

CST-350 Milestone 4 Save/Restore Game Progress and REST API Features

Alex M. Frear

College of Science, Engineering, and Technology, Grand Canyon University

Course Number: CST-350

Professor Brandon Bass

12/6/2024

GitHub Link:

https://github.com/amfrear/cst350/tree/main/Milestone_4

Video Link for Code Review:

<https://www.loom.com/share/338e115b93e14562b7bf6bf70231afa3>

Video Link for App Running:

<https://www.loom.com/share/2e09d228753c468a8e7de6b41a06f016>

Contents

GitHub Link	1
Video Link for Code Review	1
Video Link for App Running.....	1
Application Overview	3
Screenshots.....	3
1. Database Table - Games	3
2. Initial Game State.....	4
3. Game Saved Successfully	5
4. Saved Games Page Updated.....	6
5. Load Game Confirmation	7
6. Loading a Game.....	8
7. Updating a Saved Game	9
8. Deleting a Saved Game	10
9. Saved Games Page Updated After Deletion	11
10. REST API - List All Saved Games	12
11. REST API - Retrieve a Single Game by ID	13
12. REST API - Delete a Specific Game	14
13. Verification After Deletion.....	15
Summary of Key Concepts.....	16

Application Overview

Screenshots:

Below are screenshots demonstrating the features implemented as part of Milestone 4 - Save/Restore Game Progress and REST API Features.

1. Database Table - Games

The screenshot displays the MySQL Workbench interface. On the left, the 'SCHEMAS' pane shows the 'minesweeper_users_db' database selected, with the 'games' table highlighted under the 'Tables' section. The 'Table: games' information pane shows the following columns:

Column	Type	Attributes
Id	int(11)	AI PK
UserId	int(11)	
DateSaved	datetime	
GameData	longtext	

The central SQL editor shows the query: `SELECT * FROM minesweeper_users_db.games;`. The 'Result Grid' pane displays the following data:

Id	UserId	DateSaved	GameData
1	2	2024-12-0...	("Size":9,"Difficulty":0.1,"Grid":[[{"Row":0,"Column":0,"Visited":true,"Live":false,"LiveNeighbors":0,"Flagged":false},{"Row":0,"Column":1,"Visi...
17	2	2024-12-0...	("Size":9,"Difficulty":0.1,"Grid":[[{"Row":0,"Column":0,"Visited":true,"Live":false,"LiveNeighbors":0,"Flagged":false},{"Row":0,"Column":1,"Visi...

The 'Output' pane at the bottom shows the execution log:

#	Time	Action	Message	Duration / Fetch
4	12:31:16	CREATE TABLE 'minesweeper_users_db' 'games' ('Id' INT NOT NULL AUTO_INCREMENT, 'User...	0 row(s) affected	0.093 sec
5	12:31:32	SELECT * FROM minesweeper_users_db.games LIMIT 0, 1000	0 row(s) returned	0.000 sec / 0.000 sec
6	12:51:56	SELECT * FROM minesweeper_users_db.games LIMIT 0, 1000	2 row(s) returned	0.000 sec / 0.000 sec

Figure 1 This screenshot shows the Games table in the database, which stores the game state, user ID, date saved, and serialized game data.

