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OASIS Standard incorporating Draft 01 of Errata 03

10 March 2016

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Technical Committee:

OASIS Open Data Protocol (OData) TC

Chairs:

Ralf Handl (ralf.handl@sap.com), SAP SE
Ram Jeyaraman (Ram.Jeyaraman@microsoft.com), Microsoft

Editors:

Ralf Handl (ralf.handl@sap.com), SAP SE
Michael Pizzo (mikep@microsoft.com), Microsoft
Mark Biamonte (mark.biamonte@progress.com), Progress Software

Additional artifacts:

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- *OData JSON Format Version 4.0 Plus Errata 03*. Edited by Ralf Handl, Michael Pizzo, and Mark Biamonte. 10 March 2016 OASIS Standard incorporating Draft 01 of Errata 03.

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http://docs.oasis-open.org/odata/odata-json-format/v4.0/errata03/csd01/odata-json-format-v4.0-errata03-csd01-complete.html.

Related work:

This specification is related to:

- *OData Version 4.0*. OASIS Standard. Multi-part Work Product that includes:
  - *OData Version 4.0. Part 1: Protocol*. http://docs.oasis-open.org/odata/odata/v4.0/os/part1-protocol/odata-v4.0-os-part1-protocol.html.
  - *OData Version 4.0. Part 2: URL Conventions*. http://docs.oasis-open.org/odata/odata/v4.0/os/part2-url-conventions/odata-v4.0-os-part2-url-conventions.html.
  - *OData Version 4.0. Part 3: Common Schema Definition Language (CSDL)*. http://docs.oasis-open.org/odata/odata/v4.0/os/part3-csdl/odata-v4.0-os-part3-csdl.html.
  - ABNF components: http://docs.oasis-open.org/odata/odata/v4.0/os/abnf/.
  - Vocabulary components: http://docs.oasis-open.org/odata/odata/v4.0/os/vocabularies/.
  - XML schemas: http://docs.oasis-open.org/odata/odata/v4.0/os/schemas/.
  - OData Metadata Service Entity Model: http://docs.oasis-open.org/odata/odata/v4.0/os/models/MetadataService.edmx.
- *OData Atom Format Version 4.0*. Edited by Martin Zurmuehl, Michael Pizzo, and Ralf Handl. Latest version: http://docs.oasis-open.org/odata/odata-atom-format/v4.0/odata-atom-format-v4.0.html.

Abstract:

The Open Data Protocol (OData) for representing and interacting with structured content is comprised of a set of specifications. The core specification for the protocol is in OData Version 4.0 Part 1: Protocol; this document extends the former by defining representations for OData requests and responses using a JSON format.

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TC members should send comments on this specification to the TC's email list. Others should send comments to the TC's public comment list, after subscribing to it by following the instructions at the "Send A Comment" button on the TC's web page at https://www.oasis-open.org/committees/odata/.

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Table of Contents

1 Introduction 6
1.1 Terminology 6
1.2 Normative References 6
1.3 Typographical Conventions 7
2 JSON Format Design 8
3 Requesting the JSON Format 9
3.1 Controlling the Amount of Control Information in Responses 9
3.1.1 `odata.metadata=minimal` 9
3.1.2 `odata.metadata=full` 10
3.1.3 `odata.metadata=none` 10
3.2 Controlling the Representation of Numbers 11
4 Common Characteristics 12
4.1 Header `Content-Type` 12
4.2 Message Body 12
4.3 Relative URLs 12
4.4 Payload Ordering Constraints 13
4.5 Control Information 14
4.5.1 Annotation `odata.context` 14
4.5.2 Annotation `odata.metadataEtag` 14
4.5.3 Annotation `odata.type` 14
4.5.4 Annotation `odata.count` 15
4.5.5 Annotation `odata.nextLink` 15
4.5.6 Annotation `odata.deltaLink` 15
4.5.7 Annotation `odata.id` 16
4.5.8 Annotation `odata.editLink` and `odata.readLink` 16
4.5.9 Annotation `odata.etag` 17
4.5.10 Annotation `odata.navigationLink` and `odata.associationLink` 17
4.5.11 Annotation `odata.media*` 17
5 Service Document 19
6 Entity 21
7 Structural Property 22
7.1 Primitive Value 22
7.2 Complex Value 23
7.3 Collection of Primitive Values 23
7.4 Collection of Complex Values 23
8 Navigation Property 25
8.1 Navigation Link 25
8.2 Association Link 25
8.3 Expanded Navigation Property 25
8.4 Deep Insert 26
8.5 Bind Operation 26
9 Stream Property 28

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10 Media Entity 29
11 Individual Property or Operation Response 30
12 Collection of Entities 31
13 Entity Reference 32
14 Delta Response 33
14.1 Added/Changed Entity 34
14.2 Deleted Entity 34
14.3 Added Link 34
14.4 Deleted Link 35
15 Bound Function 36
16 Bound Action 37
17 Action Invocation 38
18 Instance Annotations 39
18.1 Annotate a JSON Object 39
18.2 Annotate a JSON Array or Primitive 40
19 Error Response 41
20 Extensibility 42
21 Security Considerations 43
22 Conformance 44
Appendix A. Acknowledgments 45
Appendix B. Revision History 46

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1 Introduction

The OData protocol is comprised of a set of specifications for representing and interacting with structured content. The core specification for the protocol is in **[OData-Protocol]**; this document is an extension of the core protocol. This document defines representations for the OData requests and responses using the JavaScript Object Notation (JSON), see **[RFC7159]**.

An OData JSON payload may represent:

a single primitive value

a collection of primitive values

a single complex type value

a collection of complex type values

a single entity or entity reference

a collection of entities or entity references

a collection of changes

a service document describing the top-level resources exposed by the service

an error.

1.1 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in **[RFC2119]**.

1.2 Normative References

[GeoJSON] Howard Butler, Martin Daly, Alan Doyle, Sean Gillies, Tim Schaub and Stefan Drees, "The GeoJSON Format" draft-butler-geojson-~~02, 15 March~~04, 05 August 2014. http://tools.ietf.org/html/draft-butler-geojson-~~02~~04.

[I-JSON] Bray, T., Ed., "The I-JSON Message Format~~" draft-bray-i-json-01, 06 January 2014.~~", RFC7493, March 2015. ~~http://tools.ietf.org/html/draft-bray-i-json-01~~https://tools.ietf.org/html/rfc7493.

[OData-ABNF] *OData ABNF Construction Rules Version 4.0*.
See link in “Related work” section on cover page.

[OData-CSDL] OData Version 4.0 Part 3: Common Schema Definition Language (CSDL).
See link in “Related work” section on cover page.

[OData-Protocol] *OData Version 4.0 Part 1: Protocol*.
See link in “Related work” section on cover page.

[OData-URL] *OData Version 4.0 Part 2: URL Conventions*.
See link in "Related work" section on cover page.

[OData-VocCap] *OData Capabilities Vocabulary.*
See link in "Related work" section on cover page.

[RFC2119] Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. http://www.ietf.org/rfc/rfc2119.txt.

[RFC3986] Berners-Lee, T., Fielding, R., and L. Masinter, “Uniform Resource Identifier (URI): Generic Syntax”, IETF RFC3986, January 2005.
http://www.ietf.org/rfc/rfc3986.txt.

[RFC3987] Duerst, M. and, M. Suignard, “Internationalized Resource Identifiers (IRIs)”, RFC 3987, January 2005. http://www.ietf.org/rfc/rfc3987.txt.

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[RFC7159] Bray, T., Ed., “The JavaScript Object Notation (JSON) Data Interchange Format”, RFC 7159, March 2014. http://tools.ietf.org/html/rfc7159.

[RFC5646] Phillips, A., Ed., and M. Davis, Ed., “Tags for Identifying Languages”, BCP 47, RFC 5646, September 2009. http://tools.ietf.org/html/rfc5646.

[ECMAScript] *ECMAScript Language Specification Edition 5,1*. June 2011. Standard ECMA-262. http://www.ecma-international.org/publications/standards/Ecma-262.htm.

1.3 Typographical Conventions

Keywords defined by this specification use this `monospaced` font.

```
Normative source code uses this paragraph style.
```

Some sections of this specification are illustrated with non-normative examples.

