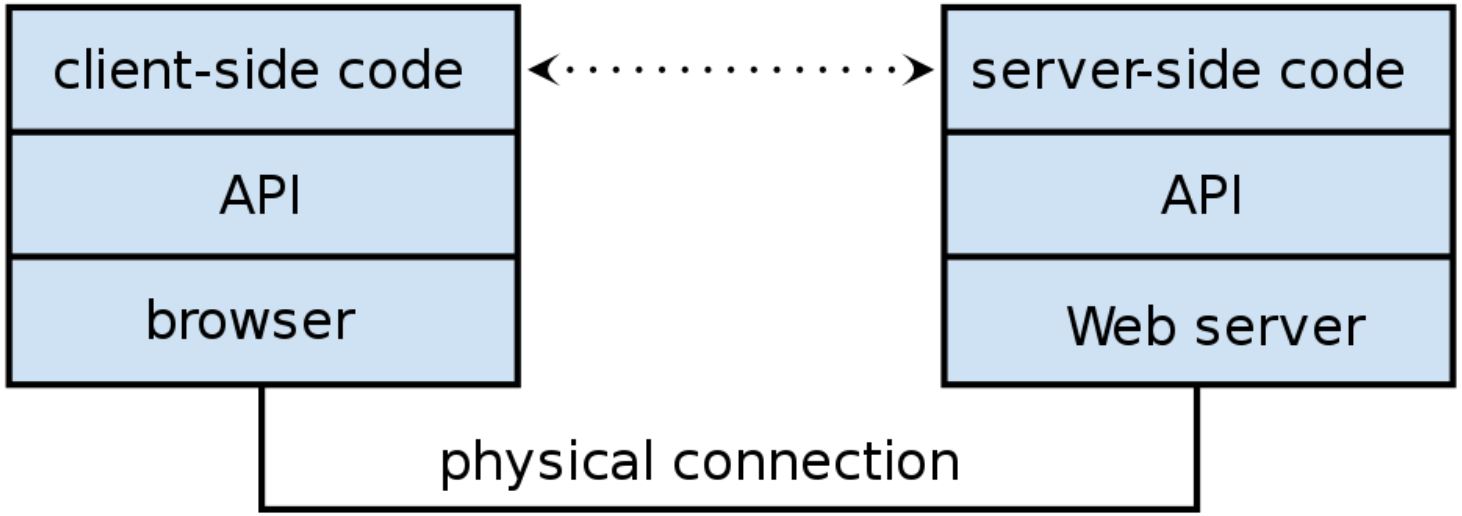


Express Middleware

Frank Walsh

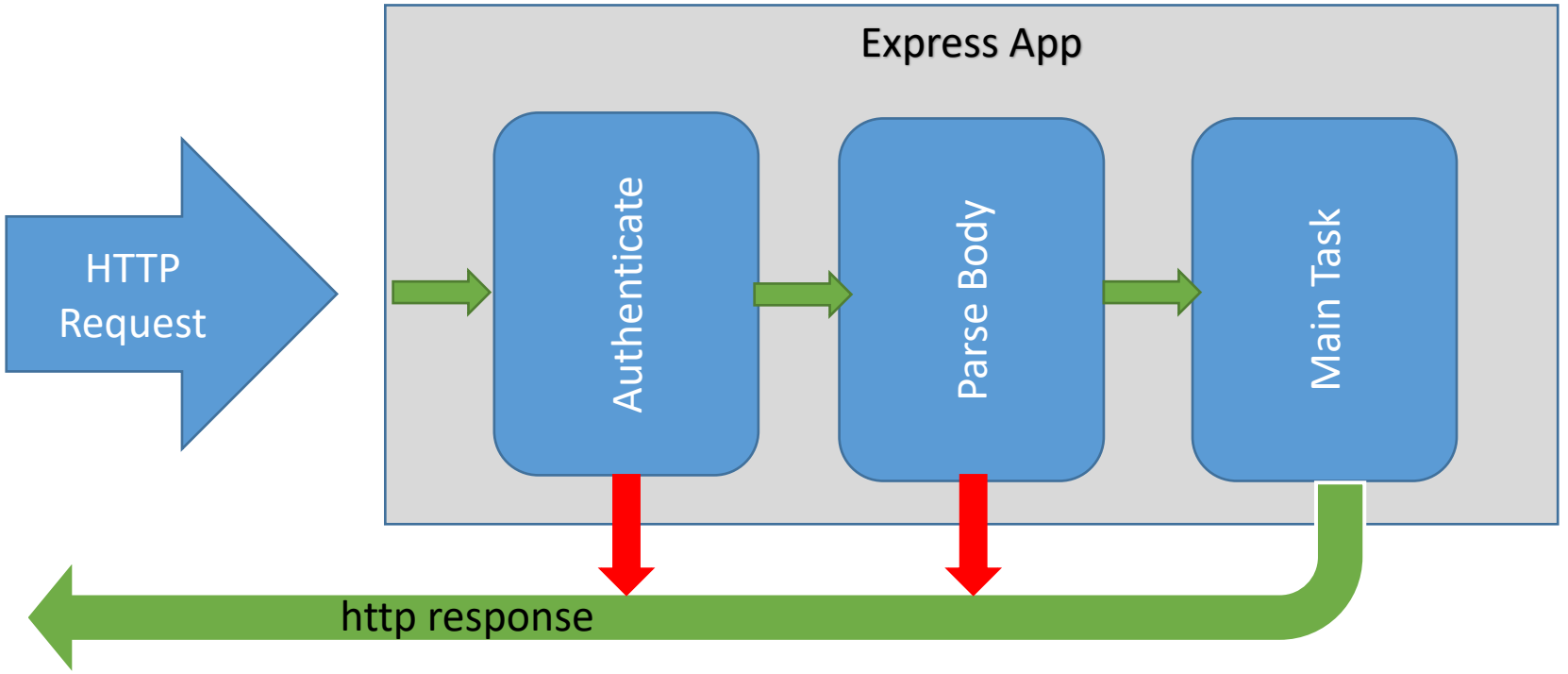
Agenda

- Express Middleware
- Routing in Express
- The Request and Response object

Express Middleware

Express Middleware stack

- The HTTP request (also the response) passes through a pipeline/stack of middleware functions
- Some task is executed at each stage:



Express Middleware

- Middleware functions have access to the request object (req), the response object (res), and the *next()* middleware function in an express application's request-response cycle.
- Your express app will have a 'stack' of middleware functions that can
  - Execute any code.
  - Make changes to the request and the response objects.
  - End the request-response cycle.
  - Call the next middleware function in the stack.

```
11  const middleware1 = (req, res, next) => {
12    console.log('in middleware 1');
13    next();
14  };
15
16  app.use(middleware1);
17  app.use(express.static('public'));
```

Express Middleware Types

- 3rd Party (e.g. body-parser)
- Router level
- Application level (*app.use(…)*)
  - Every request is handled
- Error handlers
  - Takes error as first parameter
    (err,req,res,next) => { …. }
- Baked in
  - Express.static()

Middleware Functions

- App level and 3rd party middleware receive 3 arguments

```
const middleware1 = (req,res,next)=>{
    console.log('in middleware 1');
    next();
}
```

- Error Handling middleware receive 4 arguments(error first)

```
const errorHandler1=(err,req,res,next)=>{
    console.log('in error handler');
    console.log(err);
    res.status(500).end('something went wrong!');
}
```

Express Middleware – Error Middleware

```
11  const middleware1 = (req, res, next) => {
12    console.log('in middleware 1');
13    next(new Error('BOOM!')); // for error handler example
14    // next(); // for general middleware example
15  };
16
17  const errorHandler1 = (err, req, res, next) => {
18    console.log('error handler!!!');
19    console.log(err);
20    next();
21  };
22
23  app.use(middleware1);
24  app.use(express.static('public'));
25  app.use('/api/contacts', contactsRouter);
26  app.use(errorHandler1);
```

Raise error and pass on to next error handling middleware in middleware stack

NOTE: Middleware stack processed in the order it appears in script.

Routing in Express: Routing Middleware

Express Routers

- Can have several "routers" to implement your APIs.
- Router can have its own routing and middleware
  - Good for multiple APIs/ versioning
- Still uses the application level middleware of express app.

Exports router instance

/api/contacts/index.js (contacts router)

```
import express from 'express';
import {contacts} from './contacts';

const router = express.Router(); // eslint-disable-line
router.get('/', (req, res) => {
  res.send({contacts: contacts});
});

export default router;
```

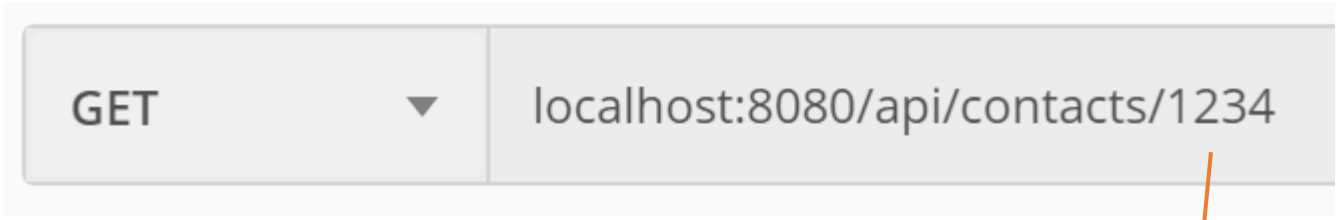
/index.js (express app)

```
import dotenv from 'dotenv';
import express from 'express';
import contactsRouter from './api/contacts';

dotenv.config();

const app = express();


app.use(express.static('public'));
app.use('/api/contacts', contactsRouter);
app.use(errorHandler1);
```

Mount router to URL. **/api/contacts** becomes **Base Route** for router

Express Routers – Parameters

- Route parameters are named URL segments that capture the values specified at their position in the URL.
- The **req.params** object contains the parameter values, with the name of the route parameter specified in the path as their respective keys.

