GovTech SupplyAlly SWE Challenge

Creator: Travis Tan

Date: 14 April 2021

Position Applying For: Software Engineering Intern

Department: SupplyAlly

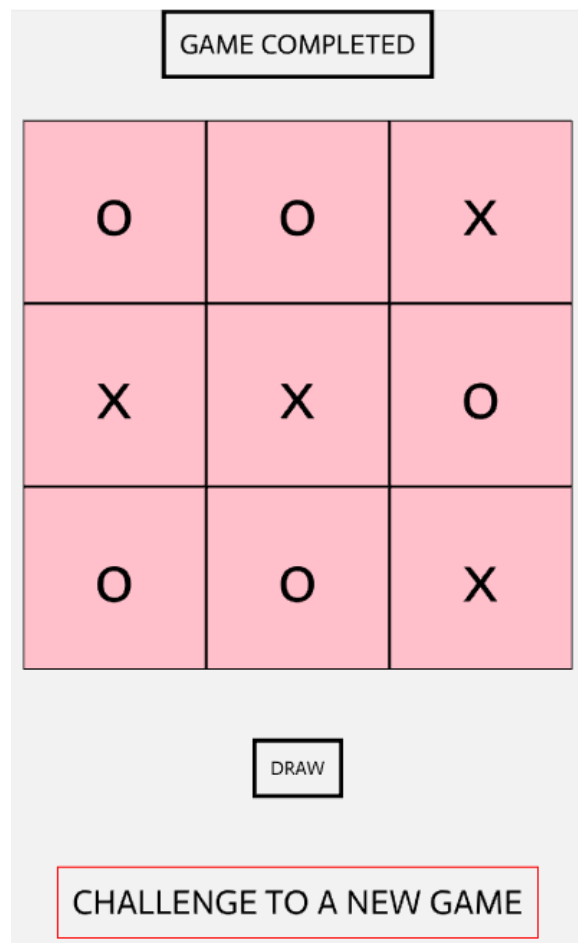Description: Serverless Multiplayer Tic Tac Toe Mobile App

Table Of Contents

1. Introduction

Firstly, I would like to thank GovTech for giving me the opportunity to work on this assignment.

I did not have any experience with serverless architecture or React Native prior to this assignment and I went with AWS Amplify after some research for the serverless backend as it was easier to set up and dive right into development. This is also the first time I've developed a mobile application.

I have learnt a lot these past 7 days albeit facing many challenging tasks and countless hours spent debugging. Aside from the development regarding the frontend and serverless architecture, I have definitely improved my committing and branching standards on GitHub and at Git cherrypicking.

I am very much looking forward to working in GovTech's SupplyAlly team and being a GovTechie. GovTech has been my number one choice to do my internship with due to the numerous technologies they've developed that I use in my daily life and as such I would love to play a part in contributing towards these apps that other Singaporeans use within their daily lives as well.

I look forward to being guided by the full time software engineers in the team to learn better coding practices and to contribute to the local community by helping with the development of apps that assist local retailers and distributors.

The main learning outcomes I wish to takeaway from this internship are:

1. The culture and environment of writing software in a large tech company
2. Unit Testing with Jest
3. CI/CD pipelines
4. Mobile app development
5. UI/UX design
6. Software engineering practices
7. Collaboration within a team

As it wasn't stated in my resume submission, my commitment for this internship will be a minimum of 12 weeks (3 months) or 6 months if allowed and beyond should GovTech allow me to continue on.

2. Assumptions With Regards To The Assignment

- There will be multiple players playing the game at the same time.

- Live updates have to be handled for each move.

- User authentication is required to link each move with a certain player stored in the database.

- All data will be stored inside a NoSQL database, DynamoDB in this case.

3. Infrastructure Choices

I developed this app on a Mac using Visual Studio Code and version control using Git and GitHub.