Example 1: text describing an example uses this paragraph style

```
Non-normative examples use this paragraph style.
```

All examples in this document are non-normative and informative only.

All other text is normative unless otherwise labeled.

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2 JSON Format Design

JSON, as described in **[RFC7159]**, defines a text format for serializing structured data. Objects are serialized as an unordered collection of name-/value pairs.

JSON does not define any semantics around the name/value pairs that make up an object, nor does it define an extensibility mechanism for adding control information to a payload.

OData's JSON format extends JSON by defining general conventions for name-/value pairs that annotate a JSON object, property or array. OData defines a set of canonical annotations for control information such as ids, types, and links, and custom annotations MAY be used to add domain-specific information to the payload.

A key feature of OData's JSON format is to allow omitting predictable parts of the wire format from the actual payload. To reconstitute this data on the receiving end, expressions are used to compute missing links, type information, and other control data. These expressions (together with the data on the wire) can be used by the client to compute predictable payload pieces as if they had been included on the wire directly.

Annotations are used in JSON to capture control information that cannot be predicted (e.g., the next link of a collection) as well as a mechanism to provide values where a computed value would be wrong (e.g., if the media read link of one particular entity does not follow the standard URL conventions). Computing values from metadata expressions is compute intensive and some clients might opt for a larger payload size to avoid computational complexity; to accommodate for this the `Accept` header allows the client to control the amount of control information added to the response.

To optimize streaming scenarios, there are a few restrictions that MAY be imposed on the sequence in which name/value pairs appear within JSON objects. For details on the ordering requirements see Payload Ordering Constraints.

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3 Requesting the JSON Format

The OData JSON format can be requested using the `$format` query option in the request URL with the MIME type `application/json`, optionally followed by format parameters, or the case-insensitive abbreviation `json` which MUST NOT be followed by format parameters.

Alternatively, this format can be requested using the `Accept` header with the MIME type `application/json`, optionally followed by format parameters.

If specified, `$format` overrides any value specified in the `Accept` header.

Possible format parameters are:

- `odata.metadata`
- `IEEE754Compatible`
- `ExponentialDecimals`
- `odata.streaming`

The names and values of these format parameters are case-insensitive.

Services SHOULD advertise the supported MIME types by annotating the entity container with the term `Capabilities.SupportedFormats` defined in **[OData-VocCap]**, listing all available formats and combinations of supported format parameters.

3.1 Controlling the Amount of Control Information in Responses

The amount of control information needed (or desired) in the payload depends on the client application and device. The `odata.metadata` parameter can be applied to the `Accept` header of an OData request to influence how much control information will be included in the response.

Other `Accept` header parameters (e.g., `odata.streaming`) are orthogonal to the `odata.metadata` parameter and are therefore not mentioned in this section.

If a client prefers a very small wire size and is intelligent enough to compute data using metadata expressions, the `Accept` header should include `odata.metadata=minimal`. If computation is more critical than wire size or the client is incapable of computing control information, `odata.metadata=full` directs the service to inline the control information that normally would be computed from metadata expressions in the payload. `odata.metadata=none` is an option for clients that have out-of-band knowledge or don't require control information.

In addition the client may use the `odata.include-annotations` preference in the `Prefer` header to request additional control information. Services supporting this MUST NOT omit control information required by the chosen `odata.metadata` parameter, and services MUST NOT exclude the `odata.nextLink`, `odata.deltaLink`, and `odata.count` if they are required by the response type.

3.1.1 `odata.metadata=minimal`

The `odata.metadata=minimal` format parameter indicates that the service SHOULD remove computable control information from the payload wherever possible. This is the default value for the `odata.metadata` parameter and will be assumed if no other value is specified in the `Accept` header or `$format` query option. The response payload MUST contain at least the following common annotations:

`odata.context`: the root context URL of the payload and the context URL for any deleted entries or added or deleted links in a delta response, or for entities or entity collections whose set cannot be determined from the root context URL

- ~~`odata.metadataEtag`: the ETag of the metadata document as applicable~~

`odata.etag`: the ETag of the entity, as appropriate

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odata.count: the total count of a collection of entities or collection of entity references, if requested

odata.nextLink: the next link of a collection with partial results

odata.deltaLink: the delta link for obtaining changes to the result, if requested

In addition, odata annotations MUST appear in the payload for cases where actual values are not the same as the computed values and MAY appear otherwise. When odata annotations appear in the payload, they are treated as exceptions to the computed values.

Media entities and stream properties MAY in addition contain the following annotations:

odata.mediaEtag: the ETag of the stream, as appropriate

odata.mediaContentType: the content type of the stream

3.1.2 odata.metadata=full

The odata.metadata=full format parameter indicates that the service MUST include all control information explicitly in the payload.

The full list of annotations that may appear in an odata.metadata=full response is as follows:

odata.context: the context URL for a collection, entity, primitive value, or service document.

odata.count: the total count of a collection of entities or collection of entity references, if requested.

odata.nextLink: the next link of a collection with partial results

odata.deltaLink: the delta link for obtaining changes to the result, if requested

odata.id: the ID of the entity

odata.etag: the ETag of the entity

odata.readLink: the link used to read the entity, if the edit link cannot be used to read the entity

odata.editLink: the link used to edit/update the entity, if the entity is updatable and the odata.id does not represent a URL that can be used to edit the entity

odata.navigationLink: the link used to retrieve the values of a navigation property

odata.associationLink: the link used to describe the relationship between this entity and related entities

odata.type: the type of the containing object or targeted property if the type of the object or targeted property cannot be heuristically determined

Media entities and stream properties may in addition contain the following annotations:

odata.mediaReadLink: the link used to read the stream

odata.mediaEditLink: the link used to edit/update the stream

odata.mediaEtag: the ETag of the stream, as appropriate

odata.mediaContentType: the content type of the stream

3.1.3 odata.metadata=none

The odata.metadata=none format parameter indicates that the service SHOULD omit control information other than odata.nextLink and odata.count. These annotations MUST continue to be included, as applicable, even in the odata.metadata=none case.

It is not valid to specify odata.metadata=none on a delta request.

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3.2 Controlling the Representation of Numbers

The `IEEE754Compatible=true` format parameter indicates that the service MUST serialize `Edm.Int64` and `Edm.Decimal` numbers (including the `odata.count`, if requested) as strings. This is in conformance with **[I-JSON]**.

If not specified, or specified as `IEEE754Compatible=false`, all numbers MUST be serialized as JSON numbers.

This enables support for JavaScript numbers that are defined to be 64-bit binary format IEEE 754 values **[ECMAScript]** (see section 4.3.1.9) resulting in integers losing precision past 15 digits, and decimals losing precision due to the conversion from base 10 to base 2.

OData JSON payloads that format `Edm.Int64` and `Edm.Decimal` values as strings MUST specify this format parameter in the media type returned in the `Content-Type` header.

The `ExponentialDecimals=true` format parameter indicates that the service MAY serialize `Edm.Decimal` numbers (including the `odata.count`, if requested) in exponential notation (e.g. `1e-6` instead of `0.000001`).

The sender of a request MUST specify `ExponentialDecimals=true` in the `Content-Type` header if the request body contains `Edm.Decimal` values in exponential notation.

If not specified, or specified as `ExponentialDecimals=false`, all `Edm.Decimal` values MUST be serialized in long notation, using only an optional sign, digits, and an optional decimal point followed by digits.

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4 Common Characteristics

This section describes common characteristics of the representation for OData values in JSON. A request or response body consists of several parts. It contains OData values as part of a larger document. Requests and responses are structured almost identical; the few existing differences will be explicitly called out in the respective subsections.

4.1 Header `Content-Type`

Requests and responses with a JSON message body MUST have a `Content-Type` header value of `application/json`.

Requests MAY add the `charset` parameter to the content type. Allowed values are `UTF-8`, `UTF-16`, and `UTF-32`. If no charset parameter is present, `UTF-8` MUST be assumed.

Responses MUST include the `odata.metadata` parameter to specify the amount of metadata included in the response.

Responses MUST include the `IEEE754Compatible` parameter if `Edm.Int64` and `Edm.Decimal` numbers are represented as strings.

Requests and responses MAY add the `odata.streaming` parameter with a value of `true` or `false`, see section Payload Ordering Constraints.

