**Bank-Web-App**

**Transaction Service**

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# 1. INTRODUCTION

The **Transaction API** provides a comprehensive set of endpoints to manage and monitor financial transactions within the banking system. It supports operations such as deposits, transfers, balance inquiries, EMI deductions, recurring payments, and fixed deposits. Additionally, it offers features for generating transaction reports, freezing accounts, and downloading monthly statements in PDF format. Admins and employees can also access specialized reporting tools to analyze transaction activity across branches. This API ensures secure, traceable, and real-time transaction handling for both customers and internal users.

**Feature**

1. Deposit Funds
2. Transfer Funds
3. Check Balance
4. Bulk Balance Inquiry
5. EMI Deduction
6. Download Monthly Statement (PDF)
7. Transaction History Details
8. Recurring Payments
9. Fixed Deposit (FD) Transactions
10. Freeze User Account
11. Transaction Search (Admin)
12. Branch Reports (Employee)
13. Branch Reports (Admin)
14. Health Check

This service communicates with other services using RestTemplate and FeignClient.

# 2. TECH STACK

|  |  |
| --- | --- |
| Technology | Version |
| JDK | 17 |
| Maven | 3.6.3 |
| Spring Boot | 3.5.3 |
| PostgreSQL | 17.5 |
| Kafka | 7.4.3 |
| Zookeeper | 7.4.3 |
| Zipkin | 2.23 |
| Elasticsearch | 8.13.4 |
| Kibana | 8.13.4 |
|  |  |

# 3. DATA DICTIONARY

**Database :** account\_transaction

|  |  |  |
| --- | --- | --- |
| No | Table Name | Description |
| 1 | **Account** | The Account entity stores key banking details, including balance, branch, account holder, and status indicators. |
| 2 | **LoanPayment** | The LoanPayment entity tracks individual EMI payments toward a loan. |
| 3 | **RecurringAccountPayment** | The RecurringAccountPayment entity records monthly payments for recurring deposits, tracking schedule, amount, interest, and related transactions. |
| 4 | **Transaction** | The Transaction entity records all financial transactions associated with an account. It captures transaction details like type, amount, timestamp, and links to associated loan or recurring account payments. |

## 3.1.1 Account

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data Type | Description | Sample Value |
| accountNum | Long | Primary key; unique identifier for the account | 1234567890 |
| uid | String | Unique user ID linked to the account | "user\_001" |
| accountType | String | Type of the account (e.g., Savings, Current) | "Savings" |
| balance | double | Current account balance | 15000.75 |
| email | String | Email address associated with the account | "[user@example.com](mailto:user@example.com)" |
| branchName | String | Name of the branch managing the account | "Downtown Branch" |
| branchId | String | Branch identifier code | "BR001" |
| name | String | Account holder's full name | "John Doe" |
| isActive | boolean (nullable) | Status flag indicating if the account is active | true |
| isFreeze | boolean (nullable) | Flag indicating whether the account is frozen | false |
| description | String | Optional description or note about the account | "Primary salary account" |
| transactions | List<Transaction> | List of transactions associated with the account | List of Transaction objects |

## 3.1.2 LoanPayment

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data Type | Description | Sample Value |
| lpId | Long | Primary key; unique identifier for the loan payment | 10001 |
| scheduleDate | LocalDate | Scheduled date for EMI payment | 2024-08-01 |
| paymentAmount | Double | Total amount expected to be paid | 5000.00 |
| principleAmount | Double | Portion of payment applied to the principal | 4000.00 |
| interestAmount | Double | Portion of payment applied to interest | 1000.00 |
| paidAmount | Double | Actual amount paid | 5000.00 |
| dueAmount | Double | Remaining due if underpaid | 0.00 |
| emiAmount | Double | Fixed EMI amount | 5000.00 |
| paymentDate | LocalDateTime | Actual date and time of payment | 2024-08-01T10:30:00 |
| loanNum | Long | Loan number this payment is associated with | 9001 |
| accountNum | Long | Account number from which the payment was made | 1234567890 |
| transaction | Transaction (entity) | Reference to the transaction associated with the payment | Transaction object |