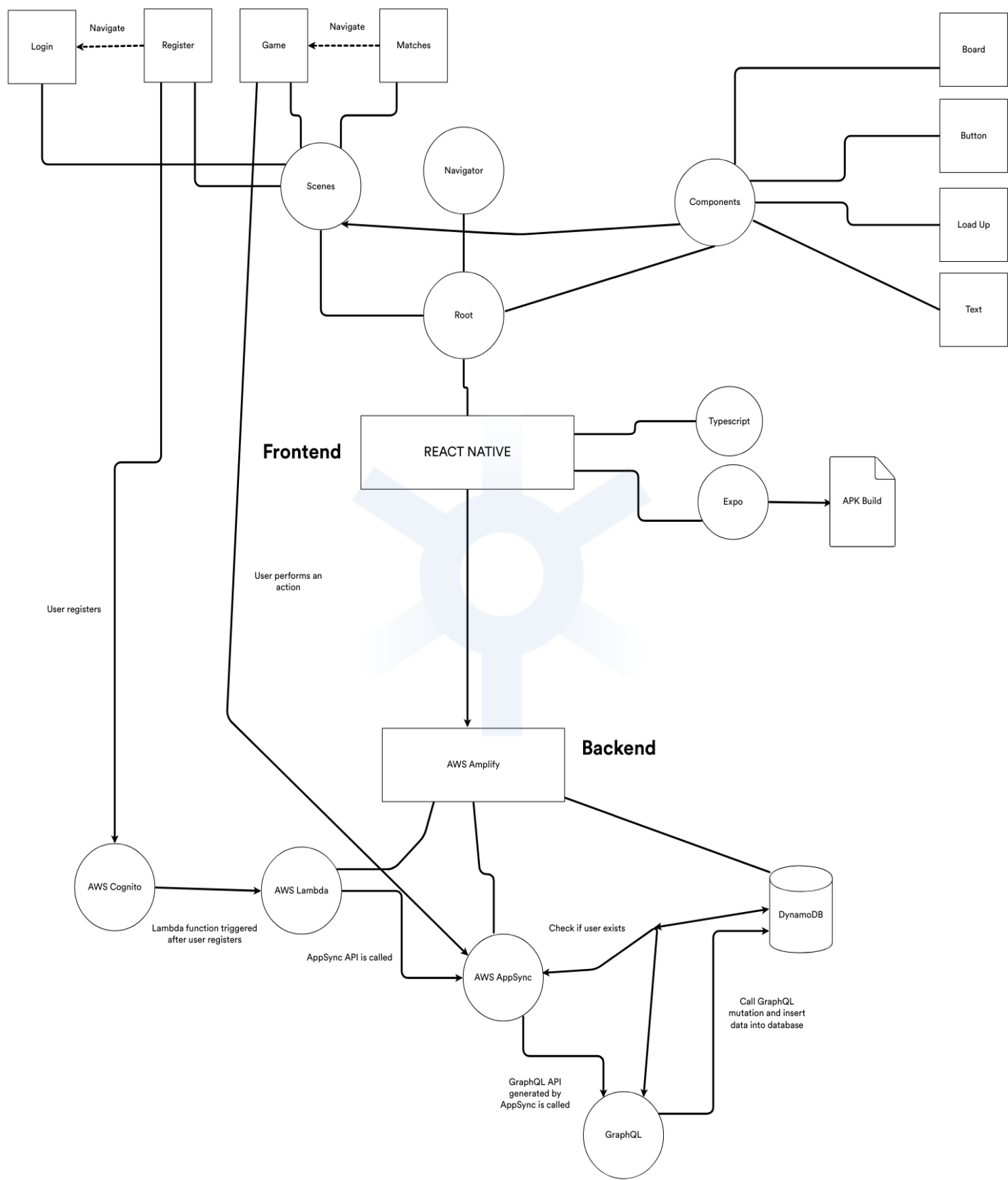Frontend:
- Typescript, React Native, Expo.
Typescript was utilized to enable strong static typing during development and to ensure that errors would be detected before runtime.

Backend:
- AWS Amplify comprising AWS Cognito, AWS Lambda, AWS AppSync, GraphQL, DynamoDB.