4.2 Message Body

Each message body is represented as a single JSON object. This object is either the representation of an entity, an entity reference or a complex type instance, or it contains a name/value pair whose name MUST be `value` and whose value is the correct representation for a primitive value, a collection of primitive values, a collection of complex values, a collection of entities, or a collection of objects that represent changes to a previous result.

Client libraries MUST retain the order of objects within an array in JSON responses.

4.3 Relative URLs

URLs present in a payload (whether request or response) MAY be represented as relative URLs.

Relative URLs, other than those in `odata.type`, are relative to their base URL, which is

- the context URL of the same JSON object, if one exists, otherwise
- the context URL of the enclosing object, if one exists, otherwise
- the context URL of the next enclosing object, if one exists, etc. until the document root, otherwise
- the request URL.

For context URLs these rules apply starting with the second bullet point.

Within the `odata.type` annotation, relative URLs are relative to the base type URL, which is

- the `odata.type` of the enclosing object, if one exists, otherwise
- the `odata.type` of the next enclosing object, if one exists, etc. until the document root, otherwise
- the context URL of the document root, if one exists, otherwise
- the request URL.

Processors expanding the URLs MUST use normal URL expansion rules as defined in **RFC3986**. This means that if the base URL is a context URL, the part starting with `$metadata#` is ignored when resolving the relative URL.

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Clients that receive relative URLs in response payloads SHOULD use the same relative URLs, where appropriate, in request payloads (such as bind operations and batch requests) and in system query options (such as `$id`).

Example 2:

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  ...
  "@odata.editLink": "Customers('ALFKI')",
  ...
  "Orders@odata.navigationLink": "Customers('ALFKI')/Orders",
  ...
}
```

The resulting absolute URLs are `http://host/service/Customers('ALFKI')` and `http://host/service/Customers('ALFKI')/Orders`.

4.4 Payload Ordering Constraints

Ordering constraints MAY be imposed on the JSON payload in order to support streaming scenarios. These ordering constraints MUST only be assumed if explicitly specified as some clients (and services) might not be able to control, or might not care about, the order of the JSON properties in the payload.

Clients can request that a JSON response conform to these ordering constraints by specifying a media type of `application/json` with the `odata.streaming=true` parameter in the `Accept` header or `$format` query option. Services MUST return `406 Not Acceptable` if the client only requests streaming and the service does not support it.

Clients may specify the `odata.streaming=true` parameter in the `Content-Type` header of requests to indicate that the request body follows the payload ordering constraints. In the absence of this parameter, the service must assume that the JSON properties in the request are unordered.

Processors MUST only assume streaming support if it is explicitly indicated in the `Content-Type` header via the `odata.streaming=true` parameter.

Example 3: a payload with

```
Content-Type: application/json;odata.metadata=minimal;odata.streaming=true
```

can be assumed to support streaming, whereas a payload with

```
Content-Type: application/json;odata.metadata=minimal
```

cannot be assumed to support streaming.

JSON producers are encouraged to follow the payload ordering constraints whenever possible (and include the `odata.streaming=true` content type parameter) to support the maximum set of client scenarios.

To support streaming scenarios the following payload ordering constraints have to be met:

If present, the `odata.context` annotation MUST be the first property in the JSON object.

The `odata.type` annotation, if present, MUST appear next in the JSON object.

The `odata.id` and `odata.etag` annotations MUST appear before any property or property annotation.

All annotations for a structural or navigation property MUST appear as a group immediately before the property they annotate. The one exception is the `odata.nextLink` annotation of an expanded collection which MAY appear after the navigation property it annotates.

All other `odata` annotations can appear anywhere in the payload as long as they do not violate any of the above rules.

Annotations for navigation properties MUST appear after all structural properties.

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4.5 Control Information

In addition to the “pure data” a message body MAY contain control information that is represented as annotations whose names start with `odata` followed by a dot.

In some cases control information is required in request payloads; this is called out in the following subsections.

Receivers that encounter unknown annotations in any namespace, including the `odata` namespace, MUST NOT stop processing and MUST NOT signal an error.

4.5.1 Annotation `odata.context`

The `odata.context` annotation returns the context URL (see **[OData-Protocol]**) for the payload. This URL can be absolute or relative.

The `odata.context` annotation is not returned if `odata.metadata=none` is requested. Otherwise it MUST be the first property of any JSON response.

The `odata.context` annotation MUST also be included in requests and responses for entities whose entity set cannot be determined from the context URL of the collection.

For more information on the format of the context URL, see **[OData-Protocol]**.

Request payloads MAY include a context URL as a base URL for relative URLs in the request payload.

Example 4:

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  "@odata.metadataEtag": "W/\"A1FF3E230954908F\"",
  ...
}
```

4.5.2 Annotation `odata.metadataEtag`

The `odata.metadataEtag` annotation MAY appear in a response in order to specify the entity tag (ETag) that can be used to determine the version of the metadata of the response. If an ETag is returned when requesting the metadata document, then the service SHOULD set the `odata.metadataEtag` annotation to the metadata document's ETag in all responses when using `odata.metadata=minimal` or `odata.metadata=full`. If no ETag is returned when requesting the metadata document, then the service SHOULD NOT set the `odata.metadataEtag` annotation in any responses.

For details on how ETags are used, see **[OData-Protocol]**.

4.5.3 Annotation `odata.type`

The `odata.type` annotation specifies the type of a JSON object or name/value pair. Its value is a URI that identifies the type of the property or object. For built-in primitive types the value is the unqualified name of the primitive type, specified as a URI fragment. For all other types, the URI may be absolute or relative to the `odata.type` of the containing object. The root `odata.type` may be absolute or relative to the root context URL.

For non-built in primitive types, the URI contains the namespace-qualified or alias-qualified type, specified as a URI fragment. For properties that represent a collection of values, the fragment is the namespace-qualified or alias-qualified element type enclosed in parentheses and prefixed with `Collection`. The namespace or alias MUST be defined or the namespace referenced in the metadata document of the service, see **[OData-CSDL]**.

The `odata.type` annotation MUST appear in requests and in responses with minimal or full metadata, if the type cannot be heuristically determined, as described below, and one of the following is true:

The type is derived from the type specified for the (collection of) entities or (collection of) complex type instances, or

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The type is for a property whose type is not declared in `$metadata`.

The following heuristics are used to determine the primitive type of a dynamic property in the absence of the `odata.type` annotation:

Boolean values have a first-class representation in JSON and do not need any additional annotations.

Numeric values have a first-class representation in JSON but are not further distinguished, so they include an `odata.type` annotation unless their type is `Double`.

The special floating-point values `NaN`, `INF`, and `-INF` are serialized as strings and MUST have an `odata.type` annotation to specify the numeric type.

String values do have a first class representation in JSON, but there is an obvious collision: OData also encodes a number of other primitive types as strings, e.g. `DateTimeOffset`, `Int64` in the presence of the `IEEE754Compatible` format parameter etc. If a property appears in JSON string format, it should be treated as a string value unless the property is known (from the metadata document) to have a different type.

For more information on namespace- and alias-qualified names, see **[OData-CSDL]**.

Example 5: entity of type `Model.VipCustomer` defined in the metadata document of the same service with a dynamic property of type `Edm.Double` and a value of positive infinity

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  "@odata.type": "#Model.VipCustomer",
  "ID": 2,
  "DynamicLimit": "INF",
  "DynamicLimit@odata.type": "#Double",
  ...
}
```

Example 6: entity of type `Model.VipCustomer` defined in the metadata document of a different service

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  "@odata.type": "http://host/alternate/$metadata#Model.VipCustomer",
  "ID": 2,
  ...
}
```

4.5.4 Annotation `odata.count`

The `odata.count` annotation occurs only in responses and can annotate any ~~collection of entities or collection of entity references.~~collection, see **[OData-Protocol]** section 11.2.5.5 System Query Option `$count`. Its value is an `Edm.Int64` value corresponding to the total count of members in the collection represented by the request.

4.5.5 Annotation `odata.nextLink`

The `odata.nextLink` annotation indicates that a response is only a subset of the requested collection ~~of entities or collection of entity references.~~. It contains a URL that allows retrieving the next subset of the requested collection.

This annotation can also be applied to expanded to-many navigation properties.