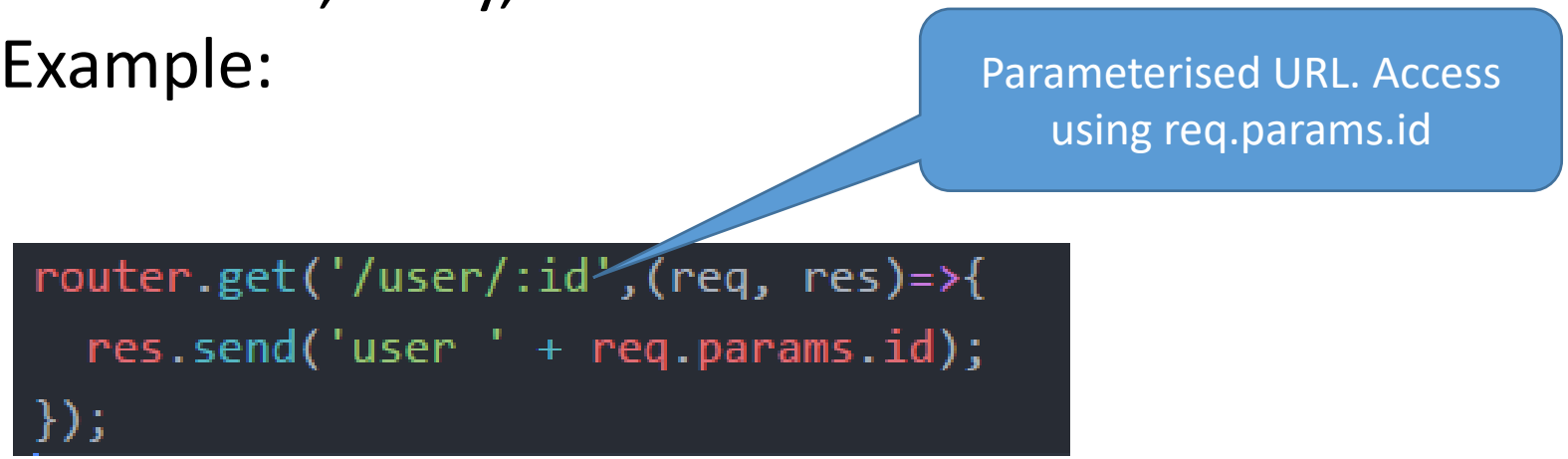



```
router.get('/:id', (req, res) => {
  const id = req.params.id; //gets id param from URL
  //usually retrieve details for customer but for now just return id
  return res.status(200).end(`id parameter from URL is ${id}`);
});
```

```
1  id parameter from URL is 1234
```

Express Request Object

- The **req** object represents the HTTP request.
  - by convention, the object is referred to as '**req**', Response is '**res**'
- Can use it to access the request query string, parameters, body, HTTP headers.
- Example:



Express Request Object req.body

- Contains data submitted in the request body.
- Usually need 3rd party body-parsing middleware such as **body-parser**.
- This example shows how to use body-parsing middleware to populate req.body.

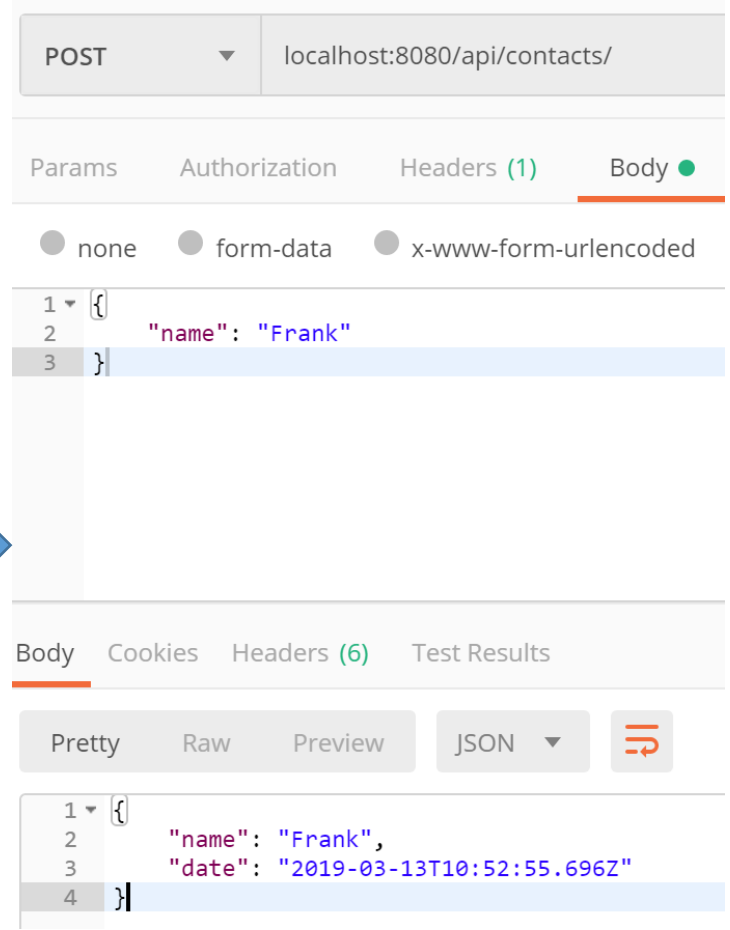
index.js code snip (express app)

```
// parse application/json
app.use(bodyParser.json())

app.use('/api/contacts', contactsRouter);
```

