The URL where my application is deployed on GCP: https://final-project-hanho.uc.r.appspot.com

The URL for account creation/login: https://final-project-hanho.uc.r.appspot.com

Final Project

CS 493: Cloud Application Development

Fall 2022

Oregon State University

Last Update: Nov 22

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Change log

Version	Change	Date
1.0	Initial version	Nov 22, 2022

Data Model

The app stores two kinds of non-user entities in Datastore, Boats and Loads, and one kind of user entity, users.

Users

Property	Data Type	Notes
id	Integer	The id of the user. Datastore automatically generates it.
unique_id	String	The unique id of the user (the value of "sub" from the JWT).
		Required when creating a user.

Boats

Property	Data Type	Notes
id	Integer	The id of the boat. Datastore automatically generates it.
name	String	Name of the boat. Required in the request body field when creating a boat. A valid value is a string that shows the name of the boat.
type	String	Type of the boat. E.g., Sailboat, Catamaran, etc. Required in the request body field when creating a boat. A valid value is a string that shows the type of the boat.
length	Integer	The length of the boat in feet. Required in the request body field when creating a boat. A valid value is an integer that shows the length of the boat in feet.
loads	List	Loads that are assigned to the boat. Many loads can be assigned to one boat. If there are loads on the boat, it displays the ids and self links of those loads. Otherwise, it is an empty list.
owner	String	The owner's unique id (the value of "sub" from the JWT). Each boat is owned by a user.

Loads

Property	Data Type	Notes
id	Integer	The id of the load. Datastore automatically generates it.
volume	Integer	The volume of the load. Required in the request body field when creating a load. A valid value is an integer that shows the volume of the load.
carrier	Dictionary	If the load is assigned to a boat, it displays the id, name, and self link of the boat. Otherwise, null.
item	String	Items in the load. Required in the request body field when creating a load. A valid value is a string that shows the items in the load.
creation_date	String	Date the load was created. Required in the request body field when creating a load. A valid value is a string that shows the date the load was created.

Relationship between the non-user entities:

A boat can have zero, one, or more loads on it. A load can only be assigned to one boat.

Modelling the user entity:

- Unique identifier of a user:
 - the value of "sub" from the JWT
- The request needs to supply a user identifier, what needs to be specified by the person: A valid JWT needs to be provided when making a request.
- How the application maps a supplied JWT to the identifier of a user: It uses the value of "sub" from the JWT provided to map the identifier of a user.
- The relationship between the user entity and non-user entity:
 A boat is owned by a user. A user can own multiple boats.

View all Users

View all the users. It is not protected and does not require a JWT.

GET/users

Request

Path Parameters

None

Request Body

None

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes
Success	200 OK	
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, users will not be returned, and 406 status code will be returned.

Response Examples

Success

```
Status: 406 Not Acceptable

{
    "Error": "Accept-Type not supported"
}
```

Create a Boat

Allows you to create a new boat. It is protected and requires a valid JWT corresponding to the relevant user.

POST /boats

Request

Path Parameters

None

Authorization

JWT

Request Body

Required

Request Body Format

JSON

Request JSON Attributes

Name	Description	Required?
name	The name of the boat. A valid value is a string that shows the name of the boat.	Yes
type	The type of the boat. E.g., Sailboat, Catamaran, etc. A valid value is a string that shows the type of the boat.	Yes
length	Length of the boat in feet. A valid value is an integer that shows the length of the boat in feet.	Yes

Request Body Example

```
{
   "name": "Sea Witch",
   "type": "Catamaran",
   "length": 28
}
```

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes
Success	201 Created	
Failure	401 Unauthorized	If JWT is missing, the boat will not be created, and 401 status code will be returned.
Failure	401 Unauthorized	If JWT is not valid, the boat will not be created, and 401 status code will be returned.
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, the boat will not be

		created, and 406 status code will be returned.
Failure	400 Bad Request	If the request is missing any of the 3 required attributes, the boat will not be created, and 400 status code will be returned.

