OData API

Questionmark Analytics
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Objectives

- By the end of the session, you should be able to:
  - Explain the role of OData in providing access to raw data from the Results Warehouse
  - Define the three parts of an OData URL
  - Return results data for a specific assessment using OData
  - Use a web browser to access OData
  - Use Excel PowerPivot to access OData
The OData Story: Data Access
A Trip to the Bank

- We store our currency at the bank...

- ...but we expect to be able to access it whenever we want to...

- ...and we expect that currency to be accepted in lots of places.
The OData Story: Data Access

- Data are the currency of assessment validity
- We want to be able to **access** our data at any time
- We expect the data to be accepted by many applications and BI tools
OData Overview

Data-analysis and visualization tools

OData

QMWISeR

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Liberating Your Data

- Ad hoc reporting
- Refreshable data
- Merge data with other data sources
- Load data into other applications and BI tools
The Anatomy of OData URLs
OData Overview

- Data are accessed and queried with URLs, like the addresses of websites
- OData is an industry standard (www.odata.org)
  - Example Producers
    - Government data portals
    - Netflix
    - Ebay
    - Questionmark
  - Example Consumers
    - Excel
    - Business intelligence tools
    - Web browsers
    - Sesame
    - Custom dashboards
The Anatomy of an OData URL

Example OData URL:
https://ondemand.questionmark.com/123456/odata/Assessments(71111)/Results?$top=5

- OData URLs have three parts:
  - Root
  - Resource Path
  - Query
The Anatomy of an OData URL

For OnDemand users, the root of the OData URL is simply the URL for your OnDemand area followed by “/odata.”

https://ondemand.questionmark.com/123456/odata
The Anatomy of an OData URL

Resource Path
Specify the feeds and fields in which you are interested. For example, here we are asking for the results associated with the assessment with key number 71111.
The Anatomy of an OData URL

Query
Specify, arrange, or limit the number of entries returned from the Resource Path. For example, here we are asking for the top five entries from the Resource Path.
Questionmark’s OData Feeds
Resource Path: Available Feeds

<table>
<thead>
<tr>
<th>OData Feeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
</tr>
<tr>
<td>Groups</td>
</tr>
<tr>
<td>Results</td>
</tr>
<tr>
<td>Questions</td>
</tr>
<tr>
<td>Choices</td>
</tr>
<tr>
<td>Answers</td>
</tr>
<tr>
<td>Topics</td>
</tr>
<tr>
<td>TopicScores</td>
</tr>
<tr>
<td>Outcomes</td>
</tr>
<tr>
<td>Assessments</td>
</tr>
<tr>
<td>AssessmentQuestionLinks</td>
</tr>
<tr>
<td>...more are coming soon!</td>
</tr>
</tbody>
</table>

- Each feed contains dozens of fields with applicable data
- Feeds can be linked (e.g., link results to data about participants)
OData Examples
Questionmark OData in Excel PowerPivot
Questionmark OData in Excel PowerView

Power View OData Demo Report

<table>
<thead>
<tr>
<th>GroupName</th>
<th>Count of ParticipantKey</th>
<th>Average of ResultPercentageScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>37</td>
<td>59.25</td>
</tr>
<tr>
<td>Software</td>
<td>120</td>
<td>64.09</td>
</tr>
<tr>
<td>Sales</td>
<td>124</td>
<td>62.90</td>
</tr>
<tr>
<td>Research</td>
<td>219</td>
<td>63.37</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
<td>63.12</td>
</tr>
</tbody>
</table>

Count of ParticipantKey by SpecialField2, and Group!

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Questionmark OData in Sesame
Questionmark OData in Tableau
Questionmark OData in Dashboards

- Score Correlation between Art History Test [rev 4] and Music Trivia [rev 4]
- Score Distribution for: General Knowledge Exam 1 [rev 2]

- Number of Results: 5902
- Mean Percentage Score: 63.9%
- Standard Deviation: 19.1%
Questionmark OData in R

```r
library("RCurl")
library("XML")

setwd("D:\Documents\Research\IRT\OData IRT Proof of Concept\R - R Editor")

# Set SSL cert globally
options(RCurlOptions = list(caInfo = system.file("CurlSSL", "cacert.pem", package = "RCurl")))

# Enter OData URL and credentials
url = "https://ondemand.questionmark.com/gmpproductowners/odata/Assessments(7111)/Answers"
creds = "gmpproductowners:******"

odata = getURL(url, userpwd = creds)
doc = xmlTreeParse(odata, getDTD = F, useInternalNodes=T)
data = xmlRoot(doc)

# Create blank matrix ("final") to collect all of the data for final use
final_matrix[nrow=0, ncol=1] = xmlChildren(doc)["entry"]["content"][1]
props = as.vector(xml2apply(data[["entry"]]["content"][1], xmlName)
colnames(final) = props

# Full in data using continuations
while(url.exists(url, userpwd = creds)){
  odata = getURL(url, userpwd = creds)
doc = xmlTreeParse(odata, getDTD = F, useInternalNodes=T)
data = xmlRoot(doc)

  # Find number of entries in the data batch
  nentry = sum(as.vector(xml2apply(data, xmlName)) == "entry")

  # Make a temp matrix and fill it with values from each entry's properties.
  # Note that first entry is presumed to be at data[[i-getLineNumber(data["entry"])]-3]
  temp = matrix(nrow=nentry, ncol=ncol(final))
  i = 1
  while(i<nentry){
    j = i
    while(j<ncol(temp)){
      temp[i,j] = xmlValue(data[[i-getLineNumber(data["entry"])]-3]["content"])["p:"
    }
    i = i + 1
  }
}
```

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odata.org

- Query and filter conventions
- Ecosystem of applications
- Technical documentation

Questionmark Learning Café

- Video introduction to OData
- Video tutorials on how to make different reports in Excel with OData
- Video tutorial for using OData in Tableau

See: https://www.questionmark.com/us/learningcafe/premium/Pages/default.aspx
Questionmark Knowledge Base

- Articles about anatomy of OData URL
- Overview of applying queries
- Links to additional resources

Questionmark Analytics User Guide

- Specs for each field in each feed
- Information on “keys” used to link feeds
- Sample queries

Tutorials for developers
Sample code
Sample reportlets in a dashboard
- Score distribution
- Attempts distribution
- Score correlation
- Pre-test post-test
Publicly available!

See: http://developer.questionmark.com/home/
Demonstration: Browser and Excel
OData Tips

- Use keys to specify data or make connections
- Use queries to bring in small chunks of data quickly
- Set up queries once in an application, then save them to refresh your data
- OData URLs are case-sensitive
Browser Demo

- Counts the number of results for Assessment 71111 where the percentage score is greater than or equal to 70% (192 results).
Excel Demo

- Excel 2010 or 2013
- Free PowerPivot add in
- PowerPivot tab
- Click “Manage” to open PowerPivot
- “Get External Data” from OData
- Provide URL and security information
Excel Activity
Goal

- We are going to make this chart in Excel using the Results feed:

Extra credit: Link Results feed to the Group feed to add a group filter to your chart
High Level Steps

- Get results for Demo Assessment – Form C
- Create pivot chart
- Get Groups data
- Create relationship between Results and Groups
- Add slicer (filter) to pivot chart
Activity Tools

- https://ondemand.questionmark.com/qmproductowners/odata/Results?$filter=substringof('Demo Assessment - Form C', AssessmentName) eq true

- https://ondemand.questionmark.com/qmproductowners/odata/Groups
Questions about OData?
Thank you!

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