Step 1 - The stack

We'll be building medium in the following stack

1. React in the frontend
2. Cloudflare workers in the backend
3. zod as the validation library, type inference for the frontend types
4. Typescript as the language
5. Prisma as the ORM, with connection pooling
6. Postgres as the database
7. jwt for authentication

Step 2 - Initialize the backend

Whenever you're building a project, usually the first thing you should do is initialise the project's backend.

Create a new folder called `medium`

```
mkdir medium
cd medium
```

Initialize a `hono` based cloudflare worker app

```
npm create hono@latest
```

Target directory › `backend`

Which template do you want to use? - `cloudflare-workers`

Do you want to install project dependencies? … yes
Which package manager do you want to use? › npm (or yarn or bun, doesnt matter)

> 💡 Reference https://hono.dev/top

Step 3 - Initialize handlers

To begin with, our backend will have 4 routes

1. POST /api/v1/user/signup
2. POST /api/v1/user/signin
3. POST /api/v1/blog
4. PUT /api/v1/blog
5. GET /api/v1/blog/:id
6. GET /api/v1/blog/bulk

> 💡 https://hono.dev/api/routing

▾ Solution

```ts
import { Hono } from 'hono';

// Create the main Hono app
const app = new Hono();

app.post('/api/v1/signup', (c) => {
  return c.text('signup route')
})

app.post('/api/v1/signin', (c) => {
  return c.text('signin route')
})

app.get('/api/v1/blog/:id', (c) => {
  const id = c.req.param('id')
  console.log(id);
  return c.text('get blog route')
})

app.post('/api/v1/blog', (c) => {

  return c.text('signin route')
})

app.put('/api/v1/blog', (c) => {
  return c.text('signin route')
})

export default app;
```

Step 4 - Initialize DB (prisma)

1. Get your connection url from neon.db or aieven.tech

```
postgres://avnadmin:password@host/db
```

2. Get connection pool URL from Prisma accelerate

https://www.prisma.io/data-platform/accelerate

```
prisma://accelerate.prisma-data.net/?api_key=eyJhbGciOiJIUzI1N
```

3. Initialize prisma in your project

Make sure you are in the `backend` folder

```
npm i prisma
npx prisma init
```

Replace `DATABASE_URL` in `.env`

```
DATABASE_URL="postgres://avnadmin:password@host/db"
```

Add `DATABASE_URL` as the `connection pool` url in `wrangler.toml`

```
name = "backend"
```

```
compatibility_date = "2023-12-01"

[vars]
DATABASE_URL = "prisma://accelerate.prisma-data.net/?api_key=
```

💡 You should not have your prod URL committed either in .env or in wrangler.toml to github
wranger.toml should have a dev/local DB url
.env should be in .gitignore

4. Initialize the schema

```
generator client {
  provider = "prisma-client-js"
}

datasource db {
  provider = "postgresql"
  url      = env("DATABASE_URL")
}

model User {
  id       String   @id @default(uuid())
  email    String   @unique
  name     String?
  password String
  posts    Post[]
}

model Post {
  id       String   @id @default(uuid())
  title    String
  content  String
  published Boolean  @default(false)
```

```
  author    User     @relation(fields: [authorId], references: [id])
  authorId  String
}
```

5. Migrate your database

```
npx prisma migrate dev --name init_schema
```

💡 You might face issues here, try changing your wifi if that happens

6. Generate the prisma client

```
npx prisma generate --no-engine
```

7. Add the accelerate extension

```
npm install @prisma/extension-accelerate
```

8. Initialize the prisma client

```
import { PrismaClient } from '@prisma/client/edge'
import { withAccelerate } from '@prisma/extension-accelerate'

const prisma = new PrismaClient({
  datasourceUrl: env.DATABASE_URL,
}).$extends(withAccelerate())
```

Step 5 - Create non auth routes

1. Simple Signup route

Add the logic to insert data to the DB, and if an error is thrown, tell the user about it

▼ Solution

```
app.post('/api/v1/signup', async (c) => {
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL,
    }).$extends(withAccelerate());
    const body = await c.req.json();
    try {
        const user = await prisma.user.create({
            data: {
                email: body.email,
                password: body.password
            }
        });

        return c.text('jwt here')
    } catch(e) {
        return c.status(403);
    }
})
```

💡 To get the right types on `c.env`, when initializing the Hono app, pass the types of env as a generic

```
const app = new Hono<{
    Bindings: {
        DATABASE_URL: string
    }
}>();
```

💡 Ideally you shouldn't store passwords in plaintext. You should hash before storing them. More details on how you can do that - https://community.cloudflare.com/t/options-for-password-hashing/138077

https://developers.cloudflare.com/workers/runtime-apis/web-crypto/

2. Add JWT to signup route

Also add the logic to return the user a `jwt` when their user id encoded.
This would also involve adding a new env variable `JWT_SECRET` to wrangler.toml

