

Bank-Web-App

ACCOUNT SERVICE

TABLE OF CONTENTS

1. Introduction.....	2
2. Tech Stack.....	3
3. Data Dictionary	4
3.1.1 AccountUser	5
3.1.2 AccountDetails.....	6
3.1.3 Branch.....	7
3.1.4 Employee	7
3.1.5 FD	8
3.1.6 RecurringAccount.....	9
3.1.7 Loan.....	10
3.1.8 Interest.....	10
4.REST API Endpoints	11
4.1.1 /create-account.....	12
4.1.2 /active-account/{uid}.....	14
4.1.3 /start-fd.....	15
4.1.4 /close-fd	17
4.1.5 /my-fds/{account}.....	19
4.1.6 /create-loan-account	20
4.1.7 /recurring-account-calculator	21
4.1.8 /pending-active-account.....	23
4.1.10 /check-balance.....	25
4.1.11 /add-employee.....	27
4.1.12 /add-branch	28
5. Resilience4j Configuration	30
5.1.1 Circuit Breaker Configuration	30
5.1.2 Rate Limiter Configuration.....	30
6. Project Structure	31

1. Introduction

The Account Service is a core microservice in a banking ecosystem responsible for customer account management and financial operations like Fixed Deposits (FDs), Recurring Deposits, and Loan handling.

It exposes RESTful APIs for internal/external communication and interacts with other services via Kafka, Feign Clients, and RestTemplate.

Key Features

1. Create New Accounts (Savings, Current, Recurring)
- 2 . Add Employee
3. Activate Account
4. Book Fixed Deposit (FD)
5. Close Fixed Deposit (FD)
6. FD Listing by Account
7. Apply for Loan
8. Check Account Balance
9. Add Loan Interest Rate
10. Calculate Recurring Account Interest
11. Get Pending Activation Accounts
12. Add New Branch
13. Fetch Branch Details
14. Get Account Details

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

3. Data Dictionary

No	Table Name	Description
1	AccountUser	Holds user identity and account preferences
2	AccountDetails	Core account information
3	Branch	Bank branch details
4	Employee	Employee metadata
5	FD	Fixed deposit entries
6	RecurringAccount	Recurring deposit information
7	Loan	Loan applications
8	Interest	Interest rates for loans

3.1.1 AccountUser

Table Description: Holds user identity and account preferences

Field Name	Data Type	Description	Sample Value
id	Integer	Primary key, auto-generated unique identifier	101
uid	String	Unique user identifier	"user_12345"
name	String	Full name of the user	"John Doe"
email	String	User email address	" john.doe@example.com "
contact	String	User contact number	"+1-555-1234567"
createdOn	LocalDateTime	Timestamp when user was created	2023-02-15T09:30:00
updatedOn	Date	Last update timestamp	2023-07-01
aadharNumber	String	Government-issued Aadhar number (India-specific)	"1234-5678-9012"
panCardNumber	String	Government-issued PAN card number (India-specific)	"ABCDE1234F"
isActive	boolean	User active status	true
accountDetails	List	List of accounts associated with the user	List of AccountDetails objects

3.1.2 AccountDetails

Table Description: Core account information

Field Name	Data Type	Description	Sample Value
accountNumber	Long	Unique identifier for the account	1234567890
accountType	String	Type of account (e.g., Savings, Checking)	"Savings"
balance	Double	Current balance in the account	10500.75
isActive	Boolean	Status if account is active	true
openDate	LocalDateTime	Date and time when account was opened	2023-01-15T10:00:00
closeDate	LocalDateTime	Date and time when account was closed (nullable)	null
accountUser	AccountUser (entity)	Reference to user owning the account	User object (ID, Name)
branch	Branch (entity)	Reference to bank branch managing the account	Branch object (ID, Name)
loans	List	List of loans associated with this account	List of Loan objects
recurringAccounts	List	List of recurring deposit accounts associated	List of RecurringAccount
fdList	List	List of fixed deposits linked to the account	List of FD objects

3.1.3 Branch

Table Description: Bank branch details

Field Name	Data Type	Description	Sample Value
branchId	Long	Primary key, auto-generated branch identifier	1001
branchName	String	Name of the bank branch	"Downtown Branch"
branchCode	String	Unique code assigned to the branch	"DTB001"
address	String	Physical address of the branch	"123 Main St, Cityville"
phoneNumber	String	Contact phone number of the branch	" +1-555-9876543"
accounts	List	List of accounts associated with this branch	List of AccountDetails objects
interestRates	List	Interest rates applicable at this branch	List of Interest objects