4.5.6 Annotation `odata.deltaLink`

The `odata.deltaLink` annotation contains a URL that can be used to retrieve changes to the current set of results. The `odata.deltaLink` annotation MUST only appear on the last page of results. A page of results MUST NOT have both an `odata.deltaLink` annotation and an `odata.nextLink` annotation.

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4.5.7 Annotation odata.id

The odata.id annotation contains the entity-id; see **[OData-Protocol]**. By convention the entity-id is identical to the canonical URL of the entity, as defined in **[OData-URL]**.

The odata.id annotation MUST appear in responses if odata.metadata=full is requested, or if odata.metadata=minimal is requested and any of the entity's key fields are omitted from the response *or* the entity-id is not identical to the canonical URL of the entity after

- IRI-to-URI conversion as defined in **[RFC3987]**,
- relative resolution as defined in section 5.2 of **[RFC3986]**, and
- percent-encoding normalization as defined in section 6 of **[RFC3986]**.

Note that the entity-id MUST be invariant across languages, so if key values are language dependent then the odata.id MUST be included if it does not match convention for the localized key values. If the odata.id is represented, it MAY be a relative URL.

If the entity is transient (i.e. cannot be read or updated), the odata.id annotation MUST appear and have the null value.

The odata.id annotation MUST NOT appear for a collection. Its meaning in this context is reserved for future versions of this specification.

Entities with odata.id equal to null cannot be compared to other entities, reread, or updated. If odata.metadata=minimal is specified and the odata.id is not present in the entity then the canonical URL MUST be used as the entity-id.

4.5.8 Annotation odata.editLink and odata.readLink

The odata.editLink annotation contains the edit URL of the entity; see **[OData-Protocol]**.

The odata.readLink annotation contains the read URL of the entity or collection; see **[OData-Protocol]**.

The odata.editLink and odata.readLink annotations are ignored in request payloads and not written in responses if odata.metadata=none is requested.

The default value of both the edit URL and read URL is the entity's entity-id appended with a cast segment to the type of the entity if its type is derived from the declared type of the entity set. If neither the odata.editLink nor the odata.readLink annotation is present in an entity, the client uses this default value for the edit URL.

For updatable entities:

The odata.editLink annotation is written if odata.metadata=full is requested or if odata.metadata=minimal is requested and the edit URL differs from the default value of the edit URL.

The odata.readLink annotation is written if the read URL is different from the edit URL. If no odata.readLink annotation is present, the read URL is identical to the edit URL.

For read-only entities:

The odata.readLink annotation is written if odata.metadata=full is requested or if odata.metadata=minimal is requested and its value differs from the default value of the read URL.

The odata.readLink annotation may also be written if odata.metadata=minimal is specified in order to signal that an individual entity is read-only.

For collections:

The odata.readLink annotation, if written, MUST be the request URL that produced the collection.

The odata.editLink annotation MUST NOT be written as its meaning in this context is reserved for future versions of this specification.

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4.5.9 Annotation odata.etag

The odata.etag annotation MAY be applied to an entity in a response. The value of the annotation is an entity tag (ETag) which is an opaque string value that can be used in a subsequent request to determine if the value of the entity has changed.

For details on how ETags are used, see **[OData-Protocol]**.

The odata.etag annotation is ignored in request payloads and not written in responses if odata.metadata=none is requested.

4.5.10 Annotation odata.navigationLink and odata.associationLink

The odata.navigationLink annotation in a response contains a *navigation URL* that can be used to retrieve an entity or collection of entities related to the current entity via a navigation property.

The *default computed value of a navigation URL* is the value of the read URL appended with a segment containing the name of the navigation property. The service MAY omit the odata.navigationLink annotation if odata.metadata=minimal has been specified on the request and the navigation link matches this computed value.

The odata.associationLink annotation in a response contains an *association URL* that can be used to retrieve a reference to an entity or a collection of references to entities related to the current entity via a navigation property.

The *default computed value of an association URL* is the value of the navigation URL appended with /$ref. The service MAY omit the odata.associationLink annotation if the association link matches this computed value.

The odata.navigationLink and odata.associationLink annotations are ignored in request payloads and not written in responses if odata.metadata=none is requested.

4.5.11 Annotation odata.media*

For media entities and stream properties at least one of the annotations odata.mediaEditLink and odata.mediaReadLink MUST be included in responses if they don't follow standard URL conventions as defined in **OData-URL** or if odata.metadata=full is requested.

The odata.mediaEditLink annotation contains a URL that can be used to update the binary stream associated with the media entity or stream property. It MUST be included for updatable media entities if it differs from the value of the odata.id, and for updatable stream properties if it differs from standard URL conventions.

The odata.mediaReadLink annotation contains a URL that can be used to read the binary stream associated with the media entity or stream property. It MUST be included if its value differs from the value of the associated odata.mediaEditLink, if present, or the value of the odata.id for media entities if the associated odata.mediaEditLink is not present.

The odata.mediaContentType annotation MAY be included; its value SHOULD match the content type of the binary stream represented by the odata.mediaReadLink URL. This is only a hint; the actual content type will be included in a header when the resource is requested.

The odata.mediaEtag annotation MAY be included; its value is the ETag of the binary stream represented by this media entity or stream property.

The odata.media* annotations are ignored in request payloads and not written in responses if odata.metadata=none is requested.

Example 7:

```
{
  "@odata.context": "http://host/service/$metadata#Employees/$entity",
  "@odata.mediaReadLink": "Employees(1)/$value",
  "@odata.mediaContentType": "image/jpeg",
```

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```
  "EmployeeID": 1,
  ...
}
```

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5 Service Document

A service document in JSON is represented as a single JSON object with at least two properties; `odata.context` and `value`.

The value of the `odata.context` property MUST be the URL of the metadata document, without any fragment part.

The value of the `value` property MUST be a JSON Array containing one element for each entity set and function import with an explicit or default value of `true` for the attribute `IncludeInServiceDocument` and each singleton exposed by the service, see **[OData-CSDL]**.

Each element MUST be a JSON object with at least two name/value pairs, one with name `name` containing the name of the entity set, function import, or singleton, and one with name `url` containing the URL of the entity set, which may be an absolute or a relative URL. It MAY contain a name/value pair with name `title` containing a human-readable, language-dependent title for the object.

JSON objects representing an entity set MAY contain an additional name/value pair with name `kind` and a value of `EntitySet`. If the `kind` name/value pair is not present, the object MUST represent an entity set.

JSON objects representing a function import MUST contain the `kind` name/value pair with a value of `FunctionImport`.

JSON objects representing a singleton MUST contain the `kind` name/value pair with a value of `Singleton`.

JSON objects representing a related service document MUST contain the `kind` name/value pair with a value of `ServiceDocument`.

Clients that encounter unknown values of the `kind` name/value pair not defined in this version of the specification MUST NOT stop processing and MUST NOT signal an error.

Service documents MAY contain annotations in any of its JSON objects. Services MUST NOT produce name/value pairs other than the ones explicitly defined in this section, and clients MUST ignore unknown name/value pairs.

Example 8:

```
{
  "@odata.context": "http://host/service/$metadata",
  "value": [
    {
      "name": "Orders",
      "kind": "EntitySet",
      "url":  "Orders"
    },
    {
      "name":  "OrderItems",
      "title": "Order Details",
      "url":   "OrderItems"
    },
    {
      "name":  "TopProducts",
      "title": "Best-Selling Products",
      "kind":  "FunctionImport",
      "url":   "TopProducts"
    },
    {
      "name":  "~~Contoso~~MainSupplier",
      "title": "~~Contoso Ltd.",~~Main Supplier",
      "kind":  "Singleton",
```

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```
      "url":   "~~Contoso~~MainSupplier"
    },
    {
      "name": "Human Resources",
      "kind": "ServiceDocument",
      "url":  "http://host/HR/"
    }
  ]
}
```

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6 Entity

An entity is serialized as a JSON object.

Each property to be transmitted is represented as a name/value pair within the object. The order properties appear within the object is considered insignificant.

An entity in a payload may be a complete entity, a projected entity (see *System Query Option* `$select` **[OData-Protocol]**), or a partial entity update (see *Update an Entity* in **[OData-Protocol]**).

An entity representation can be (modified and) round-tripped to the service directly. The context URL is used in requests only as a base for relative URLs.