> 💡 Use jwt provided by hono - https://hono.dev/helpers/jwt

▾ Solution

```
import { PrismaClient } from '@prisma/client/edge'
import { withAccelerate } from '@prisma/extension-accelerate'
import { Hono } from 'hono';
import { sign } from 'hono/jwt'

// Create the main Hono app
const app = new Hono<{
    Bindings: {
        DATABASE_URL: string,
        JWT_SECRET: string,
    }
}>();


app.post('/api/v1/signup', async (c) => {
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL   ,
    }).$extends(withAccelerate());

    const body = await c.req.json();
    try {
        const user = await prisma.user.create({
            data: {
                email: body.email,
                password: body.password
            }
        });
        const jwt = await sign({ id: user.id }, c.env.JWT_SECRET);
        return c.json({ jwt });
    } catch(e) {
        c.status(403);
        return c.json({ error: "error while signing up" });

    }
})
```

3. Add a signin route

▾ Solution

```
app.post('/api/v1/signin', async (c) => {
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL   ,
    }).$extends(withAccelerate());

    const body = await c.req.json();
    const user = await prisma.user.findUnique({
        where: {
            email: body.email
        }
    });

    if (!user) {
        c.status(403);
        return c.json({ error: "user not found" });
    }

    const jwt = await sign({ id: user.id }, c.env.JWT_SECRET);
    return c.json({ jwt });
})
```

Step 6 - Middlewares

Creating a middleware in hono is well documented - https://hono.dev/guides/middleware

1. Limiting the middleware

To restrict a middleware to certain routes, you can use the following -

```
app.use('/message/*', async (c, next) => {
  await next()
})
```

In our case, the following routes need to be protected -

```
app.get('/api/v1/blog/:id', (c) => {})
```

```
app.post('/api/v1/blog', (c) => {})

app.put('/api/v1/blog', (c) => {})
```

So we can add a top level middleware

```
app.use('/api/v1/blog/*', async (c, next) => {
  await next()
})
```

2. Writing the middleware

Write the logic that extracts the user id and passes it over to the main route.

- How to pass data from middleware to the route handler?

  Using the context - https://hono.dev/api/context

set() / get()

Set the value specified by the key with `set` and use it later with `get`.

```ts
app.use(async (c, next) => {
  c.set('message', 'Hono is cool!!')
  await next()
})

app.get('/', (c) => {
  const message = c.get('message')
  return c.text(`The message is "${message}"`)
})
```

Pass the `Variables` as Generics to the constructor of `Hono` to make it type-safe.

```ts
type Variables = {
  message: string
}

const app = new Hono<{ Variables: Variables }>()
```

▾ How to make sure the types of `variables` that are being passed is correct?

```
const app = new Hono<{
  Bindings: {
    DATABASE_URL: string,
    JWT_SECRET: string,
  },
  Variables : {
    userId: string
  }
}>();
```

▾ Solution

```
app.use('/api/v1/blog/*', async (c, next) => {
    const jwt = c.req.header('Authorization');
    if (!jwt) {
        c.status(401);
        return c.json({ error: "unauthorized" });
    }
    const token = jwt.split(' ')[1];
    const payload = await verify(token, c.env.JWT_SECRET);
    if (!payload) {
        c.status(401);
        return c.json({ error: "unauthorized" });
    }
    c.set('userId', payload.id);
    await next()
})
```

3. Confirm that the user is able to access authenticated routes

```
app.post('/api/v1/blog', (c) => {
    console.log(c.get('userId'));
```

```
    return c.text('signin route')
})
```

send the Header from Postman and ensure that the user id gets logged on the server

Callout

> 💡 If you want, you can extract the prisma variable in a global middleware that set's it on the context variable

```
app.use("*", (c) => {
  const prisma = new PrismaClient({
    datasourceUrl: c.env.DATABASE_URL,
  }).$extends(withAccelerate());
  c.set("prisma", prisma);
})
```

Ref https://stackoverflow.com/questions/75554786/use-cloudflare-worker-env-outside-fetch-scope

Step 7 - Blog routes and

better routing

Better routing

https://hono.dev/api/routing#grouping

Hono let's you group routes together so you can have a cleaner file structure.

