Student ID: _____

Full Names: _____

CS489 – Applied Software Development

Final Exam

(April 2024)

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1. The time allotted for completing this test (both Parts) is 3 hours.
2. You are expected to use your Computer with an IDE or any Code Editor tool of your choice to implement your solution for the Software Dev question in Part 2.
3. *For the tasks in the coding question, you are expected to take screenshot(s) of your result(s), save each into a .png or .jpg image file, placed inside a folder named, screenshots and include these in your submission, making sure to include all your project source code. For the given coding question, when you have completed your own solution, you are required to take each of the set of 5 evidential sample screenshots, which have been included at the end of the question.*
4. Upon completion, to submit your work for review and grading, simply zip your entire Project folder (including the screenshots folder) into a zip file. And upload to the Exam Question on Sakai.
5. **This CS489 Exam question paper belongs to MIU CS Department and must not be copied or photographed or reproduced or transferred or shared or distributed**. **Any violation will be penalized.**

Make sure to include the screenshots of your results, as required.

Part II: Software Development, Problem-solving, Coding skills (70 points)

Evaluating your Software Development and Coding ability:

1. (70 points) **Implementing RESTful Web API for an Enterprise Web Application**

Note 1: You are expected to use an IDE or any Code Editor tool of your choice to implement your solution for this question.

Note 2: *For the tasks in this question, you are expected to take screenshot(s) of your result(s), save each into a .png or .jpg image file, placed inside a folder named, screenshots and include these in the FinalExam.zip file, you submit.*

Note 3: *For this question, when you complete your own solution, you are required to take each of the set of 5 evidential sample screenshots, which have been included at the end of the question. See below.*

Upon completion, to submit, put your entire project(s), into a single zip file named, say, **FinalExam.zip**, and upload it to the Question on Sakai, as your submission.

Problem Statement:

Equinox Residential, LLC is a Property Development & Management company who own and manage residential properties in Cities and States across the country.

Assume that the company has hired you to develop a Web API for their Property Leasing Management system, which they will be using to manage data about their Properties and the Leases. Specifically, the system will be used in registering new **Properties**, and also for viewing, updating and maintaining the details about the Properties and the associated Leases. They want you to implement a basic RESTful Web API for this system.

An important need for the property managers is to be able to view the list of all Properties that they own/manage. And also, to see the **Projected total Revenue** (income) that accrues from the Leases.

A **Property** is a residential accommodation that is rented-out through a Lease agreement.
A **Lease** is an agreement or contract issued to a rental customer, which allows the customer to occupy/live/reside in a specific property for a given period.

A Property can have many Leases.

A Lease can be associated to only one Property.

IMPORTANT: Your solution model should consist of only the two entity classes, named:

1. Property
2. Lease

Here are the attributes for the **Property** entity, including some useful descriptions and/or sample data values:

Property:

propertyId: integer, (Primary Key field)

propertyRef, (required field) (e.g. 1210 Kilo Road etc.)

city, (optional field)

state, (optional field)

monthlyRentalRate, (required field) (e.g. $3,945.50, $950.00 etc.)

Here are the attributes for the **Lease** entity, including some useful descriptions and/or sample data values:

Lease:

leaseId: long (Primary Key field)

leaseReferenceNumber, (required field, unique) (e.g. 5121543109, 7000511568 etc. **Note**: These are numeric values)

startDate, (required field) (e.g. 2023-09-17, 2023-10-20, etc.)

endDate, (REQUIRED FIELD) (e.g. 2024-03-17, 2024-10-20, etc.)

Data:

Here is the company's existing data, which you are expected to load/input into your database:

Properties and Leases data: (Note: This is NOT necessarily a Database table)

<table>
<tr><th>PropertyId</th><th>PropertyRef</th><th>City</th><th>State</th><th>Monthly Rental Rate</th><th>Leases</th></tr>
<tr><td>1</td><td>1210 Kilo Road</td><td>Denver</td><td>CO</td><td>$3,945.50</td><td>
<table>
<tr><th>LeaseReference Number</th><th>StartDate</th><th>EndDate</th></tr>
<tr><td>5121543109</td><td>2023-09-17</td><td>2024-03-17</td></tr>
<tr><td>7000511568</td><td>2023-10-20</td><td>2024-10-20</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>1A Galaria</td><td>Dallas</td><td>TX</td><td>$950.00</td><td>
<table>
<tr><th>LeaseReference Number</th><th>StartDate</th><th>EndDate</th></tr>
<tr><td>6927458265</td><td>2022-12-09</td><td>2023-12-09</td></tr>
</table>
</td></tr>
</table>

