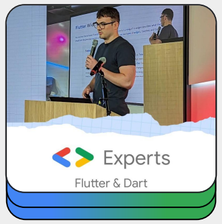
Google I/O Extended

# Fullstack Flutter




Luke Moody

Google I/O Extended

Table of Contents

Google I/O Extended

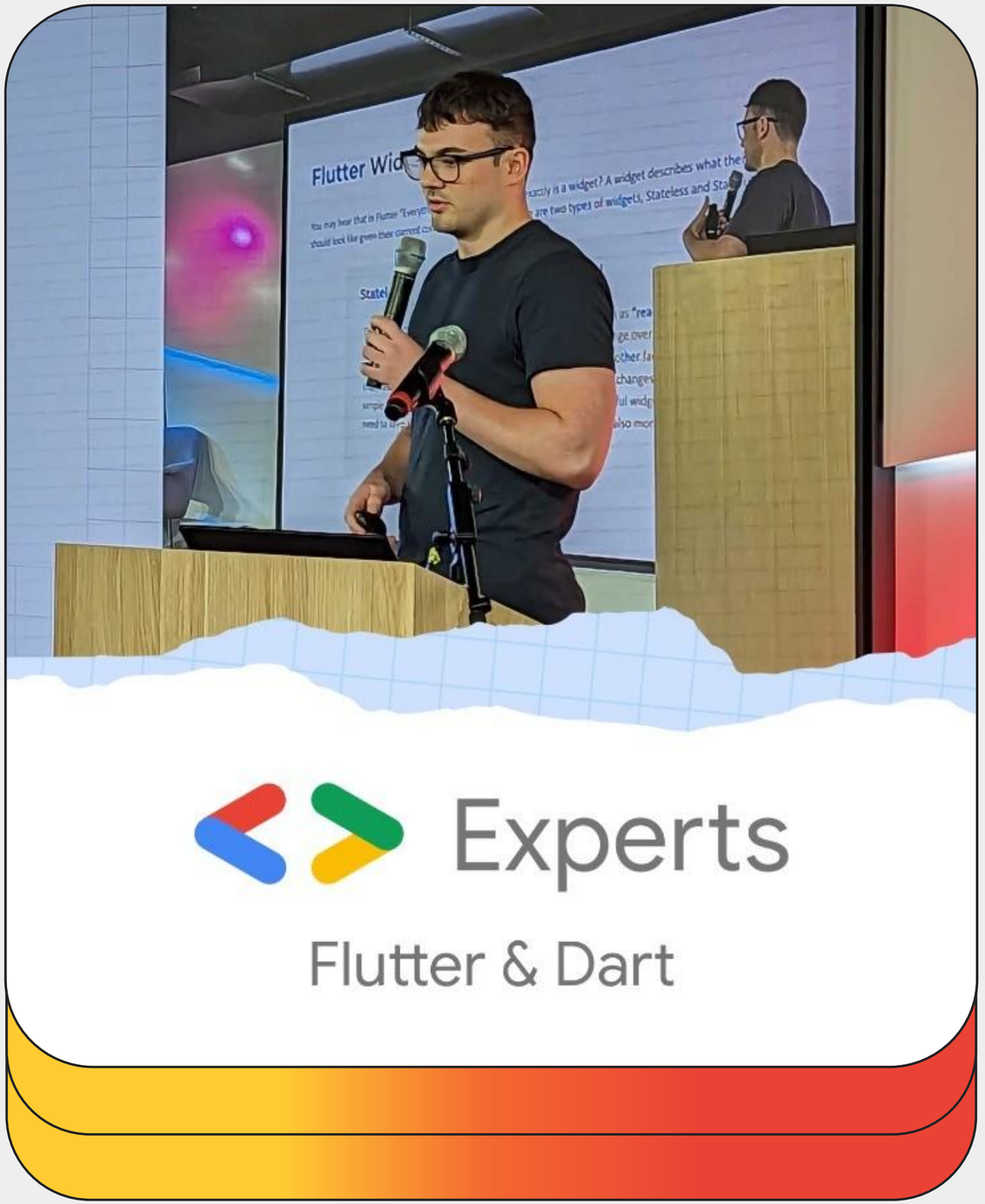
# Who am I?

Who am I?

# Luke Moody

Google Developer Expert (GDE) in Flutter & Dart, and Founder at Cleer Consulting.

We specialize in crafting robust and intuitive software applications, using Flutter, .NET, GCP, and other relevant technologies



Google I/O Extended

# BAAS options

# BAAS options

01

## Firebase

Google's Firebase is often the first stop for many when it comes to backend services, particularly for Flutter developers.

02

## Supabase

Often hailed as the open-source alternative to Firebase, Supabase aims to match the capabilities of Firebase while providing developers with the added benefits that come from an open-source solution.

03

## AWS Amplify

AWS Amplify makes it easy for Flutter developers to integrate cloud services like AWS Lambda, Amazon DynamoDB, and Amazon S3 into their applications.

BAAS options

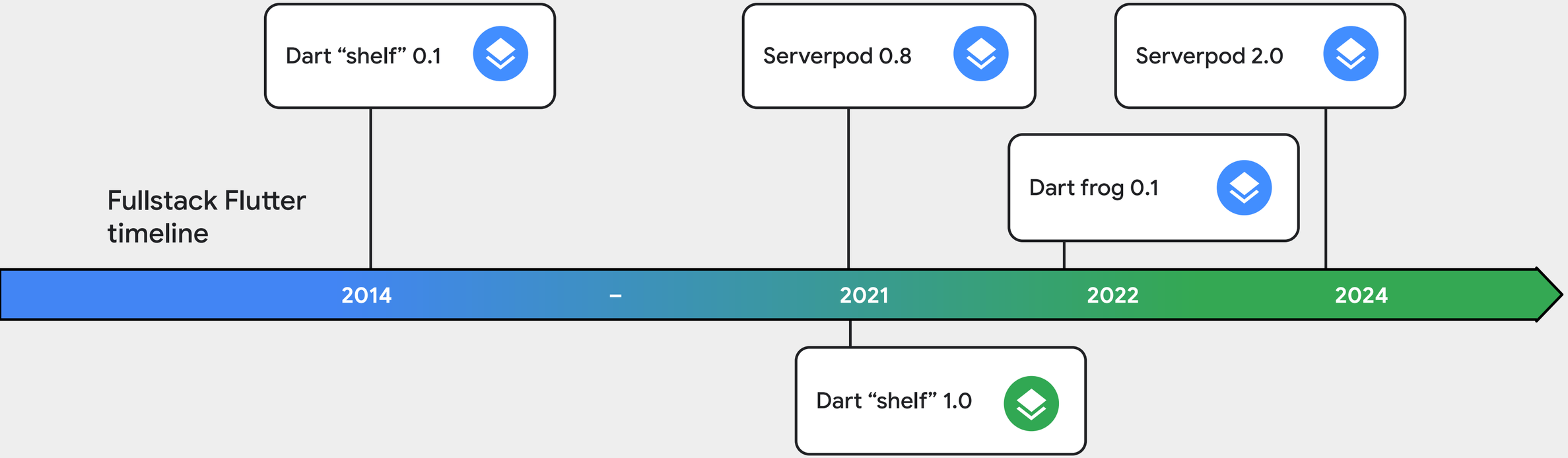
# Main drawbacks

- Different programming languages. (Such as JavaScript/TypeScript, etc)
- You end up going down the cloud functions route when wanting to add some custom backend code
- Code reuse on both front and back ends

Google I/O Extended

# What is Fullstack Flutter?

Google I/O Extended



Fullstack Flutter


Welcome to the first edition of the **Full Stack Flutter** conference, two exciting days dedicated to the vibrant Flutter community. Whether you're a seasoned developer or just starting out, this is your unique opportunity to delve deep into the ecosystem. Our focus extends beyond front-end development, covering backend solutions in Dart and a range of indispensable tools designed to enhance your Flutter experience. This event is a platform to connect and learn from leading experts and an open invitation for speakers to share their insights.

