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"
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"
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

```
[12,43,23,12]
```

Response

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

```
account-service/
├── src/
│   ├── main/
│   │   ├── java/
│   │   │   └── com/
│   │   │       └── com.bank.web.app.account/
│   │   │           └── account/
│   │   │               ├── config/
│   │   │               ├── controller/
│   │   │               ├── service/
│   │   │               ├── repo/
│   │   │               ├── model/
│   │   │               ├── dto/
│   │   │               ├── kafka/
│   │   │               ├── validation/
│   │   │               └── AccountApplication.java
│   └── resources/
│       ├── application.yml
│       ├── static/
│       └── templates/
├── test/
│   └── java/
│       └── com/
│           └── com.bank.web.app.account/
│               └── account/
│                   ├── controller/
│                   ├── service/
│                   └── Account
```