For this question, you are required to do the following:

TASK: Code Implementation

Using the set of Java backend tools, technologies and frameworks which you have learnt about in this CS489 course, including Spring Boot, Spring WebMVC, Spring Data, etc., implement the RESTful Web API backend service for the system, paying close attention to the required details. You may use any database of your choice.

Here are the Web API endpoints that you are required to implement:

1. Implement a RESTful Web API endpoint url which presents the list of all the Properties for a given State, in JSON format. The Company requires this list to be displayed sorted in ascending order of the Property's monthly rental rate and it should include the list of Leases for each Property.

2. Implement a RESTful Web API endpoint url which presents the list of all the Leases data in the system, in JSON format. The Company requires this data to include the Property information of each Lease. And the list should be sorted in descending order by the Lease Reference Number.

3. Implement a RESTful Web API endpoint url which presents the data of the **Projected total Revenue** (income) that accrues from the Leases of Properties in a given State, in JSON format. **Note:** This data should contain only the total amount of money which the company

stands to make from the leases of properties in a given state. This can be calculated by simply taking the sum of the products of the monthly rental rate amounts and the number of months for each lease.

4. Implement a RESTful Web API endpoint url that registers/adds a new Lease for a given Property (by PropertyId) into the system, upon receiving the following JSON-formatted data submitted to it via an HTTP POST request.

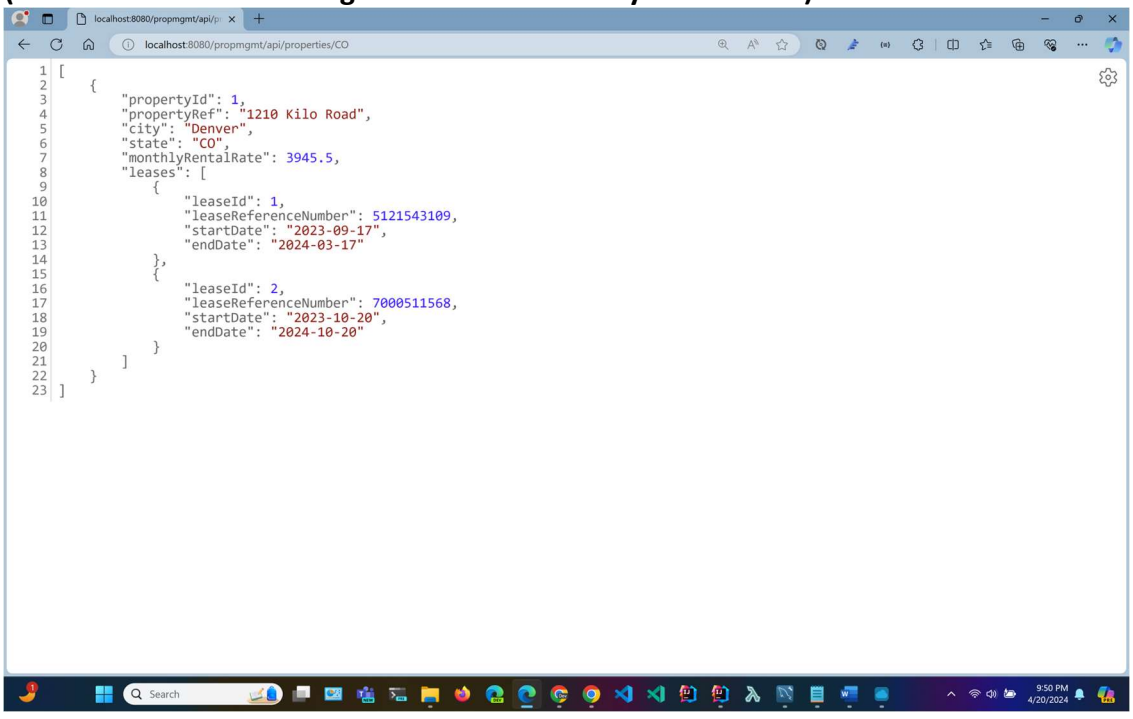
   New Lease Data in JSON format:

```
{
 "leaseReferenceNumber": "6927458266",
 "startDate": "2024-04-22",
 "endDate": "2025-04-22"
}
```