2. Initial Game State

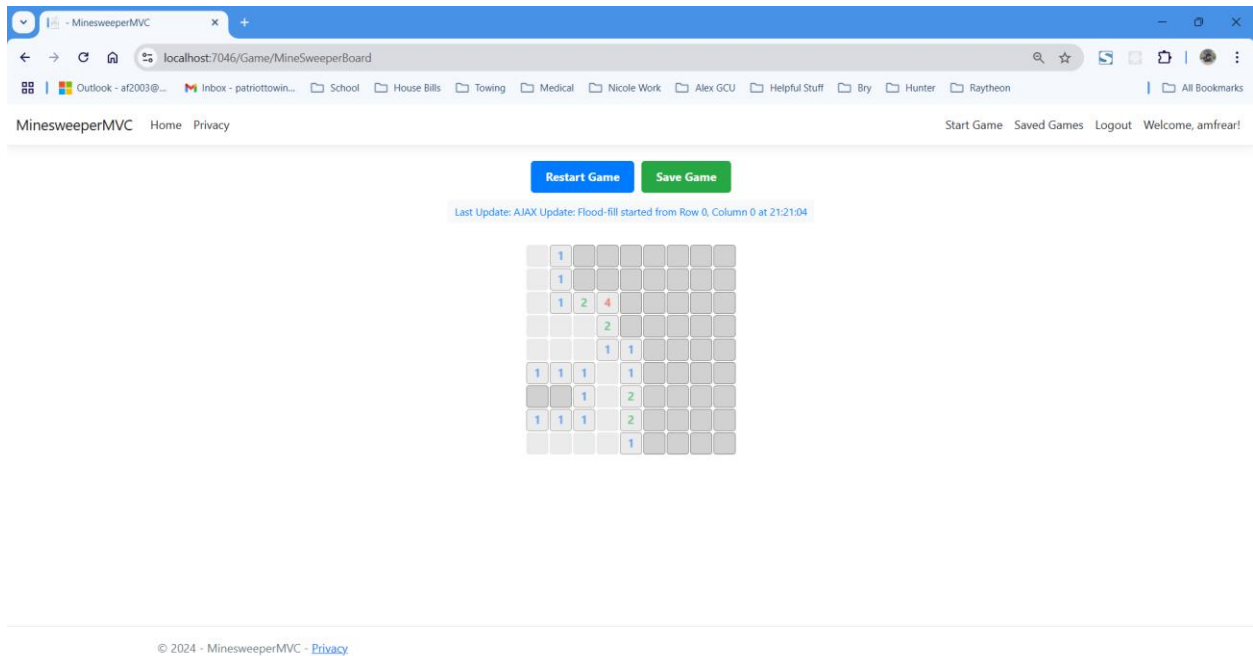


Figure 2 This screenshot displays the initial game board state before saving progress.

3. Game Saved Successfully

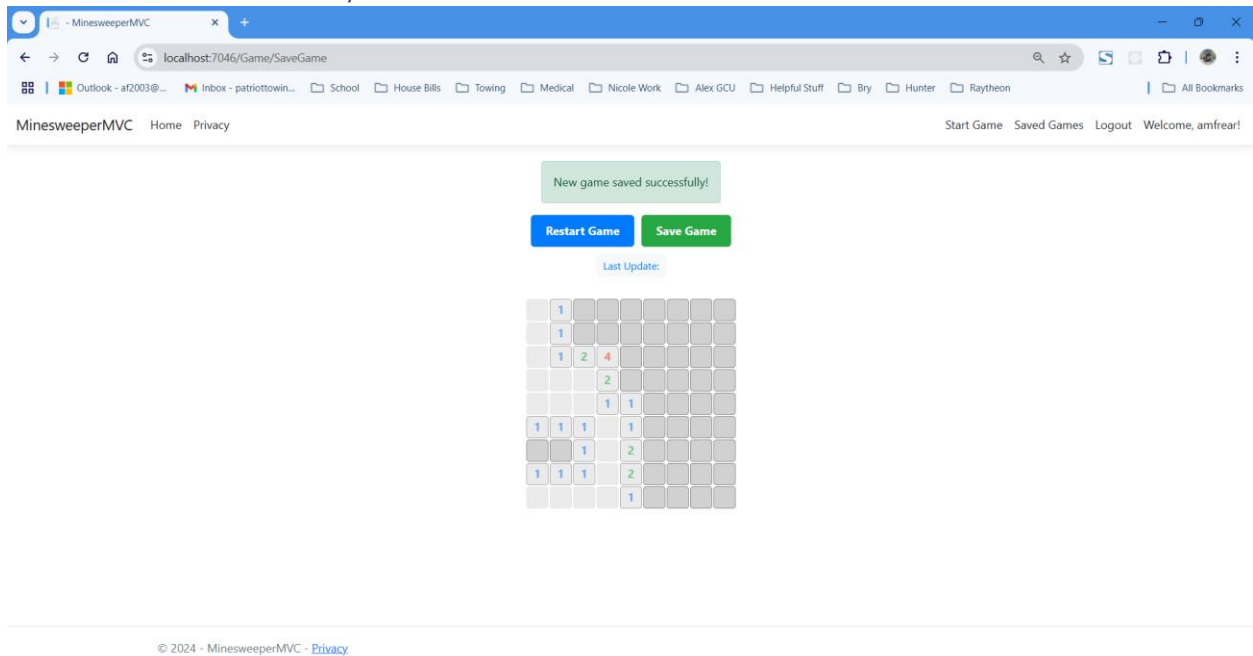


Figure 3 This screenshot demonstrates a successful game save operation. The game state is serialized and stored in the database.

4. Saved Games Page Updated

localhost:7046/Game/ShowSavedGames

MinesweeperMVC Home Privacy Start Game Saved Games Logout Welcome, amfreak!

Saved Games

#	Date Saved	Actions
1	12/6/2024 2:25 PM	<button>Load</button> <button>Delete</button>
2	12/6/2024 2:02 PM	<button>Load</button> <button>Delete</button>
3	12/6/2024 1:31 PM	<button>Load</button> <button>Delete</button>

Figure 4 This screenshot shows the Saved Games page updated with the newly saved game.