## 3.1.3 RecurringAccountPayment

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data Type | Description | Sample Value |
| pId | Long | Primary key; unique identifier for the payment entry | 8001 |
| scheduleDate | LocalDate | Scheduled monthly SIP payment date | 2024-08-01 |
| paymentAmount | Double | Total amount expected to be paid (SIP + interest) | 5100.00 |
| interestRate | Float | Interest rate applicable for the deposit | 6.5 |
| paidAmount | Double | Actual amount paid | 5100.00 |
| sipAmount | Double | Monthly fixed SIP amount | 5000.00 |
| month | int | Total duration in months | 12 |
| monthsCompleted | int | Number of months completed | 5 |
| dueAmount | Double | Unpaid amount (if any) | 0.00 |
| paymentDate | LocalDateTime | Date and time the payment was made | 2024-08-01T09:15:00 |
| totalAmount | Double | Total accumulated amount so far | 25500.00 |
| racId | Long | Recurring account ID | 7001 |
| accountNum | Long | Linked account number | 1234567890 |
| email | String | Email ID of the account holder | "[user@example.com](mailto:user@example.com)" |
| transaction | Transaction (entity) | Reference to the transaction record of this payment | Transaction object |

## 3.1.4 Transaction

|  |  |  |  |
| --- | --- | --- | --- |
| Field Name | Data Type | Description | Sample Value |
| tId | Long | Primary key; unique transaction ID | 50001 |
| transactionType | String | Type of transaction (e.g., Debit, Credit, EMI Payment) | "Debit" |
| timeStamp | LocalDateTime | Timestamp when the transaction occurred | 2025-07-29T15:30:00 |
| amount | double | Transaction amount | 1500.00 |
| affected\_balance | double | Account balance after the transaction | 13400.00 |
| transactionMethod | String | Method of transaction (e.g., Online, Cheque) | "Online" |
| remark | String | Additional remarks or description of the transaction | "Loan EMI Payment" |
| account | Account (entity) | Reference to the Account associated with this transaction | Account object |
| loanPayment | LoanPayment (entity) | Associated loan payment (if this transaction is related to a loan) | LoanPayment object (nullable) |
| recurringAccountPayment | RecurringAccountPayment (entity) | Associated recurring deposit payment (if applicable) | RecurringAccountPayment object (nullable) |

# 4.REST API ENDPOINTS

**Base URL:** http://localhost:8222/api/v1/transaction

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Method | Endpoint | Description |
| 1 | POST | /deposit | Deposits money into a user’s account after validation. |
| 2 | POST | /transfer | Transfers funds between user accounts. |
| 3 | POST | /check-balance | Returns the current balance for a specific account. |
| 4 | POST | /get-list-balance | Returns balances for a list of account IDs. |
| 5 | POST | /emi-deduct | Deducts EMI from a list of loan account IDs. |
| 6 | GET | /download-transaction-pdf/{account}/{month} | Downloads a PDF statement for a specific account and month. |
| 7 | POST | /transaction-details | Retrieves detailed transaction history for an account. |
| 8 | POST | /recurring-payments | Initiates a recurring payment transaction. |
| 9 | PUT | / book-fd | Books a Fixed Deposit (FD) transaction. |
| 10 | PUT | /admin/freeze | Freezes a specific user account by admin request. |
| 11 | GET | /admin/search/{keyword} | Searches transaction records based on a keyword (admin only). |
| 12 | GET | /employee/branch-report | Retrieves branch-level transaction report for employees (filterable). |
| 13 | GET | /admin/branch-report/{branch} | Admin view of branch-level transaction reports with optional filters. |
| 14 | GET | /heartbeat | Health check endpoint to verify transaction service availability. |

## 4.1.1 /deposit

Deposits money into a user’s account.

|  |  |
| --- | --- |
| Field | Value |
| Method | POST |
| URL | http://localhost:8222/api/v1/transaction/deposit |
| Authorization | Bearer Token |
| Role | User |
| Request Body | JSON |
| DTO | **TransactionDto** |
| Internal Service Dependency | No |