I went with AWS Amplify because I could get it up and running quickly by installing the Amplify CLI in my development environment which gave me the benefits of the AWS Services required for a serverless architecture with Lambda functions being added at ease through the Amplify cli and GraphQL schemas being auto generated for me.

4. Infrastructure Diagram

Login

Register

Game

Matches

Navigate

Navigate

Board

Button

Load Up

Text

Scenes

Navigator

Components

Root

Frontend

REACT NATIVE

Typescript

Expo

APK Build

User performs an
action

Backend

AWS Amplify

User registers

AWS Cognito

AWS Lambda

Lambda function triggered
after user registers

AppSync API is called

AWS AppSync

Check if user exists

DynamoDB

Call GraphQL
mutation and insert
data into database

GraphQL API
generated by
AppSync is called

GraphQL

5. API Specifications To Production Endpoints And Sample Data

- I will be using Postman for this.

- Use POST Request and GraphQL in the body section with my GraphQL endpoint,

https://pcvm6mlto5euvlhm54voqmu6ta.appsync-api.eu-west-2.amazonaws.com/graphql

- Under Authorization,

Select AWS Signature Type and add authorization data to Request Headers

Enter the Access and Secret Key generated from AWS Amplify configuration (using my personal keys in this case).

Enter eu-west-2 for AWS Region (for my case since I was using Europe West)

Enter appsync for Service Name

| Params | Authorization ● | Headers (11) | Body ● | Pre-request Script | Tests | Settings | | Cookies |

| Type | | AWS Signature ⌄ | | ⚠ Heads up! These parameters hold sensitive data. To keep this data secure while working in a collaborative environment, we recommend using variables. Learn more about variables ↗ | ✕ |

The authorization header will be automatically generated when you send the request. Learn more about authorization ↗

Add authorization data to | Request Headers ⌄

AccessKey | AKIASCO2G2P6F6EXUSXO

SecretKey | s8lSvlOugVGjx0jM34rVL1XmO5TMv05536(...

⌄ ADVANCED

These are advanced configuration options. They are optional. Postman will auto generate values for some fields if left blank.

AWS Region ⓘ | eu-west-2

Service Name ⓘ | appsync

Session Token ⓘ | Session Token

Search Postman

Invite

Upgrade

POST https://pcvm6mlt... ●   +   ooo

No Environment

https://pcvm6mlto5euvlhm54voqmu6ta.appsync-api.eu-west-2.amazonaws.com/graphql

Save

POST   https://pcvm6mlto5euvlhm54voqmu6ta.appsync-api.eu-west-2.amazonaws.com/graphql   Send

Params   Authorization ●   Headers (11)   Body ●   Pre-request Script   Tests   Settings   Cookies

none   form-data   x-www-form-urlencoded   raw   binary   GraphQL   No schema

QUERY

```
1   query MyQuery {
2     listGames {
3       items {
4         id
5         owners
6         state
7         status
8         turn
9         winner
10      }
11    }
12  }
13
```

GRAPHQL VARIABLES ⓘ

```
1
```

Body   Cookies   Headers (11)   Test Results   Status: 200 OK   Time: 771 ms   Size: 8.57 KB   Save Response

Pretty   Raw   Preview   Visualize   JSON

```
2       "data": {
3           "listGames": {
4               "items": [
5                   {
6                       "id": "6e23e9d7-da1f-4b62-9dc4-d64fef74ced9",
7                       "owners": [
8                           "test4",
9                           "test5"
10                      ],
11                      "state": [
12                          null,
13                          null,
14                          null,
15                          null,
16                          null,
17                          null,
18                          null,
19                          null,
20                          null
21                      ],
22                      "status": "REQUESTED",
23                      "turn": "test4",
```

Bootcamp   Runner   Trash

```
25                      },
26                      {
27                          "id": "9f4a3538-8eab-4f45-966d-ad14fd13a104",
28                          "owners": [
29                              "player2",
30                              "player1"
31                          ],
32                          "state": [
33                              null,
34                              "o",
35                              null,
36                              null,
37                              "o",
38                              "x",
39                              null,
40                              "o",
41                              "x"
42                          ],
43                          "status": "FINISHED",
44                          "turn": "player2",
45                          "winner": "player1"
46                      },
47                      {
```

