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«Київський політехнічний інститут імені Ігоря Сікорського»
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Лабораторна робота № 9

з дисципліни «Інженерія програмного забезпечення» на тему:
Проєктування та реалізація програмного продукту з використанням архітектурної моделі “Клієнт-Сервер”

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Проєктування та реалізація програмного продукту з використанням архітектурної моделі «Клієнт-Сервер»

Мета: Вивчити реалізацію та специфіку використання архітектури «клієнт-сервер». Спроєктувати програмну систему (або її частину), архітектура якої відповідала б програмній моделі «Клієнт-Сервер».

<u>Завдання</u>

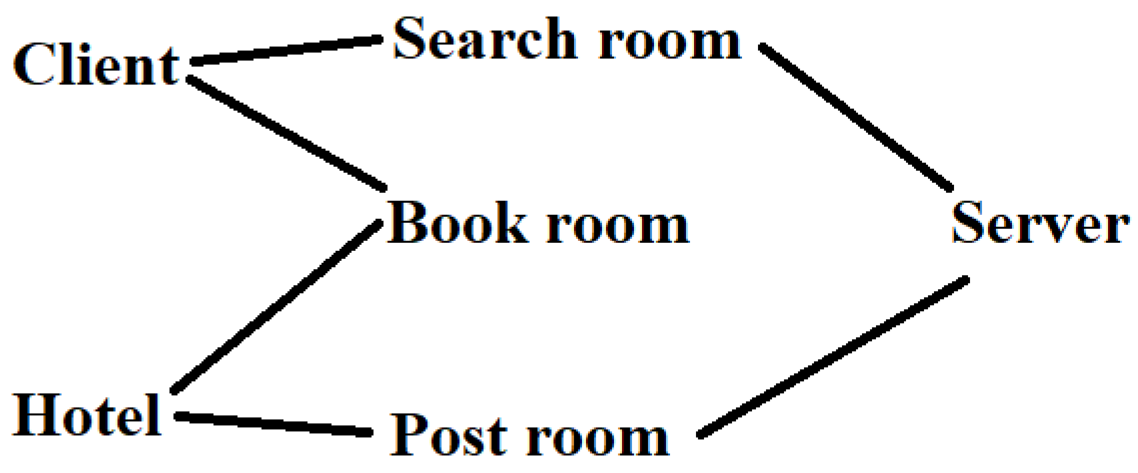
1. Опрацювати теоретичний матеріал (леції 16-19). Ознайомитись зі специфікою архітектурної моделі «Клієнт-Сервер».
2. Розробити та описати схему варіантів використання програмної системи. Опишіть основні функціональні можливості системи.
3. Спроєктувати ієрархію класів: основні сутності, сервіси для роботи із сутностями, серверні класи для обробки запитів від клієнта, клієнтські класи.
4. Реалізувати серверну частину (механізм обробки клієнтських запитів), використовуючи Java з бібліотекою Java Servlets або Spring Boot (або інший веб-фреймворк). Сервер обробляє HTTP-запити від клієнтів і надсилає відповіді. Організуйте зберігання даних у файлах або базі даних.
5. Розробити клієнтську частину. Веб-інтерфейс, реалізований за допомогою HTML/CSS/JavaScript, який надсилає запити до сервера для отримання, додавання, редагування даних.
6. Написати коментарі до коду (до всіх класів, методів і основних блоків коду).

Номер варіанту — 3208 % 6 = 4

4. ***Система он-лайн бронювання готелів***

   Розробити систему, яка дозволить користувачам шукати готелі за різними критеріями та здійснювати онлайн-бронювання номерів через веб-сайт. Серверна частина системи може включати базу даних або файлами, куди зберігається інформація про готелі та вільні номери, а також логіку обробки запитів користувачів і обробки платежів.

Схема варіантів використання:



Роздруківка коду:

Main.java

```
package work9;


import org.springframework.boot.SpringApplication;

import org.springframework.boot.autoconfigure.SpringBootApplication;


@SpringBootApplication


/**

 *  The class that contains the entry point of the program

 */

public class Main {


    /**

     *  The entry point of the program that initializes the Spring Boot application
     *  @param args THe arguments of the program
     */
    public static void main(String[] args) {
        SpringApplication.run(Main.class, args);
    }

}
```

HotelRoom.java

```
package work9;

/**
 *  A class that describes a hotel room
 */
public class HotelRoom {

    /**
     *  The internal id of the room
     */
    public int id;

    /**
     *  Id setter
     */
    public void setId(int id) { this.id = id; }

    /**
     *  Id getter
     */
    public int getId() { return this.id; }



    /**
     *  The name of the hotel
     */
    public String hotelName;

    /**
     *  hotelname setter
     */
    public void setHotelName(String hotelName) { this.hotelName = hotelName; }

    /**
     *  hotelName getter
     */
    public String getHotelName() { return hotelName; }



    /**
     *  The city where the room is located at
     */
    public String city;

    /**
     *  city setter
     */
    public void setCity(String city) { this.city = city; }

    /**
     *  city getter
     */
    public String getCity() { return city; }



    /**
     *  The amout of stars the room has
     */
    public int stars;

    /**
     *  stars setter
     */
    public void setStars(int stars) { this.stars = stars; }

    /**
     *  stars getter
     */
    public int getStars() { return stars; }



    /**
     *  The price for the room
     */
    public int price;

    /**
     *  price setter
     */
    public void setPrice(int price) { this.price = price; }

    /**
     *  price getter
     */
    public int getPrice() { return price; }



    /**
     *  Whether the room has already been booked
     */
    public boolean isBooked;

    /**
     *  isBooked setter
     */
    public void setIsBooked(boolean isBooked) { this.isBooked = isBooked; }

    /**
     *  isBooked getter
     */
```

```
    public boolean getIsBooked() { return this.isBooked; }



    /**
     *  The number of the room in the hotel
     */
    public int roomNumber;

    /**
     *  roomNumber setter
     */
    public void setRoomNumber(int roomNumber) { this.roomNumber = roomNumber; }

    /**
     *  roomNumber getter
     */
    public int getRoomNumber() { return roomNumber; }

}
```

