[MS-ART]:
Access Run Time Protocol Specification

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Revision Summary

Date	Revision History	Revision Class	Comments
01/20/2012	0.1	New	Released new document.

Table of Contents

1 Introduction

The Access Run Time Protocol enables a protocol client to read, insert, update or delete data in a **database application**.

Sections 1.8, 2, and 3 of this specification are normative and contain RFC 2119 language. Sections 1.5 and 1.9 are also normative but cannot contain RFC 2119 language. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are defined in [MS-GLOS]:

> **Augmented Backus-Naur Form (ABNF)**
> **Hypertext Transfer Protocol (HTTP)**
> **Hypertext Transfer Protocol over Secure Sockets Layer (HTTPS)**

The following terms are defined in [MS-OFCGLOS]:

> **alert**
> **caption**
> **database application**
> **field**
> **Help topic identifier**
> **JavaScript Object Notation (JSON)**
> **primary key**
> **record**
> **Request-URI**
> **result set**
> **row**
> **session**
> **session identifier**
> **site**
> **Uniform Resource Identifier (URI)**
> **Uniform Resource Locator (URL)**

The following terms are specific to this document:

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

1.2 References

References to Microsoft Open Specification documents do not include a publishing year because links are to the latest version of the documents, which are updated frequently. References to other documents include a publishing year when one is available.

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. Please check the archive site, http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624, as an additional source.

[MS-ADR] Microsoft Corporation, "Access Services Data Run Time Protocol Specification".

[MS-AXL2] Microsoft Corporation, "Access Application Transfer Data Structure Version 2".

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

[RFC2616] Fielding, R., Gettys, J., Mogul, J., et al., "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2616, June 1999, http://www.ietf.org/rfc/rfc2616.txt

[RFC2818] Rescorla, E., "HTTP Over TLS", RFC 2818, May 2000, http://www.ietf.org/rfc/rfc2818.txt

[RFC4627] Crockford, D., "The application/json Media Type for Javascript Object Notation (JSON)", RFC 4627, July 2006, http://www.ietf.org/rfc/rfc4627.txt

[RFC5234] Crocker, D., Ed., and Overell, P., "Augmented BNF for Syntax Specifications: ABNF", STD 68, RFC 5234, January 2008, http://www.rfc-editor.org/rfc/rfc5234.txt

[XMLNS] Bray, T., Hollander, D., Layman, A., et al., Eds., "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation, December 2009, http://www.w3.org/TR/2009/REC-xml-names-20091208/

[XMLSCHEMA1] Thompson, H.S., Ed., Beech, D., Ed., Maloney, M., Ed., and Mendelsohn, N., Ed., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/

[XMLSCHEMA2] Biron, P.V., Ed. and Malhotra, A., Ed., "XML Schema Part 2: Datatypes", W3C Recommendation, May 2001, http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/

1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "Windows Protocols Master Glossary".

[MS-OFCGLOS] Microsoft Corporation, "Microsoft Office Master Glossary".

1.3 Overview

This protocol is used for manipulating data maintained by a protocol server. Communication is always initiated by the protocol client using different operations, the functionality of which is outlined following.

▪ Inserting, reading, updating and deleting data from the database application.

▪ Filtering, sorting data while reading it from the database application.

▪ Modeling hypothetical updates on the protocol server.

▪ Reading distinct values for a certain **field (3)** in a **result set**.

A typical scenario for this protocol is opening a result set and updating or deleting data.

1.4 Relationship to Other Protocols

This protocol enables a protocol client to send a request that calls methods and accesses data on a protocol server, and then receive a corresponding response from the protocol server. This protocol depends on other structures and protocols to transport messages. Applications are layered on top of this protocol and they interact directly with this protocol specification.

The messages that are sent from the protocol client to the protocol server are formatted as **JSON**. It transmits those messages by using **HTTP**, as described in [RFC2616], or **HTTPS**, as described in [RFC2818]. Responses from the protocol server are formatted as JSON.
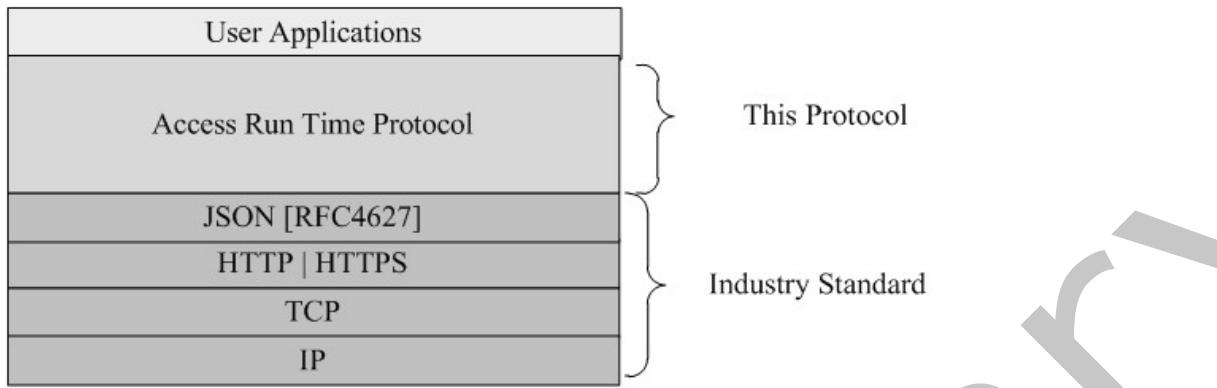
Figure 1: This protocol in relation to other protocols

1.5   Prerequisites/Preconditions

This protocol operates against a protocol server that is configured to listen for HTTP or HTTPS requests and a protocol client that knows the **Request-URI** of the protocol server.

1.6   Applicability Statement

This protocol is applicable for the following scenarios:

- Inserting, reading, updating, or deleting data from the database application.

- Retrieving data from the database application in **Pages** (section 3.1.1). This applies only if the number of **records** exceeds a threshold specified by the protocol server.

- Filtering data by retrieving only the data matching given restrictions.

- Sorting data retrieved from the database application

- Retrieving only distinct values for certain fields (3) in the result set from the database application

- Modeling hypothetical updates on the protocol server.

This protocol is not applicable for the following scenarios:

- Creating, updating or deleting objects on the database application.

- Acting as a data transfer channel between protocol client and protocol server. Instead the data sent to protocol client is intended to be rendered for end user viewing.

1.7 Versioning and Capability Negotiation

This document covers versioning issues in the area of supported transports. This protocol can use HTTP or HTTPS as a transport. For more information, see Transport (section 2.1).

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

Protocol servers MUST support HTTP, as specified in [RFC2616]. Protocol servers SHOULD also additionally support HTTPS, as specified in [RFC2818], to help secure connections with protocol clients.

Protocol messages MUST be formatted as JSON as specified in [RFC4627]. Protocol clients MUST use the **GET** or **POST** method to send messages to the protocol servers.

2.2 Message Syntax

This section contains common definitions used by this protocol specification. The syntax of the definitions uses JavaScript Object Notation (JSON), as specified in [RFC4627].

2.2.1 Common Message Syntax

This section contains common JavaScript Object Notation (JSON) definitions used by the protocol in **ABNF** syntax specified by [RFC5234]. JSON is specified by [RFC4627].

```
json-begin-array = json-whitespace %x5B json-whitespace ; [ left square bracket

json-begin-object = json-whitespace %x7B json-whitespace ; { left curly bracket

json-end-array = json-whitespace %x5D json-whitespace ; ] right square bracket

json-end-object = json-whitespace %x7D json-whitespace ; } right curly bracket

json-name-separator = json-whitespace %x3A json-whitespace ; : colon

json-value-separator = json-whitespace %x2C json-whitespace ; , comma

json-whitespace = *(

%x20 / ; Space

%x09 / ; Horizontal tab

%x0A / ; Line feed or New line

%x0D ; Carriage return

)

json-value = json-false / json-null / json-true / json-object / json-array / json-
number / json-string

json-false = %x66.61.6c.73.65 ; false

json-null = %x6e.75.6c.6c ; null

json-true = %x74.72.75.65 ; true

json-bool = json-false / json-true

json-object = json-begin-object [json-member *( json-value-separator json-member ) ]
json-end-object
```

```
json-member = json-string json-name-separator json-value

json-number = [ json-minus ] json-int [ json-frac ] [ json-exp ]

json-decimal-point = %x2E ; .

json-digit1-9 = %x31-39 ; 1-9

json-e = %x65 / %x45 ; e E

json-exp = json-e [ json-minus / json-plus ] 1*DIGIT

json-frac = json-decimal-point 1*DIGIT

json-int = json-zero / ( json-digit1-9 *DIGIT )

json-minus = %x2D ; -

json-plus = %x2B ; +

json-zero = %x30 ; 0

json-array = json-begin-array [ json-value *( json-value-separator json-value ) ]
json-end-array

json-string = json-quotation-mark *json-char json-quotation-mark

json-char = json-unescaped /

json-escape (

%x22 / ; " quotation mark U+0022

%x5C / ; \ reverse solidus U+005C

%x2F / ; / solidus U+002F

%x62 / ; b backspace U+0008

%x66 / ; f form feed U+000C

%x6E / ; n line feed U+000A

%x72 / ; r carriage return U+000D

%x74 / ; t tab U+0009

%x75 4HEXDIG ) ; uXXXX U+XXXX

json-escape = %x5C ; \

json-quotation-mark = %x22 ; "

json-unescaped = %x20-21 / %x23-5B / %x5D-10FFFF
```

The following table defines the common JSON types used in this document.

Common Type	Value
JsonAnyValue	json-value

Common Type	Value
JsonStringValue	json-string
JsonArrayOfAnyType	json-array
JsonArrayOfString	json-begin-array [json-string *(json-value-separator json-string)] json-end-array
JsonArrayOfInt	json-begin-array [json-int *(json-value-separator json-int)] json-end-array
JsonArrayOfArrayOfAnyType	json-begin-array [JsonArrayOfAnyType *(json-value-separator JsonArrayOfAnyType)] json-end-array
JsonArrayOfArrayOfString	json-begin-array [JsonArrayOfString *(json-value-separator JsonArrayOfString)] json-end-array
JsonArrayOfArrayOfArrayOfString	json-begin-array [JsonArrayOfArrayOfString *(json-value-separator JsonArrayOfArrayString)] json-end-array

2.2.2 Complex Types

The following table summarizes the set of common JSON complex type definitions defined by this specification. JSON complex type definitions that are specific to a particular operation are described with the operation.

Complex Type	Description
ClientMessage	See section 2.2.2.1.
FilterInfo	See section 2.2.2.3.
FixupRecord	Specifies the values for the fields (3) of the records which are to be used for the modeling a hypothetical update on the protocol server. See section 2.2.2.4 for more details.
FormatInfo	See section 2.2.2.5.
PagingInfo	Specifies which records of data from the **Source** (section 3.1.1) are requested by the protocol client. See section 2.2.2.6 for more details.
ParameterValue	Specifies a container for name of a **CT_Parameter** ([MS-AXL2] section 2.2.3.12) and its associated value. See section 2.2.2.7 for more details.
ServiceError	Specifies information about an **alert** sent from protocol server to the protocol client. See section 2.2.2.9 for more details.
ServiceResult	Specifies the result of the protocol operation. See section 2.2.2.10 for more details.
SharedDataBaseInfo	Specifies information about **Source** (section 3.1.1) on which protocol operations are to be performed. See section 2.2.2.11 for more details.
UpdateRecord	Specifies information about original values and new values of fields (3) in a record which is to be inserted or updated in database application. See section 2.2.2.12 for more details.

2.2.2.1 ClientMessage

The meaning of **ClientMessage** is specified by [MS-ADR] section 3.2.4.7.3.4. The format of the **ClientMessage** complex type is specified by this section. The following ABNF references types specified by section 2.2.1

```
ClientMessage = json-object
MessageID = json-quotation-mark "MessageID" json-quotation-mark json-name-
separator  ClientMessageID
Context =  json-quotation-mark "Context" json-quotation-mark json-name-
separator  JsonArrayOfAnyType
```

The meanings of **Context** and **MessageID** are specified by [MS-ADR] section 3.2.4.7.3.4.

ClientMessage MUST contain exactly two **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **Context** and **MessageID**.