Sample GraphQL Query to list all games in AWS AppSync Console

Sample GraphQL Mutation to make a move in an active game with move stored in DynamoDB

Sample GraphQL Subscription to subscribe and listen to game updates

Amazon Cognito User Pool - eu-west-2_Z6y5PCSJj ▼

Explorer ✕

Subscription ▼ +

subscription **MySubscription**

▶ onCreateGame
▶ onCreatePlayer
▶ onCreatePlayerGame
▶ onDeleteGame
▶ onDeletePlayer
▶ onDeletePlayerGame
▶ onUpdateGame
▼ onUpdateGameById
  ☑ id*: 4e604c9d-d2cc-4f0
  ☐ createdAt
  ☑ id
  ☐ initiator
  ☐ owners
    ▶ players
  ☑ state
  ☑ status
  ☑ turn
  ☐ updatedAt
  ☑ winner
▶ onUpdatePlayer
▶ onUpdatePlayerGame

■ Logout player1 ⟳ Subscribed to 1 mutation(s) ⓘ

```
 1 ▾ subscription MySubscription {
 2 ▾   onUpdateGameById(id: "4e604c9d-d2cc-4f04-a4e6-0c66495262e2") {
 3       id
 4       state
 5       status
 6       turn
 7       winner
 8     }
 9   }
10
```

After a GraphQL mutation happens

Explorer ✕

Subscription ▼ +

subscription **MySubscription**

▶ onCreateGame
▶ onCreatePlayer
▶ onCreatePlayerGame
▶ onDeleteGame
▶ onDeletePlayer
▶ onDeletePlayerGame
▶ onUpdateGame
▼ onUpdateGameById
  ☑ id*: 4e604c9d-d2cc-4f0
  ☐ createdAt
  ☑ id
  ☐ initiator
  ☐ owners
    ▶ players
  ☑ state
  ☑ status
  ☑ turn
  ☐ updatedAt
  ☑ winner
▶ onUpdatePlayer
▶ onUpdatePlayerGame

■ Logout player1 ⟳ Subscribed to 1 mutation(s) ⓘ

```
 1 ▾ subscription MySubscription {
 2 ▾   onUpdateGameById(id: "4e604c9d-d2cc-4f04-a4e6-0c66495262e2") {
 3       id
 4       state
 5       status
 6       turn
 7       winner
 8     }
 9   }
10
```

```
▾ {
▾   "data": {
▾     "onUpdateGameById": {
        "id": "4e604c9d-d2cc-4f04-a4e6-0c66495262e2",
▾       "state": [
          null,
          null,
          "x",
          "x",
          null,
          null,
          null,
          "o",
          null
        ],
        "status": "ACTIVE",
        "turn": "player1",
        "winner": null
      }
    }
  }
```

Data of players registered in DynamoDB

Player-rjivonlmwvepvoiyhgtgijanra-dev   Close

Overview | Items | Metrics | Alarms | Capacity | Indexes | Global Tables | Backups | Contributor Insights | Triggers | Access control | Tags

Create item | Actions ▾

Scan: [Table] Player-rjivonlmwvepvoiyhgtgijanra-dev: use…   Viewing 1 to 18 items

