Qlik Sense Application Performance Tuning Using Document Analyzer

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COOK BOOK
Recipes for Qlik Success

Qlik
Luminary
2019

Masters Summit for Qlik

Panalytics

WEBSY

MICHAEL STEEDLE

AXIS

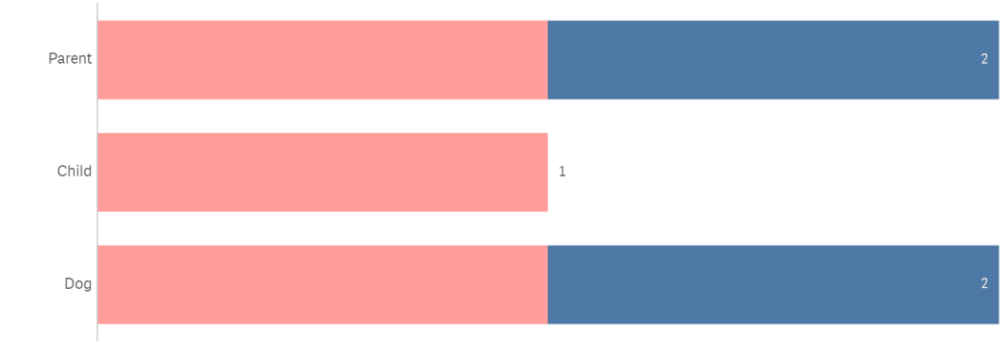
Chief Solutions Architect

BI practice lead, best practices, deployment framework, utilities, consultant training, multicooker recipes

Years on Earth	Years consulting	Customers served	Coffee breaks
37.1	13.2	216	6,862

Family members

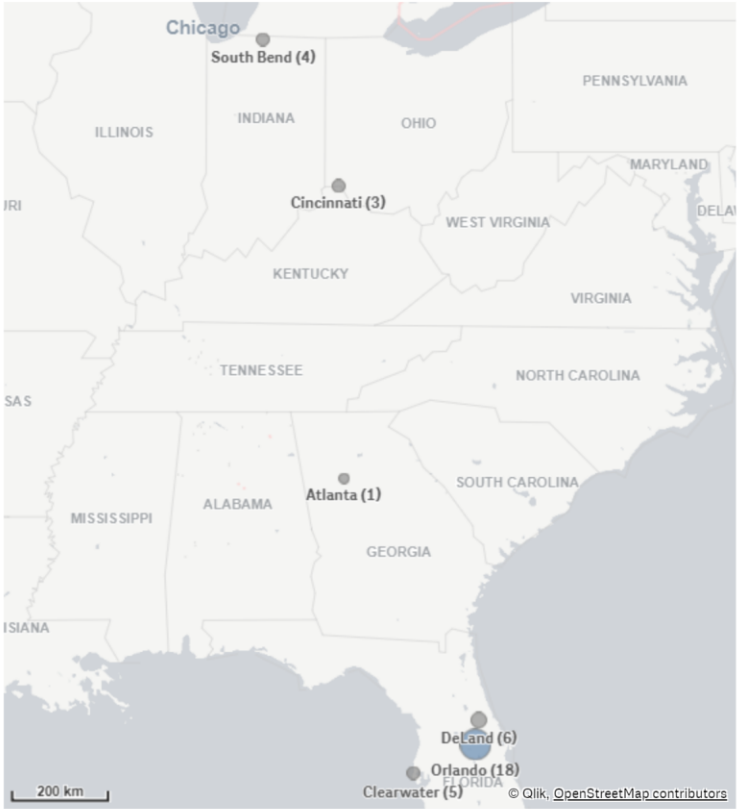
Not listed in order of importance



more info: michaelsteedle.com

Places lived (years)

Current: Orlando



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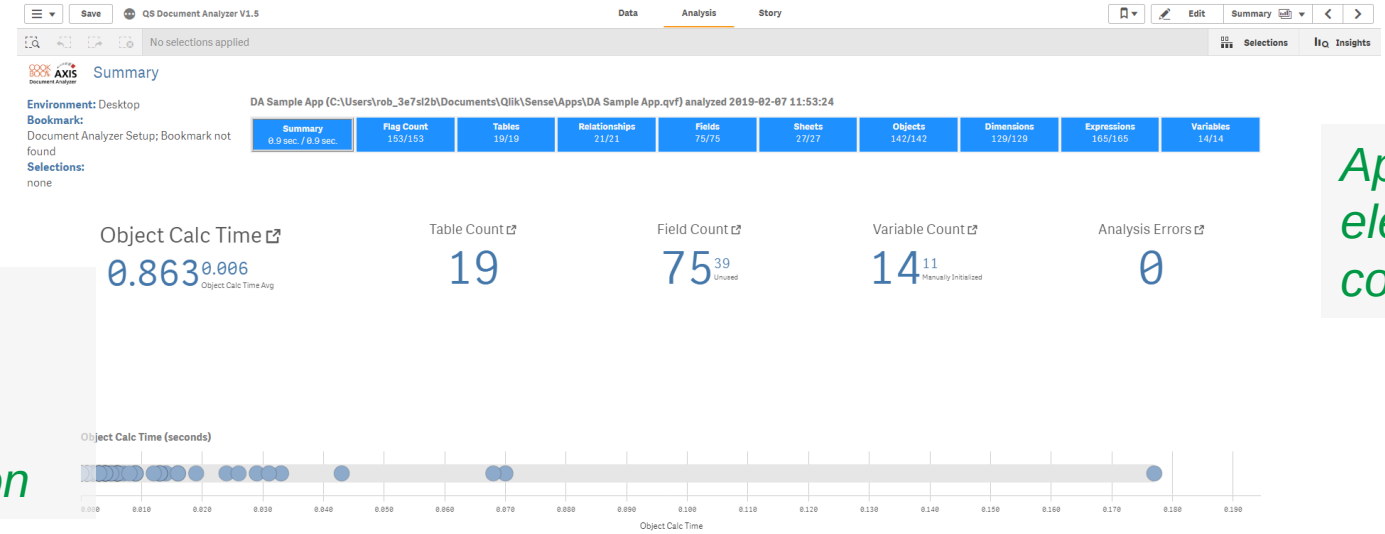
Got **app problems?**

