

[MS-QDEFF]:

Query Definition File Format

Intellectual Property Rights Notice for Open Specifications Documentation

- **Technical Documentation.** Microsoft publishes Open Specifications documentation (“this documentation”) for protocols, file formats, data portability, computer languages, and standards support. Additionally, overview documents cover inter-protocol relationships and interactions.
- **Copyrights.** This documentation is covered by Microsoft copyrights. Regardless of any other terms that are contained in the terms of use for the Microsoft website that hosts this documentation, you can make copies of it in order to develop implementations of the technologies that are described in this documentation and can distribute portions of it in your implementations that use these technologies or in your documentation as necessary to properly document the implementation. You can also distribute in your implementation, with or without modification, any schemas, IDLs, or code samples that are included in the documentation. This permission also applies to any documents that are referenced in the Open Specifications documentation.
- **No Trade Secrets.** Microsoft does not claim any trade secret rights in this documentation.
- **Patents.** Microsoft has patents that might cover your implementations of the technologies described in the Open Specifications documentation. Neither this notice nor Microsoft's delivery of this documentation grants any licenses under those patents or any other Microsoft patents. However, a given Open Specifications document might be covered by the Microsoft [Open Specifications Promise](#) or the [Microsoft Community Promise](#). If you would prefer a written license, or if the technologies described in this documentation are not covered by the Open Specifications Promise or Community Promise, as applicable, patent licenses are available by contacting iplg@microsoft.com.
- **License Programs.** To see all of the protocols in scope under a specific license program and the associated patents, visit the [Patent Map](#).
- **Trademarks.** The names of companies and products contained in this documentation might be covered by trademarks or similar intellectual property rights. This notice does not grant any licenses under those rights. For a list of Microsoft trademarks, visit www.microsoft.com/trademarks.
- **Fictitious Names.** The example companies, organizations, products, domain names, email addresses, logos, people, places, and events that are depicted in this documentation are fictitious. No association with any real company, organization, product, domain name, email address, logo, person, place, or event is intended or should be inferred.

Reservation of Rights. All other rights are reserved, and this notice does not grant any rights other than as specifically described above, whether by implication, estoppel, or otherwise.

Tools. The Open Specifications documentation does not require the use of Microsoft programming tools or programming environments in order for you to develop an implementation. If you have access to Microsoft programming tools and environments, you are free to take advantage of them. Certain Open Specifications documents are intended for use in conjunction with publicly available standards specifications and network programming art and, as such, assume that the reader either is familiar with the aforementioned material or has immediate access to it.

Support. For questions and support, please contact dochelp@microsoft.com.

Revision Summary

| Date | Revision History | Revision Class | Comments |
|------------|------------------|----------------|--|
| 9/25/2015 | 1.0 | New | Released new document. |
| 5/6/2016 | 1.1 | Minor | Clarified the meaning of the technical content. |
| 7/15/2016 | 1.1 | None | No changes to the meaning, language, or formatting of the technical content. |
| 9/14/2016 | 1.1 | None | No changes to the meaning, language, or formatting of the technical content. |
| 6/20/2017 | 1.2 | Minor | Clarified the meaning of the technical content. |
| 9/19/2017 | 2.0 | Major | Significantly changed the technical content. |
| 4/27/2018 | 3.0 | Major | Significantly changed the technical content. |
| 8/28/2018 | 4.0 | Major | Significantly changed the technical content. |
| 9/24/2019 | 4.1 | Minor | Clarified the meaning of the technical content. |
| 5/19/2020 | 4.2 | Minor | Clarified the meaning of the technical content. |
| 11/17/2020 | 4.2 | None | No changes to the meaning, language, or formatting of the technical content. |
| 4/22/2021 | 5.0 | Major | Significantly changed the technical content. |
| 8/17/2021 | 6.0 | Major | Significantly changed the technical content. |
| 11/15/2022 | 6.1 | Minor | Clarified the meaning of the technical content. |

