Full Stack Development with MERN

API Development and Integration Report

Date	09-07-2024
Team ID	SWTID1720104852
Project Name	Banking Management App(MERN)
Maximum Marks	10

Project Title: Banking Management

Date: 09-07-2024

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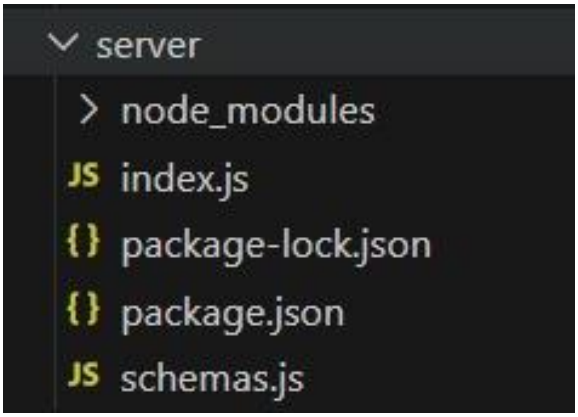
Objective
The objective of this report is to document the API development progress and key aspects of the backend services implementation for the Banking Management project.

Technologies Used

- **Backend Framework:** Node.js with Express.js
- **Database:** MongoDB
- **Authentication:** JWT

Project Structure
Provide a screenshot of the backend project structure with explanations for key directories and files.



project-root/

│

├── node_modules/ **Directory containing all the installed npm packages.**

├── index.js **Entry point for the Node.js application where the server is initialized**.

├── package-lock.json **Automatically generated file that records the exact versions of installed npm dependencies.**

├── package.json **Configuration file that lists project details and dependencies.**

└── schemas.js **File containing Mongoose schema definitions for the database models**.

Key Directories and Files

1. **/schems.js**
    - Includes Mongoose schemas and models for MongoDB collections

server > JS schemas.js > ...

```
import mongoose from 'mongoose';

const userSchema = new mongoose.Schema({
    username: { type: String, required: true },
    email: { type: String, required: true, unique: true },
    usertype: { type: String, required: true },
    homeBranch: { type: String, required: true },
    ifsc: { type: String, required: true },
    password: { type: String, required: true },
    balance: {type: Number, default: 0}
});
const bankSchema = new mongoose.Schema({
    username: { type: String, required: true },
    email: { type: String, required: true, unique: true },
    usertype: { type: String, required: true },
    password: { type: String, required: true }
});
const transactionSchema = new mongoose.Schema({
    senderId: { type: String },
    senderName: {type: String},
    remarks: {type: String},
    receiverId: { type: String},
    receiverIFSC: { type: String },
    receiverName: {type: String},
    deposit: {type: String},
    loan: {type: String},
    amount: { type: Number, required: true },
    paymentMethod: { type: String },
    time: { type: String}
});
const depositSchema = new mongoose.Schema({
    depositName: { type: String, required: true },
    customerId: { type: String, required: true },
    customerName: {type: String},
    nomineeName: {type: String},
```

- Contains functions to handle requests and responses.

```
    matureDate: {type:String}
});
const loanSchema = new mongoose.Schema({
    loanType: { type: String },
    customerId: { type: String, required: true },
    customerName: {type: String},
    nomineeName: {type: String},
    nomineeAge: {type: String},
    duration: {type: Number},
    loanAmount: { type: Number },
    balance: { type: Number },
    loanStatus: {type: String, default: 'pending'},
    createdDate: {type: String},
    endDate: {type: String}
});

export const User = mongoose.model('users',userSchema);
export const Bank = mongoose.model('bank',bankSchema);
export const Transactions = mongoose.model('transactions',transactionSchema);
export const Deposits = mongoose.model('deposits',depositSchema);
export const Loans = mongoose.model('loans',loanSchema);
```

2. **/index.js**

    1. **/controllers**

        - User Controller
        - Transaction Controller
        - Loan Controller

    2. **/Middleware**

```
const requestLogger = (req, res, next) => {
    console.log(`${req.method} ${req.url} - ${new Date().toISOString()}`);
    next(); }; app.use(requestLogger);

```

    3. **/config**

        - Configuration files for database connections.

```
const PORT = 6001;
mongoose.connect('mongodb://localhost:27017/bankmern', {
        useNewUrlParser: true,
        useUnifiedTopology: true,
    }
).then(()=>{
```

```
    matureDate: {type:String}
});
const loanSchema = new mongoose.Schema({
    loanType: { type: String },
    customerId: { type: String, required: true },
    customerName: {type: String},
    nomineeName: {type: String},
    nomineeAge: {type: String},
    duration: {type: Number},
    loanAmount: { type: Number },
    balance: { type: Number },
    loanStatus: {type: String, default: 'pending'},
    createdDate: {type: String},
    endDate: {type: String}
});

export const User = mongoose.model('users',userSchema);
export const Bank = mongoose.model('bank',bankSchema);
export const Transactions = mongoose.model('transactions',transactionSchema);
export const Deposits = mongoose.model('deposits',depositSchema);
export const Loans = mongoose.model('loans',loanSchema);
```

API Endpoints:
A summary of the main API endpoints and their purposes:

Authentication and User Management

- POST /register: Registers a new user
- POST /login: Logs in a user .
- GET /user-details/:id: Fetches the details of a user by their ID.