**Flow:** Validate account number -> deposit amount in account -> send credit email using Notification service

**Body** raw (JSON)

{

accountNumber: integer,

amount: number,

method: string,

remark: string

}

**Body Example**

{

    "accountNumber":234197540589,

    "amount":400.00,

    "method":"neft"

}

**Response**

{

**status : string**

**message : string**

**object : any**

}

## 4.1.2 /transfer

This endpoint allows users to initiate a transfer transaction between accounts. It requires specific details about the accounts involved and the amount to be transferred.

|  |  |
| --- | --- |
| Field | Value |
| Method | POST |
| URL | http://localhost:8222/api/v1/transaction/transfer |
| Authorization | Bearer Token |
| Role | User |
| Request Body | JSON |
| DTO | DebitTransactionDTO |
| Internal Service Dependency | No |

**Flow:** Validate sender & receiver -> debit from sender account & credit in receiver account-> send debit & credit email using Notification service

**Body** raw (JSON)

{

"reviverAccount": "integer (int64)",

"senderAccount": "integer (int64)",

"amount": "number (double)",

"method": "string (upi | neft | cash | rtgs)"

}

**Example**

{

    "reviverAccount":469912588965,

    "senderAccount":234197540589,

    "amount":300.50,

    "method":"upi"

}

**Response**

{

**status : string**

**message : string**

**object : any**

}

**Response Example**

{

"status": "200",

"message": "Transaction Success",

"obj": null

}

## 4.1.3 /check-balance

This endpoint is return a balance of account.

|  |  |
| --- | --- |
| Field | Value |
| Method | POST |
| URL | http://localhost:8222/api/v1/transaction/check-balance |
| Authorization | Bearer Token |
| Role | User (used as internal service) |
| Request Body | JSON |
| DTO | CheckBalanceDTO |
| Internal Service Dependency | No |

**Use case :** this endpoint is used by another service like Account service for get updated balance.

**Body raw** (JSON)

{

"accountNum": "integer (int64)",

"uid": "string"

}

**Example**

{

"accountNum": 234232334,

"uid": "azmwkrnxyrhnedj-ardfrtgaldmnbvwdsf-asdasd"

}

**Response**

Double

**Response Example**

50000.00

## 4.1.4 /get-list-balance

This endpoint is provide specific account Transaction details with specific time periods.

|  |  |
| --- | --- |
| Field | Value |
| Method | POST |
| URL | http://localhost:8222/api/v1/transaction/get-list-balance |
| Authorization | Bearer Token |
| Role | Service |
| Request Body | List<Long> |
| List | Long |
| Internal Service Dependency | No |

**Use case:** This Endpoint is used by Schedule service for check balance for Loan EMI deduct

**Body raw**

**Example**

[]

**Response**

[12,43,23,12]

Map<Long,Double>

{

1200012 :120.00,

1200012 :130.00

}

## 4.1.5 /emi-deduct

|  |  |
| --- | --- |
| Field | Value |
| Method | POST |
| URL | http://localhost:8222/api/v1/transaction/emi-deduct |
| Authorization | Bearer Token |
| Role | Service |
| Request Body | List<Long>(payment ID) |
| List | Long |
| Internal Service Dependency | No |

**Use case:** This service is called by schedule service for the deduct automatically loan EMI in schedule date.

**Body raw**

**Body Example**

[]

[12,43,23,12]

**Response**

void

## 4.1.6 /transaction-details

This Endpoint is return transaction details on specific time period.

|  |  |
| --- | --- |
| Field | Value |
| Method | POST |
| URL | http://localhost:8222/api/v1/transaction/transaction-details |
| Authorization | Bearer Token |
| Role | User (used as internal service) |
| Request Body | JSON |
| DTO | GetTransactionDTO |
| Internal Service Dependency | No |

Use case: This endpoint is used by Download Service for get Transaction details for user download statement service or send statement in email.