Example 9: entity with `odata.metadata=minimal`

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  "ID": "ALFKI",
  "CompanyName": "Alfreds Futterkiste",
  "ContactName": "Maria Anders",
  "ContactTitle": "Sales Representative",
  "Phone": "030-0074321",
  "Fax": "030-0076545",
  "Address": {
    "Street": "Obere Str. 57",
    "City": "Berlin",
    "Region": null,
    "PostalCode": "D-12209"
  }
}
```

Example 10: entity with `odata.metadata=full`

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  "@odata.id": "Customers('ALFKI')",
  "@odata.etag": "W/\"MjAxMy0wNS0yN1QxMTo1OFo=\"",
  "@odata.editLink": "Customers('ALFKI')",
  "ID": "ALFKI",
  "CompanyName": "Alfreds Futterkiste",
  "ContactName": "Maria Anders",
  "ContactTitle": "Sales Representative",
  "Phone": "030-0074321",
  "Fax": "030-0076545",
  "Address": {
    "Street": "Obere Str. 57",
    "City": "Berlin",
    "Region": null,
    "PostalCode": "D-12209",
    "Country@odata.associationLink":"Customers('ALFKI')/Address/Country/$ref",
    "Country@odata.navigationLink": "Customers('ALFKI')/Address/Country"
  },
  "Orders@odata.associationLink": "Customers('ALFKI')/Orders/$ref",
  "Orders@odata.navigationLink": "Customers('ALFKI')/Orders"
}
```

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7 Structural Property

A property within an entity or complex type instance is represented as a name/value pair. The name MUST be the name of the property; the value is represented depending on its type as a primitive value, a complex value, a collection of primitive values, or a collection of complex values.

7.1 Primitive Value

Primitive values are represented following the rules of **[RFC7159]**.

Null values are represented as the JSON literal `null`.

Values of type `Edm.Boolean` are represented as the JSON literals `true` and `false`

Values of types `Edm.Byte`, `Edm.SByte`, `Edm.Int16`, `Edm.Int32`, `Edm.Int64`, `Edm.Single`, `Edm.Double`, and `Edm.Decimal` are represented as JSON numbers, except for `NaN`, `INF`, and `-INF` which are represented as strings.

Values of type `Edm.String` are represented as JSON strings, using the JSON string escaping rules.

Values of type `Edm.Binary`, `Edm.Date`, `Edm.DateTimeOffset`, `Edm.Duration`, `Edm.Guid`, and `Edm.TimeOfDay` are represented as JSON strings whose content satisfies the rules `binaryValue`, `dateValue`, `dateTimeOffsetValue`, `durationValue`, `guidValue`, and `timeOfDayValue` respectively, in **[OData-ABNF]**.

~~Values of type `enumValue`~~ Enumeration values are represented as JSON strings ~~using~~whose content satisfies the rule `enumValue` in **[OData-ABNF]**. The preferred representation is the `enumerationMember`~~, defined in **[OData-ABNF]**, where~~. If no `enumerationMember` (or combination of named enumeration members) is available~~.~~, the `enumMemberValue` representation may be used.

Geography and geometry values are represented as geometry types as defined in **[GeoJSON]**, with the following modifications:

Keys SHOULD be ordered with type first, then coordinates, then any other keys

The `coordinates` member of a `LineString` can have zero or more positions

If the optional CRS object is present, it MUST be of type `name`, where the value of the `name` member of the contained `properties` object is an EPSG SRID legacy identifier.

Geography and geometry types have the same representation in a JSON payload. Whether the value represents a geography type or geometry type is inferred from its usage or specified using the `odata.type` annotation.

Example 11:

```
{
  "NullValue": null,
  "TrueValue": true,
  "FalseValue": false,
  "BinaryValue": "T0RhdGE",
  "IntegerValue": -128,
  "DoubleValue": 3.1415926535897931,
  "SingleValue": "INF",
  "DecimalValue": 34.95,
  "StringValue": "Say \"Hello\",\nthen go",
  "DateValue": "2012-12-03",
  "DateTimeOffsetValue": "2012-12-03T07:16:23Z",
  "DurationValue": "P12DT23H59M59.999999999999S",
  "TimeOfDayValue": "07:59:59.999",
  "GuidValue": "01234567-89ab-cdef-0123-456789abcdef",
  "Int64Value": 0,
```

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```
  "ColorEnumValue": "Yellow",
  "GeographyPoint": {"type": "Point","coordinates":[142.1,64.1]}
}
```

7.2 Complex Value

A complex value is represented as a single JSON object containing one name/value pair for each property that makes up the complex type. Each property value is formatted as appropriate for the type of the property.

It MAY have name/value pairs for instance annotations, including `odata` annotations.

Example 12:

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  ...
  "Address": {
    "Street": "Obere Str. 57",
    "City": "Berlin",
    "Region": null,
    "PostalCode": "D-12209"
  }
}
```

A complex value with no selected properties, or no defined properties (such as an empty open complex type or complex type with no structural properties) is represented as an empty JSON object.

7.3 Collection of Primitive Values

A collection of primitive values is represented as a JSON array; each element in the array is the representation of a primitive value. A JSON literal `null` represents a null value within the collection. An empty collection is represented as an empty array.

Example 13: partial collection of strings with next link

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  ...
  "EmailAddresses": [
    "Julie@Swansworth.com",
    "Julie.Swansworth@work.com"
  ],
  "EmailAddresses@odata.nextLink": "..."
}
```

7.4 Collection of Complex Values

A collection of complex values is represented as a JSON array; each element in the array is the representation of a complex value. A JSON literal `null` represents a null value within the collection. An empty collection is represented as an empty array.

Example 14: partial collection of complex values with next link

```
{
  "PhoneNumbers": [
    {
      "Number": "425-555-1212",
      "Type": "Home"
    },
    {
      "@odata.type": "#Model.CellPhoneNumber",
      "Number": "425-555-0178",
```

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```
      "Type": "Cell",
      "Carrier": "Sprint"
    }
  ],
  "PhoneNumbers@odata.nextLink": "..."
}
```

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8 Navigation Property

A navigation property is a reference from a source entity to zero or more related entities.

8.1 Navigation Link

The navigation link for a navigation property is represented as a name/value pair. The name is the name of the property, followed by `@odata.navigationLink`. The value is an absolute or relative URL that allows retrieving the related entity or collection of entities.

The navigation link for a navigation property is only represented if the client requests `odata.metadata=full` or the navigation link cannot be computed, e.g. if it is within a collection of complex type instances. If it is represented it MUST immediately precede the expanded navigation property if the latter is represented.

Example 15:

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  ...
  "Orders@odata.navigationLink": "Customers('ALFKI')/Orders",
  ...
}
```

8.2 Association Link

The association link for a navigation property is represented as a name/value pair. The name is the name of the property, followed by `@odata.associationLink`. The value is an absolute or relative URL that can be used to retrieve the reference or collection of references to the related entity or entities.

The association link for a navigation property is only represented if the client requests `odata.metadata=full` or the association link cannot be computed by appending `/$ref` to the navigation link. If it is represented, it MUST immediately precede the navigation link if the latter is represented, otherwise it MUST immediately precede the expanded navigation property if it is represented.

Example 16:

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  ...
  "Orders@odata.associationLink": "Customers('ALFKI')/Orders/$ref",
  ...
}
```

8.3 Expanded Navigation Property

An expanded navigation property is represented as a name/value pair where the name is the name of the navigation property, and the value is the representation of the related entity or collection of entities.

If at most one entity can be related, the value is the representation of the related entity, or `null` if no entity is currently related.

If a collection of entities can be related, it is represented as a JSON array. Each element is the representation of an entity or the representation of an entity reference. An empty collection of entities (one that contains no entities) is represented as an empty JSON array. The navigation property MAY be annotated with `odata.context`, `odata.count` or `odata.nextLink`. If a navigation property is expanded with the suffix `/$count`, only the `odata.count` annotation is represented.

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Example 17:

```
{
  "@odata.context": "http://host/service/$metadata#Customers/$entity",
  ...
  "Orders@odata.count": 42,
  "Orders": [ ... ],
  "Orders@odata.nextLink": "...",
  ...
}
```

8.4 Deep Insert

When inserting a new entity with a `POST` request, related new entities MAY be specified using the same representation as for an expanded navigation property.

Deep inserts are not allowed in update operations using `PUT` or `PATCH` requests.