Create two new files -

`routes/user.ts`

`routes/blog.ts`

and push the user routes to `user.ts`

▾ index.ts

```
import { Hono } from 'hono'
import { userRouter } from './routes/user';
import { bookRouter } from './routes/blog';

export const app = new Hono<{
  Bindings: {
     DATABASE_URL: string;
     JWT_SECRET: string;
  }
}>();

app.route('/api/v1/user', userRouter)
app.route('/api/v1/book', bookRouter)

export default app
```

▾ user.ts

```
import { PrismaClient } from "@prisma/client/edge";
```

```
import { withAccelerate } from "@prisma/extension-accelerate"
import { Hono } from "hono";
import { sign } from "hono/jwt";

export const userRouter = new Hono<{
    Bindings: {
        DATABASE_URL: string;
        JWT_SECRET: string;
    }
}>();

userRouter.post('/signup', async (c) => {
    const prisma = new PrismaClient({
      datasourceUrl: c.env.DATABASE_URL,
    }).$extends(withAccelerate());

    const body = await c.req.json();

    const user = await prisma.user.create({
      data: {
        email: body.email,
        password: body.password,
      },
    });

    const token = await sign({ id: user.id }, c.env.JWT_SECRET)

    return c.json({
      jwt: token
    })
})

userRouter.post('/signin', async (c) => {
    const prisma = new PrismaClient({
    //@ts-ignore
        datasourceUrl: c.env?.DATABASE_URL   ,
```

```
    }).$extends(withAccelerate());

    const body = await c.req.json();
    const user = await prisma.user.findUnique({
      where: {
        email: body.email,
    password: body.password
      }
    });

    if (!user) {
      c.status(403);
      return c.json({ error: "user not found" });
    }

    const jwt = await sign({ id: user.id }, c.env.JWT_SECRET);
    return c.json({ jwt });
  })
```

Blog routes

1. Create the route to initialize a blog/post

▾ Solution

```
app.post('/', async (c) => {
    const userId = c.get('userId');
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL  ,
    }).$extends(withAccelerate());

    const body = await c.req.json();
    const post = await prisma.post.create({
        data: {
            title: body.title,
            content: body.content,
            authorId: userId
        }
    });
    return c.json({
        id: post.id
    });
})
```

2. Create the route to update blog

▾ Solution

```
app.put('/api/v1/blog', async (c) => {
    const userId = c.get('userId');
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL  ,
    }).$extends(withAccelerate());

    const body = await c.req.json();
    prisma.post.update({
        where: {
            id: body.id,
            authorId: userId
        },
        data: {
            title: body.title,
            content: body.content
        }
    });

    return c.text('updated post');
});
```

3. Create the route to get a blog

▾ Solution

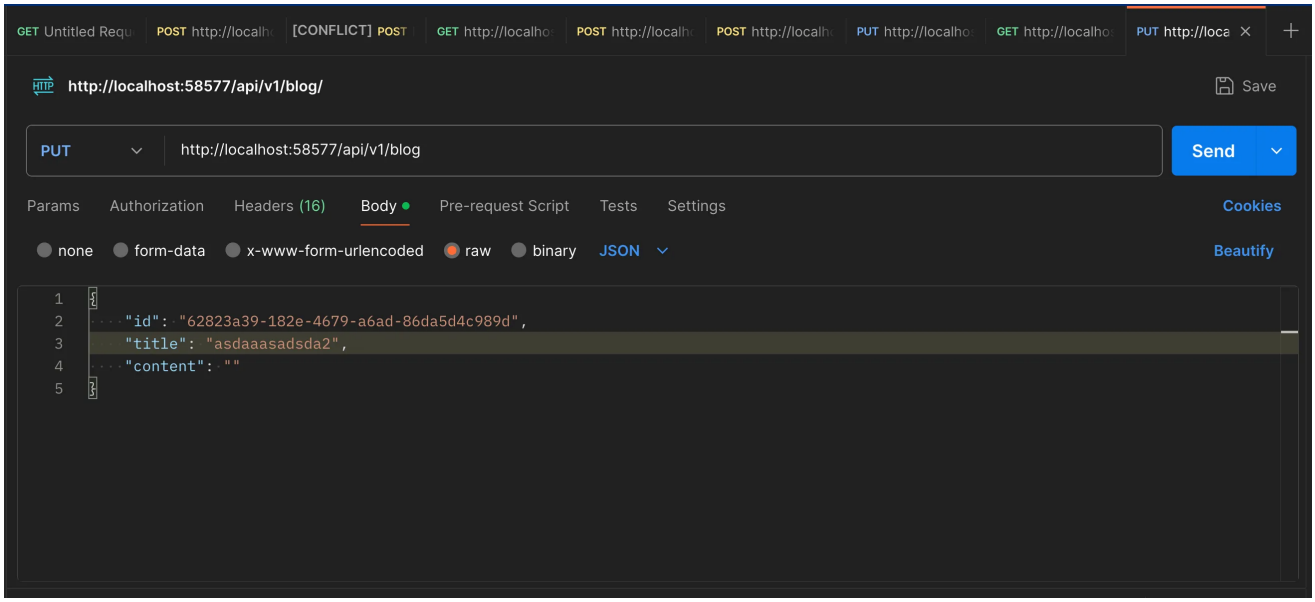
```
app.get('/api/v1/blog/:id', async (c) => {
    const id = c.req.param('id');
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL  ,
    }).$extends(withAccelerate());
```