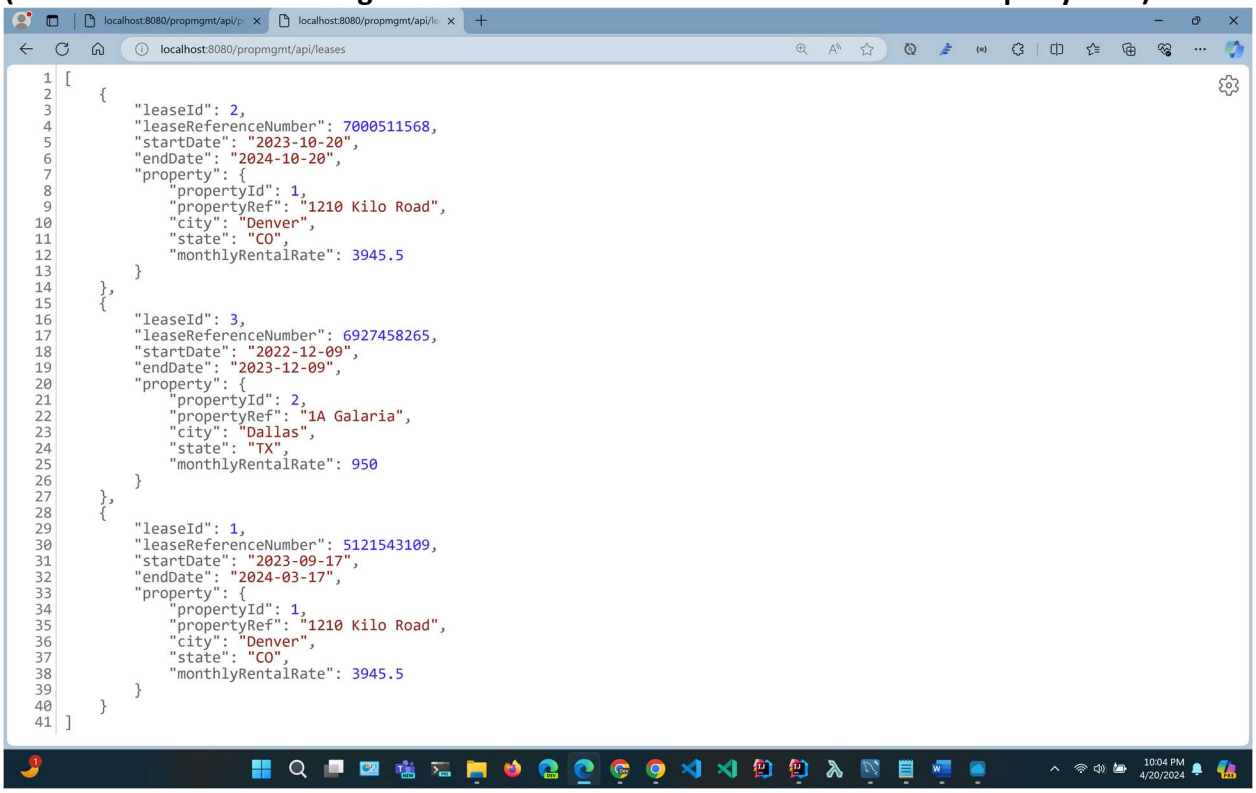
Shown below are sample screenshots and data presentation for the above requirements.

Note: Your own screenshots may be different if you use a different Web API testing tool. However, your screenshots should contain/present similar operations and data and data fields, as required.