2.2.2.2 FieldSchema

The meaning of **FieldSchema** is specified by [MS-ADR] section 3.2.4.7.3.2. The format of the **FieldSchema** complex type is specified by this section. The following ABNF references types specified by section 2.2.1.

```
FieldSchema = json-object
ColumnName = json-quotation-mark "ColumnName" json-quotation-mark json-name-separator json-
string
DataType = json-quotation-mark " DataType" json-quotation-mark json-name-separator json-
string
DefaultValue = json-quotation-mark "DefaultValue" json-quotation-mark json-name-
separator json-string
IsKey = json-quotation-mark "IsKey" json-quotation-mark json-name-separator json-bool
Required = json-quotation-mark "Required" json-quotation-mark json-name-separator json-bool
ReadOnly = json-quotation-mark " ReadOnly" json-quotation-mark json-name-separator json-bool
MaxLength = json-quotation-mark "MaxLength" json-quotation-mark json-name-separator json-int
DefaultExpression = json-quotation-mark "DefaultExpression" json-quotation-mark json-name-
separator json-string
ValidationScript = json-quotation-mark "ValidationScript" json-quotation-mark json-name-
separator  JsonString
ValidationMessage = json-quotation-mark "ValidationMessage" json-quotation-mark json-name-
separator ClientMessage
KeyIndex = json-quotation-mark "KeyIndex" json-quotation-mark json-name-separator json-int
SourceObject = json-quotation-mark "SourceObject" json-quotation-mark json-name-separator
json-string
DependentFields = json-quotation-mark "DependentFields" json-quotation-mark json-name-
separator JsonArrayOfInt
AllowMultipleValues = json-quotation-mark "AllowMultipleValues" json-quotation-mark json-
name-separator json-bool
FormatString = json-quotation-mark "FormatString" json-quotation-mark json-name-
separator json-string
CurrencySymbol = json-quotation-mark "CurrencySymbol" json-quotation-mark json-name-
separator json-string
DecimalPlaces = json-quotation-mark "DecimalPlaces" json-quotation-mark json-name-
separator json-int
TextType = json-quotation-mark "TextType" json-quotation-mark json-name-separator json-string
IsTableQueryLookup = json-quotation-mark "IsTableQueryLookup" json-quotation-mark json-name-
separator json-bool
```

```
LookupSource = json-quotation-mark "LookupSource" json-quotation-mark json-name-
separator json-string
LookupBoundField = json-quotation-mark "LookupBoundField" json-quotation-mark json-name-
separator json-string
LookupDisplayField = json-quotation-mark "LookupDisplayField" json-quotation-mark json-name-
separator json-string
```

The meanings of **ColumnName**, **DataType**, **DefaultValue**, **IsKey**, **Required**, **ReadOnly**, **MaxLength**, **DefaultExpression**, **ValidationScript**, **ValidationMessage**, **KeyIndex**, **SourceObject**, **DependentFields**, **AllowMultipleValues**, **FormatString**, **CurrencySymbol**, **DecimalPlaces**, **TextType**, **IsTableQueryLookup**, **LookupSource**, **LookupBoundField**, and **LookupDisplayField** are specified by [MS-ADR] section 3.2.4.7.3.2.

FieldSchema MUST contain at least one and no more than twenty two **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **ColumnName**, **DataType**, **DefaultValue**, **IsKey**, **Required**, **ReadOnly**, **MaxLength**, **DefaultExpression**, **ValidationScript**, **ValidationMessage**, **KeyIndex**, **SourceObject**, **DependentFields**, **AllowMultipleValues**, **FormatString**, **CurrencySymbol**, **DecimalPlaces**, **TextType**, **IsTableQueryLookup**, **LookupSource**, **LookupBoundField**, and **LookupDisplayField**.

2.2.2.3 FilterInfo

The meaning of **FilterInfo** is specified by [MS-ADR] section 2.2.4.10. The format of the **FilterInfo** complex type is specified by this section. The following ABNF references types specified by section 2.2.1.

```
FilterInfo = json-object
Culture = json-quotation-mark "Culture" json-quotation-mark json-name-separator  JsonString
Expression =  json-quotation-mark "Expression" json-quotation-mark json-name-
separator  JsonString
Fields = json-quotation-mark "Fields" json-quotation-mark json-name-
separator  JsonArrayOfStrings
Text = json-quotation-mark "Text" json-quotation-mark json-name-separator JsonString
```

The meanings of **Culture**, **Expression**, **Fields** and **Text** are specified by [MS-ADR] section 2.2.4.10.

FilterInfo MUST contain at least one and no more than four **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **Culture**, **Expression**, **Fields**, and **Text**. If one of the **json-member** instances is **Text**, then an instance of **Fields** and an instance of **Culture** MUST also be present.

2.2.2.4 FixupRecord

The **FixupRecord** type specifies the values for the fields (3) of **Updatable Source** (section 3.1.1) which are used for modeling a hypothetical update on the protocol server. These values are only used for the hypothetical update, and are not updated in the database application.

The **FixupRecord** type is an input for the **FixupRow** operation (section 3.1.5.1.6).

The following ABNF references types specified by section 2.2.1 and applies to the **FixupRecord**, unless extended or overridden by an operation specification.

```
FixupRecord = json-object
Key = json-quotation-mark "Key" json-quotation-mark json-name-separator json-string
```

```
SupportingFieldIndexes = json-quotation-mark "SupportingFieldIndexes" json-quotation-mark
json-name-separator JsonArrayOfInt
SupportingFieldValues = json-quotation-mark "SupportingFieldValues" json-quotation-mark json-
name-separator JsonArrayOfString
```

FixupRecord MUST contain three **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **Key**, **SupportingFieldIndexes** and **SupportingFieldValues**

Key: A **json-string** (section 2.2.1) that specifies a value that uniquely identifies the record on which a **FixupRow** operation (section 3.1.5.1.6) is to be performed. MUST be present. MUST NOT be **json-null**.

SupportingFieldIndexes: A **JsonArrayOfInt** (section 2.2.1), that specifies the indexes of the fields (3) whose values are used for performing **FixupRow** operation. MUST be present. MUST have at least one element.

SupportingFieldValues: A **JsonArrayOfString** (section 2.2.1) that specifies the values of **SupportingFieldIndexes**. MUST be present. MUST have at least one element.

2.2.2.5   FormatInfo

The **FormatInfo** complex type specifies the format for a field (3) in a **Source** (section 3.1.1). The format is used by the protocol server to verify the value of the field (3) sent by the protocol client and also to convert the value of field (3) to its format before returning the value to the protocol client.

The **FormatInfo** complex type is an input as well as output used by some protocol operations.

The following ABNF references types specified by section 2.2.1 and applies to the **FormatInfo**, unless extended or overridden by an operation specification.

```
FormatInfo = json-object
Currency = json-quotation-mark "Currency" json-quotation-mark json-name-separator json-string
Format = json-quotation-mark "Format" json-quotation-mark json-name-separator json-string
Precision = json-quotation-mark "Precision" json-quotation-mark json-name-separator json-int
```

FormatInfo MUST contain three **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **Currency**, **Format**, and **Precision**.

Currency: A **json-string** (section 2.2.1) that specifies the currency symbol for the value of a field (3) of a **Source** (section 3.1.1) in the database application. MUST be set to **json-null** (section 2.2.1) when the **Format** of the value of the field (3) is not "currency".

Format: A **json-string** (section 2.2.1) that specifies the format for the value of a field (3) of a **Source** (section 3.1.1) in the database application. MUST either be **json-null** (section 2.2.1) or MUST have one of the following values.

- "general date"

- "long date"

- "short date"

- "long time"

- "medium time"

- "short time"

- "general number"

- "standard"

- "fixed"

- "scientific"

- "percent"

- "currency"

Precision: A **json-int** (section 2.2.1) that specifies the maximum number of digits present after the decimal point in the value of a field (3) of a **Source** (section 3.1.1) in the database application. MUST be a number between 0 and 15 and MUST only be present when **Format** is one of the following:

- "general number"

- "standard"

- "fixed"

- "scientific"

- "percent"

- "currency"

2.2.2.6   PagingInfo

The **PagingInfo** type specifies which **Page** (section 3.1.1) of data from the cached result set or from the **Source** (section 3.1.1) is requested by the protocol client.

The **PagingInfo** complex type is used as an input as well as output by some protocol operations.

The following ABNF references types specified by section 2.2.1 and applies to the **PagingInfo**, unless extended or overridden by an operation specification.

```
PagingInfo = json-object
FirstRow = json-quotation-mark "FirstRow" json-quotation-mark json-name-separator json-int
PageSize = json-quotation-mark "PageSize" json-quotation-mark json-name-separator json-int
Moniker = json-quotation-mark "Moniker" json-quotation-mark json-name-separator (json-string
/ json-null)
UseCache = json-quotation-mark "UseCache" json-quotation-mark json-name-separator json-bool
CacheCommands = json-quotation-mark "CacheCommands" json-quotation-mark json-name-separator
CacheCommands
SortExpression = json-quotation-mark "SortExpression" json-quotation-mark json-name-separator
json-string
Filter = json-quotation-mark "Filter" json-quotation-mark json-name-separator FilterInfo
TotalRows = json-quotation-mark "TotalRows" json-quotation-mark json-name-separator json-int
```

```
SessionId = json-quotation-mark "SessionId" json-quotation-mark json-name-separator json-
string
```

PagingInfo MUST contain at least one and no more than ten **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **CacheCommands**, **Filter**, **FirstRow**, **Source**, **Moniker**, **PageSize**, **SessionId**, **SortExpression**, **TotalRows** and **UseCache**.

CacheCommands: A **CacheCommands** (section 2.2.3.1) that specifies the operations to perform on the result set.

Filter: A **FilterInfo** (section 2.2.2.3) that specifies how to filter the result set.

FirstRow: A **json-int** (section 2.2.1) that specifies the index of the first record to return from the **Source** (section 3.1.1) specified by the **SelectCommand** element of the **SharedDataBaseInfo** (section 2.2.2.11).

- MUST be present.

- MUST be nonnegative.

- MUST be less than total records in Source.

Moniker: A **json-string** (section 2.2.1) that specifies the identifier for a result set which was specified by the protocol client. If a **Moniker** is specified in the **session (2)** then it MUST be used as the moniker element for the input to all **GetData** service operations (section 3.1.5.1.1) within the same session (2).

PageSize: A **json-int** (section 2.2.1) that specifies the maximum number of records to return. MUST be nonnegative.

SessionId: A **SessionIdentifier,** as specified by [MS-ADR] section 2.2.5.11, that specifies a unique identifier for the current session (2) that was previously received from the protocol server in the response of the first **GetData** service operation (section 4.1).

SortExpression: A **json-string** (section 2.2.1) that specifies the sort order to apply to the result set. If the **CacheCommands** contains **ApplySort:**

- MUST be present.

- MUST contain a **CT_AdhocOrdering**, as specified in [MS-AXL2] section 2.2.3.5.

TotalRows: A **json-int** (section 2.2.1) that specifies the total number of records in the **Source**. This element is populated by the protocol server, and sent as a part of **PagingInfo**, in the response body of some protocol operations. MUST be present when included in a paging response.

UseCache: MUST be ignored.

2.2.2.7   ParameterValue

The **ParameterValue** complex type is an input used by some protocol operations.

The following applies to the **ParameterValue** complex type, unless extended or overridden by an operation specification.

The **ParameterValue** type, serves as a container for a parameter and its associated value. Some **Sources** (section 3.1.1) in a database application are parameterized, and need parameter values to

open them. Hence, this complex type is sent along with **SelectCommand** in a **SharedDataBaseInfo** (section 2.2.2.11) in the request body of some protocol operations. The following ABNF references types specified by section 2.2.1.

```
ParameterValue = json-object
Name = json-quotation-mark "Name" json-quotation-mark json-name-separator json-string
Value = json-quotation-mark "Value" json-quotation-mark json-name-separator json-value
```

ParameterValue MUST contain two **json-member** instances that are not **json-null**, and each instance MUST be different. Each instance MUST be one of the following: **Name** and **Value**.

Name: A **json-string** (section 2.2.1) that specifies a value that uniquely identifies the ParameterValue within a collection.

Value: A **json-value** (section 2.2.1) that specifies data associated with the given **Name**.

2.2.2.8   RecordSet

The **RecordSet** is a complex type that is output by all the protocol operations. The RecordSet is specified by the **Result** element of the **ServiceResult** complex type (section 2.2.2.10).

The following ABNF references types specified by section 2.2.1 and applies to the **RecordSet**, unless extended or overridden by an operation specification.

```
RecordSet = json-object
Values = json-quotation-mark "Values" json-quotation-mark json-name-separator
JsonArrayOfArrayOfAnyType
Localized = json-quotation-mark "Localized" json-quotation-mark json-name-separator
JsonArrayOfArrayOfArrayOfString
Paging = json-quotation-mark "Paging" json-quotation-mark json-name-separator PagingInfo
Fields = json-quotation-mark " Fields" json-quotation-mark json-name-separator json-begin-
array [FieldSchema *( json-value-separator FieldSchema) ] json-end-array
FormatInfos = json-quotation-mark "FormatInfos" json-quotation-mark json-name-separator json-
begin-array [FormatInfo *( json-value-separator FormatInfo) ] json-end-array
```

RecordSet MUST contain at exactly five **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **Values**, **Localized**, **Paging**, **Fields**, and **FormatInfos**.

Values: A **JsonArrayOfArrayOfAnyType** (section 2.2.1) that specifies a record array. Each record is an array of values for the fields (3). Each field (3) value at an ordinal in a record array is the value of the **FieldSchema** (section 2.2.2.2) at the same ordinal in the **Fields** array **RecordSet**, returned in the **Result** element of the **ServiceResult** element from a previous call to the **GetData** operation (section 3.1.5.1.1). MUST be present.

Localized: A **JsonArrayofArayOfArrayOfString** (section 2.2.1) that specifies the formatted value for each value in the **Values** array at the same ordial in the **FormatInfos** element in **SharedDataBaseInfo** (section 2.2.2.11). MUST be present.