Response Examples

- Datastore will automatically generate an ID and store it with the entity being created. The app will send back this value in the response body as shown in the example.
- The value of the attribute loads is the loads that are on the boat. If there are no loads on the boat, the value of loads is an empty list. All newly created boats are not loaded.
- The value of the attribute self is the link that goes to the most direct location to find that resource.

Success

```
Status: 201 Created

{
    "id": 123,
    "name": "Sea Witch",
    "type": "Catamaran",
    "length": 28,
    "loads": [],
    "owner": "123456",
    "self": "https://appspot.com/boats/123"
}
```

```
Status: 401 Unauthorized

{
    "Error": "JWT is missing"
}
Status: 401 Unauthorized

{
    "Error": "JWT is invalid"
}
Status: 406 Not Acceptable

{
    "Error": "Accept-Type not supported"
}
Status: 400 Bad Request

{
    "Error": "The request object is missing at least one of the required attributes"
}
```

View a Boat

Allows you to get an existing boat. It is protected and requires a valid JWT corresponding to the relevant user.

GET /boats/:boat_id

Request

Path Parameters

Name	Description
boat_id	ID of the boat

Authorization

JWT

Request Body

None

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes
Success	200 OK	
Failure	401 Unauthorized	If JWT is missing, the boat will not be returned, and 401 status code will be returned.
Failure	401 Unauthorized	If JWT is not valid, the boat will not be returned, and 401 status code will be returned.
Failure	404 Not Found	No boat with this boat_id exists
Failure	403 Forbidden	If the boat does not belong to this owner, the boat will not be returned, and 403 status code will be returned.
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, the boat will not be returned, and 406 status code will be returned.

Response Examples

Success

```
Status: 200 OK

{
    "id": 123,
    "name": "Sea Witch",
    "type": "Catamaran",
    "length": 28,
    "loads": [],
    "owner": "123456",
    "self": "https://appspot.com/boats/123"
}
```

```
Status: 401 Unauthorized

{
    "Error": "JWT is missing"
}
Status: 401 Unauthorized

{
    "Error": "JWT is invalid"
}
Status: 404 Not Found

{
    "Error": "No boat with this boat_id exists"
}
Status: 403 Forbidden

{
    "Error": "Sorry you are not the owner"
}
Status: 406 Not Acceptable

{
    "Error": "Accept-Type not supported"
}
```

View all Boats

View all the boats. It is protected and requires a valid JWT corresponding to the relevant user.

GET/boats

Request

Path Parameters

Name	Description
limit	5; five boats per page
offset	0; skip zero boats

Authorization

JWT

Request Body

None

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes	
Success	200 OK		
Failure	401 Unauthorized	If JWT is missing, boats will not be returned, and 401 status code will be returned.	
Failure	401 Unauthorized	If JWT is not valid, boats will not be returned, and 401 status code will be returned.	
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, boats will not be returned, and 406 status code will be returned.	

Response Examples

• It implements pagination using offsets and limits, and it returns 5 boats per page.

Success

```
Status: 401 Unauthorized

{
    "Error": "JWT is missing"
}

Status: 401 Unauthorized

{
    "Error": "JWT is invalid"
}

Status: 406 Not Acceptable

{
    "Error": "Accept-Type not supported"
}
```

Edit a Boat (PUT)

Allows you to edit a boat. It is protected and requires a valid JWT corresponding to the relevant user.

PUT /boats/:boat_id

Request

Path Parameters

Name	Description
boat_id	ID of the boat

Authorization

JWT

Request Body

Required

Request Body Format

JSON

Request JSON Attributes

Name	Description	Required?
name	The name of the boat. A valid value is a string that shows the name of the boat.	Yes
type	The type of the boat. E.g., Sailboat, Catamaran, etc. A valid value is a string that shows the type of the boat.	Yes
length	Length of the boat in feet. A valid value is an integer that shows the length of the boat in feet.	Yes

Request Body Example

```
"name": "Sea Witch",
   "type": "Catamaran",
   "length": 30
}
```

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes	
Success	200 OK		
Failure	401 Unauthorized	If JWT is missing, the boat will not be updated, and 401 status code will be returned.	
Failure	401 Unauthorized	If JWT is not valid, the boat will not be updated, and 401 status code will be returned.	
Failure	404 Not Found	No boat with this boat_id exists	
Failure	403 Forbidden	If the boat does not belong to this owner, the boat will not be updated, and 403 status code will be returned.	

Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is	
		not included in the Accept header, the boat will not be	
		updated, and 406 status code will be returned.	
Failure	400 Bad Request	If the request is missing any of the 3 required attributes, the	
		boat will not be updated, and 400 status code will be	
		returned.	

Response Examples

Success

```
Status: 200 OK

{
    "id": 123,
    "name": "Sea Witch",
    "type": "Catamaran",
    "length": 30,
    "loads": [],
    "owner": "123456",
    "self": "https://appspot.com/boats/123"
}
```

```
Status: 401 Unauthorized

{
    "Error": "JWT is missing"
}

Status: 401 Unauthorized

{
    "Error": "JWT is invalid"
}
Status: 404 Not Found

{
    "Error": "No boat with this boat_id exists"
}
Status: 403 Forbidden

{
    "Error": "Sorry you are not the owner"
}
Status: 406 Not Acceptable

{
    "Error": "Accept—Type not supported"
}
Status: 400 Bad Request

{
    "Error": "The request object is missing at least one of the required attributes"
}
```

Edit a Boat (PATCH)

Allows you to edit a boat. It is protected and requires a valid JWT corresponding to the relevant user.

PATCH /boats/:boat_id

Request

Path Parameters

Name	Description
boat_id	ID of the boat

Authorization

JWT

Request Body

Required

Request Body Format

JSON

Request JSON Attributes

Name	Description	Required?
name	The name of the boat. A valid value is a string that shows the name of the boat.	No
type	The type of the boat. E.g., Sailboat, Catamaran, etc. A valid value is a string that shows the type of the boat.	No
length	Length of the boat in feet. A valid value is an integer that shows the length of the boat in feet.	No

Comment: At least one of the attributes above must be provided.

Request Body Example

```
{
    "name": "Sea Witch",
    "type": "Catamaran"
}
```

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes
Success	200 OK	
Failure	401 Unauthorized	If JWT is missing, the boat will not be updated, and 401
		status code will be returned.
Failure	401 Unauthorized	If JWT is not valid, the boat will not be updated, and 401
		status code will be returned.
Failure	404 Not Found	No boat with this boat_id exists
Failure	403 Forbidden	If the boat does not belong to this owner, the boat will not

		be updated, and 403 status code will be returned.	
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, the boat will not be updated, and 406 status code will be returned.	
Failure	400 Bad Request	If the request object is missing, the boat will not be updated, and 400 status code will be returned.	

Response Examples

Success

```
Status: 200 OK

{
    "id": 123,
    "name": "Sea Witch",
    "type": "Catamaran",
    "length": 30,
    "loads": [],
    "owner": "123456",
    "self": "https://appspot.com/boats/123"
}
```

```
Status: 401 Unauthorized

{
    "Error": "JWT is missing"
}
Status: 401 Unauthorized

{
    "Error": "JWT is invalid"
}
Status: 404 Not Found

{
    "Error": "No boat with this boat_id exists"
}
Status: 403 Forbidden

{
    "Error": "Sorry you are not the owner"
}
Status: 406 Not Acceptable

{
    "Error": "Accept—Type not supported"
}
Status: 400 Bad Request

{
    "Error": "The request object is missing"
}
```

Delete a Boat

Allows you to delete a boat. Deleting a boat will unload any loads that were loaded onto it. It is protected and requires a valid JWT corresponding to the relevant user.

