
epam
NODE.JS GLOBAL
Middleware. Frameworks. Validation
DECEMBER, 2019

# AGENDA

1. What is Express
2. What is middleware
3. Build in modules
4. Validation

# WHAT IS EXPRESS

Express

Fast, unopinionated, minimalist web framework for Node.js

```
$ npm install express
```

# REQUEST RESPONSE CYCLE

1. Request
2. Configuration
3. Application middlewares
4. Route middlewares
5. View (html / json)
6. Response

# MIDDLEWARE IS THE BACKBONE

Express = Routing + Middlewares

# MIDDLEWARE CONCEPT

1. Execute any code.
2. Make changes to the request and the response objects.
3. End the request-response cycle.
4. Call the next middleware in the stack.

# MIDDLEWARE TYPES

1. Application-level
2. Router-level
3. Error-handling
4. Built-in
5. 3rd party (ex.: xxx-parser)

# APPLICATION LEVEL MIDDLEWARE

1. Change anything to the request and the response objects and then call next()

```
app.use(function (req, res, next) {
    console.log('Time: %d', Date.now());
    next();
});
```

2. You can attach middleware to the specific route

```
app.use('/abcd', function (req, res, next) {
    console.log('Time: %d', Date.now());
    next();
});
```

3. Do not forget about next(). This code will never return control to the route handler

```
app.use(function(req, res, next) {
    console.log('Time: %d', Date.now());
    res.send('Hello World');
});
```

# ERROR-HANDLING MIDDLEWARE

1. Has four arguments – and the first is error

```
app.use(function(err, req, res, next) {
    console.error(err.stack);
    next(err);
});
```

2. You can call it by **next(err)** in any middleware

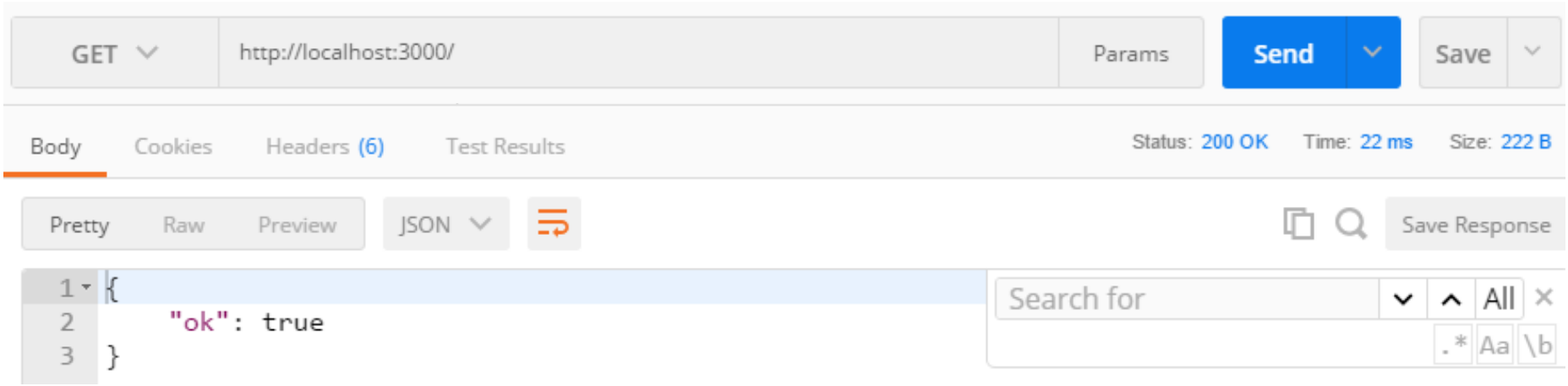
3. Once **next(err)** is called, all other non-error middlewares would be skipped

# BACK TO EXPRESS

1. express()
2. Application
3. Request
4. Response
5. Router

# SIMPLE EXPRESS APP

```
1   const express = require('express');
2   const app = express();
3
4   app.listen(3000);
5
6   app.get('/', function (req, res) {
7       res.json( { ok : true } );
8   });
9
```



# express()

1. Creates an Express application

2. Provide some useful middlewares
   - **static** to server static files
   - **json** – to parse JSON to body
   - **urlencode** – to parse urlencoded body

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

app.listen(3000);

app.use(express.json());
```

# APPLICATION

1. Routing HTTP requests (all, METHOD)
2. General app configuration (enable / disable)
3. Adding middleware (use)
4. Global parameters handling
5. Registering and using a template engine(engine, render)

# APPLICATION: ROUTES

1. all
2. METHOD
3. use (for middleware)

# APPLICATION: PROPERTIES

1. **listen** - starts UNIX socket and listens to connections on given path
2. **locals** - local variables within application
3. **set & get**
4. **disable & enable**

```
app.enabled('isAdmin');
// => false

app.enable('isAdmin');
app.enabled('isAdmin');
// => true

app.set('title', 'Express API Reference');
app.get('title'); // "Express API Reference"
```

# APPLICATION: SETTINGS

1. case sensitive routing
2. strict routing
3. x-powered-by
4. trust proxy

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

app.listen(3000);

app.set('case sensitive routing', true);
```

# APPLICATION: PARAM

1. Adds callback triggers to route specific route-parameters
2. .. also can be used to load user settings

```
1   const express = require('express');
2   const app = express();
3
4   app.listen(3000);
5
6   app.param('id', function(req, res, next, id){
7       // Restore user from the datebase by id
8       req.user = user;
9       next();
10  });
11
12  app.get('/employees/:id', function (req, res) {
13      // Here we will have our user as req.user
14      //...
15  });
```

# REQUEST

1. Extended version of **IncomingMessage** from http module
2. body
3. cookies
4. params (path params)
5. query (query params)

```
app.get('/employees/:id', function (req, res) {
    let employee = _.find(data, {id: req.params.id});

    if (employee === undefined) {
        res.status(404)
            .json({message: `Employee with id ${req.params.id} not found`});
    } else {
        res.json(employee);
    }
});
```

# REQUEST: BODY

1. Contains submitted data as key-value pairs and undefined by default
2. Use body-parser to populate body from json

```
1   const express = require('express');
2   const bodyParser = require('body-parser');
3   const app = express();
4
5   app.listen(3000);
6
7   app.use(bodyParser.json());
8
9   app.post('/employees', function (req, res) {
10      let employee = req.body;
11      data.push(employee);
12      res.status(204).send();
13  });
```

# REQUEST: BODY (4.16.0+)

1. Contains submitted data as key-value pairs and undefined by default
2. ~~Use body-parser to populate body from json~~
3. Use **express.json** middleware to populate body from json

```
1   const express = require('express');
2   const app = express();
3
4   app.listen(3000);
5
6   app.use(express.json());
7
8   app.post('/employees', function (req, res) {
9       let employee = req.body;
10      data.push(employee);
11      res.status(204).send();
12  });
```

# REQUEST: COOKIES

1. Contains cookies as key-value pairs
2. Use cookie-parser to populate

```
1   const express = require('express');
2   const cookieParser = require('cookie-parser')
3   const app = express();
4
5   app.listen(3000);
6
7   app.use(cookieParser());
8
9   app.get('/', function(req, res) {
10    console.log('Cookies: ', req.cookies)
11  })
```

# REQUEST: PARAMS

1. Object with properties mapped from named route “parameters”
2. .. or array of elements captured by regular expressions

```
app.get('/employees/:id', function (req, res) {
    const employee = _.find(data, {id: req.params.id});
```

**Route path**: '/employees/:id'
**Request url**: http://localhost:3000/employees/42
**req.params**: {"id": "42"}

**Route path**: '/employees/*'
**Request url**: http://localhost:3000/employees/42
**req.params[0]**: "42”

**Route path**: '/employees/*'
**Request url**: http://localhost:3000/employees/42/awards/17
**req.params[0]**: "42/awards/17"

