In [3]:
```
import random
import datetime

# Global data stores
credentials = {}
users_db = {}
passbook = {}

def generate_account_number():
    base = "1111122222"
    return base + ''.join(str(random.randint(0, 9)) for _ in range(4))

def generate_username(fname):
    return fname.lower() + ''.join(str(random.randint(0, 9)) for _ in range(2))

def generate_password():
    return ''.join(str(random.randint(0, 9)) for _ in range(4))

def open_account():
    print("\n--- Open New Account ---")
    fname = input("Enter First Name: ")
    lname = input("Enter Last Name: ")
    pan = input("Enter PAN Card Number: ")

    if pan in users_db:
        print("Account already exists. Try logging in.\n")
        return

    acc_num = generate_account_number()
    acc_type = input("Enter Account Type (Savings/Current): ")
    try:
        balance = float(input("Enter initial deposit amount: "))
    except ValueError:
        print("Invalid amount entered. Try again.")
        return

    username = generate_username(fname)
    password = generate_password()

    credentials[username] = password
    users_db[pan] = [fname, lname, acc_num, acc_type, balance]

    print("\n✅ Account Created Successfully!")
    print("Your Username:", username)
    print("Your Password:", password)
    print("Your Account Number:", acc_num)
    print("Account Type:", acc_type)
    print("Initial Balance: ₹", balance, "\n")

def authenticate():
    username = input("Enter Username: ")
    password = input("Enter Password: ")
    pan = input("Enter PAN Card Number: ")

    if username in credentials and credentials[username] == password and pan in
        return pan
    else:
        print("❌ Authentication failed. Try again.\n")
```

```
        return None

def view_account():
    print("\n--- View Account Details ---")
    pan = authenticate()
    if pan:
        fname, lname, acc_num, acc_type, balance = users_db[pan]
        print(f"Account Holder: {fname} {lname}")
        print(f"Account Number: {acc_num}")
        print(f"Account Type: {acc_type}")
        print(f"Available Balance: ₹ {balance}\n")

def perform_transaction():
    print("\n--- Perform Transaction ---")
    pan = authenticate()
    if not pan:
        return

    print("\n1. Deposit\n2. Withdraw\n3. Transfer")
    choice = input("Choose transaction type: ").strip().lower()

    try:
        amount = float(input("Enter amount: "))
    except ValueError:
        print("Invalid amount entered.\n")
        return

    timestamp = datetime.datetime.now()

    if choice == "1" or choice == "deposit":
        users_db[pan][4] += amount
        print("✅ Deposit successful. Current Balance: ₹", users_db[pan][4])

    elif choice == "2" or choice == "withdraw":
        if amount > users_db[pan][4]:
            print("❌ Insufficient balance.")
            return
        users_db[pan][4] -= amount
        print("✅ Withdrawal successful. Remaining Balance: ₹", users_db[pan][4

    elif choice == "3" or choice == "transfer":
        receiver_pan = input("Enter receiver's PAN Card: ")
        if receiver_pan not in users_db:
            print("❌ Receiver not found.")
            return
        if amount > users_db[pan][4]:
            print("❌ Insufficient balance for transfer.")
            return
        users_db[pan][4] -= amount
        users_db[receiver_pan][4] += amount
        print("✅ Transfer successful. Remaining Balance: ₹", users_db[pan][4])
    else:
        print("❌ Invalid transaction type.")
        return

    # Record transaction
    if pan not in passbook:
        passbook[pan] = {}
    passbook[pan][timestamp] = [choice.capitalize(), amount, users_db[pan][4]]
```

```
def view_transaction_history():
    print("\n--- Transaction History ---")
    pan = authenticate()
    if not pan:
        return

    if pan in passbook:
        print("\nTimestamp                 | Type     | Amount   | Balance")
        print("-" * 55)
        for ts, tx in sorted(passbook[pan].items()):
            print(f"{ts.strftime('%Y-%m-%d %H:%M:%S')} | {tx[0]:<8} | ₹{tx[1]:<7
        print()
    else:
        print("No transactions available for this account.\n")

def main():
    print("-" * 10, "Welcome to Bank of Binay", "-" * 10)

    while True:
        print("""
1. Open an Account
2. View Account Details
3. Perform Transaction (Deposit/Withdraw/Transfer)
4. View Transaction History
5. Exit
""")

        try:
            choice = int(input("Enter your choice (1-5): "))
        except ValueError:
            print("Please enter a valid number.\n")
            continue

        if choice == 1:
            open_account()
        elif choice == 2:
            view_account()
        elif choice == 3:
            perform_transaction()
        elif choice == 4:
            view_transaction_history()
        elif choice == 5:
            print("\nThank you for banking with Bank of Binay. Goodbye! 👋")
            break
        else:
            print("❌ Invalid choice. Try again.\n")

if __name__ == "__main__":
    main()
```

```
---------- Welcome to Bank of Binay ----------

1. Open an Account
2. View Account Details
3. Perform Transaction (Deposit/Withdraw/Transfer)
4. View Transaction History
5. Exit

--- Open New Account ---
```

```
✅ Account Created Successfully!
Your Username: binay43
Your Password: 7877
Your Account Number: 11111222226047
Account Type: Savings
Initial Balance: ₹ 5000.0


1. Open an Account
2. View Account Details
3. Perform Transaction (Deposit/Withdraw/Transfer)
4. View Transaction History
5. Exit

--- View Account Details ---
❌ Authentication failed. Try again.


1. Open an Account
2. View Account Details
3. Perform Transaction (Deposit/Withdraw/Transfer)
4. View Transaction History
5. Exit

Thank you for banking with Bank of Binay. Goodbye! 👋
```

In [ ]: