EXPRESS.JS

Routes & REST

WHAT'S ON THE SCHEDULE?

- **Pop Quiz**
  - What's a client?
  - What's a server?
  - What's a request?
  - What's a response?
  - What's the request-response cycle?
  - What is middleware?
- **Express Router**
- **REST Architecture pattern**
- **Body Parser**

BY THE END OF THIS, WE SHOULD BE ABLE TO

- **Understand what Express Routing middleware is**
- **Understand why Express routing is useful**
- **Understand what the REST architecture is and what it helps us achieve in organizing the routes of our application**
  - Understand and implement our backend routes tuned to the REST architecture
- **Understand what the various HTTP verbs are and what they are used for**
  - GET
  - POST
  - PUT (and PATCH)
  - Delete
- **Understand what information gets sent in the req.body and how to parse that information using body-parser**

BUT FIRST...

POP QUIZ

CLIENT

Something that makes (HTTP) requests

SERVER

Something that responds to (HTTP) requests

REQUEST

A formatted message sent over the network by a client.
Contains VERB, URI (route), headers, and body.

RESPONSE

A server's reply to a request (formatted message).
Contains headers, payload, and status.

REQUEST-RESPONSE CYCLE

*The client **always** initiates by sending a request, and the server completes it by sending **exactly one** response*

EXPRESS MIDDLEWARE

A function that receives the request and response objects of an HTTP request/response cycle.

EXPRESS MIDDLEWARE

A function that receives the request and response objects of an HTTP request/response cycle.

function(req, res, next){…}

EXPRESS MIDDLEWARE CAN…

- Execute any code (such as logging) **then** move to the **next** middleware function in the chain
- Modify the request and the response objects **then** pass them to the **next** middleware function in the chain
- End the request-response cycle (E.g. **res.send**)

EXPRESS ROUTER

EXPRESS ROUTER

- **Express provides a Router middleware to create modular, mountable route handlers.**
- **Think of it as a “mini-app” that nests within an existing app.**
- **It lets you break up the major parts of your application into separate modules.**

App.js

```
const express = require("express");
const morgan = require("morgan");
const client = require("./db");
const postList = require("./views/postList");
const postDetails = require("./views/postDetails");

const app = express();

app.use(morgan("dev"));
app.use(express.static(__dirname + "/public"));

app.get("/", async (req, res) => {
  const data = await client.query("SELECT...");
  res.send(postList(data.rows));
});

app.get("/posts/:id", async (req, res) => {
  const data = await client.query("SELECT ...);
  const post = data.rows[0];
  res.send(postDetails(post));
});

const PORT = 1337;

app.listen(PORT, () => {

  console.log(`App listening in port ${PORT}`);

});
```

App.js

```
const express = require("express");
const morgan = require("morgan");


const routes = require("./routes");

const app = express();

app.use(morgan("dev"));
app.use(express.static(__dirname + "/public"));
app.use(routes);

const PORT = 1337;


app.listen(PORT, () => {
  console.log(`App listening in port ${PORT}`);
});
```

routes.js

```
const express = require('express');
const router = express.Router();
const client = require("./db");
const postList = require("./views/postList");
const postDetails = require("./views/postDetails");

app.get("/", async (req, res) => {
  const data = await client.query("SELECT...");
  res.send(postList(data.rows));
});

app.get("/posts/:id", async (req, res) => {
  const data = await client.query("SELECT ...);
  const post = data.rows[0];
  res.send(postDetails(post));
});
module.exports = router;
```

App.js

```
const express = require("express");
const morgan = require("morgan");


const routes = require("./routes");

const app = express();

app.use(morgan("dev"));
app.use(express.static(__dirname + "/public"));
app.use(routes);

const PORT = 1337;
app.listen(PORT, () => {
  console.log(`App listening in port ${PORT}`);
});
```

routes.js

```
const express = require('express');
const router = express.Router();
const client = require("./db");
const postList = require("./views/postList");
const postDetails = require("./views/postDetails");

router.get("/", async (req, res) => {
  const data = await client.query("SELECT...");
  res.send(postList(data.rows));
});

router.get(“/posts/:id", async (req, res) => {
  const data = await client.query("SELECT ...);
  const post = data.rows[0];
  res.send(postDetails(post));
});
module.exports = router;
```

App.js

```
const express = require("express");
const app = express();
app.use(morgan("dev"));
app.use(express.static(__dirname + "/public"));

app.use('/posts', require('./routes/posts'));
app.use('/users', require('./routes/users'));

const PORT = 1337;


app.listen(PORT, () => {
  console.log(`App listening in port ${PORT}`);
});
```

