

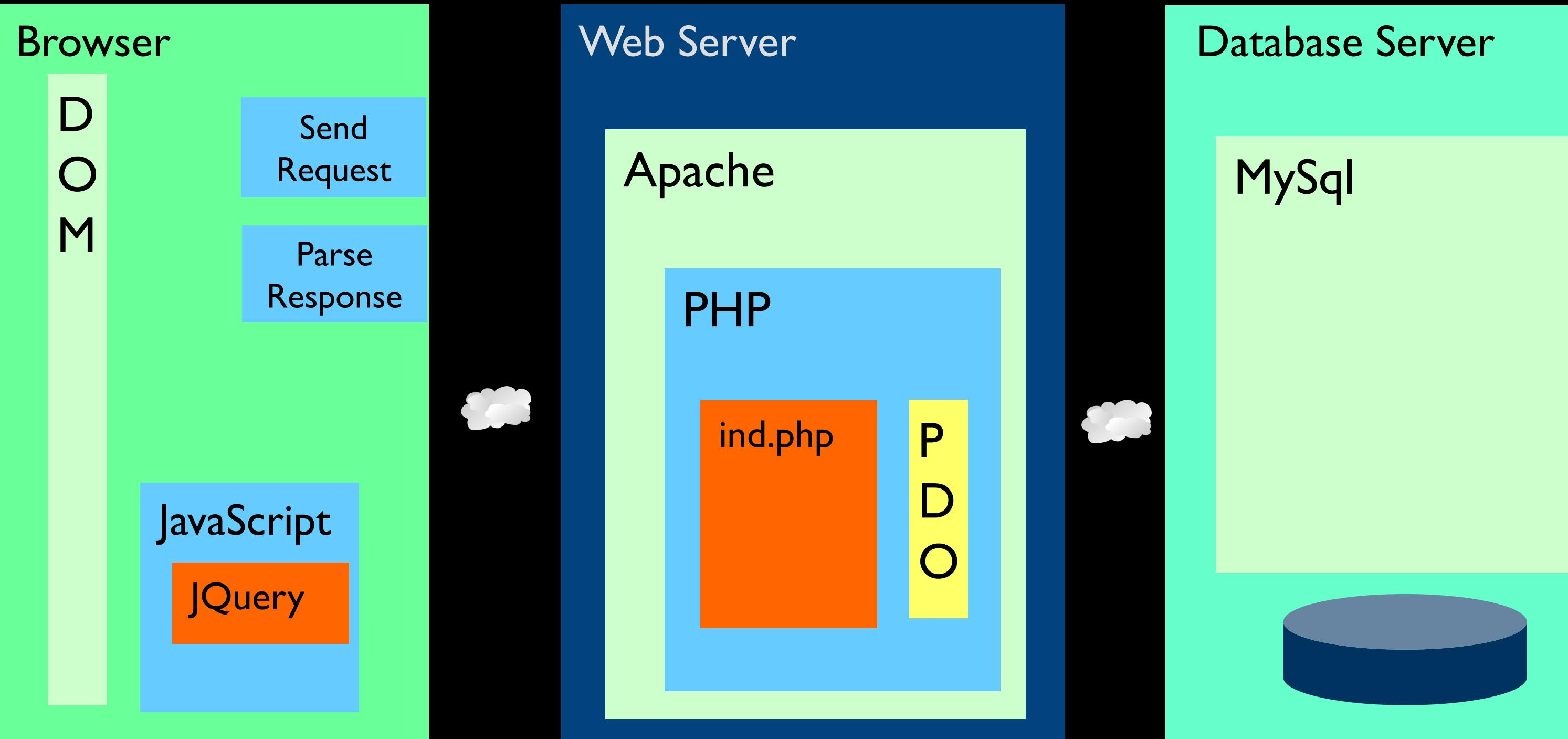
JSON – JavaScript Object Notation

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www.wa4e.com

<http://www.wa4e.com/code/json-01.zip>
<http://www.wa4e.com/code/json-02-chat.zip>