Paging: A **PagingInfo**, as specified by section 2.2.2.6. MUST be present.

Fields: A **json-array** of **FieldSchema** ([MS-ADR] section 3.2.4.7.3.1) that specifies the schema of the fields (3) of the **Source** (section 3.1.1), which is specified by the **SelectCommand** of the **SharedDataBaseInfo** complex type (section 2.2.2.11). MUST be present.

FormatInfos: A **json-array** of **FormatInfo** (section 2.2.2.5) that specifies the format information for the fields (3) in the **Source**. MUST be present.

2.2.2.9 ServiceError

The **ServiceError** complex type is an output used by some protocol operations. It is used to return alert information to the protocol client.

The following ABNF references types specified by section 2.2.1 and applies to the **ServiceError**, unless extended or overridden by an operation specification.

```
ServiceError = json-object
Message = json-quotation-mark "Message" json-quotation-mark json-name-separator ClientMessage
Caption = json-quotation-mark "Caption" json-quotation-mark json-name-separator (json-string
/ json-null)
HelpText = json-quotation-mark "HelpText" json-quotation-mark json-name-separator (json-
string / json-null)
HelpId = json-quotation-mark "HelpId" json-quotation-mark json-name-separator (json-string /
json-null)
Severity = json-quotation-mark "Severity" json-quotation-mark json-name-separator
MessageSeverity
Number = json-quotation-mark "Number" json-quotation-mark json-name-separator json-value
```

ServiceError MUST contain at least five and no more than six **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **Caption**, **HelpId**, **HelpText**, **Message**, **Number**, and **Severity**.

Caption: A **json-string** (section 2.2.1) that specifies the **caption** for the alert. MUST be present.

HelpId: A **json-string** (section 2.2.1) that specifies the **Help topic identifier**.

HelpText: A **json-string** (section 2.2.1) that specifies a description of the help topic. MUST be present.

Message: A **json-string** (section 2.2.1) that specifies a description of the alert. MUST be present. MUST NOT be empty.

Number: A **json-value** (section 2.2.1) that specifies an error code that is associated with this alert. MUST either be **json-null** or **json-int**.

Severity: A **MessageSeverity** (section 2.2.3.3) that specifies the severity of the alert. MUST be present.

2.2.2.10 ServiceResult

The **ServiceResult** complex type is an output used by some protocol operations.

The following ABNF references types specified by section 2.2.1 and applies to the **ServiceResult**, unless extended or overridden by an operation specification.

```
ServiceResult = json-object
Result = json-quotation-mark "Result" json-quotation-mark json-name-separator json-value
Error = json-quotation-mark "Error" json-quotation-mark json-name-separator ServiceError
```

ServiceResult MUST contain at least one and no more than two **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **Error**, and **Result**.

Error: A **ServiceError**, as specified in section 2.2.2.9.

Result: A **json-value** (section 2.2.1) that specifies the result of the protocol operation.

After the protocol server has finished the execution of the protocol operation, it creates the **ServiceResult** object, and then sends it in the Response body of the protocol operation. The **Result** element of the **ServiceResult** contains the result of the protocol operation, if it completed successfully, otherwise the **Error** element will contain the error information.

2.2.2.11   SharedDataBaseInfo

The **SharedDataBaseInfo** complex type specifies the **Source**, the fields (3) from this **Source**, the sort order and restriction criteria of the records that should be retrieved from database application.

The **SharedDataBaseInfo** complex type is an input used by all protocol operations.

The following ABNF references types specified by section 2.2.1 and applies to the **SharedDataBaseInfo**, unless extended or overridden by an operation specification.

```
SharedDataBaseInfo = json-object
SessionId = json-quotation-mark "SessionId" json-quotation-mark json-name-separator (json-
string | json-null)
SelectCommand = json-quotation-mark "SelectCommand" json-quotation-mark json-name-separator
(json-string | json-null)
ParameterValues = json-quotation-mark "ParameterValues" json-quotation-mark json-name-
separator json-begin-array [ParameterValue *( json-value-separator ParameterValue) ] json-
end-array
OriginalCommand = json-quotation-mark "OriginalCommand" json-quotation-mark json-name-
separator (json-string | json-null)
AggregateExpressions = json-quotation-mark "AggregateExpressions" json-quotation-mark json-
name-separator (json-string | json-null)
AggregateFormatInfos = json-quotation-mark "AggregateFormatInfos" json-quotation-mark json-
name-separator json-begin-array [FormatInfo *( json-value-separator FormatInfo) ] json-end-
array
Restriction = json-quotation-mark "Restriction" json-quotation-mark json-name-separator
(json-string | json-null)
Ordering = json-quotation-mark "Ordering" json-quotation-mark json-name-separator (json-
string | json-null)
AllowEdits = json-quotation-mark "AllowEdits" json-quotation-mark json-name-separator (json-
string | json-null)
AllowAdditions = json-quotation-mark "AllowAdditions" json-quotation-mark json-name-separator
(json-string | json-null)
AllowDeletions = json-quotation-mark "AllowDeletions" json-quotation-mark json-name-separator
(json-string | json-null)
DataEntry = json-quotation-mark "DataEntry" json-quotation-mark json-name-separator json-bool
FieldNames = json-quotation-mark "FieldNames" json-quotation-mark json-name-separator (json-
string | json-null)
FormatInfos = json-quotation-mark "FormatInfos" json-quotation-mark json-name-separator json-
begin-array [FormatInfo *( json-value-separator FormatInfo) ] json-end-array
DataLevelFormat = json-quotation-mark "DataLevelFormat" json-quotation-mark json-name-
separator json-bool
ShowHeaders = json-quotation-mark "ShowHeaders" json-quotation-mark json-name-separator json-
bool
InitialPage = json-quotation-mark "InitialPage" json-quotation-mark json-name-separator
(json-string | json-null)
FetchSchema = json-quotation-mark "FetchSchema" json-quotation-mark json-name-separator json-
bool
FetchKeyFields = json-quotation-mark "FetchKeyFields" json-quotation-mark json-name-separator
json-bool
```

```
FetchDisplayFields = json-quotation-mark "FetchDisplayFields" json-quotation-mark json-name-
separator json-bool
```

SharedDataBaseInfo MUST contain at least one **json-member** instance from the following **json-member** instances. All **json-member** instances MUST be unique.

AggregateExpressions: MUST NOT be used.

AggregateFormatInfos: MUST NOT be used.

AllowAdditions: MUST NOT be used.

AllowDeletions: MUST NOT be used.

AllowEdits: MUST NOT be used.

DataEntry: MUST NOT be used.

DataLevelFormat: MUST NOT be used.

FetchSchema: A **json-bool** (section 2.2.1) that specifies whether the protocol server fetches the schema information of the **SelectCommand** element. The protocol server fetches the schema information if the value of **FetchSchema** is **json-true**. The protocol server does not fetch schema information otherwise. If this element is not specified, a default value of **json-true** is used.

FieldNames: The fields (3) from the **SelectCommand** for which data is to be fetched.

FormatInfos: A **json-array** of **FormatInfo** instances, as specified in section 2.2.2.5.

InitialPage: MUST NOT be used.

Ordering: A **json-string** (section 2.2.1) that specifies the sort order. If present, the protocol server applies this sort order to the data, and returns the sorted data. MUST contain a **CT_AdHocOrdering**, as specified in [MS-AXL2] section 2.2.3.5.

OriginalCommand: MUST NOT be used.

ParameterValues: The value of each parameter, as specified in [MS-AXL2] section 2.2.3.17, required in the **SelectCommand** element. MUST be present for every parameter defined in **SelectCommand**.

▪ The **Key** element is the name of the parameter.

▪ The **Value** element is the value of the parameter in the correct data type.

Restriction: A **CT_Expression**, as specified in [MS-AXL2] section 2.2.3.1. Only records in **SelectCommand** that return "true" for this restriction expression are included in the **Result Set** (section 3.1.1).

SelectCommand: A **json-string** (section 2.2.1) that specifies the **Source** (section 3.1.1) from which data is to be retrieved.

SessionId: A **json-string** (section 2.2.1) that specifies a unique identifier for the session (2) as specified in [MS-ADR] section 3.2.1.2.

ShowHeaders: MUST NOT be used.

FetchKeyFields: A **json-bool** (section 2.2.1) that specifies whether the protocol server fetches the values of the **primary key** fields (3) of the **SelectCommand** element. The protocol server fetches the values of the primary key fields (3) if the value of **FetchKeyFields** is **json-true**. The protocol server does not fetch the values of the primary key fields (3) otherwise. If this element is not specified, a default value of **json-false** is used

FetchDisplayFields: A **json-bool** (section 2.2.1) that specifies whether the protocol server fetches the display values of the **foreign key** fields (3) of the **SelectCommand** element. The protocol server fetches the display values of the **foreign key** fields (3) if the value of **FetchDisplayFields** is **json-true**. The protocol server does not fetch the display values of the **foreign key** fields (3) otherwise. If this element is not specified, a default value of **json-false** is used

2.2.2.12   UpdateRecord

The **UpdateRecord** complex type specifies the new values and original values for fields (3) in an **Updatable Source** (section 3.1.1) which are used for insert, update and delete operations.

The **UpdateRecord** type is an input used by some protocol operations.

The following ABNF references types specified by section 2.2.1 and applies to **UpdateRecord**, unless extended or overridden by an operation specification.

```
UpdateRecord = json-object
OriginalValues = json-quotation-mark "OriginalValues" json-quotation-mark json-name-separator
JsonArrayOfArrayOfAnyType
NewValues = json-quotation-mark "NewValues" json-quotation-mark json-name-separator
JsonArrayOfArrayOfString
Paging = json-quotation-mark "Paging" json-quotation-mark json-name-separator PagingInfo
ReturnDataMacroIds = json-quotation-mark "ReturnDataMacroIds" json-quotation-mark json-name-
separator json-bool
```

UpdateRecord MUST contain at least one and no more than four **json-member** instances, and each instance MUST be different. Each instance MUST be one of the following: **NewValues**, **OriginalValues**, **Paging**, and **ReturnDataMacroIds**.

NewValues: A **JsonArrayOfArrayOfString** (section 2.2.1) that specifies the new values of a collection of records which need to be inserted, updated or deleted. The protocol server will insert, update, or delete the records in a **Source** (section 3.1.1) with the values that are provided by this element.

OriginalValues: A **JsonArrayOfArrayOfAnyType** (section 2.2.1) that specifies the existing values of a collection of records in a **Source** (section 3.1.1), which need to be inserted, updated or deleted.

Paging: A **PagingInfo** complex type, as specified in section 2.2.2.6. MUST be present.

ReturnDataMacroIds: MUST NOT be used.

2.2.3   Simple Types

The following table summarizes the set of common JSON simple type definitions defined by this specification. JSON simple type definitions that are specific to a particular operation are described with the operation.

Simple Type	Description
CacheCommands	The **CacheCommands** simple type as specified in [MS-ADR] section 3.2.4.4.4.1. See section 2.2.3.1. for more details.
ClientMessageID	A **ClientMessageID** simple type, as specified in [MS-ADR] section 3.2.4.7.4.1. See section 2.2.3.2 for more details.
MessageSeverity	Specifies the severity of a **ServiceError** (section 2.2.2.9) sent from protocol server to protocol client. See section 2.2.3.3 for more details.

2.2.3.1 CacheCommands

The meaning of **CacheCommands** is specified by [MS-ADR] section 3.2.4.4.4.1. The format of the **CacheCommands** simple type is specified by this section. The following ABNF references types specified by section 2.2.1.

```
CacheCommands = json-string; the value of the string MUST be one of the values
                            in the following table.
```

The following table specifies the allowable values for **CacheCommands:**

Value	Meaning
RefreshData	See [MS-ADR] section 3.2.4.4.4.1.
ApplyFilter	See [MS-ADR] section 3.2.4.4.4.1.
ClearFilter	See [MS-ADR] section 3.2.4.4.4.1.
ApplySort	See [MS-ADR] section 3.2.4.4.4.1.
RetrieveImage	See [MS-ADR] section 3.2.4.4.4.1.

2.2.3.2 ClientMessageID

The meaning of **ClientMessageID** is specified by[MS-ADR] section 3.2.4.7.4.1. The format of the **ClientMessageID** simple type is specified by this section. The following ABNF references types specified by section 2.2.1.

```
ClientMessageID = json-string; the value of the string MUST be one of the values
                            in the following table.
```

The following table specifies the allowable values for **ClientMessageID:**

Value	Meaning
None	See [MS-ADR] section 3.2.4.7.4.1
PassthroughMessage	See [MS-ADR] section 3.2.4.7.4.1
WebServiceUnavailableMessage	See [MS-ADR] section 3.2.4.7.4.1
WebServiceCanceledMessage	See [MS-ADR] section 3.2.4.7.4.1

Value	Meaning
DataMacroStopWaiting	See [MS-ADR] section 3.2.4.7.4.1
GenericError	See [MS-ADR] section 3.2.4.7.4.1
NotifyRecordUpdated	See [MS-ADR] section 3.2.4.7.4.1
NotifyRecordsDeleted	See [MS-ADR] section 3.2.4.7.4.1
NotifyCannotDelete	See [MS-ADR] section 3.2.4.7.4.1
NotifyCannotSave	See [MS-ADR] section 3.2.4.7.4.1
NotifyCannotSaveDescription	See [MS-ADR] section 3.2.4.7.4.1
SubFormNestingLimitExceededError	See [MS-ADR] section 3.2.4.7.4.1
DivisionByZero	See [MS-ADR] section 3.2.4.7.4.1
TypeMismatch	See [MS-ADR] section 3.2.4.7.4.1
NoCurrentRecord	See [MS-ADR] section 3.2.4.7.4.1
RecordNotUpdatable	See [MS-ADR] section 3.2.4.7.4.1
WhereConditionTooLong	See [MS-ADR] section 3.2.4.7.4.1
InvalidArgument	See [MS-ADR] section 3.2.4.7.4.1
InvalidContainerControlName	See [MS-ADR] section 3.2.4.7.4.1
ActionArgumentNotFound	See [MS-ADR] section 3.2.4.7.4.1
FormCannotClose	See [MS-ADR] section 3.2.4.7.4.1
AttachmentMustSave	See [MS-ADR] section 3.2.4.7.4.1
InvalidExpression	See [MS-ADR] section 3.2.4.7.4.1
AttachmentUploadSucceed	See [MS-ADR] section 3.2.4.7.4.1
AttachmentDeleted	See [MS-ADR] section 3.2.4.7.4.1
FormOrReportNotBound	See [MS-ADR] section 3.2.4.7.4.1
InvalidPropertyOrMethod	See [MS-ADR] section 3.2.4.7.4.1
InvalidUrl	See [MS-ADR] section 3.2.4.7.4.1
UserInterfaceMacroLoadFailure	See [MS-ADR] section 3.2.4.7.4.1
CannotFindMacroObject	See [MS-ADR] section 3.2.4.7.4.1
CannotGoToSpecifiedRecord	See [MS-ADR] section 3.2.4.7.4.1
InvalidConditionExpression	See [MS-ADR] section 3.2.4.7.4.1
CannotGoToSubformOrTabpage	See [MS-ADR] section 3.2.4.7.4.1
InvalidControl	See [MS-ADR] section 3.2.4.7.4.1

Value	Meaning
CannotFocusOnControl	See [MS-ADR] section 3.2.4.7.4.1
InvalidControlValue	See [MS-ADR] section 3.2.4.7.4.1
NoControlName	See [MS-ADR] section 3.2.4.7.4.1
CannotFindErrorHandlingMacro	See [MS-ADR] section 3.2.4.7.4.1
InvalidSetPropertyControl	See [MS-ADR] section 3.2.4.7.4.1
LocalVarNameNotSpecified	See [MS-ADR] section 3.2.4.7.4.1
LocalVarExpressionNotSpecified	See [MS-ADR] section 3.2.4.7.4.1
LocalVariableNameInvalid	See [MS-ADR] section 3.2.4.7.4.1
TempVarNameNotSpecified	See [MS-ADR] section 3.2.4.7.4.1
TempVariableNameInvalid	See [MS-ADR] section 3.2.4.7.4.1
CommandNotAvailable	See [MS-ADR] section 3.2.4.7.4.1
ExpressionErrorCannotSet	See [MS-ADR] section 3.2.4.7.4.1
TooManyRunMacros	See [MS-ADR] section 3.2.4.7.4.1
InvalidBrowseToPathArgument	See [MS-ADR] section 3.2.4.7.4.1
InvalidObjectReference	See [MS-ADR] section 3.2.4.7.4.1
FormNotFoundRep	See [MS-ADR] section 3.2.4.7.4.1
ControlDoesNotSupportRequery	See [MS-ADR] section 3.2.4.7.4.1
ReadOnlyNote	See [MS-ADR] section 3.2.4.7.4.1
TooMuchParameterData	See [MS-ADR] section 3.2.4.7.4.1
OperationNotSupportedOnSubReports	See [MS-ADR] section 3.2.4.7.4.1
ExpressionErrorInfo	See [MS-ADR] section 3.2.4.7.4.1
InvalidPropertyValue	See [MS-ADR] section 3.2.4.7.4.1
AutocompleteWaitingForValidationMessage	See [MS-ADR] section 3.2.4.7.4.1
AutocompleteInvalidDataMessage	See [MS-ADR] section 3.2.4.7.4.1
TooManyTermsInFilter	See [MS-ADR] section 3.2.4.7.4.1
InvalidValueForFieldMessage	See [MS-ADR] section 3.2.4.7.4.1
InvalidValueForControlMessage	See [MS-ADR] section 3.2.4.7.4.1
ImageUploadFailureNotificationMessage	See [MS-ADR] section 3.2.4.7.4.1
NoResultsFromFilter	See [MS-ADR] section 3.2.4.7.4.1

2.2.3.3 MessageSeverity

The **MessageSeverity** simple type is used to specify the severity of a **ServiceError** (section 2.2.2.9) sent to the protocol client. The following ABNF references types specified by section 2.2.1.

```
MessageSeverity = json-string; the value of the string MUST be one of the values
                        in the following table.
```

The following table specifies the allowable values for **MessageSeverity:**

Value	Meaning
Info	The **ServiceError** indicates that an informational message has been sent from the protocol server.
Warn	The **ServiceError** indicates that a warning has been sent from the protocol server.
Error	The **ServiceError** indicates that an error has occurred.

3   Protocol Details

3.1   Server Details

The protocol server receives request messages from the protocol client in JSON format. The request messages can be either to retrieve, insert, update or delete data from the database application. The protocol server processes the request, and then returns the result set and alert in the **Result** and **Error** elements of **ServiceResult** (section 2.2.2.10) object to the protocol client. The protocol server never initiates communication with other endpoints of the protocol.

3.1.1   Abstract Data Model

This section describes a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

This protocol includes the following Abstract Data Model elements, which are directly accessed from Access Services Data Run Time protocol as specified in [MS-ADR] section 3.2.1:

- **Session**

- **Request**

- **Source**

- **Updatable Source**

The following elements are specific to this protocol:

- **Page :** A partial result set, which is part of a sequence of partial result sets of the same size.

3.1.2   Timers

No new timers are required beyond those specified in [MS-ADR] section 3.2.2.

3.1.3   Initialization

None.

3.1.4   Higher-Layer Triggered Events

None.

3.1.5   Message Processing Events and Sequencing Rules

The following table summarizes the operations in this protocol.

Resources	Description
AccessPortal	Specifies a resource which operates against a **site (2)** that contains the database application. See section 3.1.5.1 for more details.

The responses to all the operations can result in the following status codes.

Status code	Description
200	This status code indicates that operation completed successfully.

3.1.5.1 AccessPortal

This resource operates against a site (2) that is identified by a **URL** that is known by protocol clients. The protocol server endpoint is formed by appending "/_vti_bin/accsvc/accessportal.json" to the URL of the site (2), for example:
http://www.example.com/Repository/_vti_bin/accsvc/accessportal.json.

The operation path is obtained by appending the operation name to the endpoint, for example, "http://www.example.com/Repository/_vti_bin/accsvc/accessportal.json/<serviceName>"

The URL parameters are defined by the following ABNF syntax:

serviceName = STRING

serviceName: The unique name of the hosted service operation.

Operation	Description
GetData	Operation which retrieves a subset of **rows** from a **Source** (section 3.1.1) in a database application. See section 3.1.5.1.1 for more details.
InsertRecords	Operation which inserts records into an **Updatable Source** (section 3.1.1) in a database application. See section 3.1.5.1.2 for more details.
UpdateRecords	Operation which updates records into an **Updatable Source** (section 3.1.1) in a database application. See section 3.1.5.1.3 for more details.
DeleteRecords	Operation which deletes records from an **Updatable Source** (section 3.1.1) in a database application. See section 3.1.5.1.4 for more details.
GetDistinctValues	Operation which retrieves distinct values for a field (3) from a **Source** (section 3.1.1) in a database application. See section 3.1.5.1.5 for more details.
FixupRow	Operation which performs modeling of a hypothetical update for an **Updatable Source** (section 3.1.1) in a database application. See section 3.1.5.1.6 for more details.

3.1.5.1.1 GetData

This operation fetches a subset of rows from a **Source** (section 3.1.1), which is passed in as **SelectCommand** element of **SharedDataBaseInfo** (section 2.2.2.11).

This operation is transported by an HTTP **POST.**

The **serviceName** as specified in section 3.1.5.1 MUST be "GetData".

The operation can be invoked through the following **URI**:

```
http://www.example.com/Repository/_vti_bin/accsvc/accessportal.json/GetData.
```

During this operation, the protocol server receives a JSON request that contains the **SharedDataBaseInfo** (section 2.2.2.11) and **PagingInfo** (section 2.2.2.6) objects. The protocol server then processes the request, and then responds with a JSON response that contains **ServiceResult** (section 2.2.2.10). The **Values** element of **RecordSet** (section 2.2.2.8), which is returned as **Result** element of the **ServiceResult** contains the rows of data which protocol client had requested.

In the event of an application error on the protocol server during this operation, the **ServiceError**, as specified in section 2.2.2.9, MUST be present in **ServiceResult** (section 2.2.2.10).

The processing details for this operation are specified by section 3.1.5.1.1.3.

3.1.5.1.1.1   Request Body

The **SharedDataBaseInfo** (section 2.2.2.11) and **PagingInfo** (section 2.2.2.6) objects in Request Body determine which records are fetched from a **Source** (section 3.1.1), which is specified by the **SelectCommand** element of the **SharedDataBaseInfo**. The following ABNF references types specified by section 2.2.1.

```
GetDataRequest = dataBaseInfo-member pagingInfo-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
pagingInfo-member = json-quotation-mark "pagingInfo" json-quotation-mark json-name-separator
PagingInfo
```

dataBaseInfo: A **SharedDataBaseInfo** (section 2.2.2.11) that specifies the **Source**, the fields (3) from this **Source**, the sort order and restriction criteria of the records that should be retrieved from database application.

pagingInfo: A **PagingInfo** (section 2.2.2.6) that specifies which records should be retrieved from the database application. MUST be present.

3.1.5.1.1.2   Response Body

The records from the **Source** (section 3.1.1) which is specified by the **SelectCommand** element of **SharedDataBaseInfo** (section 2.2.2.11) are returned to the protocol client in the **Values** element of **RecordSet** (section 2.2.2.8), which is returned as the **Result** element of the **ServiceResult** (section 2.2.2.10) in the Response Body. If there is any error on the protocol server, a **ServiceError** (section 2.2.2.9) is returned in the **Error** element of **ServiceResult.** The following ABNF references types specified by section 2.2.1.

```
GetDataResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult
```

GetDataResult: A **ServiceResult** (section 2.2.2.10) that specifies the records returned by protocol server to the protocol client. MUST be present.

3.1.5.1.1.3   Processing Details

The protocol client sends a request message, and the protocol server responds as specified in [MS-ADR] section 3.2.4.4, except as follows:

- The protocol server retrieves data from the given **Source** (section 3.1.1) which is supplied as the **SelectCommand** element of the **SharedDataBaseInfo** (section 2.2.2.11), which is an input element of the Request Body (section 3.1.5.1.1.1).

- Only the fields (3) that are specified by **FieldNames** input element of **SharedDataBaseInfo** are retrieved.

- If the **FetchSchema** element of **SharedDataBaseInfo** is true, the protocol server also returns the schema information about the fields (3) in **Source**, which are specified by **Fields** element of **SharedDataBaseInfo**. This schema information is returned via the **Fields** element of the **RecordSet** (section 2.2.2.8).

- If the request sent to the protocol server is the first GetData request in the session (2), then the protocol server MUST return the **SessionIdentifier** ([MS-ADR] section 3.2.1.2) in the **SessionId** element of the **PagingInfo** (section 2.2.2.6). The **PagingInfo** type is returned as an element in the **RecordSet**, which is returned as the **Result** element of the **ServiceResult** (section 2.2.2.10) complex type.

In the event of an application error on the protocol server during this operation, the **ServiceError**, as specified in section 2.2.2.9, MUST be present in **ServiceResult** (section 2.2.2.10).

3.1.5.1.2 InsertRecords

This operation inserts records into an **Updatable Source** (section 3.1.1) specified in the **SelectCommand** element of the **SharedDataBaseInfo** element in the request body (section 2.2.2.11).

The protocol server receives a JSON request that contains the **SharedDataBaseInfo** and **UpdateRecord** (section 2.2.2.12) objects. The protocol server processes the request and responds with a JSON response that contains the **ServiceResult** (section 2.2.2.10). The **Values** element of **RecordSet** (section 2.2.2.8) returned as the **Result** element of the **ServiceResult** contains the records of data which the protocol server inserted.

In the event of an application error on the protocol server, the **ServiceError** element (section 2.2.2.9) MUST be present in **ServiceResult** (section 2.2.2.10).

This operation is transported by an HTTP **POST**.

The **serviceName** as specified in section 3.1.5.1 MUST be "InsertRecords".

The processing details for this operation are specified by section 3.1.5.1.2.3.

