
Web API and Access (and a little Power BI)

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Definition

- A server-side web API is a programmatic interface to a defined request-response message system, typically expressed in JSON or XML, which is exposed via the web—most commonly by means of an HTTP-based web server. These RESTful web APIs are accessible via standard HTTP methods by a variety of HTTP clients including browsers and mobile devices.

(https://en.wikipedia.org/wiki/Web_API)

Or:

- Web APIs are not made for humans but for data exchange between software components
- Independant from Platform, Operating system or Programming language

From Web Services to Web APIs?

- Easier...
 - No SOAP or WSDL any more
 - No extra libraries or DLL's
 - Even Javascript can work with them;-)
 - From XML to JSON

Use for Access developers

- Up to date info in your database
 - Exchange rates, Weather, Converting Data
- Extend application with external services
 - SMS, Email
- Publish data to the web

Theory – the buzzwords

- Representational State Transfer (REST)
 - GET, POST, PUT, DELETE
- XML / JSON

REST

- Representational State Transfer (REST) is a software architecture style for building scalable web services.
- RESTful systems typically, but not always, communicate over the Hypertext Transfer Protocol with the same HTTP verbs (GET, POST, PUT, DELETE) which web browsers use to retrieve web pages and to send data to remote servers.

REST Methods

- GET
 - Select
- POST
 - Insert
- PUT
 - Update
- DELETE
 - Delete

REST Example

- <http://api.example.com/v1/products/>
 - All Products
- <http://api.example.com/v1/products/12421>
 - Just Product 12421
- Demo:
 - <https://www.openligadb.de/api/getmatchdata/bl1/2018/7>

JavaScript Object Notation JSON

- JSON, sometimes JavaScript Object Notation, is an open standard format that uses human-readable text to transmit data objects consisting of attribute–value pairs. It is the primary data format used for asynchronous browser/server communication, largely replacing XML.

JSON

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

JSON versus XML

The following JSON example defines an employees object, with an array of 3 employee records:

JSON Example

```
{ "employees": [
  { "firstName": "John", "lastName": "Doe" },
  { "firstName": "Anna", "lastName": "Smith" },
  { "firstName": "Peter", "lastName": "Jones" }
]}
```

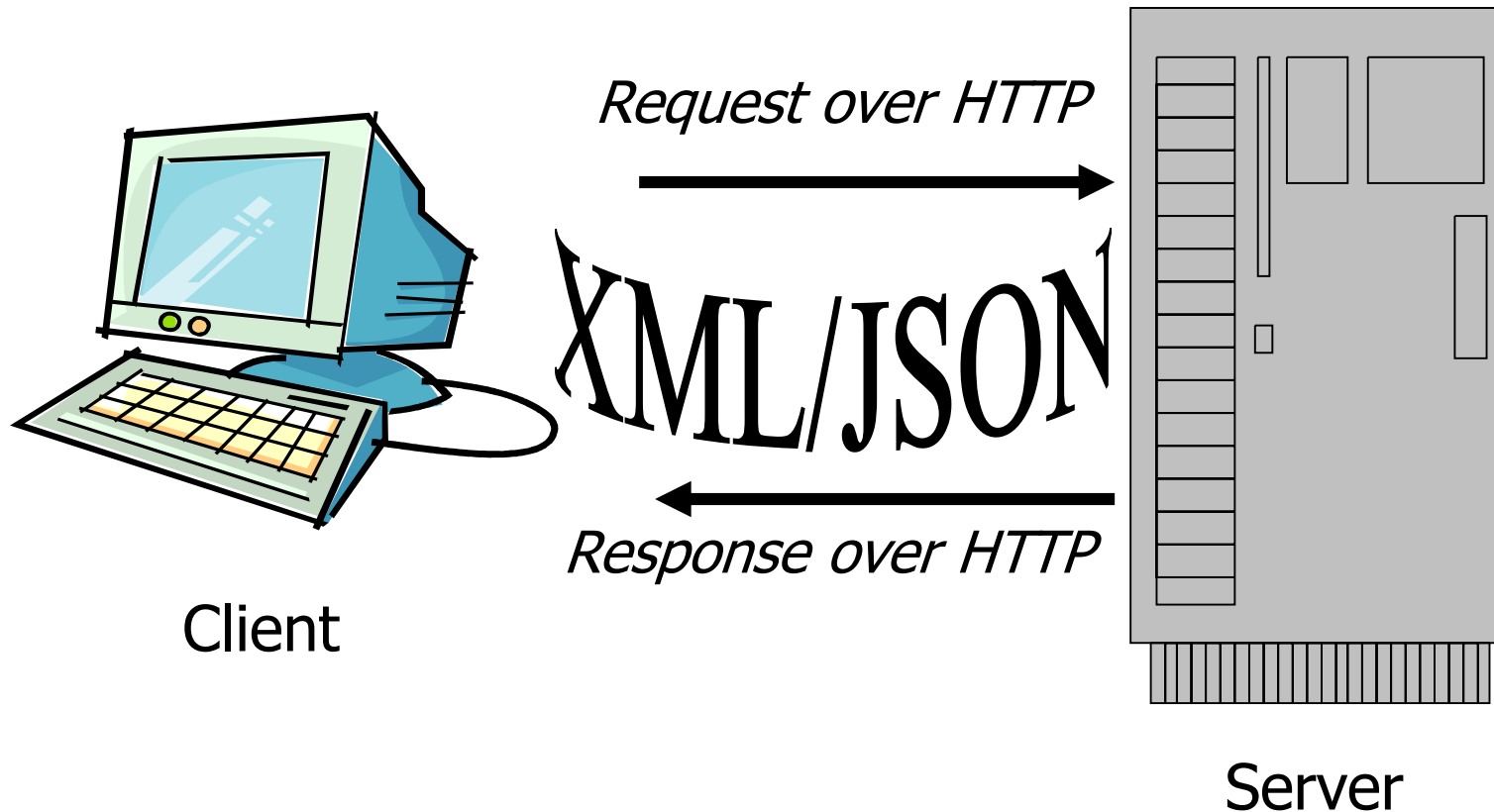
The following XML example also defines an employees object with 3 employee records:

XML Example

```
<employees>
  <employee>
    <firstName>John</firstName> <lastName>Doe</lastName>
  </employee>
  <employee>
    <firstName>Anna</firstName> <lastName>Smith</lastName>
  </employee>
  <employee>
    <firstName>Peter</firstName> <lastName>Jones</lastName>
  </employee>
</employees>
```

(<http://www.w3schools.com/json/default.asp>)

Web API (Server – Client model)



This diagram is courtesy of Michele Leroux-Bustamante...

Found Web APIs - I

- www.programmableweb.com
 - “Search over 13,939 APIs. Updated daily”
 - 10/10/2018: 20315!

Found Web APIs - II

Über	Airbnb
Spotify	Paypal
Amazon	Facebook
Twitter	Zanox
MS Visual Studio Online	MS Office 365
Google (Google Maps)	Reuters
Sendgrid	DHL
Yahooapis.com	Trackunit.com

Demo – ZEIT API

- <http://api.zeit.de>
 - No https
 - Autorisation through API-KEY
 - JSON
- <http://developer.zeit.de/explorer/>
 - Documentation
 - Request an API-KEY

Web API - ZEIT

The screenshot displays the ZEIT API Explorer interface in a web browser. The browser's address bar shows the URL `http://developer.zeit.de/explorer/#!`. The page header includes navigation links: `START POLITIK WIRTSCHAFT GESELLSCHAFT KULTUR WISSEN DIGITAL STUDIUM KARRIERE LEBENSART REISEN MOBILITÄT SPORT HAMBURG`.

API Explorer

You can browse the API with this interactive explorer. Select an endpoint to see its available parameters and their default values. If you have **requested an API key**, it is inserted automatically in the form below.

REQUEST

```
GET /content /id
?sort=release_date desc
&fields=subtitle,uwid,title,href,release_date,uri,sni;
&q=":"
&limit=10
&facet_date=
&offset=0
&facet_field=

Host: http://api.zeit.de
X-Authorization: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

RESPONSE

