LoopBack

API Economy Made Easy With LoopBack 4

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What is the API Economy?

API Economy

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API Economy is about connecting data and services to create value for customers

Create differentiating customer experiences

Extend your reach into a larger ecosystem

Deliver innovation to market faster

Some popular API's

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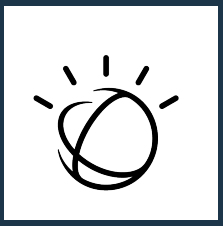

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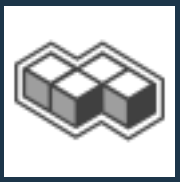

Introduction to LoopBack

LoopBack

- Set up models and create REST APIs in minutes
- Model relation support
- Easy authentication and authorization setup
- Connect to backend data stores
- Run Ad-hoc queries
- Add-on components
- MIT Open-Source license

What's new in LoopBack 4

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Complete Rewrite

ES2017

TypeScript

More Extensible

Much Simpler

Dependency Injection

LoopBack 4 Terminology

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Context
Inversion of Control container that abstracts all state and dependencies of your Application

Application
A container for your application's components, controllers, etc.

Servers
An implementation of a transport protocol

Controllers
A class that implements operations defined by your REST API

Components
A packaged extension providing a controller, provider of a value, etc.

An idea ...

The idea

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Prerequisites

Prerequisites

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- NodeJS v8.0.0 or later
- TypeScript v.2.5 or later

Step 1: Project Setup

ibm.biz/cascon-loopback
Branch: step-01

Project Setup

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Create new directory

We'll create a new project directory for our code. We can call it **cascon-diary**

npm init

Using terminal we will go to **cascon-diary** and run `npm init`

Accept all default answers except:

entry point: (index.js): `dist/index.js`

Start script

In our `package.json` we'll add the following under the `scripts` section to compile and start our project:

```
"start": "tsc && node ."
```

Installing Dependencies

Install LoopBack 4 and other dependencies by running the following in terminal:

```
npm i @loopback/core
@loopback/rest @loopback/context
```

```
npm i --save-dev @types/node
```

Project Setup

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TypeScript Config

Create a file in the project directory called `tsconfig.json` with the following contents:

```
{
  "compilerOptions": {
    "emitDecoratorMetadata": true,
    "experimentalDecorators": true,
    "module": "commonjs",
    "moduleResolution": "node",
    "target": "es2017",
    "outDir": "dist",
    "sourceMap": true,
    "declaration": true
  }
}
```

Step 2: Hello World

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Branch: step-02

NEW FILE: index.ts

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```
import {Application} from '@loopback/core';
import {RestComponent, get} from '@loopback/rest';
class DiaryController {
  @get('/')
  helloWorld() {
    return 'Hello LoopBack';
  }
}
class DiaryApp extends Application {
  constructor() {
    super({
      components: [RestComponent],
    });
    this.controller(DiaryController);
  }
}
async function main() {
  const app = new DiaryApp();
  await app.start();
  console.log('App started');
}
main();
```

Running our App

LoopBack

Starting the App

In `terminal` run the following (in project directory):

```
npm start
```

Viewing the App

From your favorite browser visit `localhost:3000`
You should see the following message:
`Hello LoopBack`

Stopping the App

In `terminal` press the following keys together:

```
Ctrl + C
```

Step 3: Refactoring

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Branch: step-03

Refactoring: Controllers

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New directories

Create a new directory in your project called `src`

Create a new directory in `src` called `controllers`

New file: `/src/controllers/diary.controller.ts`

- In `/src/controllers` create a new fille called `diary.controller.ts`
- Copy and paste the controller from `index.ts` into this file

NOTE: *We will need to import the dependencies and export the class as shown below*

```
import {get} from '@loopback/rest';

export class DiaryController {
  @get('/')
  helloWorld() {
    return 'Hello LoopBack';
  }
}
```

Refactoring: Application

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New file: `/src/app.ts`

- In the `src` directory, we'll create a new file called `app.ts`
- We'll move our `DiaryApp` into this new file which should look as follows:

```
import {Application} from '@loopback/core';
import {RestComponent} from '@loopback/rest';
import {DiaryController} from './controllers/diary.controller';

export class DiaryApp extends Application {
  constructor() {
    super({
      components: [RestComponent],
    });

    this.controller(DiaryController);
  }
}
```

Refactoring: index.ts

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Updated index.ts

- We've moved the application and controller class out of this file
- We'll import DiaryApp and start the server here. The file should look as follows:

```
import {DiaryApp} from './src/app';
import {RestServer} from '@loopback/rest';

(async function main() {
  const app = new DiaryApp();

