**Bank-Web-App**

**Account Service**

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# 1. Introduction

The Account Serviceis 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

Database : Accounts

|  |  |  |
| --- | --- | --- |
| 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](mailto: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

**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**

**Response**

{

**status : string**

**message : string**

**object : any**

}

## 4.1.2/active-account/{accountNum }

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/{account](http://localhost:8222/api/v1/account/user/active-account/%7baccount)num} |
| 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/*/close-fd* |
| 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 lisr

|  |  |
| --- | --- |
| 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**4.1.9 /add-interest-rate

{

    "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"

        }

    ] }

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 }**

}

**Response Example**

{

    "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**4.1.13 /heartbeat

{

**status : string**

**message : string**

**object : any**

**}**

}

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