5. Load Game Confirmation

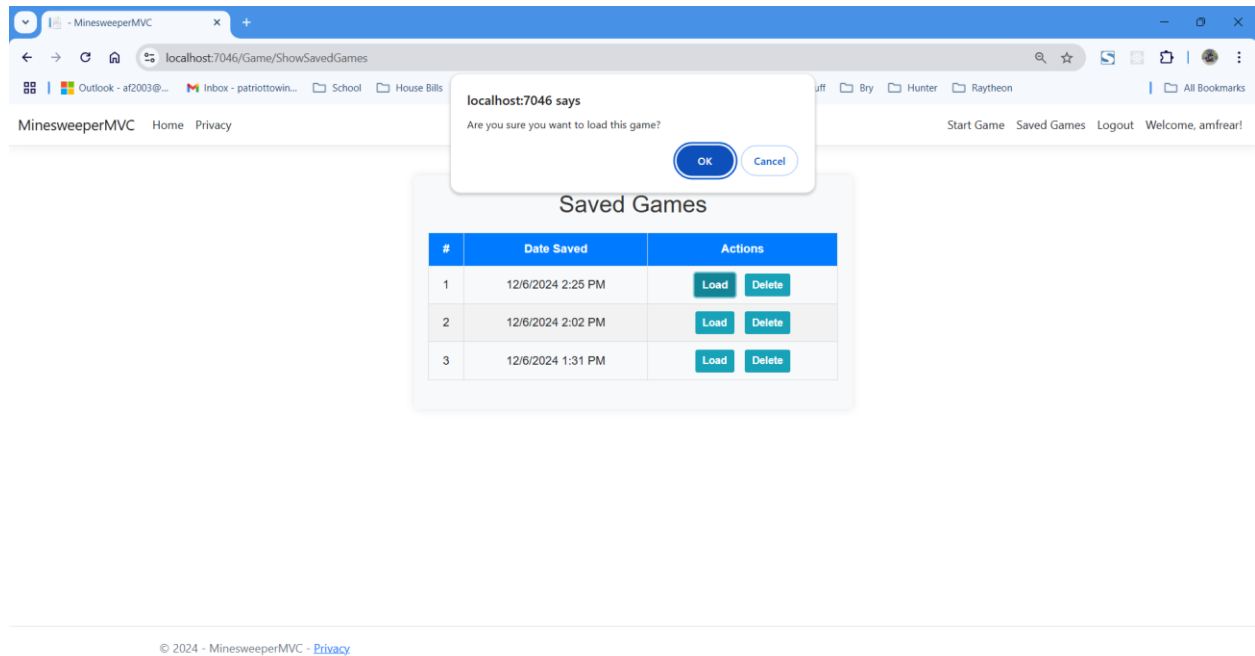


Figure 5 This screenshot shows the confirmation dialog displayed when the user selects a saved game to load.

6. Loading a Game

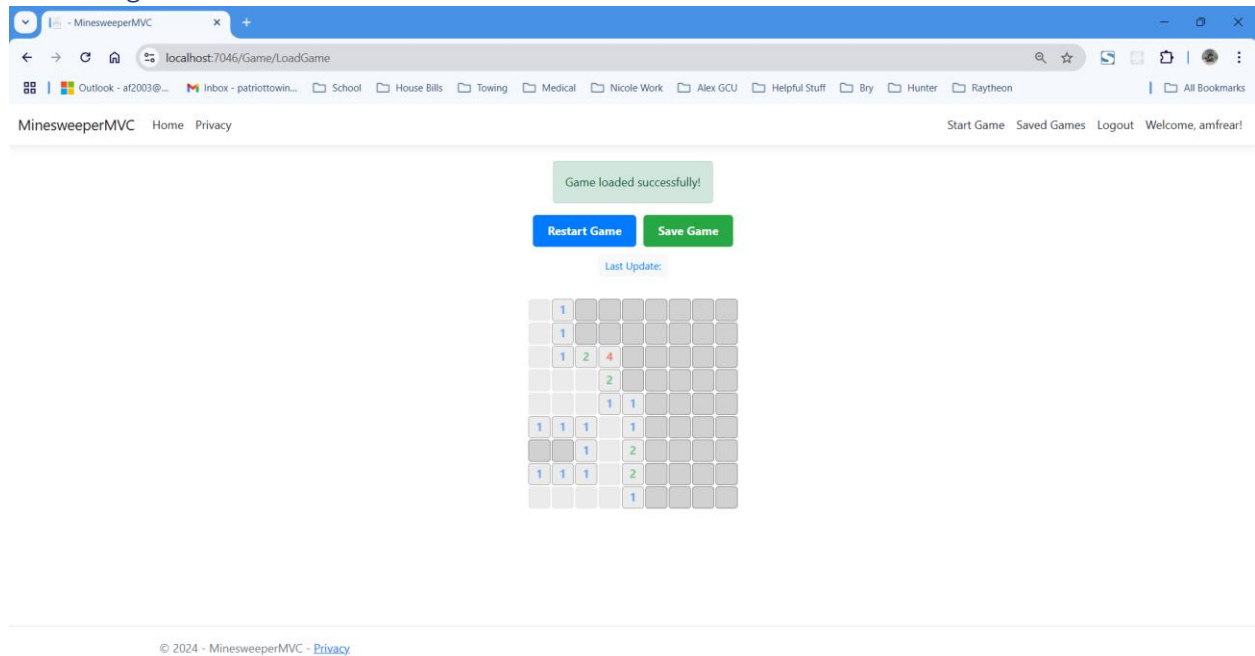


Figure 6 This screenshot demonstrates the successful loading of a previously saved game.

7. Updating a Saved Game

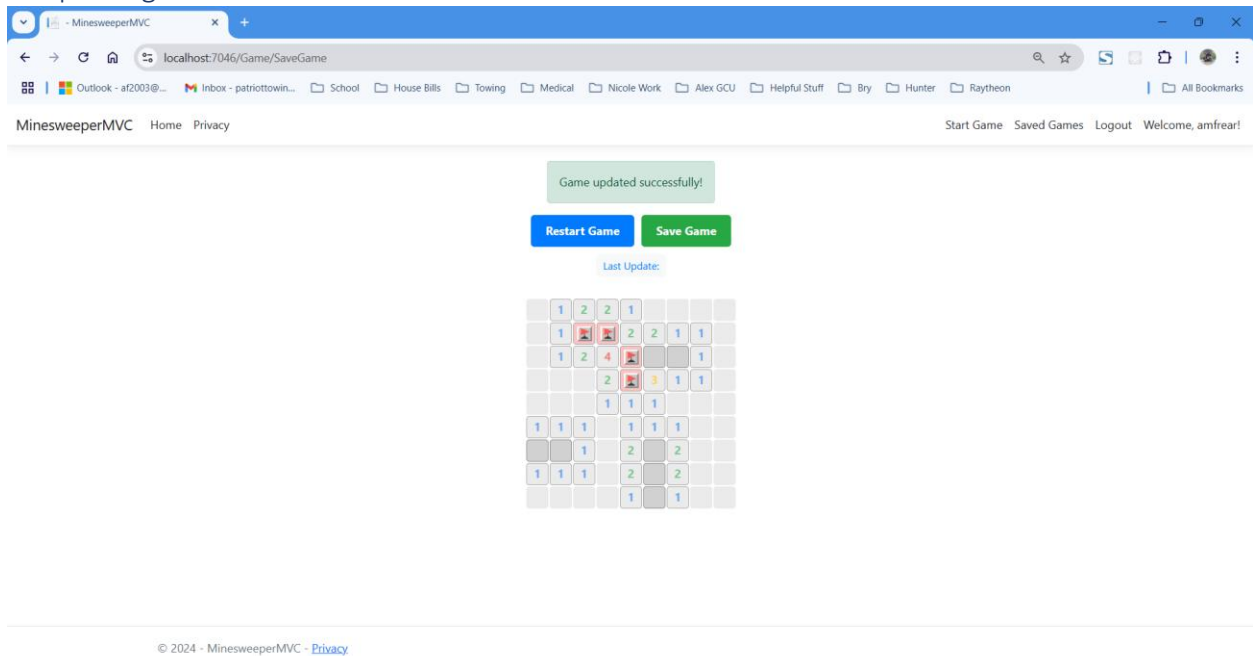


Figure 7 This screenshot shows the functionality of updating the same saved game to reflect the latest state.

8. Deleting a Saved Game

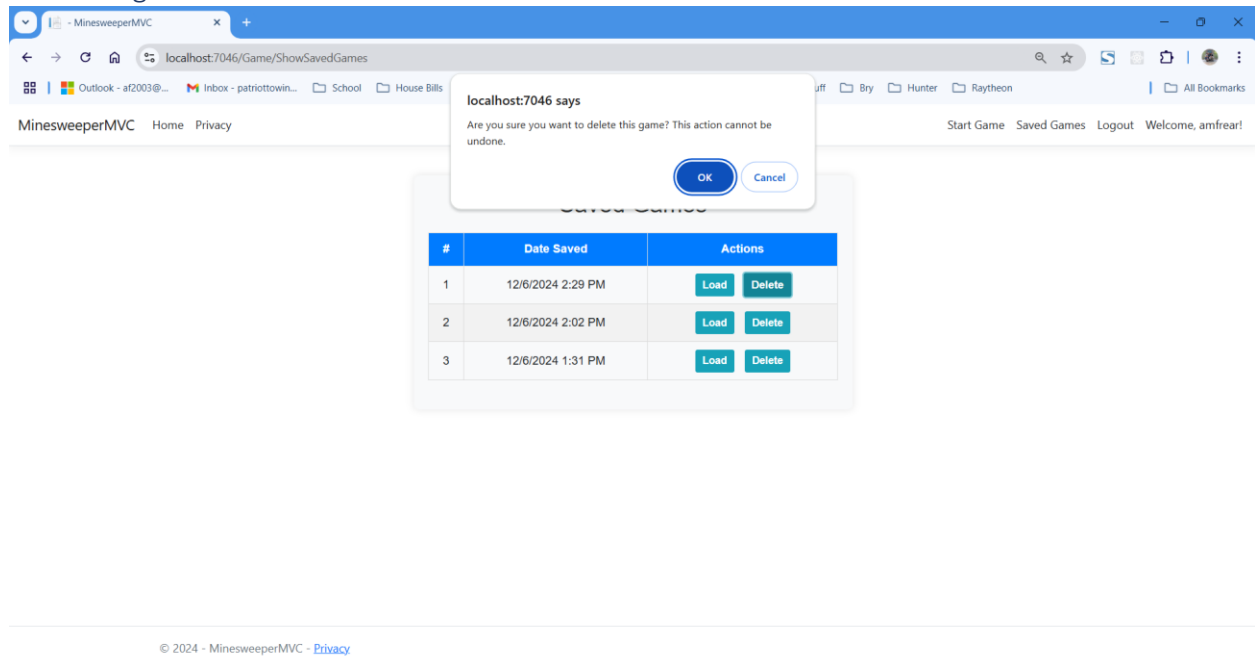


Figure 8 This screenshot shows the confirmation message after a user selects a saved game for deletion.

9. Saved Games Page Updated After Deletion

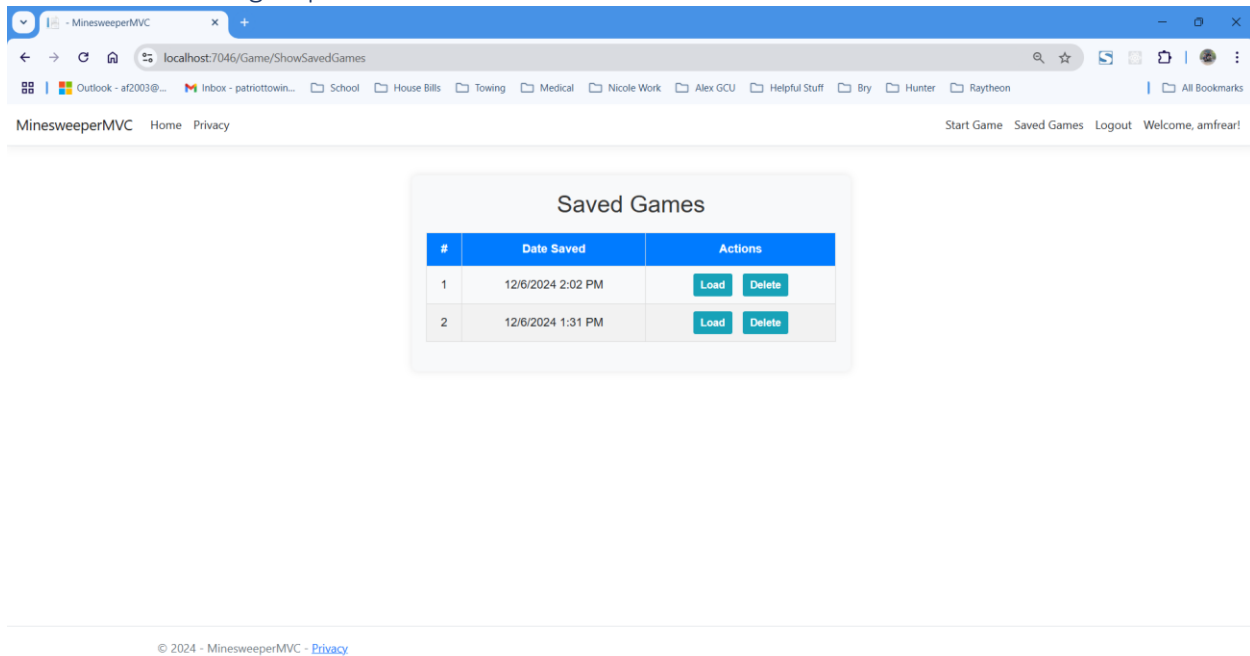


Figure 9 This screenshot shows the Saved Games page updated after a game was deleted.

10. REST API - List All Saved Games

The screenshot displays the Postman interface for a REST API. The left sidebar shows a workspace named 'My Workspace' with a collection of APIs. The 'MineSweeperMVC' collection is expanded, showing several endpoints. The main panel shows the 'GET ShowSavedGames' endpoint selected, with the URL 'https://localhost:7046/api/showSavedGames'. The 'Send' button is visible. Below the URL bar, the 'Body' tab is active, showing a JSON response in 'Pretty' format. The response is a list of three game objects, each containing 'id', 'userId', 'dateSaved', and 'gameDataPreview'.