Scan ▾ | [Table] Player-rjivonlmwvepvoiyhgtgijanra-dev: username ▾ | ⌃

➕ Add filter

Start search

	username ⓘ	__typename	cognitoID	createdAt	email	id	nam
☐	john	Player	gge	2021-04-11T11:44:15.386Z	test2@test.com	19319e28-877e-4387-b59a-bf45fcf747b8	john
☐	john2	Player	gge	2021-04-11T11:44:31.342Z	test2@test.com	61a2bac6-9a5b-4446-817f-37ffa7c39106	john
☐	johndo	Player	e4bf7cab-4792-4f08-a401-30abdbf0b199	2021-04-11T22:25:15.435Z	ilenerdee@gmail.com	b9f815a2-4f5f-461c-8978-ce058ef5f227	john
☐	mike2	Player	gge	2021-04-11T11:44:39.619Z	test2@test.com	7bd0eaa4-8d9a-4f7a-84a1-24eae6708b11	mike
☐	okay	Player	77ad5c15-830e-43f9-8671-5b8bc796256a	2021-04-11T21:29:42.007Z	67hufflepuff@gmail.com	f9835b37-c996-4d66-9598-674e8980b759	lea
☐	player1	Player	294aa344-c302-4b43-98ab-85726b0fb76c	2021-04-11T13:17:32.832Z	ilenerdee@gmail.com	e6ea8806-e36c-47f2-978a-1084112a2482	Play
☐	player2	Player	9b79e4b2-ce11-4a25-aabc-9b248f5652e2	2021-04-11T13:18:07.601Z	ilenerdee@gmail.com	d89e5042-dcde-4a41-b796-66517cf3cc30	Play
☐	test	Player	gge	2021-04-11T11:43:52.177Z	test@test.com	51c5fbd5-7299-468a-ae72-9981499bdf06	john
☐	test2	Player	6c040f37-e846-4bbc-835f-72e72c7e605b	2021-04-11T13:00:47.498Z	ilenerdee@gmail.com	0bb0a152-aff9-4f0e-aca0-b928e290ec12	Test
☐	test4	Player	c1ca6586-9dbb-4984-bc3e-726513024e8a	2021-04-10T11:46:41.815Z	ilenerdee@gmail.com	6b35fcfc-89a2-4e97-83ed-f49ab6897ad2	test
☐	test5	Player	eabb021c-7bb7-4faf-948f-e9a4e1c7b56b	2021-04-10T11:58:29.962Z	ilenerdee@gmail.com	2b83f2ea-79d9-490f-8312-2ecea94f1566	test
☐	test7	Player	2e4a9f50-6376-43f7-bdd2-2d48c881f3e7	2021-04-10T12:13:51.375Z	ilenerdee@gmail.com	87b63cda-f693-4a6e-9074-9cd0c69e87ad	test
☐	travistester	Player	e1cb9cca-1682-407b-a6da-a9874c632790	2021-04-13T13:07:17.330Z	ilenerdee@gmail.com	750b8482-c8b8-4208-a9ae-d4b181d0788b	Travi
☐	travistester2	Player	1f2c60aa-c830-4549-97e3-bf69464cc469	2021-04-13T13:08:42.849Z	ilenerdee@gmail.com	154096df-f49f-4bf6-a3ef-b1a824ae8ad1	travis
☐	travistesting	Player	41a3e969-4869-4fac-8475-a6d1c0f08a59	2021-04-13T13:14:32.222Z	ilenerdee@gmail.com	c49b45b9-a8dd-4d29-ad18-7ef7efa4c2cf	Tra

Data of games created by users

PlayerGame-rjivonlmwvepvoiyhgtgijanra-dev   Close

Overview | Items | Metrics | Alarms | Capacity | Indexes | Global Tables | Backups | Contributor Insights | Triggers | Access control | Tags