Table of Contents

| | | |
|----------|--|-----------|
| 1 | Introduction | 4 |
| 1.1 | Glossary | 4 |
| 1.2 | References | 5 |
| 1.2.1 | Normative References | 5 |
| 1.2.2 | Informative References | 5 |
| 1.3 | Overview | 5 |
| 1.4 | Relationship to Protocols and Other Structures | 5 |
| 1.5 | Applicability Statement | 6 |
| 1.6 | Versioning and Localization | 6 |
| 1.7 | Vendor-Extensible Fields | 6 |
| 2 | Structures | 7 |
| 2.1 | Root Element..... | 7 |
| 2.2 | Top-level Binary Stream | 7 |
| 2.3 | Package Parts | 9 |
| 2.3.1 | Package.xml | 9 |
| 2.3.2 | Section1.m | 10 |
| 2.3.3 | Embedded Contents..... | 10 |
| 2.4 | Permissions..... | 10 |
| 2.5 | Metadata | 10 |
| 2.5.1 | Metadata XML | 11 |
| 2.5.2 | Metadata Content | 14 |
| 2.6 | Permission Bindings | 14 |
| 3 | Structure Examples | 16 |
| 3.1 | Root Element..... | 16 |
| 3.2 | Package.xml..... | 16 |
| 3.3 | Section1.m..... | 17 |
| 3.4 | Permissions XML | 17 |
| 3.5 | Metadata XML..... | 17 |
| 4 | Security | 19 |
| 4.1 | Security Considerations for Implementers | 19 |
| 4.2 | Index of Security Fields | 19 |
| 5 | Appendix A: Product Behavior | 20 |
| 6 | Change Tracking..... | 21 |
| 7 | Index..... | 22 |

1 Introduction

The Query Definition File Format defines a file format that is used to store the Power Query Formulas of the queries in a spreadsheet and their associated metadata.

Sections 1.7 and 2 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

base64 encoding: A binary-to-text encoding scheme whereby an arbitrary sequence of bytes is converted to a sequence of printable ASCII characters, as described in [\[RFC4648\]](#).

culture: A part of a language identification tagging system, as described in [\[RFC1766\]](#). Culture names adhere to the format "<languagecode2>-<country/regioncode2>."

Data Protection Application Program Interface (DPAPI): An application programming interface (API) for creating protected data BLOBs. For more information, see [\[MSDN-DPAPI\]](#).

globally unique identifier (GUID): A term used interchangeably with universally unique identifier (UUID) in Microsoft protocol technical documents (TDs). Interchanging the usage of these terms does not imply or require a specific algorithm or mechanism to generate the value. Specifically, the use of this term does not imply or require that the algorithms described in [\[RFC4122\]](#) or [\[C706\]](#) must be used for generating the **GUID**. See also universally unique identifier (UUID).

Office Open XML (OOXML): A family of XML schemas, specified in [\[ECMA-376\]](#), that is used for office productivity applications.

Open Packaging Conventions (OPC): An open standard for a portable container technology that defines a structured way to store application data with related resources by using a standard .ZIP file format. OPC is a component of Office Open XML File Formats [\[ECMA-376\]](#).

Power Query Formula: A script language that defines how a query filters and combines data from one or more supported data sources.

query table: A two-dimensional table that presents data from an external data source.

spreadsheet data model: A local Online Analytical Processing (OLAP) storage of data used by a spreadsheet application.

table: A list that is defined in a workbook.

UTF-8: A byte-oriented standard for encoding Unicode characters, defined in the Unicode standard. Unless specified otherwise, this term refers to the UTF-8 encoding form specified in [\[UNICODE5.0.0/2007\]](#) section 3.9.

worksheet: A single logical container for a set of tabular data and other objects in a workbook.

XML: The Extensible Markup Language, as described in [\[XML1.0\]](#).