Google I/O Extended

# Serverpod

## What is it?

Serverpod

# Serverpod

“Serverpod is a next-generation app and web server, built for the Flutter community. It allows you to write your server-side code in Dart, automatically generate your APIs, and hook up your database with minimal effort. Serverpod is open-source, and you can host your server anywhere.”

serverpod 2.0.1

Published 9 days ago • serverpod.dev Dart 3 compatible

SDK DART FLUTTER PLATFORM ANDROID IOS LINUX MACOS WINDOWS 547

Readme Changelog Example Installing Versions Scores

Serverpod

## World-class logging

Stop struggling. You no longer need to search through endless server logs. Pinpoint exceptions and slow database queries in an easy-to-use user interface with a single click.

## Built-in caching

Cut down on your database costs. Don't save all your data permanently when you don't have to. Serverpod comes with a high-performance distributed cache built right in.

## Revolutionary ORM

Save time. Talking with your database can be a hassle. With Serverpod's ORM, your queries use native Dart types and null-safety. There is a straight path from your statically checked code to the database.

Serverpod

## File uploads

Upload straight to S3 or Google cloud with ease.

## Authentication

Sign in through social logins or wing your own.

## Data streaming

Pass serialized objects through authenticated web sockets.

## Task scheduling

Serverpod's future calls replace complicated cron jobs.

## Health checks

Monitor the database & external services that you are using.

## Easy deployment

Quickly deploy your Serverpods with Docker containers.

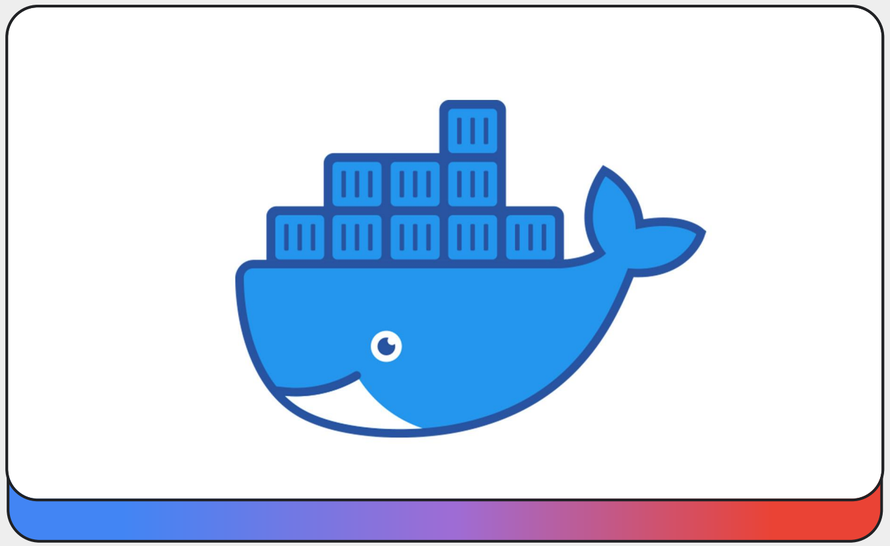
Google I/O Extended

# Getting started

Getting started

# Prerequisites

- Install an IDE (VSCode)
- Install Flutter
- Install Docker
- VSCode extension: Serverpod*

Activate server pod globally:

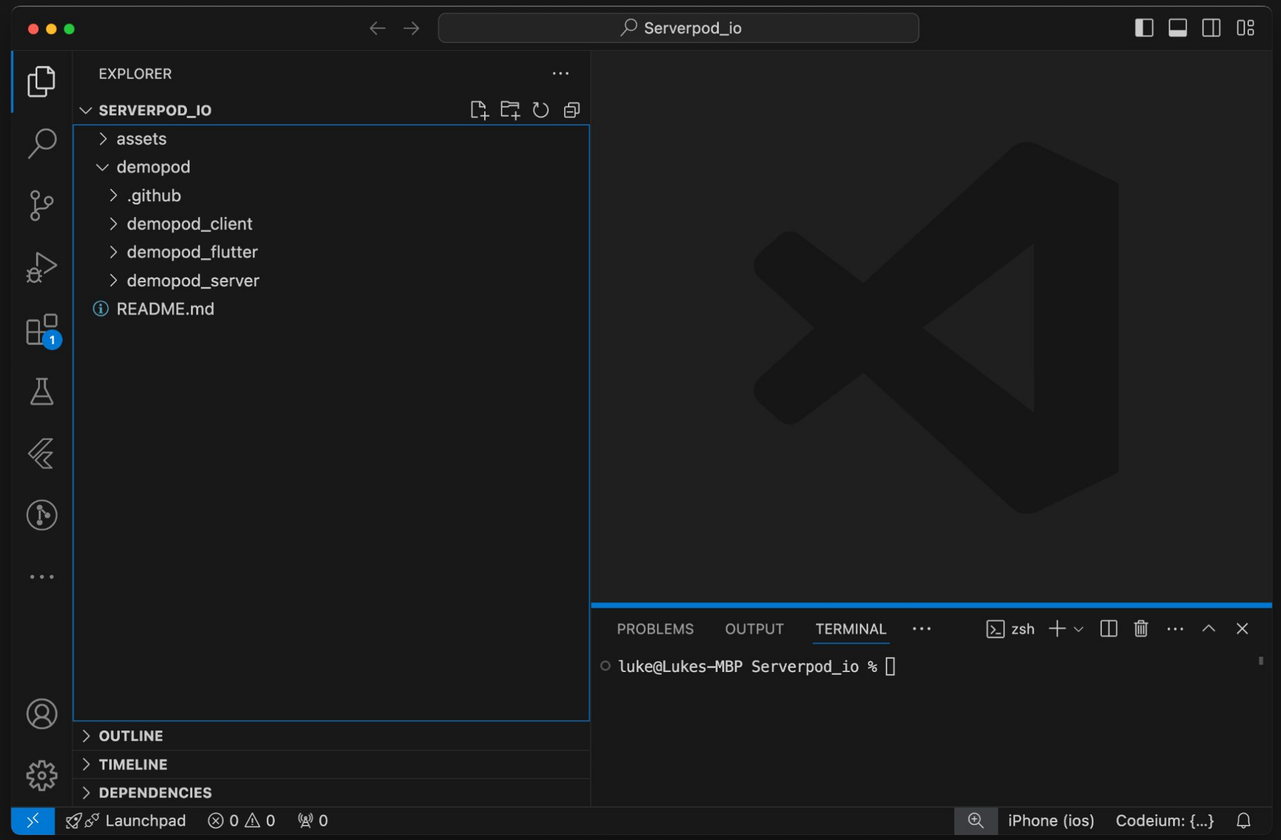
```
$ dart pub global activate serverpod_cli
_____________________________________
Installed executable serverpod.
Activated serverpod_cli 2.0.1.
```