Filter.java

```
package work9;

/**
 *  A class that describes a filter that checks whether a hotel room passes the requirements
 */
public abstract class Filter {
```

```
/**
 *  The next filter in the chain
 */
private Filter next;

/**
 *  A method that combines two filters
 *  @param f The next filter
 *  @return The filter you passed to the method
 */
public Filter then(Filter f) { next = f; return next; }

/**
 *  A method to check whether the hotelroom passes the whole chain of the filters
 *  @param room The room to be checked
 *  @return True if the room passes
 */
public boolean filter(HotelRoom room) {
    return check(room) && (next == null || next.filter(room));
}

/**
 *  The method that checks whether the room passes this specific filter
 *  @param room The room to be checked
 *  @return True if the room passes
 */
public abstract boolean check(HotelRoom room);
```

```
}
```

FilterAlways.java

```
package work9;

/**
 *  A filter that always passes
 */
public class FilterAlways extends Filter {

    /**
     *  A filter that always passes the room
     *  @param room The room in question
     *  @return Always true
     */
    public boolean check(HotelRoom room) { return true; }

}
```

FilterCity.java

```
package work9;

/**
 *  A filter that filters the rooms based on their city
 */
public class FilterCity extends Filter {

    /**
```

```
     *  The city to be checked against
     */
    private String city;

    /**
     *  The constructor for the city filter
     *  @param city The city of the filter
     */
    public FilterCity(String city) {
        this.city = city;
    }

    /**
     *  The method that checks whether the room's city fits
     *  @param room The room to be checked
     *  @return True if the city of the room is the same as filter's
     */
    public boolean check(HotelRoom room) {
        return room.city.equals(city);
    }

}
```

FilterId.java

```
package work9;

/**
 *  A filter that checks whether the ids are the same
 */
public class FilterId extends Filter {

    /**
     *  The id to be compared to
     */
    private int id;

    /**
     *  A constructor for the id filter
     *  @param id The id
     */
    public FilterId(int id) {
        this.id = id;
    }

    /**
     *  The method that checks whether the ids are the same
     *  @param room The room to be checked
     *  @return True if the room id is the same
     */
    public boolean check(HotelRoom room) {
        return room.id == id;
    }

}
```

<u>FilterIsBooked.java</u>

```
package work9;

/**
 *  The filter that checks the status of room being booked
 */
public class FilterIsBooked extends Filter {

    /**
     *  The required status
     */
    private boolean isBooked;

    /**
     *  A constructor for the filter
     *  @param isBooked The asked status
     */
    public FilterIsBooked(boolean isBooked) {
        this.isBooked = isBooked;
    }

    /**
     *  The method that checks whether the room passes the test
     *  @param room The room to be checked
     *  @return True if room's booked status is the same
     */
    public boolean check(HotelRoom room) {
        return room.isBooked == this.isBooked;
    }

}
```

FilterPrice.java

```
package work9;

/**
 *  The filter that checks whether the price fits in range
 */
public class FilterPrice extends Filter {

    /**
     *  The minimum allowed price
     */
    private int minPrice;

    /**
     *  The maximum allowed price
     */
    private int maxPrice;

    /**
     *  The constructor for the filter
     *  @param minPrice The min price
     *  @param maxPrice The max price
     */
    public FilterPrice(int minPrice, int maxPrice) {
        this.minPrice = minPrice;

        this.maxPrice = maxPrice;

    }


    /**

     *  The method that checks whether the room passes the price requirements

     *  @param room The room to be checked

     *  @return True if room's price fits the specified range

     */

    public boolean check(HotelRoom room) {

        return room.price >= minPrice && room.price <= maxPrice;

    }


}
```

FilterStars.java

```
package work9;


/**

 *  The filter that checks whether the room fits the range of stars

 */

public class FilterStars extends Filter {


    /**

     *  The minimum allowed amount of stars

     */

    private int minStars;
    /**
     *  The maximum allowed amount of stars
     */
    private int maxStars;

    /**
     *  The cosntructor for the filter
     *  @param minStars The min stars
     *  @param maxStars The max stars
     */
    public FilterStars(int minStars, int maxStars) {
        this.minStars = minStars;
        this.maxStars = maxStars;
    }

    /**
     *  The method that checks whether the room fits the stars requirement
     *  @param room The room
     *  @return True if room's star amount fits the specified range
     */
    public boolean check(HotelRoom room) {
        return room.stars >= minStars && room.stars <= maxStars;
    }

}
```

Iterator.java

```
package work9;
```

```
import java.util.List;
import java.util.ArrayList;

/**
 *  The class that describes the way to iterate over the hotel rooms
 */
public abstract class Iterator {

    /**
     *  The internal list
     */
    protected List<HotelRoom> list;

    /**
     *  The method to get the next room
     *  @return The next room
     */
    public abstract HotelRoom next();

    /**
     *  The method to check whether there is a next room
     *  @return True if there is next
     */
    public abstract boolean hasNext();
    /**
     *  The method that gets n or less next items
     *  @param n The max amount to get
     *  @return A list of at most n rooms
     */
    public List<HotelRoom> nextn(int n) {
        List<HotelRoom> result = new ArrayList<>();
        while(hasNext() && (n--) > 0) { result.add(next()); }
        return result;
    }

    /**
     *  The method to skip next n items
     *  @param n The amount of items to skip
     */
    public void skipn(int n) {
        nextn(n);
    }
}
```

