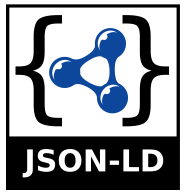
JSON-LD



JSON as an XML Alternative

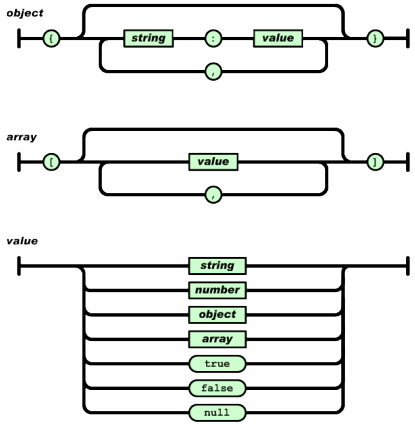
- JSON is a light-weight alternative to XML for data-interchange
- JSON = JavaScript Object Notation
  - It's really language independent
  - most programming languages can easily read it and instantiate objects or some other data structure
- Defined in RFC 4627
- Started gaining traction ~2006 and now widely used
- http://json.org/has more information

Example

```
{"firstName": "John",
 "lastName" : "Smith",
 "age"        : 25,
 "address"   :
   {"streetAdr" : "21 2nd Street",
    "city"       : "New York",
    "state"      : "NY",
    "zip"        : "10021"},
 "phoneNumber":
   [{"type"  : "home",
     "number": "212 555-1234"},
    {"type"  : "fax",
     "number" : "646 555-4567"}]
}
```

- This is a JSON object with five key-value pairs
- Objects are wrapped by curly braces
- There are no object IDs
- Keys are strings
- Values are numbers, strings, objects or arrays
- Arrays are wrapped by square brackets

The BNF is simple



Evaluation

- JSON is simpler than XML and more compact
  - No closing tags, but if you compress XML and JSON the difference is not so great
  - XML parsing is hard because of its complexity
- JSON has a better fit for OO systems than XML, but not as extensible
- Preferred for simple data exchange by many
- MongoDB is a very popular open-source 'NoSQL' database for JSON objects

JSON-LD

JSON-LD is a W3C recommendation for representing RDF data as JSON objects

```
{"@context": {
   "name": "http://xmlns.com/foaf/0.1/name",
   "homepage": {
    "@id": "http://xmlns.com/foaf/0.1/workplaceHomepage",
    "@type": "@id"
   },
   "Person": "http://xmlns.com/foaf/0.1/Person"
 },
 "@id": "http://me.markus-lanthaler.com",
 "@type": "Person",
 "name": "Markus Lanthaler",
 "homepage": "http://www.tugraz.at/"
}
```

In the beginning

```
{
  "name": "Manu Sporny",
  "homepage": "http://manu.sporny.org/",
  "image": "http://manu.sporny.org/images/manu.png"
}
```

A bit better

```
{
  "http://schema.org/name": "Manu Sporny",
  "http://schema.org/url": { "@id": "http://manu.sporny.org/" }
  "http://schema.org/image":
       { "@id": "http://manu.sporny.org/images/manu.png" }
}
```

- The '@id' keyword means 'This value is an identifier that is an IRI'

Define a context

```
{ "@context":
 {
   "name": "http://schema.org/name",     % [1]
   "image": {
     "@id": "http://schema.org/image",    % [2]
     "@type": "@id"                        % [3]
   },
   "homepage": {
     "@id": "http://schema.org/url",       % [4]
     "@type": "@id"                       % [5]
   } } }
```

[1] This means that 'name' is shorthand for 'http://schema.org/name'

[2] This means that 'image' is shorthand for 'http://schema.org/image'

[3] This means that a string value associated with 'image' should be interpreted as an identifier that is an IRI

[4] This means that 'homepage' is shorthand for 'http://schema.org/url'

[5] This means that a string value associated with 'homepage' should be interpreted as an identifier that is an IRI

Reference an external context

```
{
  "@context": "http://json-ld.org/contexts/person.jsonld",
  "name": "Manu Sporny",
  "homepage": "http://manu.sporny.org/",
  "image": "http://manu.sporny.org/images/manu.png"
}
```

Add context inline

```
{"@context":
  {
    "name": "http://schema.org/name",
    "image": {
      "@id": "http://schema.org/image",
      "@type": "@id"
    },
    "homepage": {
      "@id": "http://schema.org/url",
      "@type": "@id"
    }
  },
  "name": "Manu Sporny",
  "homepage": "http://manu.sporny.org/",
  "image": "http://manu.sporny.org/images/manu.png"
}
```

Making assertions about things

```
{
  "@context": {
    ...
    "Restaurant": "http://schema.org/Restaurant",
    "Brewery": "http://schema.org/Brewery"
  }
  "@id": "http://example.org/places#BrewEats",
  "@type": [ "Restaurant", "Brewery" ],
  ...
}
```

Adding a default vocabulary

```
{
 "@context": {
  "@vocab": "http://schema.org/"
 }
 "@id": "http://example.org/places#BrewEats",
 "@type": "Restaurant",
 "name": "Brew Eats"
 ...
}
```