GET ShowSavedGames

https://localhost:7046/api/showSavedGames

Send

Params Authorization Headers (6) Body Scripts Tests Settings

Query Params

Key	Value	Description
Key	Value	Description

Body Cookies Headers (4) Test Results

200 OK 93 ms 562 B Save Response

```
1 [
2   {
3     "id": 20,
4     "userId": 2,
5     "dateSaved": "2024-12-06T14:33:18",
6     "gameDataPreview": "{\\\"Size\\\":9,\\\"Difficulty\\\":0.1,\\\"Grid\\\":[[{\\\"Row\\\":0,\\\"Colu...\"
7   },
8   {
9     "id": 17,
10    "userId": 2,
11    "dateSaved": "2024-12-06T14:02:46",
12    "gameDataPreview": "{\\\"Size\\\":9,\\\"Difficulty\\\":0.1,\\\"Grid\\\":[[{\\\"Row\\\":0,\\\"Colu...\"
13  },
14  {
15    "id": 1,
16    "userId": 2,
17    "dateSaved": "2024-12-06T13:31:39",
18    "gameDataPreview": "{\\\"Size\\\":9,\\\"Difficulty\\\":0.1,\\\"Grid\\\":[[{\\\"Row\\\":0,\\\"Colu...\"
19  }
20 ]
```

Figure 10 This screenshot shows the REST API endpoint `localhost/api/showSavedGames`, which lists all saved games.

11. REST API - Retrieve a Single Game by ID

The screenshot shows the Postman interface with a REST client setup for the endpoint `https://localhost:7046/api/showSavedGames/1`. The request is a `GET` method. The response is a `200 OK` status with a response time of 25 ms and a body size of 7.8 KB. The response body is displayed in the 'Pretty' tab, showing a JSON object with the following structure:

```

1 {
2   "id": 1,
3   "userId": 2,
4   "dateSaved": "2024-12-06T13:31:39",
5   "gameData": {
6     "Size": 9, "Difficulty": 0.1, "Grid": [
7       [{"Row": 0, "Column": 0, "Visited": true, "Live": false, "LiveNeighbors": 0,
8         "Flagged": false}, {"Row": 0, "Column": 1, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 0,
9         "Column": 2, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 0, "Column": 3, "Visited": true,
10        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 0, "Column": 4, "Visited": true, "Live": false, "LiveNeighbors": 0,
11        "Flagged": false}, {"Row": 0, "Column": 5, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 0,
12        "Column": 6, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 0, "Column": 7, "Visited": true,
13        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 0, "Column": 8, "Visited": true, "Live": false, "LiveNeighbors": 0,
14        "Flagged": false}], [{"Row": 1, "Column": 0, "Visited": true, "Live": false, "LiveNeighbors": 1, "Flagged": false}, {"Row": 1,
15        "Column": 1, "Visited": true, "Live": false, "LiveNeighbors": 1, "Flagged": false}, {"Row": 1, "Column": 2, "Visited": true,
16        "Live": false, "LiveNeighbors": 1, "Flagged": false}, {"Row": 1, "Column": 3, "Visited": true, "Live": false, "LiveNeighbors": 0,
17        "Flagged": false}, {"Row": 1, "Column": 4, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 1,
18        "Column": 5, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 1, "Column": 6, "Visited": true,
19        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 1, "Column": 7, "Visited": true, "Live": false, "LiveNeighbors": 0,
20        "Flagged": false}, {"Row": 1, "Column": 8, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}], [{"Row": 2,
21        "Column": 0, "Visited": true, "Live": false, "LiveNeighbors": 1, "Flagged": false}, {"Row": 2, "Column": 1, "Visited": true,
22        "Live": false, "LiveNeighbors": 1, "Flagged": false}, {"Row": 2, "Column": 2, "Visited": true, "Live": false, "LiveNeighbors": 1,
23        "Flagged": false}, {"Row": 2, "Column": 3, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 2,
24        "Column": 4, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 2, "Column": 5, "Visited": true,
25        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 2, "Column": 6, "Visited": true, "Live": false, "LiveNeighbors": 0,
26        "Flagged": false}, {"Row": 2, "Column": 7, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 2,
27        "Column": 8, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}], [{"Row": 3, "Column": 0, "Visited": true,
28        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 3, "Column": 1, "Visited": true, "Live": false, "LiveNeighbors": 0,
29        "Flagged": false}, {"Row": 3, "Column": 2, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 3,
30        "Column": 3, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 3, "Column": 4, "Visited": true,
