



searchRetrieve: Part 3. searchRetrieve Operation: APD Binding for SRU 2.0 Version 1.0

Committee Specification Draft 01

08 December 2011

Specification URIs

This version:

<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part3-sru2.0/searchRetrieve-v1.0-csd01-part3-sru2.0.doc> (Authoritative)
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part3-sru2.0/searchRetrieve-v1.0-csd01-part3-sru2.0.html>
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part3-sru2.0/searchRetrieve-v1.0-csd01-part3-sru2.0.pdf>

Previous version:

N/A

Latest version:

<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/searchRetrieve-v1.0-part3-sru2.0.doc>
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<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/searchRetrieve-v1.0-part3-sru2.0.html>
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Additional artifacts:

This prose specification is one component of a Work Product which also includes:

- XML schemas: <http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/schemas/>
- *searchRetrieve: Part 0. Overview Version 1.0.*
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part0-overview/searchRetrieve-v1.0-csd01-part0-overview.html>
- *searchRetrieve: Part 1. Abstract Protocol Definition Version 1.0.*
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part1-apd/searchRetrieve-v1.0-csd01-part1-apd.html>

- *searchRetrieve: Part 2. searchRetrieve Operation: APD Binding for SRU 1.2 Version 1.0.*
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part2-sru1.2/searchRetrieve-v1.0-csd01-part2-sru1.2.html>
- *searchRetrieve: Part 3. searchRetrieve Operation: APD Binding for SRU 2.0 Version 1.0.*
(this document)
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part3-sru2.0/searchRetrieve-v1.0-csd01-part3-sru2.0.html>
- *searchRetrieve: Part 4. APD Binding for OpenSearch Version 1.0.*
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part4-opensearch/searchRetrieve-v1.0-csd01-part4-opensearch.html>
- *searchRetrieve: Part 5. CQL: The Contextual Query Language Version 1.0.*
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part5-cql/searchRetrieve-v1.0-csd01-part5-cql.html>
- *searchRetrieve: Part 6. SRU Scan Operation Version 1.0.*
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part6-scan/searchRetrieve-v1.0-csd01-part6-scan.html>
- *searchRetrieve: Part 7. SRU Explain Operation Version 1.0.*
<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part7-explain/searchRetrieve-v1.0-csd01-part7-explain.html>

Related work:

This specification is related to:

- Search/Retrieval via URL. The Library of Congress. <http://www.loc.gov/standards/sru/>

Abstract:

This document specifies a binding of the OASIS SWS Abstract Protocol Definition to the specification of version 2.0 of the protocol SRU: Search/Retrieve via URL. This is one of a set of documents for the OASIS Search Web Services (SWS) initiative.

Status:

This document was last revised or approved by the OASIS Search Web Services TC on the above date. The level of approval is also listed above. Check the "Latest version" location noted above for possible later revisions of this document.

Technical Committee members should send comments on this specification to the Technical Committee's email list. Others should send comments to the Technical Committee by using the "Send A Comment" button on the Technical Committee's web page at <http://www.oasis-open.org/committees/search-ws/>.

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Citation format:

When referencing this specification the following citation format should be used:

[SearchRetrievePt3]

searchRetrieve: Part 3. searchRetrieve Operation: APD Binding for SRU 2.0 Version 1.0. 08 December 2011. OASIS Committee Specification Draft 01. <http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part3-sru2.0/searchRetrieve-v1.0-csd01-part3-sru2.0.html>.

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1 Introduction

This is one of a set of documents for the OASIS Search Web Services (SWS) initiative.

This document, “*SearchRetrieve Operation: Binding for SRU 2.0*” is the specification of the protocol SRU: Search/Retrieve via URL.

The set of documents includes the Abstract Protocol Definition (APD) for searchRetrieve operation, which presents the model for the SearchRetrieve operation and serves as a guideline for the development of *application protocol bindings* describing the capabilities and general characteristic of a server or search engine, and how it is to be accessed.

The collection of documents also includes three bindings. This document is one of the three.

Scan, a companion protocol to SRU, supports index browsing, to help a user formulate a query. The Scan specification is also one of the documents in this collection.

Finally, the Explain specification, also in this collection, describes a server’s Explain file, which provides information for a client to access, query and process results from that server.

The documents in this collection of specifications are:

1. Overview
2. APD
3. SRU1.2
4. SRU2.0 (this document)
5. OpenSearch
6. CQL
7. Scan
8. Explain

1.1 Terminology

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

1.2 References

All references for the set of documents in this collection are supplied in the Overview document:

searchRetrieve: Part 0. Overview Version 1.0

<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part0-overview/searchRetrieve-v1.0-csd01-part0-overview.doc>

1.3 Namespace

All XML namespaces for the set of documents in this collection are supplied in the Overview document:

searchRetrieve: Part 0. Overview Version 1.0

<http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part0-overview/searchRetrieve-v1.0-csd01-part0-overview.doc>

37 2 Model

38 2.1 Relationship to Abstract Protocol Definition

39 The APD defines abstract request parameters and abstract response elements. A binding lists those
40 abstract parameters and elements applicable to that binding and indicates the corresponding actual name
41 of the parameter or element to be transmitted in a request or response.

42 **Example.**

43 The APD defines the abstract parameter: [startPosition](#) as "The position within
44 the result set of the first item to be returned."
45 And this specification refers to that abstract parameter and notes that its
46 name, as used in this specification is 'startRecord'. Thus the request
47 parameter 'startRecord' in this specification represents the abstract
48 parameter startPosition in the APD.

49 Different bindings may use different names to represent this same abstract parameter, and its semantics
50 may differ across those bindings as the binding models differ. It is the responsibility of the binding to
51 explain these differences in terms of their respective models.

52 2.2 Operation Model

53 This specification defines the protocol **SRU: Search/Retrieve via URL**. Different bindings may define
54 different protocols for search/retrieve. The SRU protocol defines a request message (sent from an SRU
55 client to an SRU server) and a response message (sent from the server to the client). This transmission of
56 an SRU request followed by an SRU response is called a *SearchRetrieve operation*.

57 For the SRU protocol, three operations are defined:

- 58 1. **SearchRetrieve Operation.** The SearchRetrieve operation is defined by the SRU protocol, which
59 is this specification.
- 60 2. **Scan Operation.** Similar to SRU, the Scan protocol defines a request message and a response
61 message. The transmission of a Scan request followed by a Scan response constitutes a Scan
62 operation.
- 63 3. **Explain Operation.** See [Explain Model](#) below.

64 *Note: In earlier versions a searchRetrieve or scan request carried a mandatory operation*
65 *parameter. In version 2.0, there is no operation parameter for either. [See Interoperation](#)*
66 *with [Earlier Versions](#).*

67 2.3 Data model

68 A server exposes a *database* for access by a remote *client* for purposes of search and retrieval. The
69 database is a collection of units of data, each referred to as an *abstract record*. In this model there is a
70 single database at any given server.

71 Associated with a database are one or more formats that the server may apply to an abstract record,
72 resulting in an exportable structure referred to as a *response record*.

73 *Note:*

74 The term record is often used in place of "abstract record" or "response record" when the meaning
75 is clear from the context or when the distinction is not important.

76 Such a format is referred to as a *record schema*. It represents a common understanding shared by the
77 client and server of the information contained in the records of the database, to allow the transfer of that
78 information. It does not represent nor does it constrain the internal representation or storage of that
79 information at the server.

80

Relationship of Data Model to Abstract Model

The data model in the APD says that a “datastore is a collection of units of data. Such a unit is referred to as an abstract item...”.

In this binding:

- A datastore is referred to as a database.
- An item is referred to as a record.

The APD further notes that “Associated with a datastore are one or more formats that the server may apply to an abstract item, resulting in an exportable structure referred to as a response Item. Such a format is referred to as a response item type or item type.”

In this Binding:

- An item type is referred to as a record schema.

81 2.4 Protocol Model

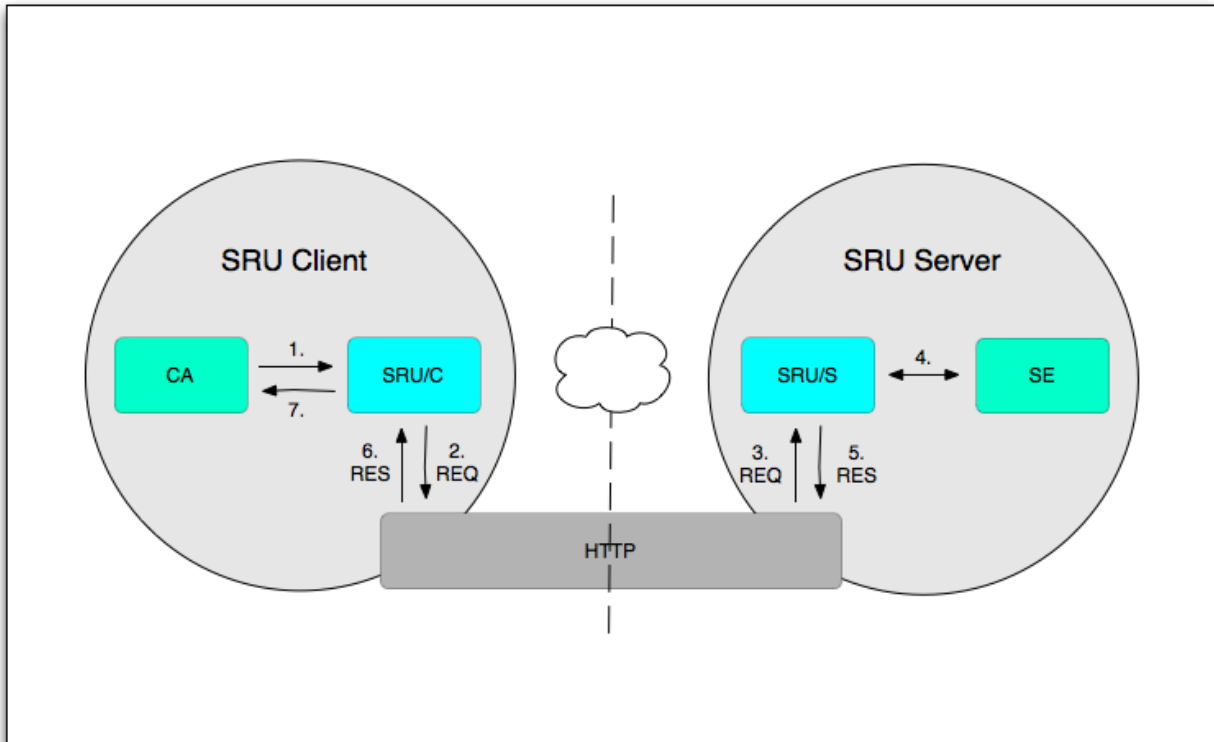
82 The protocol model assumes these conceptual components:

- 83 - The client application (**CA**),
- 84 - the SRU protocol module at the client (**SRU/C**),
- 85 - the lower level protocol (**HTTP**),
- 86 - the SRU protocol module at the server (**SRU/S**),
- 87 - the search engine at the server (**SE**).

88 For modeling purposes this standard assumes but does not prescribe bindings between the CA and
89 SRU/C and between SRU/S and SE, as well as between SRU/C and HTTP and between SRU/S and
90 HTTP; for examples of the latter two see [Bindings to Lower Level Protocols](#). The conceptual model of
91 protocol interactions is as follows:

- 92 • At the client system the SRU/C accepts a request from the CA, formulates a searchRetrieve
93 protocol request (**REQ**) and passes it to HTTP.
- 94 • Subsequently at the server system HTTP passes the request to the SRU/S which interacts with
95 the SE, forms a searchRetrieve protocol response (**RES**), and passes it to the HTTP.
- 96 • At the client system, HTTP passes the response to the SRU/C which presents results to the CA.

