JSON

JSON as an XML Alternative

- JSON is a lightweight alternative to XML for datainterchange

- 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 tracking ~2006 and now widely used

- http://json.org/ has more information

Values

- Strings
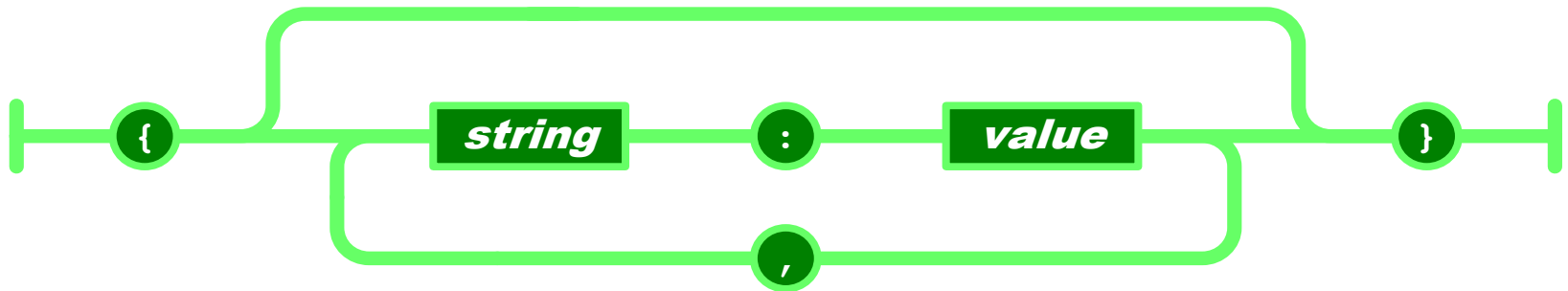- Numbers
- Integer
- Booleans

- Objects
- Arrays

- `null`

Object

- Objects are unordered containers of key/value pairs
- Objects are wrapped in **{ }**
- **,** separates key/value pairs
- **:** separates keys and values
- Keys are strings
- Values are JSON values

Object

Object

```
{
    "name":      "Jack B. Nimble",
    "at large": true,
    "grade":     "A",
    "format": {
        "type":      "rect",
        "width":     1920,
        "height":    1080,
        "interlace": false,
        "framerate": 24
    }
}
```

Array

- Arrays are ordered sequences of values
- Arrays are wrapped in `[]`
- `,` separates values
- JSON does not talk about indexing.
  - An implementation can start array indexing at 0 or 1.