31        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 3, "Column": 5, "Visited": true, "Live": false, "LiveNeighbors": 0,
32        "Flagged": false}, {"Row": 3, "Column": 6, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 3,
33        "Column": 7, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 3, "Column": 8, "Visited": true,
34        "Live": false, "LiveNeighbors": 0, "Flagged": false}], [{"Row": 4, "Column": 0, "Visited": true, "Live": false, "LiveNeighbors": 0,
35        "Flagged": false}, {"Row": 4, "Column": 1, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 4,
36        "Column": 2, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 4, "Column": 3, "Visited": true,
37        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 4, "Column": 4, "Visited": true, "Live": false, "LiveNeighbors": 0,
38        "Flagged": false}, {"Row": 4, "Column": 5, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 4,
39        "Column": 6, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 4, "Column": 7, "Visited": true,
40        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 4, "Column": 8, "Visited": true, "Live": false, "LiveNeighbors": 0,
41        "Flagged": false}], [{"Row": 5, "Column": 0, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 5,
42        "Column": 1, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 5, "Column": 2, "Visited": true,
43        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 5, "Column": 3, "Visited": true, "Live": false, "LiveNeighbors": 0,
44        "Flagged": false}, {"Row": 5, "Column": 4, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 5,
45        "Column": 5, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 5, "Column": 6, "Visited": true,
46        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 5, "Column": 7, "Visited": true, "Live": false, "LiveNeighbors": 0,
47        "Flagged": false}, {"Row": 5, "Column": 8, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}], [{"Row": 6,
48        "Column": 0, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 6, "Column": 1, "Visited": true,
49        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 6, "Column": 2, "Visited": true, "Live": false, "LiveNeighbors": 0,
50        "Flagged": false}, {"Row": 6, "Column": 3, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 6,
51        "Column": 4, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 6, "Column": 5, "Visited": true,
52        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 6, "Column": 6, "Visited": true, "Live": false, "LiveNeighbors": 0,
53        "Flagged": false}, {"Row": 6, "Column": 7, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 6,
54        "Column": 8, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}], [{"Row": 7, "Column": 0, "Visited": true,
55        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 7, "Column": 1, "Visited": true, "Live": false, "LiveNeighbors": 0,
56        "Flagged": false}, {"Row": 7, "Column": 2, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 7,
57        "Column": 3, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 7, "Column": 4, "Visited": true,
58        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 7, "Column": 5, "Visited": true, "Live": false, "LiveNeighbors": 0,
59        "Flagged": false}, {"Row": 7, "Column": 6, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 7,
60        "Column": 7, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 7, "Column": 8, "Visited": true,
61        "Live": false, "LiveNeighbors": 0, "Flagged": false}], [{"Row": 8, "Column": 0, "Visited": true, "Live": false, "LiveNeighbors": 0,
62        "Flagged": false}, {"Row": 8, "Column": 1, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 8,
63        "Column": 2, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 8, "Column": 3, "Visited": true,
64        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 8, "Column": 4, "Visited": true, "Live": false, "LiveNeighbors": 0,
65        "Flagged": false}, {"Row": 8, "Column": 5, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 8,
66        "Column": 6, "Visited": true, "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 8, "Column": 7, "Visited": true,
67        "Live": false, "LiveNeighbors": 0, "Flagged": false}, {"Row": 8, "Column": 8, "Visited": true, "Live": false, "LiveNeighbors": 0,
68        "Flagged": false}]]]]