3.1.5.1.2.1 Request Body

The **SharedDataBaseInfo** (section 2.2.2.11) and **UpdateRecord** (section 2.2.2.12) objects in Request Body determine the values for the fields (3) of the records to be inserted into the **Updatable Source** (section 3.1.1). The **Updatable Source** is specified by the **FieldSchema** elements in **RecordSet** (section 2.2.2.8) returned as the **Result** element in the Response Body of a prior **GetData** operation (section 3.1.5.1.2).

The values to be inserted are specified by the **NewValues** element of **UpdateRecord.** These values MUST be formatted according to the **FormatInfo** element of **SharedDataBaseInfo.** The **SessionId** element of **SharedDataBaseInfo** MUST be the same as the **SessionId** element of the **PagingInfo** which is an element of **RecordSet** (section 2.2.2.8) returned as the **Result** element in Response Body of the first **GetData** operation.

```
InsertRecordsRequest = dataBaseInfo-member updateRecord-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
updateRecord-member = json-quotation-mark "updateRecord" json-quotation-mark json-name-
separator UpdateRecord
```

dataBaseInfo: A **SharedDataBaseInfo** (section 2.2.2.11) that specifies information about the **Updatable Source** (section 3.1.1) into which records are to be inserted.

updateRecord: An **UpdateRecord** (section 2.2.2.12) that specifies the values for the fields (3) of the records to be inserted.

- The number of fields (3) in each record MUST be the same for all the records, and MUST match the number and ordering of fields (3) in the **FieldNames** element of **dataBaseInfo**.

- The value of primary key fields (3) in **NewValues** element MUST be "null".

- Each field (3) value at an ordinal in a record array from the **NewValues** element MUST be formatted according to the **FormatInfo** at the same ordinal in the **FormatInfos** array of the **dataBaseInfo**.

- The **OriginalValues** element of the **UpdateRecord** MUST be ignored.

- The field (3) value at an ordinal in a record array from the **NewValues** element MUST be "null" if the **ReadOnly** element of the **FieldSchema** element at the same ordinal in the **Fields** array of the **RecordSet** (section 2.2.2.8), returned in the **Result** element of the **ServiceResult** element from a previous call to the **GetData** operation (section 3.1.5.1.1) is "true".

3.1.5.1.2.2 Response Body

Returns the values of the successfully inserted records in the **Values** element of the **RecordSet** (section 2.2.2.8) returned in the **Result** element of the **ServiceResult** (section 2.2.2.10) in the Response Body. In the event of an error on the protocol server, a **ServiceError** (section 2.2.2.9) is returned in the **Error** part of **ServiceResult**.

```
InsertRecordsResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult
```

InsertRecordsResult: A **ServiceResult** (section 2.2.2.10) that specifies the records which are inserted by the protocol server. MUST be present.

- The **Paging** element of the **RecordSet** MUST be the same as the **Paging** element of the **UpdateRecord** (section 2.2.2.12) which is passed in as an input element in the **Request Body** (section 3.1.5.1.2.1) of the protocol operation.

3.1.5.1.2.3 Processing Details

The protocol server processes **SharedDataBaseInfo** (section 2.2.2.11) and **UpdateRecord** (section 2.2.2.12) and inserts a collection of records in the **Updatable Source** (section 3.1.1), which is specified by **SelectCommand** of **SharedDataBaseInfo**.

The protocol server responds as specified in [MS-ADR] section 3.2.4.8, except as follows:

- The values for the fields (3) of the new records are retrieved from the **NewValues** property of **UpdateRecord**.

- The protocol server retrieves the values of all fields (3) of the newly inserted records from the **Updatable Source** and returns them in the **Values** element of **RecordSet** (section 2.2.2.8), which is the **Result** element of **ServiceResult** (section 2.2.2.10) in Response Body.

In the event of an application error on the protocol server during this operation, the **ServiceError**, as specified in section 2.2.2.9, MUST be present in **ServiceResult** (section 2.2.2.10).

3.1.5.1.3 UpdateRecords

This operation updates records in an **Updatable Source** (section 3.1.1), specified in the **SelectCommand** element of **SharedDataBaseInfo** (section 2.2.2.11) in the request body of the operation (section 3.1.5.1.3.1).

The protocol server receives a JSON request that contains the **SharedDataBaseInfo** (section 2.2.2.11) and **UpdateRecord** (section 2.2.2.12) objects. The protocol server processes the request and responds with a JSON response that contains **ServiceResult** (section 2.2.2.10). The **Values** element of **RecordSet** (section 2.2.2.8) returned as the **Result** element of the **ServiceResult** contains the records which the protocol server updated.

In the event of an application error on the protocol server during this operation, the **ServiceError** element (section 2.2.2.9) MUST be present in **ServiceResult** (section 2.2.2.10).

This operation is transported by an HTTP **POST**.

The **serviceName** as specified in section 3.1.5.1 MUST be "UpdateRecords".

The processing details for this operation are specified by section 3.1.5.1.3.3.

3.1.5.1.3.1 Request Body

The **SharedDataBaseInfo** (section 2.2.2.11) and **UpdateRecord** (section 2.2.2.12) objects in Request Body determine the original and new values for the fields (3) of the records to be updated into the **Updatable Source**. The **Updatable Source** is specified by the **FieldSchema** elements in **RecordSet** (section 2.2.2.8) returned as the **Result** element in the Response Body of a prior **GetData** operation (section 3.1.5.1.1.2)**.**

The original values and new values are specified by the **OriginalValues** and **NewValues** elements of the **UpdateRecord,** respectively**.** These values MUST be formatted according to the **FormatInfo** element of **SharedDataBaseInfo.** The **SessionId** element of the **SharedDataBaseInfo** MUST be same as the **SessionId** element of the **PagingInfo** element of **RecordSet** (section 2.2.2.8) returned in the **Result** element in Response Body of the first **GetData** operation.

```
UpdateRecordsRequest = dataBaseInfo-member updateRecord-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
updateRecord-member = json-quotation-mark "updateRecord" json-quotation-mark json-name-
separator UpdateRecord
```

dataBaseInfo: A **SharedDataBaseInfo** (section 2.2.2.11) that specifies information about the **Updatable Source** to be updated.

updateRecord: An **UpdateRecord** (section 2.2.2.12) that specifies the values for the fields (3) of the records to be updated.

- The number of records in **NewValues** element and **OriginalValues** element MUST be the same.

- The number of fields (3) in each record MUST be same for all the records, and MUST match the number and ordering of fields (3) in **FieldNames** element of **dataBaseInfo**.

- The fields (3) value at an ordinal in a record array from the **OriginalValues** element MUST be of the same data type as specified by the **DataType** element of the **FieldSchema** element at the same ordinal in the **Fields** array of **RecordSet** (section 2.2.2.8), returned in the **Result** element of **ServiceResult** element of a prior call to **GetData** operation (section 3.1.5.1.1).

- Each field (3) value at an ordinal in a record array from the **NewValues** element MUST be formatted according to the **FormatInfo** (section 2.2.2.5) at the same ordinal in the **FormatInfos** array of the **dataBaseInfo.**

- Each primary key fields (3) value at an ordinal in a record array from the **NewValues** element, when converted to a number MUST be equal to the value of field (3) at the same ordinal in a record array from the **OriginalValues** element.

- If value of any field (3) in **OriginalValues** element is "null", that field (3) is ignored by the protocol server and is not updated in the **Updatable Source**.

- The field (3) value at an ordinal in a record array from the **NewValues** and **OriginalValues** elements MUST be "null" if the **ReadOnly** element of the **FieldSchema** element at the same ordinal in the **Fields** array of the **RecordSet** (section 2.2.2.8), returned in the **Result** element of the **ServiceResult** element from a prior call to the **GetData** operation (section 3.1.5.1.1) is "true".

3.1.5.1.3.2   Response Body

Returns the values of the successfully updated records in the **Values** element of the **RecordSet** (section 2.2.2.8) returned in the **Result** element of the **ServiceResult** (section 2.2.2.10) in the Response Body. In the event of an error on the protocol server, a **ServiceError** (section 2.2.2.9) is returned in the **Error** part of **ServiceResult**.

```
UpdateRecordsResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult
```

UpdateRecordsResult: A **ServiceResult** (section 2.2.2.10) that specifies the records which are updated by the protocol server. MUST be present.

- The **Paging** element of the **RecordSet** MUST be same as the **Paging** element of the **UpdateRecord** (section 2.2.2.12) which is passed in as an input element in the **Request Body** (section 3.1.5.1.3.1) of the protocol operation.

3.1.5.1.3.3   Processing Details

The protocol server processes the **SharedDataBaseInfo** (section 2.2.2.11) and **UpdateRecord** (section 2.2.2.12) and updates a record in the **Updatable Source** (section 3.1.1), specified by **SelectCommand** of **SharedDataBaseInfo**.

The protocol server responds as specified in [MS-ADR] section 3.2.4.12, except as follows:

- The new values for the fields (3) of the records to be updated are retrieved from the **NewValues** property of **UpdateRecord**.

- The original values for the fields (3) of the records to be updated are retrieved from the **OriginalValues** property of **UpdateRecord**.

- The protocol server retrieves the newly updated records from the **Updatable Source** and returns them in the **Values** element of **RecordSet** (section 2.2.2.8) which is returned as the **Result** element of **ServiceResult** (section 2.2.2.10) in Response Body.

3.1.5.1.4 DeleteRecords

This operation deletes records from an **Updatable Source** (section 3.1.1), specified in the **SelectCommand** element of **SharedDataBaseInfo** (section 2.2.2.11) in the request body of the operation (section 3.1.5.1.4.1).

The protocol server receives a JSON request that contains the **SharedDataBaseInfo** (section 2.2.2.11) and **UpdateRecord** (section 2.2.2.12) objects. The protocol server processes the request and responds with a JSON response that contains **ServiceResult** (section 2.2.2.10). The **Values** element of **RecordSet** (section 2.2.2.8) returned as the **Result** element of the **ServiceResult** contains a subset of the remaining records from the **Updatable Source**, after the requested records have been deleted.

In the event of an application error on the protocol server during this operation, the **ServiceError** element (section 2.2.2.9) MUST be present in **ServiceResult** (section 2.2.2.10)

This operation is transported by an HTTP **POST**.

The **serviceName** as specified in section 3.1.5.1 MUST be "DeleteRecords".

The processing details for this operation are specified by section 3.1.5.1.4.3.

3.1.5.1.4.1 Request Body

The **SharedDataBaseInfo** (section 2.2.2.11) and **UpdateRecord** (section 2.2.2.12) objects in Request Body determine the records to be deleted from **Updatable Source** (section 3.1.1). The **Updatable Source** is specified by the **FieldSchema** elements in **RecordSet** (section 2.2.2.8) returned as the **Result** element in the Response Body of a prior **GetData** operation (section 3.1.5.1.1.2).

The **SessionId** element of the **SharedDataBaseInfo** must be same as the **SessionId** element of the **PagingInfo** element of **RecordSet**, which is returned in the **Result** element in Response Body of the first **GetData** operation.

```
DeleteRecordsRequest = dataBaseInfo-member updateRecord-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
updateRecord-member = json-quotation-mark "updateRecord" json-quotation-mark json-name-
separator UpdateRecord
```

dataBaseInfo: A **SharedDataBaseInfo** (section 2.2.2.11) that specifies information about the **Updatable Source** from which records are to be deleted.

updateRecord: An **UpdateRecord** (section 2.2.2.12) that specifies the original values for the fields (3) of the records to be deleted.

- The number of fields (3) in each record from **OriginalValues** element of **UpdateRecord** MUST be the same for all the records, and MUST match the number and ordering of fields (3) in the **FieldNames** element of **dataBaseInfo**.

- The value of primary key fields (3) in **OriginalValues** element MUST NOT be "null".

- The values of fields (3) which are not primary key, are ignored.

- The **NewValues** element of the **UpdateRecord** MUST be ignored.

3.1.5.1.4.2   Response Body

Returns the values of a subset of remaining records from the **Updatable Source** (section 3.1.1) in the **Values** element of the **RecordSet** (section 2.2.2.8) returned by the **Result** element of the **ServiceResult** (section 2.2.2.10) in the Response Body. In the event of an error on the protocol server, a **ServiceError** (section 2.2.2.9) is returned in the **Error** part of **ServiceResult.**

```
DeleteRecordsResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult
```

DeleteRecordsResult: A **ServiceResult** (section 2.2.2.10) that specifies a subset of the remaining records from **Updatable Source** after the requested records have been deleted by protocol server. MUST be present.

- The **Paging** element of the **RecordSet** MUST be same as the **Paging** element of the **UpdateRecord** (section 2.2.2.12) which is passed in as an input element in the **Request Body** (section 3.1.5.1.2.1) of the protocol operation.

3.1.5.1.4.3   Processing Details

The protocol server processes the **SharedDataBaseInfo** (section 2.2.2.11) and **UpdateRecord** (section 2.2.2.12) and then deletes a collection of records from the **Updatable Source** (section 3.1.1), which is specified by **SelectCommand** of **SharedDataBaseInfo**.