4. Create the route to get all blogs

```
    const post = await prisma.post.findUnique({
        where: {
```

```
app.get('/api/v1/blog/bulk', async (c) => {
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL  ,
    }).$extends(withAccelerate());

    const posts = await prisma.post.find({});

    return c.json(posts);
})
```

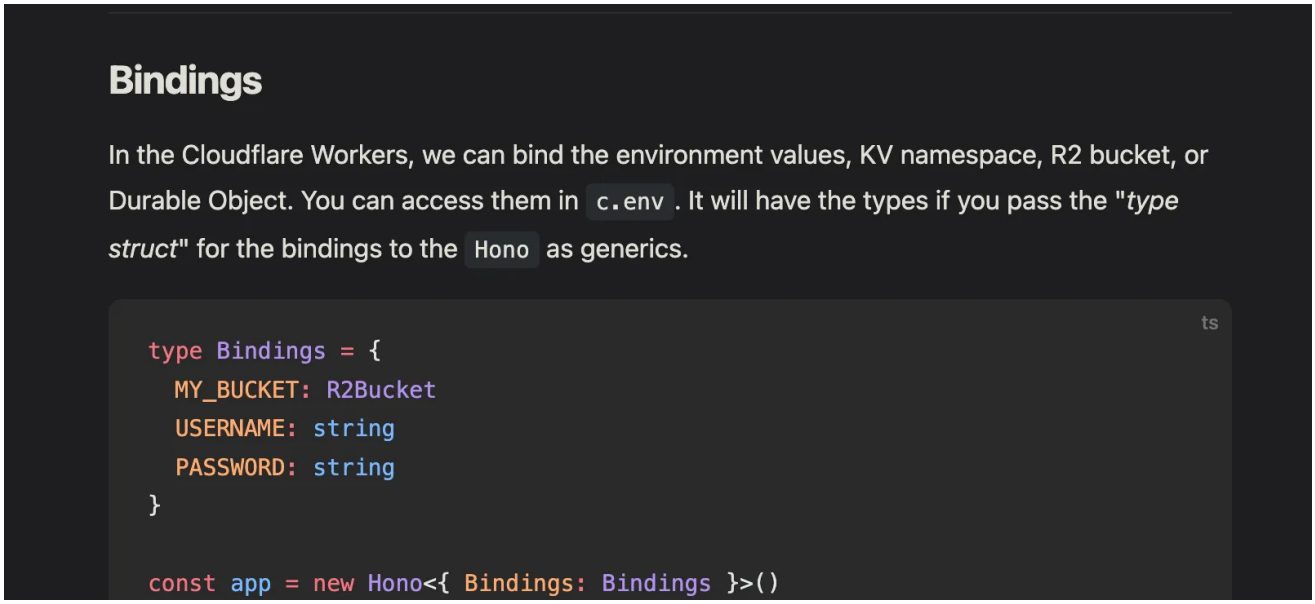
Try to hit the routes via POSTMAN and ensure they work as expected



Step 8 - Understanding the types

Bindings

https://hono.dev/getting-started/cloudflare-workers#bindings



Bindings

In the Cloudflare Workers, we can bind the environment values, KV namespace, R2 bucket, or Durable Object. You can access them in `c.env`. It will have the types if you pass the "*type struct*" for the bindings to the `Hono` as generics.