97 The protocol model is described diagrammatically in the following picture:



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1. CA passes a request to SRU/C.
2. SRU/C formulates a REQ and passes it to HTTP.
3. HTTP passes the REQ to SRU/S.
4. SRU/S interacts with SE to form a RES.
5. The RES is passed to HTTP.
6. HTTP passes the RES to SRU/C.
7. SRU/C presents results to CA.

106 2.5 Processing Model

107 A client sends a searchRetrieve request to a server. The request includes a query to be matched against
 108 the database at the server. The server processes the query, creating a result set of records that match
 109 the query.

110 The request also indicates the desired number of records to be included in the response and includes the
 111 identifier of a record schema for transfer of the records in the response, as well as the identifier of a
 112 response schema for transfer of the entire response (including all of the response records).

113 The response includes records from the result set, [diagnostic information](#), and a result set identifier that
 114 the client may use in a subsequent request to retrieve additional records.

115 2.6 Query model

116 Any appropriate query language may be used for SRU version 2.0. Only one in particular is required to be
 117 supported: the Contextual Query Language, CQL [4]. The following is intended as only a very cursory
 118 overview of CQL's capabilities; for details, consult the CQL specification.

119 A CQL query consists of a single search clause, or multiple search clauses connected by Boolean
 120 operators: AND, OR, or AND-NOT. A search clause may include an index, relation, and search term (or a
 121 search term alone where there are rules to infer the index and relation). Thus for example "title = dog" is a
 122 search clause in which "title" is the index, "=" is the relation, and "dog" is the search term. "Title = dog

123 AND subject = cat” is a query consisting of two search clauses linked by a Boolean operator AND, as is
124 “dog AND cat”. CQL also supports proximity and sorting. For example, “cat prox/unit=paragraph hat” is a
125 query for records with “cat” and “hat” occurring in the same paragraph. “title = cat sortby author” requests
126 that the results of the query be sorted by author.

127 2.7 Parameter Model

128 The SRU protocol defines several parameters by name. A searchRetrieve request includes one or more
129 of these parameters and may also include one or more parameters not defined by the protocol.

130 One of the parameters defined by SRU is named ‘query’. Each request includes a query, carried either in
131 the ‘query’ parameter or collectively in those parameters *not* defined by the protocol.

132 One reason for modeling parameters in this manner – where parameters may occur in the request that
133 are not defined in the protocol – is to accommodate the case where a query must be conveyed by
134 multiple parameters and it is not feasible to attempt to predict how many parameters. An example might
135 be a forms-based query where each component of the query is carried in a separate parameter. Another
136 reason is to allow a developer of a query type to designate a specific parameter name for that query type.
137 For example a developer might define a query type based on the W3C XQuery specification [7] and
138 designate that it be carried in a parameter named XQuery.

139 This model aims to provide a simple syntax for well-known query types by providing a default parameter
140 (query) while allowing more complex queries (form-based queries for example) to be supported.

141 See [Query Parameters](#) for details.

142 2.8 Result Set Model

143 This is a logical model; support of result sets is neither assumed nor required by this standard. There are
144 applications where result sets are critical and applications where result sets are not viable.

145 When a query is processed, a set of matching records is selected and that set is represented by a result
146 set maintained at the server. The result set, logically, is an ordered list of references to the records. Once
147 created, a result set cannot be modified; any process that would somehow change a result set is viewed
148 logically to instead create a new result set. (For example, an existing result set may be sorted. In that
149 case, the existing result set is logically viewed to be deleted, and a new result set – the sorted set -
150 created.) Each result set is referenced via a unique identifying string, generated by the server when the
151 result set is created.

152 From the client point of view, the result set is a set of abstract records each referenced by an ordinal
153 number, beginning with 1. The client may request a given record from a result set according to a specific
154 format. For example the client may request record 1 in the Dublin Core format, and subsequently request
155 record 1 in the MODS [7] format. The format in which records are supplied is not a property of the result
156 set, nor is it a property of the abstract records as a member of the result set; the result set is simply the
157 ordered list of abstract records. How the client references a record in the result set is unrelated to how the
158 server may reference it.

159 The records in a result set are not necessarily ordered according to any specific or predictable scheme.
160 The server determines the order of the result set, unless it has been created with a request that includes
161 a sort specification. (In that case, only the final sorted result set is considered to exist, even if the server
162 internally creates a temporary result set and then sorts it. The unsorted, temporary result set is not
163 considered to have ever existed, for purposes of this model.) In any case, the order must not change. (As
164 noted above, if a result set is created and subsequently sorted, a new result set must be created.)

165 Thus, suppose an abstract record is deleted or otherwise becomes unavailable while a result set which
166 references that record still exists. This **MUST** not cause re-ordering. For example, if a client retrieves
167 records 1 through 3, and subsequently record 2 becomes unavailable, if the server again requests record
168 3, it must be the same record 3 that was returned as record 3 in the earlier operation. (“Same record”
169 does not necessarily mean the same content; the record’s content may have changed.) If the server

170 requests record 2 (no longer available) the server should supply a surrogate diagnostic (see [Diagnostic](#)
171 [Model](#)) in place of the response record for record 2.
172
173

Relationship of Result Set Model to Abstract Model

The result set model for SRU 2.0 is as described in the Abstract Protocol Definition, with the following exceptions:

- Addition of the preceding paragraph (beginning with “when a result set record becomes unavailable...”).
- The APD says “A server might support requests by record ... or it may instead support requests by group. It may support one form only or both.” That sentence has been deleted. In SRU requests are by record; groups are not supported.

174 2.9 Diagnostic Model

175 A server supplies diagnostics in the response as appropriate. A diagnostics is *fatal* or *non-fatal*. A fatal
176 diagnostic is generated when the execution of the request cannot proceed and no results are available.
177 For example, if the client supplied an invalid query there might be nothing that the server can do. A non-
178 fatal diagnostic is one where processing may be affected but the server can continue. For example if a
179 particular record is not available in the requested schema but others are, the server may return the ones
180 that are available rather than failing the entire request.

181 Non-fatal diagnostics are further divided into two categories: *surrogate* and *non-surrogate*. Surrogate
182 diagnostics take the place of a record (as described in the [Result Set Model](#)). Non-surrogate, non-fatal
183 diagnostics are diagnostics saying that while some or all the entries are available, something may have
184 gone wrong; for example the requested sorting algorithm might not be available. Or, it may be just a
185 warning. See [Diagnostics](#).

186 2.10 Explain Model

187 Every SRU server provides an associated Explain record. The standard requires that this record be
188 retrievable as the response of an HTTP GET at the base URL for SRU server. The Explain record for a
189 server may be obtained from other sources as well. An SRU client may retrieve this record which provides
190 information about the server’s capabilities. The client may use the information in the Explain record to
191 self-configure and provide an appropriate interface to the user.

192 The Explain record provides such details as query types supported, CQL context sets (and for each
193 context set indexes supported), diagnostic sets, record schemas, sorting capabilities, specification of
194 defaults, and other details. It also includes sample queries, and conditions of use (for example mandatory
195 display of copyright and syndication rights).

196 2.11 Serialization Model

197 This specification does not restrict the serialization of the response message and response records. For
198 modeling purposes this document assumes XML serialization. Examples and schemas are portrayed
199 using XML. However non-XML serializations may be used, either for the response message, the
200 response records, or both.

201 **2.12 Multi-server search Model**

202 A server might support multi-server searching: sending the query to multiple data sources and
203 consolidating the results into a single result set. From the protocol point of view there is a single server
204 and multi-server searching is for the most part invisible. However there are two areas where multiple data
205 sources may be exposed: faceted search and search result analysis. See the Multi-server search
206 Support subsections of the [Faceted Search](#) and [Search Result Analysis](#) sections.

207 3 Request Parameters (Summary)

208 As noted at the beginning of this document, the APD defines abstract request parameters. A binding,
 209 such as this specification, lists those abstract parameters and indicates the corresponding actual names
 210 of the parameter to be transmitted in a request. Below, the actual parameters for this binding are listed,
 211 and following that, the binding of each parameter to its corresponding abstract parameter in the APD.

212 3.1 Actual Request Parameters for this Binding

213 The following table provides a summary of the actual request parameters defined in this binding, and links
 214 to their descriptions.

215 . Table 1: *Summary of Request Parameters*

Actual Parameter Name	Occurrence	Reference
query	optional, non-repeatable; must occur if queryType is omitted.	see queryType and query
startRecord	optional, non-repeatable	see startRecord and maximumRecords
maximumRecords	optional, non-repeatable	
recordXMLEscaping (Renamed. Was recordPacking in 1.2.)	optional, non-repeatable	see recordXMLEscaping
recordSchema	optional, non-repeatable	see recordSchema
resultSetTTL	optional, non-repeatable	see resultSetTTL
Stylesheet	optional, non-repeatable	see stylesheet and renderedBy
Extension parameters	optional, see note	see Extensions
The following parameters are new in version 2.0		
queryType	optional, non-repeatable; must occur if parameter 'query' is omitted	see queryType and query
sortKeys	optional, non-repeatable	see sorting
Facet Parameters	Optional, (individually) non-repeatable	see Facet Request Parameters
RenderedBy	optional, non-repeatable	see stylesheet and renderedBy
httpAccept	optional, non-repeatable	see httpAccept
responseType	optional, non-repeatable	see responseType
recordPacking	optional, non-repeatable	See recordPacking

216 *Note: If there is more than one extension parameter they will normally have different names, and so no*
 217 *individual extension parameter will be repeated.*

218 3.2 Relationship of Actual Parameters to Abstract Parameters

219 3.2.1 Abstract Request Parameters

220 The following table summarizes the relationship of actual parameters to abstract parameters defined in
 221 the APD. In the first two columns are shown abstract parameters and their corresponding actual
 222 parameters for those abstract parameters that have corresponding actual parameters in this binding. The
 223 third column shows abstract parameters for which no corresponding actual parameters are defined for
 224 this binding. The fourth column lists new parameters defined for this binding, that is, for which there are
 225 no corresponding abstract parameters.

226 *Table 2: Relationship of actual parameters to abstract parameters*

Abstract Parameter	Corresponding Actual Parameter	Excluded Abstract Parameters	Additional Actual Parameters
responseFormat	httpAccept		
query	query		
startPosition	startRecord		
maximumItems	maximumRecords		
responseItemType	recordSchema		
sortOrder	sortKey		
		group	
			queryType
			recordXMLEscaping
			<i>Facet Parameters</i>
			resultSetTTL
			stylesheet
			renderedBy
			<i>Extension parameters</i>
			httpAccept
			responseType
			recordPacking

227

228 4 Response Elements (Summary)

229 The APD defines abstract response elements. Binding list those abstract elements and indicate the
230 corresponding actual names of the parameter to be transmitted in a response. Below, the actual elements
231 for this binding are listed, and following that, the binding of each elements to its corresponding abstract
232 element in the APD.

233 4.1 Actual Response Elements for this Binding

234 The following table describes the top-level XML elements in the response.

235 *Table 3: Summary of Actual Response Elements*

Actual Element Name	Type	Occurrence	Reference
<numberOfRecords>	xs:integer	optional, non-repeatable	see numberOfRecords
<resultSetId>	xs:string	optional, non-repeatable	see resultSetId
<records>	structured	optional, non-repeatable	see records
<nextRecordPosition>	xs:integer	optional, non-repeatable	see nextRecordPosition
<echoedSearch RetrieveRequest>	structured	optional, non-repeatable	see Echoed Request .
<diagnostics>	structured	optional, non-repeatable	see Diagnostics (This element applies to non-surrogate diagnostics.)
<extraResponseData>	structured	optional, repeatable	see Extensions
The following elements are new in version 2.0			
<resultSetTTL>	xs:integer	optional, non-repeatable	See resultSetTTL
<resultCountPrecision>	xs:string	Optional, repeatable	see resultCountPrecision
<facetedResults>	structured	optional, repeatable	see facetedResults
<searchResultAnalysis>	structured	optional, repeatable	see searchResultAnalysis

236 4.2 Relationship of Actual Elements to Abstract Elements

237 The following table summarizes the relationship of actual elements to abstract elements defined in the
238 APD. In the first two columns are shown abstract elements and their corresponding actual elements for
239 those abstract elements that have corresponding actual elements in this binding. The third column shows
240 abstract elements for which no corresponding actual elements are defined for this binding. The fourth
241 column lists new elements defined for this binding, that is, for which there are no corresponding abstract
242 elements.