Create item | Actions ▾

Scan: [Table] PlayerGame-rjivonlmwvepvoiyhgtgijanra-de…   Viewing 1 to 86 items

Scan ▾ | [Table] PlayerGame-rjivonlmwvepvoiyhgtgijanra-dev: id ▾ | ⌃

➕ Add filter

Start search

	id ⓘ	__typename	createdAt	gameID	owners
☐	00508c9c-cdcf-426e-a328-147550292be1	PlayerGame	2021-04-11T22:01:16.684Z	9f4a3538-8eab-4f45-966d-ad14fd13a104	[{ "S" : "player2" }, { "S" : "player1" }]
☐	023af522-7ffd-4c96-a557-3226554046fd	PlayerGame	2021-04-13T13:16:54.475Z	1aeeb7d8-50ca-422f-9930-491eacc898f4	[{ "S" : "travistesting" }, { "S" : "travistesting2" }]
☐	06f7c691-56a8-4b43-8331-017624d59112	PlayerGame	2021-04-11T18:43:38.692Z	6ae79fc0-310c-4094-b24f-9509c916681b	[{ "S" : "player1" }, { "S" : "player2" }]
☐	0b7a032c-3207-4ac3-aea2-d6dc5f62a119	PlayerGame	2021-04-11T10:31:40.380Z	6505e6d0-0721-4151-b9c1-10657d5cdebe	[{ "S" : "test4" }, { "S" : "test5" }]
☐	0c01e445-1d85-40e7-9fb7-6f04b6d7cca5	PlayerGame	2021-04-11T13:19:33.087Z	7d8e0984-57e4-41de-b1a4-c078c2d5f4ae	[{ "S" : "player1" }, { "S" : "player2" }]
☐	0ea37381-8d9e-475d-8ad5-f53db986dc7c	PlayerGame	2021-04-11T21:41:14.051Z	97d8e6c3-73eb-4ea1-9068-bb448cfc2db9	[{ "S" : "player2" }, { "S" : "player1" }]
☐	0f75483d-af12-4ae3-afd2-f91295e3f7de	PlayerGame	2021-04-11T18:43:38.835Z	6ae79fc0-310c-4094-b24f-9509c916681b	[{ "S" : "player1" }, { "S" : "player2" }]
☐	1059f90e-4f5a-4336-bb42-f964bd7c3fa1	PlayerGame	2021-04-12T02:59:20.539Z	d6567940-b174-4a7c-bad2-3d4d7e18c243	[{ "S" : "yeoster" }, { "S" : "yonglolz" }]
☐	10dd8d03-d841-40a7-8336-505181d1280e	PlayerGame	2021-04-13T13:16:54.564Z	1aeeb7d8-50ca-422f-9930-491eacc898f4	[{ "S" : "travistesting" }, { "S" : "travistesting2" }]
☐	12badf09-de8b-4302-bdba-ff4da53ab933	PlayerGame	2021-04-11T18:37:40.412Z	28c8e2e2-4829-465b-b34a-a6e3ca2e8f7e	[{ "S" : "player1" }, { "S" : "player2" }]
☐	157f69b0-5af9-4ef0-b8c8-acf452a06ea4	PlayerGame	2021-04-11T21:30:55.518Z	889901ab-17b7-4d9a-a1e2-ebfbda710b58	[{ "S" : "okay" }, { "S" : "player1" }]
☐	16773ee9-d9c1-407d-bf14-bad54a268f49	PlayerGame	2021-04-11T22:02:59.877Z	986bd06a-f736-4c33-b63d-47248e9c6a99	[{ "S" : "okay" }, { "S" : "player1" }]
☐	193e43d8-1e8a-4d43-86b3-31604658c592	PlayerGame	2021-04-11T18:42:57.776Z	28b7a003-e628-43ac-be7d-29444d05c8d0	[{ "S" : "player1" }, { "S" : "player2" }]
☐	1c361019-f000-4e6f-a157-ce8015c2b6a6	PlayerGame	2021-04-11T23:06:43.327Z	2909637f-2c54-465a-b7e8-7ec713d15d25	[{ "S" : "player1" }, { "S" : "johndo" }]
☐	1edfa8c7-d206-4b93-98e5-452da7bc2fb	PlayerGame	2021-04-11T18:38:52.843Z	0365e825-d1eb-4ca4-a9ef-8662a773b034	[{ "S" : "player1" }, { "S" : "player2" }]

Data of moves made by each player in each game in the "state" category

Game-rjivonlmwvepvoiyhgtgijanra-dev   Close

Overview | **Items** | Metrics | Alarms | Capacity | Indexes | Global Tables | Backups | Contributor Insights | Triggers | Access control | Tags

