REST

ian.mcloughlin@gmit.ie

HTTP APIs

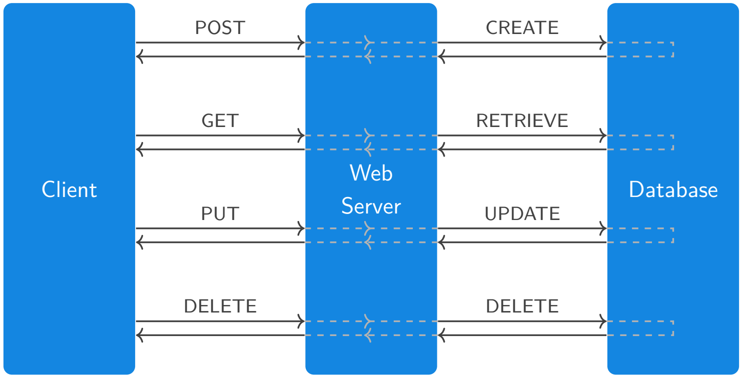
- Facebook, Google, Reddit and others often provide programmable interfaces to their services.
- This lets other application developers use the services programmatically.
- For instance, Reddit allows developers to create mobile apps for viewing and making submissions to reddit.
- HTTP is often the mechanism used for this purpose.
- Access is provided through a set of URLs, across a variety of HTTP methods.
- The APIs often require JSON in HTTP request bodies and often return the query results as JSON.

REST

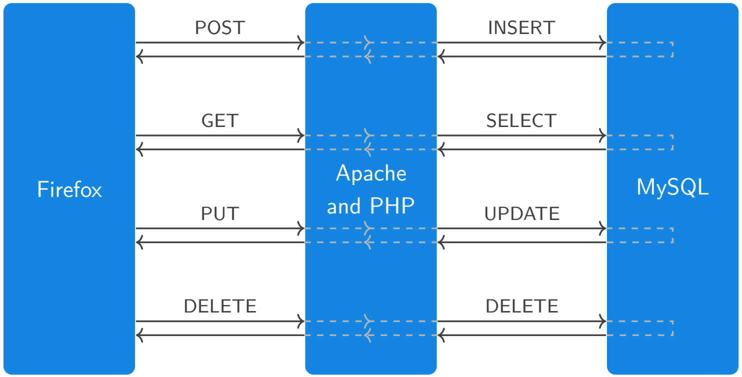
- REST stands for Representational State Transfer.
- REST is an architecture describing how we might use HTTP.
- RESTful APIs make use of more HTTP methods than just GET and POST.
- Most HTTP APIs are not RESTful.
- RESTful APIs adhere to a few loosely defined constraints.
- Two of those constraints are that the API is stateless and cacheable.

drdobbs.com/web-development/restful-web-services-a-tutorial/240169069

HTTP and CRUD



AMP


POST
INSERT
GET
SELECT
Firefox
Apache and PHP
MySQL
PUT
UPDATE
DELETE
DELETE

Typical example

Suppose we have a system for storing and retrieving emails.

Method	URL	Description
GET	/emails	list all emails
POST	/email	store new email
GET	/email/32	retrieve email with id 32
PUT	/email/32	update email with id 32
DELETE	/email/32	delete email with id 32

bitworking.org/news/201/restify-daytrader

Stateless

- Statelessness is a REST constraint.
- HTTP uses the client-server model.
- The server should treat each request as a single, independent transaction.
- No client state should be stored on the server.
- Each request must contain all of the information to perform the request.

Cacheable

- REST APIs should provide responses that are cacheable.
- Intermediaries between the client and server should be able to cache responses.
- This should be transparent to the client.
- Cacheability increases response time.
- Browsers usually cache resources, in case they are requested again.
- There is usually a time limit on cached resources.

CouchDB

- CouchDB is a document-oriented database.
- Documents are represented in CouchDB as JSON objects.
- Each document has its own id and revision, indicated by properties `_id` and `_rev` in the JSON document.
- Updating a document leaves its `_id` intact, but updates its `_rev`.
- Different documents can have different properties – there is no schema.
- The main interface with CouchDB, for storage and retrieval is a HTTP API.
- CouchDB uses HTTP methods such as `GET`, `POST`, `PUT` and `DELETE` to retrieve, add, update and delete documents.

NoSQL

- NoSQL is the umbrella term for databases that do not conform to the relational, SQL-style model.
- Relational databases are good for some types of data.
- However, they have some issues.
- SQL queries can result in costly joins.
- Tables can be sparsely populated.
- Two common NoSQL database types are Document-oriented and Graph.

Futon

- CouchDB has an in-built admin interface.
- It's called Futon.
- You access it through the `/_utils` path.
- You can create and delete databases.
- You can also create, update and delete documents.

MapReduce

- MapReduce is a way of programming.
- It is a model for performing specific types of problems that are common in programming.
- MapReduce promotes algorithms that have an initially embarrassingly parallel part, and a subsequent consolidation part.
- The former is the Map part, and the latter is the Reduce part.
- MapReduce isn't necessarily anything new, the ideas have existed for a long time.
- The formalisation of those ideas and their implementation in systems such as Hadoop is useful.

joelonsoftware.com/items/2006/08/01.html

Map

Map takes a function and a list, and applies the function to every element of the list.

```
function map(fn, a) {
  r = [];
  for (i = 0; i < a.length; i++)
          r[i] = fn(a[i]);
        return r;
}
```

joelonsoftware.com/items/2006/08/01.html

Reduce

Reduce takes the output of Map, and accumulates the elements in some way.

```
function reduce(fn, a, init) {
  var s = init;
  for (i = 0; i < a.length; i++)
      s = fn(s, a[i]);
  return s;
}
```

joelonsoftware.com/items/2006/08/01.html

Map Reduce in CouchDB

Reduce takes the output of Map, and accumulates the elements in some way.

```
function(doc) {
  if(doc.date && doc.title) {
    emit(doc.date, doc.title);
  }
}
```

```
function(keys, values, rereduce) {
  if (rereduce)
    return sum(values);
        else
    return values.length;
}
```

http://guide.couchdb.org/draft/views.html

Security

- HTTP is not encrypted.
- HTTPS is a protocol based on HTTP, but it provides security.
- GET and POST are by far the most commonly used HTTP methods (by web developers).
- Data sent by GET and POST will be encrypted over HTTPS.
- However, it's generally accepted that POST is more secure for sending sensitive data.
- This is because browsers will typically cache and servers will typically log URLS, with the data encoded in them.

HTTP access control (CORS)

cross-origin	HTTP requests occur when a resource makes a request from a different domain than it was served from.
img	tags often do this – for example, an image might be included from a photo sharing service.
css and js	files are also often served from domains different from the original.
Browsers	usually restrict cross-origin requests initiated by scripts.

developer.mozilla.org/en-US/docs/Web/HTTP/Access_control_CORS