Example 18: inserting a new order for a new customer with order items related to existing products:

```
{
  "ID": 11643,
  "Amount": 100,
  ...,
  "Customer": {
    "ID": "ANEWONE",
    ...
  },
  "Items": [
    {
      "Product@odata.bind": "Products(28)",
      "Quantity": 1,
       ...
    },
    {
      "Product@odata.bind": "Products(39)",
      "Quantity": 5,
      ...
    }
  ]
}
```

8.5 Bind Operation

When inserting or updating an entity, relationships of navigation properties MAY be inserted or updated via bind operations. A bind operation is encoded as a property annotation `odata.bind` on the navigation property it belongs to and has a single value for ~~singleton~~single-valued navigation properties or an array of values for collection navigation properties. For nullable single-valued navigation properties the value `null` may be used to remove the relationship.

The values are the ids of the related entities. They MAY be absolute or relative URLs.

For insert operations collection navigation property bind operations and deep insert operations can be combined. In this case, the bind operations MUST appear before the deep insert operations in the payload.

For update operations a bind operation on a collection navigation property adds additional relationships, it does not replace existing relationships, while bind operations on an entity navigation property update the relationship.

Example 19: assign an existing product to an existing category with a partial update request

```
PATCH http://host/service/Products(42) HTTP/1.1
```

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```
{
  "Category@odata.bind": "Categories(6)"
}
```

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9 Stream Property

An entity or complex type instance can have one or more stream properties. The actual stream data is not contained in the representation. Instead stream property data is read and edited via URLs. The value for a stream property contains the URLs for reading and editing the stream data along with other metadata for the stream.

The value of a stream property is represented as a set of `odata.media*` annotations.

Example 20:

```
{
  "@odata.context": "http://host/service/$metadata#Products/$entity",
  ...
  "Thumbnail@odata.mediaReadLink": "http://server/Thumbnail546.jpg",
  "Thumbnail@odata.mediaEditLink": "http://server/uploads/Thumbnail546.jpg",
  "Thumbnail@odata.mediaContentType": "image/jpeg",
  "Thumbnail@odata.mediaEtag": "W/\"####\"",
  ...
}
```

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10 Media Entity

Media entities are entities that describe a media resource, for example a photo. They are represented as entities that contain additional `odata.media*` annotations.

Example 21:

```
{
  "@odata.context": "http://host/service/$metadata#Employees/$entity",
  "@odata.mediaReadLink": "Employees(1)/$value",
  "@odata.mediaContentType": "image/jpeg",
  "ID": 1,
  ...
}
```

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11 Individual Property or Operation Response

An individual property or operation response is represented as a JSON object.

A single-valued property or operation response that has the `null` value does not have a representation; see **[OData-Protocol]**.

A property or operation response that is of a primitive type is represented as an object with a single name/value pair, whose name is `value` and whose value is a primitive value.

A property or operation response that is of complex type is represented as a complex value.

A property or operation response that is of a collection type is represented as an object with a single name/value pair whose name is `value`. Its value is the JSON representation of a collection of complex type values or collection of primitive values.

Example 22: primitive value

```
{
  "@odata.context": "http://host/service/$metadata#Edm.String",
  "value": "Pilar Ackerman"
}
```

Example 23: collection of primitive values

```
{
  "@odata.context": "http://host/service/$metadata#Collection(Edm.String)",
  "value": ["small", "medium", "extra large"]
}
```

Example 24: empty collection of primitive values

```
{
  "@odata.context": "http://host/service/$metadata#Collection(Edm.String)",
  "value": []
}
```

Example 25: complex value

```
{
  "@odata.context": "http://host/service/$metadata#Model.Address",
  "Street": "12345 Grant Street",
  "City": "Taft",
  "Region": "Ohio",
  "PostalCode": "OH 98052",
  "Country@odata.navigationLink": "Countries('US')"
}
```

Example 26: empty collection of complex values

```
{
  "@odata.context":"http://host/service/$metadata#Collection(Model.Address)",
  "value": []
}
```

Note: the context URL is optional in requests.

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12 Collection of Entities

A collection of entities is represented as a JSON object containing a name/value pair named `value`. It MAY contain `odata.context`, `odata.count`, `odata.nextLink`, or `odata.deltaLink` annotations.

If present, the `odata.context` annotation MUST be the first name/value pair in the response.

The `odata.count` name/value pair represents the number of entities in the collection. If present and the `odata.streaming=true` content type parameter is set, it MUST come before the `value` name/value pair. If the response represents a partial result, the `odata.count` name/value pair MUST appear in the first partial response, and it MAY appear in subsequent partial responses (in which case it may vary from response to response).

The value of the `value` name/value pair is a JSON array where each element is representation of an entity or a representation of an entity reference. An empty collection is represented as an empty JSON array.

Functions or actions that are bound to this collection of entities are advertised in the "wrapper object" in the same way as functions or actions are advertised in the object representing a single entity.

The `odata.nextLink` annotation MUST be included in a response that represents a partial result.

Example 27:

```
{
  "@odata.context": "...",
  "@odata.count": 37,
  "value": [
    { ... },
    { ... },
    { ... }
  ],
  "@odata.nextLink": "...?$skiptoken=342r89"
}
```

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13 Entity Reference

An entity reference (see **[OData-Protocol]**) MAY take the place of an entity instance in a JSON payload, based on the client request. It is serialized as a JSON object that MUST contain the id of the referenced entity and MAY contain the `odata.type`.

A collection of entity references is represented as a collection of entities, with entity reference representations instead of entity representations as items in the array value of the `value` name/value pair.

The outermost JSON object MUST contain an `odata.context` annotation and MAY contain `odata.count`, `odata.nextLink`, or `odata.deltaLink` annotations.

Example 28: entity reference to order 10643

```
{
  "@odata.context": "http://host/service/$metadata#$ref",
  "@odata.id": "Orders(10643)"
}
```

Example 29: collection of entity references

```
{
  "@odata.context": "http://host/service/$metadata#Collection($ref)",
  "value": [
    { "@odata.id": "Orders(10643)" },
    { "@odata.id": "Orders(10759)" }
  ]
}
```

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14 Delta Response

The non-format specific aspects of the delta handling are described in the section “Requesting Changes” in **[OData-Protocol]**.

Responses from a delta request are returned as a JSON object. The JSON object MUST contain an array-valued property named `value` containing all added, changed, or deleted entities, as well as added or deleted links between entities, and MAY contain additional, unchanged entities.

If the delta response contains a partial list of changes, it MUST include a next link for the client to retrieve the next set of changes.

The last page of a delta response SHOULD contain a delta link for retrieving subsequent changes once the current set of changes has been applied to the initial set.

If the response from the delta link contains an `odata.count` annotation, the returned number MUST include all added, changed, or deleted entities to be returned, as well as added or deleted links.

Example 30: delta response with five changes, in order of occurrence

1. *`ContactName` for customer 'BOTTM' was changed to "Susan Halvenstern"*
2. *Order 10643 was removed from customer 'ALFKI'*
3. *Order 10645 was added to customer 'BOTTM'*
4. *The shipping information for order 10643 was updated*
5. *Customer 'ANTON' was deleted*

```
{
  "@odata.context":"http://host/service/$metadata#Customers/$delta",
  "@odata.count":5,
  "value":
  [
    {
      "@odata.id":"Customers('BOTTM')'",
      "ContactName":"Susan Halvenstern"
    },
    {
      "@odata.context":"#Customers/$deletedLink",
      "source":"Customers('ALFKI')'",
      "relationship":"Orders",
      "target":"Orders(10643)"
    },
    {
      "@odata.context":"#Customers/$link",
      "source":"Customers('BOTTM')",
      "relationship":"Orders",
      "target":"Orders(10645)"
    },
    {
      "@odata.context":"#Orders/$entity",
      "@odata.id":"Orders(10643)",
      "ShippingAddress":{
        "Street":"23 Tsawassen Blvd.",
        "City":"Tsawassen",
        "Region":"BC",
        "PostalCode":"T2F 8M4"
      },
    },
    {
      "@odata.context":"#Customers/$deletedEntity",
      "id":"Customers('ANTON')",
      "reason":"deleted"
```

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```
    }
  ],
  "@odata.deltaLink": "Customers?$expand=Orders&$deltatoken=8015"
}
```

14.1 Added/Changed Entity

Added or changed entities within a delta response are represented as entities.