XML document: A document object that is well formed, as described in [\[XML10/5\]](#), and might be valid. An XML document has a logical structure that is composed of declarations, elements, comments, character references, and processing instructions. It also has a physical structure that is composed of entities, starting with the root, or document, entity.

XML schema: A description of a type of **XML document** that is typically expressed in terms of constraints on the structure and content of documents of that type, in addition to the basic syntax constraints that are imposed by **XML** itself. An XML schema provides a view of a document type at a relatively high level of abstraction.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as defined in [\[RFC2119\]](#). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the [Errata](#).

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.

[MSDOCS-MLANG] Microsoft Corporation, "<https://learn.microsoft.com/en-us/powerquery-m/power-query-m-language-specification>".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <https://www.rfc-editor.org/rfc/rfc2119.html>

1.2.2 Informative References

[ECMA-376-2/2] ECMA, "Information technology – Document description and processing languages – Office Open XML File Formats – Part 2: Open Packaging Conventions", 2nd edition, Standard ECMA-376-2, December 2008, https://www.ecma-international.org/wp-content/uploads/ecma-376_second_edition_december_2008.zip

[ECMA-376] ECMA International, "Office Open XML File Formats", <https://www.ecma-international.org/publications-and-standards/standards/ecma-376/>

[MSFT-Support] Microsoft Corporation, "Support", <http://support.microsoft.com/>

[XML] World Wide Web Consortium, "Extensible Markup Language (XML) 1.0 (Fourth Edition)", W3C Recommendation 16 August 2006, edited in place 29 September 2006, <http://www.w3.org/TR/2006/REC-xml-20060816/>

1.3 Overview

The Query Definition File Format Structure contains information about the queries in a spreadsheet, including the **Power Query Formula** of each query as well as metadata that describes its relationship to other elements in the spreadsheet. It is stored within a CustomXML Part in the spreadsheet file.

1.4 Relationship to Protocols and Other Structures

This file format is hosted within the structures that are defined in the following reference:

- [\[ECMA-376\]](#) describes the Custom XML Part within an **Office Open XML (OOXML)** document.

This file format makes use of the structures that are defined in the following references:

- [\[XML\]](#) describes the XML format.
- [\[ECMA-376-2/2\]](#) describes the **Open Packaging Conventions (OPC)** package format.
- [\[MSDOCS-MLANG\]](#) describes the Power Query Formula language.

1.5 Applicability Statement

This structure is used to persist information about queries that utilize Power Query technology within a spreadsheet file. This structure applies to the case where a user authors such a query using spreadsheet software that produces the containing file.

1.6 Versioning and Localization

This document covers versioning issues in the following areas:

- **Structure Versions:** Version information related to this structure is stored within the structure. For more details, see section [2.3.1](#).
- **Localization:** Locale-specific information related to this structure is stored within the structure. For more details, see section [2.3.1](#).

1.7 Vendor-Extensible Fields

Each query is associated with an extensible set of metadata entries in which vendors store vendor-specific information. For more details, see section [2.5.1](#).

2 Structures

The Query Definition File Format Structure consists of a root **XML** element (section 2.1) containing a **base64-encoded** binary stream. The binary stream (section 2.2) consists of four variable-length fields, namely:

- Package Parts (section 2.3)
- Permissions (section 2.4)
- Metadata (section 2.5)
- Permission Bindings (section 2.6)

Each field is preceded by a 4-byte integer field that specifies its length.

2.1 Root Element

The following **XML schema** fragment defines this element.

```
<xs:schema targetNamespace="http://schemas.microsoft.com/DataMashup"
  elementFormDefault="qualified"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns="http://schemas.microsoft.com/DataMashup">

  <xs:simpleType name="guid">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{12}" />
    </xs:restriction>
  </xs:simpleType>

  <xs:element name="DataMashup">
    <xs:complexType>
      <xs:simpleContent>
        <xs:extension base="xs:base64Binary">
          <xs:attribute name="sqmid" type="guid" use="optional" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
  </xs:element>

</xs:schema>
```

sqmid: An arbitrary **GUID** used to correlate the spreadsheet for telemetry.

2.2 Top-level Binary Stream

The following table defines the top-level binary stream contained in the root element after **base64** decoding.

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| Version | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Package Parts Length | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| |
|--------------------------------|
| Package Parts (variable) |
| ... |
| ... |
| ... |
| Permissions Length |
| Permissions (variable) |
| ... |
| ... |
| ... |
| Metadata Length |
| Metadata (variable) |
| ... |
| ... |
| ... |
| Permission Bindings Length |
| Permission Bindings (variable) |
| ... |
| ... |
| ... |

Version (4 bytes): Unsigned integer that MUST be set to 0.

Package Parts Length (4 bytes): Unsigned integer that specifies the length of the **Package Parts** field.

Package Parts (variable): Variable-length binary stream (section [2.3](#)).

Permissions Length (4 bytes): Unsigned integer that specifies the length of the **Permissions** field.

Permissions (variable): Variable-length binary stream (section [2.4](#)).

Metadata Length (4 bytes): Unsigned integer that specifies the length of the **Metadata** field.

Metadata (variable): Variable-length binary stream (section [2.5](#)).

Permission Bindings Length (4 bytes): Unsigned integer that specifies the length of the **Permission Bindings** field.

Permission Bindings (variable): Variable-length binary stream (section [2.6](#)).

2.3 Package Parts

The **Package Parts** binary stream is an **Open Packaging Conventions (OPC)** package that consists of the following parts:

| Name | Content Type | Reference |
|----------------------|--------------------------|-------------------------------|
| /Config/Package.xml | text/xml | section 2.3.1 |
| /Formulas/Section1.m | text/plain | section 2.3.2 |
| /Content/Guid1 | application/octet-stream | section 2.3.3 |
| ... | | |

Note that *Guid1* above is a placeholder for a **GUID**, and the package MAY contain one or more of such parts.

2.3.1 Package.xml

The following **XML schema** fragment defines this part.

```
<xs:schema targetNamespace="http://schemas.microsoft.com/DataMashup"
  elementFormDefault="qualified"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns="http://schemas.microsoft.com/DataMashup">

  <xs:simpleType name="version">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-9]+\.[0-9]+(\.[0-9]+(\.[0-9]+)?)?" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="culture">
    <xs:restriction base="xs:string">
      <xs:enumeration value="en-us" />
      <!-- Other culture names as specified by RFC1766 -->
    </xs:restriction>
  </xs:simpleType>

  <xs:element name="Package">
    <xs:complexType>
      <xs:all>
        <xs:element name="Version" type="version"></xs:element>
        <xs:element name="MinVersion" type="version"></xs:element>
        <xs:element name="Culture" type="culture"></xs:element>
      </xs:all>
    </xs:complexType>
  </xs:element>

</xs:schema>
```

Version: Specifies the version of the client used to create this file.

MinVersion: Specifies the minimum version of the client that is able to read this file.

Culture: Specifies the **culture** to be used when parsing date/time strings.

2.3.2 Section1.m

This part is the plain-text document that contains the **Power Query Formula** for each query in the spreadsheet. It is fully specified by [\[MSDOCS-MLANG\]](#).

2.3.3 Embedded Contents

Each of these parts can contain application-specific binary data.