243
244
245
246

247 *Table 4: Relationship of actual element to abstract elements*

Abstract Element	Corresponding Actual element	Excluded Abstract Elements	Additional Actual Elements
numberOfItems	numberOfRecords		
resultSetId	resultSetId		
item	record		
nextPosition	nextRecordPosition		
diagnostics	diagnostics		
echoedRequest	echoedSearch RetrieveRequest		
		numberOfGroups	
		nextGroup	
			resultCountPrecision
			facetedResults
			searchResultAnalysis
			extraResponseData

249 5 Parameter and Element Descriptions - Summary

250 All of the parameters and elements are described in the following several sections. This section provides
251 a summary.

- 252 • [Query Parameters:](#)
 - 253 ○ describes parameters queryType and query.
- 254 • [Result Set Parameters and Elements:](#)
 - 255 ○ Describes parameters startRecord, maximumRecords, resultSetTTL, resultSetIdleTime,
256 and resultCountPrecision; and elements <nextResultPosition>, <resultSetId>, and
257 <numberOfRecords>.
- 258 • [facets:](#)
 - 259 ○ describes facet request parameters and faceted results.
- 260 • [Search Result Analysis:](#)
 - 261 ○ describes the searchResultAnalysis element.
- 262 • [Sorting:](#)
 - 263 ○ describes the sortKeys parameter.
- 264 • [Diagnostics:](#)
 - 265 ○ describes the <diagnostics> element.
- 266 • [Extensions](#)
 - 267 ○ describes extension request parameters and response element <extraResponseData>:
- 268 • [Response and Record Serialization Parameters and Elements:](#)
 - 269 ○ describes parameters recordXMLEscaping, recordSchema, recordPacking, httpAccept
270 (and other accept parameters), and responseType; and elements <records>,
271 <stylesheet>, <renderedBy>
- 272 • [echoedRequest:](#)
 - 273 ○ describes the element <echoedSearchRetrieveRequest>

274 6 Query Parameters

275 6.1 Parameter queryType

276 The request parameter **queryType** is a string indicating the query type. It is optional and if omitted the
277 default value is 'cql'. Its value (except in the case of a [reserved query type](#)) is a short name as described
278 in [Query Type Definition and Short Name](#).

279 6.1.1 Reserved Values for parameter queryType

280 The following strings 'are reserved values for queryType.

- 281 1. 'cql' See [4]
- 282 2. 'searchTerms'. When the value of the parameter queryType is 'searchTerms', the query may
283 (but need not) consist of a list of term separated by space (e.g. "cat hat rat"). The server
284 processes the query however it chooses.

285 6.1.2 Query Type Definition and Short Name

286 If the query type is other than a reserved type, then there must be a definition for that query type. Each
287 SRU server lists supported query types within its explain file, and for each, supplies a URI for the query
288 type's definition, and a short name to be used for the value of the parameter queryType in a request.

289 The short name need not be unique. For example one developer might define a query type based on the
290 W3C XQuery specification [7], and another developer may also define a query type also based on
291 XQuery, perhaps using a different profile of the XQuery specification. These two query types would have
292 different definitions (and thus different URIs) and if both are supported on the same server would need
293 different short names, e.g. XQuery1 and XQuery2, but if supported on separate servers they could be
294 assigned the same short name, e.g. XQuery.

295 6.2 Parameter query

296 The parameter '**query**' contains the query when the query type is a reserved query type, or when the
297 query type definition specifies that 'query' is the parameter to contain the query. It must occur if
298 parameter queryType is omitted, in which case it contains a CQL query.

299

300 6.3 Parameters that Carry the Query

301 Each query type definition list one or more parameters to carry the query. If more than one is listed, then
302 they collectively carry the query, and the query definition describes how the query is to be assembled
303 from these parameters.

304 These are parameters that are not defined in the SRU specification - with one possible exception: the
305 definition may state that the query is to be carried in the 'query' parameter (which *is* defined by SRU).

306 7 Result Set Parameters and Elements

307 7.1 startRecord and maximumRecords

308 The client requests that the server include a range of result set records in the response, beginning with
309 **startRecord** and the number of records supplied is not to exceed **maximumRecords**.

310 startRecord is a positive integer, optional, and its default if omitted is 1. maximumRecords is a non-
311 negative integer, optional, and if omitted, the server may choose any value.

312 The server may return less than the number of records specified by maximumRecords, for example if
313 there are fewer matching records than requested, but **MUST NOT** return more.

314 7.2 numberOfRecords

315 The server reports the size of the result set via the response element **<numberOfRecords>**. If the query
316 fails, its value **MUST** be zero.

317 7.3 nextRecordPosition

318 When the last record in the response is not the last result set record, the response includes the element
319 **<nextRecordPosition>** whose value is the ordinal position of the next result set record following the final
320 returned record. If there are no remaining records, this element **MUST** be omitted.

321 7.4 resultSetId

322 The server may supply the identifier of the result set created by the current operation via the response
323 element **<resultSetId>**. Its purpose is to allow the result set to be referenced in a subsequent request.

324 Note that the SRU protocol does not directly support the ability to reference a result set in a request. Thus
325 In order for an SRU request to reference the result set, that reference must occur within the query, and
326 thus the query language must support this feature. CQL, for example, does support this feature.

327 7.5 resultSetTTL

328 In the request the client may supply the request parameters **resultSetTTL**, the result set time to live,
329 specified in seconds. If supplied, the client is suggesting that the result set need exist no longer than the
330 specified time.

331 In the response the server may supply the response elements **<resultSetTTL>**. It may be supplied or
332 omitted whether or not the corresponding parameter had been supplied in the request. The value in the
333 response need not agree with the value in the request (if supplied).

334 **<resultSetTTL>** if supplied is a good-faith estimate by the server of the result set's time to live (measured
335 from the time that the response is transmitted). The server projects, but does not guarantee the value.

336 For example suppose the server says in the search response that resultSetTTL is two weeks (1209600).
337 The server projects that the result set will probably disappear after two weeks, although it could disappear
338 anytime before two weeks, or stay available indefinitely.

339 7.6 resultCountPrecision

340 The response element **<resultCountPrecision>** allows the server to indicate or estimate the accuracy
341 of the result count as reported by **<numberOfRecords>**. The value is a URI, identifying a term from a
342 controlled vocabulary.

343 There may be many such vocabularies maintained from which the value of this element may be chosen.
344 There will be one such vocabulary maintained in conjunction with this standard. The following values are

345 included in the standard vocabulary at the time of publication of this standard and additional values may
346 be added:

- 347 • **exact**
- 348 ○ The server guarantees that the value as reported in <numberOfRecords> is accurate.
- 349 • **unknown**
- 350 ○ The server has no idea what the result count is, and does not want to venture an
351 estimate.
- 352 • **estimate**
- 353 ○ The server does not know the result set count, but offers an estimate.
- 354 • **maximum**
- 355 ○ The value supplied is an estimate of the maximum possible count that the result set will
356 attain.
- 357 • **minimum**
- 358 ○ The server does not know the result count but guarantees that it is at least this large.
- 359 • **current**
- 360 ○ The value supplied is an estimate of the count at the time the response was sent,
361 however the result set may continue to grow.

362 7.6.1 Extensibility

363 In general the value for parameter resultCountPrecision is a URI. Any URI indentifying a term appropriate
364 for use as a value of this parameter may be used.

365 7.6.2 'info' URI Representation of Value

366 The values listed above ('exact', 'unknown', etc.) are represented by the following URIs:

- 367 • info:srw/vocabulary/resultCountPrecision/1/exact
- 368 • info:srw/vocabulary/resultCountPrecision/1/unknown
- 369 • info:srw/vocabulary/resultCountPrecision/1/estimate
- 370 • info:srw/vocabulary/resultCountPrecision/1/maximum
- 371 • info:srw/vocabulary/resultCountPrecision/1/minimum
- 372 • info:srw/vocabulary/resultCountPrecision/1/current

373 For these values, the actual parameter value used may be the URI or it may be the term itself. The rule is
374 that whenever the parameter value does not take the form of a URI, then it is assumed to be prefixed by
375 the string 'info:srw/vocabulary/resultCountPrecision/1/'.

376 In these URIs, the path component '1' is the authority component; '1' refers to the SRU Maintenance
377 Agency. Other authorities will be registered upon request. See
378 <http://www.loc.gov/standards/sru/resources/infoURI.html> for details. In this manner additional values may
379 be defined for the parameter resultCountPrecision.

380 The 'info' URI mechanism is not intended to preclude use of other types of URIs to represent values of
381 this parameter.

382 8 Facets

383 The client may request, and/or the server supply, faceted results for a query: analysis of how the search
384 results are distributed over various categories (or "facets"). For example the analysis may reveal how the
385 results are distributed by author. The user might then refine the query to one particular author among
386 those listed.

387 8.1 Facet Request Parameters

388 These parameters are used to request (or suppress) the reporting of facet counts.

389 8.1.1 facetLimit Parameter

390 The maximum number of counts that should be reported per facet field.

391 The facetLimit parameter can specify a limit on a per field basis, and/or a global limit applying to all fields.

392 Examples:

- 393 1. **facetLimit:=100**
394 sets the limit to 100 for any field.
- 395 2. **facetLimit:=100:dc.subject|**
396 means that the limit is 100 for dc.subject; do not supply facets for any other field.
- 397 3. The combination: **facetLimit=10,100:dc.subject**
398 means that the limit is 100 for dc.subject and 10 for all other fields.
- 399 4. The combination: **facetLimit=10,100:dc.subject,200:dc.title**
400 means that the limit is 100 for dc.subject , 200 for dc.title, and 10 for all other fields.
- 401 5. The combination: **facetLimit=100:dc.subject,200:dc.title**
402 means that the limit is 100 for dc.subject , 200 for dc.title; do not supply facets for any other
403 fields.
- 404 6. The combination: **facetLimit= -1,100: dc.subject**
405 means that the limit is 100 for dc.subject and is unlimited for all other fields.
- 406 7. **facetLimit:=0**
407 means do not supply any facets.

408 The parameter may have zero or one unqualified limit and zero or more qualified limits. An unqualified
409 limit applies to all fields and a qualified limit applies to a specified field. Limits are separated by comma,
410 their values are integers, and a qualified limit is followed by a colon followed by the name of an index.

411 The value of each limit is an integer whose meaning is as follows:

- 412 • If positive, the server may (but is not obligated to) supply facet counts not to exceed the limit.
- 413 • If zero, no facet counts are to be supplied.
- 414 • A negative value means that unlimited counts may be supplied.

415 If the facetLimit parameter is omitted entirely, then the server is free to supply facets as it sees fit, and the
416 effect would be the same as if 'facetLimit=-1' had been specified.

417 **Restriction on index names that may be used in the facetLimit parameter:**

418 Index names which contain either or both of the characters comma (,) or colon (:) should not be used
419 within the facetLimit expression.

420 These two characters have been introduced as delimiters within the syntax but both are legal characters
421 in index names. Thus theoretically there could be an index with the name

422 **'dc.subject,200:dc.title'.**

423 In that case, the parameter assignment

424 **facetLimit=100:dc.subject,200:dc.title**

425 would be ambiguous.

426 It is recommended that special characters, and in particular the comma and colon, not be used when
427 creating index names.

428 **8.1.2 facetStart**

429 An offset into the list of counts, to allow paging. It is 1-based and the default value is 1 (meaning start
430 with the first count). This parameter can be specified on a per field basis.

- 431 ○ **facetStart=10**
432 means begin with the 10th count.
- 433 ○ **facetStart:dc.subject=10**
434 means begin with the 10th count for dc.subject.