- Slow application
- Large application
- Reviewing app before deployment
- Auditing for best practices
- Need to document what is in an application
- Missing the "Expression Overview" feature of QlikView

Enter: **Qlik Sense Document Analyzer**

- Created by Rob Wunderlich, Qlik Luminary
- Heir to widely used *QlikView Document Analyzer*
- Built in collaboration with Axis Group

Summary sheet



Application element counts

Object calctime, total and distribution

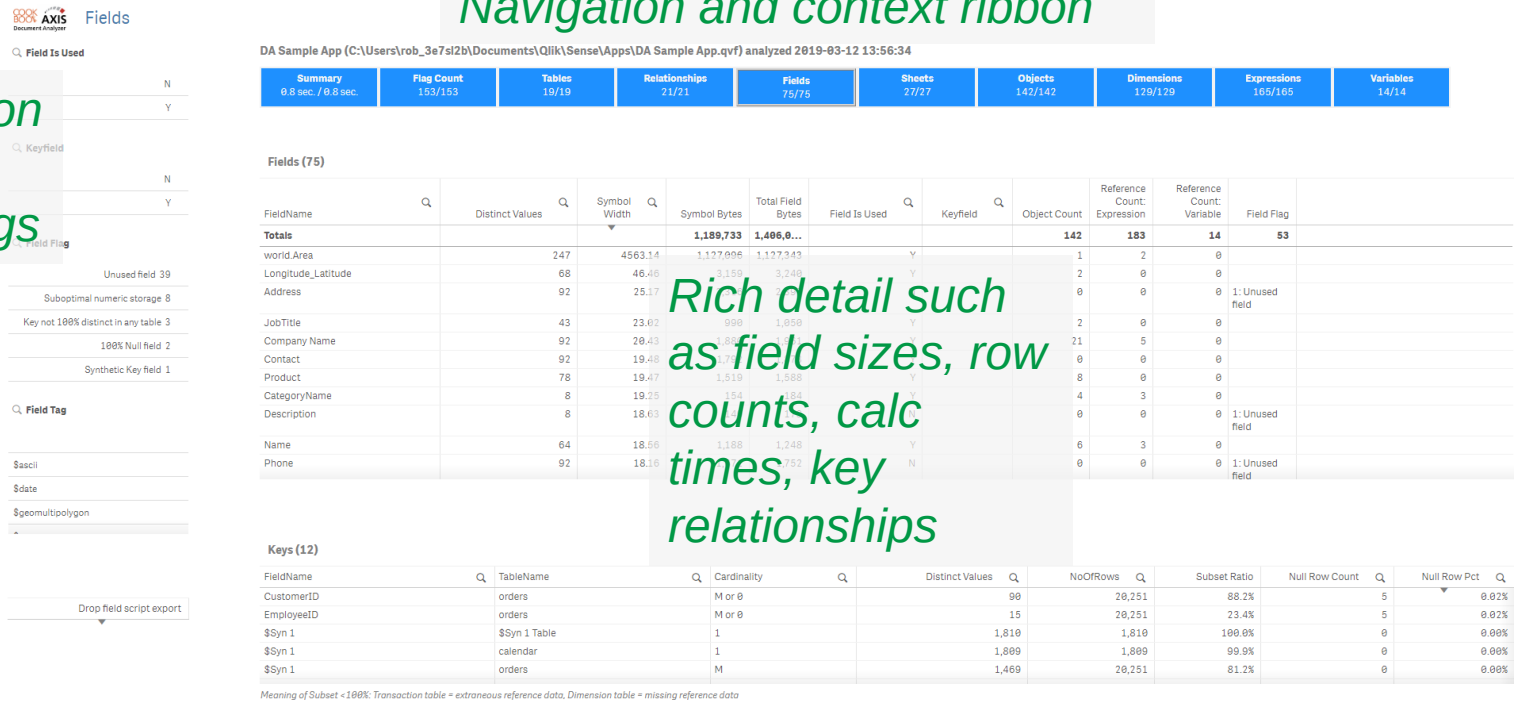
Memory per user, used & unused fields

Detail sheets

Navigation and context ribbon

Selection filters and flags

Rich detail such as field sizes, row counts, calc times, key relationships



Qlik Sense Document Analyzer *best* fit

- Identify unused fields
- Find Calculated dimensions
- Find objects that calculate slowly
- Answer general questions about what is in an application's data model and interface, such as compliance with best practices, ex.
  - Are expressions using variables?
  - Are charts using Master Dimensions and Measures?

What gets installed?