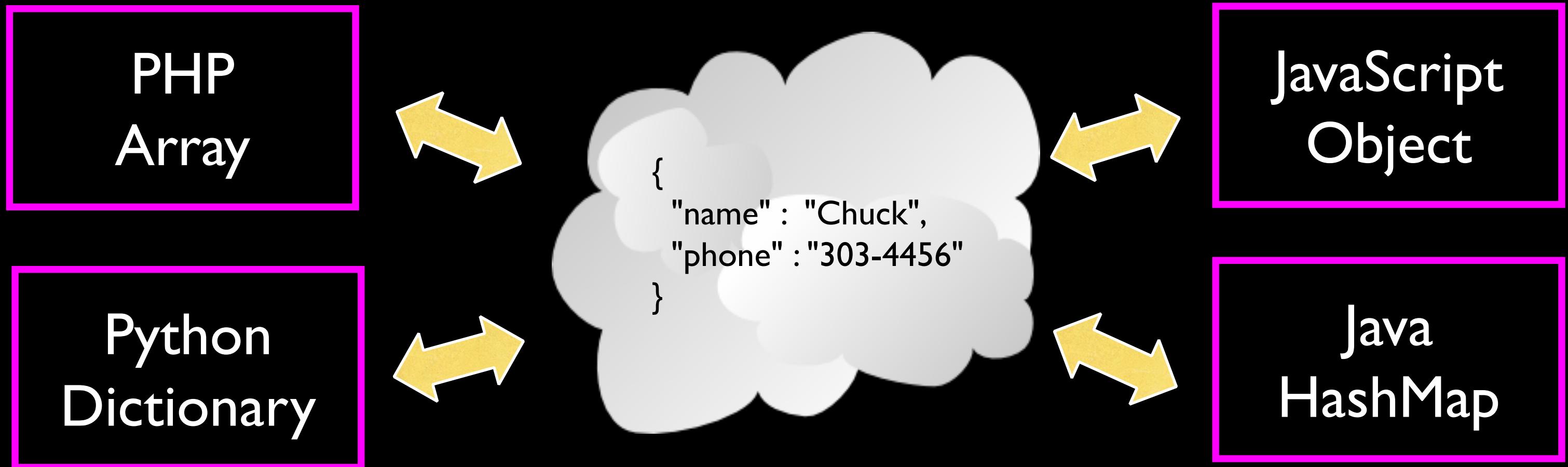
Time

<http://www.wa4e.com/code/rrc/>

Data on the Web

- With the HTTP Request/Response well understood and well supported, there was a natural move toward exchanging data between programs using these protocols.
- We needed to come up with an agreed way to represent data going between applications and across networks.

Agreeing on a “Wire Format”



a.k.a. “Wire Protocol” - What we send on the “wire”

JSON is a “Wire Format”



JavaScript Object Notation

- Douglas Crockford – “Discovered” JSON
- Object literal notation in JavaScript



<https://www.youtube.com/watch?v=kc8BAR7SHJI>



Introducing JSON

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ECMA-404 The JSON Data Interchange Standard.

JSON (JavaScript Object Notation) is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate. It is based on a subset of the [JavaScript Programming Language, Standard ECMA-262 3rd Edition - December 1999](#). JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. These properties make JSON an ideal data-interchange language.

JSON is built on two structures:

- A collection of name/value pairs. In various languages, this is realized as an *object*, record, struct, dictionary, hash table, keyed list, or associative array.
- An ordered list of values. In most languages, this is realized as an *array*, vector, list, or sequence.

These are universal data structures. Virtually all modern programming languages support them in one form or another. It makes sense that a data format that is interchangeable with programming languages also be based on these structures.

In JSON, they take on these forms:

An *object* is an unordered set of name/value pairs. An object begins with { (left brace) and ends with } (right brace). Each name is followed by : (colon) and the name/value pairs are separated by , (comma).