435 **8.1.3 facetSort Parameter**

436 The facetSort parameter is a sort specification for the facet results. It is non-repeatable, and has the
437 following components.

- 438 • **sortBy.** One of the following:
 - 439 ○ 'recordCount' (the number of records matching the facet value)
 - 440 ○ 'alphanumeric'
- 441 • **order.** Optional, one of:
 - 442 ○ 'ascending' (default for sortBy=alphanumeric)
 - 443 ○ 'descending' (default for sortBy=recordCount)
- 444 • **caseSensitivity.** Optional, and meaningful only for 'alphanumeric'. One of:
 - 445 ○ 'caseSensitive'
 - 446 ○ 'caseInsensitive' (default)

447 **Serialization**

448 The value of the parameter is a sequence of these components, occurring in the order given, separated
449 by commas. sortBy must occur; either of the other two may be omitted. If caseSensitivity only is omitted,
450 then sortBy and order are separated by a single comma. If order only is omitted, then sortBy and
451 caseSensitivity are separated by two consecutive commas. In any case there is no trailing comma after
452 the last component.

453 **Examples**

- 454 • facetSort=recordCount
- 455 • facetSort=alphanumeric,descending
- 456 • facetSort=alphanumeric,,caseSensitive
- 457 • facetSort=alphanumeric,descending,caseSensitive

458 If the server is unable to sort according to the request, then it **MUST** supply an appropriate diagnostic.

459 **8.1.4 facetCount Parameter**

460 This parameter may be used to request the facet count for a specific term, instead of the matching facet
461 values. The parameter may be repeated, but should not be used in conjunction with any other facet
462 parameter.

463 Example:

464 **facetCount:dc.subject=history**

465 **8.2 facetedResults**

466 The server supplies faceted results in the response, via the response element <facetedResults>; see the
467 [example](#) below, and [see XML for Faceted Results](#). Results should correspond to the facet parameters
468 supplied:

- 469 • If there were no facet parameters in the request, the server may supply whatever faceted results
470 it chooses to, or none at all.
- 471 • If the sole facet parameter in the request was “facetLimit=0” then the server **MUST NOT** supply
472 any faceted results.
- 473 • Otherwise, the server **SHOULD** attempt to supply faceted results according to the facet
474 parameters in the request, as described above.

475 **8.2.1 Multi-server search Support for Faceted Search**

476 A server might support multi-server searching, that is, sending the query to multiple data sources and
477 then consolidating the results into a single result set. This is for the most part invisible to the protocol,
478 that is, from the protocol point of view there is a single server. However, for faceted results, multiple data
479 sources may be exposed, as illustrated in the following example. (Multiple data sources may also be
480 exposed for [search result analysis](#).)

481 **8.2.2 Faceted results example**

482 For this example there are two data sources: Library of Congress Catalog, and MELVYL. An XML
483 instance and schema are provided in Appendix B.

Example

In this example, there are two data sources,

- **Library of Congress Catalog**
- **MELVYL**

The server supports facet types:

- **subject**
- **author**

A request includes the following parameters:

query=nuthatch
facetLimit=10

Which says: for the query “nuthatch” report facet counts for all facet types, not to exceed 10 counts per facet type.

The response includes the following facet counts:

source

- **Library of Congress Catalog**
 - **Facet counts for subject**
 - **birds – 15 records**
 - **nuthatches – 12 records**
 - **Facet counts for author**
 - **Davies, Melvyn - 1 record**
 - **Pravosudov, Vladimir V - 1 record**
 - **MELVYL**
 - **Facet counts for subject**
 - **nuthatches – 18 records**
 - **Sitta carolinensis – 4 records**
 - **Facet counts for author**
 - **Deignan, H. G - 2 records**
 - **Dunbar , Catherine - 1 record**
 - **Audubon, John James - 1 record**
-

484 9 Search Result Analysis

485 The response may provide analysis of the search results, via element <searchResultAnalysis>

486 9.1 Example

487 Consider for example the query:

488 `title=cat and subject=dog or author=frog`

489 Sub queries could be:

- 490 • `title=cat`
- 491 • `subject=dog`
- 492 • `author=frog`
- 493 • `title=cat and subject=dog`
- 494 • `title=cat or author=frog`
- 495 • `subject=dog or author=frog`

496 Sub query analysis would provide information for some or all of these sub queries, including the result
497 count and a request URL. The choice of which sub queries to evaluate is determined by the server and
498 typically based on intermediate results derived during the processing of the query. In this example, one
499 could expect all the single terms to be returned as they needed to be evaluated to process the query. In
500 normal left-to-right processing, the next sub query evaluated would be “title=cat and subject=dog”.
501 Finally, “author=frog” would be ORd into that sub query and returned as the final result.

502 The above query might contain the following information.

- 503 • Subquery: title=cat
 - 504 ○ Results: 9003
 - 505 ○ Request URL: [http://www.xyz.com/sru?query="title=cat"](http://www.xyz.com/sru?query= "cat\"")
- 506 • Subquery: subject=dog
 - 507 ○ Results: 2007
 - 508 ○ Request URL: [http://www.xyz.com/sru?query="subject=dog"](http://www.xyz.com/sru?query=)
- 509 • Subquery: author=frog
 - 510 ○ Results: 100
 - 511 ○ Request URL: [http://www.xyz.com/sru?query="author=frog"](http://www.xyz.com/sru?query=)
- 512 • Subquery: title=cat and subject =dog
 - 513 ○ Results: 1863
 - 514 ○ Request URL: [http://www.xyz.com/sru?query="title=cat and subject=dog"](http://www.xyz.com/sru?query= "cat")

515 If the example had been “title=cat and (subject=dog or author=frog)” ; and if “title=cat” had resulted in
516 zero documents, some search engines might have stopped processing on the query as no possible
517 values in the remainder of the query would have affected the result of the overall query. In that case, the
518 only sub query returned would have been “title=cat”.

519 9.2 Multi-server search Support for Search Result Analysis

520 As noted above in Facets, a server might support multi-server searching, invisible to the protocol except
521 in the case of facet results and search result analysis. The above example does not illustrate multiple
522 data sources; however this feature is illustrated in the XML schema and example instance in Annex B
523 ([XML for Search Result Analysis](#)).

524 10 Sorting

525 If the **sortKeys** request parameter is included, it is a request for the server to sort the result set. The
526 sortKeys parameter consists of one or more sort keys, each with sub-parameters described below.

527 *Note: While sorting is a function of SRU, sorting may or may not also be a function of the query*
528 *language. So it is possible for a request to include a sort specification at both the protocol level and*
529 *at the query level. (For example, sorting is a function of CQL. Thus an SRU request may include a*
530 *CQL query, where both the SRU request and the query include a sort specification.) The server*
531 *decides how such a request is to be handled. Diagnostic 94, 95, or 96 may apply.*

532 10.1 Sort Key Sub-parameters

533 Each sort key has one or more of the following sub-parameters.

- 534 • **Path**

535 Mandatory. An XPath [6] expression for a tagpath to be used in the sort.

- 536 • **xsortSchema**

537 Optional. A short name for a URI identifying an XML schema to which the XPath expression
538 applies. (The short name to URI mapping is included in the server's Explain file.) This is a utility
539 schema into which records can be transformed in order to sort them in a particular way.

540 It is not (necessarily) the same schema used to supply records in the response, there is a
541 separate parameter, recordSchema, for that. However If sortSchema is omitted, then
542 recordSchema applies.

543 For example, if the record has a geographical location in it, it may be desirable to sort the
544 locations in the records from north to south and east to west. This may require transformation into
545 a schema that allows sorting by a convenient coordinate system, rather than lexically on the place
546 name, and this schema may not be available for retrieving the records. So to sort by title, one
547 might specify the xpath of "/record/title" within the Dublin Core schema

- 548 • **Ascending**

549 Optional. Boolean, default 'true'.

- 550 • **caseSensitive**

551 Optional. Boolean, default 'false'.

- 552 • **missingValue**

553 Optional. (Default is 'highValue'). If the supplied XPath is not present within the record (for
554 example if the server is instructed to sort by author, and a record has no author), it will behave in
555 accordance with this value. One of:

- 556 ○ 'abort'

557 Supply a diagnostic saying that the sort could not be performed.

- 558 ○ 'highValue'

559 The server should sort this as if it were the highest possible value.

- 560 ○ 'lowValue'

561 The server should sort this as if it were the lowest possible value.

- 562 ○ 'omit'.
563 The server should remove this record from the results.
564 ○ A fixed value.
565 The server should sort the record as if this value were supplied.

566 **10.2 Serialization**

567 The value of the parameter sortKeys is represented as one or more keys, serialized as follows:

- 568 • Each key except the last is followed by a space.
569 • Each individual key is a sequence of key-parameters, occurring in the order given above,
570 separated by commas.
571 • Key-parameters beyond the first may be supplied with no value (represented by consecutive
572 commas), in which case the server will use the default, except for the last parameter supplied,
573 which must have a value (i.e. the key may not end in a comma).
574 • The path and schema must be quoted if they contain quotes, commas or spaces. Internal quotes
575 must be escaped with a backslash.
576 • Boolean parameters are expressed as 1 (true) or 0 (false).

577 An example of the sortKeys parameter in an SRU URL might be:

578 `&sortKeys=title,onix date,onix,,0`

579 This example asks to sort as follows:

- 580 • Primarily by 'title', from the 'onix' schema. 'ascending', 'caseSensitive' and 'missingValue' are not
581 given, therefore the defaults apply, namely 'ascending', 'insensitive' and 'highValue'.
582 • Secondly by 'date', also from the 'onix' schema, ascending (as the default), insensitive.
583 'missingValue' is not given, therefore the default applies, namely 'highValue'.

584 **10.3 Failure to Sort**

585 If the server is unable to create a sorted result set according to the request, then it must supply an
586 appropriate diagnostic.

587 11 Diagnostics

588 Diagnostics are provided in SRU responses both in the response element **<diagnostics>**, and in the
589 response element **<records>**.

590 A diagnostics is *fatal* or *non-fatal*. Non-fatal diagnostics are further divided into two categories: *surrogate*
591 and *non-surrogate*. See the [diagnostic model](#); to summarize: A surrogate diagnostic replaces a record; a
592 non-surrogate diagnostic refers to the response at large and is supplied in addition and external to the
593 records. A non-surrogate diagnostic may be fatal or non-fatal. So three combinations are possible:

- 594 • surrogate, non-fatal diagnostic (in element **<records>**)
- 595 • non-surrogate, non-fatal diagnostic (in element **<diagnostics>**)
- 596 • non-surrogate, fatal diagnostic (in element **<diagnostics>**)

597 (“Fatal, surrogate” is not a valid combination.)

598 11.1 Diagnostic List

599 See [Diagnostics for use with SRU 2.0](#) . This diagnostic list has the namespace: info:srw/diagnostic/1. For
600 example, the URI info:srw/diagnostic/1/10 identifies the diagnostic “Query syntax error”.

601 Diagnostics used in SRU 2.0 need not be limited to this list, nor need this list be used exclusively for
602 SRU 2.0.

603 11.2 Diagnostic Format

604 The format described in this section is based on the [XML Schema for Content Type Application/sru+xml](#)
605 and is the default diagnostic schema for SRU 2.0.

606 The diagnostic schema has three elements, 'uri', 'details' and 'message'.

607 The 'uri' field is required. Its value is a URI, identifying the particular diagnostic. The 'details' part contains
608 information specific to the diagnostic. The 'message' field contains a human readable message to be
609 displayed. Only the uri field is required, the other two are optional.

610 The identifier for the diagnostic schema is: info:srw/schema/1/diagnostics-v1.1

611 Table 3: Elements of the Diagnostic Schema

Element	Type	Occurrence	Description
<uri>	xs:anyURI	Mandatory	The diagnostic's identifying URI.
<details>	xs:string	Optional	Any supplementary information available, often in a format specified by the diagnostic
<message>	xs:string	Optional	A human readable message to display to the end user. The language and style of this message is determined by the server, and clients should not rely on this text being appropriate for all situations.