Mixing vocabularies

```
{
 "@context":
 {
  "xsd": "http://www.w3.org/2001/XMLSchema#",
  "foaf": "http://xmlns.com/foaf/0.1/",
  "foaf:homepage": { "@type": "@id" },
  "picture": { "@id": "foaf:depiction", "@type": "@id" }
 },
 "@id": "http://me.markus-lanthaler.com/",
 "@type": "foaf:Person",
 "foaf:name": "Markus Lanthaler",
 "foaf:homepage": "http://www.markus-lanthaler.com/",
 "picture": "http://twitter.com/account/profile_image/markuslanthaler"
}
```

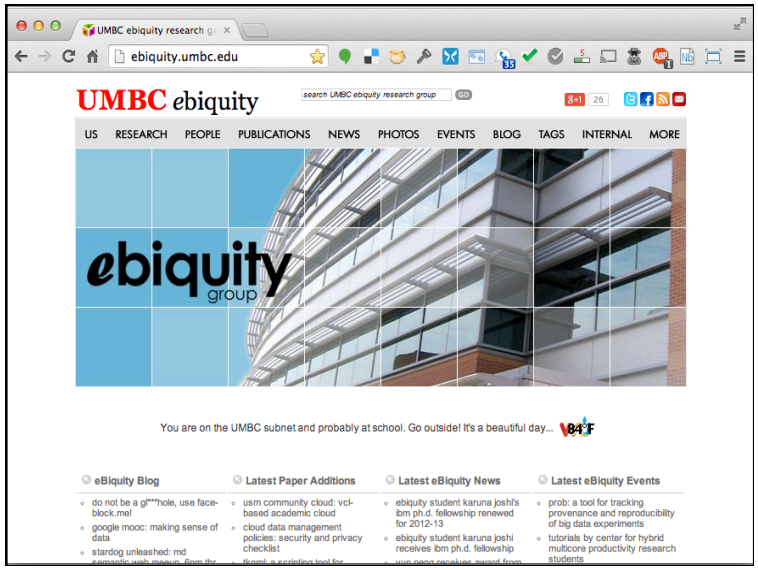
Embedding other objects

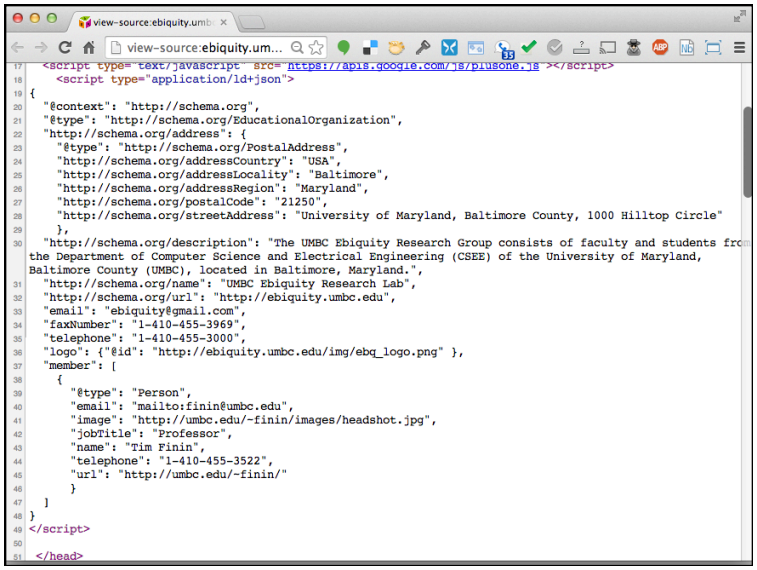
```
{
  ...
 "name": "Manu Sporny",
 "foaf:knows":
 {
  "@type": "Person",
  "name": "Gregg Kellogg",
 }
...
}
```

Google looks for JSON-LD

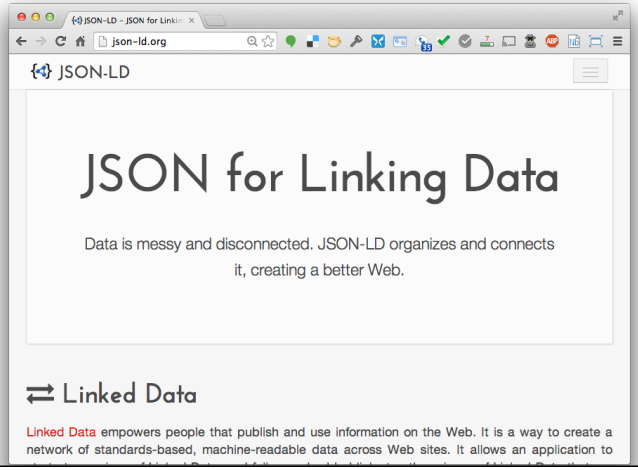
- Google looks for and uses some JSON-LD markup (e.g., for organizations)
- Put a JSON-LD object in the head of a web page wrapped with script tags:

```
<script type="application/ld+json">
{...}
</script>
```





http://json-ld.org/



Conclusion

- JSON-LD is a good solution to putting blocks of semantic data on web pages
- It's aimed at publish linked data, not ontologies, i.e.. ABOX not TBOX
- Tools are available for extracting their content as RDF triples
- Search companies are beginning to look for and JSON-LD in web pages that uses vocabularies they understand (i.e., schema.org)
- Look for more of this in the future

http://json-ld.org/playground/