DELETE /boats/:boat_id

Request

Path Parameters

Name	Description
boat_id	ID of the boat

Authorization

JWT

Request Body

None

Response

No body

Response Body Format

Success: No body

Failure: JSON

Response Statuses

Outcome	Status Code	Notes	
Success	204 No Content		
Failure	401 Unauthorized	If JWT is missing, the boat will not be deleted, and 401 status code will be returned.	
Failure	401 Unauthorized	If JWT is not valid, the boat will not be deleted, and 401 status code will be returned.	
Failure	404 Not Found	No boat with this boat_id exists	
Failure	403 Forbidden	If the boat does not belong to this owner, the boat will not be deleted, and 403 status code will be returned.	

Response Examples

Success

```
Status: 204 No Content
```

```
Status: 401 Unauthorized

{
    "Error": "JWT is missing"
}
Status: 401 Unauthorized

{
    "Error": "JWT is invalid"
```

```
Status: 404 Not Found

{
    "Error": "No boat with this boat_id exists"
}

Status: 403 Forbidden

{
    "Error": "Sorry you are not the owner"
}
```

Create a Load

Allows you to create a new load. It is not protected and does not require a JWT.

POST /loads

Request

Path Parameters

None

Request Body

Required

Request Body Format

JSON

Request JSON Attributes

Name	Description	Required?
volume	The volume of the load. A valid value is an integer that shows the volume of the load.	Yes
item	The items in the load. A valid value is a string that shows the items in the load.	Yes
creation_date	Date the load was created. A valid value is a string that shows the date the load was created.	Yes

Request Body Example

```
{
    "volume": 5,
    "item": "LEGO Blocks",
    "creation_date": "10/18/2021"
}
```

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes
Success	201 Created	
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, the load will not be created, and 406 status code will be returned.
Failure	400 Bad Request	If the request is missing attributes, the load will not be created, and 400 status code will be returned.

Response Examples

- Datastore will automatically generate an ID and store it with the entity being created. This value will be sent in the response body as shown in the example.
- The value of the attribute carrier is the boat that carries this load. If the load is not assigned to a

boat, the value of carrier will be null. All newly created loads begin unassigned to any boat.

• The value of the attribute self is the link that goes to the most direct location to find that resource.

Success

```
Status: 201 Created

{
    "id": 789,
    "volume": 5,
    "carrier": null,
    "item": "LEGO Blocks",
    "creation_date": "10/18/2021",
    "self": "https://appspot.com/loads/789"
}
```

```
Status: 406 Not Acceptable

{
    "Error": "Accept-Type not supported"
}

Status: 400 Bad Request

{
    "Error": "The request object is missing at least one of the required attributes"
}
```

View a Load

Allows you to view an existing load. It is not protected and does not require a JWT.

GET /loads/:load id

Request

Path Parameters

Name	Description
load_id	ID of the load

Request Body

None

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes
Success	200 OK	
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, the load will not be returned, and 406 status code will be returned.
Failure	404 Not Found	No load with this load_id exists

Response Examples

Success

```
Status: 200 OK

{
    "id": 789,
    "volume": 5,
    "carrier": null,
    "item": "LEGO Blocks",
    "creation_date": "10/18/2021",
    "self": "https://appspot.com/loads/789"
}
```

```
Status: 406 Not Acceptable

{
    "Error": "Accept-Type not supported"
}

Status: 404 Not Found

{
    "Error": "No load with this load_id exists"
}
```

View all Loads

View all the Loads. It is not protected and does not require a JWT.

GET /loads

Request

Path Parameters

Name	Description
limit	5; five loads per page
offset	0; skip zero loads

Request Body

None

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes
Success	200 OK	
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, loads will not be returned, and 406 status code will be returned.

Response Examples

· It implements pagination using offsets and limits, and it returns 5 loads per page.