<u>IteratorPrice.java</u>

```
package work9;

import java.util.List;
import java.util.Collections;

/**
 *  The class that describes an iterator that goes from lowest price to highest
 */
public class IteratorPrice extends Iterator {

    /**
     *  The current index of the iterator
     */
    private int index;

    /**
     *  The constructor that orders rooms to increase price
     *  @param list The list of data
     */
    public IteratorPrice(List<HotelRoom> list) {
        Collections.sort(list, (a, b) -> Integer.compare(a.price, b.price));
        this.list = list;
    }

    /**
     *  Checks whether there is a next room
     *  @return True if there is
     */
    public boolean hasNext() { return index < list.size(); }

    /**
     *  Returns the next room is there is one
     *  @return The next item
     */
    public HotelRoom next() { return list.get(index++); }

}
```

IteratorStars.java

```
package work9;

import java.util.List;
import java.util.Collections;

/**
 *  The iterator that orders the rooms from highest stars to lowest
 */
public class IteratorStars extends Iterator {

    /**
     *  The internal index
     */
    private int index;

    /**
     *  The constructor for the iterator that orders rooms as stars decrease
     *  @param list The list of data
     */
    public IteratorStars(List<HotelRoom> list) {
        Collections.sort(list, (a, b) -> Integer.compare(b.stars, a.stars)); // descending
        this.list = list;
    }
    /**
     *  The method that checks if there is a next item
     *  @return True if yes
     */
    public boolean hasNext() { return index < list.size(); }

    /**
     *  The method that returns the next item
     *  @return The next item
     */
    public HotelRoom next() { return list.get(index++); }

}
```

VeryCoolController.java

```
package work9;

import java.util.List;
import java.util.ArrayList;
import org.springframework.stereotype.Controller;
import org.springframework.ui.Model;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.PostMapping;
import org.springframework.web.bind.annotation.RequestParam;
import org.springframework.web.bind.annotation.ModelAttribute;
import java.util.Random;
```

```
@Controller

/**
 *  The class that routes the requests
 */
public class VeryCoolController {

    /**
     *  The amount of rooms that you can see per page
     */
    private static final int pageSize = 10;

            @GetMapping("/search")
    /**
     *  A method that routes the request to the search page, does the search idk i dont care
     *  @param minStars Min stars
     *  @param maxStars Max stars
     *  @param minPrice Min price
     *  @param maxPrice Max price
     *  @param city City
     *  @param id Id (if specified ignore everything else)
     *  @param page Page (skip page*pageSize items)
     *  @param order The way to order
     *  @param model Model
     */
            public String search(
        @RequestParam(name="minStars", required=false, defaultValue="0") int minStars,
        @RequestParam(name="maxStars", required=false, defaultValue="9999999") int maxStars,
        @RequestParam(name="minPrice", required=false, defaultValue="0") int minPrice,
        @RequestParam(name="maxPrice", required=false, defaultValue="9999999") int maxPrice,
        @RequestParam(name="city", required=false, defaultValue="") String city,
        @RequestParam(name="id", required=false, defaultValue="-1") int id,

        @RequestParam(name="page", required=false, defaultValue="0") int page,
        @RequestParam(name="order", required=false, defaultValue="stars") String order,

        Model model
    ) {

        Filter f = new FilterAlways();
        Filter filter = f;

        filter = filter.then(new FilterIsBooked(false));
        filter = filter.then(new FilterStars(minStars, maxStars));
        filter = filter.then(new FilterPrice(minPrice, maxPrice));

        if(city.length() != 0) filter = filter.then(new FilterCity(city));
        if(id != -1) filter = filter.then(new FilterId(id));

        Database db = Database.get();
        List<HotelRoom> result = db.getFiltered(f);
        Iterator iterator;

            if(order.equals("stars"))       iterator = new IteratorStars(result);
            else if(order.equals("price"))   iterator = new IteratorPrice(result);

            else                        iterator = new IteratorStars(result);

            iterator.skipn(pageSize * page);
            List<HotelRoom> rooms = iterator.nextn(pageSize);

            String component = "<div class=\"listRoom\"><a href=\"/room?id=%d\"><h2>Hotel %s at
    city %s</h2></a>   <p>★ %d</p>   <p>$ %d</p></div>";
            String roomComponents = "";

            for(HotelRoom room : rooms) {
                roomComponents += String.format(component, room.id, room.hotelName, room.city,
    room.stars, room.price);
            }

            model.addAttribute("rooms", roomComponents);
                    return "search";
                }

                @GetMapping("/room")
        /**
         *  The route to check the details of the room
         *  @param id The room id
         *  @param model Model
         */
                public String room(
            @RequestParam(name="id", required=false, defaultValue="0") int id,
        Model model
    ) {
        if(id == 0) return "index"; // TODO: error

        Filter filter = new FilterId(id);

        Database db = Database.get();
        List<HotelRoom> result = db.getFiltered(filter);
        if(result.size() <= 0) {
            return "index"; // TODO: error?
        }

        HotelRoom room = result.get(0);

        model.addAttribute("number", room.roomNumber);

        model.addAttribute("stars", room.stars);
        model.addAttribute("price", room.price);

        model.addAttribute("city", room.city);
        model.addAttribute("hotelName", room.hotelName);

                    return "room";
            }

            @GetMapping("/book")
    /**
```

```
 *  A route that books the room and redirects you to home page
 *  @param id The id of the room to book
 *  @param model Model
 */
    public String book(
  @RequestParam(name="id", required=false, defaultValue="0") int id,
  Model model
) {
  if(id == 0) return "index"; // TODO: error

  Filter filter = new FilterId(id);

  Database db = Database.get();
  List<HotelRoom> result = db.getFiltered(filter);
  if(result.size() <= 0) {
    return "index"; // TODO: error?
  }

  HotelRoom room = result.get(0);

  if(room.isBooked) return "index";

  // NOTE: contact the hotel here
  room.isBooked = true;
  db.saveDatabase();

          return "index";
```

```
        }


        @GetMapping("/posthotel")
    /**
     *  A route to the form to post your room
     *  @param model Model
     */
        public String postHotelGet(Model model) {
      model.addAttribute("hotelRoom", new HotelRoom());
          return "posthotel";
        }


        @PostMapping("/posthotel")
    /**
     *  A route to post your room to the database
     *  @param hotelRoom The room to be posted
     *  @param model Model
     */
        public String postHotelSubmit(@ModelAttribute HotelRoom hotelRoom, Model model)
{
      Database db = Database.get();
      hotelRoom.isBooked = false;
      db.addRoom(hotelRoom);
              return "index";
        }


        @GetMapping("/home")
    /**
     *  The route to the home page
     */
        public String home() {
                return "index";
        }

    @GetMapping("/DEBUG_POPULATE")
    /**
     *  The debug route to generate some data
     */
    public String debugGenerate() {
      Random rng = new Random();

        Database db = Database.get();
        String[] hotelWords = { "Aboba", "Kamaz", "Pivo", "Chupa", "Zebra", "Kaban", "Cool",
"Amogus", "Guga", "Krab", "Cabra", "Kavun", "Zhizha" };
        String[] cities = { "Kyiv", "New York", "Odessa", "Tokyo", "Beijing", "Berlin", "Rome",
"Madrid", "Chernobyl", "Kabanograd", "Aboba town" };
        for(int hotel = 0; hotel < 30; hotel++) {
            String word1 = hotelWords[rng.nextInt(hotelWords.length)];
            String word2 = hotelWords[rng.nextInt(hotelWords.length)];
            String hotelName = word1 + word2;

            int amountOfRooms = rng.nextInt(5) + 5;
            int maxStars = rng.nextInt(3) + 6;
            int priceMultiplier = rng.nextInt(3) + 10;
            int roomOffset = rng.nextInt(30) + 30;
            for(int roomIndex = 0; roomIndex < amountOfRooms; roomIndex++) {
                HotelRoom room = new HotelRoom();
                room.hotelName = hotelName;
                room.city = cities[rng.nextInt(cities.length)];
                room.stars = rng.nextInt(maxStars) + 1;
                room.price = (rng.nextInt(4) + 20) * priceMultiplier;
                room.isBooked = false;
                room.roomNumber = roomOffset++;
                db.addRoom(room);
            }
        }

        return "index";
    }

}
```