2.4 Permissions

The Permissions binary stream is a **UTF-8** encoded **XML document** defined by the following schema fragment.

```
<xs:schema targetNamespace="http://schemas.microsoft.com/DataMashup"
  elementFormDefault="qualified"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns="http://schemas.microsoft.com/DataMashup">
  <xs:element name="PermissionList">
    <xs:complexType>
      <xs:all>
        <xs:element name="CanEvaluateFuturePackages" type="xs:boolean" />
        <xs:element name="FirewallEnabled" type="xs:boolean" />
        <xs:element name="WorkbookGroupType" nillable="true">
          <xs:simpleType>
            <xs:restriction base="xs:string">
              <xs:enumeration value="None" />
              <xs:enumeration value="Public" />
              <xs:enumeration value="Organizational" />
              <xs:enumeration value="SeparatePrivate" />
            </xs:restriction>
          </xs:simpleType>
        </xs:element>
      </xs:all>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

CanEvaluateFuturePackages: Specifies whether the client is allowed to read files created in a newer version of the client. This value is ignored when read, and is always written as "false".

FirewallEnabled: Specifies whether Privacy Level settings are used when combining data. See the [\[MSFT-Support\]](#) article "Privacy levels (Power Query)" for more information.

WorkbookGroupType: Specifies the Privacy Level of the current spreadsheet. See the [\[MSFT-Support\]](#) article "Privacy levels (Power Query)" for more information. Note the following mapping between the enumeration value and the Setting as documented in the article:

- Public: Public data source
- Organizational: Organizational data source
- SeparatePrivate: Private data source

2.5 Metadata

The Metadata binary stream is defined in the following table.

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 |
|-------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Version | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Metadata XML Length | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Metadata XML (variable) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Content Length | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Content (variable) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Version (4 bytes): Unsigned integer that MUST be set to 0.

Metadata XML Length (4 bytes): Unsigned integer that specifies the length of the **Metadata XML** field.

Metadata XML (variable): **UTF-8** encoded **XML document** that specifies the metadata for the collection of queries as well as each individual query (section [2.5.1](#)).

Content Length (4 bytes): Unsigned integer that specifies the length of the **Content** field.

Content (variable): **Open Packaging Conventions (OPC)** package (section [2.5.2](#)).

2.5.1 Metadata XML

The **Metadata XML** binary stream is a **UTF-8** encoded **XML document** that specifies the metadata associated with each query in the spreadsheet, as well as the entire collection of queries.

The following **XML schema** fragment defines this XML document.

```
<xs:schema targetNamespace="http://schemas.microsoft.com/DataMashup"
  elementFormDefault="qualified"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns="http://schemas.microsoft.com/DataMashup">

  <xs:element name="LocalPackageMetadataFile">
    <xs:complexType>
      <xs:all>
        <xs:element name="Items">
          <xs:complexType>
            <xs:sequence minOccurs="0" maxOccurs="unbounded">
```

```

        <xs:element name="Item" type="Item" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:all>
</xs:complexType>
</xs:element>

<xs:complexType name="Item">
  <xs:all>
    <xs:element name="ItemLocation" type="ItemLocation" />
    <xs:element name="StableEntries">
      <xs:complexType>
        <xs:sequence minOccurs="0" maxOccurs="unbounded">
          <xs:element name="Entry" type="Entry" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:all>
</xs:complexType>

<xs:complexType name="ItemLocation">
  <xs:all>
    <xs:element name="ItemType">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:enumeration value="Formula" />
          <xs:enumeration value="AllFormulas" />
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <xs:element name="ItemPath" type="xs:string" />
  </xs:all>
</xs:complexType>