# REQUEST: QUERY

1. Object with properties mapped from query string parameters
2. If there is no query string, it is the empty object, {}.
3. You have to merge req.params and req.query in order to get all incoming parameters – from recourse path and query string

**Request url**: http://localhost:3000/employees?order=desc
**req.query**: {"order": ”desc"}

# RESPONSE

1. Represents the HTTP response that an Express app sends for HTTP request
2. locals
3. Sending response

```
app.get('/employees/:id', function (req, res) {
    let employee = _.find(data, {id: req.params.id});

    if (employee === undefined) {
        res.status(404)
            .json({message: `Employee with id ${req.params.id} not found`});
    } else {
        res.json(employee);
    }
});
```

# RESPONSE : LOCALS

1. Contains response local variables scoped to the request
2. Available only to current request / response cycle (unlike app.locals)
3. .. useful for storing authenticated user, user settings, etc.

```
app.use(function(req, res, next){
  res.locals.user = req.user;
  res.locals.authenticated = ! req.user.anonymous;
  next();
});
```

# SENDING RESPONSE

1. **end** – quickly end the response without any data
2. **sendStatus** – ответ только со статусом и его описанием
3. **send** – default response with data (Buffer, String, object, or Array)
4. **sendFile** – sends the file at the given path to the client
5. **json** –JSON response with proper content-type
6. **jsonp** – JSON response with JSONP support. Callback called *callback* by default
7. **redirect** – redirects to the specified URL (or path). You can set status code
8. **render** – renders a view and sends the rendered HTML string to the client

# ROUTER

1. The object with isolated instance of middleware and routes
2. METHOD
3. all
4. param
5. route
6. use

# ROUTER: EXAMPLE

```
1   const express = require('express');
2   const app = express();
3   const router = express.Router();
4
5   app.listen(3000);
6
7   router.get('/employees/:id', function(req, res) {
8     res.json( {id : req.params.id });
9   });
10
11  app.use('/', router);
```

# ROUTER: OPTIONS

1. **caseSensitive:** when disabled treat /Users as /users
2. **strict** – when disabled treat /Users as /Users/
3. **mergeParams** - Preserve the req.params values from the parent router
4. All options are disabled by default

```
1   const express = require('express');
2   const app = express();
3   const router = express.Router(options);
```

# ROUTER: METHOD

Provide the routing functionality for specific HTTP methods (verbs)

```
1   const express = require('express');
2   const app = express();
3   const router = express.Router();
4
5   app.listen(3000);
6
7   router.get('/', function(req, res) {
8     res.json( { ok : true });
9   });
10
11  app.use('/', router);
```

# ROUTER: ALL

1. Provide the routing functionality for all HTTP methods
2. .. useful for checking user authentication and load user settings

```
router.all('*', requireAuthentication, loadUser);

router.all('/api/*', requireAuthentication);
```

# ROUTER: PARAM

1. Adds callback triggers to route specific route-parameters
2. .. also can be used to load user settings

```
router.param('id', function (req, res, next, id) {
  console.log('CALLED ONLY ONCE');
  next();
});

router.get('/employees/:id', function (req, res, next) {
  console.log('although this matches');
  next();
});

router.get('/employees/:id', function (req, res) {
  console.log('and this matches too');
  res.end();
});
```

# ROUTER: ROUTE

1. Returns an instance of a single route
2. Useful for avoiding duplicate route naming and thus typing errors

```
const router = express.Router();

router.param('id', function(req, res, next, id) {
  req.employee = _.find(data, {id: id});
  next();
});

router.route('/employees/:id')
.all(function(req, res, next) {
  // runs for all HTTP verbs first
  // think of it as route specific middleware!
  next();
})
.get(function(req, res, next) {
  res.json(req.employee);
})
```