Database.java

```
package work9;

import com.google.gson.*;
import java.util.List;
import java.util.Arrays;
import java.util.ArrayList;
import org.apache.commons.io.FileUtils;
import java.io.File;
import java.lang.Exception;
import java.nio.charset.Charset;
import java.util.Random;

/**
 *  A class that decribes a database stored in a file
 */
public class Database {

    /**
     *  A random number generator for internal use
     */
    private static Random random;

    /**
     *  A singleton instance of the database
     */
    private static Database instance;

    /**
     *  A private constructor to ensure the singleton
     */
    private Database() {}

    /**
     *  The path where the database is stored
     */
    private static final String databasePath = "database.json";
```

```
/**
 *  A method to get (or load) the database
 *  @return The database
 */
public static Database get() {
    if(instance == null) loadDatabase();
    return instance;
}

/**
 *  A method to load the database
 */
private static void loadDatabase() {
    try{

    random = new Random();
    instance = new Database();

    File file = new File(databasePath);
    file.createNewFile();
    String json = FileUtils.readFileToString(file);

    if(json.length() == 0) { json = "[]"; }

    Gson g = new Gson();
    HotelRoom[] data = g.fromJson(json, HotelRoom[].class);
    instance.data = new ArrayList<>(Arrays.asList(data));
    }catch(Exception e) { System.out.println("I couldn't care less"); System.exit(1); }
}

/**
 *  The internal representation of the database
 */
private List<HotelRoom> data;

/**
 *  The method to get entries from the database that pass the filter
 *  @param filter The filter being used
 *  @return The data that passed the filter
 */
public List<HotelRoom> getFiltered(Filter filter) {
    List<HotelRoom> result = new ArrayList<>();
    for(HotelRoom room : data) {
        if(filter.filter(room)) result.add(room);
    }
    return result;
}

/**
 *  A method to add the room to the data and back up the database
 *  @param room The room to be added
 */
public void addRoom(HotelRoom room) {
        room.id = random.nextInt(1000000) + 1;
        data.add(room);
        saveDatabase();
    }

    /**
     *  A method to save the database
     */
    public void saveDatabase() {
        File file = new File(databasePath);
        Gson g = new Gson();
        HotelRoom[] array = new HotelRoom[data.size()];
        data.toArray(array);
        String json = g.toJson(array);
        try{
        FileUtils.writeStringToFile(file, json, Charset.forName("UTF-8"));
        }catch(Exception e) { System.out.println(e.toString()); System.exit(1); }
    }
}
```

<u>static/book.js</u>

```
function book() {
    const urlParams = new URLSearchParams(window.location.search);
    const roomId = urlParams.get("id");

    location.href = `/book?id=${roomId}`;
}
```