Create a serverpod project

mini:
$ serverpod create demopod --mini
normal:
$ serverpod create demopod

Create a serverpod project

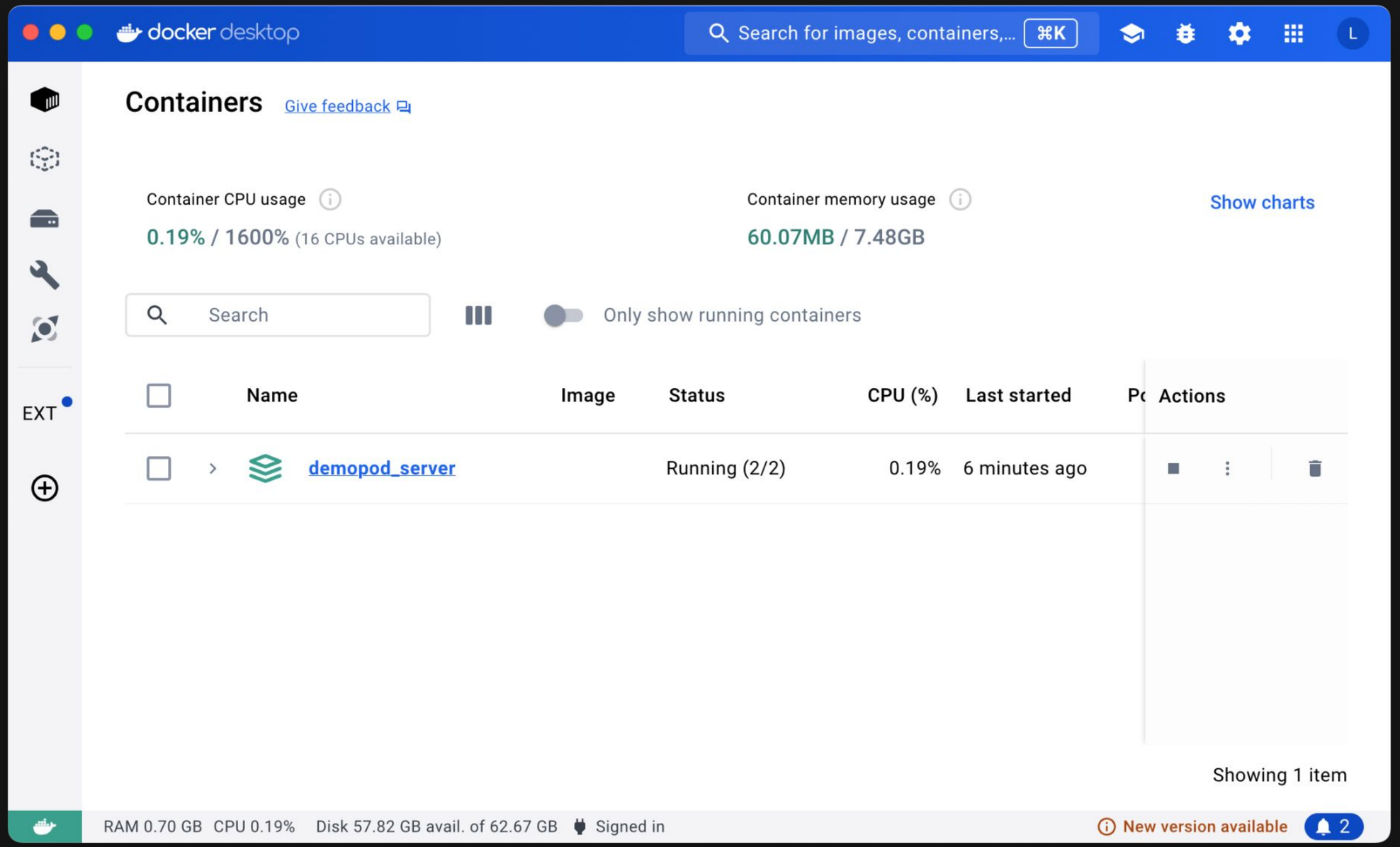
mini:
$ serverpod create demopod --mini
normal:
$ serverpod create demopod



```dart
import 'packages:...';

void run(List<String> args) async {
  final pod = Serverpod(
    args,
    Protocol(),
    Endpoints(),
  );
  pod.webServer.addRoute(RouteRoot(), '/');
  pod.webServer.addRoute(RouteRoot(), '/index.html');
  pod.webServer.addRoute(
    RouteStaticDirectory(serverDirectory: 'static', basePath: '/'),
    '/*',
  );
  await pod.start();
}
```

Now spin up your server

```
$ cd demopod/demopod_server
$ docker compose up --build --detach
$ dart bin/main.dart --apply-migrations

[+] Running 2/2
 ✔ Container demopod_server-redis-1 Started
 ✔ Container demopod_server-postgres-1 Started

Latest database migration already applied.
Insights listening on port 8081
Server default listening on port 8080
Webserver listening on port 8082
```


docker desktop
Search for images, containers,... ⌘K
L
Containers
Give feedback
Container CPU usage
0.19% / 1600% (16 CPUs available)
Container memory usage
60.07MB / 7.48GB
Show charts
Search
Only show running containers
Name
Image
Status
CPU (%)
Last started
Actions
demopod_server
Running (2/2)
0.19%
6 minutes ago
EXT
Showing 1 item
RAM 0.70 GB CPU 0.19% Disk 57.82 GB avail. of 62.67 GB Signed in
New version available
2

Google I/O Extended

# It’s running, now what?

Home Workspaces API Network Trial Ends in 3 Days

My Workspace New Import

GET Hello LiikeDev

Collections
Environments
History

Serverpod_Demo
GET Hello

Serverpod_Demo / Hello Save Share

GET http://localhost:8080/example/hello?name= Send

Params Auth Headers (6) Body Scripts Settings Cookies

Query Params

| Key | Value | Description | Bulk Edit |
| --- | --- | --- | --- |
| name | | | |
| Key | Value | Description | |

Response

Click Send to get a response

Online Find and replace Console All Logs Clear

No logs yet

Send a request to view its details in the console.

Postbot Runner Start Proxy Cookies Vault Trash

Home Workspaces API Network Trial Ends in 3 Days

My Workspace New Import

GET Hello

LiikeDev

Collections

Environments

History

Serverpod_Demo

GET Hello

Serverpod_Demo / Hello

Save Share

GET http://localhost:8080/example/hello?name= Send

Params Auth Headers (6) Body Scripts Settings Cookies

Query Params

| Key | Value | Description | Bulk Edit |
| --- | --- | --- | --- |
| name | | | |
| Key | Value | Description | |

Response

Click Send to get a response

Online Find and replace Console All Logs Clear

No logs yet

Send a request to view its details in the console.

Postbot Runner Start Proxy Cookies Vault Trash

Home Workspaces API Network Trial Ends in 3 Days

My Workspace New Import

Collections
Environments
History

Serverpod_Demo
GET Hello

GET Hello

LiikeDev

Serverpod_Demo / Hello

Save Share

GET http://localhost:8080/example/hello?name=Tiana Send

Params Auth Headers (6) Body Scripts Settings Cookies

Query Params

| Key | Value | Description | Bulk Edit |
| --- | --- | --- | --- |
| name | Tiana | | |
| Key | Value | Description | |