The protocol server responds as specified in [MS-ADR] section 3.2.4.2, except as follows:

- The values of the primary key fields (3) of each records are retrieved from the **OriginalValues** element of **UpdateRecord**.

- The protocol server returns a subset of the remaining records retrieved according to the **FirstRow** and the **PageSize elements** of the **PagingInfo** element of the **UpdateRecord**.

3.1.5.1.5   GetDistinctValues

This operation retrieves records with distinct values for a field (3) from **Source** (section 3.1.1), specified in the **SelectCommand** element of **SharedDataBaseInfo** (section 2.2.2.11) in the request body of the operation (section 3.1.5.1.5.1).

The protocol server receives a JSON request that contains the **SharedDataBaseInfo** and **PagingInfo** (section 2.2.2.6) objects. The request also contains a **columnName** for which distinct values are requested. The protocol server processes the request and responds with a JSON response that contains **ServiceResult** (section 2.2.2.10). The **Values** element of **RecordSet** (section 2.2.2.8) returned as the **Result** element of the **ServiceResult** contains the records from the **Source**, which contain distinct values for the requested **columnName.**

In the event of an application error on the protocol server during this operation, the **ServiceError** element (section 2.2.2.9) MUST be present in **ServiceResult** (section 2.2.2.10)

This operation is transported by an HTTP **POST**.

The **serviceName** as specified in section 3.1.5.1 MUST be "GetDistinctValues".

The processing details for this operation are specified by section 3.1.5.1.5.3

3.1.5.1.5.1 Request Body

The **SharedDataBaseInfo (**section 2.2.2.11) and **PagingInfo** (section 2.2.2.6) objects and the **columnName** element in Request Body determine which records are to be fetched from a **Source** (section 3.1.1), which is specified by the **SelectCommand** element of the **SharedDataBaseInfo.**

```
GetDistinctValuesRequest = dataBaseInfo-member columnName-member pagingInfo-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
columnName-member = json-quotation-mark "columnName" json-quotation-mark json-name-separator
json-string
pagingInfo-member = json-quotation-mark "pagingInfo" json-quotation-mark json-name-separator
PagingInfo
```

dataBaseInfo: A **SharedDataBaseInfo** (section 2.2.2.11) that specifies the **Source**, the fields (3) from this **Source**, the sort order and restriction criteria of the records that should be retrieved from database application.

columnName: A **json-string** (section 2.2.1) that specifies the field (3) in the **Source** for which distinct values are retrieved.

pagingInfo: A **PagingInfo** (section 2.2.2.6) that specifies which records should be retrieved from the database application.

3.1.5.1.5.2 Response Body

Returns the values of field (3) specified by **columnName** from the **Source** (section 3.1.1) in the **Values** element of the **RecordSet** (section 2.2.2.8) returned by the **Result** element of the **ServiceResult** (section 2.2.2.10) in the Response Body. In the event of an error on the protocol server, a **ServiceError** (section 2.2.2.9) is returned in the **Error** part of **ServiceResult**

```
GetDistinctValuesResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult
```

GetDistinctValuesResult: A **ServiceResult** (section 2.2.2.10) that specifies the rows containing distinct values for the field (3) specified by **columnName** element. MUST be present.

3.1.5.1.5.3 Processing Details

The protocol server processes the **SharedDataBaseInfo** (section 2.2.2.11) and **PagingInfo** (section 2.2.2.6) objects and returns a subset of records from the **Source** (section 3.1.1), which contains distinct values for the field (3), specified by **columnName** in the Request Body.

The protocol server responds as specified in [MS-ADR] section 3.2.4.5, except as follows:

▪ The protocol server retrieves data from the given **Source** passed in as the **SelectCommand** element of the **SharedDataBaseInfo** (section 2.2.2.11), an input element of the Request Body (section 3.1.5.1.5.1).

- Values are retrieved only for the field (3) that is specified by **columnName** input element of the Request Body.

3.1.5.1.6 FixupRow

This operation returns the resulting values of modeling a hypothetical update on one of the records in an **Updatable Source** (section 3.1.1), specified in the **SelectCommand** element of **SharedDataBaseInfo** (section 2.2.2.11) in the request body of the operation (section 3.1.5.1.6.1).

The protocol server receives a JSON request that contains the **SharedDataBaseInfo** (section 2.2.2.11) and **FixupRecord** (section 2.2.2.4) objects. The protocol server processes the request and responds with a JSON response that contains **ServiceResult** (section 2.2.2.10). The **Values** element of **RecordSet** (section 2.2.2.8) returned as **Result** element of the **ServiceResult** contains the record from the **Updatable Source**, which contains resulting values of hypothetical update on that record.

In the event of an application error on the protocol server during this operation, the **ServiceError** element (section 2.2.2.9) MUST be present in **ServiceResult** (section 2.2.2.10)

This operation is transported by an HTTP **POST.**

The **serviceName** as specified in section 3.1.5.1 MUST be "FixupRow".

The processing details for this operation are specified by section 3.1.5.1.6.3.

3.1.5.1.6.1 Request Body

The **SharedDataBaseInfo** (section 2.2.2.11) and **FixupRecord** (section 2.2.2.12) objects in Request Body determine the values for the fields (3) of the record for which an update is to be modeled in the **Updatable Source** (section 3.1.1). The **Updatable Source** is specified by the **FieldSchema** elements in **RecordSet** (section 2.2.2.8) returned as the **Result** element in the Response Body of a prior **GetData** operation (section 3.1.5.1.1.2). This operation just returns the result of the hypothetical update. The fields (3) in **Updatable Source** are not updated.

```
FixupRowRequest = dataBaseInfo-member fixupRecord-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
fixupRecord-member = json-quotation-mark "fixupRecord" json-quotation-mark json-name-
separator FixupRecord
```

dataBaseInfo: A **SharedDataBaseInfo** (section 2.2.2.11) that specifies information about **Updatable Source** on which hypothetical update is to be performed.

- The **SessionId** element of **SharedDataBaseInfo** must be same as the **SessionId** element of the **PagingInfo** element of **RecordSet** (section 2.2.2.8), which is returned in the **Result** element in Response Body of the first **GetData** operation (section 3.1.5.1.1.2).

fixupRecord: A **FixupRecord** (section 2.2.2.4) that specifies the values for the fields (3) of the records which are to be used for the hypothetical update.

- The values to be updated are specified by the **SupportingFieldValues** element of **FixupRecord.**

- These values are for the fields (3) whose indexes in **Fields** array of **RecordSet** (section 2.2.2.8), returned in the **Result** element of **ServiceResult** element of a previous call to **GetData** operation (section 3.1.5.1.1) are specified by **SupportingFieldIndexes** element.

- These values MUST be formatted according to the **FormatInfo** element of **SharedDataBaseInfo.**

- The number of values in **SupportingFieldValues** element and **SupportingFieldIndexes** element MUST be the same.

- The value of the primary key field (3) of the **Updatable Source** is specified by the **Key** element of the **FixupRecord**.

3.1.5.1.6.2   Response Body

Returns the resulting values of the successful hypothetical update in the **Values** element of the **RecordSet** (section 2.2.2.8) returned in the **Result** element of the **ServiceResult** (section 2.2.2.10) in the Response Body. In the event of an error on the protocol server, a **ServiceError** (section 2.2.2.9) is returned in the **Error** part of **ServiceResult.**

```
FixupRowResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult
```

FixupRowResult: A **ServiceResult** (section 2.2.2.10) that specifies the row that is result of hypothetical update. MUST be present.

3.1.5.1.6.3   Processing Details

The protocol server processes the **SharedDataBaseInfo** (section 2.2.2.11) and **FixupRecord** (section 2.2.2.4) objects and returns a record from the **Updatable Source** (section 3.1.1), which is specified by the **SelectCommand** element of **SharedDataBaseInfo** (section 2.2.2.11)**.** The values contain the resulting values of a hypothetical update performed on that record.

The protocol server responds as specified in [MS-ADR] section 3.2.4.3, except as follows:

- The original record is retrieved from **Updatable Source** (section 3.1.1). The primary key of the record MUST match the **Key** element from **FixupRecord** (section 2.2.2.4).

- In the event of an application error on the protocol server during this operation, the **ServiceError**, as specified in section 2.2.2.9, MUST be present in **ServiceResult** (section 2.2.2.10).

3.1.5.1.7   GetSearchData

This operation retrieves records from **Source** (section 3.1.1), specified in the **SelectCommand** element of **SharedDataBaseInfo** (section 2.2.2.11) in the request body of the operation (section 3.1.5.1.7.1).

The protocol server receives a JSON request that contains the **SharedDataBaseInfo** object. The protocol server processes the request and responds with a JSON response that contains **ServiceResult** (section 2.2.2.10). The **Values** element of **RecordSet** (section 2.2.2.8) returned as the **Result** element of the **ServiceResult** contains the records from the **Source,** which matches the following conditions.

- A maximum of 9 records are retrieved.

- In each record, the combination of values of fields(3) whose indexes in **FieldNames** are 0 and 1 MUST be distinct.

- Only records where value of the field (3) whose index in **FieldNames** is 1, contains the **Restriction** element of **SharedDataBaseInfo** are retrieved.

In the event of an application error on the protocol server during this operation, the **ServiceError** element (section 2.2.2.9) MUST be present in **ServiceResult** (section 2.2.2.10)

This operation is transported by an HTTP **POST**.

The **serviceName** as specified in section 3.1.5.1 MUST be "GetSearchData".

The processing details for this operation are specified by section 3.1.5.1.7.3.

3.1.5.1.7.1 Request Body

The **SharedDataBaseInfo (**section 2.2.2.11) object in Request Body determines fields (3) to be retrieved from a **Source** (section 3.1.1), which is specified by the **SelectCommand** element of the **SharedDataBaseInfo.**

```
GetSearchDataRequest = dataBaseInfo-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
```

dataBaseInfo: A **SharedDataBaseInfo** (section 2.2.2.11) that specifies information about **Source** from which records are to be retrieved from database application.

- The fields (3) for which data is to be retrieved are specified by the **FieldNames** element of the **SharedDataBaseInfo**.

- At least two fields (3) MUST be present in the **FieldNames** element.

- At most three fields (3) MUST be present in the **FieldNames** element.

- **Restriction** element of **SharedDataBaseInfo** MUST NOT be empty.

3.1.5.1.7.2 Response Body

Returns the values of field (3) specified by the **FieldNames** element of **SharedDataBaseInfo** (section 2.2.2.11) from the **Source** (section 3.1.1) in the **Values** element of the **RecordSet** (section 2.2.2.8) returned by the **Result** element of the **ServiceResult** (section 2.2.2.10) in the Response Body. In the event of an error on the protocol server, a **ServiceError** (section 2.2.2.9) is returned in the **Error** part of **ServiceResult**

```
GetSearchDataResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult
```

GetSearchDataResult: A **ServiceResult** (section 2.2.2.10) that specifies the rows containing values for field (3) specified by **FieldNames** element of **SharedDataBaseInfo**. MUST be present

3.1.5.1.7.3 Processing Details

The protocol server processes the **SharedDataBaseInfo** (section 2.2.2.11) object and returns at most 9 records from the **Source** (section 3.1.1), which contains distinct values for the combination of fields (3), with indexes 0 and 1 in the **FieldNames** element of **SharedDataBaseInfo** element in the Request Body.

The processing is done as follows.

- The protocol server retrieves data from the given **Source** passed in as the **SelectCommand** element of the **SharedDataBaseInfo** (section 2.2.2.11), an input element of the Request Body (section 3.1.5.1.5.1).

- Values are retrieved only for the first three fields (3) specified by the **FieldNames** element of the **SharedDataBaseInfo** input element of the Request Body.

- In each record, the combination of values of fields(3) whose indexes in **FieldNames** are 0 and 1 MUST be distinct.

- Only records where value of the field (3) whose index in **FieldNames** is 1, contains the **Restriction** element of **SharedDataBaseInfo** are retrieved.

3.1.6   Timer Events

None

3.1.6.1   Session Timeout

Session Timeout, as specified by [MS-ADR] section 3.2.5.1.

3.1.7   Other Local Events

None.

4 Protocol Examples

4.1 GetData Service Operation

This example shows fetching a subset of rows from a Source (section 3.1.1).