Transactions

- POST /send-money: Sends money from one user to another.
- GET /transactions: Fetches all transactions.

Deposits

- GET /fetch-deposits: Fetches all deposit records.
- POST /new-deposit: Creates a new deposit for a customer.

Loans

- GET /fetch-loans: Fetches all loan records.
- POST /new-loan: Creates a new loan request for a customer.
- PUT /approve-loan: Approves a loan request.
- PUT /decline-loan: Declines a loan request.
- POST /repay-loan: Processes a loan repayment.

Users

- GET /fetch-users: Fetches all users.

User Authentication

- **POST /api/user/register** - Registers a new user.

```
app.post('/register', async (req, res) => {
    const { username, email, usertype, password, homeBranch } = req.body;
    try {
      if (usertype === 'customer'){
        const existingUser = await User.findOne({ email });
        if (existingUser) {
            return res.status(400).json({ message: 'User already exists' });
        }
        const IFSC = {'hyderabad': 'SB007HYD25',
                      'bangalore': 'SB007BLR30',
                      'chennai': 'SB007CNI99',
                      'mumbai': 'SB007MBI12',
                      'tirupati': 'SB007TPTY05',
                      'vizag': 'SB007VZG229',
                      'pune': 'SB007PN77',
                      'delhi': 'SB007DLI09',
                      'kochi': 'SB007KCI540',
                      'Venkatagiri': 'SB007VGR313',  }
        const hashedPassword = await bcrypt.hash(password, 10);
        const newUser = new User({
            username,
            email,
            usertype,
            homeBranch,
            ifsc : IFSC[homeBranch],
            password: hashedPassword
        });
        const userCreated = await newUser.save();
        return res.status(201).json(userCreated);
      }else if (usertype === 'admin'){
        const existingUser = await Bank.findOne({ email });
        if (existingUser) {
            return res.status(400).json({ message: 'User already exists' });
```

- **POST /api/user/login -** Authenticates a user and returns a token.

```
app.post('/login', async (req, res) => {
    const { email, usertype, password } = req.body;
    try {

      if (usertype === 'customer'){

            const user = await User.findOne({ email });

            if (!user) {
                return res.status(401).json({ message: 'Invalid email or password' });
            }
            const isMatch = await bcrypt.compare(password, user.password);
            if (!isMatch) {
                return res.status(401).json({ message: 'Invalid email or password' });
            } else{

                return res.json(user);
            }
      }else if (usertype === 'admin'){
            const user = await Bank.findOne({ email });

            if (!user) {
                return res.status(401).json({ message: 'Invalid email or password' });
            }
            const isMatch = await bcrypt.compare(password, user.password);
            if (!isMatch) {
                return res.status(401).json({ message: 'Invalid email or password' });
            } else{
                return res.json(user);
            }
      }
    } catch (error) {
      console.log(error);
      return res.status(500).json({ message: 'Server Error' });
    }
});
```

User Management

- **GET /api/user/-** Retrieves user information by ID.

```
app.get('/user-details/:id', async (req, res) => {
    try{

        const user = await User.findOne({_id: req.params.id});
        if(!user){
            return res.status(404).json({ message: 'User not found' });
        }
        res.json(user);
    } catch (error) {
      console.log(error);
      return res.status(500).json({ message: 'Server Error' });
    }
});
```

- **PUT /api/user/**- Updates user information by ID.

```
app.put('/approve-loan', async (req, res)=>{
    const {id} = req.body;
    try{
        console.log(id)
        const loan = await Loans.findOne({_id: id});
        const user = await User.findOne({_id: loan.customerId});
        loan.loanStatus = 'approved';
        user.balance = user.balance + loan.loanAmount;
        await loan.save();
        await user.save();
        res.json({message:"loan approved successfully"});

        const transaction = new Transactions({
            receiverId: user._id, receiverName: user.name, loan: loan.loanType, amount, time: new Date(), remarks: "Loan approval"
        })
        await transaction.save();

    }catch(err){
        res.status(500).json({message: 'error occured'});
    }
})
```