Response

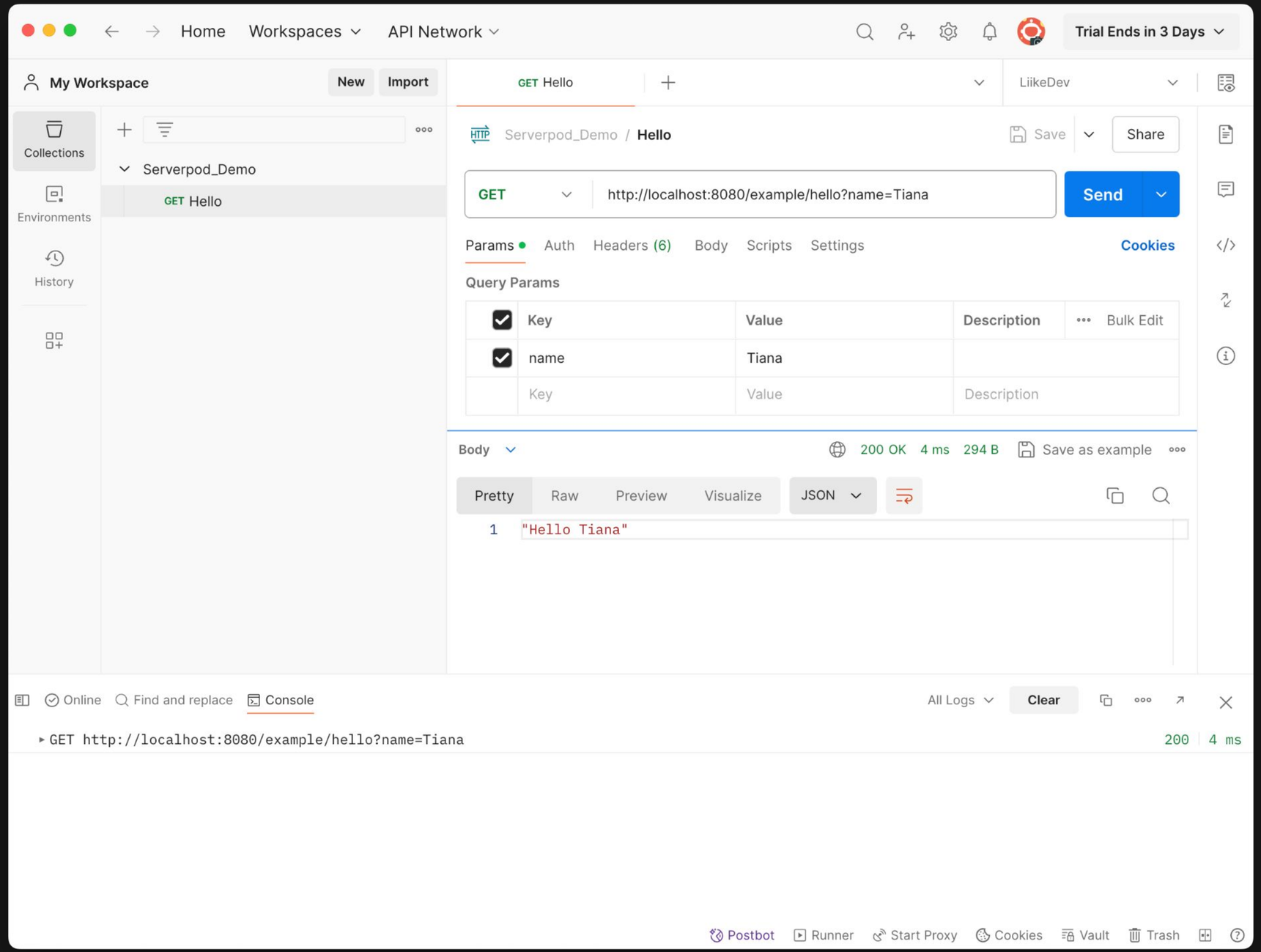
Click Send to get a response

Online Find and replace Console All Logs Clear

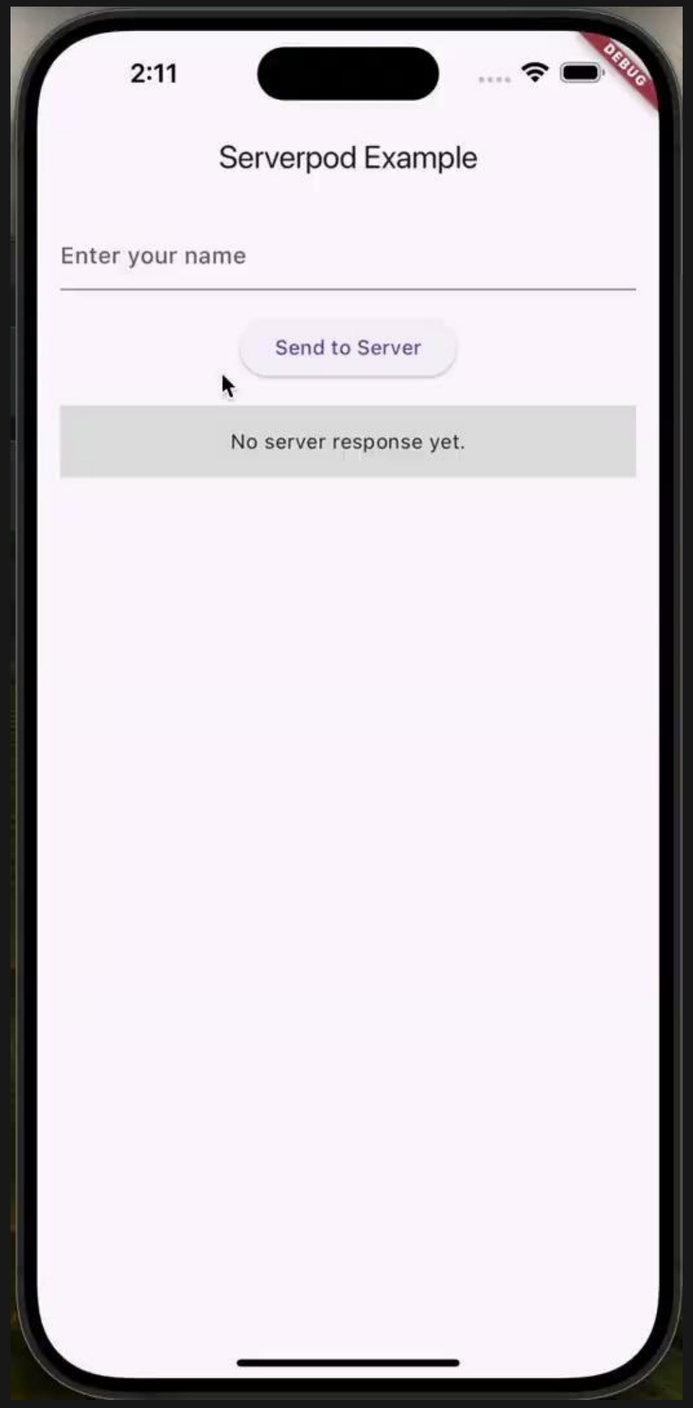
No logs yet

Send a request to view its details in the console.