Success

```
Status: 200 OK
   "loads": [
        "id": 789,
        "volume": 5,
        "carrier": null,
        "item": "LEGO Blocks",
        "creation_date": "10/18/2021",
"self": "https://appspot.com/loads/789"
      },
         "id": 567,
         "volume": 6,
         "carrier": {
              "id": 123,
              "name": "Sea Witch",
              "self": "https://appspot.com/boats/123"
        "item": "fruits",
"creation_date": "10/19/2021",
        "self": "https://appspot.com/loads/567"
```

```
"next": https://appspot.com/loads?limit=5&offset=5,
"total": 6
```

```
Status: 406 Not Acceptable
{
    "Error": "Accept-Type not supported"
```

Edit a Load (PUT)

Allows you to edit a boat. It is not protected and does not require a JWT.

PATCH /loads/:load_id

Request

Path Parameters

Name	Description
load_id	ID of the load

Request Body

Required

Request Body Format

JSON

Request JSON Attributes

Name	Description	Required?
volume	The volume of the load. A valid value is an integer that shows the volume of the load.	
item	The items in the load. A valid value is a string that shows the items in the load.	
creation_date	Date the load was created. A valid value is a string that shows the date the load was created.	

Request Body Example

```
{
    "volume": 15,
    "item": "LEGO Blocks",
    "creation_date": "10/18/2021"
}
```

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes
Success	200 OK	
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, the load will not be updated, and 406 status code will be returned.
Failure	400 Bad Request	If the request is missing attributes, the load will not be updated, and 400 status code will be returned.
Failure	404 Not Found	No load with this load_id exists

Response Examples

Success

Status: 200 OK

```
{
    "id": 789,
    "volume": 15,
    "carrier": null,
    "item": "LEGO Blocks",
    "creation_date": "10/18/2021",
    "self": "https://appspot.com/loads/789"
}
```

```
Status: 406 Not Acceptable

{
    "Error": "Accept-Type not supported"
}

Status: 400 Bad Request

{
    "Error": "The request object is missing at least one of the required attributes"
}

Status: 404 Not Found

{
    "Error": "No load with this load_id exists"
}
```

Edit a Load (PATCH)

Allows you to edit a boat. It is not protected and does not require a JWT.

PATCH /loads/:load_id

Request

Path Parameters

Name	Description
load_id	ID of the load

Request Body

Required

Request Body Format

JSON

Request JSON Attributes

Name	Description	
volume	The volume of the load. A valid value is an integer that shows the volume of	
	the load.	
item	The items in the load. A valid value is a string that shows the items in the	
	load.	
creation_date	Date the load was created. A valid value is a string that shows the date the	No
	load was created.	

Comment: At least one of the attributes above must be provided.

Request Body Example

```
"volume": 15,
   "item": "LEGO Blocks"
}
```

Response

Response Body Format

JSON

Response Statuses

Outcome	Status Code	Notes	
Success	200 OK		
Failure	406 Not Acceptable	The response must allow JSON. If 'application/json' is not included in the Accept header, the load will not be updated, and 406 status code will be returned.	
Failure	404 Not Found	No load with this load_id exists	
Failure	400 Bad Request	If the request object is missing, the load will not be updated, and 400 status code will be returned.	

Response Examples

Success

Status: 200 OK

```
"id": 789,
    "volume": 15,
    "carrier": null,
    "item": "LEGO Blocks",
    "creation_date": "10/18/2021",
    "self": "https://appspot.com/loads/789"
}
```

```
Status: 406 Not Acceptable

{
    "Error": "Accept-Type not supported"
}

Status: 404 Not Found

{
    "Error": "No load with this load_id exists"
}

Status: 400 Bad Request

{
    "Error": "The request object is missing"
}
```

Delete a Load

Allows you to delete a load. Deleting a load will update the boat that was carrying it. It is not protected and does not require a JWT.