1. Custom **data connector**, to extract app metadata

QsAppMetadataConnector

2. **QVF** for analysis

COOK BOOK AXIS
Document Analyzer

QS Document Analyzer V1.5

3. Navigation ribbon **extension**

DA Sample App (C:\Users\rob_3e7sl2b\Documents\Qlik\Sense\Apps\DA Sample App.qvf) analyzed 2019-02-01 14:04:13

Summary	Flag Count	Tables	Relationships	Fields	Sheets	Objects	Dimensions	Expressions	Variables
0.8 sec. / 0.8 sec.	153/153	19/19	21/21	75/75	27/27	142/142	129/129	165/165	14/14

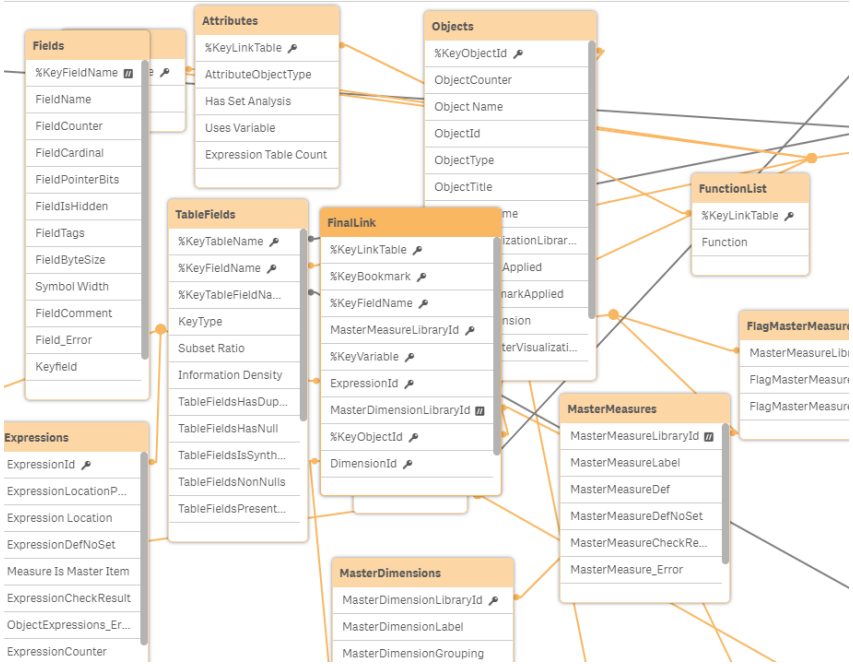
What metadata is extracted?

- Expected
  - Tables, Fields, Table/Field relationships
  - Master Dimensions and Measures
  - Sheets, Sheet/Object relationships
  - Objects, and their Dimensions and Expressions
  - Variables
- Surprising!
  - Object calculation time (make sure app isn’t cached first)
  - Expression parsing results, ex. errors in syntax
  - Subset ratios, information density

QS Document Analyzer data model

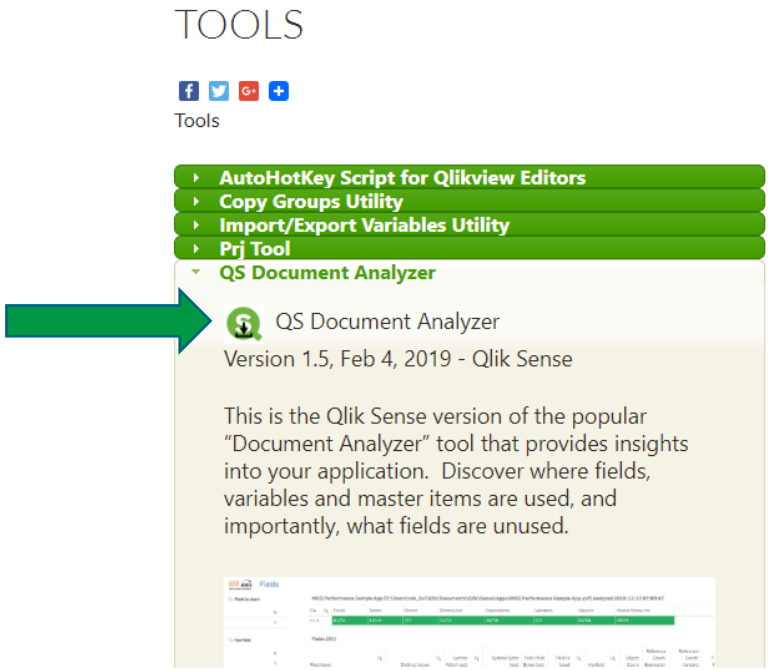
The QVF script ties the app metadata together

- Central **link table** connects all the application elements together
- For example: Master Measures to Objects, Fields, Functions, Variables used



Where to get the Qlik Sense Document Analyzer

- Download from the *Tools* section of QlikCookbook.com
- No charge



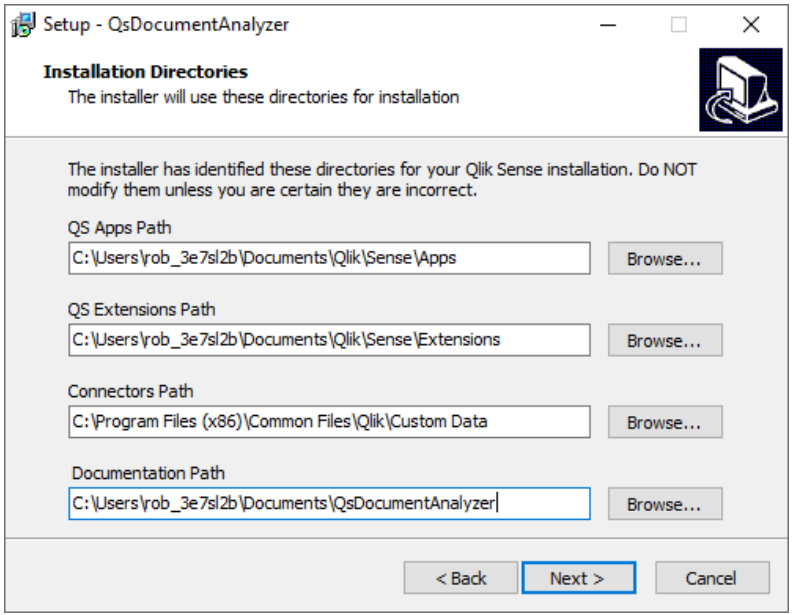
How to install

- Pre-requisites
  - Qlik Sense Desktop (but it can analyze Server apps *from* QS Desktop)
  - Windows Administrator access

1. Download from qlikviewcookbook.com/tools
2. Unzip
3. Launch setup.exe

Installation directories

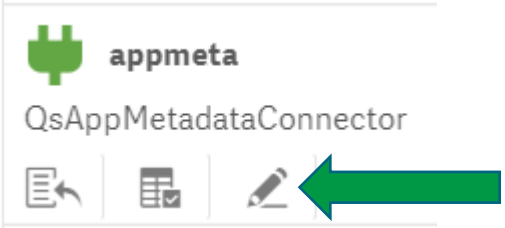
- Modify if you know they are incorrect



Windows Admin access required if your Connectors Path is “Program Files (x86)..”

