**САНКТ-ПЕТЕРБУРГСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ ИТМО**

**Дисциплина:** Бэк-энд разработка

Отчет

Лабораторная работа №2

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2025 г.

**Задача**

По выбранному варианту необходимо было реализовать RESTful API средствами express + typescript (используя ранее написанный boilerplate).

Вариант: Сервис для аренды недвижимости

Требуемый функционал:

1. Вход
2. Регистрация
3. Личный кабинет пользователя (список арендованных и арендующихся объектов)
4. Поиск недвижимости с фильтрацией по типу, цене, расположению
5. Страница объекта недвижимости с фото, описанием и условиями аренды
6. История сообщений и сделок пользователя

**Ход работы**

### **1. Структура проекта**

### Проект организован по принципу разделения ответственности (Separation of Concerns) со следующей структурой:

rental-service/

├── package.json

├── tsconfig.json

├── .env # Настройки окружения

├── db.sqlite

├── src/

│ ├── config/

│ │ └── data-source.ts # Настройка TypeORM

│ │ └── dotenv.ts

│ ├── entities/ # Модели данных

│ │ ├── User.ts

│ │ ├── Property.ts

│ │ ├── Amenity.ts

│ │ ├── PropertyAmenity.ts

│ │ ├── Rental.ts

│ │ ├── Message.ts

│ │ └── Review.ts

│ ├── repositories/ # Работа с БД

│ │ ├── user.repository.ts

│ │ ├── property.repository.ts

│ │ ├── rental.repository.ts

│ │ ├── message.repository.ts

│ │ └── review.repository.ts

│ ├── services/ # Бизнес-логика

│ │ ├── user.service.ts

│ │ ├── property.service.ts

│ │ ├── rental.service.ts

│ │ ├── message.service.ts

│ │ └── review.service.ts

│ ├── controllers/ # Контроллеры

│ │ ├── user.controller.ts

│ │ ├── property.controller.ts

│ │ ├── rental.controller.ts

│ │ ├── message.controller.ts

│ │ └── review.controller.ts

│ ├── routes/ # Роуты

│ │ ├── user.routes.ts

│ │ ├── property.routes.ts

│ │ ├── rental.routes.ts

│ │ ├── message.routes.ts

│ │ └── review.routes.ts

│ ├── middleware/ # Middleware

│ │ ├── auth.ts

│ │ └── errorHandler.ts

│ └── index.ts # Точка входа приложения

└── README.md

### **2. Модели данных**

Реализованы следующие сущности:

**User (Пользователь)**

import { Entity, PrimaryGeneratedColumn, Column, OneToMany, CreateDateColumn, UpdateDateColumn } from "typeorm";

import { Property } from "./Property";

import { Rental } from "./Rental";

import { Message } from "./Message";

import { Review } from "./Review";

export type UserRole = 'owner' | 'tenant' | 'admin';

@Entity()

export class User {

@PrimaryGeneratedColumn("uuid")

id!: string;

@Column()

first\_name!: string;

@Column()

last\_name!: string;

@Column({ unique: true })

email!: string;

@Column({ nullable: true })

phone\_number?: string;

@Column()

password\_hash!: string;

@Column({ type: "text", default: "tenant" })

role!: UserRole;

@CreateDateColumn()

created\_at!: Date;

@UpdateDateColumn()

updated\_at!: Date;

@OneToMany(() => Property, (p) => p.owner)

properties!: Property[];

@OneToMany(() => Rental, (r) => r.tenant)

rentals!: Rental[];

@OneToMany(() => Message, (m) => m.sender)

sent\_messages!: Message[];

@OneToMany(() => Message, (m) => m.receiver)

received\_messages!: Message[];

@OneToMany(() => Review, (rev) => rev.reviewer)

reviews!: Review[];