3.1.4 Employee

Table Description: Employee metadata

Field Name	Data Type	Description	Sample Value
employeeId	String	Unique identifier for the employee	"EMP12345"
position	String	Job position or title	"Branch Manager"
branch	Branch (entity)	Reference to the branch the employee belongs to	Branch object (ID, Name)

3.1.5 FD

Table Description: Fixed deposit entries

Field Name	Data Type	Description	Sample Value
id	Long	Primary key, auto-generated unique ID	5001
account	AccountDetails (entity)	Reference to the linked account	AccountDetails object
duration	int	Duration of the fixed deposit (in months)	12
amount	double	Principal amount deposited	10000.00
maturityAmount	double	Amount to be received at maturity	11000.00
startDate	LocalDate	Start date of the fixed deposit	2024-01-01
maturityDate	LocalDate	Date when the deposit matures	2025-01-01
withdrawalDate	LocalDate	Date of withdrawal if withdrawn early	null
interestRate	float	Interest rate applied to the deposit	7.5
interestAmount	Double	Interest amount earned	1000.00
withdrawalAmount	Double	Amount withdrawn (principal + interest)	null (if not withdrawn)
isClosed	Boolean	Status indicating if the FD is closed	false

3.1.6 RecurringAccount

Table Description: Recurring deposit info

Field Name	Data Type	Description	Sample Value
id	Long	Primary key, auto-generated unique ID	7001
accountNum	Long	Account number associated with the recurring account	1234567890
interestRate	Float	Interest rate for the recurring deposit	6.5
sipAmount	Double	Monthly installment amount (Systematic Investment Plan)	5000.00
month	int	Duration in months	12
totalAmount	Double	Total amount accumulated	62000.00
compoundAmount	Double	Compound interest amount	7000.00
startDate	LocalDate	Start date of the recurring deposit	2024-01-01
endDate	LocalDate	End date of the recurring deposit	2024-12-31
status	Boolean	Status of the recurring account (active/inactive)	true
isApproved	Boolean	Approval status	true
account	AccountDetails (entity)	Reference to the linked account	AccountDetails object

3.1.7 Loan

Table Description: Loan applications

Field Name	Data Type	Description	Sample Value
loanNumber	Long	Primary key, auto-generated unique loan identifier	9001
loanAmount	Double	Total loan amount sanctioned	250000.00
interestRate	float	Interest rate applicable to the loan	7.5
duration	int	Loan duration in months or years	60
startTime	Date	Date when the loan starts	2024-03-01
endTime	Date	Date when the loan is due to end	2029-03-01
status	String	Current status of the loan (e.g., Active, Closed)	"Active"
isApproved	boolean	Approval status of the loan	true
account	AccountDetails (entity)	Reference to the associated account	AccountDetails object
loanType	String	Type of loan (e.g., Personal, Home, Education)	"Home Loan"

3.1.8 Interest

Table Description: Interest rates for loan

Field Name	Data Type	Description	Sample Value
ID	Integer	Primary key, auto-generated identifier	101
oneYearIncrement	float	Interest rate increment for one-year loans	0.5
loanType	String	Type of loan the interest rate applies to	"Home Loan"
fixedRate	float	Fixed interest rate for the loan	7.0
branch	Branch (entity)	Reference to the branch associated with this rate	Branch object (ID, Name)

4.REST API Endpoints

Base URL: http://localhost:8222/api/v1/account/user

No.	Method	Endpoint	Description
1	POST	/create-account	Create a new account
2	PUT	/active-account/{uid}	Activate user account
3	POST	/start-fd	Book a new Fixed Deposit (FD)
4	PUT	/close-fd	Close an existing Fixed Deposit
5	GET	/my-fds/{account}	Get all FDs by account number
6	POST	/create-loan-account	Apply for a loan
7	POST	/recurring-account-calculator	Calculate recurring deposit interest
8	GET	/pending-active-account	Get list of pending activation accounts
9	POST	/add-interst-rate	Add new interest rate for loans/FDs
10	GET	/check-balance	Check balance of an account
11	POST	/add-employee	Add a new employee
12	POST	/add-branch	Register a new branch
13	GET	/get-branch-name/{uid}	Fetch branch name by user ID
14	GET	/get-account-details/{account}	Fetch detailed account information

4.1.1 /create-account

This endpoint allows users to create a new bank account by providing necessary personal and account details.