<xs:complexType name="Entry">
  <xs:attribute name="Type" type="xs:string" />
  <xs:attribute name="Value">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:pattern value="l[0-9]+" />
        <xs:pattern value="f[0-9]+\.[0-9]+" />
        <xs:pattern value="s.*" />
        <xs:pattern value="c[0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{12}" />
        <xs:pattern value="d[0-9]{4}-[0-9]{2}-[0-9]{2}T[0-9]{2}:[0-9]{2}:[0-9]{2}\.[0-9]{7}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
</xs:complexType>
</xs:schema>

```

Items: Container for all metadata collections. Can contain one or more metadata entry collections.

Items.Item: A single collection of metadata entries for a particular query.

Items.Item.ItemLocation: Contains information about the query that this collection of metadata entries applies to.

Items.Item.ItemLocation.ItemType: This value MUST be "Formula" if this collection of metadata entries applies to a single query. Otherwise it MUST be "AllFormulas".

Items.Item.ItemLocation.ItemPath: If the value of ItemType is "Formula", this value MUST be of the form "Section1/Query Name", where Query Name is the name of the query. Otherwise, it MUST be the empty string.

Items.Item.StableEntries: The collection of metadata entries.

Items.Item.StableEntries.Entry: A single metadata entry.

Items.Item.StableEntries.Entry.Type: The name of the metadata entry.

Items.Item.StableEntries.Entry.Value: The value of the metadata entry. This value is composed of a single-letter prefix followed by the value itself, with the prefix denoting the data type of the value:

- l: integer value, or Boolean value with 0=false, 1=true
- f: decimal value
- s: string value
- c: GUID referencing binary content (section [2.5.2](#))
- d: date/time value

Note: The following metadata entries are added to the query.

| Name | Data Type | Description |
|---------------------------------|-----------|--|
| AddedToDataModel | Boolean | Whether the query has been loaded to the spreadsheet data model . |
| BufferNextRefresh | Boolean | Whether data will be buffered on the next refresh. |
| FillCount | Integer | The number of rows retrieved during the most recent refresh. |
| FillEnabled | Boolean | Whether the query will load to the worksheet . |
| FillErrorCode | String | A code indicating the error that occurred in the most recent refresh. |
| FillErrorCount | Integer | The number of rows retrieved that contained errors in the most recent refresh. |
| FillErrorMessage | String | The message for the error that occurred in the most recent refresh. |
| FillLastUpdated | Date/Time | The date/time of the most recent refresh. |
| FillColumnTypes | String | List of the column data types retrieved in the most recent refresh. |
| FillColumnNames | String | List of the column names retrieved in the most recent refresh. |
| FilledCompleteResultToWorksheet | Boolean | Whether the most recent refresh loaded the entire data set to the worksheet. |
| FillStatus | String | The final status of the most recent refresh. |
| FillTargetNameCustomized | Boolean | Whether the name of the table associated with the query has been renamed. |
| FillTargetName | String | The name of the table associated with the query. |
| FillToDataModelEnabled | Boolean | Whether the query load to the spreadsheet data model. |

| Name | Data Type | Description |
|--------------------------------|-----------|---|
| IsFunctionQuery | Boolean | Whether the query is a function query (see [MSDOCS-MLANG]). |
| IsPrivate | Boolean | Whether the query is private. |
| PublishedPackageID | String | The GUID of package that contains the query after it was sent to the Data Catalog. |
| PublishedPackageLastModifiedAt | Date/Time | The timestamp when the query was most recently sent to the Data Catalog. |
| QueryGroupID | String | The GUID of the query group that the query belongs to. |
| QueryID | String | A GUID associated with the query for telemetry. |
| RecoveryTargetColumn | Integer | The column index of the top-left cell of the table the query was loaded to most recently. |
| RecoveryTargetRow | Integer | The row index of the top-left cell of the table the query was loaded to most recently. |
| RecoveryTargetSheet | String | The name of the worksheet the query was loaded to most recently. |
| RelationshipInfoContainer | String | Information about the columns of the data set retrieved by this query. |
| ResultType | String | The data type of the result retrieved by the query. |

Note: The following metadata entries are created for the query collection.

| Name | Data Type | Description |
|--------------------------------|-----------|--|
| IsRelationshipDetectionEnabled | Boolean | Whether relationship detection is enabled. |
| QueryGroups | String | The query groups for the spreadsheet. |
| Relationships | String | The relationships created for the queries. |

2.5.2 Metadata Content

The Metadata Content binary stream is an **Open Packaging Conventions (OPC)** package consisting of zero or more of the following parts.

| Name | Content Type |
|-------------|--------------------------|
| <i>GUID</i> | application/octet-stream |

Each part holds the binary content that is referenced by the part's **GUID** in the **Metadata XML** defined in section [2.5.1](#).

2.6 Permission Bindings

The Permission Bindings binary stream is a cryptographic checksum that **MUST** be generated as follows:

- Compute the SHA-256 hash of the Package Parts binary stream (section [2.3](#)) and the Permissions binary stream (section [2.4](#)), and concatenate them. Each hash is preceded by an Int32 value indicating the length of the hash.
- Encrypt the concatenated hashes using the **Data Protection Application Program Interface (DPAPI)** with the following parameters:
 - **Data protection scope:** Current user
 - **Optional entropy:** **UTF-8** encoding of the string "DataExplorer Package Components"

When reading the Query Definition File Format Structure from the spreadsheet, if the Permission Bindings cryptographic checksum computed using the algorithm above does not match what is persisted in the spreadsheet file, the Permissions binary stream persisted in the spreadsheet file **MUST** be discarded, and replaced with the following defaults.