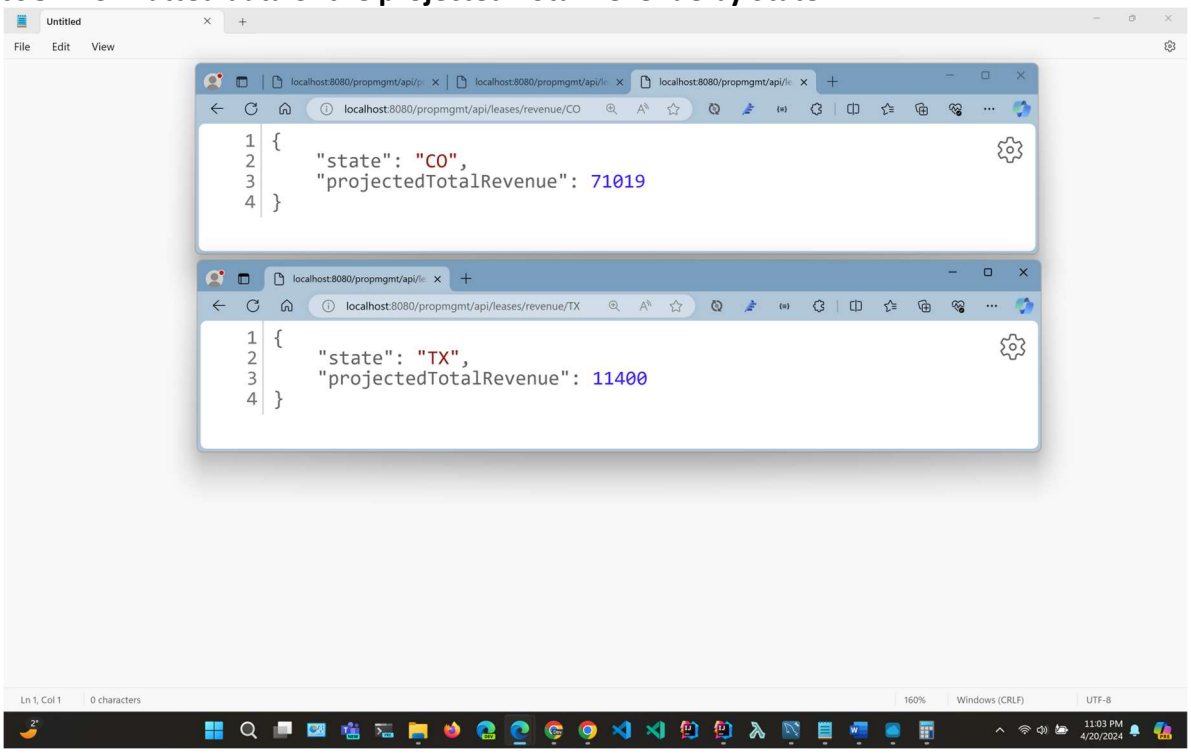
JSON-formatted list of all Properties for a given state:
(Note: Sorted in ascending order of the Monthly Rental Rate)



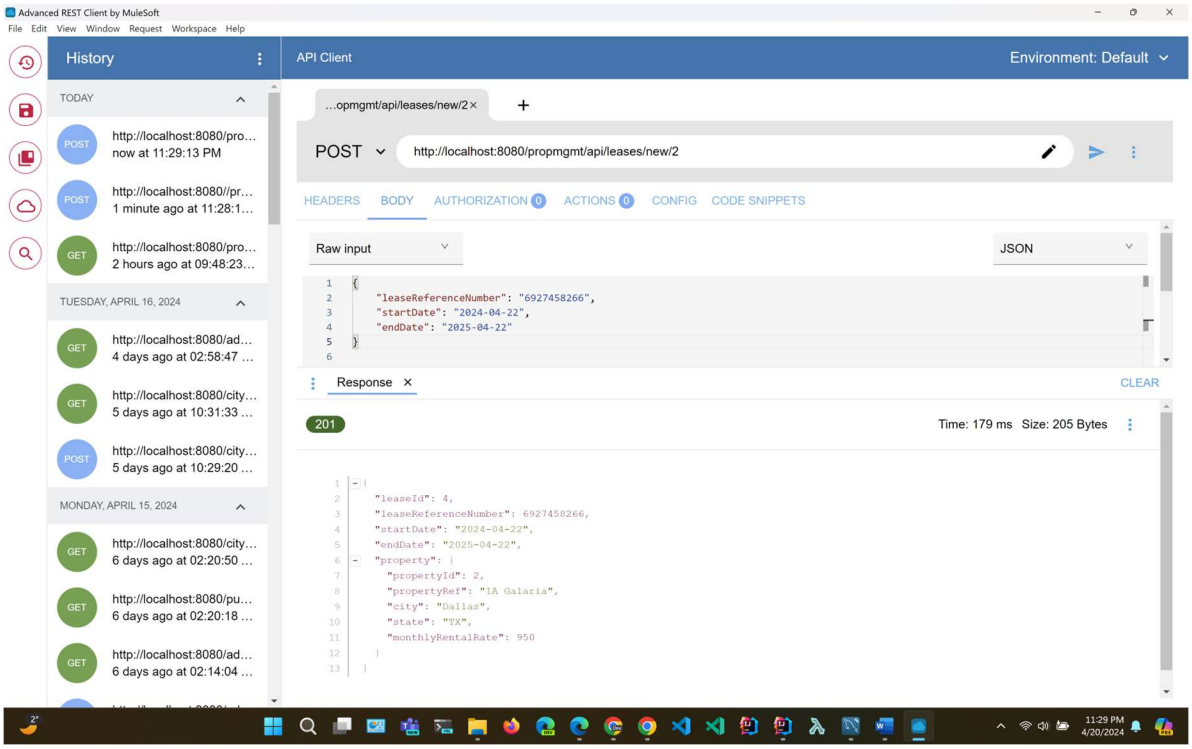
JSON-formatted data of all Leases:
(Note: Sorted in descending order of LeaseRefNumber and contains the Property data)