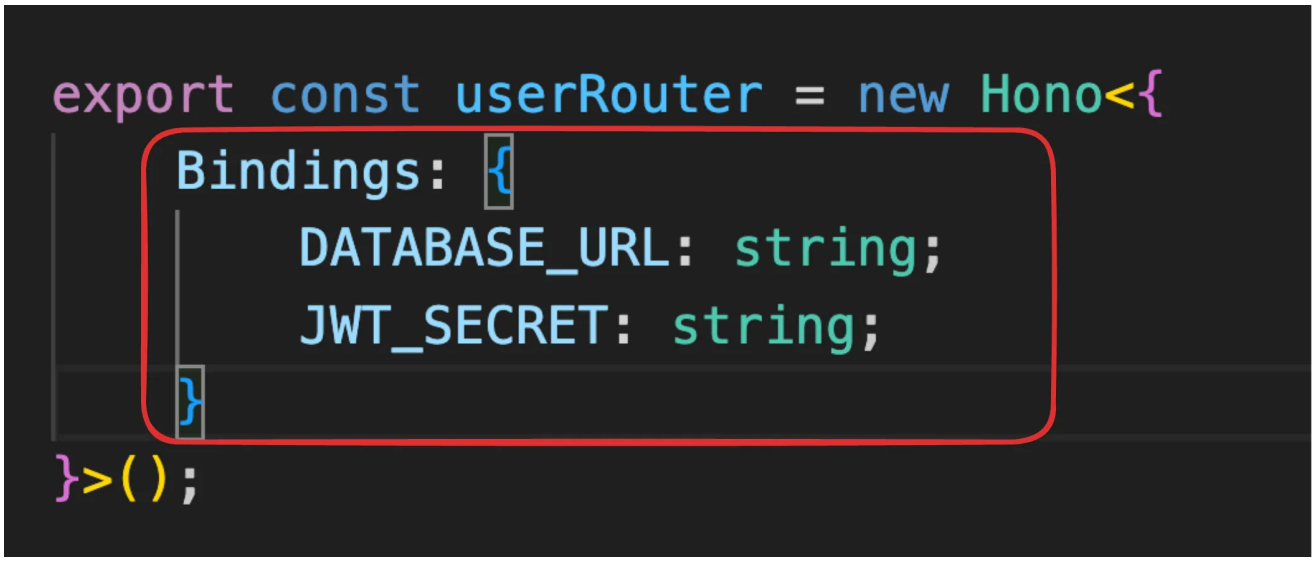
```ts
type Bindings = {
  MY_BUCKET: R2Bucket
  USERNAME: string
  PASSWORD: string
}

const app = new Hono<{ Bindings: Bindings }>()
```

```ts
// Access to environment values
app.put('/upload/:key', async (c, next) => {
  const key = c.req.param('key')
  await c.env.MY_BUCKET.put(key, c.req.body)
  return c.text(`Put ${key} successfully!`)
})
```

In our case, we need 2 env variables -

JWT_SECRET

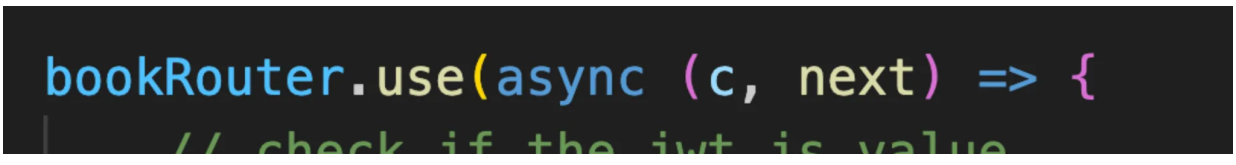
DATABASE_URL



Variables

https://hono.dev/api/context#var

If you wan't to get and set values on the context of the request, you can use `c.get` and `c.set`



```
    // check if the jwt is valid
    c.set('userId', "jwt");
    await next()
});
```

You need to make typescript `aware` of the variables that you will be setting on the context.

```
export const bookRouter = new Hono<{
    Bindings: {
        DATABASE_URL: string;
        JWT_SECRET: string;
    },
    Variables: {
        userId: string
    }
}>();
```

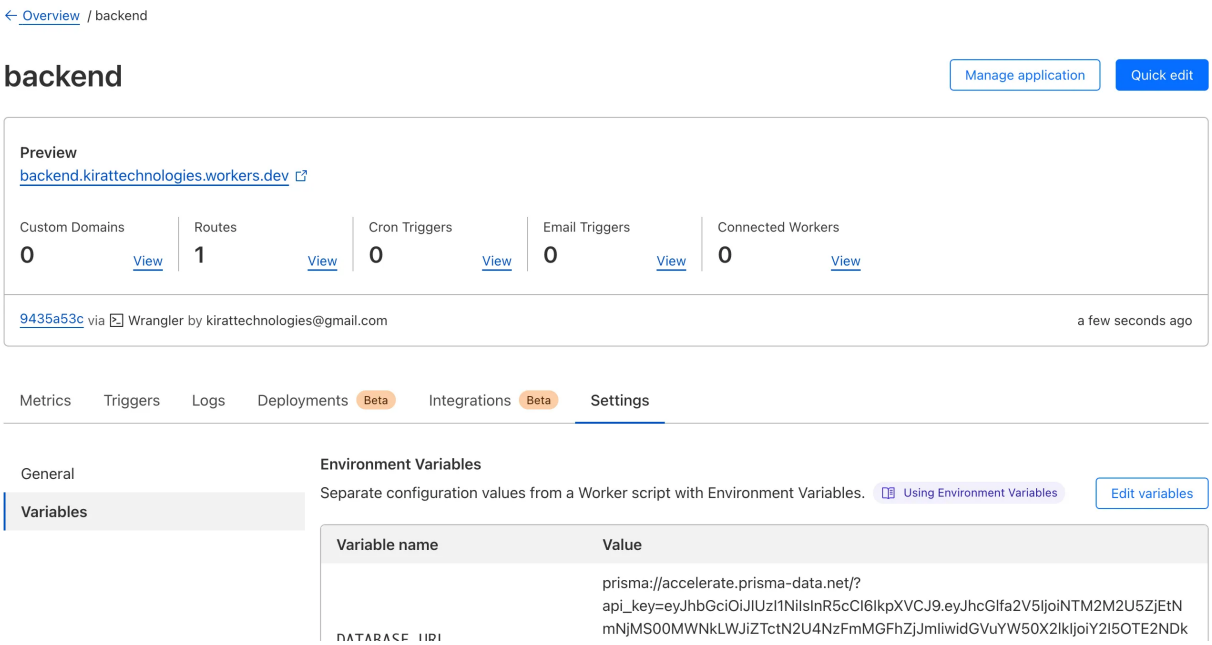
💡 You can also create a middleware that sets `prisma` in the context so you don't need to initialise it in the function body again and again