612

613

614 11.3 Examples

615 These examples are based on the format described above.

616 11.3.1 Non-Surrogate Example

617 **Non-surrogate, fatal diagnostic:**

```
618 <diagnostics>
619   <diagnostic xmlns="info:srw/xmlns/1/sru-2-0-diagnostic">
620     <uri>info:srw/diagnostic/1/38</uri>
621     <details>10</details>
622     <message>Too many boolean operators, the maximum is 10.
623       Please try a less complex query.</message>
624   </diagnostic>
625 </diagnostics>
```

626 11.3.2 Surrogate Example

627 **Surrogate, non-fatal diagnostic:**

```
628 <records>
629
630   <record>
631     <!-- a real record here -->
632   </record>
633
634   <!-- surrogate diagnostic record: -->
635   <record>
636     <recordSchema> info:srw/schema/1/diagnostics-v1.1</recordSchema>
637     <recordData>
638       <diagnostic xmlns=" info:srw/xmlns/1/sru-2-0-diagnostic">
639         <uri>info:srw/diagnostic/1/65</uri>
640         <message>Record deleted by another user.</message>
641       </diagnostic>
642     </recordData>
643   </record>
644
645   <record>
646     <!--a real record here -->
647   </record>
648
649   .....
650
651 </records>
```

652

12 Extensions

653 Both in the request and in the response, additional information may be provided - in the request by an
654 extension parameter (whose name is constructed as described next) and in the response by the
655 <extraResponseData> element.

12.1 Extension Request Parameter

657 An extension parameter takes on the name of the extension. It must begin with 'x-' : lower case x followed
658 by hyphen. (SRU will never define a parameter with a name beginning with 'x-').

659 The extension definition MUST supply a namespace. It is recommended that the extension name be 'x-'
660 followed by an identifier for the namespace, again followed by a hyphen, followed by the name of the
661 element within the namespace.

662

example

663

```
http://z3950.loc.gov:7090/voyager?...&x-info4-onSearchFail=scan
```

664 Note that this convention does not guarantee uniqueness since the extension name will not include a full
665 URI. The extension owner should try to make the name as unique as possible. If the namespace is
666 identified by an 'info:srw' URI , then the recommended convention is to name the extension "x-infoNNN-
667 XXX" where NNN is the 'info:srw' authority string, and XXX is the name of the extension. Extension
668 names MUST never be assigned with this form except by the proper authority for the given 'info'
669 namespace.

12.2 Extension Response Element: extraResponseData

671 An extension definition may (but need not) define a response, to be carried via the extraResponseData
672 element. The extension definition indicates the element names, from the extension's namespace, which
673 will carry the response information.

674

example:

675

```
<sru:extraResponseData>
```

676

```
<auth:token xmlns:auth="info:srw/extension/2/auth-1.0">
```

677

```
277c6d19-3e5d-4f2d-9659-86a77fb2b7c8
```

678

```
</auth:token>
```

679

```
</sru:extraResponseData>
```

12.3 Behavior

681 The response may include extraResponseData for a given extension only if the request included the
682 extension parameter for that extension, and the extension definition prescribes a response. Thus, an SRU
683 response may never include unsolicited extraResponseData. For example the response may contain cost
684 information regarding the query or information on the server or database supplying the results. This data
685 must, however, have been requested.

686 If the server does not recognize an extension supplied in an extension parameter, it may simply ignore it.
687 (For that matter, even if the server does recognize the extension, it may choose to ignore it.) If the
688 particular request requires some confirmation that it has been carried out rather than ignored, then the
689 extension designer should define a response. There may even be an element defined in the response for
690 the server to indicate that it did recognize the request but did not carry it out (and even an indication why).
691 However, the server is never obliged to include a response. Thus though a response may be included in
692 the definition of an extension, it may never be designated as mandatory.

693 Thus, the semantics of parameters in the request may not be modified by extensions, because the client
694 cannot be assured that the server recognizes the extension. On the other hand, the semantics of parts of
695 the response may be modified by extensions, because the client will be aware that the extension has
696 been invoked, because extensions are always invoked by the client: the response semantics may be
697 changed by an extension only if the client specifically requests the change. Even when a client does
698 request a change in response semantics, it should be prepared to receive regular semantics since
699 servers are at liberty to ignore extensions.

700 **12.4 Echoing the Extension Request**

701 If the server chooses to echo the request (see [echoedRequest](#)) it must be able to transform the
702 extension parameter into XML, properly namespaced (the extension parameter name will not transform to
703 a valid element in the SRU namespace). If it encounters an unrecognized element and cannot determine
704 the namespace, the server may either make its best guess as to how to transform the element, or simply
705 not return it at all. It should not, however, add an undefined namespace to the element as this would
706 invalidate the response.

707 13 Response and Record Serialization Parameters and 708 Elements

709 13.1 recordXMLEscaping

710 For those responses where records are transferred in XML, In order that records which are not well
711 formed do not break the entire message, it is possible to request that they be transferred as a single
712 string with the '<', '>' and '&' characters escaped to their entity forms. Moreover some toolkits may not be
713 able to distinguish record XML from the XML that forms the response. However, some clients may prefer
714 that the records be transferred as XML in order to manipulate them directly with a stylesheet that renders
715 the records and potentially also the user interface.

716 This distinction is made via the request parameter **recordXMLEscaping**. This parameter is defined for
717 requests only in cases when the response records are to be transferred in XML. Its value is 'string' or
718 'xml' (default is 'xml' if omitted). If the value of the parameter is 'string', then the server should perform
719 the conversion (escape the relevant characters) before transferring records. If the value is 'xml', then it
720 should embed the XML directly into the response. If the server cannot comply with this request, then it
721 MUST return a diagnostic.

722 13.2 recordPacking

723 *Note: the recordPacking parameter in earlier versions had entirely different semantics.*
724 *That parameter has been replaced by the above parameter, recordXMLEscaping.*

725 Data in a record might be viewed as roughly consisting of structure and payload, where the latter is the
726 actual application data. In some cases the data may be served according to a strict schema and in other
727 cases the server may be prepared to offer variations, allowing easier access to the application data
728 without forcing the client to go through the syntactic infrastructure.

729 This distinction is made via the request parameter **recordPacking**. Its value is 'packed' or 'unpacked'
730 (default is 'packed' if omitted). If the value of the parameter is 'packed', then the client requests that the
731 server should supply records strictly according to the requested schema. If the value is 'unpacked', then
732 the server is free to allow the location of application data to vary within the record.

733 13.3 recordSchema

734 The request parameter **recordSchema** identifies the schema of the records to be supplied in the
735 response. The value of the parameter is the short name that the server assigns to the identifier for the
736 schema, as listed in the server's Explain file. The default value if not supplied is determined by the server.

737 For example, for the [MODS Schema Version 3.3](http://www.loc.gov/standards/sru/resources/schemas.html) the identifier is info:srw/schema/1/mods-v3.3, as
738 shown in the table at <http://www.loc.gov/standards/sru/resources/schemas.html> (note: schema identifiers
739 are not restricted to those in this table) and the short name might (but need not) be 'mods'. The server
740 MUST supply records in the requested schema only. If the schema is unknown or a record cannot be
741 rendered in that schema, then the server MUST return a diagnostic:

- 742 • If the schema is unknown, the server SHOULD supply a non-surrogate (fatal) diagnostic, for
743 example info:srw/diagnostic/1/66: "Unknown schema for retrieval".
- 744 • If an individual record cannot be rendered in the requested schema, the server SHOULD supply a
745 surrogate (non-fatal) diagnostic in place of the record, for example: info:srw/diagnostic/1/67:
746 "Record not available in this schema".

747 13.4 httpAccept

748 The request parameter **httpAccept** may be supplied to indicate the preferred format of the response.
749 The value is an internet media type. For example if the client wants the response to be supplied in the
750 ATOM format, the value of the parameter is 'application/atom+xml'.

751 The default value for the response type is 'application/sru+xml'.

752 The intent of the httpAccept parameter can be accomplished with an HTTP Accept header. Servers
753 SHOULD support either mechanism. In either case (via the httpAccept parameter or HTTP Accept
754 header), if the server does not support the requested media type then the server MUST respond with a
755 406 status code and SHOULD return an HTML message with pointers to that resource in supported
756 media types.

757 If an SRU server supports multiple media types and uses content negotiation to determine the media type
758 of the response, then the server SHOULD provide a URL in the Content-Location header of the response
759 pointing directly to the response in that mime-type.

760 For instance, if the client had sent the URL

761 `http://example.org/sru?query=dog`

762 with an Accept header of 'application/rss+xml',

763 then the server SHOULD return a Content-Location value of

764 `http://example.org/sru?query=dog&httpAccept=application/rss+xml`. This Content-Location header is
765 returned along with the content itself, presumably in the application/rss+xml format. (It would also be
766 acceptable to return a redirect to that URL instead, but that behavior is not encouraged as it is inefficient.)

767 The default response type is application/sru+xml. That is, if there is neither an Accept header (or if there
768 is an Accept header of "*") nor an httpAccept parameter, the response should be of media type
769 application/sru+xml, and a corresponding Content-Location header should be returned with the response.
770 For example if the request is

771 `http://example.org/sru?query=dog`

772 a Content-Location header of

773 `http://example.org/sru?query=dog&httpAccept=application/sru+xml`

774 should be returned.

775 13.5 responseType

776 The request parameter '**responseType**', paired with the internet media type specified for the response
777 (via either the httpAccept parameter or http accept header) determines the schema for the response.

778 The value of the parameter is a string. It should be bound to a URI via Explain.

779 This parameter is optional, and the internet media type (either httpAccept or accept header) is also
780 optional, and any combination is valid – media type plus responseType, media type with no
781 responseType, responseType with no media type, or neither.

782 The parameter need not be supplied in the case where the requested internet media type is a fully
783 specified SRU response format, for example application/sru+xml.

784 Suppose, however, that the requested media type is, for example, 'application/atom+xml'. This is not a
785 fully specified SRU format; however there is an **ATOM extension** which is. Within the definition of that
786 extension, a URI is declared ("info:srw/1/response-type/SRU-ATOM-Response-1") for use as the value of
787 this parameter, to indicate that this particular extension is desired as the response format.

788 When there is a mismatch:

- 789 • Media type that is not a fully specified SRU response format and no responseType; or
- 790 • responseType but no media type supplied and the media type cannot be determined from the
791 responseType; or
- 792 • both the responseType and media type are specified but the responseType is not valid for the
793 given media type; or

794 • any other incompatibility between responseType and media type;
795 then the server SHOULD return an http 406 error, "Not Acceptable".

796 **13.6 records**

797 The response element <records> contains the records and/or surrogate diagnostics, and may be
798 represented differently for different response schemas. For the [SRU default response schema](#), it is a
799 sequence of <record> elements, where each contains either a record, or a surrogate diagnostic
800 explaining why that record could not be transferred.

801 **13.7 stylesheet and renderedBy**

802 The request parameter 'stylesheet' is a URL for a stylesheet, to be used for the display of the response
803 to the user. The value of parameter 'renderedBy' determines whether the stylesheet is to be rendered
804 by the client or server; its value is 'client' or 'server', respectively. If omitted, the default is 'client'.

805 **13.7.1 Client Rendering**

806 If the value of 'renderedBy' is 'client', the client requests that the server simply return this URL in the
807 response, in the href attribute of the xml-stylesheet processing instruction before the response xml. (It is
808 likely that the type will be XSL, but not necessarily so.) If the server cannot fulfill this request it MUST
809 supply a [non-surrogate diagnostic](#) .

810 The purpose is to allow a thin client to turn the response XML into a natively renderable format, often
811 HTML or XHTML. This allows a web browser or other application capable of rendering stylesheets, to act
812 as a dedicated client without requiring any further application logic.

