

Access Europe session
Wed 6 Mar 2024

BETTER ACCESS CHARTS

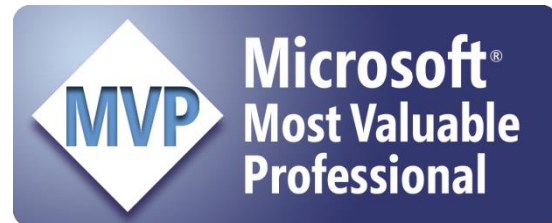
The Next Generation



Thomas Möller, www.Team-Moeller.de

About me

- Thomas Möller (Graduated banker)
- 2000 - 2013 Access developer
- 2013 - 2017 Data Governance /
Data Quality Management
- 2017 - 2021 Project Manager DWH
- Since 12/2022 Sen. Project Manager
- 2007 - 2016 MVP MS Access
- Spare-time activity: [Team-Moeller.de](https://www.team-moeller.de)



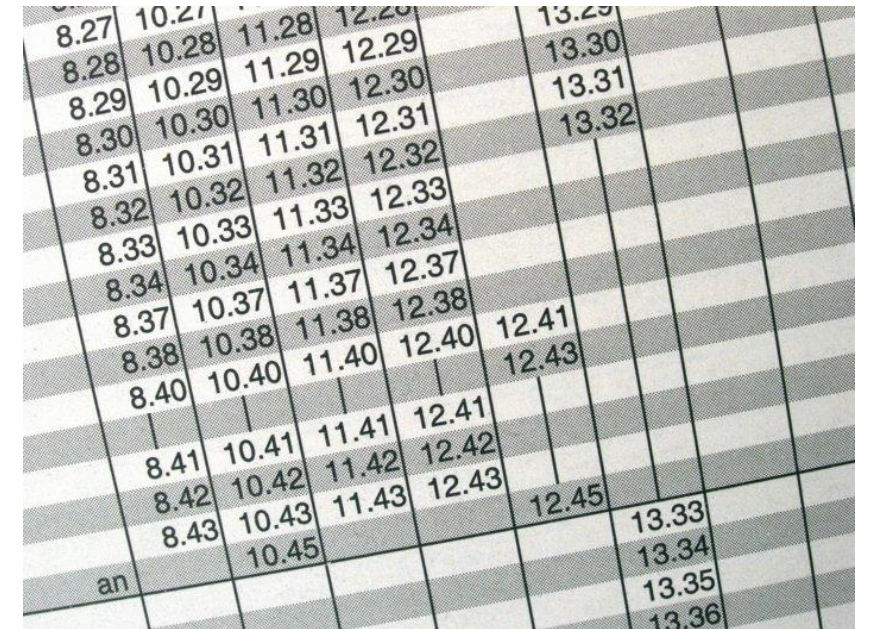
Contact

- Website www.Team-Moeller.de
- Blog Blog.Team-Moeller.de
- E-Mail Thomas@Team-Moeller.de
- Twitter <https://twitter.com/ThomasMoeller>
- GitHub <https://github.com/team-moeller>
- XING [https://www.xing.com/profile/Thomas Moeller40](https://www.xing.com/profile/Thomas_Moeller40)
- Linked In <https://www.linkedin.com/in/TeamMoeller>
- Facebook <https://www.facebook.com/TeamMoeller>



Schedule

- “Divide and conquer”
 - Divide a monster class into 20 simple classes
- “Pictures of you”
 - Take a picture from a chart and put it on a report
- “You are fired”
 - How to get rid of the HTML file
- “Living on the edge”
 - Challenges with the new Edge browser control
- “New kids on the block”
 - Adjustments to run Chart.js v3 & v4



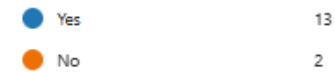
8.27	10.27	11.28	12.29	13.30
8.28	10.28	11.29	12.29	13.30
8.29	10.29	11.30	12.30	13.31
8.30	10.30	11.31	12.31	13.32
8.31	10.31	11.31	12.31	
8.32	10.32	11.32	12.32	
8.33	10.33	11.33	12.33	
8.34	10.34	11.34	12.34	
8.37	10.37	11.37	12.37	
8.38	10.38	11.38	12.38	12.41
8.40	10.40	11.40	12.40	12.43
8.41	10.41	11.41	12.41	
8.42	10.42	11.42	12.42	
8.43	10.43	11.43	12.43	
an	10.45			12.45
				13.33
				13.34
				13.35
				13.36

Survey

- I heard about Better Access Charts {yes, no}
- I played around with it {yes, no}
- I use it in at least one project {yes, no}

1. I have already heard about Better Access Charts (BAC)

[More Details](#)



2. I have played around with them

[More Details](#)



3. I use Better Access Charts in at least one project

[More Details](#)



“DIVIDE AND CONQUER”