Deposites Management

- **GET /api/fetch-deposits** - Retrieves all deposits.

```
app.get('/fetch-deposits', async (req, res)=>{
    try{
        const deposits = await Deposits.find();
        res.json(deposits);
    }catch(err){
        res.status(500).json({message: "Error occured"});
    }
})
```

- **POST /api/new-deposit** - Adds new Deposit.

```
app.post('/new-deposit', async (req, res) =>{
    const {depositName, customerId, customerName, nomineeName, nomineeAge, duration, amount, createdDate} = req.body
    try{
        const date = new Date(createdDate);

        const matureDate = date.getDate() + '-' + (date.getMonth() % 12) + '-' + (date.getFullYear() + Math.floor(duration/12) )
        const user = await User.findOne({_id: customerId});
        const newDeposit = new Deposits({
            depositName, customerId, customerName, nomineeName, nomineeAge, duration, amount, createdDate, matureDate
        });

        const transaction = new Transactions({
            senderId: customerId, senderName: customerName, deposit: depositName, amount, time: new Date(), remarks: "Deposit payment"
        })
        await transaction.save();

        const depo = await newDeposit.save();
        user.balance = user.balance - amount;
        await user.save();
        res.json({message: "deposit created"});
    }catch(err){
        res.status(500).json({message: "Error occured"});
    }
})
```

User Details

- **GET /api/fetchuserdetails** - Retrieves all details of a user.

```
app.get('/user-details/:id', async (req, res) => {
    try{

        const user = await User.findOne({_id: req.params.id});
        if(!user){
            return res.status(404).json({ message: 'User not found' });
        }
        res.json(user);
    } catch (error) {
      console.log(error);
      return res.status(500).json({ message: 'Server Error' });
    }
});
```

Loans Data Management

- **GET /api/fetch-loans -** Retrieves all loans.

```
app.get('/fetch-loans', async (req, res)=>{
    try{
        const loans = await Loans.find();
        res.json(loans);
    }catch(err){
        res.status(500).json({message: "Error occured"});
    }
})
```

- **POST /api/new-loan -** Creates a new loan.

```
app.post('/new-loan', async (req, res) =>{

    const {loanType, customerId, customerName, nomineeName, nomineeAge, duration, loanAmount, createdDate} = req.body
    try{
        const date = new Date(createdDate);

        const endDate = date.getDate() + '-' + (date.getMonth() % 12) + '-' + (date.getFullYear() + Math.floor(duration/12) );

        const balance = loanAmount;
        const newLoan = new Loans({
            loanType, customerId, customerName, nomineeName, nomineeAge, duration, loanAmount, balance, createdDate, endDate
        })
        const loan = await newLoan.save();
        res.json({message: "loan request created"});
    }catch(err){
        res.status(500).json({message: "Error occured"});
    }
})
```

- **POST /api/repay -loan** – Repays an existing loan.

```
app.post('/repay-loan', async (req, res)=>{
    const {id, amount} = req.body;
    try{
        const loan = await Loans.findOne({_id: id});
        const user = await User.findOne({_id: loan.customerId});
        loan.balance = loan.balance - amount;
        user.balance = user.balance - amount;
        await loan.save();
        await user.save();

        const transaction = new Transactions({
            senderId: user._id, senderName: user.name, loan: loan.loanType, amount, time: new Date(), remarks: "Loan re-payment"
        })
        await transaction.save();

        res.json({message: 'repayment successful'});
    }catch(err){
        res.status(500).json({message: 'message occured'});
    }
})
```

- **PUT /api/approve -loan -**Approves a new loan.

```
app.put('/approve-loan', async (req, res)=>{
    const {id} = req.body;
    try{
        console.log(id)
        const loan = await Loans.findOne({_id: id});
        const user = await User.findOne({_id: loan.customerId});
        loan.loanStatus = 'approved';
        user.balance = user.balance + loan.loanAmount;
        await loan.save();
        await user.save();
        res.json({message:"loan approved successfully"});

        const transaction = new Transactions({
            receiverId: user._id, receiverName: user.name, loan: loan.loanType, amount, time: new Date(), remarks: "Loan approval"
        })
        await transaction.save();

    }catch(err){
        res.status(500).json({message: 'error occured'});
    }
})
```

- **PUT /api/decline -loan** -Declines a loan if the customer is not eligible.

```
app.put('/decline-loan', async (req, res)=>{
    try{
        const {id} = req.body;
        const loan = await Loans.findOne({_id: id});
        loan.loanStatus = 'declined';
        await loan.save();
        res.json({message:"loan declined successfully"});

    }catch(err){
        res.status(500).json({message: 'error occured'});
    }
})
```

Integration with Frontend

The backend communicates with the frontend via RESTful APIs. Key points of integration include:

- **User Authentication:** Tokens are passed between frontend and backend to handle authentication.

```
app.post('/login', async (req, res) => {
    const { email, usertype, password } = req.body;
    try {

      if (usertype === 'customer'){

            const user = await User.findOne({ email });

            if (!user) {
                return res.status(401).json({ message: 'Invalid email or password' });
            }
            const isMatch = await bcrypt.compare(password, user.password);
            if (!isMatch) {
                return res.status(401).json({ message: 'Invalid email or password' });
            } else{

                return res.json(user);
            }
      }else if (usertype === 'admin'){
            const user = await Bank.findOne({ email });

            if (!user) {
                return res.status(401).json({ message: 'Invalid email or password' });
            }
            const isMatch = await bcrypt.compare(password, user.password);
            if (!isMatch) {
                return res.status(401).json({ message: 'Invalid email or password' });
            } else{
                return res.json(user);
            }
      }
    } catch (error) {
      console.log(error);
      return res.status(500).json({ message: 'Server Error' });
    }
});
```

- **Data Fetching:** Frontend components make API calls to fetch necessary data for display and interaction.

```
app.get('/user-details/:id', async (req, res) => {
    try{

        const user = await User.findOne({_id: req.params.id});
        if(!user){
            return res.status(404).json({ message: 'User not found' });
        }
        res.json(user);
    } catch (error) {
      console.log(error);
      return res.status(500).json({ message: 'Server Error' });
    }
});
```

Error Handling and Validation
Describe the error handling strategy and validation mechanisms:

- **Error Handling:** Centralized error handling using middleware.

```
app.post('/new-deposit', async (req, res) =>{
    const {depositName, customerId, customerName, nomineeName, nomineeAge, duration, amount, createdDate} = req.body
    try{
        const date = new Date(createdDate);

        const matureDate = date.getDate() + '-' + (date.getMonth() % 12) + '-' + (date.getFullYear() + Math.floor(duration/12) )
        const user = await User.findOne({_id: customerId});
        const newDeposit = new Deposits({
            depositName, customerId, customerName, nomineeName, nomineeAge, duration, amount, createdDate, matureDate
        });

        const transaction = new Transactions({
            senderId: customerId, senderName: customerName, deposit: depositName, amount, time: new Date(), remarks: "Deposit payment"
        })
        await transaction.save();

        const depo = await newDeposit.save();
        user.balance = user.balance - amount;
        await user.save();
        res.json({message: "deposit created"});
    }catch(err){
        res.status(500).json({message: "Error occured"});
    }
})
```

- **Validation:** Input validation using libraries like Json.

```
app.post('/send-money', async (req, res) =>{

    const {senderId, senderName, remarks, receiverId, receiverIFSC, amount, paymentMethod, time} = req.body;
    console.log(req.body);
    try{
        const sender = await User.findOne({_id: senderId});
        const receiver = await User.findOne({_id: receiverId});
        if(!receiver){
            return res.status(404).json({message: 'Receiver not exists'})
        }
        if(receiver.ifsc !== receiverIFSC){
            return res.status(500).json({message: 'Transaction failed'})
        }
        const receiverName = receiver.username;

        const transaction = new Transactions({
            senderId,
            senderName,
            receiverId,
            receiverIFSC,
            receiverName,
            amount,
            remarks,
            paymentMethod,
            time
        })

        const newTransaction = await transaction.save();

        sender.balance = parseFloat(sender.balance) - parseFloat(amount);
        receiver.balance = parseFloat(receiver.balance) + parseFloat(amount);

        await sender.save();
        await receiver.save();
```

Security Considerations
Outline the security measures implemented:

Password Hashing

- Uses bcrypt to hash passwords before storing them in the database, ensuring that passwords are not stored in plain text.

Input Validation and Error Handling

- Basic error handling for database queries and user input is implemented to ensure robustness and to prevent the application from crashing.

CORS

- Uses cors middleware to handle Cross-Origin Resource Sharing, which controls how resources are shared across different domains.

Environment Configuration

- The database connection string and other sensitive information should be stored in environment variables (e.g., using dotenv package) to avoid exposing them in the source code.

- **Authentication:** Secure authentication.

```
app.post('/login', async (req, res) => {
    const { email, usertype, password } = req.body;
    try {

      if (usertype === 'customer'){

            const user = await User.findOne({ email });

            if (!user) {
                return res.status(401).json({ message: 'Invalid email or password' });
            }
            const isMatch = await bcrypt.compare(password, user.password);
            if (!isMatch) {
                return res.status(401).json({ message: 'Invalid email or password' });
            } else{

                return res.json(user);
            }
      }else if (usertype === 'admin'){
            const user = await Bank.findOne({ email });

            if (!user) {
```

- **Data Encryption:** Encrypt sensitive data at rest and in transit.