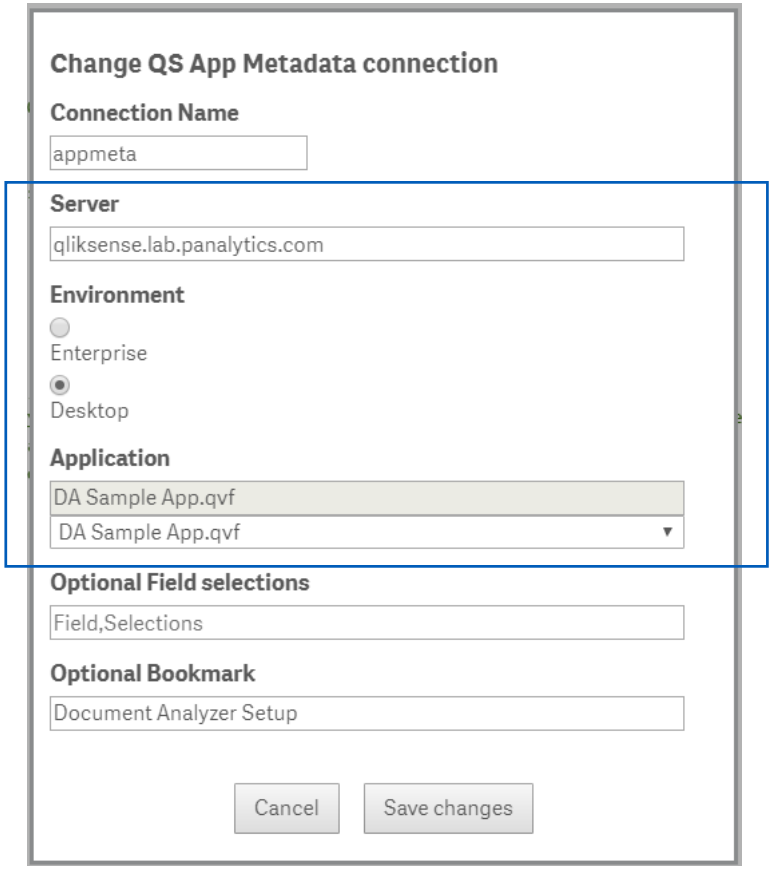
Analyzing an application

- Open Qlik Sense Desktop
- Open the QS Document Analyzer QVF
- Open the Data load editor and edit the *appmeta* connection



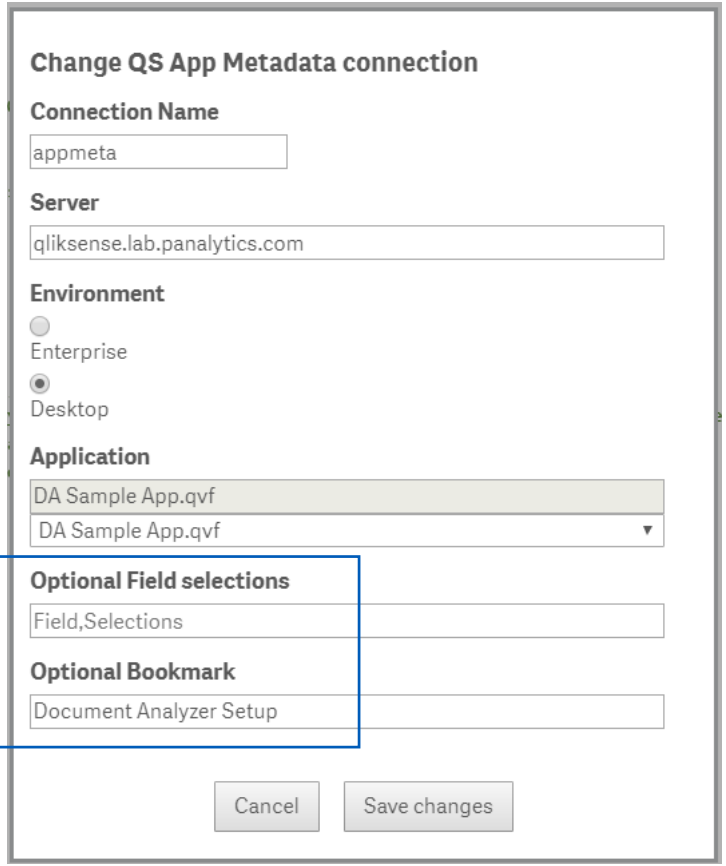
Select a target app

- To analyze an app stored
  - on your computer, select the *Desktop* radio button
  - on a server, enter the Server name and select the *Enterprise* radio button
- Select one Application from the dropdown



Target app default selections (optional)

- Bookmark and field selections may be specified to condition the data before computing object calculation times
- After reload, the Summary sheet will indicate if default selections were successful