Postbot Runner Start Proxy Cookies Vault Trash

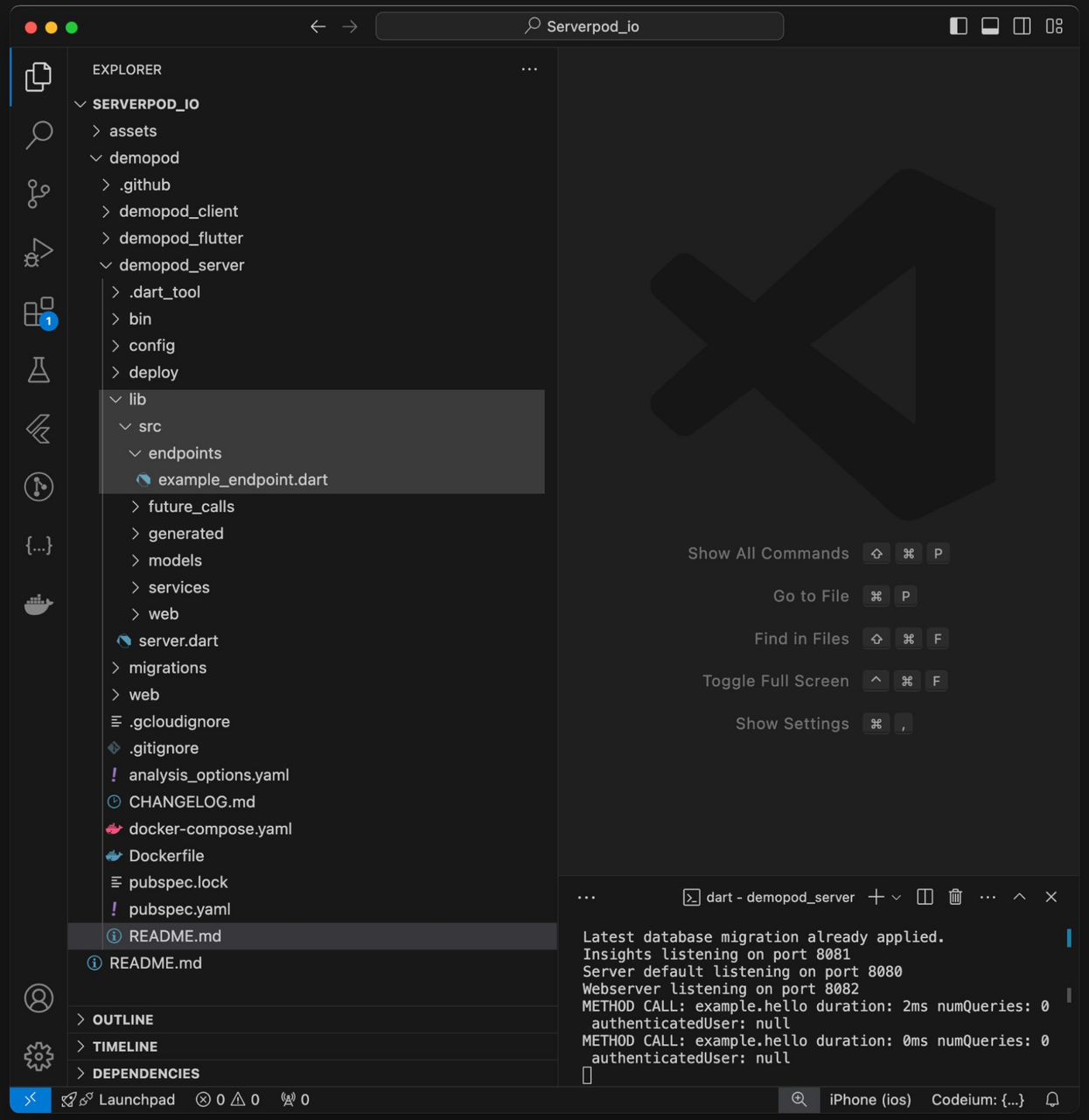

Home
Workspaces
API Network
Trial Ends in 3 Days
My Workspace
New
Import
Collections
Environments
History
Serverpod_Demo
GET Hello
GET Hello
LiikeDev
Serverpod_Demo / Hello
Save
Share
GET
http://localhost:8080/example/hello?name=Tiana
Send
Params
Auth
Headers (6)
Body
Scripts
Settings
Cookies
Query Params
Key
Value
Description
Bulk Edit
name
Tiana
Key
Value
Description
Body
200 OK
4 ms
294 B
Save as example
Pretty
Raw
Preview
Visualize
JSON
1 "Hello Tiana"
Online
Find and replace
Console
All Logs
Clear
GET http://localhost:8080/example/hello?name=Tiana
200
4 ms
Postbot
Runner
Start Proxy
Cookies
Vault
Trash

Generated code from `serverpod create`



Google I/O Extended

# Creating some endpoints


Serverpod_io
EXPLORER
SERVERPOD_IO
assets
demopod
.github
demopod_client
demopod_flutter
demopod_server
.dart_tool
bin
config
deploy
lib
src
endpoints
example_endpoint.dart
future_calls
generated
models
services
web
server.dart
migrations
web
.gcloudignore
.gitignore
analysis_options.yaml
CHANGELOG.md
docker-compose.yaml
Dockerfile
pubspec.lock
pubspec.yaml
README.md
README.md
OUTLINE
TIMELINE
DEPENDENCIES
Show All Commands ⇧ ⌘ P
Go to File ⌘ P
Find in Files ⇧ ⌘ F
Toggle Full Screen ^ ⌘ F
Show Settings ⌘ ,
dart - demopod_server
Latest database migration already applied.
Insights listening on port 8081
Server default listening on port 8080
Webserver listening on port 8082
METHOD CALL: example.hello duration: 2ms numQueries: 0
authenticatedUser: null
METHOD CALL: example.hello duration: 0ms numQueries: 0
authenticatedUser: null
Launchpad
0 0
0
iPhone (ios)
Codeium: {...}

```dart
import 'package:serverpod/serverpod.dart';

class ExampleEndpoint extends Endpoint {
  Future<String> hello(Session session, String name) async {
    return 'Hello $name';
  }
}
```

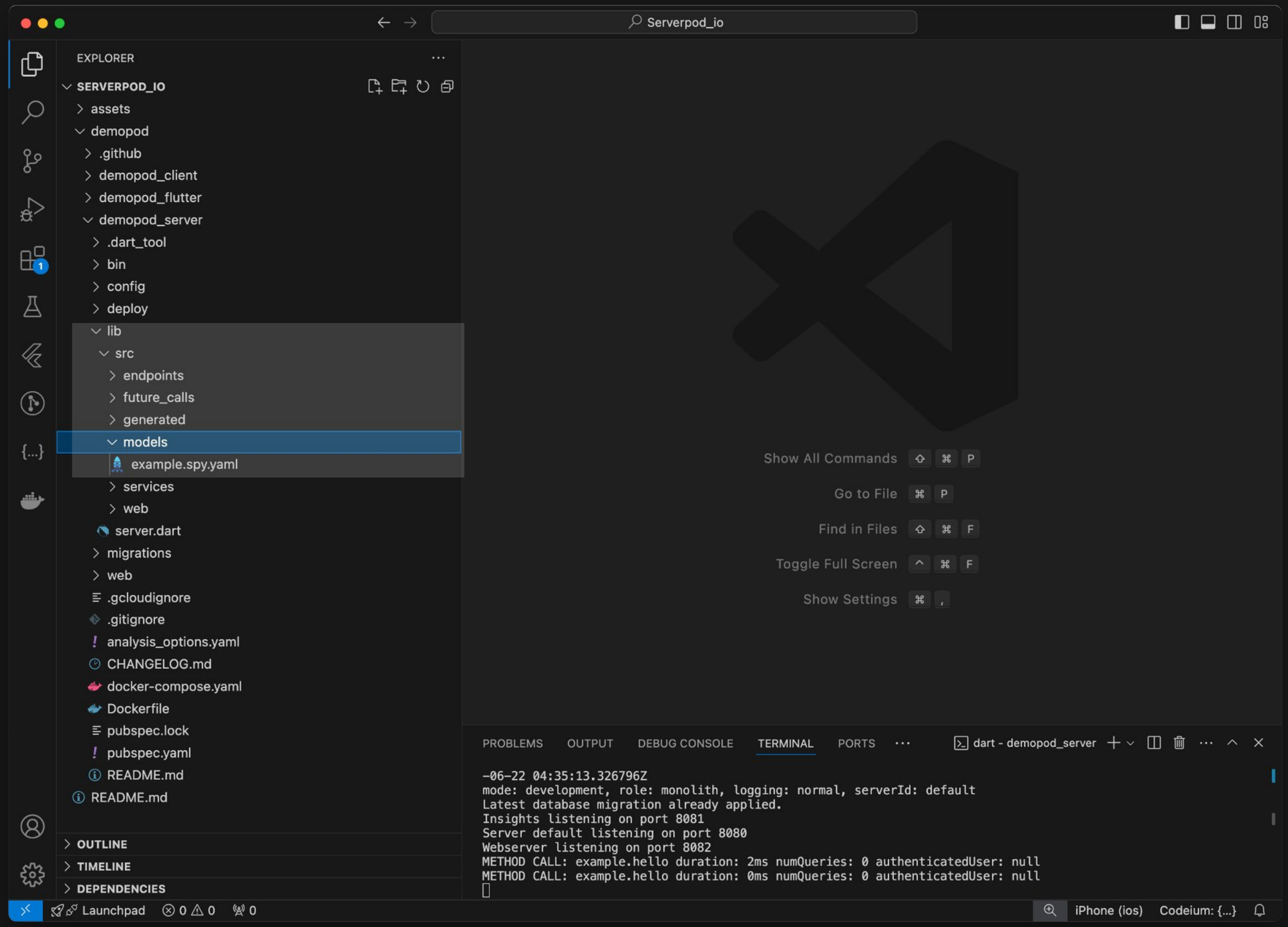
```dart
import 'package:serverpod/serverpod.dart';

class ExampleEndpoint extends Endpoint {
  Future<String> hello(Session session, String name) async {
    return 'Hello $name';
  }
}
```

```dart
import 'package:serverpod/serverpod.dart';

class ExampleEndpoint extends Endpoint {
  Future<String> hello(Session session, String name) async {
    return 'Hello $name';
  }
}
```

```
var result = await client.example.hello('World');
```