Field	Value
Method	POST
URL	http://localhost:8222/api/v1/account/user/create-account
Authorization	Bearer Token
Auth Role	User
Request Body	JSON
DTO	AccountUserDto
Internal Service Dependency	No

Body raw (JSON)

```
{
  contact: string,
  aadharNumber: string,
  panCardNumber: string,
  branch: string,
  accountType: string,
  monthlyAmount: number,
  months: integer,
  sipDate: string
}
```

Example

```
{  
  "contact":"+919879560747",  
  "aadharNumber":"12322342342",  
  "panCardNumber":"HBXPP3001F",  
  "branch":"S0123",  
  "accountType":"saving",  
  # only if account type is recurring  
  "monthlyAmount":1000.0,  
  "months":60,  
  "sipDate":"12"  
}
```

Response

```
{  
  status : string  
  message : string  
  object : any  
}
```

4.1.2 /active-account/{uid}

This endpoint allows you to update the status of an active user account. By sending a PUT request to the specified URL, you can modify the account information for the user identified by the unique account ID.

Field	Value
Method	PUT
URL	http://localhost:8222/api/v1/account/user/active-account/{accountnum}
Authorization	Bearer Token
Auth Role	Employee
Request Body	JSON
Path Variable	Account Number (Long) Example : 342532432234
Internal Service Dependency	No

Response

```
{
  status : string
  message : string
  object : any
}
```

4.1.3 /start-fd

This endpoint allows users to initiate a fixed deposit (FD) account by providing the necessary parameters.

Field	Value
Method	POST
URL	127.0.0.1:8222/api/v1/account/user/start-fd
Authorization	Bearer Token
Auth Role	user
Request Body	JSON
DTO	newFDdto
Internal Service Dependency	Yes

Internal Service Dependency:

Before creating the FD, this endpoint calls the following external service to validate the latest balance:

- **Service:** TRANSACTION-SERVICE
- **Endpoint Called:** GET <http://TRANSACTION-SERVICE/api/v1/transaction/check-balance> (RestTemplate)
- **Purpose:** To fetch the user's current balance and ensure sufficient funds before booking the FD.

Body raw (JSON)

```
{
  amount: number, // double
  month: integer, // int32
  accountNum: integer // int64
}
```

Example

```
{
  "amount": 5000,
  "month": 12,
  "accountNum": 994684771912
}
```

Response

```
{  
  status : string  
  message : string  
  object : any  
}
```


4.1.4 /close-fd

This endpoint allows users to close a specific account by providing the account's file descriptor number FD number.

Field	Value
Method	PUT
URL	127.0.0.1:8222/api/v1/account/user/ <i>close-fd</i>
Authorization	Bearer Token
Auth Role	User
Request Body	JSON
DTO	FdWithdraw
Internal Service	Yes

Internal Service:

- **Service Name:** TRANSACTION-SERVICE
- **Endpoint Called:** POST /api/v1/transaction/deposit
- **Method Signature:**
ResponseDTO addMoney(@RequestHeader("Authorization") String auth, @RequestBody TransactionDto transactionDto);
- **Purpose:**
To credit the FD amount into the user's account as part of the FD withdrawal process. A deposit transaction is recorded.

Body raw (JSON)

```
{
  amount: number, // double
  month: integer, // int32
  accountNum: integer // int64
}
```

Example

```
{
  fdNum: integer
}
```

Response

```
{  
  status : string  
  message : string  
  object : any  
}
```

4.1.5 /my-fds/{account}

This endpoint retrieves account information for a specific user identified by their account number. The request is return closed and active fix deposit list

Field	Value
Method	GET
URL	http://localhost:8222/api/v1/account/user/my-fds/{accountNumber}
Authorization	Bearer Token
Auth Role	User
Request Body	JSON
Path Variable	Account Number (Long) Example : 342532432234
Internal Service Dependency	NO

Response

```
{
  status : string
  message : string
  object : any
}
```

Response Example

```
{
  "status": "200",
  "message": "Fix Deposits",
  "object": [
    {
      "fdNum": 103,
      "amount": 0.0,
      "maturityAmount": 5370.0,
      "maturityDate": "2026-07-18",
      "interest": 7.4,
      "status": "Closed"
    }
  ]
}
```

4.1.6 /create-loan-account

Field	Value
Method	POST
URL	http://localhost:8222/api/v1/account/user/create-loan-account
Authorization	Bearer Token
Auth Role	User
Request Body	JSON
DTO	NewLoanDTO
Internal Service Dependency	NO

Body raw (JSON)

```
{
  accountNum: integer,
  loanType: string,
  loanAmount: number,
  duration: integer
}
```

Body Example

```
{
  "accountNum":469912588965,
  "loanAmount":8000,
  "duration":12,
  "loanType":"home"
}
```

Response

```
{
  status : string
  message : string
  object : any
}
```

4.1.7 /recurring-account-calculator

This endpoint allows users to calculate the recurring account details based on a specified monthly amount and the duration in months.