```
<PermissionList xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">  
  <CanEvaluateFuturePackages>false</CanEvaluateFuturePackages>  
  <FirewallEnabled>true</FirewallEnabled>  
  <WorkbookGroupType xsi:nil="true" />  
</PermissionList>
```



```

    <MinVersion>2.21.0.0</MinVersion>
    <Culture>en-US</Culture>
</Package>

```

3.3 Section1.m

```

section Section1;

shared Query1 = let
    Source = 1+1
in
    Source;

```

3.4 Permissions XML

```

<PermissionList xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <CanEvaluateFuturePackages>false</CanEvaluateFuturePackages>
  <FirewallEnabled>true</FirewallEnabled>
  <WorkbookGroupType xsi:nil="true" />
</PermissionList>

```

3.5 Metadata XML

```

<LocalPackageMetadataFile>
  <Items>
    <Item>
      <ItemLocation>
        <ItemType>AllFormulas</ItemType>
        <ItemPath />
      </ItemLocation>
      <StableEntries />
    </Item>
    <Item>
      <ItemLocation>
        <ItemType>Formula</ItemType>
        <ItemPath>Section1/Query1</ItemPath>
      </ItemLocation>
      <StableEntries>
        <Entry Type="IsPrivate" Value="10" />
        <Entry Type="ResultType" Value="sNumber" />
        <Entry Type="FillEnabled" Value="11" />
        <Entry Type="FillToDataModelEnabled" Value="10" />
        <Entry Type="FillCount" Value="11" />
        <Entry Type="FillErrorCount" Value="10" />
        <Entry Type="FillColumnTypes" Value="sBQ==" />
        <Entry Type="FillColumnNames" Value="s[&quot;Query1&quot;]" />
        <Entry Type="FillErrorCode" Value="sUnknown" />
        <Entry Type="FillLastUpdated" Value="d2015-09-10T04:45:41.9275900Z" />
        <Entry Type="RelationshipInfoContainer"
Value="s{&quot;columnCount&quot;;:1,&quot;keyColumnNames&quot;;:[],&quot;queryRelationships&quot;;:[],&quot;columnIdentities&quot;;:[&quot;Section1/Query1/AutoRemovedColumns1.{Query1,0}&quot;;],[&quot;ColumnCount&quot;;:1,&quot;KeyColumnNames&quot;;:[],&quot;ColumnIdentities&quot;;:[&quot;t;Section1/Query1/AutoRemovedColumns1.{Query1,0}&quot;;],[&quot;RelationshipInfo&quot;;:[]}" />
        <Entry Type="FilledCompleteResultToWorksheet" Value="11" />
        <Entry Type="AddedToDataModel" Value="10" />
        <Entry Type="RecoveryTargetSheet" Value="sSheet2" />
        <Entry Type="RecoveryTargetColumn" Value="11" />
        <Entry Type="RecoveryTargetRow" Value="11" />
        <Entry Type="NameUpdatedAfterFill" Value="10" />
        <Entry Type="FillTarget" Value="sQuery1" />
        <Entry Type="BufferNextRefresh" Value="11" />
        <Entry Type="FillStatus" Value="sComplete" />
        <Entry Type="QueryID" Value="s7e04362e-92f5-4d82-8b07-2761eaf68ae5" />
      </StableEntries>
    </Item>
  </Items>
</LocalPackageMetadataFile>

```