Step 9 - Deploy your app

```
npm run deploy
```

💡 Make sure you have logged in the cloudflare cli using `npx wrangler login`

Update the env variables from cloudflare dashboard

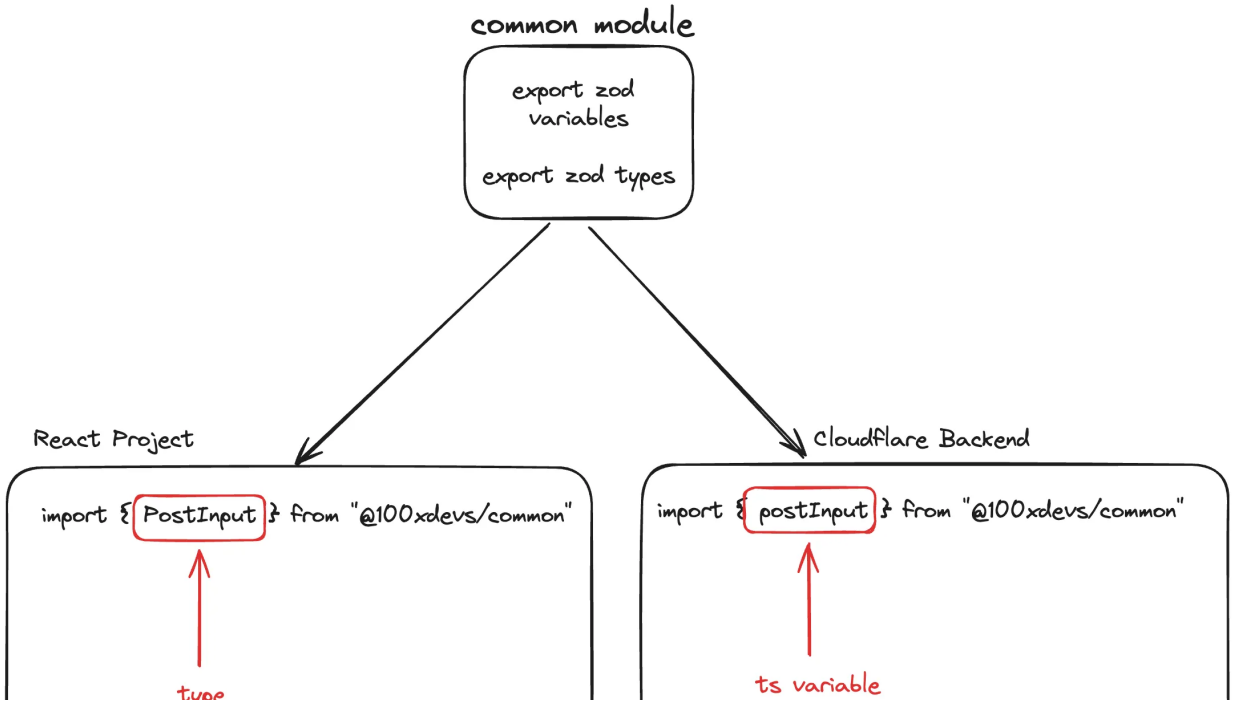


Test your production URL in postman, make sure it works

Step 10 - Zod validation

If you've gone through the video `Cohort 1 - Deploying npm packages, Intro to Monorepos`, you'll notice we introduced type inference in `Zod` https://zod.dev/?id=type-inference