Divide a monster class into 20 simple classes

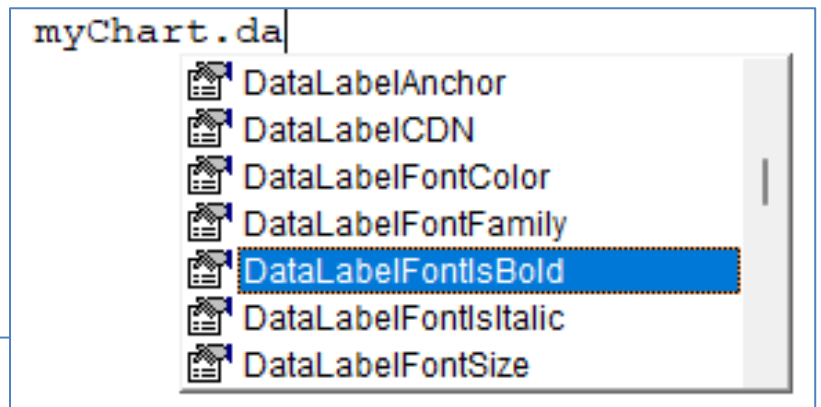
Initial Situation

- Up to version 1.34 we had one big class module
 - 1.227 lines of code
 - 46 attributes
- Has developed over time

```
Dim myChart As cls_Better_Access_Chart

Set myChart = New cls_Better_Access_Chart
Set myChart.Control = Me.ctlWebbrowser

myChart.DataSourceObjectName = "tbl_DemoData"
myChart.DataSourceDataFieldName = Array("Dataset1", "Dataset2", "Dataset3")
myChart.DataSourceLabelFieldName = "DataLabel"
myChart.DefaultFontFamily = "Arial"
myChart.ShowLegend = True
myChart.DrawChart
```



Demo

Single module vs hierarchy of classes

One single class module	Hierarchy of class modules
Only one module to import	Many modules to import
Different versions in the same database possible	Different versions in the same database <u>not</u> possible
Namespace overloaded with 46 attributes	Coding is easier (IntelliSense) Code is easier to read
	Easier to maintain/expand
Every property must be coded separately	(Sub-)classes can be reused (eg. "Font")

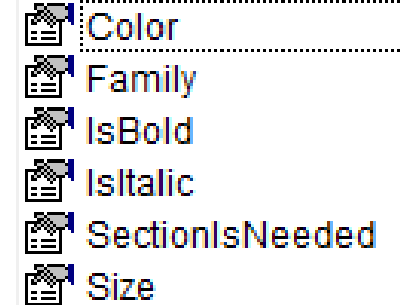
Hierarchy of classes

- Code broken down in 19 smaller class modules
 - Big Thanks to [Klaus-Dieter Gundermann](#)
 - 20 modules, 87 properties
 - 1.872 lines of code in total

```
Dim myChart As BAC_Chart
Set myChart = BAC.Chart(Me.ctlWebbrowser)
```

```
myChart.DataSource.ObjectName = "tbl_DemoData"
myChart.DataSource.DataFieldNames = Array("Dataset1", "Dataset2", "Dataset3")
myChart.DataSource.LabelFieldName = "DataLabel"
myChart.Default.Font.Family = "Arial"
myChart.Legend.Show = True
myChart.CreateChart
```

```
myChart.DataLabels.Font.
```



- Color
- Family
- IsBold
- IsItalic
- SectionIsNeeded
- Size

Demo

Documentation

- BetterAccessCharts
 - Chart
 - Animation
 - ColorSchema
 - DataLabels
 - Font
 - DataSource
 - Defaults
 - Font
 - Legend
 - Font
 - RadialAxis
 - Title
 - Font
 - XAxis
 - YAxis

- Helper
- Scripts
 - ChartJs
 - Plugin_ColorSchemes
 - Plugin_DataLabels

- All classes with all properties and methods fully documented
- Available on GitHub:
<https://github.com/team-moeller/better-access-charts/wiki/documentation>

“PICTURES OF YOU”

Take a picture from a chart and put it on a report

Better Access Chart on a report

- The problem
 - Old web browser control not available in reports
- The solution
 - On a report we can load a picture in an image control
 - We need a picture of the chart saved on disk
- Two steps to success
 - Conceptual considerations
 - Concrete Coding

