

# Payment Operation Types: Logic, Flow, and Endpoints

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This guide explains each payment operation type in the NVC Banking Platform, detailing the logic, purpose, and endpoint results for deposit, withdrawal, transfer, payment, and settlement operations.

## 1. Deposit Operation

### Logic & Purpose

- **Definition:** Adding funds to a user's account from an external source
- **Primary Purpose:** Increase available balance in the user's platform account
- **Source of Funds:** External bank accounts, payment cards, or crypto wallets
- **Direction:** Inbound (into the platform)

### Process Flow

1. User initiates deposit through the deposit form
2. Selects funding source (bank account, card, crypto wallet)
3. Specifies amount and currency
4. Platform verifies deposit request
5. External payment processor or gateway handles fund movement
6. Funds are credited to user's platform account
7. Transaction record is created with DEPOSIT type

## Endpoint Result

- **Database Changes:**
  - New transaction record with type=DEPOSIT
  - User account balance increased
  - Activity logged in audit trail
- **User Experience:**
  - Success notification
  - Updated balance visible in dashboard
  - Transaction appears in history with "Deposit" label
- **API Response** (if API-initiated):
  - Transaction ID
  - Status (completed/pending)
  - Updated balance

## 2. Withdrawal Operation

### Logic & Purpose

- **Definition:** Removing funds from a user's platform account to an external destination
- **Primary Purpose:** Access funds for use outside the platform
- **Destination:** External bank accounts, payment cards, or crypto wallets
- **Direction:** Outbound (leaving the platform)

### Process Flow

1. User initiates withdrawal from withdrawal form
2. Selects destination (bank account, crypto wallet)
3. Specifies amount (with validation against available balance)
4. Platform performs security verification (may include 2FA)

5. Withdrawal request is processed through appropriate gateway
6. Funds are deducted from user's platform account
7. External transfer to destination is initiated
8. Transaction record is created with WITHDRAWAL type

## Endpoint Result

- **Database Changes:**

- New transaction record with type=WITHDRAWAL
- User account balance decreased
- Pending withdrawal record may be created
- Activity logged in audit trail

- **User Experience:**

- Success notification with estimated completion time
- Updated balance visible immediately
- Transaction appears in history with "Withdrawal" label
- Status tracking for pending withdrawals

- **API Response** (if API-initiated):

- Transaction ID
- Status (pending/completed)
- Estimated completion time

## 3. Transfer Operation

### Logic & Purpose

- **Definition:** Moving funds between users within the platform
- **Primary Purpose:** Internal fund movement without external processing
- **Parties Involved:** Two platform users (sender and recipient)
- **Direction:** Internal (stays within platform)

## Process Flow

1. User initiates transfer from transfer form
2. Specifies recipient (email, username, or account ID)
3. Enters amount and optional description
4. Platform validates sender balance and recipient existence
5. Sender is debited and recipient is credited in a single transaction
6. Both users receive notification of the transfer
7. Transaction records created for both parties with TRANSFER type

## Endpoint Result

- **Database Changes:**
  - Two linked transaction records (sender/receiver)
  - Sender's balance decreased
  - Recipient's balance increased
  - Activity logged for both users
- **User Experience:**
  - Success confirmation with transfer details
  - Both users see the transaction in their history
  - Sender sees "Transfer Out" and recipient sees "Transfer In"
  - Immediate balance updates for both parties
- **API Response** (if API-initiated):
  - Transaction ID
  - Status (almost always "completed" due to immediate processing)
  - Updated balances for both accounts

## 4. Payment Operation

### Logic & Purpose

- **Definition:** Funds sent to external entities for goods/services
- **Primary Purpose:** Complete commercial transactions
- **Destination:** Merchants, service providers, or vendors
- **Direction:** Outbound (leaving platform) with specific purpose

### Process Flow

1. User initiates payment from payment form
2. Selects payment method (platform balance, connected card, etc.)
3. Specifies merchant/recipient and payment details
4. Enters amount, purpose, and any reference numbers
5. Platform routes payment through appropriate payment gateway
6. Payment processor handles the merchant settlement
7. User's account is debited
8. Transaction record created with PAYMENT type

### Endpoint Result

- **Database Changes:**
  - New transaction record with type=PAYMENT
  - User account balance decreased
  - Payment gateway references stored
  - Merchant information linked to transaction
- **User Experience:**
  - Payment confirmation with reference number
  - Receipt or invoice can be downloaded

- Transaction appears in history with merchant name
- Payment status tracking when applicable
- **API Response** (if API-initiated):
  - Transaction ID
  - Payment reference number
  - Status (processing/completed)
  - Receipt URL if available

## 5. Settlement Operation

### Logic & Purpose

- **Definition:** Final resolution of transactions through blockchain or banking systems
- **Primary Purpose:** Ensure finality and irreversibility of transactions
- **Technology Used:** Blockchain smart contracts or traditional banking systems
- **Direction:** Varies (can be internal or external)

### Process Flow

1. Settlement can be triggered automatically or manually
2. System identifies transactions needing settlement
3. For blockchain settlement:
  - Smart contract is called with transaction details
  - Transaction is recorded on blockchain
  - Contract executes the transfer of assets
4. For traditional settlement:
  - Banking instructions are generated
  - Funds are moved through correspondent banking or SWIFT

5. Settlement confirmation is recorded with transaction
6. Original transaction status updated to SETTLED

## Endpoint Result

- **Database Changes:**
  - Transaction status updated to SETTLED
  - Settlement records created with blockchain TX hash or banking reference
  - Settlement timestamp recorded
- **User Experience:**
  - Settlement confirmation may be displayed
  - Transaction details show settlement information
  - Blockchain explorer links provided for crypto settlements
- **API Response** (if API-initiated):
  - Settlement status
  - Settlement timestamp
  - Blockchain transaction hash or banking reference
  - Finality confirmation

## Implementation Differences

### Technical Implementation

- **Deposit/Withdrawal:** Involves integration with external payment gateways and banking connections
- **Transfer:** Purely internal database operations
- **Payment:** Combines external gateway integration with merchant-specific handling
- **Settlement:** Involves either blockchain transaction execution or banking settlement systems

## Database Interactions

```
# Deposit (simplified database update)
db.execute("""
    UPDATE user_accounts
    SET balance = balance + :amount
    WHERE user_id = :user_id
""", amount=amount, user_id=user_id)

# Withdrawal (simplified database update)
db.execute("""
    UPDATE user_accounts
    SET balance = balance - :amount,
        pending_withdrawals = pending_withdrawals + :amount
    WHERE user_id = :user_id AND balance >= :amount
""", amount=amount, user_id=user_id)

# Transfer (simplified database transaction)
with db.transaction():
    # Debit sender
    db.execute("""
        UPDATE user_accounts
        SET balance = balance - :amount
        WHERE user_id = :sender_id AND balance >= :amount
        """, amount=amount, sender_id=sender_id)

    # Credit recipient
    db.execute("""
        UPDATE user_accounts
        SET balance = balance + :amount
        WHERE user_id = :recipient_id
        """, amount=amount, recipient_id=recipient_id)
```

## Risk Profiles

- **Deposit:** Risk of fraudulent funding sources
- **Withdrawal:** Risk of unauthorized account access
- **Transfer:** Lower risk due to being internal
- **Payment:** Risk of merchant fraud or service non-delivery
- **Settlement:** Technical risks of blockchain or banking systems



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# NVC Banking Platform: Payment Operations Documentation

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