<u>static/index.html</u>

```html
<!DOCTYPE HTML>
<html>
<head>
    <title>Very cool booking website</title>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
    <link rel="stylesheet" href="style.css">
</head>
<body>
    <a href="/home"><h1>Home</h1></a>
    <h1>Book only from this website!!!</h1>
    <div><a href="/search">Search here</a></div>
    <div><a href="/posthotel">If you are a hotel click here</a></div>
</body>
</html>
```

static/search.js

```javascript
let minPrice = undefined;
let maxPrice = undefined;

let minStars = undefined;
let maxStars = undefined;

let city = undefined;
let id = undefined; // room id, ignore all other args

let page = localStorage.getItem("page");
if(page === null) page = 0;
```

```
let order = undefined; // sorting order

function populateInputs() {
    minPrice = document.getElementById("minPrice").value;
    if(isNaN(parseFloat(minPrice))) minPrice = undefined;

    maxPrice = document.getElementById("maxPrice").value;
    if(isNaN(parseFloat(maxPrice))) maxPrice = undefined;

    minStars = document.getElementById("minStars").value;
    if(isNaN(parseFloat(minStars))) minStars = undefined;

    maxStars = document.getElementById("maxStars").value;
    if(isNaN(parseFloat(maxStars))) maxStars = undefined;

    city = document.getElementById("city").value;
    if(city.length === 0) city = undefined;

    id = document.getElementById("roomId").value;
    if(isNaN(parseInt(id))) id = undefined;
}

function applyFilters() {
    populateInputs();

    let link = "/search?";
    let selectedOrder = document.querySelector('input[name="searchOrder"]:checked');
    let order = "";
    if(selectedOrder === null) order = undefined;
    else                      order = selectedOrder.value;

    console.log(order);

    if(id !== undefined) link += `id=${id}`;
    else {
        if(minPrice !== undefined) link += `minPrice=${minPrice}&`;
        if(maxPrice !== undefined) link += `maxPrice=${maxPrice}&`;

        if(minStars !== undefined) link += `minStars=${minStars}&`;
        if(maxStars !== undefined) link += `maxStars=${maxStars}&`;

        if(city !== undefined) link += `city=${city}&`;
        if(page !== undefined) link += `page=${page}&`;
        if(order !== undefined) link += `order=${order}&`;
    }

    location.href = link;
}

function search() {
    applyFilters();
    localStorage.setItem("page", 0);
}
```

```
function nextPage() {
    page++;
    localStorage.setItem("page", page);
    applyFilters();
}

function prevPage() {
    page--;
    if(page < 0) page = 0;
    localStorage.setItem("page", page);
    applyFilters();
}
```

<u>static/style.css</u>

```
.searchFilterBlock {
    display: flex;
    flex-direction: row;
}

.roomInfoItem {
    display: flex;
    flex-direction: row;
}

#searchRadios {
    display: flex;
    flex-direction: row;
}

.searchFilterBlock > * {
    padding: 10px;
}

.listRoom {
    border: solid black;
    padding: 20px;
    margin-top: 10px;
    margin-bottom: 10px;
}

#searchButtons {
    max-width: fit-content;
    margin-left: auto;
    margin-right: auto;
}

#searchRadios {
    margin-top: 20px;
    margin-bottom: 20px;
    max-width: fit-content;
    margin-left: auto;
    margin-right: auto;
}
```

templates/index.html

```
<!DOCTYPE HTML>
<html>
<head>
    <title>Very cool booking website</title>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
    <link rel="stylesheet" href="style.css">
</head>
<body>
    <a href="/home"><h1>Home</h1></a>
    <h1>Book only from this website!!!</h1>
    <div><a href="/search">Search here</a></div>
    <div><a href="/posthotel">If you are a hotel click here</a></div>
</body>
</html>
```

templates/posthotel.html

```
<!DOCTYPE HTML>
<html xmlns:th="http://www.thymeleaf.org">
<head>
    <title>Post room</title>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
    <link rel="stylesheet" href="style.css">
</head>
<body>
    <a href="/home"><h1>Home</h1></a>
    <h1>Post your very good room here!</h1>
    <form method="post" action="#" th:action="@{/posthotel}" th:object="${hotelRoom}">
```

```
        <p>name</p> <input type="text" th:field="*{hotelName}"/>
        <p>city</p> <input type="text" th:field="*{city}"/>
        <p>price</p> <input type="text" th:field="*{price}"/>
        <p>number</p> <input type="text" th:field="*{roomNumber}"/>

        <input type="submit" value="post"/>
    </form>
</body>
</html>
```