Google I/O Extended

# Serializing data


Serverpod_io
EXPLORER
SERVERPOD_IO
assets
demopod
.github
demopod_client
demopod_flutter
demopod_server
.dart_tool
bin
config
deploy
lib
src
endpoints
future_calls
generated
models
example.spy.yaml
services
web
server.dart
migrations
web
.gcloudignore
.gitignore
analysis_options.yaml
CHANGELOG.md
docker-compose.yaml
Dockerfile
pubspec.lock
pubspec.yaml
README.md
README.md
OUTLINE
TIMELINE
DEPENDENCIES
Show All Commands ⇧ ⌘ P
Go to File ⌘ P
Find in Files ⇧ ⌘ F
Toggle Full Screen ^ ⌘ F
Show Settings ⌘ ,
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
dart - demopod_server
-06-22 04:35:13.326796Z
mode: development, role: monolith, logging: normal, serverId: default
Latest database migration already applied.
Insights listening on port 8081
Server default listening on port 8080
Webserver listening on port 8082
METHOD CALL: example.hello duration: 2ms numQueries: 0 authenticatedUser: null
METHOD CALL: example.hello duration: 0ms numQueries: 0 authenticatedUser: null
Launchpad
0 0 0
iPhone (ios)
Codeium: {...}

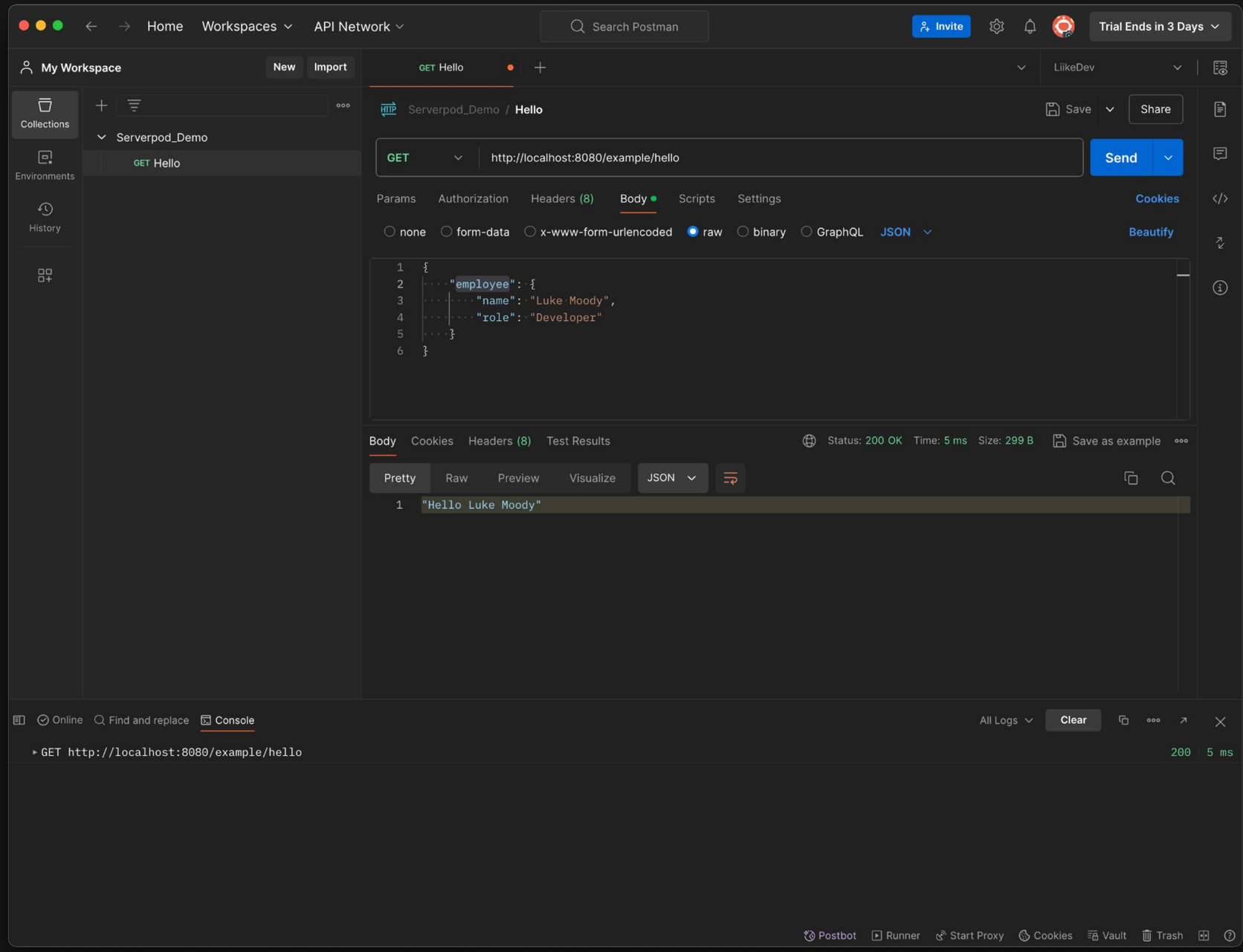
```
class: Company
fields:
  name: String
  foundedDate: DateTime?
  employees: List<Employee>
```

```
class: Employee
fields:
  name: String
  dob: DateTime?
  role: String
```

```
$ serverpod generate
✓ Generating code (2.5s)
✅ Done.
```

```dart
import 'package:demopod_server/src/generated/protocol.dart';
import 'package:serverpod/serverpod.dart';

class ExampleEndpoint extends Endpoint {
  Future<String> hello(Session session, {required Employee employee}) async {
    return 'Hello ${employee.name}';
  }
}
```

```dart
import 'package:demopod_server/src/generated/protocol.dart';
import 'package:serverpod/serverpod.dart';

class ExampleEndpoint extends Endpoint {
  Future<String> hello(Session session, {required Employee employee}) async {
    return 'Hello ${employee.name}';
  }
}
```