DELETE /loads/:load_id

Request

Path Parameters

Name	Description	
load_id	ID of the load	

Request Body

None

Response

No body

Response Body Format

Success: No body

Failure: JSON

Response Statuses

Outcome	Status Code	Notes
Success	204 No Content	
Failure	404 Not Found	No load with this load_id exists

Response Examples

Success

Status: 204 No Content

```
Status: 404 Not Found

{
    "Error": "No load with this load_id exists"
}
```

Assign a Load to a Boat

Allows you to assign a load to a boat. It is protected and requires a valid JWT corresponding to the relevant user. If the boat does not belong to the owner provided, the load will not be loaded on this boat. If a load is already assigned to one boat, it cannot be assigned to another boat without first being removed.

PUT /boats/:boat_id/loads/:load_id

Request

Path Parameters

Name	Description
boat_id	ID of the boat
load_id	ID of the load

Authorization

JWT

Request Body

None

Response

No body

Response Body Format

Success: No body

Failure: JSON

Response Statuses

Outcome	Status Code	Notes
Success	204 No Content	Succeeds only if a boat exists with this boat_id and belongs to the owner provided, a load exists with this load_id and the load is not assigned to any boat.
Failure	401 Unauthorized	If JWT is missing, the load will not be loaded on this boat, and 401 status code will be returned.
Failure	401 Unauthorized	If JWT is not valid, the load will not be loaded on this boat, and 401 status code will be returned.
Failure	404 Not Found	The specified boat and/or load does not exist.
Failure	403 Forbidden	If the boat does not belong to this owner, the load will not be loaded on this boat, and 403 status code will be returned.
Failure	403 Forbidden	The load is already loaded on a boat.

Response Examples

Success

Status: 204 No Content

Failure

Status: 401 Unauthorized

```
{
    "Error": "JWT is missing"
}
Status: 401 Unauthorized
{
    "Error": "JWT is invalid"
}
Status: 404 Not Found
{
    "Error": "The specified boat and/or load does not exist"
}
Status: 403 Forbidden
{
    "Error": "Sorry you are not the owner"
}
Status: 403 Forbidden
{
    "Error": "The load is already loaded on a boat"
}
```

Comment:

- A load cannot be assigned to multiple boats.
- If successful, it will update the loads attribute of the boat and the carrier attribute of the load.

Remove a Load from a Boat

Allows you to remove a load from a boat. It is protected and requires a valid JWT corresponding to the relevant user. If the boat does not belong to the owner provided, the load will not be removed from this boat. Removing a load from a boat will not delete that load.

DELETE /boats/:boat_id/loads/:load_id

Request

Path Parameters

Name	Description
boat_id	ID of the boat
load_id	ID of the load

Authorization

JWT

Request Body

None

Response

No body

Response Body Format

Success: No body

Failure: JSON

Response Statuses

Outcome	Status Code	Notes
Success	204 No Content	Succeeds only if a boat exists with this boat_id and belongs to the owner provided, a load exists with this load_id and this load is assigned to this boat
Failure	401 Unauthorized	If JWT is missing, the load will not be removed from this boat, and 401 status code will be returned.
Failure	401 Unauthorized	If JWT is not valid, the load will not be removed from this boat, and 401 status code will be returned.
Failure	403 Forbidden	If the boat does not belong to this owner, the load will not be removed from this boat, and 403 status code will be returned.
Failure	404 Not Found	No boat with this boat_id is loaded with the load with this load_id. This could be because no boat with this boat_id exists, or because no load with this load_id exists, or even if both boat_id and load_id are valid, the load with this load_id is not assigned to the boat with this boat_id.

Response Examples

Success

Status: 204 No Content

```
Status: 401 Unauthorized

{
    "Error": "JWT is missing"
}
Status: 401 Unauthorized

{
    "Error": "JWT is invalid"
}
Status: 404 Not Found

{
    "Error": "The specified boat and/or load does not exist"
}
Status: 403 Forbidden

{
    "Error": "Sorry you are not the owner"
}
Status: 404 Not Found

{
    "Error": "No boat with this boat_id is loaded with the load with this load_id"
}
```

Comment:

- Removing a load from a boat will not delete that load.
- If successful, it will update the loads attribute of the boat and the carrier attribute of the load.