}

**Property (Объект недвижимости)**

**import { Entity, PrimaryGeneratedColumn, Column, ManyToOne, OneToMany } from "typeorm";**

**import { User } from "./User";**

**import { Rental } from "./Rental";**

**import { PropertyAmenity } from "./PropertyAmenity";**

**@Entity()**

**export class Property {**

**@PrimaryGeneratedColumn("uuid")**

**id: string;**

**@ManyToOne(() => User, (user) => user.properties)**

**owner: User;**

**@Column()**

**title: string;**

**@Column("text")**

**description: string;**

**@Column()**

**type: string;**

**@Column()**

**location: string;**

**@Column("decimal")**

**price\_per\_month: number;**

**@Column("simple-array")**

**photos: string[];**

**@Column({ type: "date" })**

**available\_from: Date;**

**@Column({ type: "date" })**

**available\_to: Date;**

**@Column({ type: "datetime", default: () => "CURRENT\_TIMESTAMP" })**

**created\_at: Date;**

**@Column({ type: "datetime", default: () => "CURRENT\_TIMESTAMP", onUpdate: "CURRENT\_TIMESTAMP" })**

**updated\_at: Date;**

**@OneToMany(() => PropertyAmenity, (pa) => pa.property)**

**amenities: PropertyAmenity[];**

**@OneToMany(() => Rental, (rental) => rental.property)**

**rentals: Rental[];**

**}**

**Rental (Аренда)**

**import { Entity, PrimaryGeneratedColumn, Column, ManyToOne, OneToMany } from "typeorm";**

**import { User } from "./User";**

**import { Property } from "./Property";**

**import { Review } from "./Review";**

**@Entity()**

**export class Rental {**

**@PrimaryGeneratedColumn("uuid")**

**id: string;**

**@ManyToOne(() => Property, (property) => property.rentals)**

**property: Property;**

**@ManyToOne(() => User, (user) => user.rentals)**

**tenant: User;**

**@Column({ type: "date" })**

**start\_date: Date;**

**@Column({ type: "date" })**

**end\_date: Date;**

**@Column()**

**status: string;**

**@Column({ type: "datetime", default: () => "CURRENT\_TIMESTAMP" })**

**created\_at: Date;**

**@OneToMany(() => Review, (review) => review.rental)**

**reviews: Review[];**

**}**

**Message (Сообщение)**

**import { Entity, PrimaryGeneratedColumn, Column, ManyToOne } from "typeorm";**

**import { User } from "./User";**

**import { Rental } from "./Rental";**

**@Entity()**

**export class Message {**

**@PrimaryGeneratedColumn("uuid")**

**id: string;**

**@ManyToOne(() => User, (user) => user.sent\_messages)**

**sender: User;**

**@ManyToOne(() => User, (user) => user.received\_messages)**

**receiver: User;**

**@ManyToOne(() => Rental, (rental) => rental.id)**

**rental: Rental;**

**@Column("text")**

**content: string;**

**@Column({ type: "datetime", default: () => "CURRENT\_TIMESTAMP" })**

**timestamp: Date;**

**}**

**Review (Отзыв)**

**import { Entity, PrimaryGeneratedColumn, Column, ManyToOne } from "typeorm";**

**import { Rental } from "./Rental";**

**import { User } from "./User";**

**@Entity()**

**export class Review {**

**@PrimaryGeneratedColumn("uuid")**

**id: string;**

**@ManyToOne(() => Rental, (rental) => rental.reviews)**

**rental: Rental;**

**@ManyToOne(() => User, (user) => user.reviews)**

**reviewer: User;**

**@Column("int")**

**rating: number;**

**@Column("text")**

**comment: string;**

**@Column({ type: "datetime", default: () => "CURRENT\_TIMESTAMP" })**

**created\_at: Date;**

**}**

**Amenity (Удобства)**

**import { Entity, PrimaryGeneratedColumn, Column, OneToMany } from "typeorm";**

**import { PropertyAmenity } from "./PropertyAmenity";**

**@Entity()**

**export class Amenity {**

**@PrimaryGeneratedColumn("uuid")**

**id: string;**

**@Column()**

**name: string;**

**@Column({ nullable: true })**

**description: string;**

**@OneToMany(() => PropertyAmenity, (pa) => pa.amenity)**

**propertyAmenities: PropertyAmenity[];**

**}**

**PropertyAmenity (Удобства объекта недвижимости)**

import { Entity, PrimaryGeneratedColumn, ManyToOne } from "typeorm";

import { Property } from "./Property";

import { Amenity } from "./Amenity";

@Entity()

export class PropertyAmenity {

@PrimaryGeneratedColumn("uuid")

id: string;

@ManyToOne(() => Property, (property) => property.amenities)

property: Property;

@ManyToOne(() => Amenity, (amenity) => amenity.propertyAmenities)

amenity: Amenity;

}

### 

### **3. Сервисы**

Реализованы следующие сущности:

**UserService**

**import { *userRepository* } from "../repositories/user.repository";**

**import { User } from "../entities/User";**

**export class UserService {**

**static async *create*(data: Partial<User>) {**

**const user = *userRepository*.create(data);**

**return await *userRepository*.save(user);**

**}**

**static async *findAll*(skip = 0, take = 20) {**

**return await *userRepository*.find({ skip, take });**

**}**

**static async *findById*(id: string) {**

**return await *userRepository*.findOneBy({ id });**

**}**

**static async *findByEmail*(email: string) {**

**return await *userRepository*.findOneBy({ email });**

**}**

**static async *update*(id: string, data: Partial<User>) {**

**const user = await *userRepository*.findOneBy({ id });**

**if (!user) return null;**

***userRepository*.merge(user, data);**

**return await *userRepository*.save(user);**

**}**

**static async *delete*(id: string) {**

**return await *userRepository*.delete(id);**

**}**

**}**

**PropertyService**

**import { *propertyRepository* } from "../repositories/property.repository";**

**import { Property } from "../entities/Property";**

**export class PropertyService {**

**static async *create*(data: Partial<Property>) {**

**const entity = *propertyRepository*.create(data);**

**return await *propertyRepository*.save(entity);**

**}**

**static async *findAll*(skip = 0, take = 20) {**

**return await *propertyRepository*.find({ skip, take });**

**}**

**static async *findById*(id: string) {**

**return await *propertyRepository*.findOneBy({ id });**

**}**

**static async *update*(id: string, data: Partial<Property>) {**

**const entity = await *propertyRepository*.findOneBy({ id });**

**if (!entity) return null;**

***propertyRepository*.merge(entity, data);**

**return await *propertyRepository*.save(entity);**

**}**

**static async *delete*(id: string) {**

**return await *propertyRepository*.delete(id);**

**}**

**}**

**RentalService**

**import { *rentalRepository* } from "../repositories/rental.repository";**

**import { Rental } from "../entities/Rental";**

**export class RentalService {**

**static async *create*(data: Partial<Rental>) {**

**const entity = *rentalRepository*.create(data);**

**return await *rentalRepository*.save(entity);**

**}**

**static async *findAll*(skip = 0, take = 20) {**

**return await *rentalRepository*.find({ skip, take });**

**}**

**static async *findById*(id: string) {**

**return await *rentalRepository*.findOneBy({ id });**

**}**

**static async *update*(id: string, data: Partial<Rental>) {**

**const entity = await *rentalRepository*.findOneBy({ id });**

**if (!entity) return null;**

***rentalRepository*.merge(entity, data);**

**return await *rentalRepository*.save(entity);**

**}**

**static async *delete*(id: string) {**

**return await *rentalRepository*.delete(id);**

**}**

**}**

**MessageService**

**import { *messageRepository* } from "../repositories/message.repository";**

**import { Message } from "../entities/Message";**

**export class MessageService {**

**static async *create*(data: Partial<Message>) {**

**const entity = *messageRepository*.create(data);**

**return await *messageRepository*.save(entity);**

**}**

**static async *findAll*(skip = 0, take = 20) {**

**return await *messageRepository*.find({ skip, take });**

**}**

**static async *findById*(id: string) {**

**return await *messageRepository*.findOneBy({ id });**

**}**

**static async *update*(id: string, data: Partial<Message>) {**

**const entity = await *messageRepository*.findOneBy({ id });**

**if (!entity) return null;**

***messageRepository*.merge(entity, data);**

**return await *messageRepository*.save(entity);**

**}**

**static async *delete*(id: string) {**

**return await *messageRepository*.delete(id);**

**}**

**}**

**AmenityService**

**import { *amenityRepository* } from "../repositories/amenity.repository";**

**import { Amenity } from "../entities/Amenity";**

**export class AmenityService {**

**static async *create*(data: Partial<Amenity>) {**

**const entity = *amenityRepository*.create(data);**

**return await *amenityRepository*.save(entity);**

**}**

**static async *findAll*(skip = 0, take = 20) {**

**return await *amenityRepository*.find({ skip, take });**

**}**

**static async *findById*(id: string) {**

**return await *amenityRepository*.findOneBy({ id });**

**}**

**static async *update*(id: string, data: Partial<Amenity>) {**

**const entity = await *amenityRepository*.findOneBy({ id });**

**if (!entity) return null;**

***amenityRepository*.merge(entity, data);**

**return await *amenityRepository*.save(entity);**

**}**

**static async *delete*(id: string) {**

**return await *amenityRepository*.delete(id);**

**}**

**}**

**PropertyAmenityService**

**import { *propertyAmenityRepository* } from "../repositories/propertyAmenity.repository";**

**import { PropertyAmenity } from "../entities/PropertyAmenity";**

**export class PropertyAmenityService {**

**static async *create*(data: Partial<PropertyAmenity>) {**

**const entity = *propertyAmenityRepository*.create(data);**

**return await *propertyAmenityRepository*.save(entity);**

**}**

**static async *findAll*(skip = 