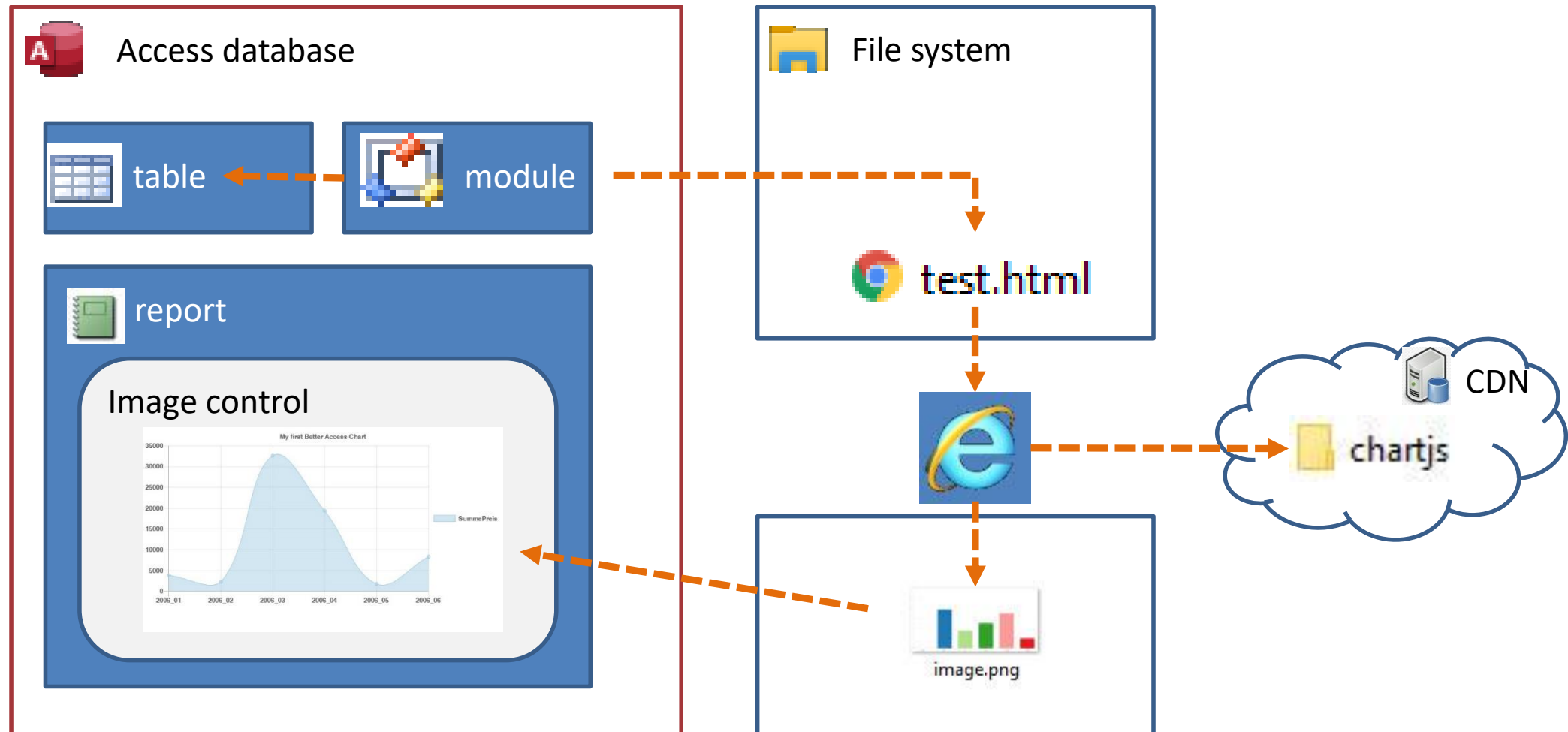
Conceptual considerations

- Where to draw the chart?

Hidden form with a web browser control	Hidden instance of the Internet Explorer
✗ Extra form needed	✓ Internet explorer is available on windows systems
✗ Extra web browser control needed	✓ Support for IE until 2029
✗ Name of form and control have to be exact as defined in Better Access Charts	✓ End of support for IE same as end of support of classic web browser control

- Obvious solution: Hidden instance of IE

Solution for reports: Schematic structure



Concrete coding: Five steps to the goal

- Start IE and load chart
- Get canvas and grab image
- Use exclamation mark if no image available
- Convert image to byte array
- Save to file

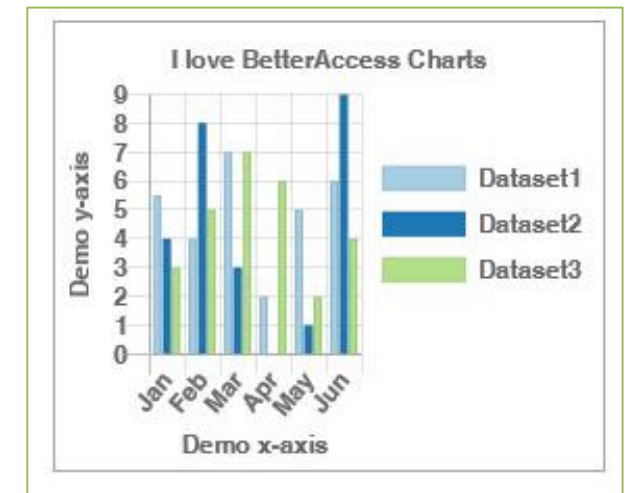
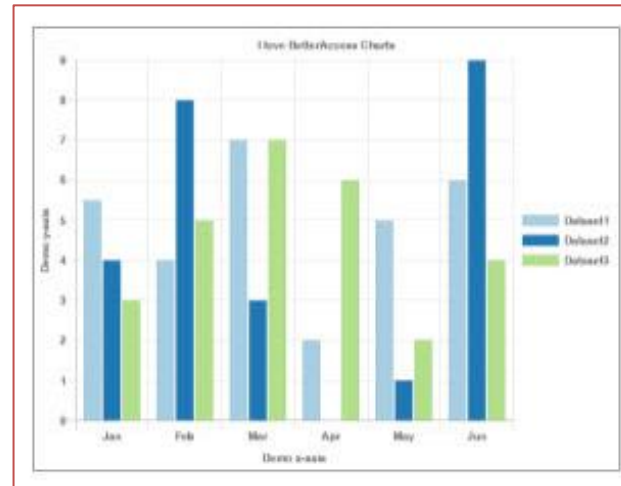
```
Private Sub SaveChartAsImage(ByRef ImageFileName As String)

    'Declarations
    Dim objIE As Object 'As SHDocVw.InternetExplorer 'InternetExplorer
    Dim objCanvas As Object 'As MSHTML.HTMLCanvasElement 'As HTMLCanvasElement
    Dim objXML As Object 'As MSXML2.DOMDocument
    Dim objDocElem As Object 'As MSXML2.IXMLDOMElement
    Dim objStream As Object 'As ADODB.Stream
    Dim strImg As String
    Dim strData As String
    Dim arr64decode() As Byte
```

[Code](#)