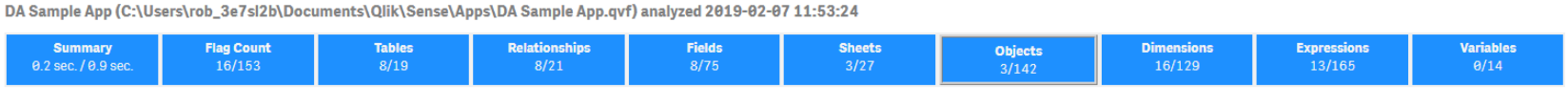


Reload

- Save your connection changes (do not rename the connection) and click *Load data*
- Reload time is dependent on complexity of objects and size of data model
- Every UI object in the target will be calculated during the reload. For accurate timing, ensure nothing is cached before reloading:
  - restart Qlik Sense Desktop, if analyzing a desktop application
  - reload the application, then do not open any sheets, if analyzing a server application

Navigating the QS Document Analyzer

- It’s a Qlik application, so selecting, searching and associations behave as you would expect
- The navigation ribbon shows element counts for your current selections and also acts as quick sheet navigation

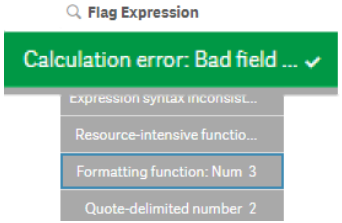


Sample analysis scenario

1. Find and select an Object with high calculation time.
2. Review the expressions and functions used by this chart object.
3. Review other objects that use the same expression.
4. Improve the expression in the target app, save, then reload the QS Document Analyzer to quantify the improvement.

Managing by exception: *flags*

- Conditions that warrant your attention are flagged during the reload: *tables, relationships, fields, dimensions, expressions, variables*

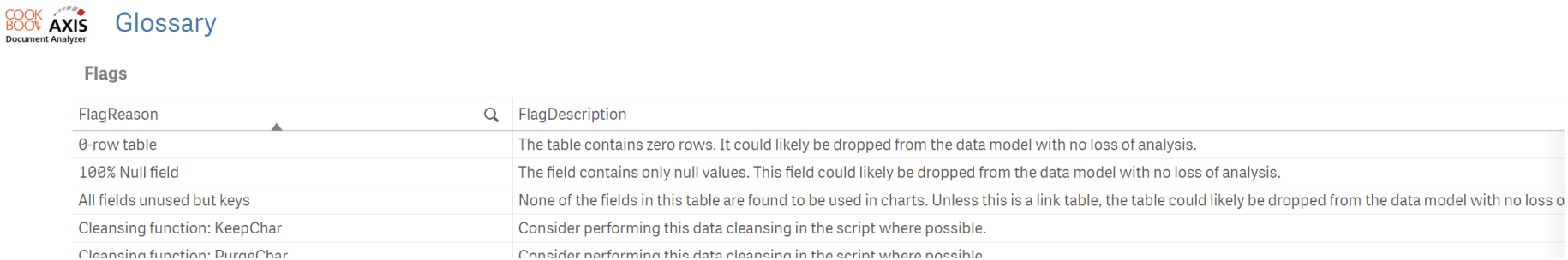


Expressions (3, 1 distinct)

Expression	Reference Count: Expression	Object Count	Fields in Expression	Expression Table Count	Flag Expression	ExpressionCheckResult
Totals	**3**	**1**	**-**	**1**	**3**	
Count(distinct CompanyName)	3	1	Name	1	3: Calculation error: Bad field name(s)	Bad field name(s) "CompanyName"

Flags

- All data model and UI flags are summarized on the Flag Summary sheet, while detailed flags are provided in context on the associated sheets
- Extended flag descriptions and recommendations are on the Glossary sheet



Flag examples

- Outright problems: Calculation Errors, Missing Extension, No Matching Keys
- Inefficiencies: Unused Fields, Resource-intensive Functions, Indistinct Keys, Calculated Dimensions
- Known “gotchas”: SynKeys, Many-to-Many Relationships, Inconsistent Syntax or Labels

Demo

Some tips from Mike

Improving Qlik apps doesn’t have to be difficult

80/20

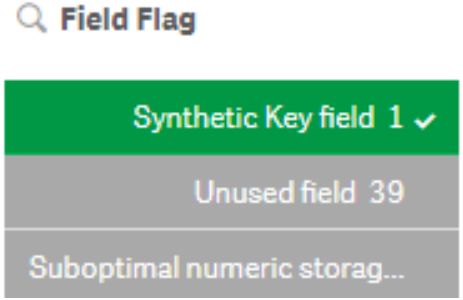
1. **Reduce app size**
   - Drop unused fields
   - Drop extraneous rows from non-fact tables
2. **Improve app efficiency**
   - Eliminate non-essential calculated dimensions
   - Look at slowest few sheet objects closely

Data model

Synthetic key

Multiple fields common between two tables

- Recommendation: Figure out what columns are even necessary to keep, then **understand the use case to determine best resolution**, if the problem still exists.

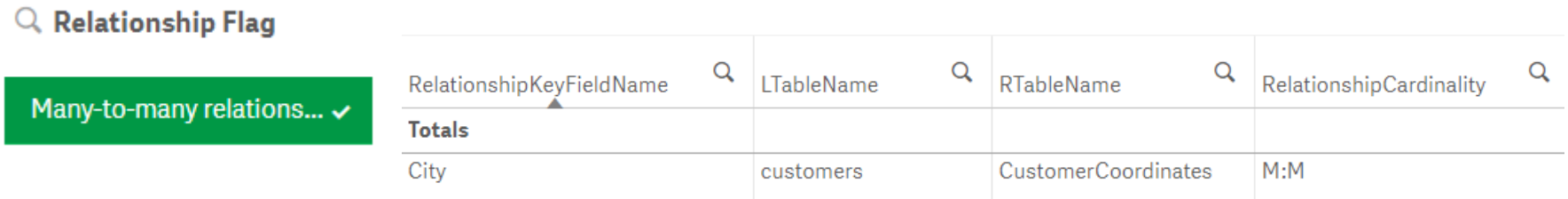


FieldName	TableName
$Syn 1	$Syn 1 Table
$Syn 1	calendar
$Syn 1	orders

Data model

Unintended many-to-many relationship in the data model

- Recommendation: **Investigate why** – bad source data, bad assumption about source data, bad transformation (especially resulting from joins).