Create item   Actions ⌄

Scan: [Table] Game-rjivonlmwvepvoiyhgtgijanra-dev: id ⌃   Viewing 1 to 43 items

Scan ⌄   [Table] Game-rjivonlmwvepvoiyhgtgijanra-dev: id   ⌄   ⌃

⊕ Add filter

Start search

	id	__typename	createdAt	initiator	owners	state
☐	889901ab-17b7-4d9a-a1e2-ebfbda710b58	Game	2021-04-11T21:30:55.163Z	okay	[{ "S" : "okay" }, { "S" : "player1" }]	[{ "S" : "x" }, { "S" : "x" }, { "S" : "x" }, { "NULL" : true }.
☐	986bd06a-f736-4c33-b63d-47248e9c6a99	Game	2021-04-11T22:02:59.768Z	okay	[{ "S" : "okay" }, { "S" : "player1" }]	[{ "NULL" : true }, { "NULL" : true }, { "NULL" : true }, {
☐	d512df2d-7713-40cc-b53e-7e4ac863346d	Game	2021-04-11T21:36:52.811Z	okay	[{ "S" : "okay" }, { "S" : "player1" }]	[{ "NULL" : true }, { "S" : "o" }, { "S" : "x" }, { "S" : "x" }.
☐	2909637f-2c54-465a-b7e8-7ec713d15d25	Game	2021-04-11T23:06:43.202Z	player1	[{ "S" : "player1" }, { "S" : "johndo" }]	[{ "S" : "x" }, { "NULL" : true }, { "S" : "o" }, { "S" : "o" }.
☐	1a79e1e5-0850-45b1-a354-023986457058	Game	2021-04-11T22:02:38.374Z	player1	[{ "S" : "player1" }, { "S" : "okay" }]	[{ "S" : "o" }, { "S" : "x" }, { "S" : "x" }, { "NULL" : true }.
☐	6b746850-9965-4c6d-b57b-3068bb28da96	Game	2021-04-11T21:31:41.655Z	player1	[{ "S" : "player1" }, { "S" : "okay" }]	[{ "S" : "x" }, { "S" : "x" }, { "S" : "o" }, { "NULL" : true }.
☐	0365e825-d4eb-4ca4-a9ef-9662a773b034	Game	2021-04-11T18:38:52.633Z	player1	[{ "S" : "player1" }, { "S" : "player2" }]	[{ "NULL" : true }, { "NULL" : true }, { "NULL" : true }, {
☐	114bcdb9-6b03-4255-aed3-f410b122933d	Game	2021-04-11T18:37:16.505Z	player1	[{ "S" : "player1" }, { "S" : "player2" }]	[{ "NULL" : true }, { "NULL" : true }, { "NULL" : true }, {
☐	2326c132-aaaa-463a-b320-71253f827406	Game	2021-04-11T22:19:08.972Z	player1	[{ "S" : "player1" }, { "S" : "player2" }]	[{ "S" : "o" }, { "S" : "o" }, { "NULL" : true }, { "S" : "x" }.
☐	24b6dee6-e6e1-4229-9f5e-477b3406d5f8	Game	2021-04-11T18:43:58.976Z	player1	[{ "S" : "player1" }, { "S" : "player2" }]	[{ "S" : "x" }, { "S" : "o" }, { "NULL" : true }, { "S" : "x" }.
☐	28b7a003-e628-43ac-be7d-29444d05c8d0	Game	2021-04-11T18:42:57.629Z	player1	[{ "S" : "player1" }, { "S" : "player2" }]	[{ "S" : "o" }, { "NULL" : true }, { "NULL" : true }, { "NULL
☐	28c8e2e2-4829-465b-b34a-a6e3ca2e8f7e	Game	2021-04-11T18:37:40.119Z	player1	[{ "S" : "player1" }, { "S" : "player2" }]	[{ "NULL" : true }, { "NULL" : true }, { "NULL" : true }, {
☐	37c79b50-ab29-4729-a6b5-1bf1209e2010	Game	2021-04-11T19:42:19.828Z	player1	[{ "S" : "player1" }, { "S" : "player2" }]	[{ "S" : "x" }, { "NULL" : true }, { "NULL" : true }, { "S" :
☐	4c74ae00-55b7-45f9-9522-3dc0900f0d08	Game	2021-04-11T13:19:27.110Z	player1	[{ "S" : "player1" }, { "S" : "player2" }]	[{ "NULL" : true }, { "NULL" : true }, { "NULL" : true }, {