Unexpected problems to solve

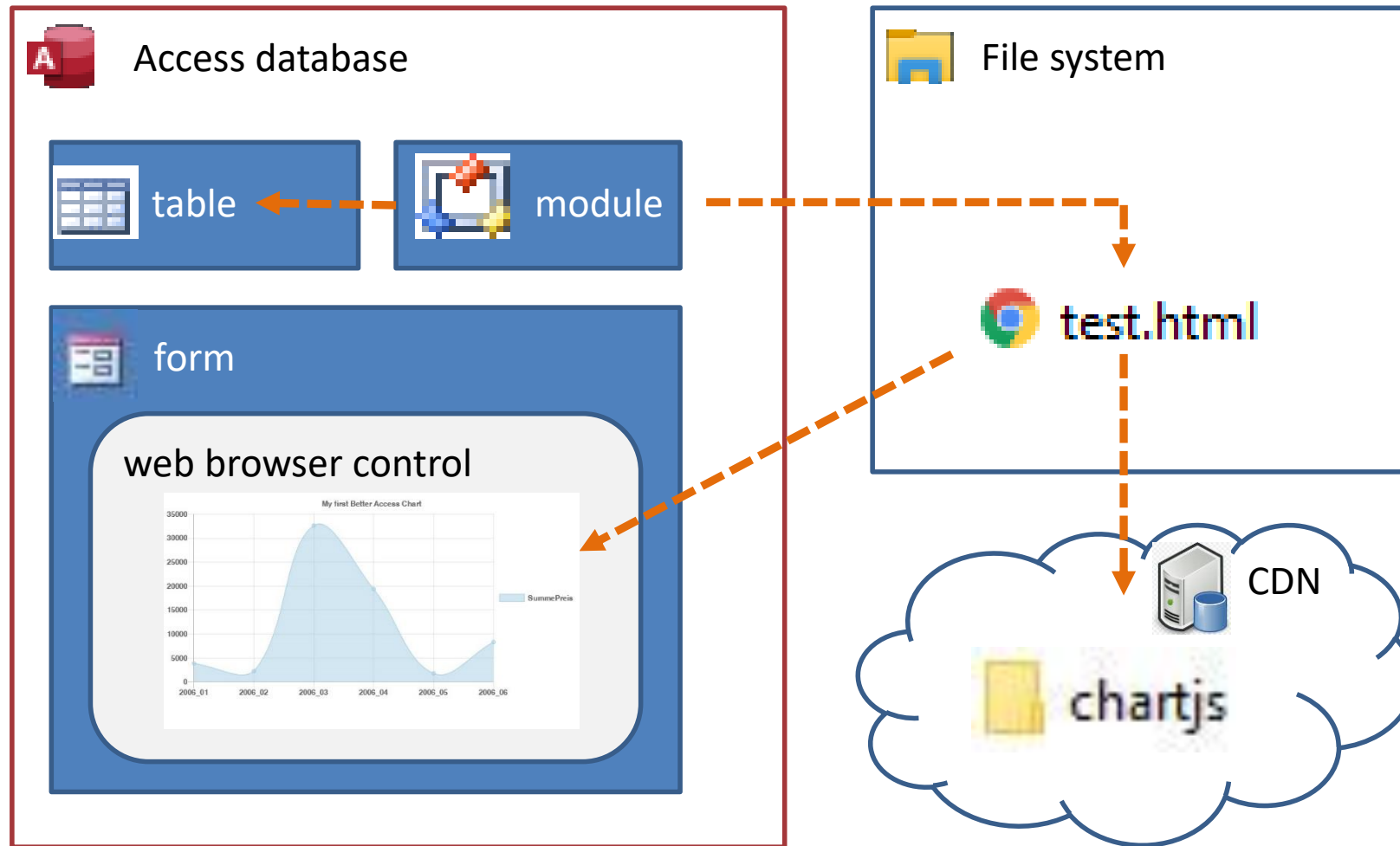
- Size of the chart doesn't fit
 - Problem:
The full canvas of IE is used
 - Solution:
Resize IE to size of image control
- Chart is not drawn completely
 - Problem: Animation not finished yet
 - Solution: Deactivate animation



“YOU ARE FIRED”

How to get rid of the HTML file

Schematic structure: Load file



The 1st try

- Previous code: Navigate to HTML file

```
Public Sub DrawChart()  
    CreateChartFile  
    Control.Object.Navigate getHTMLFileName  
End Sub
```