**Body raw** (JSON)

{

"accountNum": "integer (int64)",

"startTime": "string (date-time)",

"endTime": "string (date-time)"

}

**Response**

List<TransactionDataDTO>

[

{

"transactionType": "string",

"timeStamp": "string (date-time)",

"amount": "number (double)",

"affected\_balance": "number (double)",

"transactionMethod": "string",

"remark": "string",

"balance": "number (double)",

"tid": "integer (int64)"

}

]

## 4.1.7 /recurring-payments

This endpoint is accepting a payment of recurring account and schedule next payment date.

|  |  |
| --- | --- |
| Field | Value |
| Method | POST |
| URL | http://localhost:8222/api/v1/transaction/recurring-payments |
| Authorization | Bearer Token |
| Role | User (used as internal service) |
| Request Body | JSON |
| DTO | TransactionDto |
| Internal Service Dependency | No |

**Body raw** (JSON)

{

accountNumber: integer,

amount: number,

method: string,

remark: string

}

**Body Example**

{

    "accountNumber":234197540589,

    "amount":400.00,

    "method":"neft"

}

**Response**

{

**status : string**

**message : string**

**object : any**

}

## 4.1.8 /book-fd

This endpoint is used to create fixed deposit records.

|  |  |
| --- | --- |
| Field | Value |
| Method | PUT |
| URL | http://localhost:8222/api/v1/transaction/book-fd |
| Authorization | Bearer Token |
| Role | User (used as internal service) |
| Request Body | JSON |
| DTO | FdBookTransaction |
| Internal Service Dependency | No |

**Body raw** (JSON)

{

accountNumber: integer,

amount: number,

method: string,

remark: string

}

**Body raw** (JSON)

{

"amount": 50000.75,

"account": 1234567890123456,

"fdID": 9876543210987654,

"secret": "mySecretCode123"

}

**Response**

Object

## 4.1.9 /admin/freeze

This endpoint is freezing account debit Transaction.

|  |  |
| --- | --- |
| Field | Value |
| Method | P |
| URL | http://localhost:8222/api/v1/transaction/admin/freeze |
| Authorization | Bearer Token |
| Role | admin |
| Request Body | JSON |
| DTO | FreezeAccount |
| Internal Service Dependency | No |

This endpoint is freeze and unfreeze user account.

**Body raw** (JSON)

{

"account": "integer (int64)",

"desc": "string",

"freeze": "boolean",

"email": "string"

}

Example for **Freeze account**

{

"account": 1234567890123456,

"desc": "Temporary freeze due to KYC verification",

"freeze": true,

"email": "john.doe@example.com"

}

Example for **Unfreeze account**

{

"account": 1234567890123456,

"desc": "Temporary freeze due to KYC verification",

"freeze": false,

"email": "john.doe@example.com"

}

**Response**

{

**status : string**

**message : string**

**object : any**

}

## 4.1.10 /admin/search/{keyword}

This endpoint is search account using name, email, account number

|  |  |
| --- | --- |
| Field | Value |
| Method | GET |
| URL | http://localhost:8222/api/v1/transaction/admin/search/{keyword} |
| Authorization | Bearer Token |
| Role | admin |
| Request Body | - |
| Path Variable | Keyword : String  Example:   1. Dhruv Patel 2. 59000003989 3. abc@gmail.com |
| Internal Service Dependency | Yes |

**Internal Service Dependency:**

* **Service:** ELASTICSEARCH
* **Endpoint Called:** POST http://localhost:9200/user/\_search (RestTemplate)
* **Purpose:** To query the Elasticsearch index for user data based on the provided keyword and return relevant search results for the /admin/search/{keyword} endpoint.