  // Catch any startup errors
  try {
    await app.start();
  } catch (err) {
    console.error('Cannot start the application! ', err);
    process.exit(1);
  }

  console.log('App started');
})();
```

Running our App

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Starting the App

In `terminal` run the following (in project directory):

```
npm start
```

Viewing the App

From your favorite browser visit `localhost:3000`
You should see the following message:
`Hello LoopBack`

Stopping the App

In `terminal` press the following keys together:

```
Ctrl + C
```

Step 4: Basic Diary Application

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Branch: step-04

Basic App: types.ts

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New file: /src/types.ts

- Before we go about creating APIs, we're going to define a Diary type
- We're also going to define an OpenAPI Schema for request properties

```
import {SchemaObject} from '@loopback/openapi-spec';
export type Diary = {
  title: string;
  post: string;
  id: number;
};
export const diarySchema: SchemaObject = {
  properties: {
    title: {
      type: 'string',
    },
    post: {
      type: 'string',
    },
  },
};
```

Basic App

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Install new dependency

- We used `@loopback/openapi-spec` but haven't installed it yet
- Install it by running the following command in `terminal`

```
npm i @loopback/openapi-spec
```

New Directory

- Create a new directory in `src` called `datastores`

New File: `/src/datastores/diary.datastore.ts`

- Create a new file in the `datastores` directory called `diary.datastore.ts`
- This is where we'll create a datastore to store diary entries

New File: /src/datastores/diary.datastore.ts

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Writing a basic DataSource – store and retrieve Diary entries

```
import {Diary} from '../types';
export class DiaryDataStore {
  diaries: {[key: number]: Diary};
  id: number;
  constructor() {
    this.diaries = {}; // We will store our entries in an object
    this.id = 1; // We'll increment this to create id for new entries
  }
  getDiaries(): Diary[] {
    return Object.values(this.diaries);
  }
  getDiaryById(id: number): Diary {
    return this.diaries[id];
  }
  createDiary(diary: Diary): Diary {
    diary.id = this.id;
    this.diaries[this.id] = diary;
    this.id++;
    return diary;
  }
}
```

Using the DataStore

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Binding the DataStore

- Since it's a memory store, we'll want a single instance in the entire application
- We'll make the following changes in `/src/app.ts`

- Add the following at the top of the file

```
import {BindingScope} from '@loopback/context';
import {DiaryDataStore} from './datastores/diary.datastore';
```

- In the constructor, add the following line to bind DiaryDataStore to `'datastores.diary'`

```
this.bind('datastores.diary')
.toClass(DiaryDataStore)
.inScope(BindingScope.SINGLETON);
```

Basic Diary Controller

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Clean start

- We can start by deleting the existing contents of `/src/controllers/diary.controllers.ts`

Start with imports

- We'll start with adding the following imports (some should be familiar)

```
import {get, post, param, operation, RestBindings} from '@loopback/rest';
import {inject} from '@loopback/core';
import {ServerResponse} from 'http';
import {Diary, diarySchema} from '../types';
import {DiaryDataStore} from '../datastores/diary.datastore';
```

Diary Controller: Constructor

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Constructor

- We'll use the constructor to inject in the Response Object and DiaryDataStore into the Controller

```
export class DiaryController {
  constructor(
    @inject('datastores.diary') public diaryStore: DiaryDataStore,
    @inject(RestBindings.Http.RESPONSE) public res: ServerResponse
  ) {}
}
```

Diary Controller: Methods

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Adding basic GET and POST methods

```
@get('/')
getDiaries(): Diary[] {
  return this.diaryStore.getDiaries();
}
@get('/{id}')
@param.path.number('id')
getDiaryById(id: number): Diary {
  return this.diaryStore.getDiaryById(id);
}
@post('/')
@param.body('diary', diarySchema)
createDiary(diary: Diary): Diary {
  return this.diaryStore.createDiary(diary);
}
@operation('OPTIONS', '/') // For CORS pre-flight requests
optionsHeader() {
  this.res.setHeader('Access-Control-Allow-Methods', 'GET, POST, OPTIONS');
  this.res.setHeader('Access-Control-Allow-Headers',
    'Content-Type, Access-Control-Allow-Headers');
}
```

Running our App

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Starting the App

In `terminal` run the following (in project directory):

```
npm start
```

Viewing the App

Try the various APIs from your favorite browser by visiting:

```
localhost:3000/swagger-ui
```

Stopping the App

In `terminal` press the following keys together:

```
Ctrl + C
```

Step 5: Making it Cognitive

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Branch: step-05

Making it Cognitive

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Install new Dependencies

- Run the following command in terminal to install new dependencies

```
npm i watson-developer-cloud bluebird @types/watson-developer-cloud @types/bluebird
```

Update: /src/types.ts

- Add a new type called Tone to the file

