount].getAccountNumber());
107             }
108         }
109     }
110 }
```
- Status Bar:** Ln 213, Col 1 Spaces: 4 UTF-8 CRLF {} Java Go Live

The screenshot shows a Java IDE interface with the following details:

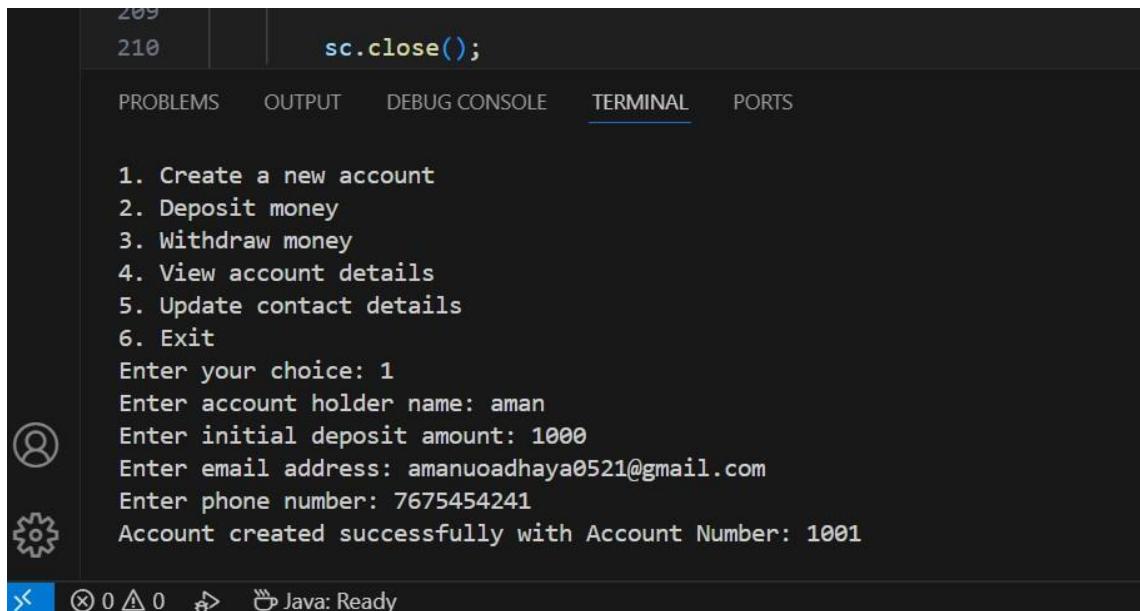
- File Tabs:** index.html, BankingApplication.java (active), # style.css
- Code Content:**

```
 3  public class BankingApplication {
 6      static class Account {
 7          public void displayAccountDetails() {
 8              System.out.println("Account Details");
 9          }
10
11          // Update Contact Details
12          public void updateContactDetails(String email, String phoneNumber) {
13              this.email = email;
14              this.phoneNumber = phoneNumber;
15              System.out.println("Contact details updated successfully!");
16          }
17
18          public int getAccountNumber() {
19              return accountNumber;
20          }
21
22      }
23
24      // ===== Main Application (User Interface) =====
25      public static void main(String[] args) {
26          Scanner sc = new Scanner(System.in);
27          Account[] accounts = new Account[100];
28          int accountCount = 0;
29          int nextAccountNumber = 1001;
30
31          int choice;
32          do {
33              System.out.println("\n===== Welcome to the Banking Application =====");
34              System.out.println("1. Create a new account");
35          }
36      }
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```
index.html | BankingApplication.java | # style.css
BankingApplication.java > ...
3  public class BankingApplication {
7  public static void main(String[] args) {
77    do {
89      switch (choice) {
175        case 5:
176          Account accUpdate = null;
177          for (int i = 0; i < accountCount; i++) {
178            if (accounts[i].getAccountNumber() == accNoUpdate) {
179              accUpdate = accounts[i];
180              break;
181            }
182          }
183          if (accUpdate != null) {
184            System.out.print(s: "Enter new email address: ");
185            String newEmail = sc.nextLine();
186            System.out.print(s: "Enter new phone number: ");
187            String newPhone = sc.nextLine();
188            accUpdate.updateContactDetails(newEmail, newPhone);
189          } else {
190            System.out.println(x: "Account not found!");
191          }
192        break;
193      }
194    }
195    case 6:
196      System.out.println(x: "Thank you for using the Banking Application!");
197    }
198  }
199  case 7:
200    System.out.println(x: "Exiting the Banking Application.");
201  }
202  default:
203    System.out.println(x: "Invalid choice. Please try again.");
204  }
205  sc.close();
206}
207}
208}
209}
210}
```

## OUTPUT



```
209
210
```

PROBLEMS	OUTPUT	DEBUG CONSOLE	<u>TERMINAL</u>	PORTS
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```
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.
- 

# 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.
- 

## 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.
- 

## 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.
-

## 5) Main loop & operations

- Menu loop reads a user choice (safe via `readInt`) and `switches` 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`. ◦ If found, call the relevant `Account` method (`deposit/withdraw/display/update`).
  - If not found, print "Account not found!".
- Exit closes scanner and ends loop.