The protocol client sends the following message to the protocol server to perform a GetData operation.

```
{ "dataBaseInfo" : { "AllowAdditions" : true,
     "AllowDeletions" : true,
     "AllowEdits" : true,
     "FetchSchema" : true,
     "SelectCommand" : "Employees"
   },
  "pagingInfo" : { "CacheCommands" : 8,
     "FirstRow" : 0,
     "PageSize" : 50,
     "SortExpression" : "<Ordering
xmlns=\"http://schemas.microsoft.com/office/accessservices/2010/12/application\" ><Order
Name=\"FirstName\" Direction=\"Ascending\" /></Ordering>",
     "UseCache" : false
   }
}
```

The protocol server sends back the following response.

```
{ "d" : { "Error" : null,
    "Result" : { "AggregateLocalized" : null,
       "AggregateValues" : null,
       "AnonymousCanInsert" : false,
       "AnonymousCanRead" : true,
       "DataMacroInstanceIds" : null,
       "Fields" : [ { "AllowMultipleValues" : false,
            "ColumnName" : "ID",
            "CurrencySymbol" : null,
            "DataType" : "Int",
            "DecimalPlaces" : -1,
            "DefaultExpression" : null,
            "DefaultValue" : "",
            "DependentFields" : null,
            "FormatString" : null,
            "IsKey" : true,
            "IsTableQueryLookup" : false,
            "KeyIndex" : -1,
            "LookupBoundField" : null,
            "LookupDisplayField" : null,
            "LookupSortType" : null,
            "LookupSource" : null,
            "MaxLength" : 4,
            "ReadOnly" : true,
            "Required" : true,
            "SourceObject" : null,
            "TextType" : null,
            "ValidationMessage" : null,
            "ValidationScript" : null
          },
```

```
                       { "AllowMultipleValues" : false,
                         "ColumnName" : "FirstName",
                         "CurrencySymbol" : null,
                         "DataType" : "NVarChar",
                         "DecimalPlaces" : -1,
                         "DefaultExpression" : null,
                         "DefaultValue" : "",
                         "DependentFields" : null,
                         "FormatString" : null,
                         "IsKey" : false,
                         "IsTableQueryLookup" : false,
                         "KeyIndex" : -1,
                         "LookupBoundField" : null,
                         "LookupDisplayField" : null,
                         "LookupSortType" : null,
                         "LookupSource" : null,
                         "MaxLength" : 220,
                         "ReadOnly" : false,
                         "Required" : false,
                         "SourceObject" : null,
                         "TextType" : "SingleLine",
                         "ValidationMessage" : null,
                         "ValidationScript" : null
                       },
                       { "AllowMultipleValues" : false,
                         "ColumnName" : "LastName",
                         "CurrencySymbol" : null,
                         "DataType" : "NVarChar",
                         "DecimalPlaces" : -1,
                         "DefaultExpression" : null,
                         "DefaultValue" : "",
                         "DependentFields" : null,
                         "FormatString" : null,
                         "IsKey" : false,
                         "IsTableQueryLookup" : false,
                         "KeyIndex" : -1,
                         "LookupBoundField" : null,
                         "LookupDisplayField" : null,
                         "LookupSortType" : null,
                         "LookupSource" : null,
                         "MaxLength" : 220,
                         "ReadOnly" : false,
                         "Required" : false,
                         "SourceObject" : null,
                         "TextType" : "SingleLine",
                         "ValidationMessage" : null,
                         "ValidationScript" : null
                       }
                     ],
                 "FormatInfos" : [ [ { "Currency" : null,
                         "Format" : null,
                         "Precision" : -1,
                         "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
                       } ],
                     [ { "Currency" : null,
                         "Format" : null,
                         "Precision" : -1,
                         "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
                       } ],
```

```
                    [ { "Currency" : null,
                        "Format" : null,
                        "Precision" : -1,
                        "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
                    } ]
                ],
            "IsAnonymous" : false,
            "Localized" : [ [ null,
                    null,
                    null
                ] ],
            "Paging" : { "CacheCommands" : 8,
                "Filter" : null,
                "FirstRow" : 0,
                "Moniker" : null,
                "PageSize" : 50,
                "SessionId" : "36.31b40d30-46c9-4850-9546-
3ac936024abd163.1.V22.50DEXMZ5ML2xUiPMVnvjBS90.5.en-US5.en-US73.+0480#0000-11-00-
01T02:00:00:0000#+0000#0000-03-00-02T02:00:00:0000#-006036.00000000-0000-0000-0000-
0000000000001.U",
                "SortExpression" : "<Ordering
xmlns=\"http://schemas.microsoft.com/office/accessservices/2010/12/application\" ><Order
Name=\"FirstName\" Direction=\"Ascending\" /></Ordering>",
                "TotalRows" : 1,
                "UseCache" : false,
                "__type" : "Microsoft.Office.Access.Services.UI.PagingInfo"
            },
            "RecordStatuses" : null,
            "Values" : [ [ 1,
                    "Updated First Name",
                    "Last Name"
                ] ]
        },
        "__type" : "Microsoft.Office.Access.Services.UI.ServiceResult"
    } }
```

4.2 InsertRecords Service Operation

This example describes how to use InsertRecords Service Operation method to insert an item into a table.

The protocol client sends the following message to the protocol server to insert an item into a table.

```
{ "dataBaseInfo" : { "AggregateExpressions" : null,
        "AggregateFormatInfos" : [ ],
        "AllowAdditions" : true,
        "AllowDeletions" : true,
        "AllowEdits" : true,
        "FetchSchema" : false,
        "FieldNames" : [ "ID",
            "FirstName",
            "LastName"
        ],
        "FormatInfos" : [ [ { "Currency" : null,
            "Format" : null,
            "Precision" : -1
            } ] ],
        "ParameterValues" : null,
```

```
      "SelectCommand" : "Employees",
      "SessionId" : "36.31b40d30-46c9-4850-9546-
3ac936024abd163.1.V22.47oNwJCV0bA0inRQRXCt3u90.5.en-US5.en-US73.+0480#0000-11-00-
01T02:00:00:0000#+0000#0000-03-00-02T02:00:00:0000#-006036.00000000-0000-0000-0000-
0000000000001.U"
    },
  "updateRecord" : { "NewValues" : [ [ null,
          "First Name",
          "Last Name"
        ] ],
      "Paging" : { "CacheCommands" : 0,
          "Filter" : null,
          "FirstRow" : 0,
          "Moniker" : null,
          "PageSize" : 1,
          "SessionId" : null,
          "SortExpression" : "<Ordering
xmlns=\"http://schemas.microsoft.com/office/accessservices/2010/12/application\" ><Order
Name=\"FirstName\" Direction=\"Ascending\" /></Ordering>",
          "TotalRows" : 1,
          "UseCache" : true
        },
      "ReturnDataMacroIds" : false
    }
}
```

The protocol server sends back the following response.

```
{ "d" : { "Error" : null,
      "Result" : { "AggregateLocalized" : null,
          "AggregateValues" : null,
          "AnonymousCanInsert" : false,
          "AnonymousCanRead" : true,
          "DataMacroInstanceIds" : null,
          "Fields" : null,
          "FormatInfos" : [ [ { "Currency" : null,
                "Format" : null,
                "Precision" : -1,
                "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
              } ],
            [ { "Currency" : null,
                "Format" : null,
                "Precision" : -1,
                "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
              } ],
            [ { "Currency" : null,
                "Format" : null,
                "Precision" : -1,
                "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
              } ]
          ],
          "IsAnonymous" : false,
          "Localized" : [ [ null,
              null,
              null
            ] ],
          "Paging" : { "CacheCommands" : 0,
              "Filter" : null,
```

```
                "FirstRow" : 0,
                "Moniker" : null,
                "PageSize" : 1,
                "SessionId" : null,
                "SortExpression" : "<Ordering
    xmlns=\"http://schemas.microsoft.com/office/accessservices/2010/12/application\" ><Order
    Name=\"FirstName\" Direction=\"Ascending\" /></Ordering>",
                "TotalRows" : 1,
                "UseCache" : true,
                "__type" : "Microsoft.Office.Access.Services.UI.PagingInfo"
            },
          "RecordStatuses" : null,
          "Values" : [ [ 1,
                "First Name",
                "Last Name"
                ] ]
        },
      "__type" : "Microsoft.Office.Access.Services.UI.ServiceResult"
    } }
```

4.3 UpdateRecords Service Operation

This example describes how to use **UpdateRecords** Service Operation method (section 3.1.5.1.3) to update an item into a table.

The protocol client sends the following message to the protocol server to update an item into a table:

```
{ "dataBaseInfo" : { "AggregateExpressions" : null,
      "AggregateFormatInfos" : [  ],
      "AllowAdditions" : true,
      "AllowDeletions" : true,
      "AllowEdits" : true,
      "FetchSchema" : false,
      "FieldNames" : [ "ID",
          "FirstName",
          "LastName"
        ],
      "FormatInfos" : [ [ { "Currency" : null,
            "Format" : null,
            "Precision" : -1
          } ] ],
      "ParameterValues" : null,
      "SelectCommand" : "Employees",
      "SessionId" : "36.31b40d30-46c9-4850-9546-
3ac936024abd163.1.V22.47oNwJCV0bA0inRQRXCt3u90.5.en-US5.en-US73.+0480#0000-11-00-
01T02:00:00:0000#+0000#0000-03-00-02T02:00:00:0000#-006036.00000000-0000-0000-0000-
0000000000001.U"
    },
  "updateRecord" : { "NewValues" : [ [ "1",
          "Updated First Name",
          null
        ] ],
      "OriginalValues" : [ [ 1,
          "First Name",
          null
        ] ],
```

```
        "Paging" : { "CacheCommands" : 0,
            "Filter" : null,
            "FirstRow" : 0,
            "Moniker" : null,
            "PageSize" : 1,
            "SessionId" : null,
            "SortExpression" : "<Ordering
xmlns=\"http://schemas.microsoft.com/office/accessservices/2010/12/application\" ><Order
Name=\"FirstName\" Direction=\"Ascending\" /></Ordering>",
            "TotalRows" : 1,
            "UseCache" : true,
            "__type" : "Microsoft.Office.Access.Services.UI.PagingInfo"
        },
      "ReturnDataMacroIds" : false
    }
}
```

The protocol server sends back the following response.

```
{ "d" : { "Error" : null,
      "Result" : { "AggregateLocalized" : null,
          "AggregateValues" : null,
          "AnonymousCanInsert" : false,
          "AnonymousCanRead" : true,
          "DataMacroInstanceIds" : null,
          "Fields" : null,
          "FormatInfos" : [ [ { "Currency" : null,
                "Format" : null,
                "Precision" : -1,
                "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
              } ],
            [ { "Currency" : null,
                "Format" : null,
                "Precision" : -1,
                "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
              } ],
            [ { "Currency" : null,
                "Format" : null,
                "Precision" : -1,
                "__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"
              } ]
          ],
          "IsAnonymous" : false,
          "Localized" : [ [ null,
              null,
              null
            ] ],
          "Paging" : { "CacheCommands" : 0,
              "Filter" : null,
              "FirstRow" : 0,
              "Moniker" : null,
              "PageSize" : 1,
              "SessionId" : null,
              "SortExpression" : "<Ordering
xmlns=\"http://schemas.microsoft.com/office/accessservices/2010/12/application\" ><Order
Name=\"FirstName\" Direction=\"Ascending\" /></Ordering>",
              "TotalRows" : 1,
              "UseCache" : true,
```

```
                "__type" : "Microsoft.Office.Access.Services.UI.PagingInfo"
            },
            "RecordStatuses" : null,
            "Values" : [ [ 1,
                    "Updated First Name",
                    "Last Name"
                ] ]
        },
        "__type" : "Microsoft.Office.Access.Services.UI.ServiceResult"
    } }
```

4.4 DeleteRecords Service Operation

This example describes how to use DeleteRecords Service Operation method to delete an item from a table.

The protocol client sends the following message to the protocol server to delete an item from a table.

```
{ "dataBaseInfo" : { "AggregateExpressions" : null,
      "AggregateFormatInfos" : [  ],
      "AllowAdditions" : true,
      "AllowDeletions" : true,
      "AllowEdits" : true,
      "FetchSchema" : false,
      "FieldNames" : [ "ID",
          "FirstName",
          "LastName"
       ],
      "FormatInfos" : [ [ { "Currency" : null,
            "Format" : null,
            "Precision" : -1
          } ] ],
      "ParameterValues" : null,
      "SelectCommand" : "Employees",
      "SessionId" : "36.31b40d30-46c9-4850-9546-
3ac936024abd163.1.V22.51RMVPQFdeHSB2Ag5Mm53S90.5.en-US5.en-US73.+0480#0000-11-00-
01T02:00:00:0000#+0000#0000-03-00-02T02:00:00:0000#-006036.00000000-0000-0000-0000-
0000000000001.U"
    },
  "updateRecord" : { "OriginalValues" : [ [ 2,
          "First Name 1",
          "Last Name 1"
        ] ],
      "Paging" : { "CacheCommands" : 0,
          "Filter" : null,
          "FirstRow" : 1,
          "Moniker" : null,
          "PageSize" : 1,
          "SessionId" : null,
          "SortExpression" : "<Ordering
xmlns=\"http://schemas.microsoft.com/office/accessservices/2010/12/application\" ><Order
Name=\"FirstName\" Direction=\"Ascending\" /></Ordering>",
          "TotalRows" : 2,
          "UseCache" : true,
```

```
           "__type" : "Microsoft.Office.Access.Services.UI.PagingInfo"
         },
       "ReturnDataMacroIds" : false
     }
  }
```

The protocol server sends back the following response.

```
  { "d" : { "Error" : null,

"Result" : { "AggregateLocalized" : null,

"AggregateValues" : null,

"AnonymousCanInsert" : false,

"AnonymousCanRead" : true,

"DataMacroInstanceIds" : null,

"Fields" : null,

"FormatInfos" : [ [ { "Currency" : null,

"Format" : null,

"Precision" : -1,

"__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"

} ],

[ { "Currency" : null,

"Format" : null,

"Precision" : -1,

"__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"

} ],

[ { "Currency" : null,

"Format" : null,

"Precision" : -1,

"__type" : "Microsoft.Office.Access.Services.UI.FormatInfo"

} ]

],

"IsAnonymous" : false,

"Localized" : [ [ null,

null,
```

]],

"Paging" : { "CacheCommands" : 0,

"Filter" : null,

"FirstRow" : 0,

"Moniker" : null,

"PageSize" : 1,

"SessionId" : "36.31b40d30-46c9-4850-9546-
3ac936024abd163.1.V22.51RMVPQFdeHSB2Ag5Mm53S90.5.en-US5.en-US73.+0480#0000-11-00-
01T02:00:00:0000#+0000#0000-03-00-02T02:00:00:0000#-006036.00000000-0000-0000-0000-
0000000000001.U",

"SortExpression" : "<Ordering
xmlns=\"http://schemas.microsoft.com/office/accessservices/2010/12/application\"
><Order Name=\"FirstName\" Direction=\"Ascending\" /></Ordering>",

"TotalRows" : 1,

"UseCache" : true,

"__type" : "Microsoft.Office.Access.Services.UI.PagingInfo"

},

"RecordStatuses" : null,

"Values" : [[1,

"First Name",

"Last Name"

]]

},

"__type" : "Microsoft.Office.Access.Services.UI.ServiceResult"

    } }

5   Security

5.1   Security Considerations for Implementers

In addition to the security considerations applicable to the underlying protocols, there are security risks associated with exposing **session identifiers (2)**. If a session identifier (2) is exposed, it is possible for an attacker to read information from, or modify data in, a session (2) on the protocol server. An implementer of this protocol needs to consider keeping session identifiers (2) protected. There could be some cases where it is desirable to expose a session identifier (2), however, an implementer is to use caution in how they expose session identifiers (2) and consider the security risks.