Home
Workspaces
API Network
Search Postman
Invite
Trial Ends in 3 Days
My Workspace
New
Import
GET Hello
LiikeDev
Collections
Environments
History
Serverpod_Demo
GET Hello
Serverpod_Demo / Hello
Save
Share
GET
http://localhost:8080/example/hello
Send
Params
Authorization
Headers (8)
Body
Scripts
Settings
Cookies
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
Beautify
{
"employee": {
"name": "Luke Moody",
"role": "Developer"
}
}
Body
Cookies
Headers (8)
Test Results
Status: 200 OK
Time: 5 ms
Size: 299 B
Save as example
Pretty
Raw
Preview
Visualize
JSON
"Hello Luke Moody"
Online
Find and replace
Console
All Logs
Clear
GET http://localhost:8080/example/hello
200
5 ms
Postbot
Runner
Start Proxy
Cookies
Vault
Trash

Google I/O Extended

# Working with a database

```
class: User
table: user
fields:
  address: Address?, relation // Object relation field
indexes:
  user_address_unique_idx:
    fields: addressId
    unique: true



class: Address
table: address
fields:
  street: String
```

```
class: User
table: user
fields:
  address: Address?, relation // Object relation field
indexes:
  user_address_unique_idx:
    fields: addressId
    unique: true



class: Address
table: address
fields:
  street: String
```

```
class: User
table: user
fields:
  address: Address?, relation // Object relation field
indexes:
  user_address_unique_idx:
    fields: addressId
    unique: true



class: Address
table: address
fields:
  street: String
```

```
class: User
table: user
fields:
  address: Address?, relation // Object relation field
indexes:
  user_address_unique_idx:
    fields: addressId
    unique: true



class: Address
table: address
fields:
  street: String
```

```
$ cd demopod/demopod_server
$ serverpod create-migration

✓ Creating migration (85ms)
 • Migration created: migrations/20240622130107460
✅ Done.

$ dart bin/main.dart --apply-migrations
```

```sql
CREATE TABLE "address" (
    "id" serial PRIMARY KEY,
    "street" text NOT NULL
);

CREATE TABLE "user" (
    "id" serial PRIMARY KEY,
    "addressId" integer NOT NULL
);
```

```sql
CREATE UNIQUE INDEX "user_address_unique_idx" ON "user" USING btree
("addressId");

ALTER TABLE ONLY "user"
    ADD CONSTRAINT "user_fk_0"
    FOREIGN KEY("addressId")
    REFERENCES "address"("id")
    ON DELETE CASCADE
    ON UPDATE NO ACTION;
```

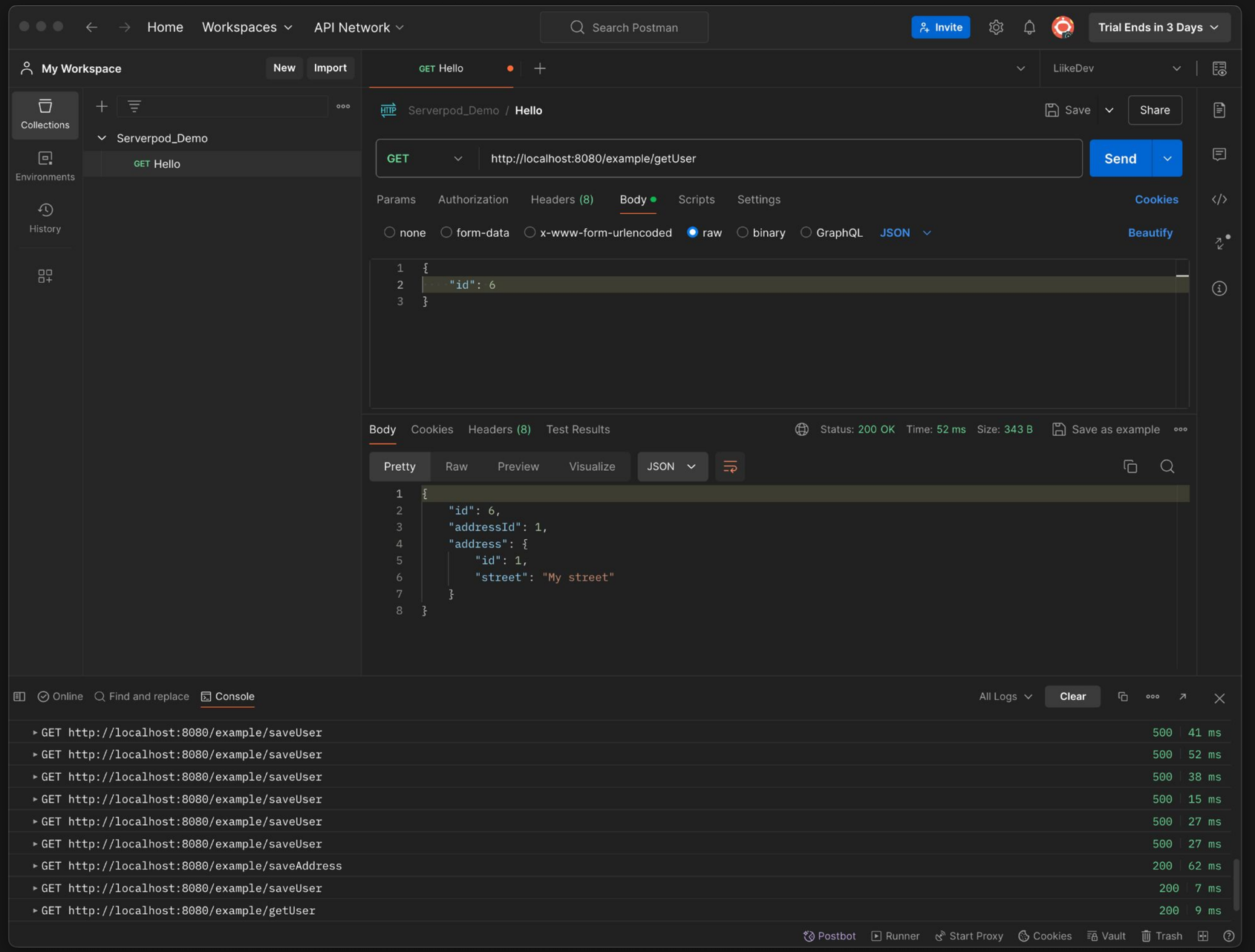
```dart
Future<Address> saveAddress(
  Session session, {
  required Address address,
}) async {
  final result = await session.db.insert<Address>([address]);
  return result.first;
}
```

```dart
Future<Address> saveAddress(
  Session session, {
  required Address address,
}) async {
  final result = await session.db.insert<Address>([address]);
  return result.first;
}
```

```dart
Future<User> saveUser(Session session, {required User user}) async {
  final result = await session.db.insert<User>([user]);
  return result.first;
}

Future<User?> getUser(Session session, int id) async {
  return session.db.findById<User>(
    id,
    include: User.include(
      address: Address.include(),
    ),
  );
}
```

```dart
Future<User> saveUser(Session session, {required User user}) async {
  final result = await session.db.insert<User>([user]);
  return result.first;
}

Future<User?> getUser(Session session, int id) async {
  return session.db.findById<User>(
    id,
    include: User.include(
      address: Address.include(),
    ),
  );
}
```

```dart
Future<User> saveUser(Session session, {required User user}) async {
  final result = await session.db.insert<User>([user]);
  return result.first;
}

Future<User?> getUser(Session session, int id) async {
  return session.db.findById<User>(
    id,
    include: User.include(
      address: Address.include(),
    ),
  );
}
```




https://docs.serverpod.dev/concepts/database/relations/one-to-one

# CRUD (Find)

```
var company = await Company.db.findFirstRow(
  session,
  where: (t) => t.name.equals('Cleer Consulting'),
);

var companies = await Company.db.find(
  session,
  where: (t) => t.id < 100,
  limit: 50,
);
```