```
Status Code: 200 OK

{
  "matches": [
    {
      "subtitle": "Die Bundeswehr schafft mehr Drohnen an, als bisher bekannt. Die unbe...",
      "uid": "SbK63PUs2khCdKZ3jt6Zof",
      "title": "Neue Drohnen für Heer und Marine gesucht",
      "href": "http://www.zeit.de/politik/deutschland/2015-08/bundeswehr-drohnen-husar...",
      "release_date": "2015-08-31T18:50:10Z",
      "uri": "http://api.zeit.de/content/SbK63PUs2khCdKZ3jt6Zof",
      "supertitle": "Bundeswehr",
      "teaser_text": "Die Bundeswehr schafft mehr Drohnen an, als bisher bekannt. Die u...",
      "teaser_title": "Neue Drohnen für Heer und Marine gesucht"
    }
  ]
}
```

CONTENT API

- QUICK START
- API EXPLORER
- LICENCE
- DOCUMENTATION
 - AUTHOR
 - CLIENT
 - CONTENT
 - DEPARTMENT
 - KEYWORD
 - PRODUCT
 - SERIES

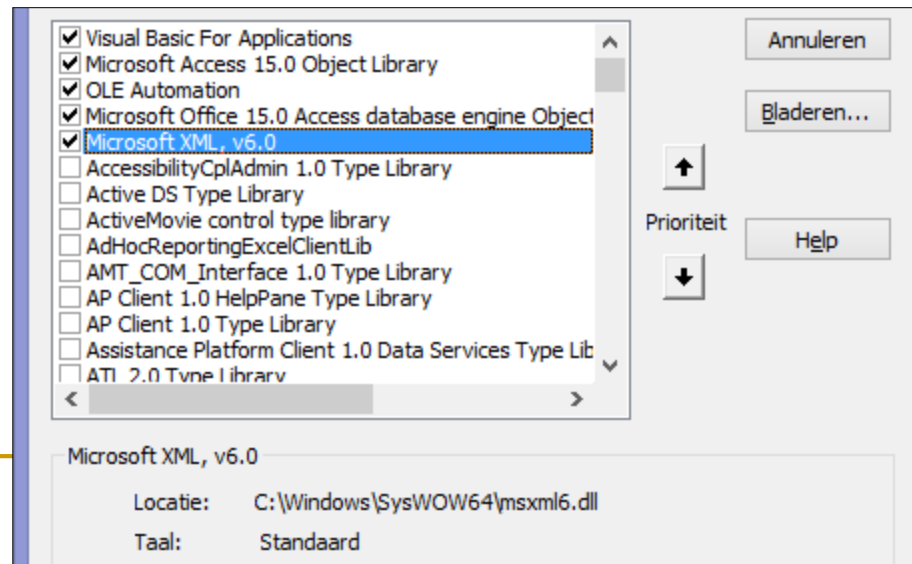
Follow @ZeitOnline 0
Zeit Online Developer Blog
Follow @zeitonline_dev

ERGO
Versichern heißt verstehen.

Windows taskbar at the bottom shows: ZEIT ONLINE | De..., AEK-webapi.ppt | ..., Bureaublad, OneDrive, NLD, 20:57.

What is needed for accessing Web APIs?

- Webaddress of the Web API
- Eventually an API Key
- Microsoft XML-library
- No Webservicess Toolkit or SOAP Library!



ZEIT Code

```
Sub zeit()  
    Dim strUrl As String  
    Dim xmlHttp As Object  
    Dim strReturn As String  
    Set xmlHttp = CreateObject("MSXML2.ServerXMLHTTP.6.0")  
    strUrl = "http://api.zeit.de/content?q=*helmut*&limit=2"  
    xmlHttp.Open "GET", strUrl  
    xmlHttp.setRequestHeader "X-Authorization", "xxxxxxxxxx"  
    xmlHttp.send  
    strReturn = xmlHttp.responseText  
    Debug.Print strReturn  
End Sub
```

(xxxxxxxxxx to be replaced by API-KEY)

XmlHttp I

■ Open

```
xmlHttp.Open "GET", strUrl, [TRUE], [username], [password]
```

```
xmlHttp.Open "POST", strUrl, [FALSE], [username], [password]
```

■ Headers

```
xmlHttp.setRequestHeader "X-Authorization", "xxxxxxxxxx"
```

```
xmlHttp.setRequestHeader "Content-Type", "text/xml"
```

```
xmlhttp.setRequestHeader "Accept", "application/xml"
```

XmlHttp II

■ Send without Data

```
xmlHttp.send
```

■ Send with Data

```
Dim postData As String
```

```
postData = "From=" & fromNumber
```

```
postData = postData & "&To=" & toNumber
```

```
postData = postData & "&Body=" & body 'Send the POST data
```

```
xmlHttp.send postData
```

```
Dim JS as string
```

```
JS = "{\"user_id\":\"abc\", \"password\":\"def\", >> >>}"
```

```
XMLHTTP.setRequestHeader "Content-Type", "application/json"
```

```
XMLHTTP.Send JS
```

XmlHttp - III

■ Response

- ❑ xmlhttp.responseText (=String)
- ❑ xmlhttp.responseBody (=Bytes)
- ❑ xmlhttp.responseStream (=raw undecoded bytes)
- ❑ xmlhttp.responseXML (=XML DOM object)
- ❑ xmlhttp.status (=Code)
- ❑ xmlhttp.statusText (=Erklärung Code)

Save JSON-Response