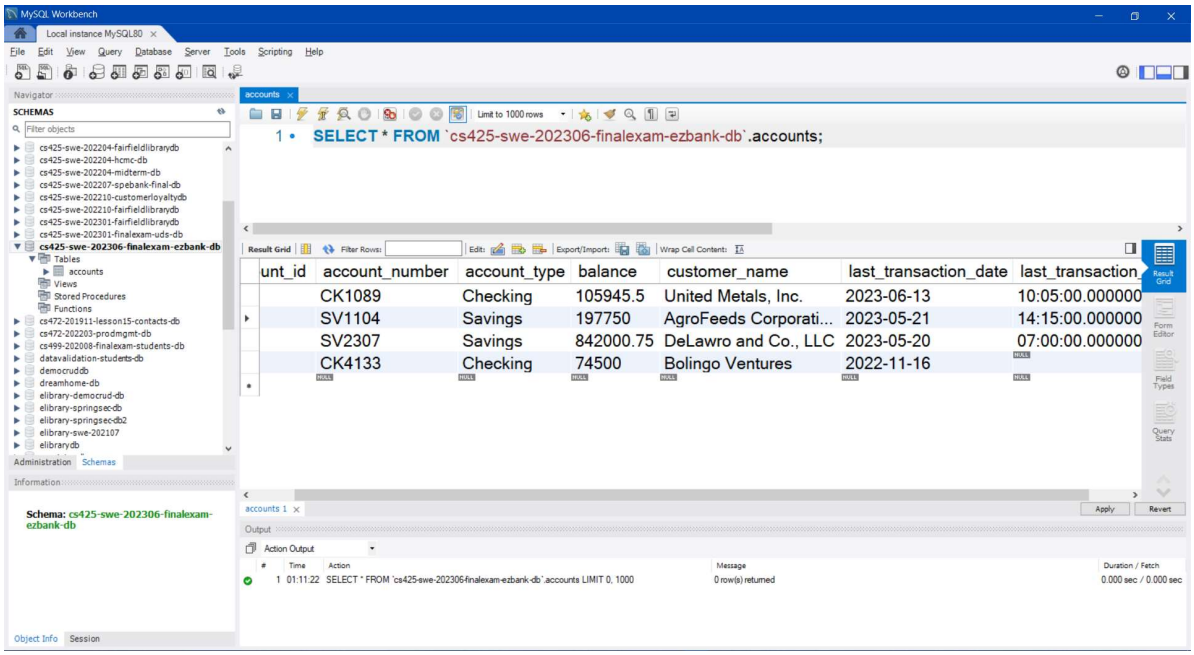
JSON-formatted data of the projected Total Revenue by State:



RESTful (Web) API endpoint url for register/add new Lease for Property by propertyId:



Database Table(s) screenshot (take a screenshot of your database table(s), like the one pasted below) - Sample Database table



//-- The End --//