Added entities MUST include all available selected properties and MAY include additional, unselected properties. Collection-valued properties are treated as atomic values; any collection-valued properties returned from a delta request MUST contain all current values for that collection.

Changed entities MUST include all available selected properties that have changed and MAY include additional properties.

If a property of an entity is dependent upon the property of another entity within the expanded set of entities being tracked, then both the change to the dependent property as well as the change to the principle property or added/deleted link corresponding to the change to the dependent property are returned in the delta response.

Entities that are not part of the entity set specified by the context URL MUST include the `odata.context` annotation to specify the entity set of the entity, regardless of the specified `odata.metadata` value.

Entities include annotations for selected navigation links based on `odata.metadata` but MUST NOT include expanded navigation properties inline.

14.2 Deleted Entity

Deleted entities in JSON are returned as deleted-entity objects. Delta responses MUST contain a deleted-entity object for each deleted entity, including deleted expanded entities that are not related through a containment navigation property. The service MAY additionally include expanded entities related through a containment navigation property in which case it MUST include those in any returned count of enumerated changes.

The deleted-entity object MUST include the following properties, regardless of the specified `odata.metadata` value:

`odata.context` – the context URL fragment MUST be `#{entity-set}/$deletedEntity`, where `{entity-set}` is the entity set of the deleted entity

`id` – The id of the deleted entity (same as the odata.id returned or computed when calling GET on resource), which may be absolute or relative

The deleted-entity object MAY include the following optional property, regardless of the specified `odata.metadata` value:

`reason` – either `deleted`, if the entity was deleted (destroyed), or `changed` if the entity was removed from membership in the result (i.e., due to a data change).

14.3 Added Link

Links within a delta response are represented as link objects.

Delta responses MUST contain a link object for each added link that corresponds to a `$expand` path in the initial request.

The link object MUST include the following properties, regardless of the specified `odata.metadata` value:

`odata.context` – the context URL fragment MUST be `#{entity-set}/$link`, where `{entity-set}` is the entity set containing the source entity

`source` – The id of the entity from which the relationship is defined, which may be absolute or relative

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`relationship` – The name of the ~~relationship~~navigation property on the ~~parent~~source object

`target` – The id of the related entity, which may be absolute or relative

14.4 Deleted Link

Deleted links within a delta response are represented as deleted-link objects.

Delta responses MUST contain a deleted-link object for each deleted link that corresponds to a `$expand` path in the initial request, unless either of the following is true:

The `source` or `target` entity has been deleted

The maximum cardinality of the related entity is one and there is a subsequent link object that specifies the same `source` and `relationship`.

The deleted-link object MUST include the following properties, regardless of the specified `odata.metadata` value

`odata.context` – the context URL fragment MUST be `#{entity-set}/$deletedLink`, where `{entity-set}` is the entity set containing the source entity

`source` – The id of the entity from which the relationship is defined, which may be absolute or relative

`relationship` – The name of the ~~relationship~~navigation property on the ~~parent~~source object

`target` – The id of the related entity, which may be absolute or relative

Note: `target` is only necessary for multi-valued navigation properties, for single-valued navigation properties `source` and `relationship` are sufficient to describe the change. Clients should not require a value for `target` for single-valued navigation properties as it will become optional in future versions of this specification.

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15 Bound Function

A function that is bound to the current entity is advertised via a name/value pair where the name is a hash (#) character followed by the namespace- or alias-qualified name of the function. The namespace or alias MUST be defined or the namespace referenced in the metadata document of the service, see **[OData-CSDL]**.

Functions that are bound to a collection of entities are advertised in representations of that collection.

A function may have multiple overloads with different parameters. If function overloads exist that cannot be bound to the current entity type, the name SHOULD address a specific function overload by appending the parentheses-enclosed, comma-separated list of non-binding parameter names, see rule `qualifiedFunctionName` in **[OData-ABNF]**.

If `odata.metadata=full` is requested, each value object MUST have at least the two name/value pairs `title` and `target`. It MAY contain annotations. The order of the name/value pairs MUST be considered insignificant.

The `target` name/value pair contains a bound function or action URL. If the URL in the `target` name/value pair cannot be used to invoke all overloads for the function, then the function name MUST be distinguished by appending the parentheses-enclosed, comma-separated list of non-binding parameter names.

The `title` name/value pair contains the function or action title as a string.

If `odata.metadata=minimal` is requested, the `target` name/value pair MUST be included if its value differs from the canonical function or action URL.

Example 31: minimal representation of a function where all overloads are applicable

```
{
  "@odata.context": "http://host/service/$metadata#Employees/$entity",
  "#Model.RemainingVacation": {},
  ...
}
```

Example 32: full representation of a specific overload

```
{
  "@odata.context": "http://host/service/$metadata#Employees/$entity",
  "#Model.RemainingVacation(Year)": {
    "title": "Remaining vacation from year...",
    "target": "Employees(2)/RemainingVacation(Year=@Year)"
  },
  ...
}
```

Example 33: full representation in a collection

```
{
  "@odata.context": "http://host/service/$metadata#Employees",
  "#Model.RemainingVacation": {
    "title": "Remaining Vacation",
    "target": "Managers(22)/Employees/RemainingVacation"
  },
  "value": [ ... ]
}
```

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16 Bound Action

An action that is bound to the current entity is advertised via a name/value pair where the name is a hash (#) character followed by the namespace- or alias-qualified name of the action. The namespace or alias MUST be defined or the namespace referenced in the metadata document of the service, see **[OData-CSDL]**.

Actions that are bound to a collection of entities are advertised in representations of that collection.

If `odata.metadata=full` is requested, each value object MUST have at least the two name/value pairs `title` and `target`. It MAY contain annotations. The order of these name/value pairs MUST be considered insignificant.

The `target` name/value pair contains a bound function or action URL.

The `title` name/value pair contains the function or action title as a string.

If `odata.metadata=minimal` is requested, the `target` name/value pair MUST be included if its value differs from the canonical function or action URL.

Example 34: minimal representation in an entity

```
{
  "@odata.context": "http://host/service/$metadata#LeaveRequests/$entity",
  "#Model.Approval": {},
  ...
}
```

Example 35: full representation in an entity:

```
{
  "@odata.context": "http://host/service/$metadata#LeaveRequests/$entity",
  "#Model.Approval": {
    "title": "Approve Leave Request",
    "target": "LeaveRequests(2)/Approval"
  },
  ...
}
```

Example 36: full representation in a collection

```
{
  "@odata.context": "http://host/service/$metadata#LeaveRequests",
  "#Model.Approval": {
    "title": "Approve All Leave Requests",
    "target": "Managers(22)/Inbox/Approval"
  },
  "value": [ ... ]
}
```

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17 Action Invocation

Action parameter values are encoded in a single JSON object in the request body.

Each non-binding parameter value is encoded as a separate name/value pair in this JSON object. The name is the name of the parameter. The value is the parameter value in the JSON representation appropriate for its type.

Any parameter values not specified in the JSON object are assumed to have the `null` value.

Example 37:

```
{
  "param1": 42,
  "param2": {
    "Street": "One Microsoft Way",
    "Zip": 98052
  },
  "param3": [ 1, 42, 99 ],
  "param4": null
}
```

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18 Instance Annotations

Annotations are an extensibility mechanism that allows services and clients to include information other than the raw data in the request or response. Annotations are used to include control information in many payloads.

Annotations are name/value pairs that have ~~a dot (.) as part of the name. All annotations that start with `odata` are~~an at (`@`) and a dot (`.`) as part of the name. The part after the "at" sign (`@`) is the *annotation identifier*. It consists of the namespace or alias of the schema that defines the term, followed by a dot (`.`), followed by the name of the term, optionally followed by a hash (`#`) and a qualifier. The namespace or alias MUST be defined in the metadata document, see **[OData-CSDL]**.

The namespace or alias `odata` is reserved for future extensions of the protocol and format. Custom annotations are annotations that have a ~~non-empty prefix~~namespace or alias that is different from `odata`.

Annotations can be applied to any name/value pair in a JSON payload that represents a value of any type from the entity data model (see **[OData-CSDL]**).