# ROUTER: ROUTE NEXT

1. You can provide multiple callback functions that behave just like middleware
2. Call next('route') to bypass the remaining route callbacks

```
router.route('/emploees/:id')
    .get(function(req, res, next) {
        // if the user ID is 0, skip to the next route
        if (req.params.id == 0) next('route');
        // otherwise pass the control to the next middleware function
        else next();
    }, function(req, res, next) {
        // some special logic for requests with param id != 0
        next();
    })
    .get(function(req, res, next){
        res.json();
    });
```

# ROUTER: USE

1. Adds the specified middleware function
2. .. and optional mount it to the specific path

```
router.use(function(req, res, next) {
  console.log('%s %s %s', req.method, req.url, req.path);
  next();
});

app.use('/employees', router);
```

# MIDDLEWARE CONCEPT. ONE MORE TIME

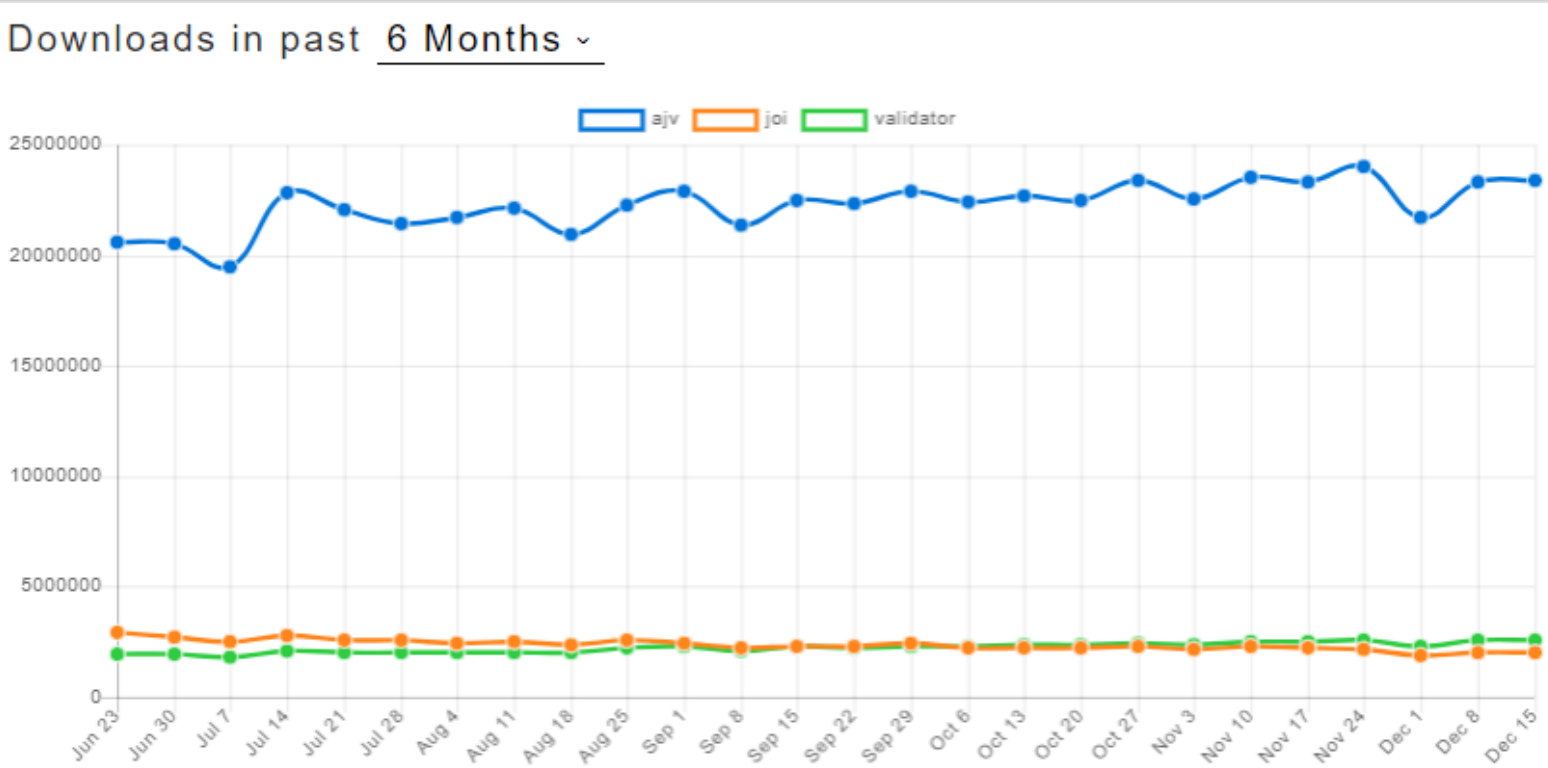
1. Execute any code.
2. Make changes to the request and the response objects.
3. End the request-response cycle.
4. Call the next middleware in the stack.