Field	Value
Method	POST
URL	http://localhost:8222/api/v1/account/user/recurring-account-calculator
Authorization	No Auth
Auth Role	User
Request Body	JSON
DTO	RecurringAccountCalculator
Internal Service Dependency	NO

Body raw (JSON)

```
{
  monthlyAmount: number,
  months: integer
}
```

Example

```
{
  "monthlyAmount":1000.00,
  "months":60
}
```

Response

```
{
  status : string
  message : string
  object : any
}
```

Response Example

```
{  
  "status": "200",  
  "message": "Compound Interest Amount",  
  "object": {  
    "month": 60,  
    "interest": 7.1,  
    "CompoundAmount": 70827.5,  
    "sip": 1000.0,  
    "TotalAmount": 60000.0  
  }  
}
```

4.1.8 /pending-active-account

This endpoint retrieves a list of pending active accounts associated with the user. It is designed to provide users with information about their accounts that are currently pending activation.

Field	Value
Method	GET
URL	http://localhost:8222/api/v1/account/user/pending-active-account
Authorization	Bearer Token
Auth Role	employee
Request Body	-
Internal Service Dependency	NO

Response

```
{
  status : string
  message : string
  object : any
}
```

Response Example

```
{
  "status": "200",
  "message": "Pending approval accounts",
  "object": [
    {
      "account": "706589538979",
      "aadharCard": "12322342342",
      "panCard": "HBXPP3001F",
      "email": "dhruvpatel22082020@gmail.com",
      "type": "SAVING",
      "uid": "8510408c-4b7e-4f83-ba01-4bdf3ea55adc"
    }
  ]
}
```

4.1.9 /add-interest-rate

This endpoint allows users to add an interest rate for a specific loan type.

Field	Value
Method	POST
URL	http://localhost:8222/api/v1/account/user/add-interst-rate
Authorization	Bearer Token
Auth Role	Employee
Request Body	JSON
DTO	InterestRateDTO
Internal Service Dependency	NO

Body raw (JSON)

```
{
  oneYearIncrement: number,
  loanType: string,
  fixedRate: number
}
```

Example

```
{
  "oneYearIncrement": 0.50,
  "loanType": "travel",
  "fixedRate": 9.5
}
```

Response

```
{
  status : string
  message : string
  object : any
}
```


4.1.10 /check-balance

Field	Value
Method	GET
URL	http://localhost:8222/api/v1/account/user/check-balance
Authorization	Bearer Token
Auth Role	user
Request Body	JSON
DTO	BalanceCheck
Internal Service Dependency	Yes

Service Dependency:

This endpoint depends on the **TRANSACTION-SERVICE** to fetch the most recent balance.

- **Internal Call:**
GET http://TRANSACTION-SERVICE/api/v1/transaction/check-balance
- **Purpose:**
To get the **updated account balance** from the TRANSACTION-SERVICE before returning it to the client.

Body raw (JSON)

```
{  
  accountNum: integer  
}
```

Example

```
{  
  "accountNum":234197540589  
}
```

Response

```
{  
  status : string  
  message : string  
  object : any   }
```

```
{  
  "status": "200",  
  "message": "Balance fetched!",  
  "object": {  
    "Account": 234197540589,  
    "Balance": 1604.34  
  }  
}
```

4.1.11 /add-employee

This endpoint allows you to add a new employee to the system.

Field	Value
Method	POST
URL	http://localhost:8222/api/v1/account/user/add-employee
Authorization	Bearer Token
Auth Role	employee
Request Body	JSON
DTO	EmployeeDTO
Internal Service Dependency	NO

Body raw (JSON)

```
{
  position: string,
  branchId: string
}
```

Example

```
{
  "position":"Manager",
  "branchId":"S0123"
}
```

Response

```
{
  status : string
  message : string
  object : any
}
```

4.1.12 /add-branch

This endpoint allows users to add a new branch to the account.

Field	Value
Method	POST
URL	http://localhost:8222/api/v1/account/user/add-branch
Authorization	Bearer Token
Auth Role	admin
Request Body	JSON
DTO	BranchDTO
Internal Service Dependency	NO

Body raw (JSON)

```
{
  branchName: string,
  branchCode: string,
  address: string,
  phoneNumber: string
}
```

Example

```
{
  "branchName":"SOBO",
  "branchCode":"S0123",
  "address":"Ahmedabad",
  "phoneNumber":"+919879560747"
}
```

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/check-balance
Authorization	Bearer Token
Auth Role	user
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
```