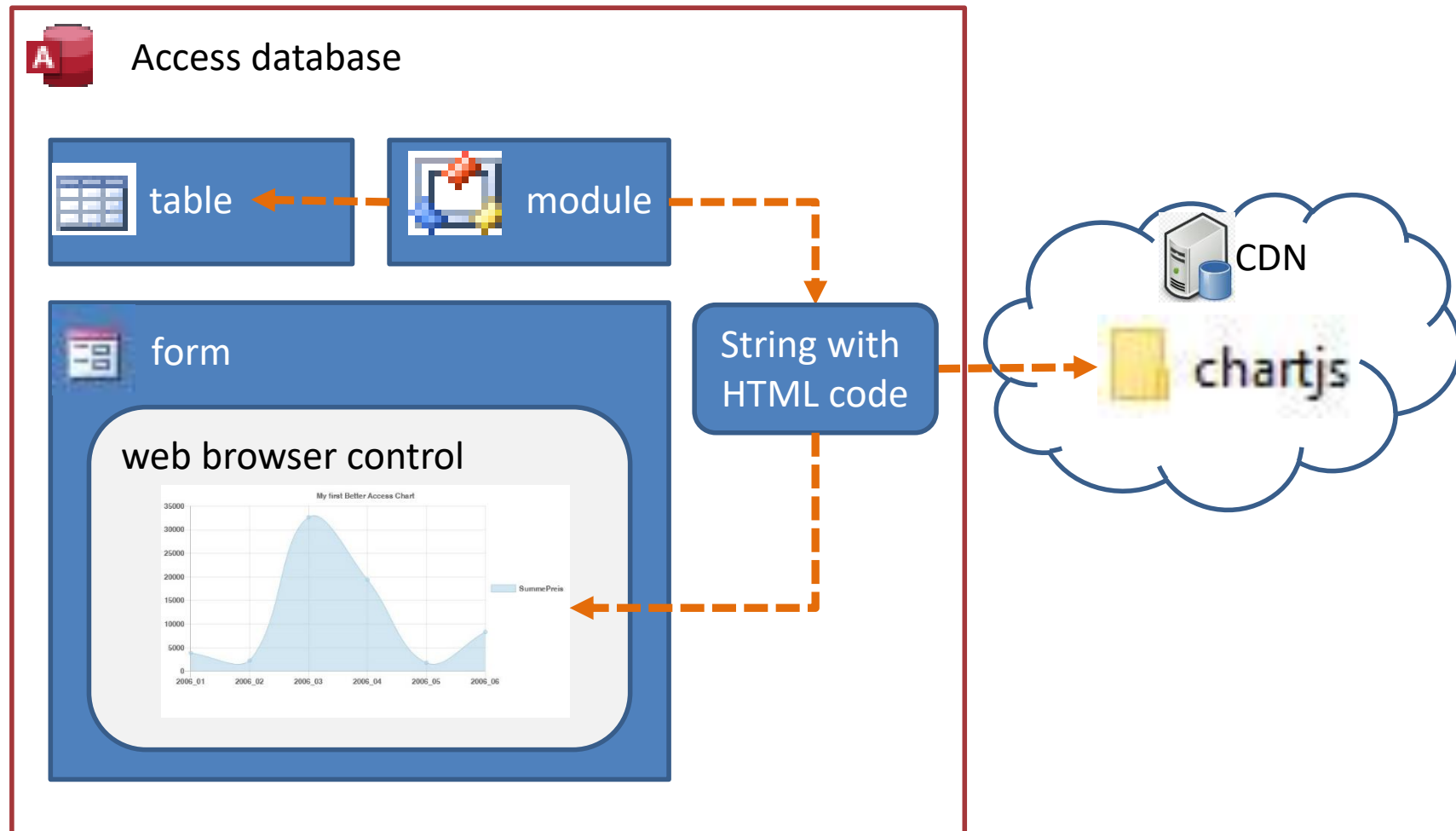
A blue rounded square button with the word "Demo" in white text.

- New way: Write HTML code into web browser

```
Public Sub DrawChart()  
    With Control.Object.Document  
        .Open  
        .Write getHtmlString  
        .Close  
    End With  
End Sub
```

A blue rounded square button with the word "Demo" in white text.

Schematic structure: Write HTML code



One step backwards

	HTML source code	
Feature Browser Emulation	load directly into browser	load from file
Directive	✘	✔
Registry	(✔)	(✔)

Directive: meta http-equiv='X-UA-Compatible' content='IE=Edge'

Registry: Computer\HKEY_CURRENT_USER\SOFTWARE\Microsoft\Internet Explorer\Main\FeatureControl\FEATURE_BROWSER_EMULATION

Blog: <https://blog.team-moeller.de/2021/12/better-access-charts-pivottable-ein.html>

The 2nd try

- First write a simple HTML file on disk and load this
- Afterwards write HTML code for chart into web browser

```
CreateEmptyHtmlFile
Me.WebBrowserControl.Object.Navigate getHTMLFileName(, True)
Do While Me.WebBrowserControl.Object.Busy Or Me.WebBrowserControl.Object.ReadyState <> 4
    DoEvents
Loop
With Me.WebBrowserControl.Object.Document
    .Open
    strHtml = BAC.Generator(Me, Me.DataSource.getData(Me.ChartType)) .GenerateHTML
    .Write strHtml
    .Close
End With
```

[Demo](#)

