M2C: Building Distributed Applications

MongoDB
MongoDB

• An example of a NoSQL database
• Is schema-less
  – Do not define tables and columns in advance
  – Store new data however you care to
• Stored as BSON
  • Similar to JSON, but with a few more data types
    – JSON is essentially serialized JavaScript objects
      » I.e. what JavaScript objects would look like if represented as an object literal
  • Therefore MongoDB essentially stores JavaScript objects
    – Easy to save a JavaScript object
    – Easy to restore as a JavaScript object
SQL vs NoSQL

• Browse comparison on:
  – http://www.mongodb.org/display/DOCS/SQL+to+Mongo+Mapping+Chart
Vs. RDBMS

• It is unclear whether it is beneficial or not to be thinking in terms of RDBMS and mapping it to Mongo.

• My intuition:
  – Forget about RDBMS in this case
  – Just see Mongo as a something
    • Simpler
    • Completely different
    • Just a way to store, query, and retrieve JavaScript objects
Database structure

• Database
  – A database is a set of collections

• Collections
  – A collection is a set of documents

• Documents
  – A document is a JSON string
Alternative mental model

• Save and find JSON documents
  – JSON documents don't have to have the same structure, but they mostly do
  – Each document has (globally) unique _id
• A Collection is a set of JSON documents
• A Database is a set of JSON collections
Example document

• What is passed to mongodb:

  { "name" : "apple",
    "price" : 1.99
  }

• Mongodb adds in the _id:

  { "name" : "apple",
    "price" : 1.99,
    "_id" : ObjectId("35414c4ebb264d700000000000") }
Mongod, mongo, mongodb drivers

• Mongod – the MongoDB database server
  – Listens by default on port 27017
  – Requests / responses via a MongoDB protocol

• Mongo – a MongoDB shell application
  – A JavaScript shell to interact with MongoDB
  – Can do all database operations

• MongoDB drivers
  – Exist for many languages
  – Provides a language-specific API for interacting with MongoDB
Who uses MongoDB?

• Scan:
  – http://www.mongodb.org/display/DOCS/Production+Deployments
Warning

- SQL vs NoSQL can be like religious wars
- There are zealots on both sides
- Our purpose in 67-328:
  - Exposure: try it out, have basic knowledge of it
  - An easy way to store and retrieve data in a form very close to JSON
  - We will not have time for an in-depth analysis of when each is most appropriate
Installing MongoDB

• Browse to https://www.mongodb.org
• Follow the download instructions:
  – MacOS: I found installing HomeBrew and then MongoDB to be easy.
• Experiment with mongo shell:
  – Start: https://docs.mongodb.org/getting-started/shell/import-data/
  – Through "Remove Data"
Node.js MongoDB Driver

• In the mongo shell, you can directly interact with the mongod in a REPL.
• To interact with mongod from within a node program, use the npm module mongodb:
  – npm install mongodb –save
Review mongo-fruit.js

• Run mongodb
• Run mongo
• Run mongodb example

• You can find the API for the demonstrated collection methods at:
  – http://mongodb.github.io/node-mongodb-native/2.0/api/Collection.html