Array

Array

```
["Sunday", "Monday", "Tuesday",
 "Wednesday", "Thursday", "Friday",
 "Saturday"]


[
  [0, 1, 0],
  [1, 0, 0],
  [0, 0, 1]
]
```
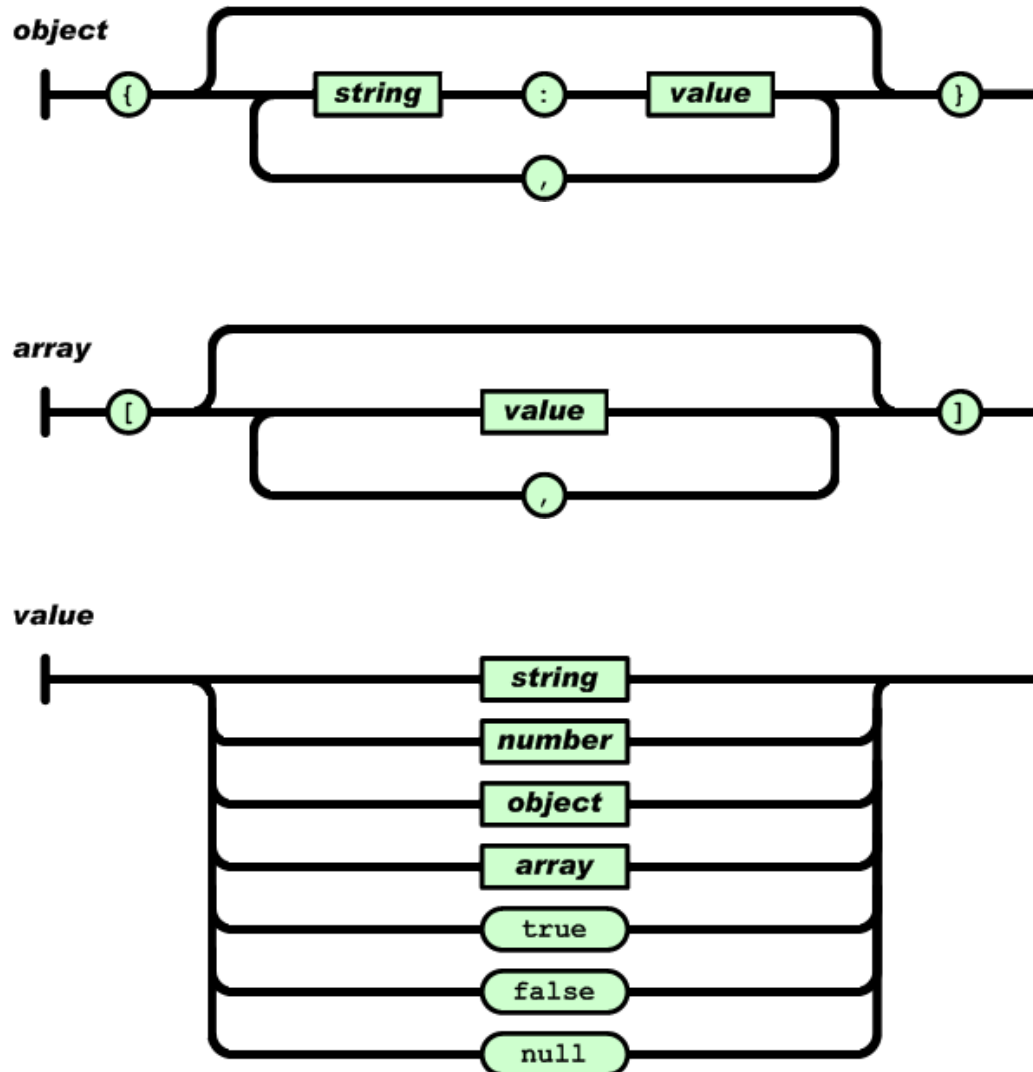
Arrays vs Objects

- Use objects when the key names are arbitrary strings.

- Use arrays when the key names are sequential integers.

Example

```
{"firstName": "John",
 "lastName" : "Smith",
 "age"        : 25,
 "address"   :
    {"streetAdr" : "21 2nd Street",
     "city"        : "New York",
     "state"      : "NY",
     "zip"         : "10021"},
 "phoneNumber":
   [{"type"  : "home",
     "number": "212 5551234"},
    {"type"  : "fax",
     "number" : "646 5554567"}]
}
```

- This is a JSON object with five keyvalue pairs
- Objects are wrapped by curly braces
- There are no object IDs
- Keys are strings
- Values are numbers, strings, objects or arrays
- Ararys 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
- JSON is not as extensible as XML
- Preferred for simple data exchange by many
- Less syntax
- Schemas? We don't need no schemas!
- Transforms? Write your own.

JSON & XML

```xml
<?xml version="1.0" encoding="ISO-8859-1"?>
<bookstore id="1">
        <book category="cooking">
                <title lang="en">Everyday Italian</title>
                <author>Giada De Laurentiis</author>
                <year>2005</year>
                <price>30.00</price>
        </book>
        <book category="cook">
                <title lang="en">Everyday Italian</title>
                <author>Giada De Laurentiis</author>
                <year>2005</year>
                <price>30.00</price>
        </book>
</bookstore>
```

```json
{
  "id": 1,
  "books": [
    {
      "category": "cooking",
      "title": {
        "lang": "en",
        "text": "Everyday"
      },
      "author": "giada",
      "year": 2005,
      "price": 30
    },
    {
      "category": "cooking",
      "title": {
        "lang": "en",
        "text": "Everyday"
      },
      "author": "giada",
      "year": 2005,
      "price": 30
    }
  ]
}
```