```
Private Function SaveToFile(strValue As String, strFileName  
    As String) As Boolean
```

```
    On Error GoTo Error_Processing  
    Dim fs As Object  
    Dim a  
    Set fs = CreateObject("Scripting.FileSystemObject")  
    Set a = fs.CreateTextFile(strFileName, True)  
    a.WriteLine (strValue)  
    a.Close  
    SaveToFile = True  
    Exit Function
```

```
Error_Processing:
```

```
    MsgBox "Cannot Save File " & Err.Description  
    SaveToFile= False
```

```
End Function
```

Save XML-Response




- Like JSON
- Or with microsoft magic....


```
Dim xmlDoc
Set xmlDoc = CreateObject("Msxml2.DOMDocument")
xmlDoc.async = False
xmlDoc.loadXML (xmlHTTP.responseText)
xmlDoc.Save (strfile)
```



Reading JSON-Datei?

- No tools in Access ;-)
- But with VBA: RECURSIVE JSON TEXT PARSING CLASS
(<http://www.codeproject.com>)


Recursive VBA JSON Parser for Excel

Tim Ski, 24 Oct 2014 CPOL  10.3K  729  4

Rate this: 

 4.20 (4 votes)

JSON parser for VBA class module, allows recursive data.

 [Download JSParse.zip - 43.4 KB](#)

Introduction

This is a VBA class that can parse recursive JSON data.

Demo Recursive JSON text parsing class

- Class saves JSON as file and parses this
- Result is a 2-dimensional array
 - 'key' und 'Value'

.....

```
For intindex = 1 To clsJSON.NumElements
    Sheet2.Cells(intindex, 1).Value = clsJSON.Key(intindex)
    Sheet2.Cells(intindex, 2).Value = clsJSON.Value(intindex)
Next
```

Demo reading XML-Datei and inserting it into Access

.....

On Error Resume Next

