Web Services and API Development: Final Project – Bank API

Team G:

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1. Problem description and proposed solution:

The task is to design API for bank services. Problem: ensure that the project structure will facilitate security while simultaneously being intuitive, and easy to manage. One of the main problems initially was how should the api structure look like. In order to solve this problem we decided to rely on the restful design of services, and at the same time, to ensure that there is a clear separation of duties. To improve future debugging and overall understandability of the code base, we have followed the basic design patterns, and split the project asssets into three separate groups: models, resources, and services. Furthermore, we have decided to use version control available via github to ensure that we have reliable backups. Finally, we developed the project incrementally, aiming initially to build MVP (minimum viable product). Once achieved, we have proceeded to expand services, and add functionalities. Overall, we found the project challenging in a positive way, as it pushed us out of our comfort zones, and forced to think through design patterns, and how to structure the overall project.

2. Security concerns

The main security concerns are:

a) User/Customer being able to access incorrect account

In order to stop the user from accessing the incorrect account, the user credentials are linked with 1 or more accounts and secure authentication should be used to ensure that the customer accounts are created safely.

b) User/Customer able to make incorrect transactions

This is managed at the database level where checks should be in place top ensure that the transaction cannot occur unless the funds are available.

Also, the transactions should be "atomic transactions" to ensure the data integrity.

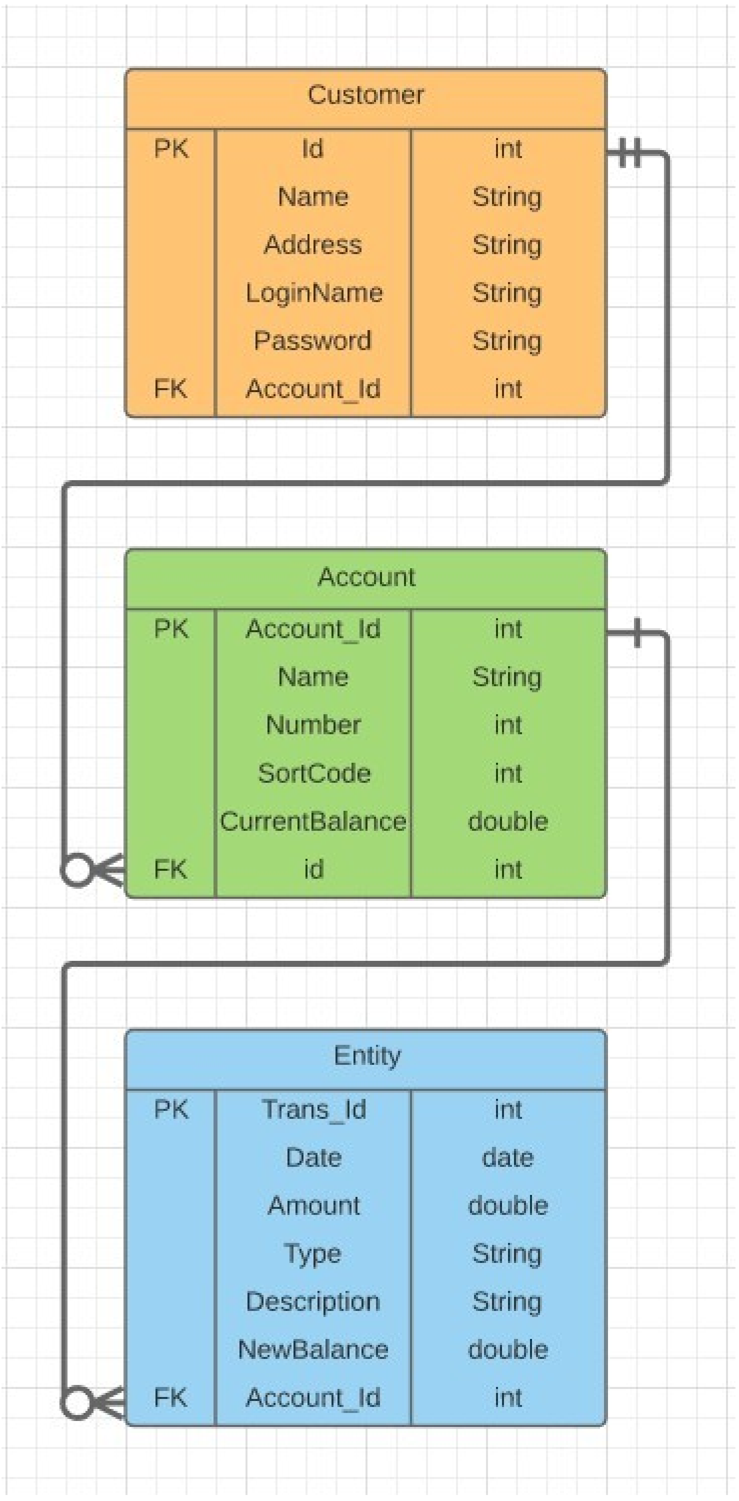
Secure REST services must only provide HTTPS endpoints to ensure security of credentials in transit and also the integrity of data.