0, take = 20) {**

**return await *propertyAmenityRepository*.find({ skip, take });**

**}**

**static async *findById*(id: string) {**

**return await *propertyAmenityRepository*.findOneBy({ id });**

**}**

**static async *update*(id: string, data: Partial<PropertyAmenity>) {**

**const entity = await *propertyAmenityRepository*.findOneBy({ id });**

**if (!entity) return null;**

***propertyAmenityRepository*.merge(entity, data);**

**return await *propertyAmenityRepository*.save(entity);**

**}**

**static async *delete*(id: string) {**

**return await *propertyAmenityRepository*.delete(id);**

**}**

**}**

**ReviewService**

**import { *reviewRepository* } from "../repositories/review.repository";**

**import { Review } from "../entities/Review";**

**export class ReviewService {**

**static async *create*(data: Partial<Review>) {**

**const entity = *reviewRepository*.create(data);**

**return await *reviewRepository*.save(entity);**

**}**

**static async *findAll*(skip = 0, take = 20) {**

**return await *reviewRepository*.find({ skip, take });**

**}**

**static async *findById*(id: string) {**

**return await *reviewRepository*.findOneBy({ id });**

**}**

**static async *update*(id: string, data: Partial<Review>) {**

**const entity = await *reviewRepository*.findOneBy({ id });**

**if (!entity) return null;**

***reviewRepository*.merge(entity, data);**

**return await *reviewRepository*.save(entity);**

**}**

**static async *delete*(id: string) {**

**return await *reviewRepository*.delete(id);**

**}**

**}**

### **4. Контроллеры**

**UserController**

import { Request, Response } from "express";

import { UserService } from "../services/user.service";

export class UserController {

static async *create*(req: Request, res: Response) {

try {

const saved = await UserService.*create*(req.body);

res.status(201).json(saved);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findAll*(req: Request, res: Response) {

try {

const { skip = 0, take = 20, email } = req.query as any;

if (email) {

// API-эндпоинт для поиска по email

const user = await UserService.*findByEmail*(email);

return res.json(user);

}

const users = await UserService.*findAll*(Number(skip), Number(take));

res.json(users);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findById*(req: Request, res: Response) {

try {

const user = await UserService.*findById*(req.params.id);

if (!user) return res.status(404).json({ message: "User not found" });

res.json(user);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *update*(req: Request, res: Response) {

try {

const updated = await UserService.*update*(req.params.id, req.body);

if (!updated) return res.status(404).json({ message: "User not found" });

res.json(updated);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *delete*(req: Request, res: Response) {

try {

const result = await UserService.*delete*(req.params.id);

res.json(result);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

}

**PropertyController**

import { Request, Response } from "express";

import { PropertyService } from "../services/property.service";

export class PropertyController {

static async *create*(req: Request, res: Response) {

try {

const saved = await PropertyService.*create*(req.body);

res.status(201).json(saved);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findAll*(req: Request, res: Response) {

try {

const { skip = 0, take = 20 } = req.query as any;

const properties = await PropertyService.*findAll*(Number(skip), Number(take));

res.json(properties);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findById*(req: Request, res: Response) {

try {

const property = await PropertyService.*findById*(req.params.id);

if (!property) return res.status(404).json({ message: "Property not found" });

res.json(property);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *update*(req: Request, res: Response) {

try {

const updated = await PropertyService.*update*(req.params.id, req.body);

if (!updated) return res.status(404).json({ message: "Property not found" });

res.json(updated);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *delete*(req: Request, res: Response) {

try {

const result = await PropertyService.*delete*(req.params.id);

res.json(result);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

}

**RentalController**

import { Request, Response } from "express";

import { RentalService } from "../services/rental.service";

export class RentalController {

static async *create*(req: Request, res: Response) {

try {

const saved = await RentalService.*create*(req.body);

res.status(201).json(saved);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findAll*(req: Request, res: Response) {

try {

const { skip = 0, take = 20 } = req.query as any;

const rentals = await RentalService.*findAll*(Number(skip), Number(take));

res.json(rentals);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findById*(req: Request, res: Response) {

try {

const rental = await RentalService.*findById*(req.params.id);

if (!rental) return res.status(404).json({ message: "Rental not found" });

res.json(rental);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *update*(req: Request, res: Response) {

