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EECE503 M – Software Security Project

The Online Banking System is a web-based application built using Flask, allowing users to manage their bank accounts, perform transactions, pay bills, and track financial activity. The system incorporates Role-Based Access Control (RBAC) to ensure that different categories of users have appropriate capabilities and restrictions.

The system contains four user roles, each with specific permissions:

- **Customer:** A bank customer who can create and manage their accounts.
- **Support Agent:** Customer support staff who can access user accounts for troubleshooting, but cannot perform financial operations.
- **Auditor:** Read-only access for internal auditing, compliance, and fraud review.
- **Admin:** Super administrator with full access to manage users, accounts, system settings, and security controls.

User Registration:

- Users create accounts by providing:
 - Full name
 - Email
 - Phone number
 - Password

Admin:

- The system comes with a default admin configured in the database. The admin logs in for the first time and changes his username and password.
- Admin can edit any user's profile and role.
- Admin can create and edit support agents and editors.

Account Creation

- Customers can open new accounts.
- Admin can open accounts for any user.
- Each account has:
 - Auto-generated account number
 - Type (checking/savings)

- Opening balance
- Status: Active, Frozen, Closed

Account Dashboard

- Customers see all their accounts with:
 - Current balance
 - Recent 5 transactions
 - Quick links for transfers or bill payment

Account Status Management (Admin Only)

- Admin can freeze/unfreeze any account.
- Frozen accounts cannot send or receive transfers.

Internal Transfers

- Customer transfers money between their own accounts.
- Validation:
 - Sufficient balance
 - Account status must be Active

External Transfers

- Customer transfers money to another user's account.
- Requirements:
 - Validate account number
 - Validate available balance
 - Store description + timestamp

Transaction History

- Filter by:
 - Date range
 - Transaction type
 - Amount range
- Export to PDF is optional.

Transaction Model Stores:

- Transaction ID
- Sender account
- Receiver account
- Amount
- Type (credit/debit)
- Timestamp

Support Management (Support Agent Role)

- Customers open tickets when they need assistance.
- Support agents can:
 - View all open tickets
 - Update ticket status to:
 - Open
 - In Progress
 - Resolved
 - Add notes for customer communication

Audit & Security Module (Auditor Role)

System must log:

- Login attempts
- Failed login attempts
- Account freezes/unfreezes
- Suspicious transactions
- Admin operations

Admin Panel

Admin capabilities include:

- Manage users (add, delete, update profile)
- Assign or change user roles
- Freeze/unfreeze accounts
- View audit logs
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RBAC Permission Matrix

Feature / Action	Customer	Support Agent	Auditor	Admin
Register/Login	OK	OK	OK	OK
Manage own profile	OK	OK	X	OK
View own accounts	OK	OK	OK	OK
View all user accounts	X	OK	OK	OK
Create accounts	OK	X	X	OK
Internal transfers	OK	X	X	OK
External transfers	OK	X	X	OK
View own transactions	OK	OK	OK	OK

Feature / Action	Customer	Support Agent	Auditor	Admin
View all transactions	X	OK	OK	OK
Freeze/unfreeze accounts	X	X	X	OK
Assign/change user roles	X	X	X	OK
View audit/security logs	X	X	OK	OK
Manage support tickets	X	OK	X	OK

Technology stack and architecture

- You should be using Python Flask as backend.
- Choose the frontend technology of your choice
- The application should be multiservice. The backed should not be a one service running all the application. For example, you can have the DB, customers' module, Admin and RBAC on separate services.

Delivery plan and evaluation

- You should take into consideration all the security measures covered in class (e.g., Injection, SSRF, Authentication, Authorization, RBAC, Cryptography failures, etc.).
- Your code should be both secure and functional.
- The evaluation of the deliverables will involve analyzing your code from a security perspective, as well as an interview/presentation.
- You should clearly state each team member's contribution to the project.
- Each team should work independently. No code exchange between groups is allowed, and this will be checked during the evaluation.