# VALIDATION

1. By schema
2. By chaining calls (fluent interface)
3. String validation

```
const Joi = require('joi');

const schema = Joi.object().keys({
    username: Joi.string().alphanum().min(3).max(30).required(),
    password: Joi.string().regex(/^[a-zA-Z0-9]{3,30}$/),
    access_token: [Joi.string(), Joi.number()],
});

// Return result.
const result = Joi.validate({ username: 'abc', birthyear: 1994 }, schema);
// result.error === null  => valid


const validator = require('validator');

validator.isEmail('foo@bar.com'); // => true
```

# VALIDATION LIBRARIES




★ 4 985

★ 10 737

★ 12 508

| | stars | forks | issues | updated | created |
|---|---|---|---|---|---|
| ajv | 6710 | 494 | 77 | Dec 14, 2019 | May 20, 2015 |
| joi | 13834 | 1157 | 13 | Dec 14, 2019 | Sep 16, 2012 |
| validator | 14614 | 1333 | 145 | Dec 16, 2019 | Oct 6, 2010 |

* https://www.npmtrends.com/ajv-vs-joi-vs-validator

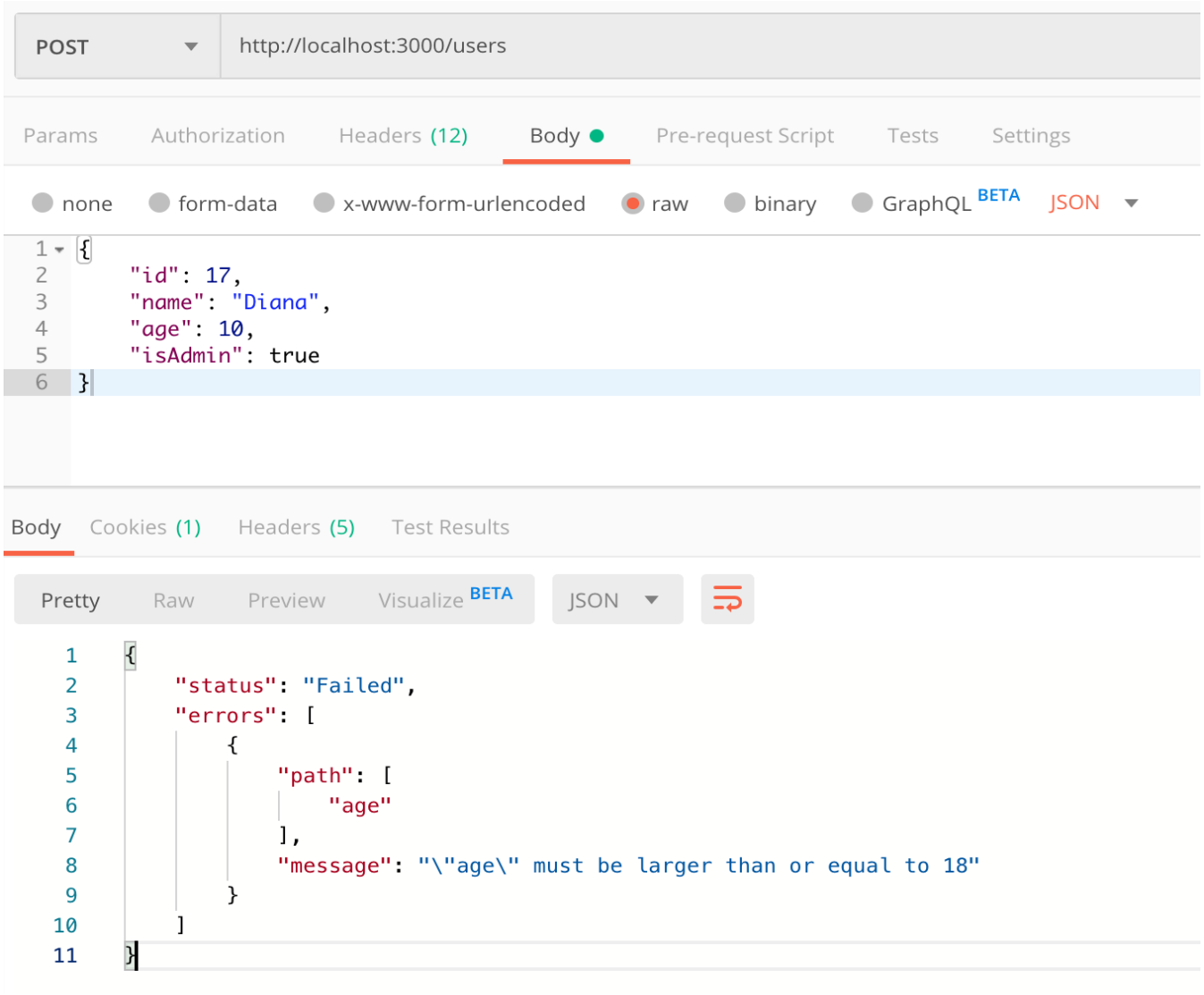
# JOI

```
// error mapping
function errorResponse (schemaErrors) {
    const errors = schemaErrors.map((error) => {
        let { path, message } = error;
        return { path, message };
    });
    return {
        status: 'failed',
        errors,
    };
};

// create validation middleware
function validateSchema (schema) {
    return (req, res, next) => {
        const { error } = schema.validate(req.body, {
            abortEarly: false,
            allowUnknown: false,
        });