posts.js

users.js

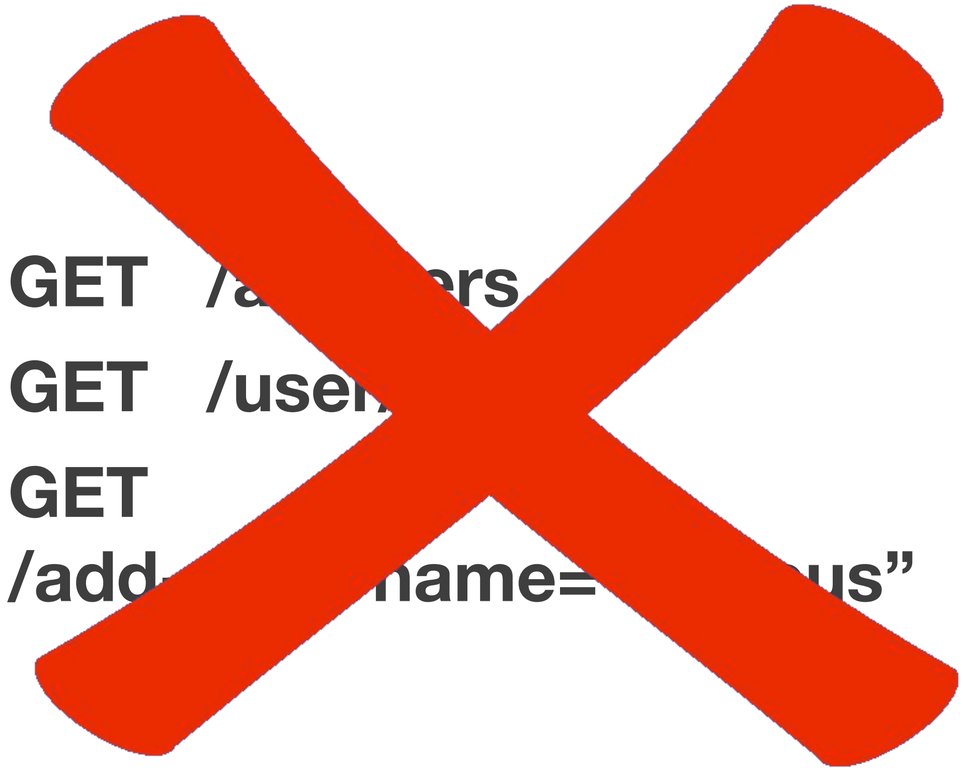
```
const express = require('express');
const router = express.Router();
const client = require("./db");

router.get("/", async (req, res) => {
  const data = await client.query("SELECT...");
  res.send(postList(data.rows));
});

router.get("/:id", async (req, res) => {
  const data = await client.query("SELECT ...);
  const post = data.rows[0];
  res.send(postDetails(post));
});
module.exports = router;
```

REST

REST

- **Architecture style for designing backend applications.**
- **Helps answer the question on how to organize routes and how to map functionality to URIs and Methods:**
  - Paths represent "nouns" or *resources*
  - HTTP “verbs” map to data operations

REST - RESOURCES



REST - RESOURCES

GET	/users	Show all users
GET	/users/4	Show a single user (whose ID=4 in the db)
POST	/users	Create a new user in the DB
PUT	/users/4	Update user 4 in the db
DELETE	/users/4	Delete user 4 from the db

COMMON REST-FUL MISTAKES

MIXING VERBS & NOUNS

The feature

- We need to delete individual records from the bears table

THE MISCONCEPTION

❌ GET /bears/delete/:id

❌ GET /bears/:id?delete=true

These url attempts to specify the operation to take in the url path and query string. Paths should only convey information about the resource. The RESTful way to do this would be DELETE /bears/1, not GET /bears/delete/1. GET is also supposed to be "safe" (does not effect the backend in an observable way).

SOLUTION

✅ DELETE /bears/:id

OPAQUE RESOURCE

The feature

- It’s a historical chess database. We have pages for individual moves in historic games.

THE MISCONCEPTION

❌ GET /games/:gameId/:moveNumber

GET /games/4/2 is not expressive enough. What does "2" refer to? The only way to know is by inspecting the implementation (or having documentation)—it's not self-evident. The RESTful way to do this is to explicitly include the sub-resource as a label: GET /games/4/moves/2. Modify the path.

SOLUTION

✅ GET /games/:gameId/moves/:moveNumber

MISLEADING RESOURCE

The feature

- We’re a scientific laboratory. Our employees generate lots of reports. We need to get a list of all the reports generated by particular request

THE MISCONCEPTION

❌ GET /reports/:scientistId

GET /reports/4 means "get report #4", NOT "get all reports by scientist #4". There are two good solutions for this, and they are not mutually exclusive—you can use both.

SOLUTION 1: QUERY STRING

✅ GET /reports?scientistId=4

SOLUTION 2: SUB-RESOURCE FOR USERS

✅ GET /users/:scientistId/reports

UNPREDICTABLE URI STRUCTURE

The feature

- We’re a big e-commerce site. We want to show all the reviews for a particular project on the same page

THE MISCONCEPTION

❌ GET /reviews/products/:productId

As a rule of thumb we expect RESTful URIs to follow the pattern /foo/:fooID/bar/:barID/baz/:bazID etc. Culturally, REST is all about predictability via consistency,
and /reviews/products/4 contradicts that—reviews is not followed by an indentifying key, it is followed by a *separate* resource name (products).

Another way to think about it is that it is similar to **Misleading Resource**. The GET request indicates that we're getting something, but what are we getting? One product? Many products? One review? Many reviews?

SOLUTION 1: QUERY STRING

✅ GET /reviews?productId=4

SOLUTION 2: SUB-RESOURCE FOR REVIEWS

✅ GET /products/:productId/reviews

REQUEST BODY & BODY PARSER

- **POST, PUT (and the less used PATCH) HTTP requests can contain information in the body**
- **The request body is streamed and frequently compressed**
- **Express comes with a built-in middleware that automatically parses incoming request bodies and makes the data available under** req.body

BODY PARSER

verb route

headers

In express…

```
request.body = {bookId:12345, author: 'Nimit'}
```

body

BODY PARSER

```
const express = require('express');

app.use(express.urlencoded({ extended: false }));
```

WHY BODY PARSER?

How the Internet Works