The diagram illustrates the structure of a JSON object. It starts with the word "object" in bold black text. A horizontal line extends from the right side of "object" to a green circle containing a left brace "{". From this circle, a vertical line descends to a green rectangle labeled "string". To the right of "string" is a green circle containing a colon ":". To the right of ":" is another green rectangle labeled "value". A vertical line descends from the bottom of "value" to a green circle containing a comma ",". From this circle, a vertical line descends back up to the right side of the initial green circle containing the left brace "{". Finally, a horizontal line extends from the right side of this circle to a green circle containing a right brace "}".

```
object
  {}
  { members }
members
  pair
  pair , members
pair
  string : value
array
  []
  [ elements ]
elements
  value
  value , elements
value
  string
  number
  object
  array
  true
  false
  null
```

```
string
  ""
  "a JSON"
  "with\nmultiple\nlines"
```

www.json.org

Derived from
the JavaScript
“constant”
syntax

Similar to Python Dictionary syntax



JSON and jQuery

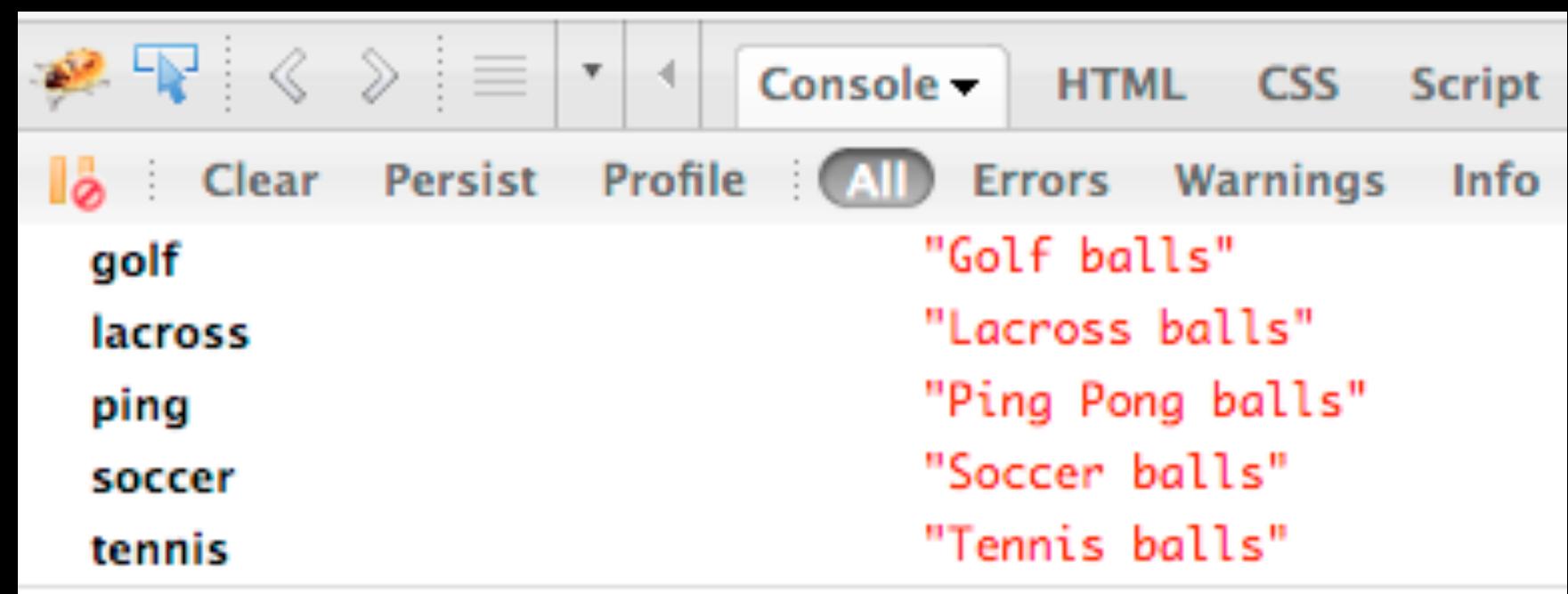
Associative ~~Arrays~~ Objects

- JavaScript Associative Arrays are actually objects with member variables.
- They can be accessed with either associative array syntax or object syntax.

```
balls = {"golf": "Golf balls",  
         "tennis": "Tennis balls",  
         "ping": "Ping Pong balls"};
```

```
balls.soccer = "Soccer balls";  
balls['lacross'] = "Lacross balls";
```

```
console.dir(balls);
```