```
DoCmd.DeleteObject acTable, "unit"
```

```
DoCmd.DeleteObject acTable, "location"
```

```
DoCmd.DeleteObject acTable, "address"
```

```
DoCmd.DeleteObject acTable, "GetUnitResponse"
```

```
Application.ImportXML DataSource:=strfile,  
    ImportOptions:=acStructureAndData
```

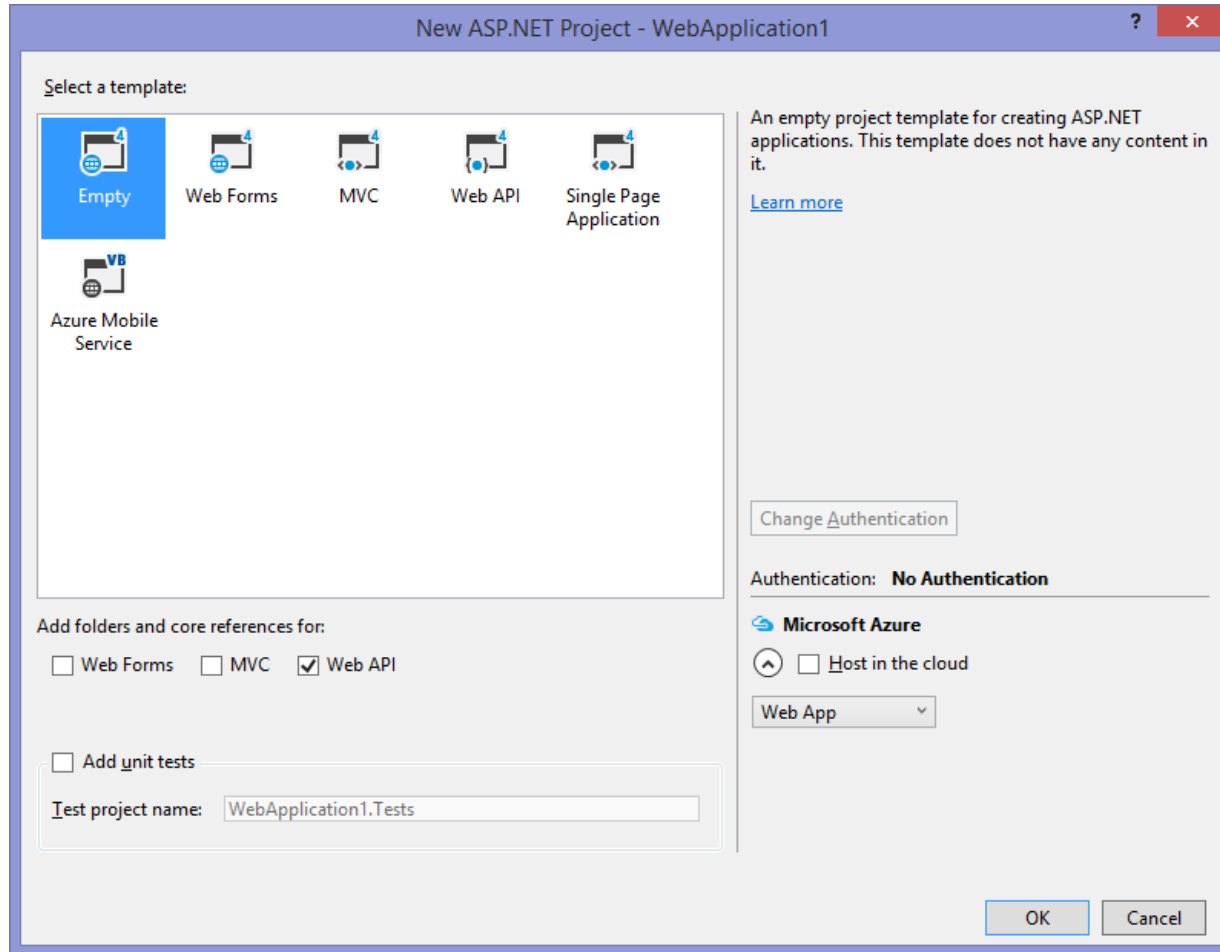
How to build your own Web Api?

- Visual Web Developer or Visual Studio
- Or other developertool that can produce a W3C-Standard webservice, like for instance Java

Demo Web API

- Visual Studio
 - New Project
 - Empty Web, check WEB API
 - Add Model
 - Object
 - Add Controller
 - Processing

Visual Studio 2015



Model

```
Public Class Product
    Private intID As Integer
    Public Property ID() As Integer
        Get
            Return intID
        End Get
        Set(ByVal value As Integer)
            intID = value
        End Set
    End Property
    Private strName As String
    Public Property Productname() As String
        Get
            Return strName
        End Get
        Set(ByVal value As String)
            strName = value
        End Set
    End Property
End Class
```

Controller I

```
Imports System.Web.Http
Namespace Controllers
Public Class ProductsController
Inherits ApiController
Dim products As New List(Of Product)
Public Sub New()
    Dim i As Integer
    For i = 1 To 10
        Dim clsProduct As New Product
        clsProduct.ID = i
        clsProduct.Productname = "AEK " & i
        products.Add(clsProduct )
    Next
End Sub
```


Controller II

Rem http://localhost:51355/api/products = GetAllProducts:

```
Public Function GetAllProducts() As IEnumerable(Of Product)
    Return products
End Function
```

Rem http://localhost:51355/api/products/5 = GetProduct

```
Public Function GetProduct(id As Integer) As IHttpActionResult
Dim product = products.FirstOrDefault(Function(p) p.ID = id)
    If product Is Nothing Then
        Return NotFound()
    End If
    Return Ok(product)
End Function
End Class
End Namespace
```

Routing in WebApiConfig

```
Imports System
Imports System.Collections.Generic
Imports System.Linq
Imports System.Web.Http

Public Module WebApiConfig
Public Sub Register(ByVal config As HttpConfiguration)

config.MapHttpAttributeRoutes ()
config.Routes.MapHttpRoute (
    name:="DefaultApi",
    routeTemplate:="api/{controller}/{id}",
    defaults:=New With {.id = RouteParameter.Optional})

End Sub
End Module
```

Demo

Questions?



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 - <http://www.codeproject.com/Articles/828911/Recursive-VBA-JSON-Parser-for-Excel>
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 - [https://msdn.microsoft.com/en-us/library/ms535874\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/ms535874(v=vs.85).aspx)
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 - Track und Trace
-

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