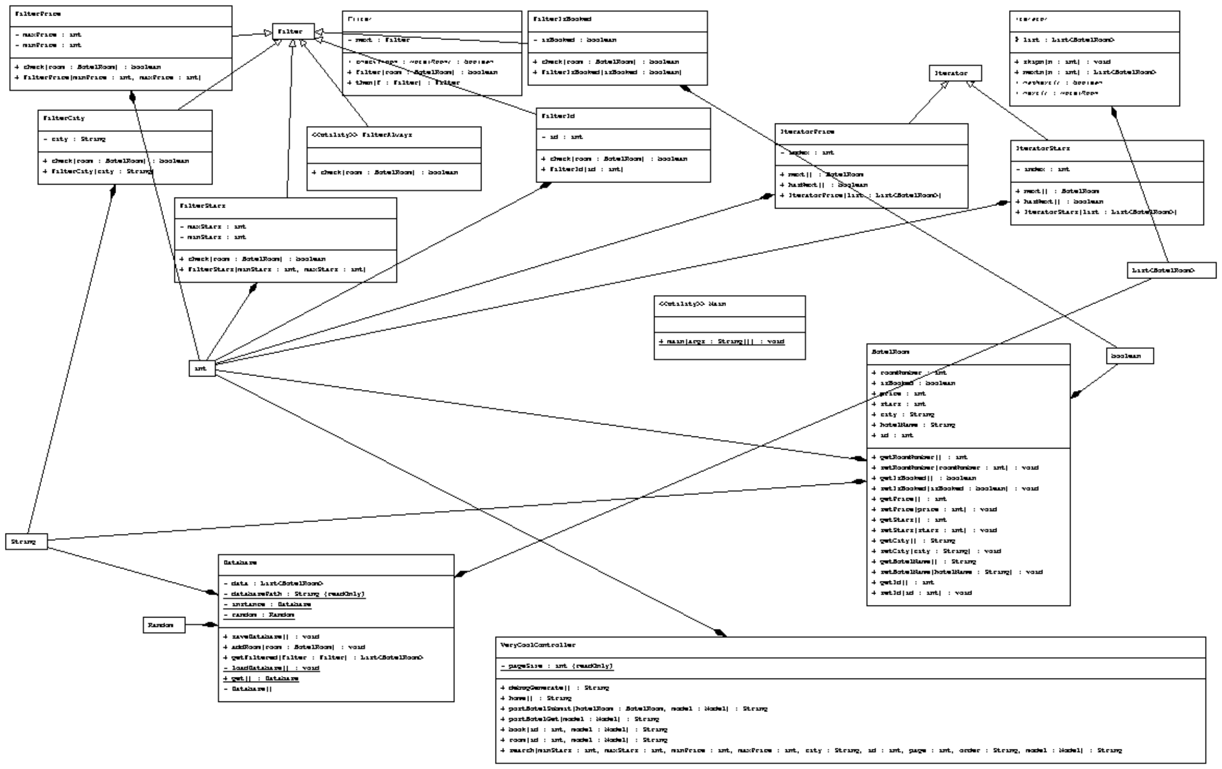
templates/room.html

```
<!DOCTYPE HTML>
<html>
<head>
    <title>Your very good room</title>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
    <script src="book.js"></script>
    <link rel="stylesheet" href="style.css">
</head>
<body>
    <a href="/home"><h1>Home</h1></a>

    <h1>A very cool room</h1>

    <div class="roomInfoItem">Room number: <div th:utext="${number}" /></div>

    <div class="roomInfoItem">★ <div th:utext="${stars}" /></div>
    <div class="roomInfoItem">$ <div th:utext="${price}" /></div>
    <div class="roomInfoItem">City: <div th:utext="${city}" /></div>
    <div class="roomInfoItem">Hotel: <div th:utext="${hotelName}" /></div>

    <button onclick="book()">Book</button>
</body>
</html>
```

templates/search.html

```
<!DOCTYPE HTML>
<html xmlns:th="http://www.thymeleaf.org">
<head>
    <title>Search</title>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
    <script src="search.js"></script>
    <link rel="stylesheet" href="style.css">
</head>
<body>
    <a href="/home"><h1>Home</h1></a>
    <h1>Search for your room here!</h1>

    <div class = "searchFilterBlock">
    <div class="searchFilterBlock"><p>Min price</p><input id="minPrice"
type="number"></input></div>
    <div class="searchFilterBlock"><p>Max price</p><input id="maxPrice"
type="number"></input></div>
    </div>

    <div class = "searchFilterBlock">
    <div class="searchFilterBlock"><p>Min stars</p><input id="minStars"
type="number"></input></div>

    <div class="searchFilterBlock"><p>Max stars</p><input id="maxStars"
type="number"></input></div>

    </div>


    <div class = "searchFilterBlock">

    <div class="searchFilterBlock"><p>City</p><input id="city" type="text"></input></div>

    <div class="searchFilterBlock"><p>Room Id</p><input id="roomId"
type="number"></input></div>

    </div>


    <div id="searchRadios">

        <div>

        <input type="radio" id="searchRadio_stars" name="searchOrder" value="stars"/>

        <label for="searchRadio_stars">Sort by stars</label>

        </div>


        <div>

        <input type="radio" id="searchRadio_price" name="searchOrder" value="price"/>

        <label for="searchRadio_price">Sort by price</label>

        </div>

    </div>




    <div id="searchButtons">

    <button onclick="prevPage()"> &lt; </button>

    <button onclick="search()">Search</button>
    <button onclick="nextPage()"> &gt; </button>
    </div>


    <div>
        <div th:utext="${rooms}" />
    </div>
</body>
</html>
```