```
    </StableEntries>
  </Item>
  <Item>
    <ItemLocation>
      <ItemType>Formula</ItemType>
      <ItemPath>Section1/Query1/Source</ItemPath>
    </ItemLocation>
    <StableEntries />
  </Item>
</Items>
</LocalPackageMetadataFile>
```

4 Security

4.1 Security Considerations for Implementers

None.

4.2 Index of Security Fields

| Security Field | Reference |
|---------------------|-----------------------------|
| Permission Bindings | Section 2.6 |

5 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Microsoft Excel 2016
- Microsoft Excel 2019
- Microsoft Excel 2021

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

6 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements.
- A document revision that captures changes to protocol functionality.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

| Section | Description | Revision class |
|---|---|----------------|
| 2.2 Top-level Binary Stream | Added a bit table for the top-level binary stream, replaced the table in section. | Minor |
| 2.5 Metadata | Added a bit table for Metadata, replaced the table in the section. | Minor |

7 Index

A

[Applicability](#) 6

B

Binary streams

[Metadata](#) 10
[Metadata Content](#) 14
[Metadata XML](#) 11
[Package Parts](#) 9
[Permission Bindings](#) 14
[Permissions](#) 10
[top-level](#) 7

C

[Change tracking](#) 21
[Common data types and fields](#) 7

D

[Data types and fields - common](#) 7

Details

[common data types and fields](#) 7
[embedded contents part](#) 10
[Metadata binary stream](#) 10
[Metadata Content binary stream](#) 14
[Metadata XML binary stream](#) 11
[Package Parts binary stream](#) 9
[package.xml part](#) 9
[Permission Bindings binary stream](#) 14
[Permissions binary stream](#) 10
[root element](#) 7
[section1.m part](#) 10
[top-level binary stream](#) 7

E

Elements

[root](#) 7

[Embedded contents part](#) 10

[Examples](#) 16

[Metadata XML](#) 17
[Package.xml](#) 16
[Permissions XML](#) 17
[Root Element](#) 16
[Section1.m](#) 17

F

[Fields - security index](#) 19
[Fields - vendor-extensible](#) 6

G

[Glossary](#) 4

I

[Implementer - security considerations](#) 19

[Index of security fields](#) 19

[Informative references](#) 5

[Introduction](#) 4

L

[Localization](#) 6

M

[Metadata binary stream](#) 10
[Metadata Content binary stream](#) 14
[Metadata XML example](#) 17
[Metadata.xml binary stream](#) 11

N

[Normative references](#) 5

O

[Overview \(synopsis\)](#) 5

P

[Package Parts binary stream](#) 9

[Package.xml example](#) 16

[package.xml part](#) 9

Parts

[embedded contents](#) 10

[package.xml](#) 9

[section1.m](#) 10

[Permission Bindings binary stream](#) 14

[Permissions binary stream](#) 10

[Permissions XML example](#) 17

[Product behavior](#) 20

R

[References](#) 5

[informative](#) 5

[normative](#) 5

[Relationship to protocols and other structures](#) 5

[Root element](#) 7

[Root Element example](#) 16

S

[Section1.m example](#) 17

[section1.m part](#) 10

Security

[field index](#) 19

[implementer considerations](#) 19

Structures

[Metadata binary stream](#) 10

[overview](#) 7

[Package Parts binary stream](#) 9

[Permission Bindings binary stream](#) 14

[Permissions binary stream](#) 10

[root element](#) 7

[top-level binary stream](#) 7

T

[Top-level binary stream](#) 7
[Tracking changes](#) 21

V

[Vendor-extensible fields](#) 6
[Versioning](#) 6