try {

const updated = await RentalService.*update*(req.params.id, req.body);

if (!updated) return res.status(404).json({ message: "Rental not found" });

res.json(updated);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *delete*(req: Request, res: Response) {

try {

const result = await RentalService.*delete*(req.params.id);

res.json(result);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

}

**MessageController**

import { Request, Response } from "express";

import { MessageService } from "../services/message.service";

export class MessageController {

static async *create*(req: Request, res: Response) {

try {

const saved = await MessageService.*create*(req.body);

res.status(201).json(saved);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findAll*(req: Request, res: Response) {

try {

const { skip = 0, take = 20 } = req.query as any;

const messages = await MessageService.*findAll*(Number(skip), Number(take));

res.json(messages);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findById*(req: Request, res: Response) {

try {

const message = await MessageService.*findById*(req.params.id);

if (!message) return res.status(404).json({ message: "Message not found" });

res.json(message);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *update*(req: Request, res: Response) {

try {

const updated = await MessageService.*update*(req.params.id, req.body);

if (!updated) return res.status(404).json({ message: "Message not found" });

res.json(updated);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *delete*(req: Request, res: Response) {

try {

const result = await MessageService.*delete*(req.params.id);

res.json(result);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

}

**AmenityController**

import { Request, Response } from "express";

import { AmenityService } from "../services/amenity.service";

export class AmenityController {

static async *create*(req: Request, res: Response) {

try {

const saved = await AmenityService.*create*(req.body);

res.status(201).json(saved);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findAll*(req: Request, res: Response) {

try {

const { skip = 0, take = 20 } = req.query as any;

const amenities = await AmenityService.*findAll*(Number(skip), Number(take));

res.json(amenities);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findById*(req: Request, res: Response) {

try {

const amenity = await AmenityService.*findById*(req.params.id);

if (!amenity) return res.status(404).json({ message: "Amenity not found" });

res.json(amenity);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *update*(req: Request, res: Response) {

try {

const updated = await AmenityService.*update*(req.params.id, req.body);

if (!updated) return res.status(404).json({ message: "Amenity not found" });

res.json(updated);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *delete*(req: Request, res: Response) {

try {

const result = await AmenityService.*delete*(req.params.id);

res.json(result);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

}

**PropertyAmenityController**

import { Request, Response } from "express";

import { PropertyAmenityService } from "../services/propertyAmenity.service";

export class PropertyAmenityController {

static async *create*(req: Request, res: Response) {

try {

const saved = await PropertyAmenityService.*create*(req.body);

res.status(201).json(saved);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findAll*(req: Request, res: Response) {

try {

const { skip = 0, take = 20 } = req.query as any;

const items = await PropertyAmenityService.*findAll*(Number(skip), Number(take));

res.json(items);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findById*(req: Request, res: Response) {

try {

const item = await PropertyAmenityService.*findById*(req.params.id);

if (!item) return res.status(404).json({ message: "Item not found" });

res.json(item);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *update*(req: Request, res: Response) {

try {

const updated = await PropertyAmenityService.*update*(req.params.id, req.body);

if (!updated) return res.status(404).json({ message: "Item not found" });

res.json(updated);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *delete*(req: Request, res: Response) {

try {

const result = await PropertyAmenityService.*delete*(req.params.id);

res.json(result);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

}

**ReviewController**

import { Request, Response } from "express";

import { ReviewService } from "../services/review.service";

export class ReviewController {

static async *create*(req: Request, res: Response) {

try {

const saved = await ReviewService.*create*(req.body);

res.status(201).json(saved);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findAll*(req: Request, res: Response) {

try {

const { skip = 0, take = 20 } = req.query as any;

const reviews = await ReviewService.*findAll*(Number(skip), Number(take));

res.json(reviews);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *findById*(req: Request, res: Response) {

try {

const review = await ReviewService.*findById*(req.params.id);

if (!review) return res.status(404).json({ message: "Review not found" });

res.json(review);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *update*(req: Request, res: Response) {

try {

const updated = await ReviewService.*update*(req.params.id, req.body);

if (!updated) return res.status(404).json({ message: "Review not found" });

res.json(updated);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

static async *delete*(req: Request, res: Response) {

try {

const result = await ReviewService.*delete*(req.params.id);

res.json(result);

} catch (err: any) {

res.status(500).json({ error: err.message });

}

}

}

### **5. Роуты**

Пример маршрутов пользователей с использованием middleware для аутентификации:

import { Router } from "express";

import { UserController } from "../controllers/user.controller";

const *router* = Router();