- Works as expected

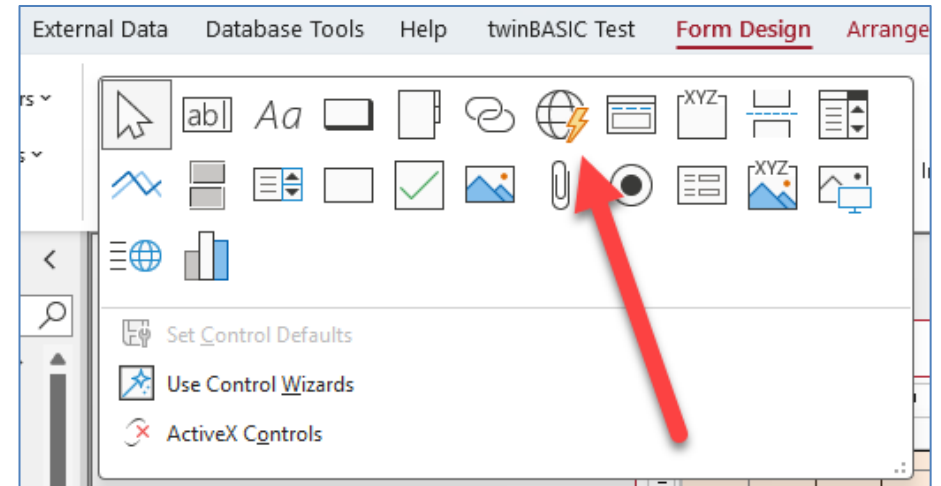
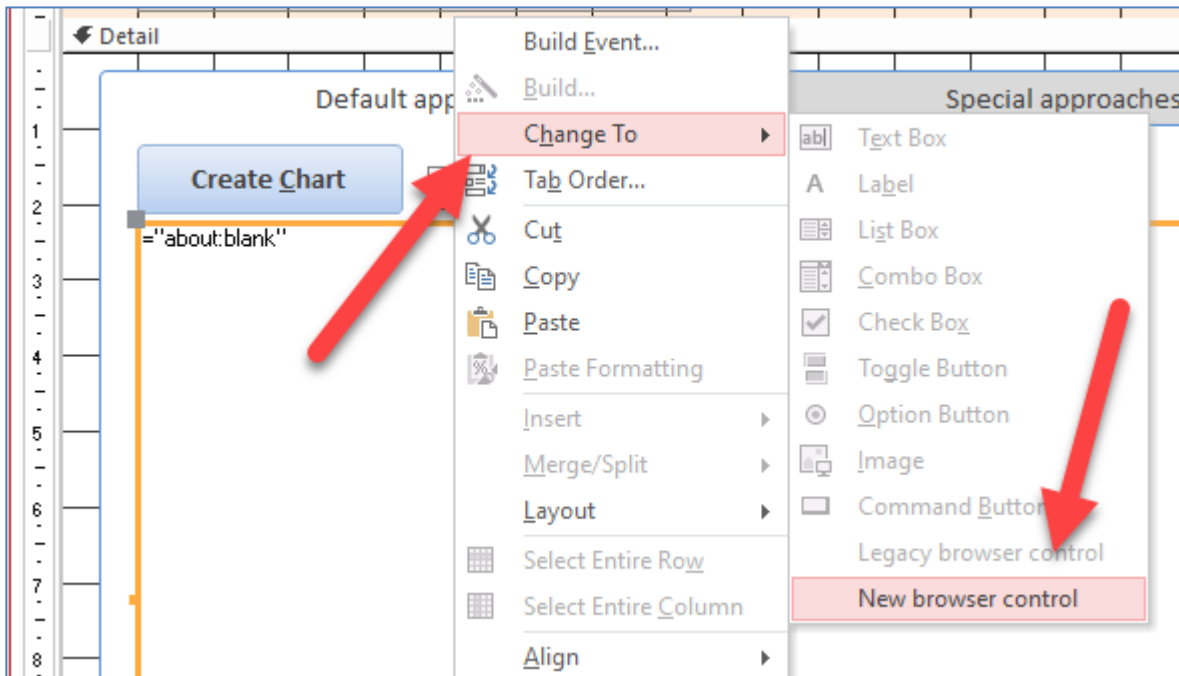


“LIVING ON THE EDGE”

Challenges with the new Edge browser control

New Edge browser control available

- Insert the new control



- Replace legacy browser control with Edge browser control

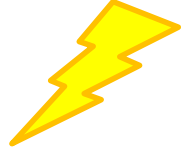
Security features (Part 1)

- First attempt: load my website
 - <https://team-moeller.de>
 - Works as expected, website is shown in control
 - Second attempt: try with redirect
 - <http://team-moeller.de>
 - Unexpected result, website is shown in local browser
 - Solution: Trusted Domains
 - <https://learn.microsoft.com/de-de/office/vba/api/access.edgebrowsercontrol.trusteddomains>
- Blog: <https://blog.team-moeller.de/2023/04/sicherheitsfeatures-im-neuen-edge.html>



Demo

Security features (Part 2)

- Load simple HTML file
 - =[currentproject].[path] & “\NoScript.html”
 - Unexpected result, website is shown in local browser
- Solution: Prefix with “https://msaccess”
 - =“https://msaccess” & [currentproject].[path] & “\NoScript.html”
 - After about 3 seconds website was loaded 
- Today, try to edit Control Source
 - Prefix is added automatically

HTML
file

Demo

Security features (Part 3)

- Insert JavaScript inline

- ✓ Works as expected

- Use Script Tag with source in the www

- ✓ Works as expected

- Use Script tag with local file

- ✗ Doesn't work, no Action

- Solution: Prefix https://msaccess

- `<script src="https://msaccess/D:/Users/.../Demo_Script_EdgeBowserControl.js"></script>`

- Blog: https://blog.team-moeller.de/2023/04/sicherheitsfeatures-im-neuen-edge_13.html

HTML
files

Demo

Load HTML code (1)

- Edge Browser control has no Document property
- Solution: Use ExecuteJavaScript

```
Dim js As String

js = js & "document.open();"
js = js & "document.write('" & getSimpleHTML & "');"
js = js & "document.close();"

MectlEdgeBrowser.ExecuteJavascript js
```

- Previously: Initialize the control with a page
- Today: This is no longer necessary
- Blog: <https://blog.team-moeller.de/2023/04/html-code-direkt-in-das-neue-edge.html>



Load HTML code (2)

During the presentation I said that this step was no longer necessary. Here I was wrong. Unfortunately, this step is still necessary.

- First try: Code didn't work
- Surprising reason: vbCrLf
- Solution: Replace vbCrLf with vbCrLfString

Demo

```
Dim js As String
js = js & "document.open();"
js = js & "document.write('" & Replace(getSimpleHTML, vbCrLf, vbCrLfString) & "');"
js = js & "document.close();"

Me.ctrlEdgeBrowser.ExecuteJavascript js
```

- Blog: <https://blog.team-moeller.de/2023/04/html-code-direkt-in-das-neue-edge.html>

Load HTML code (3)

- Integration of script files

		Init Edgebrowser control	
		Local file	www address
Location of script	Local file	✓	✗
	www address	✓	✓