813 **Example**

814 `http://z3950.loc.gov:7090/voyager?stylesheet=/master.xsl&query=dinosaur`

815 This requests the server to include the following as beginning of the response:

```
816 <?xml version="1.0"?>  
817 <?xml-stylesheet type="text/xsl" href="/master.xsl"?>  
818 <sru:searchRetrieveResponse ...
```

819 **13.7.2 Server Rendering**

820 If the value of 'renderedBy' is 'server', the client requests that the server format the response according to
821 the specified stylesheet, assuming the default SRU response schema as input to the stylesheet.
822 Typically this would make sense only if the client is requesting (either via the httpAccept parameter or
823 HTTP Accept header) HTML as the format for the response.

824 14 Echoed Request

825 Very thin clients, such as a web browser with a stylesheet, may not have the facility to have recorded the
826 query that generated the response it has just received. The server may thus echo the request back to the
827 client via the response element **<echoedSearchRetrieveRequest>**. There are no request elements
828 associated with this functionality, the server may choose to include it or not within a response.

829 **<echoedSearchRetrieveRequest>** includes subelements corresponding to request parameters, using the
830 same name.

831 Echoed Request Example

```
832  
833 <echoedSearchRetrieveRequest>  
834   <query>dc.title = dinosaur</query>  
835   <recordSchema>mods</recordSchema>  
836   <xQuery>  
837     <searchClause xmlns="info:srw/xmlns/1/xcql-2-0-v1">  
838       <index>dc.title</index>  
839       <relation>  
840         <value>=</value>  
841       </relation>  
842       <term>dinosaur</term>  
843     </searchClause>  
844   </xQuery>  
845   <baseUrl>http://z3950.loc.gov:7090/voyager</baseUrl>  
846 </echoedSearchRetrieveRequest>
```

847 In addition to the echoed parameters, note the sub-elements **<xQuery>** and **<baseUrl>**.

848 **<xQuery>** represents an XCQL rendering of the query. (See XCQL Annex of CQL specification.)

849 Note: This has two benefits.

- 850 • The client can use XSLT or other XML manipulation to modify the query without having a
851 CQL query parser.
- 852 • The server can return extra information specific to the clauses within the query.

853 **<baseUrl>** allows the client to reconstruct queries by simple concatenation, or retrieve the Explain
854 document to fetch additional information such as the title and description to include in the results
855 presented to the user.

856 15 Conformance

857 An SRU 2.0 client or server conforms to this standard if it meets the conditions specified in Client
858 Conformance or Server Conformance respectively.

859 15.1 Client Conformance

860 15.1.1 Protocol

861 The client must implement the [protocol model](#). It must support at least one LLP.
862 The SRU/C must be able to:

- 863 1. Accept a request from the CA.
- 864 2. Assign values to parameters and form Search/Retrieve requests according to the procedures
865 described in the standard.
- 866 3. Compose an REQ and pass it to HTTP.
- 867 4. Accept an RES from HTTP.
- 868 5. Decompose the RES and present information from it to the CA.

869 15.1.2 Query

870 The client must be capable of sending a CQL query. At minimum, level 0 must be supported.

871 15.1.3 Response Format

872 The client must support the 'application/sru+xml' media type for the response.

873 15.1.4 Diagnostics

874 The client must support the diagnostic schema and be able to present diagnostics received in an RES to
875 the CA.

876 15.1.5 Explain

877 The client must be able to retrieve the Explain record.

878 15.2 Server Conformance

879 15.2.1 Protocol

880 The server must implement the protocol model; it must support at least one LLP.
881 The SRU/S must be able to:

- 882 1. Accept an REQ from HTTP.
- 883 2. Decompose the REQ to determine parameter values and interact with the SE as necessary in
884 order to process the request.
- 885 3. Assign values to elements and compose an REQ according to the procedures described in the
886 standard.
- 887 4. Pass the response to HTTP.

888 15.2.2 Query

889 The server must support CQL queries. At minimum, level 0 must be supported.

890 **15.2.3 Response Format**

891 The server must support Application/sru+xml for the response.

892 **15.2.4 Diagnostics**

893 The server must support the diagnostic schema and be able to present diagnostic information received
894 from the SE.

895 **15.2.5 Explain**

896 The Explain record describing the server must be available at the base URL.

897 **Appendix A. Acknowledgements**

898 Acknowledgements are supplied in the Overview document:

899 *searchRetrieve: Part 0. Overview Version 1.0*

900 [http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part0-overview/searchRetrieve-](http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part0-overview/searchRetrieve-v1.0-csd01-part0-overview.doc)
901 [v1.0-csd01-part0-overview.doc](http://docs.oasis-open.org/search-ws/searchRetrieve/v1.0/csd01/part0-overview/searchRetrieve-v1.0-csd01-part0-overview.doc)

902 Appendix B. SRU 2.0 Bindings to Lower Level Protocol 903 (Normative)

904 B.1 Binding to HTTP GET

905 This annex describes the construction of an SRU 2.0 http: URL to encode parameter values of the form
906 'key=value'. Support for Unicode characters is described.

907 B.1.1 Syntax

908 The client sends a request via the HTTP GET method. The request is a URI as described in [RFC 3986](#).
909 Specifically it is an HTTP URL of the form:

```
910 <base URL>?<searchpart>
```

911 using the standard &-separated key=value encoding for parameters in <searchpart>.

912 Example

```
913 Assume:  
914 - The base URL is 'z3950.loc.gov:7090'.  
915 - The value of parameter 'query' is "dinosaur".  
916  
917 Then the URL would be:  
918 http://z3950.loc.gov:7090/voyager?query=dinosaur  
919  
920 And over the wire goes:  
921 GET /voyager?query=dinosaur HTTP/1.1  
922 Host: z3950.loc.gov:7090
```

923 B.1.2 Encoding (Client Procedure)

924 The following encoding procedure is recommended, in particular, to accommodate Unicode characters
925 (characters from the Universal Character Set, ISO 10646) beyond U+007F, which are not valid in a URI.

- 926 1. Convert the value to UTF-8.
- 927 2. Percent-encode characters as necessary within the value. See [RFC 3986](#) section 2.1.
- 928 3. Construct a URI from the parameter names and encoded values.

929 Note: In step 2, it is recommended to percent-encode every character in a value that is not in the URI
930 unreserved set, that is, all except alphabetic characters, decimal digits, and the following four special
931 characters: dash (-), period (.), underscore (_), tilde (~). By this procedure some characters may be
932 percent-encoded that do not need to be -- For example '?' occurring in a value does not need to be
933 percent encoded, but it is safe to do so.

934 B.1.3 Decoding (Server Procedure)

- 935 1. Parse received request based on '?', '&', and '=' into component parts: the base URL, and
936 parameter names and values.
- 937 2. For each parameter:
 - 938 a. Decode all %-escapes.
 - 939 b. Treat the result as a UTF-8 string.

940 B.1.4 Example

941 Consider the following parameter:

942 query=dc.title =/word kirkegård

943 The name of the parameter is "query" and the value is "dc.title =/word kirkegård"

944 Note that the first '=' (following "query") must not be percent encoded as it is used as a URI delimiter; it is
945 not part of a parameter name or value. The second '=' (preceding the '/') must be percent encoded as it is
946 part of a value.

947 The following characters must be percent encoded:

- 948 • the second '=', percent encoded as %3D
- 949 • the '/', percent encoded as %2F
- 950 • the spaces, percent encoded as %20
- 951 • the 'å'. Its UTF-8 representation is C3A5, two octets, and correspondingly it is represented in a
952 URI as two characters percent encoded as %C3%A5.

953 The resulting parameter to be sent to the server would then be:

954 query=dc.title%20%3D%2Fword%20kirkegård%C3%A5rd

955 **B.2 Binding to HTTP POST**

956 Rather than construct a URL, the parameters may be sent via POST.

957 The Content-type header MUST be set to

958 **application/x-www-form-urlencoded'**

959 POST has several benefits over GET. Primarily, the issues with character encoding in URLs are
960 removed, and an explicit character set can be submitted in the Content-type HTTP header. Secondly,
961 very long queries might generate a URL for HTTP GET that is not acceptable by some web servers or
962 client. This length restriction can be avoided by using POST.

963 The response for SRU via POST is identical to that of SRU via GET.

964 An example of what might be passed over the wire in the request:

```
965     POST /voyager HTTP/1.1
966     Host: z3850.loc.gov:7090
967     Content-type: application/x-www-form-urlencoded; charset=iso-8859-1
968     Content-length: 14
969     query=dinosaur
```

970 **B.3 Binding to HTTP SOAP**

971 SRU via SOAP is a binding to the [SOAP recommendation](#) of the W3C. The benefits of SOAP are the
972 ease of structured extensions, web service facilities such as proxying and request routing, and the
973 potential for better authentication systems.

974 In this transport, the request is encoded in XML and wrapped in some additional SOAP specific elements.
975 The response is the same XML as SRU via GET or POST, but wrapped in additional SOAP specific
976 elements.

977 **B.3.1 SOAP Requirements**

978 The specification adheres to the [Web Services Interoperability](#) recommendations.

- 979 • SOAP version 1.1 is required. Version 1.2 or higher may be supported.
- 980 • The service style is 'document/literal'.
- 981 • Messages MUST be inline with no multirefs.
- 982 • The SOAPAction HTTP header may be present, but should not be required. If present its value
983 MUST be the empty string. It MUST be expressed as:

984 **SOAPAction: ""**

- 985 • As specified by SOAP, for version 1.1 the Content-type header MUST be 'text/xml'. For version
986 1.2 the header value MUST be 'application/soap+xml'. (End points supporting both versions of
987 SOAP as well as SRU via POST thus have three content-type headers to consider.)

988 **B.3.2 Parameter Differences**

989 SRU parameters that cannot be transported via the SOAP binding:

- 990 • The 'stylesheet' request parameter MUST NOT be sent. SOAP prevents the use of stylesheets to
991 render the response.

992 **B.3.3 Example SOAP Request**

```
993 <SOAP:Envelope  
994 xmlns:SOAP="http://schemas.xmlsoap.org/soap/envelope/">  
995 <SOAP:Body>  
996 <SRW:searchRetrieveRequest xmlns:SRW="info:srw/xmlns/1/sru ">  
997 <SRW:query>dinosaur</SRW:query>  
998 <SRW:startRecord>1</SRW:startRecord>  
999 <SRW:maximumRecords>1</SRW:maximumRecords>  
1000 <SRW:recordSchema>info:srw/schema/1/mods-  
1001 v3.0</SRW:recordSchema>  
1002 </SRW:searchRetrieveRequest>  
1003 </SOAP:Body>  
1004 </SOAP:Envelope>
```

1005

1006 For [WSDL for SOAP support](#) see the Schema Annex.

1007

1008 Appendix C. Content Type application/sru+xml 1009 (Normative)

1010 This Annex describes the media type application/sru+xml, which is the default SRU response format.
1011 See <http://tools.ietf.org/html/rfc6207>

1012 C.1 Example searchRetrieve Response

1013 The following is an example of a searchRetrieve response supplied in the content type
1014 application/sru+xml:

```
1015 <searchRetrieveResponse>  
1016   <numberOfRecords>10</numberOfRecords>  
1017   <resultSetId>resultA</resultSetId>  
1018   <resultSetTTL>180</resultSetTTL>  
1019   <records>  
1020     <record>  
1021       record 1 ...  
1022     </record>  
1023     <record>  
1024       record 2 ....  
1025     </record>  
1026   </records>  
1027   <nextRecordPosition>3</nextRecordPosition>  
1028   <echoedSearchRetrieveRequest>  
1029     ... see Echoed Request Example  
1030   </echoedSearchRetrieveRequest>  
1031   <diagnostics>  
1032     <diagnostic>  
1033       [ first non-surrogate diagnostic (see Non Surrogate Diagnostic Example) ]  
1034     </diagnostic>  
1035     <diagnostic>  
1036       [ second non-surrogate diagnostic ]  
1037     </diagnostic>  
1038   </diagnostics>  
1039   <extraResponseData>  
1040     see Extension Example  
1041   </extraResponseData>  
1042 </searchRetrieveResponse>
```

1052 C.2 Structure of the <Record> Element

1053 The response element <records> is a sequence of <record> elements as shown below. Each contains
1054 either a record, or a surrogate diagnostic explaining why that record could not be transferred. All records
1055 are transferred in XML. Records may be expressed as a single string, or as embedded XML. If a record is
1056 transferred as embedded XML, it must be well formed and should be validatable against the record
1057 schema.