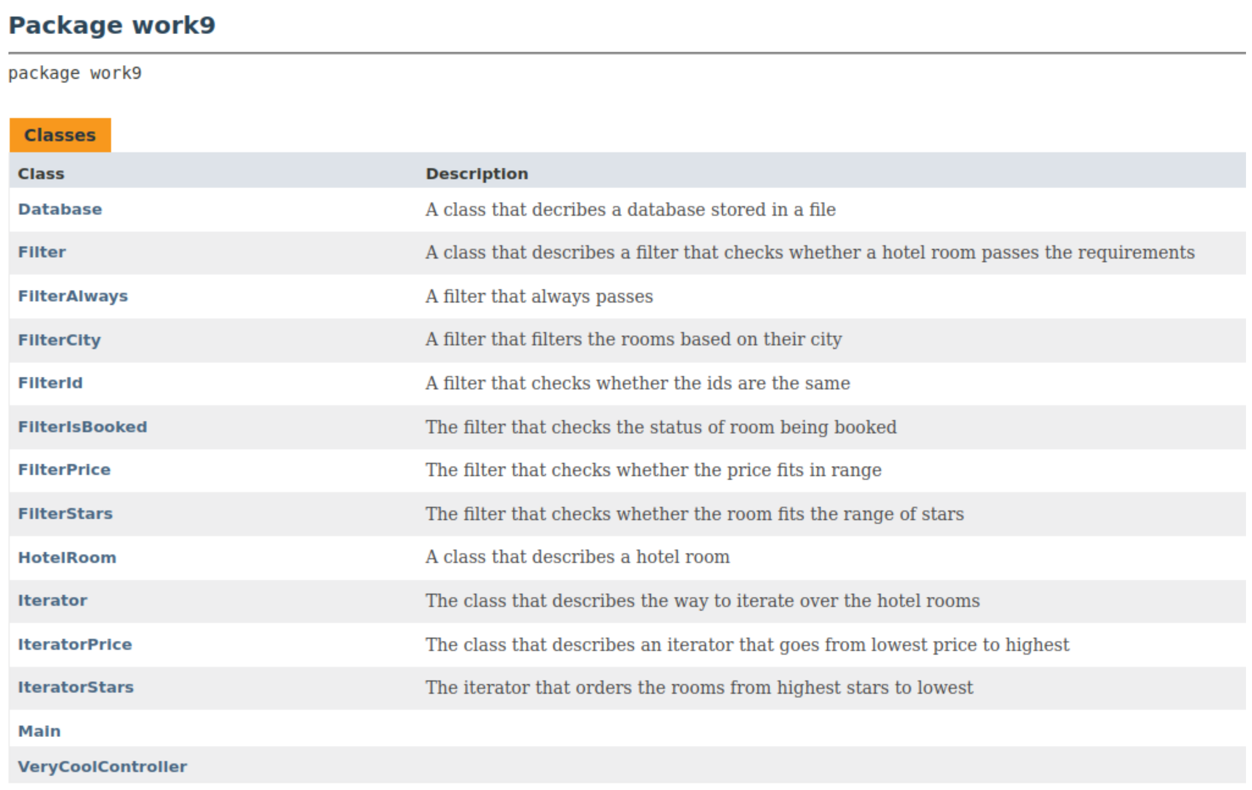
<u>Згенерована за кодом діаграма:</u>



FilterPrice
- maxPrice : int
- minPrice : int
+ check(room : HotelRoom) : boolean
+ FilterPrice(minPrice : int, maxPrice : int)
Filter
Filter
- next : Filter
+ check(room : HotelRoom) : boolean
+ filter(room : HotelRoom) : boolean
+ then(f : Filter) : Filter
FilterIsBooked
- isBooked : boolean
+ check(room : HotelRoom) : boolean
+ FilterIsBooked(isBooked : boolean)
Iterator
Iterator
# list : List<HotelRoom>
+ skip(n : int) : void
+ next(n : int) : List<HotelRoom>
+ hasNext() : boolean
+ next() : HotelRoom
FilterCity
- city : String
+ check(room : HotelRoom) : boolean
+ FilterCity(city : String)
<<Utility>> FilterAlways
+ check(room : HotelRoom) : boolean
FilterId
- id : int
+ check(room : HotelRoom) : boolean
+ FilterId(id : int)
IteratorPrice
- index : int
+ next() : HotelRoom
+ hasNext() : boolean
+ IteratorPrice(list : List<HotelRoom>)
IteratorStars
- index : int
+ next() : HotelRoom
+ hasNext() : boolean
+ IteratorStars(list : List<HotelRoom>)
FilterStars
- maxStars : int
- minStars : int
+ check(room : HotelRoom) : boolean
+ FilterStars(minStars : int, maxStars : int)
List<HotelRoom>
<<Utility>> Main
+ main(args : String[]) : void
HotelRoom
+ roomNumber : int
+ isBooked : boolean
+ price : int
+ stars : int
+ city : String
+ hotelName : String
+ id : int
+ getRoomNumber() : int
+ setRoomNumber(roomNumber : int) : void
+ getIsBooked() : boolean
+ setIsBooked(isBooked : boolean) : void
+ getPrice() : int
+ setPrice(price : int) : void
+ getStars() : int
+ setStars(stars : int) : void
+ getCity() : String
+ setCity(city : String) : void
+ getHotelName() : String
+ setHotelName(hotelName : String) : void
+ getId() : int
+ setId(id : int) : void
boolean
int
String
Database
- data : List<HotelRoom>
- databasePath : String {readOnly}
- instance : Database
- random : Random
+ saveDatabase() : void
+ addRoom(room : HotelRoom) : void
+ getFiltered(filter : Filter) : List<HotelRoom>
- loadDatabase() : void
+ get() : Database
- Database()
Random
VeryCoolController
- pageSize : int {readOnly}
+ debugGenerate() : String
+ home() : String
+ postHotelSubmit(hotelRoom : HotelRoom, model : Model) : String
+ postHotelGet(model : Model) : String
+ book(id : int, model : Model) : String
+ room(id : int, model : Model) : String
+ search(minStars : int, maxStars : int, minPrice : int, maxPrice : int, city : String, id : int, page : int, order : String, model : Model) : String

У цьому проекті були застосовані три паттерни — Singleton (підтримання лише однієї бази даних), Iterator (різні способи сортування кімнат, за зірками, отзивами або за ціною), та Chain of Responsibility (фільтрування кімнат та композиція окремих фільтрів у ланцюг)

Згенерована документація:



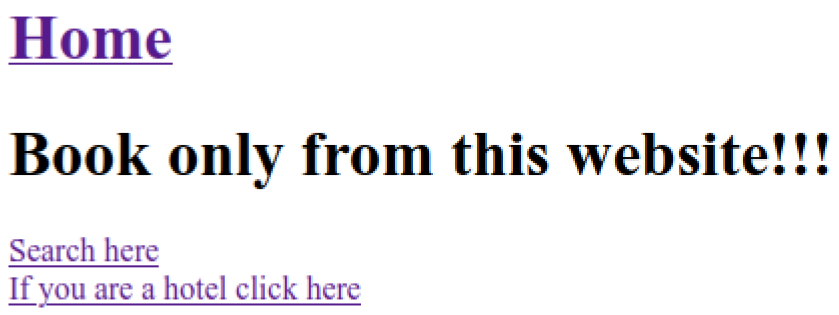
Package work9

package work9

Classes

Class	Description
Database	A class that decribes a database stored in a file
Filter	A class that describes a filter that checks whether a hotel room passes the requirements
FilterAlways	A filter that always passes
FilterCity	A filter that filters the rooms based on their city
FilterId	A filter that checks whether the ids are the same
FilterIsBooked	The filter that checks the status of room being booked
FilterPrice	The filter that checks whether the price fits in range
FilterStars	The filter that checks whether the room fits the range of stars
HotelRoom	A class that describes a hotel room
Iterator	The class that describes the way to iterate over the hotel rooms
IteratorPrice	The class that describes an iterator that goes from lowest price to highest
IteratorStars	The iterator that orders the rooms from highest stars to lowest
Main	
VeryCoolController	

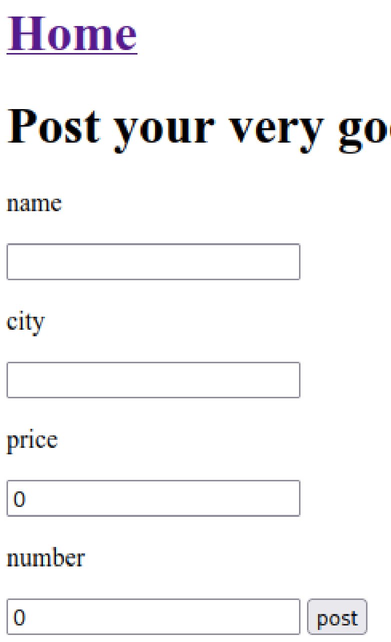
Приклади роботи програми:



Home

Book only from this website!!!

Search here
If you are a hotel click here



Home

Post your very good room here!

name

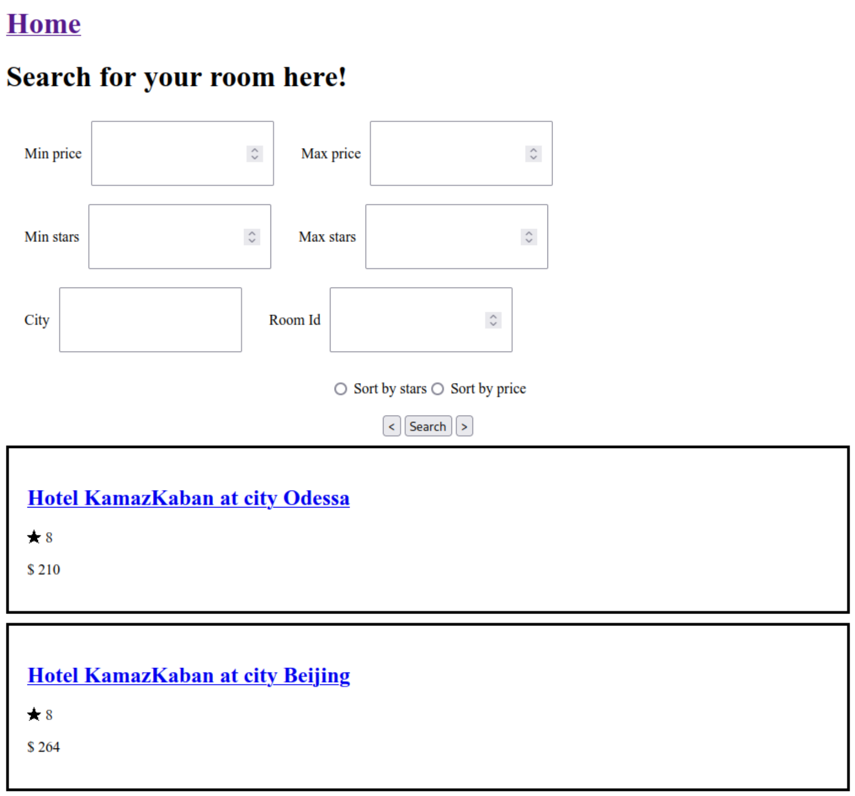
city

price

0

number

0



Home

Search for your room here!

Min price

Max price

Min stars

Max stars

City

Room Id

Hotel KamazKaban at city Odessa

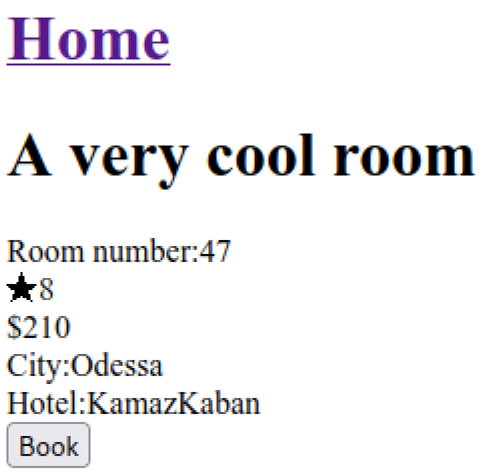
★ 8

$ 210

Hotel KamazKaban at city Beijing

★ 8

$ 264



Home

A very cool room

Room number:47
★8
$210
City:Odessa
Hotel:KamazKaban

Висновки: Під час даного розробленого проекту, навчився працювати з фреймворком Spring Boot, а також навчився реалізовувати архітектуру «клієнт-сервер». Була спроектована програмна система, підключена та добудована база даних, архітектура (всього проекту) відповідає програмній моделі «Клієнт-Сервер», тож можна змінювати та модифікувати в подальшому проект відповідно до завдання.