        if(error.isJoi) {
            res.status(400).json(errorResponse(error.details));
        } else {
            next();
        }
    }
};
```

# JOI SCHEMA

```
const userSchema = Joi
  .object()
  .keys({
    id: Joi.number().integer().required(),
    name: Joi.string().regex(/^[a-zA-Z0-9]{3,30}$/),
    age: Joi.number().integer().min(18).max(99),
    isAdmin: Joi.boolean().required(),
  })


userRouter.post('/users', validateSchema(userSchema), (req, res) => {
  const user = req.body;

  const newUsers = [...users, user];

  res.json(newUsers)
})
```

# JOI RESPONSE



# EXTRA MODULES

1. Config handler – get config for the current environment and validate it
   - config, nconf, dotenv
2. Error handler – throw error with extra details, handlers for popular errors
   - boom, http-errors
3. Log handler – log errors and debug data for different environments
   - winston, banyan
4. Validator – validate request payloads and params
   - ajv, joi
5. Helpers – add HAL links, check permissions, test request/response against spec
   - halson, ..

# USEFUL LINKS

- ExpressJS API documentation
- Writing middleware for use in Express apps
- Express middleware
- Error handling
- API Design in Node.js Using Express and Mongo (lynda.com)
- Getting Started with Express.js (egghead.io)
- Designing a Beautiful REST+JSON API

# NODE.JS GLOBAL

MIDDLEWARE. FRAMEWORKS. VALIDATION

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