The Express Framework & node-orm2

ELEC6017

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Resources

• Reminder:
  – https://hci.ecs.soton.ac.uk/wiki/JavascriptReferences
  – https://hci.ecs.soton.ac.uk/wiki/NodejsReferences
Two Programming Patterns

• Let's look at two key ideas behind express
• Mapping URLs to functions (routing)
• Augmenting function arguments
• Basic example: o8_http_routing.js
• We can wrap this functionality into an object, example: o9_http_routing_object.js
Express

• A node.js framework for web services applications
  – Express facilitates routing of URLs to functions
  – Express supports the "injection" of middleware
  – Plenty of middleware plugins

• For more information about express see also http://expressjs.com/ & http://expressjs.com/guide.html and ch. 6-9 of "Node.js in Action" (see module web page)

• Hello World example: 10_hello_express.js
More Express Examples

• Let's look at a slightly more advanced examples to demonstrate:
  – URL routing
  – Augmented req & res
  – Middleware
• We need an example scenario..
IoT Simple Example

• Assume we have 'things' that are mini-computers and can be connected to the Internet

• We will call these devices (aka sensor nodes)
  – Example: Arduino with WiFi shield (for prototyping)
  – Or simply AVR microcontroller with WiFi module

• Each device can have multiple sensors attached to it (e.g. temperature, humidity, etc..)

• Each sensor can produce sensor readings (i.e. data)
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IoT Simple Example API

• **URLs:**
  - /devices
  - /device/:device_id
  - /device/:device_id/sensors
  - /device/:device_id/sensor/:sensor_id
  - /device/:device_id/sensor/:sensor_id/readings

• Each of them could accept GET and POST
  - E.g. GET /devices to return the list of all devices
  - POST /devices to create a new device
IoT Simple Example Code

• Important notes:
  – Here I use hard-coded data, please see following slides about using DBs
  – This does not fully cover the API from the previous slide

• 11_express_urls.js
Object Relational Mapping & node-orm2

• This module is not about DBs
  – Yet, we cannot assume you already know about DBs
• An Object Relational Mapping (ORM) is a way to handle a database from an object oriented language
• An ORM abstracts some of the DB issues
• There are several ORM modules for Node.js
• We will use node-orm2

Please see: https://github.com/dresende/node-orm2
node-orm2

• It works with several DBs
  – we will use sqlite because it is easy to install (npm install sqlite3)

• node-orm2 provides an API to
  – Define what / how to store data in the DB
  – Store & edit data into the DB
  – Retrieve data from the DB
  – Search & filter
node-orm2 Example

• 12_orm.js
Summary & Outlook

• Express is a Node.js framework that makes it easier to build web services (& applications)
  – Lots of plug-ins (middleware) available to expand it
• node-orm2 is an ORM module: it abstracts how to deal with the DB
• You should now have all you need for the coursework
• In future lectures: coursework Q&A, more about IoT & my research around it