/api/contacts/index.js code snip (contactsRouter)

```
router.post('/', (req, res) => {
  console.log(req.body);
  req.body.date=new Date();
  //just echo the request json body in the response
  res.json(req.body).end();
});
```

Testing using Postman



Express Response Object

- The **res** object represents the HTTP response that an Express app sends when it gets an HTTP request.

```
//Add a contact
router.post('/', (req, res) => {
    let newContact = req.body;
    if (newContact){
          contacts.push({name: newContact.name, address : newContact.address});
          res.status(201).send({message: "Contact Created"});
      }else{
          res.status(400).send({message: "Unable to find Contact"});
      }
});
```

Express Response Properties

- **res.send([body])**
  - The body parameter can be a String, an object, or an Array.
  - For example:

```
res.send({ some: 'json' });
res.send('<p>some html</p>'); res.status(404).send('Sorry, we cannot find that!');
res.status(500).send({ error: 'something blew up' });
```

Response Properties

- **res.json([body])**
- actually calls res.send(), but before that it:
  - respects the json spaces and json replacer app setting
  - ensures the response will have utf8 charset and application/json content-type

```
res.json({ user: 'tobi' })
res.status(500).json({ error: 'message' })
```

Response Properties

- **res.format(object)**
  - –Performs content-negotiation on the Accept HTTP header on the request object
  - –Addresses "multiple representations" REST principle

```
res.format({
  'text/plain': function(){
    res.send('hey');
  },

  'text/html': function(){
    res.send('<p>hey</p>');
  },

  'application/json': function(){
    res.send({ message: 'hey' });
  },

  'default': function() {
    // log the request and respond with 406
    res.status(406).send('Not Acceptable');
  }
});
```

Filters

If you want to authenticate for access to resources you can use multiple callbacks built into express routing

Multiple Callbacks

```
function requireLogin(req, res, next) {
  if (req.session.loggedIn) {
    next(); // allow the next route to run
  } else {
    // require the user to log in
    res.redirect("/login"); // or render a form, etc.
  }
}

// Automatically apply the `requireLogin` middleware to all
// routes starting with `/admin`
router.all("/admin/*", requireLogin, (req, res, next)=> {
  next(); // if the middleware allowed us to get here,
          // just move on to the next route handler
});

router.get("/admin/posts", (req, res)=> {
  // if we got here, the `app.all` call above has already
  // ensured that the user is logged in
});
```

Summary: Express Middleware

- Express is a Routing and Middleware framework.
  - You've seen the routing in the previous lab
- Middleware functions have access to the Request,Response and the **next()** function
  - The next function calls the next middleware function.
- Use middleware to
  - Change the request/response
  - End the request/response cycle
  - Call the next middleware in the stack.
- If middleware does not call next() or return, express will just hang
  - Can be an issue with promises but can be resolved

```
11  const middleware1 = (req, res, next) => {
12    console.log('in middleware 1');
13    next();
14  };
15
16  app.use(middleware1);
17  app.use(express.static('public'));
```

Middleware with Async await/promises

- Express will not detect rejected promise automatically
  - Error handling middleware will not be called – causes app to hang.
- Couple of ways to address this
  - Use try/catch in each async function/promise (lots of repetitive code)
  - Use a helper function that wraps our express routes to handle rejected promises.

```
1  const asyncMiddleware = fn =>
2    (req, res, next) => {
3      Promise.resolve(fn(req, res, next))
4        .catch(next);
5    };
```

- **Handy:** someone has published a NPM package…
  npm install --save express-async-handler

Further Reference

- ExpressJS.com - Official Express Homepage
- Node and Express Tutorial