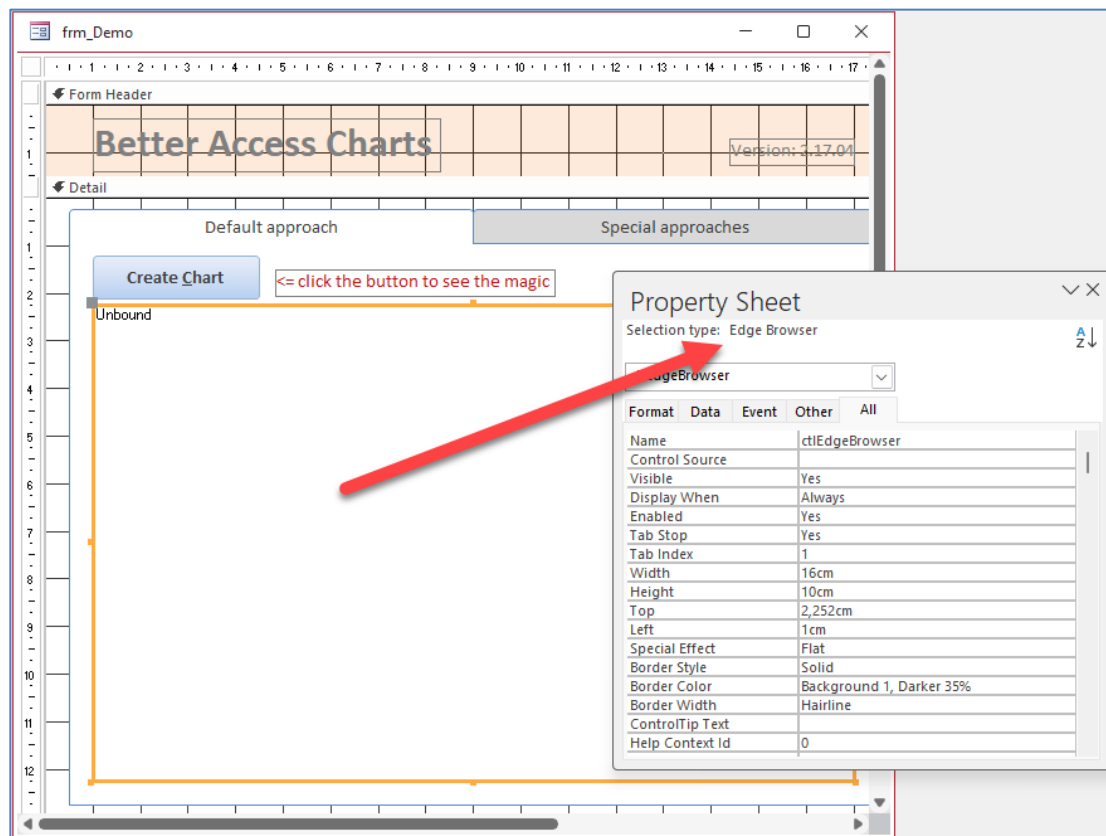
- Blog: <https://blog.team-moeller.de/2023/04/html-code-direkt-in-das-neue-edge.html>

Load HTML code (4)

- **Summary:**
 - Loading HTML code directly into the Edge browser control is possible
 - It is executed via JavaScript (see code above)
 - (Works only if control is already "initialized" with a source)
 - The HTML code must not contain vbCrLf
 - When integrating script files, the initialization of the Edge browser control and the storage location of the script file must be taken into account
-
- Blog: <https://blog.team-moeller.de/2023/04/html-code-direkt-in-das-neue-edge.html>

First version with Edge browser control

- Version 3.03, Pre-release



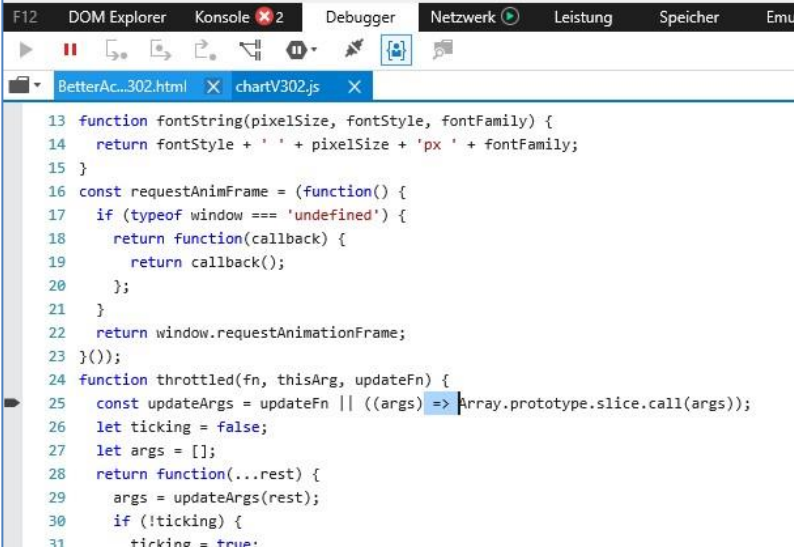
D
e
m
o

“NEW KIDS ON THE BLOCK”

Adjustments to run Chart.js v3 & v4

Chart.js: Update to version 3

- First attempt with legacy browser control not successful
- Results of investigation
 - Developers of [Chart.js stopped supporting IE](#)
- Idea:
 - Fill the gap with so-called [polyfills](#)
- Final result
 - So-called [Arrow functions](#) are used
 - **New syntax** cannot be provided using polyfills or similar constructs
- Summary: We have to use the new Edge browser control



```
13 function fontString(pixelSize, fontStyle, fontFamily) {
14   return fontStyle + ' ' + pixelSize + 'px ' + fontFamily;
15 }
16 const requestAnimationFrame = (function() {
17   if (typeof window === 'undefined') {
18     return function(callback) {
19       return callback();
20     };
21   }
22   return window.requestAnimationFrame;
23 }());
24 function throttled(fn, thisArg, updateFn) {
25   const updateArgs = updateFn || ((args) => Array.prototype.slice.call(args));
26   let ticking = false;
27   let args = [];
28   return function(...rest) {
29     args = updateArgs(rest);
30     if (!ticking) {
31       ticking = true;
```