The input parameters must be validated and anything that is outside the boundaries of a safe API call must be rejected. The content types must be validated.

The errors must be properly handled internally to avoid sending stack traces to client and this also allows the developer to send personalized messaged for the different errors, and this make it easier to return appropriate HTTP return codes.

3. Entity-Relationship diagram

There are three entities: Customer, Account, and Transaction. Customer and Account have one, and only one to many relationship. Account and Transaction have one to many relationship.



4. Work performed:

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Project overall structure, dependencies etc

All API entry points

All Java models, services, and resources

Documentation: introduction and description of all API entry points (table)

Client (html / stylsheet / javascript)

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Persistance: classes, controllers, facades, beans package, database package

Documentation: section on security and EDR diagram

Screenshots of API usage (for client & postman)

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No input

API entry points:

Name	Description	URI	HTTP VERB	PARAMS	Resource Content	Pre-Conditions	Post-Conditions
Customer Resources	Resources related to customer records	/ banking / customers					
getAllCustomers	Retreives all customers	/	GET	no params	Returns List of all customer objects	No preconditions. If no customers, returns empty array	No changes to the system state, returns array.
getCustomer	Retreives single customer	/{id}	GET	int id	Returns Customer object	Customer must existst in system	No changes to the system, object returned
createCustomer	Creates new customer record	/	POST	Customer object	Returns customer object as confirmation	Customer must not already exist in database	Customer record created, database updated
updateCustomer	Updates customer record	/{id}	PUT	int id, Customer object	Returns updated customer object	Customer must exist in the database	Customer record updated in database
deleteCustomer	Removes customer record	/{id}	DELETE	int id	Returns customer object that has been removed	Customer must exist in the database	Customer record gets removed permanently from database
Account Resources	Resources related to accounts operations	/banking/customers/{id}/accounts					
createAccount	Creates a new account for customer	/	POST	int id, String type (account name)	Returns newly created account object	Customer must exist, customer must be logged in	New account is added to customer's account array
getAllAccounts	returns all accounts that	/	GET	int id	Returns array list of accounts	Customer must be logged in. If no	No effect on system, returns

	belong to spcified customer					accounts, returns empty array	array
getAccount	Looks for and returns specific account	/{accountNumber}	GET	int id, int accountNumber	Returns account object	Customer must be logged in, account must exist for logged in user	No effect on system, returns account object.
getBalance	Looks at the balance of specified account	/{accountNumber}/balance	GET	int id, int accountNumber	Returns string containing balance of the account	Customer must be logged in, account must exist.	No effect on system, displays balance on client's app.
deleteAccount	Removes account from database	/	DELETE	int id, Account a	Returns string confirming removal of account	Customer must be logged in, account must exist	Removes permanently account for given customer with all related information
Transaction Resources	Resources related to account transactions	/banking/customers/{id}/accounts/{accountNumber}/transactions					
getTransaction	Retreives single transaction that maches specified amount	/{amount}	GET	int id, int accountNumber, double amount	Returns transaction object	Customer must be logged in, there has to be amount specified, queried account has to exist	Returns and displays transaction details on client side
getAllTransactions	Retreives all transactions for specific account	/	GET	int id, int account id	Returns array of transaction objects	Customer must be logged in, account must exist	Displays list of transactions on client's side.
withdrawFromAccount	Withdraws funds from specified account,	/withdraw/{amount}	GET	int id, int accountNumber, int	Returns transaction object	Customer must be logged in, account	Displays message on clients side if

	creates related transaction			amount		must exist, there must be sufficient funds on account	transaction successful, creates and records transaction for affected account. Updated account current balance.
lodgeToAccount	Lodges specified amount to specified account	/lodge/{amount}	GET	int id, int accountNumber, double amount	Returns transaction object	Customer must be logged in, account must exist, account must belong to customer	Displays message on clients side if transaction successful. Creates and records transaction to database. Updates affected accounts current balance
transferBetweenAccounts	Transfers funds between two accounts	/{amount}	POST	int id, int accountNumber, double amount, Account destinationAccount	Returns transaction object	Customer must be logged in, both accounts must exist, origin (account being credited) account must belong to customer!	Displays message on client's side. Creates two transaction objects, records both objects to relevant acconts. Updates balances of both accounts.