Data model

Vague or poor field names in the data model

Poorly named fields must be relabeled repeatedly throughout the front end – often inconsistently – and appear as a different name in the current selections

- Recommendation: **Name things well in the script.**

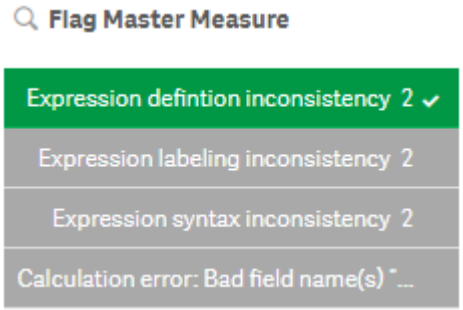
MasterDimensionLabel	MasterDimensionDef
Company	Company Name

Data model

Inconsistent expression definitions

Two Measures with the same label, but different definitions, are likely to cause confusion among users

- Recommendation: **Only one measure per label**



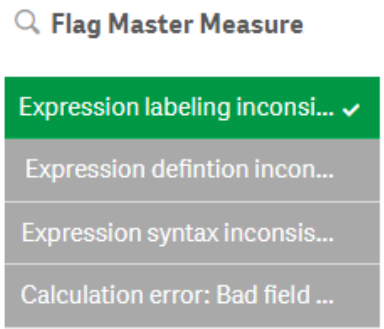
MasterMeasureLabel	MasterMeasureDef
Sales	Sum(Sales)
Sales	Sum(Sales) *1.1

Data model

Inconsistent expression labeling

Two Measures with the same definition, but different labels, forgoing reuse

- Recommendation: Don’t duplicate expressions, **use Master Measures and/or Variables** when possible



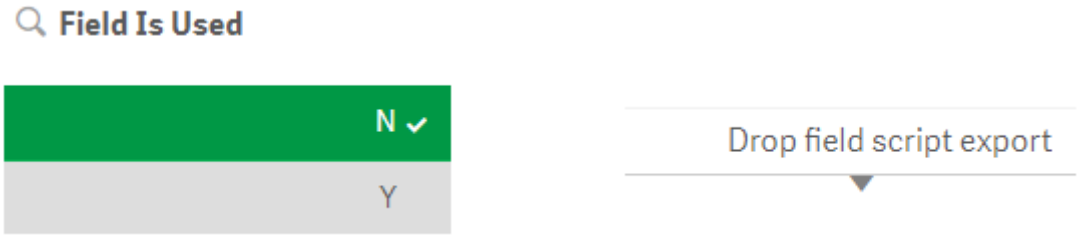
MasterMeasureLabel	MasterMeasureDef
Sales CYTD	Sum({$<CYTDFlag={'1'}, Year=, Quarter=, Month=>} Sales)
Sales Current Year	SUM({$<CYTDFlag={'1'}, Year=, Quarter=, Month=>} Sales)

Data model

Unused fields

Often resulting from Load * from wide QVDs, arbitrarily loading a lot of uninteresting columns

- Recommendation: **Unused fields can be dropped**, if not needed for self-service. In some cases the remaining data could then be aggregated, to improve calculation performance.



Data model

Extraneous dimension table rows

Dimension tables contain extraneous rows with no associated transactions, which will never appear in charts

- Recommendation: Always load fact tables first, then **dimension tables using the *Exists* function** to eliminate unnecessary rows.

Keys (12)

FieldName	TableName	Subset Ratio
CustomerID	CreditStatus	0.0%
CountryISOCode	CountryCodes	8.4%
CustomerID	SupportTickets	9.8%
Currency	Base currency	23.1%
EmployeeID	orders	23.4%

UI implementation

Calculated dimensions

Calculated dimensions found, negatively affecting calculation time and cache reuse

- Recommendation: **Clean up innocuous calculated dimensions and move the rest to the data model.**

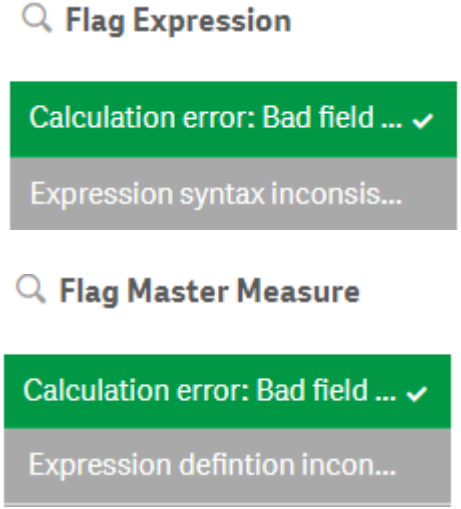
DimensionType	DimensionName	Object Count
Totals		**101**
Calculated	=[$Field]	1
Calculated	=Dual(Year([OrderDate])&'-'&Month([OrderDate]),MonthStart([OrderDate]))	2
Calculated	=[$Table]	1
Calculated	=aggr(only({<Division={'EMEA'}>}[Company Name]), [Company Name])	1
Calculated	=ValueLoop(1,100)	1
Calculated	=Aggr(	2