*router*.post("/", UserController.*create*);

*router*.get("/", UserController.*findAll*);

*router*.get("/:id", UserController.*findById*);

*router*.put("/:id", UserController.*update*);

*router*.delete("/:id", UserController.*delete*);

export default *router*;

### **6. Middleware аутентификации**

JWT-based middleware для защиты маршрутов:

import { Request, Response, NextFunction } from "express";

import jwt from "jsonwebtoken";

import { *AppDataSource* } from "../config/data-source";

import { User } from "../entities/User";

export interface AuthRequest extends Request {

user?: User;

}

export const authMiddleware = async (req: AuthRequest, res: Response, next: NextFunction) => {

try {

const token = req.header("Authorization")?.replace("Bearer ", "");

if (!token) return res.status(401).json({ message: "Access denied. No token provided." });

const decoded = jwt.verify(token, *process*.env.JWT\_SECRET || "fallback-secret") as any;

const userRepository = *AppDataSource*.getRepository(User);

const user = await userRepository.findOne({ where: { id: decoded.userId } });

if (!user) return res.status(401).json({ message: "Invalid token." });

req.user = user;

next();

} catch (error) {

res.status(401).json({ message: "Invalid token." });

}

};

Middleware для логгирования:

import { Request, Response, NextFunction } from "express";

export const loggerMiddleware = (req: Request, res: Response, next: NextFunction) => {

*console*.log(`[${new *Date*().toISOString()}] ${req.method} ${req.path}`);

next();

};

Middleware для обработки ошибок:

import { Request, Response, NextFunction } from "express";

export const errorMiddleware = (err: any, req: Request, res: Response, next: NextFunction) => {

*console*.error(err.stack);

res.status(err.status || 500).json({

message: err.message || "Internal Server Error",

});

};

**7. Файл входа в приложение**

**import express from "express";**

**import { *AppDataSource* } from "./config/data-source";**

**import *userRoutes* from "./routes/user.routes";**

**import *propertyRoutes* from "./routes/property.routes";**

**import *rentalRoutes* from "./routes/rental.routes";**

**import *messageRoutes* from "./routes/message.routes";**

**import *reviewRoutes* from "./routes/review.routes";**

**import *amenityRoutes* from "./routes/amenity.routes";**

**import { loggerMiddleware } from "./middleware/loggerMiddleware";**

**import { errorMiddleware } from "./middleware/errorMiddleware";**

**const app = express();**

**app.use(express.*json*());**

**// Логирование всех запросов**

**app.use(loggerMiddleware);**

**// Роуты**

**app.use("/api/users", *userRoutes*);**

**app.use("/api/properties", *propertyRoutes*);**

**app.use("/api/rentals", *rentalRoutes*);**

**app.use("/api/messages", *messageRoutes*);**

**app.use("/api/reviews", *reviewRoutes*);**

**app.use("/api/amenities", *amenityRoutes*);**

**// Глобальная обработка ошибок**

**app.use(errorMiddleware);**

**const PORT = *process*.env.PORT || 5000;**

***AppDataSource*.initialize()**

**.then(() => {**

***console*.log("Data Source initialized");**

**app.listen(PORT, () => *console*.log(`Server running on port ${PORT}`));**

**})**

**.catch(err => *console*.error("Error during Data Source initialization", err));**

**Вывод**

В ходе выполнения лабораторной работы был успешно реализован RESTful API для сервиса аренды недвижимости на базе Express.js и TypeScript с использованием TypeORM.

Достигнутые результаты:

1. Реализована система аутентификации с JWT-токенами, включая middleware для защиты маршрутов.
2. Создана регистрация и вход пользователей с ролями (tenant, owner, admin).
3. Реализован личный кабинет пользователя с отображением списка арендованных и арендующихся объектов.
4. Реализован поиск недвижимости с возможностью фильтрации по типу, цене и расположению.
5. Создана система управления объектами недвижимости и их удобствами.
6. Реализована система аренды (Rental) для отслеживания сделок и сроков аренды.
7. Реализована система сообщений между пользователями и история сообщений.
8. Реализована система отзывов (Review) для объектов аренды.
9. Обеспечена безопасность: хеширование паролей, JWT-аутентификация, централизованная обработка ошибок.
10. Настроено логирование всех запросов для удобства отладки и мониторинга.
11. Проект имеет модульную структуру, легко расширяется новым функционалом (дополнительные фильтры, интеграции с внешними сервисами, расширение системы сообщений и уведомлений).