JSON Syntax

```
who = {  
    "name": 'Chuck',  
    String  
  
    "age": 29,  
    Integer  
  
    "college" : true,  
    Boolean  
  
    "offices" : [ '3350DMC', '3437NQ' ],  
    List/Array  
  
    "skills" : { "fortran": 10,  
        C: 10,  
        Object  
        C++: 5,  
        "python" : '7'  
    }  
};
```

```
<html><head/><body>
<script type="text/javascript">
who = {
    "name": 'Chuck',
    "age": 29,
    "college": true,
    "offices" : [ '3350DMC', '3437NQ' ],
    "skills" : { 'fortran': 10, 'C': 10,
                 'C++': 5, 'python' : '7' }
};
window.console && console.log(who);
</script>
<p>Check out the console.log to see the cool object</p>
<pre>
....
```

json-01/syntax.php

Constant

```
<?php
sleep(2);
header('Content-Type: application/json; charset=utf-8');
$stuff = array('first' => 'first thing',
               'second' => 'second thing');
echo(json_encode($stuff));
```

json-01/json.php

```
{
  "first": "first thing",
  "second": "second thing"
}
```

```
...
$(document).ready( function () {
  $.getJSON('json.php', function(data) {
    $("#back").html(data.first);
    window.console && console.log(data);
  })
}
);
...
...
```

json-01/index.php



JSON Chat

```
<?php
    session_start();
if ( isset($_POST['reset']) ) {
    $_SESSION['chats'] = Array();
    header("Location: index.php");
    return;
}
if ( isset($_POST['message']) ) {
    if ( !isset($_SESSION['chats']) ) $_SESSION['chats'] = Array();
    $_SESSION['chats'][] = array($_POST['message'], date(DATE_RFC2822));
    header("Location: index.php");
    return;
}
?>
<html>
<head>
<script type="text/javascript" src="jquery.min.js">
</script>
</head>
```

json-02-chat/index.php

```
<body>
    <h1>Chat</h1>
    <form method="post" action="index.php">
        <p>
            <input type="text" name="message" size="60"/>
            <input type="submit" value="Chat"/>
            <input type="submit" name="reset" value="Reset"/>
        </p>
    </form>
    <div id="chatcontent">
        
    </div>
    <script type="text/javascript" src="jquery.min.js">
    </script>
    <script type="text/javascript">
        ....
```

json-02-chat/index.php

```
function updateMsg() {  
    window.console && console.log('Requesting JSON');  
    $.getJSON('chatlist.php', function(rowz){  
        window.console && console.log('JSON Received');  
        window.console && console.log(rowz);  
        $('#chatcontent').empty();  
        for (var i = 0; i < rowz.length; i++) {  
            entry = rowz[i];  
            $('#chatcontent').append('<p>' + entry[0] +  
                '<br/>&nbsp;&nbsp;' + entry[1] + "</p>\n");  
        }  
        setTimeout('updateMsg()', 4000);  
    });  
  
    // Make sure JSON requests are not cached  
    $(document).ready(function() {  
        $.ajaxSetup({ cache: false });  
        updateMsg();  
    });
```

json-02-chat/index.php

json-02-chat/chatlist.php

```
<?php
    session_start();
    sleep(5);
    header('Content-Type: application/json; charset=utf-8');
    if ( !isset($_SESSION['chats']) ) $_SESSION['chats'] = array();
    echo(json_encode($_SESSION['chats']));
]

[ "Hello", "Fri, 01 Apr 2016 00:47:38 +0200" ],
[ "Lunch?", "Fri, 01 Apr 2016 00:47:53 +0200" ]
```



json-03-crud

<http://www.wa4e.com/code/json-03-crud.zip>

Summary

- JSON is very simple and powerful.
- It is well supported and performance in many languages.
- JavaScript and PHP have excellent support.

Acknowledgements / Contributions



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