```

Figure 11 This screenshot shows the REST API endpoint `localhost/api/showSavedGames/{id}`, which retrieves a single saved game by its ID.

12. REST API - Delete a Specific Game

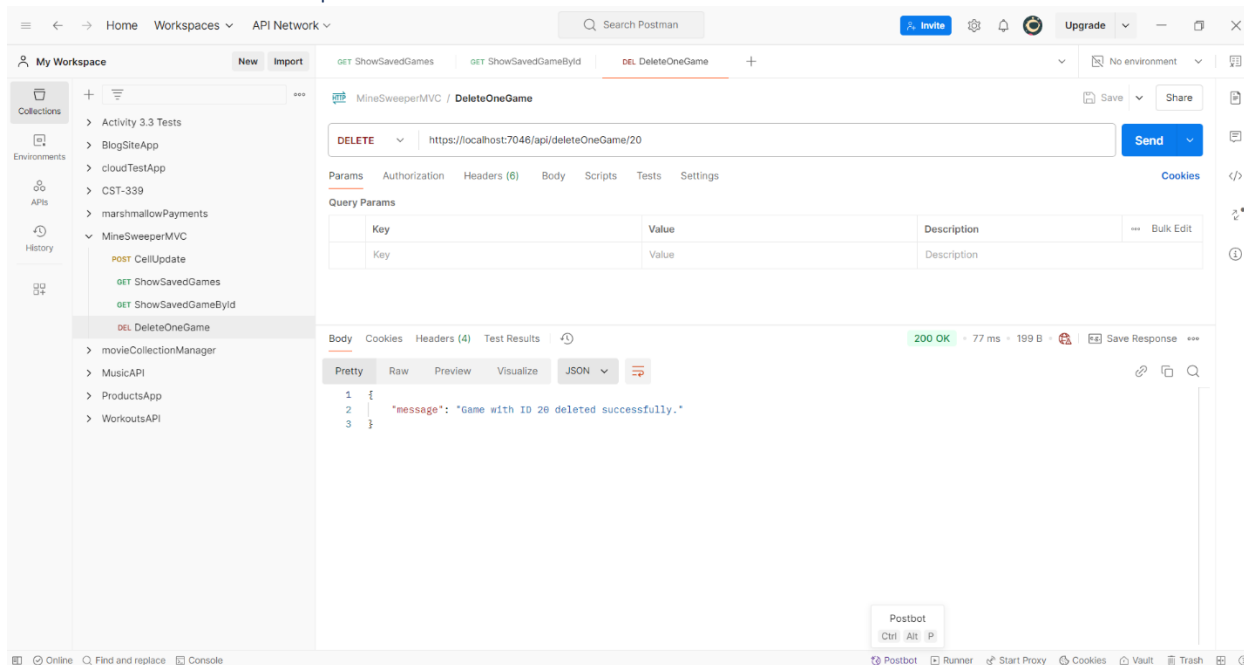


Figure 12 This screenshot shows the REST API endpoint `localhost/api/deleteOneGame/{id}`, which deletes a specific saved game.

13. Verification After Deletion

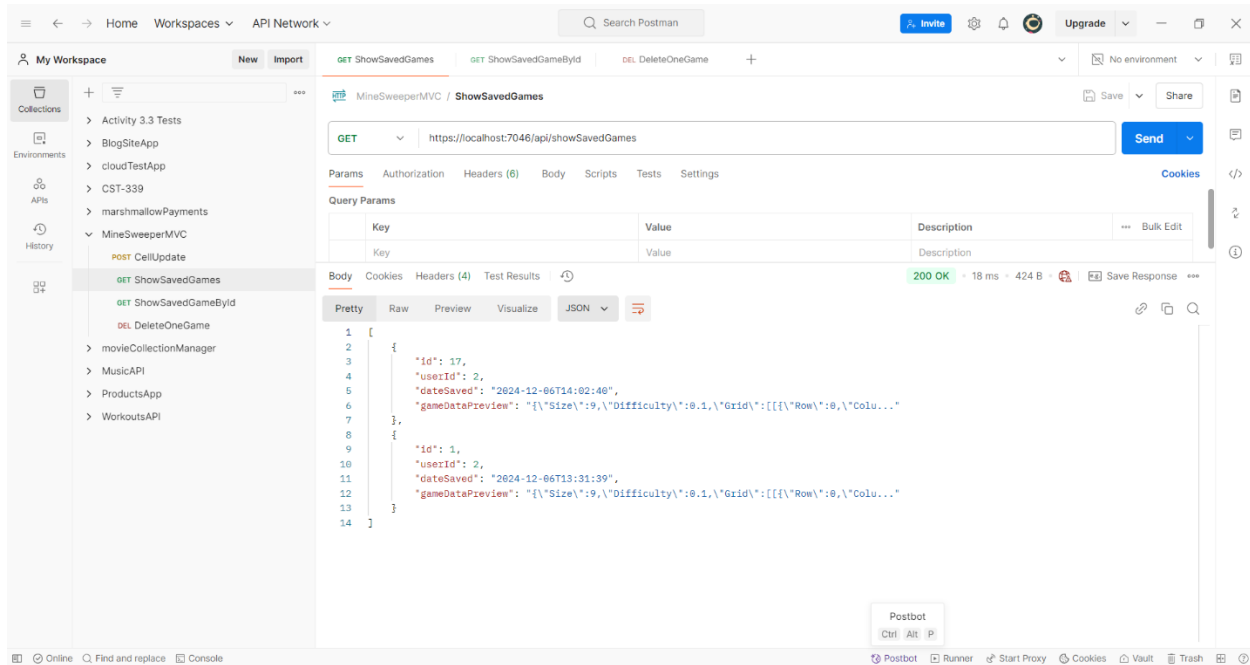


Figure 13 This screenshot confirms the successful deletion of a saved game via the REST API.

Summary of Key Concepts

In Milestone 4, I focused on enhancing the MinesweeperMVC application by implementing features for saving and restoring game progress, along with REST API functionality. I added a "Save Game" button that serializes the game state, including the game board and user information, and stores it in a database. Additionally, I created a user-friendly interface that allows users to view, load, or delete saved games. On the backend, I developed RESTful API endpoints to list all saved games, retrieve specific games by ID, and delete games from the database. These enhancements allowed me to integrate data serialization, database operations, and REST API development into a single cohesive project. This milestone not only helped me solidify my understanding of these core concepts but also gave me valuable hands-on experience in building dynamic applications with robust backend services in ASP.NET Core.