5.2   Index of Security Parameters

None.

6 Appendix A: Full JSON ABNF

```
ClientMessage = json-object
MessageID = json-quotation-mark "MessageID" json-quotation-mark json-name-
separator  ClientMessageID
Context =  json-quotation-mark "Context" json-quotation-mark json-name-
separator  JsonArrayOfAnyType


FieldSchema = json-object
ColumnName = json-quotation-mark "ColumnName" json-quotation-mark json-name-separator json-
string
DataType = json-quotation-mark " DataType" json-quotation-mark json-name-separator json-
string
DefaultValue = json-quotation-mark "DefaultValue" json-quotation-mark json-name-
separator json-string
IsKey = json-quotation-mark "IsKey" json-quotation-mark json-name-separator json-bool
Required = json-quotation-mark "Required" json-quotation-mark json-name-separator json-bool
ReadOnly = json-quotation-mark " ReadOnly" json-quotation-mark json-name-separator json-bool
MaxLength = json-quotation-mark "MaxLength" json-quotation-mark json-name-separator json-int
DefaultExpression = json-quotation-mark "DefaultExpression" json-quotation-mark json-name-
separator json-string
ValidationScript = json-quotation-mark "ValidationScript" json-quotation-mark json-name-
separator  JsonString
ValidationMessage = json-quotation-mark "ValidationMessage" json-quotation-mark json-name-
separator ClientMessage
KeyIndex = json-quotation-mark "KeyIndex" json-quotation-mark json-name-separator json-int
SourceObject = json-quotation-mark "SourceObject" json-quotation-mark json-name-separator
json-string
DependentFields = json-quotation-mark "DependentFields" json-quotation-mark json-name-
separator JsonArrayOfInt
AllowMultipleValues = json-quotation-mark "AllowMultipleValues" json-quotation-mark json-
name-separator json-bool
FormatString = json-quotation-mark "FormatString" json-quotation-mark json-name-
separator json-string
CurrencySymbol = json-quotation-mark "CurrencySymbol" json-quotation-mark json-name-
separator json-string
DecimalPlaces = json-quotation-mark "DecimalPlaces" json-quotation-mark json-name-
separator json-int
TextType = json-quotation-mark "TextType" json-quotation-mark json-name-separator json-string
IsTableQueryLookup = json-quotation-mark "IsTableQueryLookup" json-quotation-mark json-name-
separator json-bool
LookupSource = json-quotation-mark "LookupSource" json-quotation-mark json-name-
separator json-string
LookupBoundField = json-quotation-mark "LookupBoundField" json-quotation-mark json-name-
separator json-string
LookupDisplayField = json-quotation-mark "LookupDisplayField" json-quotation-mark json-name-
separator json-string


FilterInfo = json-object
Culture = json-quotation-mark "Culture" json-quotation-mark json-name-separator  JsonString
Expression =  json-quotation-mark "Expression" json-quotation-mark json-name-
separator  JsonString
Fields = json-quotation-mark "Fields" json-quotation-mark json-name-
separator  JsonArrayOfStrings
Text = json-quotation-mark "Text" json-quotation-mark json-name-separator json-string


FixupRecord = json-object
Key = json-quotation-mark "Key" json-quotation-mark json-name-separator json-string
SupportingFieldIndexes = json-quotation-mark "SupportingFieldIndexes" json-quotation-mark
json-name-separator JsonArrayOfInt
```

```
SupportingFieldValues = json-quotation-mark "SupportingFieldValues" json-quotation-mark json-
name-separator JsonArrayOfString

FormatInfo = json-object
Currency = json-quotation-mark "Currency" json-quotation-mark json-name-separator json-string
Format = json-quotation-mark "Format" json-quotation-mark json-name-separator json-string
Precision = json-quotation-mark "Precision" json-quotation-mark json-name-separator json-int

PagingInfo = json-object
FirstRow = json-quotation-mark "FirstRow" json-quotation-mark json-name-separator json-int
PageSize = json-quotation-mark "PageSize" json-quotation-mark json-name-separator json-int
Moniker = json-quotation-mark "Moniker" json-quotation-mark json-name-separator (json-string
/ json-null)
UseCache = json-quotation-mark "UseCache" json-quotation-mark json-name-separator json-bool
CacheCommands = json-quotation-mark "CacheCommands" json-quotation-mark json-name-separator
CacheCommands
SortExpression = json-quotation-mark "SortExpression" json-quotation-mark json-name-separator
json-string
Filter = json-quotation-mark "Filter" json-quotation-mark json-name-separator FilterInfo
TotalRows = json-quotation-mark "TotalRows" json-quotation-mark json-name-separator json-int
SessionId = json-quotation-mark "SessionId" json-quotation-mark json-name-separator json-
string

ParameterValue = json-object
Name = json-quotation-mark "Name" json-quotation-mark json-name-separator json-string
Value = json-quotation-mark "Value" json-quotation-mark json-name-separator json-value

RecordSet = json-object
Values = json-quotation-mark "Values" json-quotation-mark json-name-separator
JsonArrayOfArrayOfAnyType
Localized = json-quotation-mark "Localized" json-quotation-mark json-name-separator
JsonArrayOfArrayOfArrayOfString
Paging = json-quotation-mark "Paging" json-quotation-mark json-name-separator PagingInfo
Fields = json-quotation-mark " Fields" json-quotation-mark json-name-separator json-begin-
array [FieldSchema *( json-value-separator FieldSchema) ] json-end-array
FormatInfos = json-quotation-mark "FormatInfos" json-quotation-mark json-name-separator json-
begin-array [FormatInfo *( json-value-separator FormatInfo) ] json-end-array

ServiceError = json-object
Message = json-quotation-mark "Message" json-quotation-mark json-name-separator ClientMessage
Caption = json-quotation-mark "Caption" json-quotation-mark json-name-separator (json-string
/ json-null)
HelpText = json-quotation-mark "HelpText" json-quotation-mark json-name-separator (json-
string / json-null)
HelpId = json-quotation-mark "HelpId" json-quotation-mark json-name-separator (json-string /
json-null)
Severity = json-quotation-mark "Severity" json-quotation-mark json-name-separator
MessageSeverity
Number = json-quotation-mark "Number" json-quotation-mark json-name-separator json-value

ServiceResult = json-object
Result = json-quotation-mark "Result" json-quotation-mark json-name-separator json-value
Error = json-quotation-mark "Error" json-quotation-mark json-name-separator ServiceError

SharedDataBaseInfo = json-object
SessionId = json-quotation-mark "SessionId" json-quotation-mark json-name-separator (json-
string | json-null)
SelectCommand = json-quotation-mark "SelectCommand" json-quotation-mark json-name-separator
(json-string | json-null)
```

```
ParameterValues = json-quotation-mark "ParameterValues" json-quotation-mark json-name-
separator json-begin-array [ParameterValue *( json-value-separator ParameterValue) ] json-
end-array
OriginalCommand = json-quotation-mark "OriginalCommand" json-quotation-mark json-name-
separator (json-string | json-null)
AggregateExpressions = json-quotation-mark "AggregateExpressions" json-quotation-mark json-
name-separator (json-string | json-null)
AggregateFormatInfos = json-quotation-mark "AggregateFormatInfos" json-quotation-mark json-
name-separator json-begin-array [FormatInfo *( json-value-separator FormatInfo) ] json-end-
array
Restriction = json-quotation-mark "Restriction" json-quotation-mark json-name-separator
(json-string | json-null)
Ordering = json-quotation-mark "Ordering" json-quotation-mark json-name-separator (json-
string | json-null)
AllowEdits = json-quotation-mark "AllowEdits" json-quotation-mark json-name-separator (json-
string | json-null)
AllowAdditions = json-quotation-mark "AllowAdditions" json-quotation-mark json-name-separator
(json-string | json-null)
AllowDeletions = json-quotation-mark "AllowDeletions" json-quotation-mark json-name-separator
(json-string | json-null)
DataEntry = json-quotation-mark "DataEntry" json-quotation-mark json-name-separator json-bool
FieldNames = json-quotation-mark "FieldNames" json-quotation-mark json-name-separator (json-
string | json-null)
FormatInfos = json-quotation-mark "FormatInfos" json-quotation-mark json-name-separator json-
begin-array [FormatInfo *( json-value-separator FormatInfo) ] json-end-array
DataLevelFormat = json-quotation-mark "DataLevelFormat" json-quotation-mark json-name-
separator json-bool
ShowHeaders = json-quotation-mark "ShowHeaders" json-quotation-mark json-name-separator json-
bool
InitialPage = json-quotation-mark "InitialPage" json-quotation-mark json-name-separator
(json-string | json-null)
FetchSchema = json-quotation-mark "FetchSchema" json-quotation-mark json-name-separator json-
bool
FetchKeyFields = json-quotation-mark "FetchKeyFields" json-quotation-mark json-name-separator
json-bool
FetchDisplayFields = json-quotation-mark "FetchDisplayFields" json-quotation-mark json-name-
separator json-bool

UpdateRecord = json-object
OriginalValues = json-quotation-mark "OriginalValues" json-quotation-mark json-name-separator
JsonArrayOfArrayOfAnyType
NewValues = json-quotation-mark "NewValues" json-quotation-mark json-name-separator
JsonArrayOfArrayOfString
Paging = json-quotation-mark "Paging" json-quotation-mark json-name-separator PagingInfo
ReturnDataMacroIds = json-quotation-mark "ReturnDataMacroIds" json-quotation-mark json-name-
separator json-bool

CacheCommands = json-string

ClientMessageID = json-string

MessageSeverity = json-string

GetDataRequest = dataBaseInfo-member pagingInfo-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
pagingInfo-member = json-quotation-mark "pagingInfo" json-quotation-mark json-name-separator
PagingInfo

GetDataResult = json-null | serviceResult-member
```

```
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult

InsertRecordsRequest = dataBaseInfo-member updateRecord-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo

InsertRecordsResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult

UpdateRecordsRequest = dataBaseInfo-member updateRecord-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
updateRecord-member = json-quotation-mark "updateRecord" json-quotation-mark json-name-
separator UpdateRecord

UpdateRecordsResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult

DeleteRecordsRequest = dataBaseInfo-member updateRecord-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
updateRecord-member = json-quotation-mark "updateRecord" json-quotation-mark json-name-
separator UpdateRecord

DeleteRecordsResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult

GetDistinctValuesRequest = dataBaseInfo-member columnName-member pagingInfo-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
columnName-member = json-quotation-mark "columnName" json-quotation-mark json-name-separator
json-string
pagingInfo-member = json-quotation-mark "pagingInfo" json-quotation-mark json-name-separator
PagingInfo

GetDistinctValuesResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult

FixupRowRequest = dataBaseInfo-member fixupRecord-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo
fixupRecord-member = json-quotation-mark "fixupRecord" json-quotation-mark json-name-
separator FixupRecord

FixupRowResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult

GetSearchDataRequest = dataBaseInfo-member
dataBaseInfo-member = json-quotation-mark "dataBaseInfo" json-quotation-mark json-name-
separator SharedDataBaseInfo

GetSearchDataResult = json-null | serviceResult-member
serviceResult-member = json-quotation-mark "d" json-quotation-mark json-name-separator
ServiceResult
```

7   Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

▪ Microsoft® Access® 15 Technical Preview

▪ Microsoft® SharePoint® Server 15 Technical Preview

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product 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.

8   Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

9   Index