1058 Each <record> element is structured into the elements shown in the following table.

1059 Table 3: Structure of the <Record> Element

Element	Type	Occurrence	Description
<recordSchema>	xs:string	mandatory	The URI identifier of the XML schema in which the record is encoded. Although the request may use the server's assigned short name, the response must always use the full URI.
<recordXMLEscaping>	xs:string	mandatory	'string' or 'xml'.
<recordData>	<stringOrXmlFragment>	mandatory	The actual record.
<recordIdentifier>	xs:string	optional	An identifier for the record by which it can unambiguously be retrieved in a subsequent operation. For example via the 'rec.identifier' index in CQL.
<recordPosition>	xs:positiveInteger	optional	The position of the record within the result set.
<extraRecordData>	<xmlFragment>	optional	Any additional information to be transferred with the record.

Example

1060
1061
1062
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An example <records> element with three records:

```

<records>
  <record>
    <recordSchema>info:srw/schema/1/dc-v1.1</recordSchema>
    <recordXMLEscaping>xml</recordXMLEscaping>
    <recordData>
      <srw_dc:dc xsi:schemaLocation="info:srw/schema/1/dc-schema
        http://www.loc.gov/standards/sru/resources/dc-schema.xsd">
        <title>Fay Vincent Oral History Project collection [videorecording] </title>
        <creator>Vincent, Fay, interviewer.</creator>
        <type>Oral histories. aat</type>
        <language>eng</language>
        <subject>African American baseball players--Interviews.</subject>
      </srw_dc:dc>
    </recordData>
    <recordPosition>1</recordPosition>
  </record>
  <record>
    <recordSchema>info:srw/schema/1/dc-v1.1</recordSchema>
    <recordXMLEscaping>xml</recordXMLEscaping>
    <recordData>
      <srw_dc:dc xsi:schemaLocation="info:srw/schema/1/dc-schema
        http://www.loc.gov/standards/sru/resources/dc-schema.xsd">
        <title>Whitey Ford : a biography </title>
        <creator>Coverdale, Miles.</creator>
        <type>text</type>
        <publisher>Jefferson, N.C. : McFarland and Co.,</publisher>
        <date>c2006.</date>
        <language>eng</language>
        <description>Includes bibliographical references (p. 233) and index.</description>
        <subject>Ford, Whitey, 1928-</subject>
        <identifier>http://www.loc.gov/catdir/toc/ecip0610/2006009578.html</identifier>
        <identifier>URN:ISBN:0786425148 (pbk. : alk. paper)</identifier>
      </srw_dc:dc>
    </recordData>
  </record>
</records>

```

```

1097         </srw_dc:dc>
1098     </recordData>
1099     <recordPosition>2</recordPosition>
1100 </record>
1101
1102 <record>
1103     <recordSchema>info:srw/schema/1/dc-v1.1</recordSchema>
1104     <recordXMLEscaping>xml</recordXMLEscaping>
1105     <recordData>
1106         <srw_dc:dc xsi:schemaLocation="info:srw/schema/1/dc-schema
1107         http://www.loc.gov/standards/sru/resources/dc-schema.xsd">
1108             <title>Whitey Ford sings the blues [sound recording] /</title>
1109             <creator>Everlast (Musician) prf</creator>
1110             <type>sound recording</type>
1111             <publisher>New York, NY : Tommy Boy,</publisher>
1112             <date>p1998.</date>
1113             <language>eng</language>
1114             <description>Rap and rock music.</description>
1115             <description>Everlast (vocals, guitars, keyboard, scratches); with assisting musicians </description>
1116             <description>"Parental advisory, explicit lyrics"--Container.</description>
1117             <description>Compact disc.</description>
1118             <description>The white boy is back </description>
1119             <subject>Rap (Music)</subject>
1120             <subject>Rock music--1991-2000.</subject>
1121         </srw_dc:dc>
1122     </recordData>
1123     <recordPosition>3</recordPosition>
1124 </record>
1125 </records>

```

1126
1127

Appendix D. Diagnostics for use with SRU 2.0 (Normative)

1128 The diagnostics below are defined for use with the following SRU diagnostic namespace:
1129 info:srw/diagnostic/1. The number in the first column identifies the specific diagnostic within that
1130 namespace (e.g., diagnostic 2 below is identified by the URI: info:srw/diagnostic/1/2). The “details format”
1131 column specifies what should be returned in the details field. If this column is blank, the format is
1132 undefined and the server may return whatever it feels appropriate, including nothing.

General Diagnostics			
Number	Description		Details Format
1	General system error	note	Debugging information (traceback)
2	System temporarily unavailable	note	
3	Authentication error	note	
4	Unsupported operation	note	
5	Unsupported version	note	Highest version supported
6	Unsupported parameter value	note	Name of parameter
7	Mandatory parameter not supplied	note	Name of missing parameter
8	Unsupported parameter	note	Name of the unsupported parameter
9	Unsupported combination of parameters	note	
CQL Diagnostics			
Number	Description		Details Format
10	Query syntax error	note	
11	Not used.		
12	Too many characters in query	note	Maximum supported
13	Invalid or unsupported use of parentheses	Note	Character offset to error

14	Invalid or unsupported use of quotes	Note	Character offset to error
15	Unsupported context set	Note	URI or short name of context set
16	Unsupported index	Note	Name of index
17	Not used.		
18	Unsupported combination of indexes	Note	Space delimited index names
19	Unsupported relation	Note	Relation
20	Unsupported relation modifier	Note	Value
21	Unsupported combination of relation modifiers	note	Slash separated relation modifier
22	Unsupported combination of relation and index	note	Space separated index and relation
23	Too many characters in term	note	Length of longest term
24	Unsupported combination of relation and term	note	
25	Not used.		
26	Non special character escaped in term	Note	Character incorrectly escaped
27	Empty term unsupported	Note	
28	Masking character not supported	Note	
29	Masked words too short	Note	Minimum word length
30	Too many masking characters in term	Note	Maximum number supported
31	Anchoring character not supported	Note	
32	Anchoring character in unsupported position	Note	Character offset
33	Combination of proximity/adjacency and masking characters not supported	Note	
34	Combination of proximity/adjacency and anchoring characters not supported	Note	
35	Term contains only stopwords	Note	Value

36	Term in invalid format for index or relation	Note	
37	Unsupported boolean operator	Note	Value
38	Too many boolean operators in query	Note	Maximum number supported
39	Proximity not supported	note	
40	Unsupported proximity relation	Note	Value
41	Unsupported proximity distance	Note	Value
42	Unsupported proximity unit	Note	Value
43	Unsupported proximity ordering	Note	Value
44	Unsupported combination of proximity modifiers	Note	Slash separated values
45	Not used.		
46	Unsupported boolean modifier	Note	Value
47	Cannot process query; reason unknown	Note	
48	Query feature unsupported	Note	Feature
49	Masking character in unsupported position	note	the rejected term
Diagnostics Relating to Result Sets			
Number	Description		Details Format
50	Result sets not supported	note	
51	Result set does not exist	note	Result set identifier
52	Result set temporarily unavailable	note	Result set identifier
53	Result sets only supported for retrieval	note	
54	Not used.		
55	Combination of result sets with search terms not supported	note	
56	Not used.		

57	Not used.		
58	Result set created with unpredictable partial results available	note	
59	Result set created with valid partial results available	note	
60	Result set not created: too many matching records	note	Maximum number
Diagnostics Relating to Records			
Number	Description		Details Format
61	First record position out of range	note	
62	Not used.		
63	Not used.		
64	Record temporarily unavailable	note	
65	Record does not exist	note	
66	Unknown schema for retrieval	note	Schema URI or short name
67	Record not available in this schema	note	Schema URI or short name
68	Not authorized to send record	note	
69	Not authorized to send record in this schema	note	
70	Record too large to send	note	Maximum record size
71	Unsupported recordXMLEscaping value	note	
72	XPath retrieval unsupported	note	
73	XPath expression contains unsupported feature	note	Feature
74	Unable to evaluate XPath expression	note	
Diagnostics Relating to Sorting			
Number	Description		Details Format
80	Sort not supported	note	

81	Not used.		
82	Unsupported sort sequence	note	Sequence
83	Too many records to sort	note	Maximum number supported
84	Too many sort keys to sort	note	Maximum number supported
85	Not used.		
86	Cannot sort: incompatible record formats	note	
87	Unsupported schema for sort	note	URI or short name of schema given
88	Unsupported path for sort	note	XPath
89	Path unsupported for schema	note	XPath
90	Unsupported direction	note	Value
91	Unsupported case	note	Value
92	Unsupported missing value action	note	Value
93	Sort ended due to missing value	note	
94	Sort spec included both in query and protocol: query prevails		
95	Sort spec included both in query and protocol: protocol prevails		
96	Sort spec included both in query and protocol: error		
Diagnostics Relating to Explain			
Number	Description	Details Format	
100	Not used.		
101	Not used.		
102	Not used.		
Diagnostics relating to Stylesheets			
Number	Description	Details Format	

110	Stylesheets not supported	note	
111	Unsupported stylesheet	note	URL of stylesheet
Diagnostics 120-121 reserved for Scan			

D.1 Notes

No.	Cat.	Description	Notes/Examples
1	General	General system error	The server returns this error when it is unable to supply a more specific diagnostic. The sever may also optionally supply debugging information.
2	General	System temporarily unavailable	The server cannot respond right now, perhaps because it's in a maintenance cycle, but will be able to in the future.
3	General	Authentication error	The request could not be processed due to lack of authentication.
4	General	Unsupported operation	Currently three operations are defined -- searchRetrieve, explain, and scan. searchRetrieve and explain are mandatory, so this diagnostic would apply only to scan, or in SRU where an undefined operation is sent.
5	General	Unsupported version	Currently only version 1.1 is defined and so this diagnostic has no meaning. In the future, when another version is defined, for example version 1.2, this diagnostic may be returned when the server receives a request where the version parameter indicates 1.2, and the server doesn't support version 1.2.
6	general	Unsupported parameter value	This diagnostic might be returned for a searchRetrieve request which includes the recordXMLEscaping parameter with a value of 'xml', when the server does not support that value. The diagnostic might supply the name of parameter, in this case 'recordXMLEscaping'.
7	General	Mandatory parameter not supplied	This diagnostic might be returned for a searchRetrieve request which omits the query parameter. The diagnostic might supply the name of missing parameter, in this case 'query'.
8	General	Unsupported Parameter	This diagnostic might be returned for a searchRetrieve request which includes the recordXPath parameter when the server does not support that parameter. The diagnostic might supply the name of unsupported parameter, in this case 'recordXPath'.
9	General	Unsupported combination of parameter	One of the two parameters, query and queryType, must be included in a request. This diagnostic might be supplied when neither is included.
10	Query	Query syntax error	The query was invalid, but no information is given for exactly what was wrong with it. Eg. dc.title fox fish (The reason is that fox isn't a valid relation in the default context set, but the