This let's you get types from `runtime zod variables` that you can use on your frontend



We will divide our project into 3 parts

1. Backend
2. Frontend
3. common

`common` will contain all the things that frontend and backend want to share.
We will make `common` an independent `npm module` for now.
Eventually, we will see how `monorepos` make it easier to have multiple packages sharing code in the same repo

Step 11 - Initialise common

1. Create a new folder called `common` and initialize an empty ts project in it

```
mkdir common
cd common
npm init -y
```

```
npx tsc --init
```

1. Update `tsconfig.json`

```
"rootDir": "./src",
"outDir": "./dist",
"declaration": true,
```

1. Sign up/login to npmjs.org
2. Run `npm login`
3. Update the `name` in `package.json` to be in your own npm namespace, Update main to be `dist/index.js`

```
{
 "name": "@100xdevs/common-app",
 "version": "1.0.0",
 "description": "",
  "main": "dist/index.js",
 "scripts": {
  "test": "echo \"Error: no test specified\" && exit 1"
 },
 "keywords": [],
 "author": "",
 "license": "ISC"
}
```

1. Add `src` to `.npmignore`
2. Install zod

```
npm i zod
```

1. Put all types in `src/index.ts`
    1. signupInput / SignupInput

2. signinInput / SigninInput
3. createPostInput / CreatePostInput
4. updatePostInput / UpdatePostInput

▾ Solution

```ts
import z from "zod";

export const signupInput = z.object({
    email: z.string().email(),
    password: z.string(),
    name: z.string().optional(),
});

export type SignupType = z.infer<typeof signupInput>;

export const signinInput = z.object({
    email: z.string().email(),
    password: z.string(),
});

export type SigninType = z.infer<typeof signinInput>;

export const createPostInput = z.object({
    title: z.string(),
    content: z.string(),
});

export type CreatePostType = z.infer<typeof createPostInput>;

export const updatePostInput = z.object({
    title: z.string().optional(),
    content: z.string().optional(),
});

export type UpdatePostType = z.infer<typeof updatePostInput>;
```

1. `tsc -b` to generate the output
2. Publish to npm

```
npm publish --access public
```

1. Explore your package on npmjs

Step 12 - Import zod in backend

1. Go to the backend folder

```
cd backend
```

1. Install the package you published to npm

```
npm i your_package_name
```

1. Explore the package

```
cd node_modules/your_package_name
```

1. Update the routes to do zod validation on them

▾ Solution

```
import { PrismaClient } from '@prisma/client/edge'
```

```ts
import { withAccelerate } from '@prisma/extension-accelerate'
import { Hono } from 'hono';
import { sign, verify } from 'hono/jwt'
import { signinInput, signupInput, createPostInput, updatePostIn

// Create the main Hono app
const app = new Hono<{
    Bindings: {
        DATABASE_URL: string,
        JWT_SECRET: string,
    },
    Variables : {
        userId: string
    }
}>();

app.use('/api/v1/blog/*', async (c, next) => {
    const jwt = c.req.header('Authorization');
    if (!jwt) {
        c.status(401);
        return c.json({ error: "unauthorized" });
    }
    const token = jwt.split(' ')[1];
    const payload = await verify(token, c.env.JWT_SECRET);
    if (!payload) {
        c.status(401);
        return c.json({ error: "unauthorized" });
    }
    c.set('userId', payload.id);
    await next()
})

app.post('/api/v1/signup', async (c) => {
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL   ,
    }).$extends(withAccelerate());
```

```
    const body = await c.req.json();
    const { success } = signupInput.safeParse(body);
    if (!success) {
        c.status(400);
        return c.json({ error: "invalid input" });
    }
    try {
        const user = await prisma.user.create({
            data: {
                email: body.email,
                password: body.password
            }
        });
        const jwt = await sign({ id: user.id }, c.env.JWT_SECRET);
        return c.json({ jwt });
    } catch(e) {
        c.status(403);
        return c.json({ error: "error while signing up" });
    }
})

app.post('/api/v1/signin', async (c) => {
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL   ,
    }).$extends(withAccelerate());

    const body = await c.req.json();
    const { success } = signinInput.safeParse(body);
    if (!success) {
        c.status(400);
        return c.json({ error: "invalid input" });
    }
    const user = await prisma.user.findUnique({
        where: {
            email: body.email
```

```
        }
    });

    if (!user) {
        c.status(403);
        return c.json({ error: "user not found" });
    }

    const jwt = await sign({ id: user.id }, c.env.JWT_SECRET);
    return c.json({ jwt });
})

app.get('/api/v1/blog/:id', async (c) => {
    const id = c.req.param('id');
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL   ,
    }).$extends(withAccelerate());

    const post = await prisma.post.findUnique({
        where: {
            id
        }
    });

    return c.json(post);
})

app.post('/api/v1/blog', async (c) => {
    const userId = c.get('userId');
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL   ,
    }).$extends(withAccelerate());

    const body = await c.req.json();
    const { success } = createPostInput.safeParse(body);
    if (!success) {
```

```
        c.status(400);
        return c.json({ error: "invalid input" });
    }

    const post = await prisma.post.create({
        data: {
            title: body.title,
            content: body.content,
            authorId: userId
        }
    });
    return c.json({
        id: post.id
    });
})

app.put('/api/v1/blog', async (c) => {
    const userId = c.get('userId');
    const prisma = new PrismaClient({
        datasourceUrl: c.env?.DATABASE_URL   ,
    }).$extends(withAccelerate());

    const body = await c.req.json();
    const { success } = updatePostInput.safeParse(body);
    if (!success) {
        c.status(400);
        return c.json({ error: "invalid input" });
    }

    prisma.post.update({
        where: {
            id: body.id,
            authorId: userId
        },
        data: {
            title: body.title,
```

```
            content: body.content
        }
    });

    return c.text('updated post');
});

export default app;
```