**Response**

{

**status : string**

**message : string**

**object : any**

}

## 4.1.11 /employee/branch-report

This endpoint returns employee branch performance

|  |  |
| --- | --- |
| Field | Value |
| Method | GET |
| URL | http://127.0.0.1:8222/api/v1/transaction/employee/branch-report |
| Authorization | Bearer Token |
| Role | Employee |
| Request Body | - |
| Request Parameter | Yes |
| Internal Service Dependency | Yes |

|  |  |  |  |
| --- | --- | --- | --- |
| Request Parameters | | | |
| Parameter | **Type** | **Required** | **Description** |
| weeks | Integer | false | Number of weeks (optional) |
| month | Integer | false | Month value (optional) |
| start | String | false | Start date (optional) |
| end | String | false | End date (optional) |

Request Example

http://127.0.0.1:8222/api/v1/transaction/employee/branch-report?start=2025-07-24&end=2025-07-25

**Response**

{

**status : string**

**message : string**

**object : any**

}

## 4.1.12 /admin/branch-report/{branch}

This endpoint returns employee branch performance

|  |  |
| --- | --- |
| Field | Value |
| Method | GET |
| URL | http://localhost:8222/api/v1/transaction/ admin/branch-report/{branch} |
| Authorization | Bearer Token |
| Role | Employee |
| Request Body | - |
| Request Parameter | Yes |
| Path Variable | branch : String  Example:   * SOBO * B1 * BARB0CHANGO |
| Internal Service Dependency | Yes |

|  |  |  |  |
| --- | --- | --- | --- |
| Request Parameters | | | |
| Parameter | **Type** | **Required** | **Description** |
| weeks | Integer | false | Number of weeks (optional) |
| month | Integer | false | Month value (optional) |
| start | String | false | Start date (optional) |
| end | String | false | End date (optional) |

**Request Example**

http://127.0.0.1:8222/api/v1/transaction/admin/branch-report/SOBO?start=2025-07-24&end=2025-07-25

**Response**

{

**status : string**

**message : string**

**object : any**

}

## 4.1.13 /heartbeat

This endpoint is used to check the health status of the user account service. When invoked, it verifies if the service is currently active and responsive.

|  |  |
| --- | --- |
| Field | Value |
| Method | GET |
| URL | http://localhost:8222/api/v1/account/user/ heartbeat |
| Authorization | Bearer Token |
| Auth Role | - |
| Request Body | - |
| DTO | - |
| Internal Service Dependency | No |

**Response**

**String**

**Example**

ALIVE

# 5. Resilience4j Configuration

## 5.1.1 Circuit Breaker Configuration

|  |  |  |
| --- | --- | --- |
| Property | Value | Description |
| register-health-indicator | true | Enables Spring Boot actuator health indicator for this circuit breaker. |
| event-consumer-buffer-size | 10 | Size of the ring buffer for event consumption. |
| failure-rate-threshold | 50 | Percentage of failures to trigger the circuit breaker to open. |
| minimum-number-of-calls | 5 | Minimum number of calls before calculating the failure rate. |
| automatic-transition-from-open-to-half-open-enabled | true | Allows automatic transition to half-open state. |
| wait-duration-in-open-state | 7s | Duration to wait before transitioning from open to half-open. |
| permitted-number-of-calls-in-half-open-state | 3 | Number of calls allowed in half-open state. |
| sliding-window-size | 10 | Size of the sliding window to record call outcomes. |
| sliding-window-type | COUNT\_BASED | Type of window (time-based or count-based). |

## 5.1.2 Rate Limiter Configuration

|  |  |  |
| --- | --- | --- |
| Property | Value | Description |
| limit-refresh-period | 5s | Time interval after which the rate limiter resets the limit. |
| limit-for-period | 10 | Number of allowed calls per refresh period. |
| timeout-duration | 1s | Max wait time for a permit to become available. |

# 6. Project Structure

transaction-service/

├── src/

│ ├── main/

│ │ ├── java/

│ │ │ └── com/

│ │ │ └── com.bank.web.app.transaction/

│ │ │ └── account/

│ │ │ ├── config/

│ │ │ ├── controller/

│ │ │ ├── service/

│ │ │ ├── repo/

│ │ │ ├── model/

│ │ │ ├── dto/

│ │ │ ├── kafka/

│ │ │ ├── validation/

│ │ │ └── TransactionApplication.java

│ └── resources/

│ ├── application.yml

│ ├── static/

│ └── templates/

├── test/

│ └── java/

│ └── com/

│ └── com.bank.web.app.transeaction/