```
export type Tone = {
  score: number;
  tone_id: string;
  tone_name: string;
};
```

Update Diary type

- Add the following property to the Diary type

```
tones: Tone[];
```

```
export type Diary = {
  title: string;
  post: string;
  id: number;
  tones: Tone[];
};
```

Making it Cognitive: ToneAnalyzer

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Getting Credentials

- For CASCON attendees, find a file called `creds.ts` on your desktop. Move it to your project directory

- For anyone else, you can visit https://console.bluemix.net/ to get a free account for **Watson ToneAnalyzer** service
- Once you have a free account, create a file called `cred.ts` in your project directory
- Past the following into the file and put in your credentials

```
export const creds = {
  url: 'https://gateway.watsonplatform.net/tone-analyzer/api',
  username: '<YOUR USERNAME>',
  password: '<YOUR PASSWORD>',
  version: '<LATEST WATSON VERSION DATE (ex: 2017-09-21)>'
};
```

Using the Credentials

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Bind the credentials

- We'll read the credentials from `creds.ts` and bind them for dependency injection
- Import creds at the top of `app.ts` by adding the following line:

```
import {creds} from '../creds';
```

- Bind the creds by adding the following lines in the constructor

```
this.bind('tone_analyzer.creds').to(creds);
```

Controller: /src/controllers/diary.controller.ts

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Adding new imports

- Add the following imports at the top of the file

```
import {Promise} from 'bluebird';
import {ToneAnalyzerV3} from 'watson-developer-cloud';
```

Add new property

- Add a new property called `tone_analyzer` to `DiaryController`

```
export class DiaryController {
  // Add property line here
  tone_analyzer: any;
}
```

Controller: Constructor

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Updated Constructor

- We'll be injecting credentials for ToneAnalyzer into the constructor and initializing the service
- The service is callback based, to make it easier to use we'll Promisify it as well in the constructor

```
constructor(
  @inject('datastores.diary') public diaryStore: DiaryDataStore,
  @inject(RestBindings.Http.RESPONSE) public res: ServerResponse,
  @inject('tone_analyzer.creds') creds: any,
) {
    this.tone_analyzer = new ToneAnalyzerV3({
      username: creds.username,
      password: creds.password,
      version_date: creds.version,
  });
  this.tone_analyzer.tone = Promise.promisify(this.tone_analyzer.tone);
}
```

Cognitive Controller

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Saving Tone Information

- Update `createDiary` method to get a tone analysis and saving that as part of the Diary entry

```
@post('/')
@param.body('diary', diarySchema)
async createDiary(diary: Diary) {
const tone = await this.tone_analyzer.tone({ text: diary.post });
diary.tones = tone.document_tone.tones;

return this.diaryStore.createDiary(diary);
}
```

Cognitive Controller

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Retrieving Diary Entries by Tone

- Update `getDiaries` to accept an option tone query parameter to filter Diary entries

```
@get('/')
@param.query.string('tone')
getDiaries(tone?: string): Diary[] {
  const diaries = this.diaryStore.getDiaries();
  if (!tone) return diaries;
  tone = tone.toLowerCase();
  let result: Diary[];
  for (const diary of diaries) {
    for (const diaryTone of diary.tones) {
      if (diaryTone.tone_name.toLowerCase() === tone) {
        result.push(diary);
        break;
      }
    }
  }
  return result;
}
```

Running our App

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Starting the App

In `terminal` run the following (in project directory):

```
npm start
```

Viewing the App

Try the various APIs from your favorite browser by visiting:

```
localhost:3000/swagger-ui
```

Stopping the App

In `terminal` press the following keys together:

```
Ctrl + C
```

Done!

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Next Steps

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Extensions!

https://github.com/strongloop/loopback-next/issues/509

Calling for Contributors on LB Extensions

https://github.com/strongloop/loopback-next/issues/647

Do we want a new Juggler?

https://github.com/strongloop/loopback-next/issues/537

Loopback4-extension-starter

https://github.com/strongloop/loopback4-extension-starter

Loopback4-example-getting-started

https://github.com/strongloop/loopback4-example-getting-started

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Thank you

Credits

LoopBack

- Edit by Gregor Cresnar from Noun Project
- Fullscreen by Deemak Daksina S from Noun Project
- Simplify by Chris Homan from Noun Project
- Injection by Surya from Noun Project
- Diary by Rajive from Noun Project
- Silence by Alex Muravev from Noun Project
- Smile by Alex Muravev from Noun Project
- Cry by Alex Muravev from Noun Project
- Mad by Alex Muravev from Noun Project
- Worry by Alex Muravev from Noun Project
- Confusion by Alex Muravev from Noun Project
- Congratulations by Sewon Park from Noun Project