Step 13 - Init the FE project

1. Initialise a react app

```
npm create vite@latest
```

1. Initialise tailwind
   https://tailwindcss.com/docs/guides/vite

```
npm install -D tailwindcss postcss autoprefixer
npx tailwindcss init -p
```

1. Update tailwind.config.js

```
/** @type {import('tailwindcss').Config} */
export default {
  content: [
```

```
    "./index.html",
    "./src/**/*.{js,ts,jsx,tsx}",
  ],
  theme: {
    extend: {},
  },
  plugins: [],
}
```

1. Update index.css

```
@tailwind base;
@tailwind components;
@tailwind utilities;
```

1. Empty up App.css
2. Install your package

```
npm i your_package
```

1. Run the project locally

```
npm run dev
```

Step 14 - Add react-

router-dom

1. Add react-router-dom

```
npm i react-router-dom
```

1. Add routing (ensure you create the Signup, Signin and Blog components)

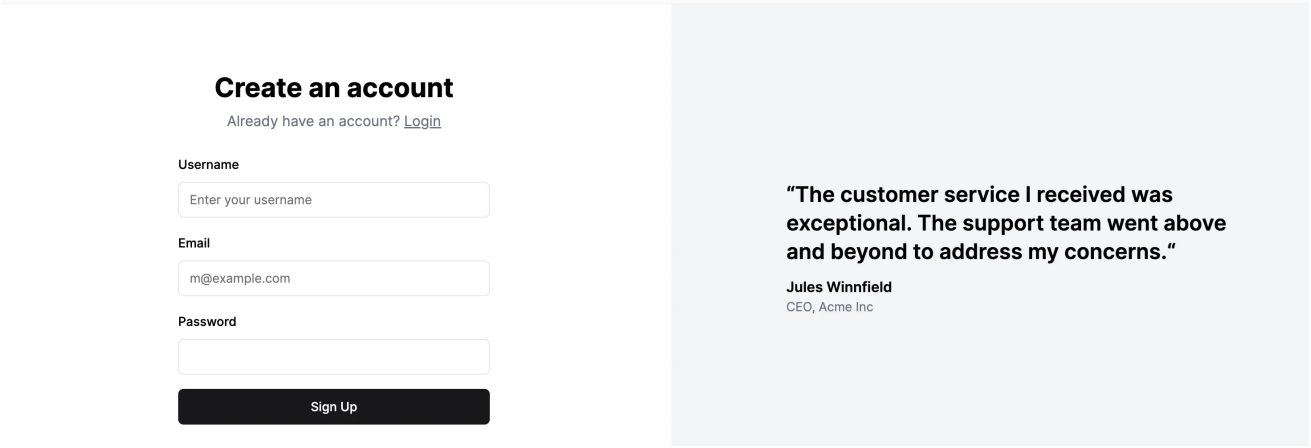
```
import { BrowserRouter, Route, Routes } from 'react-router-dom'
import { Signup } from './pages/Signup'
import { Signin } from './pages/Signin'
import { Blog } from './pages/Blog'

function App() {

 return (
  <>
   <BrowserRouter>
    <Routes>
     <Route path="/signup" element={<Signup />} />
     <Route path="/signin" element={<Signin />} />
     <Route path="/blog/:id" element={<Blog />} />
    </Routes>
   </BrowserRouter>
  </>
 )
}

export default App
```

1. Make sure you can import `types` from `your_package`

Step 15 - Creating the components

Designs generated from v0.dev - an AI service by vercel that lets you generate frontends

Signup page



Blogs page