~~*Example 38:*~~

```
{
  "@odata.context": "http://host/service/$metadata#Customers",
  "@com.contoso.customer.setkind": "VIPs",
  "value": [
    {
      "@com.contoso.display.highlight": true,
      "ID": "ALFKI",
      "CompanyName@com.contoso.display.style": { "title": true, "order": 1 },
      "CompanyName": "Alfreds Futterkiste",
      "Orders@com.contoso.display.style": { "order": 2 }
    }
  ]
}
```

Annotations are always expressed as name/value pairs. For entity data model constructs represented as JSON objects the annotation name/value pairs are placed within the object; for constructs represented as JSON arrays or primitives they are placed next to the annotated model construct.

Example 38:

```
{
  "@odata.context": "http://host/service/$metadata#Customers",
  "@com.example.customer.setkind": "VIPs",
  "value": [
    {
      "@com.example.display.highlight": true,
      "ID": "ALFKI",
      "CompanyName@com.example.display.style": { "title": true, "order": 1 },
      "CompanyName": "Alfreds Futterkiste",
      "Orders@com.example.display.style#simple": { "order": 2 }
    }
  ]
}
```

18.1 Annotate a JSON Object

When annotating a name/value pair for which the value is represented as a JSON object, each annotation is placed within the object and represented as a single name/value pair.

The name always starts with the "at" sign (`@`), followed by the ~~namespace- or alias-qualified name of the annotation, i.e. the namespace or alias of the schema that defines the term, followed by a dot (.),~~

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~~followed by the name of the term. The namespace or alias MUST be defined in the metadata document, see **[OData-CSDL]**.~~ annotation identifier.

The value MUST be an appropriate value for the annotation.

18.2 Annotate a JSON Array or Primitive

When annotating a name/value pair for which the value is represented as a JSON array or primitive value, each annotation that applies to this name/value pair MUST be placed next to the annotated name/value pair and represented as a single name/value pair.

The name is the same as the name of the property or name/value pair being annotated, followed by the "at" sign (@), followed by the ~~namespace- or alias-qualified name of the~~ annotation~~, followed by a dot (.), followed by the name of the term. The namespace or alias MUST be defined in the metadata document, see **[OData-CSDL]**.~~ identifier.

The value MUST be an appropriate value for the annotation.

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19 Error Response

The error response MUST be a single JSON object. This object MUST have a single name/value pair named `error`. The value must be a JSON object.

This object MUST contain name/value pairs with the names `code` and `message`, and it MAY contain name/value pairs with the names `target`, `details` and `innererror`.

The value for the `code` name/value pair is a language-independent string. Its value is a service-defined error code. This code serves as a sub-status for the HTTP error code specified in the response.

The value for the `message` name/value pair MUST be a human-readable, language-dependent representation of the error. The `Content-Language` header MUST contain the language code from **[RFC5646]** corresponding to the language in which the value for message is written.

The value for the `target` name/value pair is the target of the particular error (for example, the name of the property in error).

The value for the `details` name/value pair MUST be an array of JSON objects that MUST contain name/value pairs for `code` and `message`, and MAY contain a name/value pair for `target`, as described above.

The value for the `innererror` name/value pair MUST be an object. The contents of this object are service-defined. Usually this object contains information that will help debug the service. The `innererror` name/value pair SHOULD only be used in development environments in order to guard against potential security concerns around information disclosure.

Error responses MAY contain annotations in any of its JSON objects.

Example 39:

```
{
  "error": {
    "code": "501",
    "message": "Unsupported functionality",
    "target": "query",
    "details": [
      {
       "code": "301",
       "target": "$search",
       "message": "$search query option not supported"
      }
    ],
    "innererror": {
      "trace": [...],
      "context": {...}
    }
  }
}
```

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20 Extensibility

Implementations can add custom annotations of the form `@namespace.termname` or `property@namespace.termname` to any JSON object, where `property` MAY or MAY NOT match the name of a name/value pair within the JSON object. However, the namespace MUST NOT start with `odata` and SHOULD NOT be required to be understood by the receiving party in order to correctly interpret the rest of the payload as the receiving party MUST ignore unknown annotations not defined in this version of the OData JSON Specification.

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21 Security Considerations

This specification raises no security issues.

This section is provided as a service to the application developers, information providers, and users of OData version 4.0 giving some references to starting points for securing OData services as specified. OData is a REST-full multi-format service that depends on other services and thus inherits both sides of the coin, security enhancements and concerns alike from the latter.

For JSON-relevant security implications please cf. at least the relevant subsections of **[RFC7159]** as starting point.

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22 Conformance

Conforming clients MUST be prepared to consume a service that uses any or all of the constructs defined in this specification. The exception to this are the constructs defined in Delta Response, which are only required for clients that request changes.

In order to be a conforming consumer of the OData JSON format, a client or service:

1. MUST either:
   a. understand `odata.metadata=minimal` (section 3.1.1) or
   b. explicitly specify `odata.metadata=none` (section 3.1.3) or `odata.metadata=full` (section 3.1.2) in the request (client)
2. MUST be prepared to consume a response with full metadata
3. MUST be prepared to receive all data types (section 7.1)
   a. defined in this specification (client)
   b. exposed by the service (service)
4. MUST interpret all `odata` annotations defined according to the `OData-Version` header of the payload (section 4.5)
5. MUST be prepared to receive any annotations, including custom annotations and `odata` annotations not defined in the `OData-Version` header of the payload (section 20)
6. MUST NOT require `odata.streaming=true` in the `Content-Type` header (section 4.4)

In addition, in order to conform to the OData JSON format, a service:

7. MUST comply with one of the conformance levels defined in **[OData-Protocol]**
8. MUST support the `application/json` media type in the `Accept` header (section 3)
9. MUST return well-formed JSON payloads
10. MUST support `odata.metadata=full` (section 3.1.2)
11. MUST include the `odata.nextLink` annotation in partial results for entity collections (section 4.5.5)
12. MUST support entity instances with external metadata (section 4.5.1)
13. MUST support properties with externally defined data types (section 4.5.3)
14. MUST NOT violate any other aspects of this OData JSON specification
15. SHOULD support the $format system query option (section 3)
16. MAY support the `odata.streaming=true` parameter in the `Accept` header (section 4.4)
17. MAY return full metadata regardless of `odata.metadata` (section 3.1.2)

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Appendix A. Acknowledgments

The contributions of the OASIS OData Technical Committee members, enumerated in **[OData-Protocol]**, are gratefully acknowledged.

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Appendix B. Revision History

Revision	Date	Editor	Changes Made
Working Draft 01	2012-08-22	Michael Pizzo	Translated Contribution to OASIS format/template
Working Draft 01.1	2013-1-31	Ralf Handl	Adopted new, more concise JSON format
Committee Specification Draft 01	2013-04-26	Ralf Handl Michael Pizzo	Expanded error information Added enumerations Fleshed out descriptions and examples and addressed numerous editorial and technical issues through processed through the TC Added Conformance section
Committee Specification Draft 02	2013-07-01	Ralf Handl Michael Pizzo	Improved rules for `odata.id`, `odata.editLink`, and `odata.readLink` Improved action/function advertisement Improved entity references Improved rules for relative URLs Simplified delta responses GeoJSON for Geo types Improved description of primitive value representation Improved examples, aligned with Atom format specification Aligned terms across specifications
Committee Specification 01	2013-07-30	Ralf Handl Michael Pizzo	Non-Material Changes
Committee Specification Draft 03	2013-10-03	Ralf Handl Michael Pizzo	Annotations start with `@` Next link for collections of primitive and complex type Null values in collections of primitive and complex type Improved description of relative URL resolution
Committee Specification 02	2013-11-04	Michael Pizzo, Ralf Handl, Martin Zurmuehl	Non-Material Changes
OASIS Specification	2014-02-24	Michael Pizzo, Ralf Handl, Martin Zurmuehl	Non-Material Changes
Errata 01	2014-07-24	Michael Pizzo, Ralf Handl,	Minor changes and improvements

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		Martin Zurmuehl	
Errata 02	2014-10-29	Michael Pizzo, Ralf Handl, Martin Zurmuehl	Repaired mechanical error in the editable source
Errata 03	2016-03-03	Michael Pizzo, Ralf Handl, Martin Zurmuehl	Minor changes and clarifications

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