Adaptation to Chart.js v3 & v4

- First problem: Plug-In for colours
 - Used so far: [color schemes](#)
 - Not compatible with v3
 - New Plug-In: [autocolours](#)
- Second challenge:
 - Number of breaking changes in v3
 - [3.x Migration Guide](#) very helpful
- Adaption to v4
 - Small number of breaking changes
 - [4.x Migration Guide](#) helpful

3.x Migration Guide

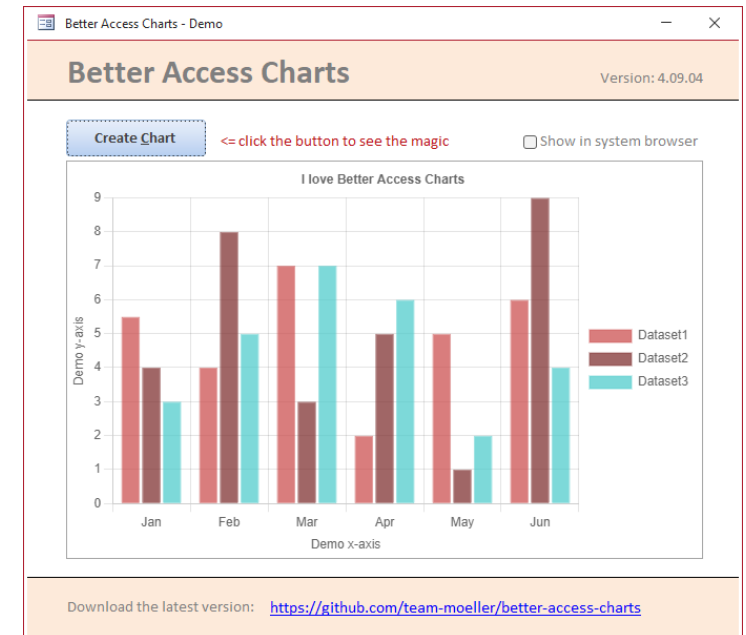
Chart.js 3.0 introduces a number of breaking changes. Chart.js 2.0 was released in April 2016. In the years since then, as Chart.js has grown in popularity and feature set, we've learned some lessons about how to better create a charting library. In order to improve performance, offer new features, and improve maintainability, it was necessary to break backwards compatibility, but we aimed to do so only when worth the benefit. Some major highlights of v3 include:

4.x Migration Guide

Chart.js 4.0 introduces a number of breaking changes. We tried keeping the amount of breaking changes to a minimum. For some features and bug fixes it was necessary to break backwards compatibility, but we aimed to do so only when worth the benefit.

Changes since using v3 & v4

- Some functional changes were made:
 - Plug-In “colorschema” replaced by “autocolors”
 - Axis: Properties “StepSize” and “Type” added
 - SubTitle added (same properties as Title)
 - Chart updates without delay
 - Font.Style (as replacement for Font.IsItalic)
 - Font.Weight (as replacement for Font.IsBold)
 - Horizontal (for Bar- and Line-charts)
- Today: Version 4.4.1 of Chart.js is supported



Demo

RESOURCES

Links, Links and more Links

Links

- GitHub Project: Better Access Charts
 - <https://github.com/team-moeller/better-access-charts>
- Blog posts on Better Access Charts
 - <https://blog.team-moeller.de/search/label/Better%20Access%20Charts>
- Better Access Charts Wiki
 - <https://github.com/team-moeller/better-access-charts/wiki>
- Roadmap to Better Access Charts
 - <https://github.com/team-moeller/better-access-charts/wiki/roadmap>
- Documentation on Better Access Charts
 - <https://github.com/team-moeller/better-access-charts/wiki/documentation>
- Releases on Better Access Charts
 - <https://github.com/team-moeller/better-access-charts/releases>

Links

- Chart.js Homepage
 - <https://www.chartjs.org/>
- Chart.js Documentation
 - <https://www.chartjs.org/docs/latest/>
- Chart.js Samples
 - <https://www.chartjs.org/docs/latest/samples>
- YouTube Video „Getting Started With Chart.js“
 - <https://www.youtube.com/watch?v=sE08f4iuOhA&t=761s>
- Curated list on Chart.js
 - <https://github.com/chartjs/awesome>

Links

- EdgeBrowserControl object (Access)
 - <https://learn.microsoft.com/en-us/office/vba/api/access.edgebrowsercontrol>
- WebBrowserControl object (Access)
 - <https://docs.microsoft.com/en-us/office/vba/api/access.webbrowsercontrol>
- Everything You Never Wanted to Know ... Modern WebBrowser Control
 - <https://www.devhut.net/everything-you-never-wanted-to-know-about-the-access-modern-web-browser-control/>
- Everything You Never Wanted to Know ... WebBrowser Control
 - <https://www.devhut.net/2019/10/18/everything-you-never-wanted-to-know-about-the-access-webbrowser-control/>
- Security Features in the New Browser Control
 - <https://nolongerset.com/trusteddomains/>

Access Europe session
Wed 6 Mar 2024

BETTER ACCESS CHARTS

The Next generation



Thomas Möller, www.Team-Moeller.de