To design an ATM monitoring application with an API that includes authorization, transaction tracking, failure logging, and video download capabilities, this API will follow **OpenAPI 3.1** specifications and use **Java** as the programming language for implementation -

**Key Features for API**

1. **Authorization**: Secure access using token-based authentication.
2. **Total Customers in the Last 24 Hours**: Fetch the total number of customers who used the ATM in the last 24 hours.
3. **Breakdown of Transactions by Type**:
   * Deposit
   * Cash Withdrawal
   * Balance Information
4. **Failure Logs**: Return details of system/device failures and the associated transaction request.
5. **Download Camera Images/Videos by Time Range**: Allow downloading of surveillance footage based on a provided time range.
6. **API Documentation using OpenAPI Specification 3.1**.

**API Design and OpenAPI 3.1 Specification**

**1. Authorization**

* **Authentication**: Token-based authentication will be used to secure all endpoints.
* **Authorization**: Each request must include a valid token in the Authorization header.

**2. Endpoints**

1. **Authorization Endpoint**  
   **POST /api/auth/token**  
   Generates an access token that will be used for all subsequent requests.

**Request:**

{

"username": "string",

"password": "string"

}

**Response:**

{

"token": "string",

"expiresIn": 3600

}

1. **Total Number of Customers in Last 24 Hours**  
   **GET /api/atm/customers/last-24-hours**  
   Fetches the total number of customers who have used the ATM in the past 24 hours.

**Response:**

{

"totalCustomers": 154

}

1. **Breakdown of Transactions by Type**  
   **GET /api/atm/transactions/breakdown**  
   Fetches the breakdown of transactions by type (Deposit, Cash Withdrawal, Balance Inquiry) within a specific period.

**Query Parameters:**

* + from: Start of the time range (optional).
  + to: End of the time range (optional).

**Response:**

{

"depositCount": 30,

"cashWithdrawalCount": 120,

"balanceInquiryCount": 40

}

1. **List of System/Device Failures**  
   **GET /api/atm/failures**  
   Retrieves the list of failures in the ATM system or attached devices over a specific period.

**Query Parameters:**

* + from: Start of the time range.
  + to: End of the time range.

**Response:**

{

"failures": [

{

"failureId": "FAIL001",

"timestamp": "2024-10-22T10:15:00Z",

"failureType": "Card Reader Error",

"transactionType": "Cash Withdrawal",

"context": "Card reader failed to read card"

},

{

"failureId": "FAIL002",

"timestamp": "2024-10-22T11:20:00Z",

"failureType": "Cash Dispenser Jam",

"transactionType": "Deposit",

"context": "Cash dispenser jammed during transaction"

}

]

}

1. **Download Camera Images/Video by Time Range**  
   **GET /api/atm/camera-logs/download**  
   Allows users to download camera footage captured during a specific time range.

**Query Parameters:**

* + from: Start of the time range (format yyyy-MM-ddTHH:mm:ssZ).
  + to: End of the time range (format yyyy-MM-ddTHH:mm:ssZ).

**Response:**

* + The endpoint returns a downloadable link for the video file.

{

"downloadUrl": "https://bank-system.com/downloads/footage/2024-10-22\_10-12.mp4"

}

**OpenAPI 3.1 Specification Example**

openapi: 3.1.0

info:

title: ATM Monitoring API

version: "1.0.0"

description: API for monitoring status and behavior of ATMs within the bank's network.

servers:

- url: https://api.bank-system.com

description: Bank Monitoring API server

paths:

/api/auth/token:

post:

summary: Generate a new authentication token

requestBody:

required: true

content:

application/json:

schema:

type: object

properties:

username:

type: string

password:

type: string

responses:

200:

description: A valid authentication token

content:

application/json:

schema:

type: object

properties:

token:

type: string

expiresIn:

type: integer

401:

description: Invalid credentials

/api/atm/customers/last-24-hours:

get:

summary: Get total number of customers in the last 24 hours

security:

- bearerAuth: []

responses:

200:

description: Total customers in the last 24 hours

content:

application/json:

schema:

type: object

properties:

totalCustomers:

type: integer

/api/atm/transactions/breakdown:

get:

summary: Get breakdown of transactions by type

security:

- bearerAuth: []

parameters:

- in: query

name: from

schema:

type: string

format: date-time

required: false

- in: query

name: to

schema:

type: string

format: date-time

required: false

responses:

200:

description: Breakdown of transactions by type

content:

application/json:

schema:

type: object

properties:

depositCount:

type: integer

cashWithdrawalCount:

type: integer

balanceInquiryCount:

type: integer

/api/atm/failures:

get:

summary: Get list of failures

security:

- bearerAuth: []

parameters:

- in: query

name: from

schema:

type: string

format: date-time

required: true

- in: query

name: to

schema:

type: string

format: date-time

required: true

responses:

200:

description: List of system and device failures

content:

application/json:

schema:

type: object

properties:

failures:

type: array

items:

type: object

properties:

failureId:

type: string

timestamp:

type: string

format: date-time

failureType:

type: string

transactionType:

type: string

context:

type: string

/api/atm/camera-logs/download:

get:

summary: Download camera footage within a time range

security:

- bearerAuth: []

parameters:

- in: query

name: from

schema:

type: string

format: date-time

required: true

- in: query

name: to

schema:

type: string

format: date-time

required: true

responses:

200:

description: Download URL for the video

content:

application/json:

schema:

type: object

properties:

downloadUrl:

type: string

components:

securitySchemes:

bearerAuth:

type: http

scheme: bearer

bearerFormat: JWT

**Data Model Design**

**Transaction Log**

{

"transactionId": "TX123456",

"timestamp": "2024-10-22T12:00:00Z",

"customerId": "CUST789",

"atmId": "ATM001",

"transactionType": "Cash Withdrawal",

"amount": 200,

"status": "Successful"

}

**Failure Log**

{

"failureId": "FAIL123",

"atmId": "ATM001",

"timestamp": "2024-10-22T12:00:00Z",

"failureType": "Cash Dispenser Error",

"transactionId": "TX123456",

"context": "Cash dispenser jammed"

}

**Camera Footage Log**

{

"videoId": "VID123",

"timestamp": "2024-10-22T12:00:00Z",

"atmId": "ATM001",

"fileName": "2024-10-22\_12-00-00.mp4",

"duration": 30,

"filePath": "/videos/atm001/2024-10-22\_12-00-00.mp4"

}

**Task Breakdown for Development**

1. **Design and Document API Specification** (OpenAPI 3.1): 1 week
2. **Set up the Java backend** with Spring Boot: 1 week
3. **Implement Authorization** (JWT Token): 2 days
4. **Create APIs for Transaction Logging and Monitoring**: 2 weeks
5. **Develop Failure Logging Mechanism**: 1 week
6. **Implement Camera Footage Download API**: 1 week
7. **Testing and Validation**: 1 week
8. **API Documentation** (Swagger/OpenAPI UI): 2 days