# CRUD (Update)

```dart
var company = await Company.db.findById(session, companyId);
company.name = 'New name';
var updatedCompany = await Company.db.updateRow(session, company);
```

```dart
var companies = await Company.db.find(session);
companies = companies.map((c) => c.copyWith(name: 'New name')).toList();
var updatedCompanies = await Company.db.update(session, companies);
```

# CRUD (And many more…)

- Filters
- Relation Queries
- Sorting
- Transactions
- Pagination
- Raw Access
- Migrations

https://docs.serverpod.dev/concepts/database/crud

Google I/O Extended

# Authentication

```
$ dart pub add serverpod_auth_server
```

```dart
import 'package:serverpod_auth_server/serverpod_auth_server.dart' as
auth;

void run(List<String> args) async {
  var pod = Serverpod(
    args,
    Protocol(),
    Endpoints(),
    authenticationHandler: auth.authenticationHandler, // Add this line
  );

  ...
}
```

```dart
import 'package:serverpod_auth_server/module.dart' as auth;

void run(List<String> args) async {

  auth.AuthConfig.set(auth.AuthConfig(
    minPasswordLength: 12,
    /// Over 25 config options
  ));

  // Start the Serverpod server.
  await pod.start();
}
```

```dart
Future<void> myMethod(Session session) async {
  var userId = await session.auth.authenticatedUserId;
  ...
}

Future<void> myMethod(Session session) async {
  var isSignedIn = await session.isUserSignedIn;
  ...
}
```

```dart
class MyEndpoint extends Endpoint {
  @override
  bool get requireLogin => true;

  Future<void> myMethod(Session session) async {
    ...
  }
  ...
}
```

```dart
class MyEndpoint extends Endpoint {
  @override
  bool get requireLogin => true;

  @override
  Set<Scope> get requiredScopes => {Scope.admin};

  Future<void> myMethod(Session session) async {
    ...
  }
  ...
}
```

```
await Users.updateUserScopes(session, userId, {Scope.admin});


class CustomScope extends Scope {
  const CustomScope(String name) : super(name);

  static const userRead = CustomScope('userRead');
  static const userWrite = CustomScope('userWrite');
}
```

```dart
class MyEndpoint extends Endpoint {
  @override
  bool get requireLogin => true;

  @override
  Set<Scope> get requiredScopes => {CustomScope.userRead,
CustomScope.userWrite};

  Future<void> myMethod(Session session) async {
    ...
  }
  ...
}
```

```dart
import 'package:serverpod_auth_server/module.dart' as auth;

auth.AuthConfig.set(auth.AuthConfig(
  sendValidationEmail: (session, email, validationCode) async {
    // Send the validation email to the user.
    return true;
  },
  sendPasswordResetEmail: (session, userInfo, validationCode) async {
    // Send the password reset email to the user.
    return true;
  },
));

// Start the Serverpod server.
await pod.start();
```

Google I/O Extended

# Uploading files

```dart
Future<String?> getUploadDescription(Session session, String path) async {
  return await session.storage.createDirectFileUploadDescription(
    storageId: 'public',
    path: path,
  );
}

Future<bool> verifyUpload(Session session, String path) async {
  return await session.storage.verifyDirectFileUpload(
    storageId: 'public',
    path: path,
  );
}
```

```
var uploadDescription = await client.myEndpoint.getUploadDescription('myfile');
if (uploadDescription != null) {
  var uploader = FileUploader(uploadDescription);
  await uploader.upload(myStream);
  var success = await client.myEndpoint.verifyUpload('myfile');
}
```

```dart
var exists = await session.storage.fileExists(
  storageId: 'public',
  path: 'my/file/path',
);

var url = await session.storage.getPublicUrl(
  storageId: 'public',
  path: 'my/file/path',
);

var myByteData = await session.storage.retrieveFile(
  storageId: 'public',
  path: 'my/file/path',
);
```

```dart
import 'package:serverpod_cloud_storage_gcp/serverpod_cloud_storage_gcp.dart'
    as gcp;

pod.addCloudStorage(gcp.GoogleCloudStorage(
  serverpod: pod,
  storageId: 'public',
  public: true,
  region: 'auto',
  bucket: 'my-bucket-name',
  publicHost: 'storage.myapp.com',
));
```

```dart
import
'package:serverpod_cloud_storage_s3/serverpod_cloud_storage_s3.dart'
    as s3;

pod.addCloudStorage(s3.S3CloudStorage(
  serverpod: pod,
  storageId: 'public',
  public: true,
  region: 'us-west-2',
  bucket: 'my-bucket-name',
  publicHost: 'storage.myapp.com',
));
```

Google I/O Extended

# Scheduling

```dart
import 'package:serverpod/serverpod.dart';

class ExampleFutureCall extends FutureCall<MyModelEntity> {
  @override
  Future<void> invoke(Session session, MyModelEntity? object) async {
    // Do something interesting in the future here.
  }
}
```

```dart
void run(List<String> args) async {
  final pod = Serverpod(
    args,
    Protocol(),
    Endpoints(),
  );

  ...

  pod.registerFutureCall(ExampleFutureCall(), 'exampleFutureCall');

  ...
}
```

```dart
await session.serverpod.futureCallWithDelay(
  'exampleFutureCall',
  data,
  const Duration(hours: 1),
);

await session.serverpod.futureCallAtTime(
  'exampleFutureCall',
  data,
  DateTime(2025, 1, 1),
);
```

```dart
await session.serverpod.futureCallWithDelay(
  'exampleFutureCall',
  data,
  const Duration(hours: 1),
  identifier: 'an-identifying-string',
);

/// This identifier can then be used to cancel all future calls
registered with said identifier.

await session.serverpod.cancelFutureCall('an-identifying-string');
```

Google I/O Extended

# Deployment

| | Server cluster | Severless |
|---|---|---|
| **Pros** | All features are supported. Great for real time communication. Cost efficient at scale. | Minimal starting cost. Easier configuration. Minimal maintenance. |
| **Cons** | Slightly higher starting cost. More complex to set up. | Limited feature set. The server cannot have a state. |

A quick deployment on GCP

```
$ gcloud init

$ gcloud config set project <PROJECT_ID>
```

config/production.yaml

```yaml
database:
  isUnixSocket: true
  host: /cloudsql/my-project:us-central1:database-name/.s.PGSQL.5432
  port: 5432
  name: serverpod
  user: postgres
```

Terminal (Bash)

```
$ cp deploy/gcp/console_gcr/cloud-run-deploy.sh .
$ chmod u+x cloud-run-deploy.sh

$ ./cloud-run-deploy.sh
```

Google I/O Extended

# FAQs

Google I/O Extended

FAQs

# Is Serverpod production ready?

Yes! But, maybe use it for projects that are less complex and do not require complex API logic or integrations.

Google I/O Extended

FAQs

# Can you unit test Serverpod?

Yes you can! The package currently does not have a testing framework, but there are ways around this, and you can test you endpoints and logic!

Google I/O Extended

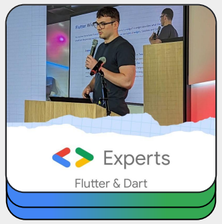
Section 3

# Should I give it a try?

Yes! If you are a dart developer and stepping out into the backend world, this is an amazing first step.

Google I/O Extended

# Thank You




Luke Moody

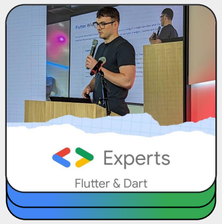
Founder / Tech Lead

Google I/O Extended

# Questions?

Google I/O Extended

# Thank You




Luke Moody

Founder / Tech Lead