UI implementation

Invalid expressions

Measure expressions broken after data model changes

- Recommendation: **Fix them**



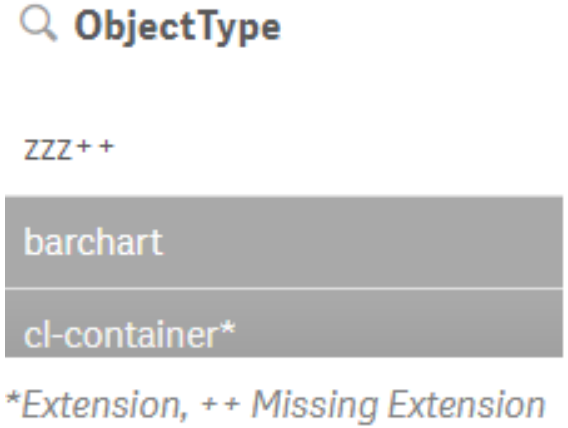
Expression	ExpressionCheckResult
Totals	
Count(distinct CompanyName)	Bad field name(s) "CompanyName"

UI implementation

Missing extensions

Application uses extension object that was never deployed on server or has been removed from server

- Recommendation: **Look into whether it should be deployed.**

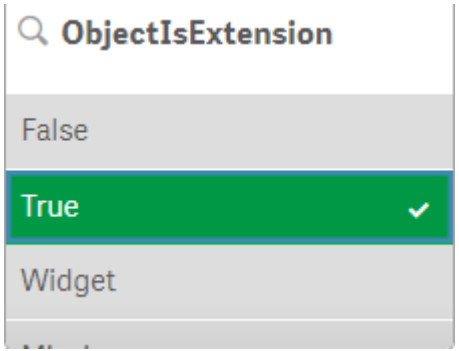


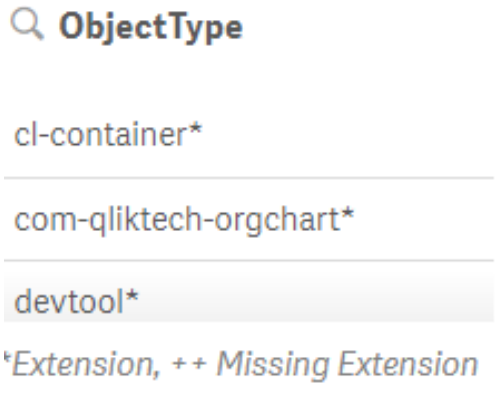
UI implementation

Extension exhaustion

Using a lot of extensions to do things that don't add much value and thus aren't worth the risk introduced

- Recommendation: **Use extensions only when needed.** Use approved or popular extensions, and replace with native charts as they become available**.**



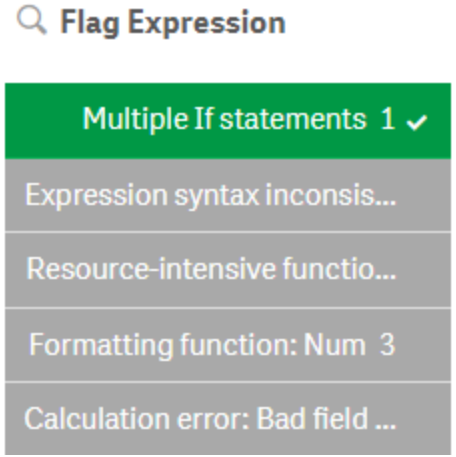


UI implementation

Excessive use of conditional functions

Excessive use of the Pick function, Pick/Match, and nested Ifs, slow performance and a pain to update

- Recommendation: **Use a variable to “look up” values from an island table, instead.**



UI implementation

Excessive use of conditional functions

Use a variable to “look up” values from an island table, instead.

MeasureIndex	MeasureLabel	MeasureBase	MeasureYTD…
1	Quantity	Sum(Quantity)	…
2	Sales	Sum(Sales)	…

```
Only({<MeasureIndex = {$(v_VariableIndex)}>} MeasureLabel)
```

UI implementation

ValueList() function

ValueList function used for list of metrics in “metric tables”, leading to poor performance

- Recommendation: **Use island table for several times better calculation time** (https://www.axisgroup.com/data-industry-insights-blog/synthetic-dimensions-with-better-performance-than-valuelists)

Function Usage

Function	Count
Totals	**236**
aggr	15
avg	24
color	5
colormix1	2
count	30

UI implementation

Manually defined variables

Manually defined variables that are time consuming to update, or no variables at all, which are also time consuming to update

- Recommendation: **Script-defined Variables are still the easiest way to make mass updates (find and replace) and reuse expressions.**

VariableName	Is Created in Script
Totals	
e.Cost	N
vASP	N
vAvgDealSize	N
vMargin	N

UI implementation

Complex business rules in expressions

Expressions contain complex business rules that could be pushed to the data model, including frequent text comparisons

- Recommendation: **Create simple fields in data model to encapsulate business rules**, using numeric values when possible for best performance.

Before	After
Relationship={'Employee'}	RelationshipCode = {1}
Relationship={'Spouse'}	RelationshipCode = {2}
Relationship={'Child','Disabled Dependent','Adult Dependent','Student'}	RelationshipCode = {3}

UI implementation

Overcomplicated calculations

Overcomplicated calculations that could be simplified mathematically

- Recommendation: **Look carefully at complex calculations**, automate simplification with Wolfram Alpha

  ex. (CY - PY) / PY = (CY / PY) – 1

WolframAlpha computational intelligence.

(A / (B / C)) / C

Browse Examples Surprise Me

Assuming "A" is a variable | Use "A / (B / C)" as a unit instead

Input:

$$\frac{\frac{A}{B}}{\frac{C}{C}}$$

Open code

Result:

Step-by-step solution

$$\frac{A}{B}$$

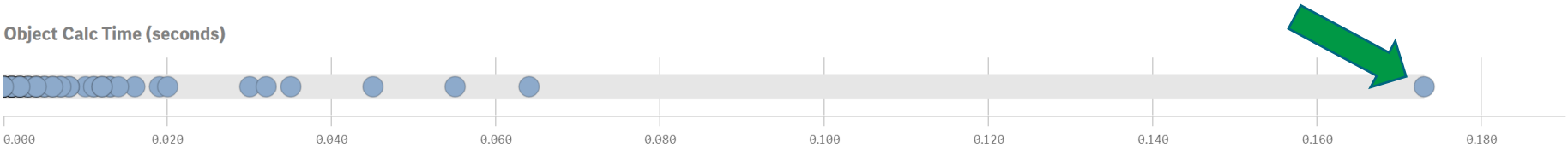
UI implementation

Default sheet/chart is slow to render

Default view is a TON of data, which takes a long time to calculate and render, whether users care about it or not

- Recommendation: **Use calculation conditions.** If users are stingy, create an override toggle using a variable.

```
Sum(RecordCount) <= 100000 OR v_CalcOverride = 1
```



UI implementation

Repeated color derivation in charts

Complicated and repetitive expressions in UI used to assign specific colors to dimensional values

- Recommendation: **Store colors in data model fields, then use those directly in the front end.**

```
Pick(
Match(right([DateOfService Quarter],1),1, 2, 3, 4),
RGB(0,85,125),RGB(128,130,132),RGB(47,159,56),RGB(122,205,196))
```

Function Usage

Function	Co
Totals	
color	
colormix1	
rgb	

UI implementation

Upgrade Qlik Sense

Upgrade Qlik Sense to take advantage of performance features and enhancements included in the latest release, ex. billions abbreviation formatting, segment colors for Master Measures.

```
pick(ceil(log10(Sum({<$(set_DateOfServiceCYTD)>}TotalAmountBilled))/3),'$' &
num(Sum({<$(set_DateOfServiceCYTD)>}TotalAmountBilled),'#,##0.00'),'$' &
num(Sum({<$(set_DateOfServiceCYTD)>}TotalAmountBilled)/1000,'#,##0.00') & 'K','$' &
num(Sum({<$(set_DateOfServiceCYTD)>}TotalAmountBilled)/1000000,'#,##0.00') & 'M','$' &
num(Sum({<$(set_DateOfServiceCYTD)>}TotalAmountBilled)/1000000000,'#,##0.00') & 'B’)
```

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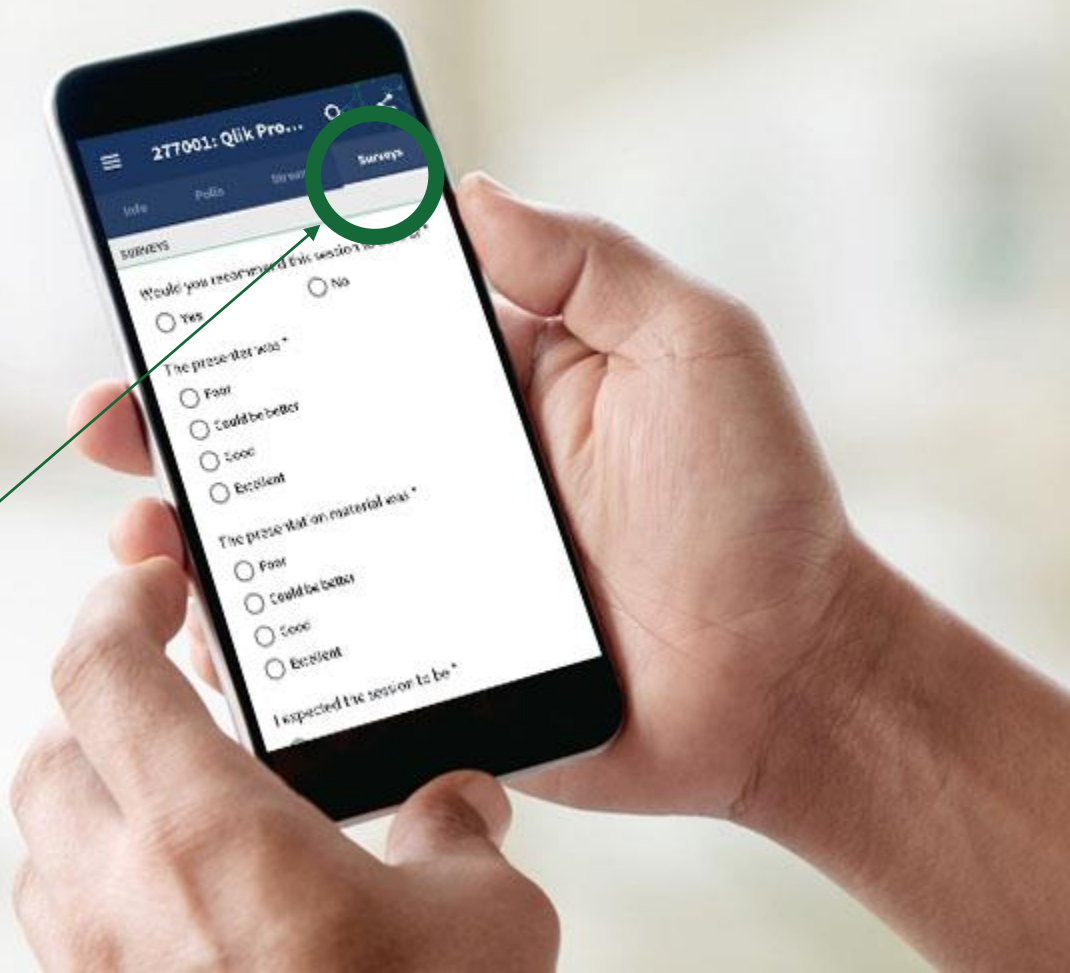

Thank You