			server isn't telling you this for some reason)
12	Query	Too many characters in query	The length (number of characters) of the query exceeds the maximum length supported by the server.
13	Query	Invalid or unsupported use of parentheses	The query couldn't be processed due to the use of parentheses. Typically either that they are mismatched, or in the wrong place. Eg. (((fish) or (sword and (b or) c)
14	Query	Invalid or unsupported use of quotes	The query couldn't be processed due to the use of quotes. Typically that they are mismatched Eg. "fish'
15	Query	Unsupported context set	A context set given in the query isn't known to the server. Eg. dc.title any dog
16	Query	Unsupported index	The index isn't known, possibly within a context set. Eg. dc.author any leVan (dc has a creator index, not author)
18	Query	Unsupported combination of indexes	The particular use of indexes in a boolean query can't be processed. Eg. The server may not be able to do title queries merged with description queries.
19	Query	Unsupported relation	A relation in the query is unknown or unsupported. Eg. The server can't handle 'within' searches for dates, but can handle equality searches.
20	Query	Unsupported relation modifier	A relation modifier in the query is unknown or unsupported by the server. Eg. 'dc.title any/fuzzy starfish' when fuzzy isn't supported.
21	Query	Unsupported combination of relation modifiers	Two (or more) relation modifiers can't be used together. Eg. dc.title any/cql.word/cql.string "star fish"
22	Query	Unsupported combination of relation and index	While the index and relation are supported, they can't be used together. Eg. dc.author within "1 5"
23	Query	Too many characters in term	The term is too long. Eg. The server may simply refuse to process a term longer than a given length.
24	Query	Unsupported combination of relation and term	The relation cannot be used to process the term. Eg dc.title within "dixson"
26	Query	Non special character escaped in term	Characters may be escaped incorrectly Eg "\a\r\n\s"
27	Query	Empty term	Some servers do not support the use of an empty term for

		unsupported	search or for scan. Eg: dc.title > ""
28	Query	Masking character not supported	A masking character given in the query is not supported. Eg. The server may not support * or ? or both
29	Query	Masked words too short	The masked words are too short, so the server won't process them as they would likely match too many terms. Eg. dc.title any *
30	Query	Too many masking characters in term	The query has too many masking characters, so the server won't process them. Eg. dc.title any "???a*f??b* *a?"
31	Query	Anchoring character not supported	The server doesn't support the anchoring character (^) Eg dc.title = "^jaws"
32	Query	Anchoring character in unsupported position	The anchoring character appears in an invalid part of the term, typically the middle of a word. Eg dc.title any "fi^sh"
33	Query	Combination of proximity/adjacency and masking characters not supported	The server cannot handle both adjacency (= relation for words) or proximity (the boolean) in combination with masking characters. Eg. dc.title = "this is a titl* fo? a b*k"
34	Query	Combination of proximity/adjacency and anchoring characters not supported	Similarly, the server cannot handle anchoring characters.
35	Query	Term contains only stopwords	If the server does not index words such as 'the' or 'a', and the term consists only of these words, then while there may be records that match, the server cannot find any. Eg. dc.title any "the"
36	Query	Term in invalid format for index or relation	This might happen when the index is of dates or numbers, but the term given is a word. Eg dc.date > "fish"
37	Query	Unsupported boolean operator	For cases when the server does not support all of the boolean operators defined by CQL. The most commonly unsupported is Proximity, but could be used for NOT, OR or AND.
38	Query	Too many boolean operators in query	There were too many search clauses given for the server to process.
39	Query	Proximity not supported	Proximity is not supported at all.
40	Query	Unsupported proximity relation	The relation given for the proximity is unsupported. Eg the server can only process = and > was given.

41	Query	Unsupported proximity distance	The distance was too big or too small for the server to handle, or didn't make sense. Eg 0 characters or less than 100000 words
42	Query	Unsupported proximity unit	The unit of proximity is unsupported, possibly because it is not defined.
43	Query	Unsupported proximity ordering	The server cannot process the requested order or lack thereof for the proximity boolean
44	Query	Unsupported combination of proximity modifiers	While all of the modifiers are supported individually, this particular combination is not.
46	Query	Unsupported boolean modifier	A boolean modifier on the request isn't supported.
47	Query	Cannot process query; reason unknown	The server can't tell (or isn't telling) you why it can't execute the query, maybe it's a bad query or maybe it requests an unsupported capability.
48	Query	Query feature unsupported	the server is able (contrast with 47) to tell you that something you asked for is not supported.
49	Query	Masking character in unsupported position	Eg, a server that can handle xyz* but not *xyz or x*yz
50	result set	Result sets not supported	The server cannot create a persistent result set.
51	result set	Result set does not exist	The client asked for a result set in the query which does not exist, either because it never did or because it had expired.
52	result set	Result set temporarily unavailable	The result set exists, it cannot be accessed, but will be able to be accessed again in the future.
53	result set	Result sets only supported for retrieval	Other operations on results apart from retrieval, such as sorting them or combining them, are not supported.
55	result set	Combination of result sets with search terms not supported	Existing result sets cannot be combined with new terms to create new result sets. eg cql.resultsetid = foo not dc.title any fish
58	result set	Result set created with unpredictable partial results available	The result set is not complete, possibly due to the processing being interrupted mid way through. Some of the results may not even be matches.
59	result set	Result set created with valid partial results available	All of the records in the result set are matches, but not all records that should be there are.

60	result set	Result set not created: too many matching records	There were too many records to create a persistent result set.
61	Records	First record position out of range	For example, if the request matches 10 records, but the start position is greater than 10.
64	Records	Record temporarily unavailable	The record requested cannot be accessed currently, but will be able to be in the future.
65	Records	Record does not exist	The record does not exist, either because it never did, or because it has subsequently been deleted.
66	Records	Unknown schema for retrieval	The record schema requested is unknown. Eg. the client asked for MODS when the server can only return simple Dublin Core
67	records	Record not available in this schema	The record schema is known, but this particular record cannot be transformed into it.
68	Records	Not authorized to send record	This particular record requires additional authorisation in order to receive it.
69	Records	Not authorized to send record in this schema	The record can be retrieved in other schemas, but the one requested requires further authorisation.
70	Records	Record too large to send	The record is too large to send.
71	Records	Unsupported recordXMLEscaping value	The server supports only one of string or xml, or the client requested a recordXMLEscaping which is unknown.
72	Records	XPath retrieval unsupported	The server does not support the retrieval of nodes from within the record.
73	Records	XPath expression contains unsupported feature	Some aspect of the XPath expression is unsupported. For example, the server might be able to process element nodes, but not functions.
74	Records	Unable to evaluate XPath expression	The server could not evaluate the expression, either because it was invalid or it lacks some capability.
80	Sort	Sort not supported	the server cannot perform any sort; that is the server only returns data in the default sequence.
82	Sort	Unsupported sort sequence	The particular sequence of sort keys is not supported, but the keys may be supported individually.
83	Sort	Too many records to sort	used when the server will only sort result sets under a certain size and the request returned a set larger than that limit.
84	Sort	Too many sort keys to sort	the server can accept a sort statement within a request but cannot deliver as requested, e.g. the server can sort by a maximum of 2 keys only such as "title" and "date" but was requested to sort by "title", "author" and "date".

86	Sort	Cannot sort: incompatible record formats	The result set includes records in different schemas and there is insufficient commonality among the schemas to enable a sort.
87	Sort	Unsupported schema for sort	the server does not support sort for records in a particular schema, e.g. it supports sort for records in the DC schema but not in the ONIX schema.
88	Sort	Unsupported path for sort	the server can accept a sort statement within a request but cannot deliver as requested, e.g. the server can deliver in title or date sequence but subject was requested.
89	Sort	Path unsupported for schema	The path given cannot be generated for the schema requested. For example asking for /record/fulltext within the simple Dublin Core schema
90	Sort	Unsupported direction	the server can accept a sort statement within a request but cannot deliver as requested, e.g. the server can deliver in ascending only but descending was requested.
91	Sort	Unsupported case	the server can accept a sort statement within a request but cannot deliver as requested, e.g. the server's index is single case so sorting case sensitive is unsupported
92	Sort	Unsupported missing value action	the server can accept a sort statement within a request but cannot deliver as requested. For example, the request includes a constant that the server should use where a record being sorted lacks the data field but the server cannot use the constant to override its normal behavior, e.g. sorting as a high value.
93	Sort	Sort ended due to missing value	missingValue of 'abort'
110	Stylesheet	Stylesheets not supported	The SRU server does not support stylesheets, or a stylesheet was requested from an SRW server.
111	Stylesheet	Unsupported stylesheet	This particular stylesheet is not supported, but others may be.

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Appendix E. Extensions for Alternative Response Formats (Non Normative)

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This Annex supplies examples of SRU response elements using responses with content types other than 'application/sru+xml'. While an SRU response could, in principle, be layered on top of any arbitrary host format based on a given content type it is most likely to be encountered in the familiar syndication formats used in applications such as OpenSearch. This Annex will show how SRU response elements may be mapped onto the following host formats: ATOM, JSON (both JSON and JSONP), and RSS (both 1.0 and 2.0).

It is worth noting that in contrast to the standard SRU response which is constrained by a W3C XML Schema the syndication formats tend to be "open" and are more loosely specified in terms of element ordering. While this has the advantage of making them ideal carrier, or host, formats, it does mean that there is no single canonical way to map SRU responses. What is shown here is a general indication of how SRU response elements (and in particular the SRU record data structures) can be embedded within the host format.

The standard SRU response shown below in outline is used for the examples, where the individual SRU response elements are shown in red, the SRU record data in purple, and the SRU records are shown in bold. The same coloring and bolding is applied to the SRU extension formats to show how an SRU response may be mapped onto those host formats.

```
<sru:searchRetrieveResponse xmlns:srw="http://www.loc.gov/zing/srw/">  
...  
<sru:numberOfRecords>2</sru:numberOfRecords>  
<sru:records>  
  <sru:record>  
    <sru:recordSchema>info:srw/schema/1/dc-v1.1</sru:recordSchema>  
    <sru:recordXMLEscaping>xml</sru:recordXMLEscaping>  
    <sru:recordData>  
      <srw_dc:dc ...>  
      ...  
    </srw_dc:dc>  
  </sru:recordData>  
  <sru:recordPosition>1</sru:recordPosition>  
</sru:record>  
  <sru:record>  
    <sru:recordSchema>info:srw/schema/1/dc-v1.1</sru:recordSchema>  
    <sru:recordXMLEscaping>xml</sru:recordXMLEscaping>  
    <sru:recordData>  
      <srw_dc:dc ...>  
      ...  
    </srw_dc:dc>  
  </sru:recordData>  
  <sru:recordPosition>2</sru:recordPosition>  
</sru:record>  
</sru:records>  
</sru:searchRetrieveResponse>
```


1178 E.1 ATOM Extension

1179 When the SRU request indicates a preference for SRU response elements within an ATOM response
1180 using the mime type 'application/atom+xml' (either through an HTTP 'Accept' header or via an
1181 '**httpAccept**' parameter) it may also designate a particular ATOM extension format through the parameter
1182 '**responseType**'.

1183 The default extension format for an ATOM response as outlined in the example below is designated by
1184 the URI:

- 1185 ○ info:srw/1/response-type/atom

1186

1187 Note that other response types may be possible and may be designated with their own 'response-type'
1188 URIs. If no '**responseType**' parameter is present then the default response type shown here will be
1189 assumed to be requested.

1190

Mime type ('Accept' header or ' httpAccept ' param)	application/atom+xml
Response type (' responseType ' param)	info:srw/1/response-type/atom

1191

1192 Example - ATOM Response (with SRU Response Elements)

```
1193 <feed xmlns="http://www.w3.org/2005/Atom" xmlns:srw="info:srw/xmlns/1/sru-2-0-v1">
```

```
1194   <title>SRU Records</title>
```

```
1195   <author>
```

```
1196     <name>Clint Courtney</name>
```

```
1197   </author>
```

```
1198   <id>urn:uuid:b636f3b1-dd07-4b9a-aeb8-d05a1997876e</id>
```

```
1199   <link rel="self"
```

```
1200     href="http://z3950.loc.gov:7090/voyager?version=1.1&operation=searchRetrieve&query%3D%2
1201     2hitchiker's%20guide%22&startRecord%3D1&maximumRecords%3D5&recordSchema%3
1202     Ddc"/>
```

```
1203   <updated>2009-12-12T12:00:00Z</updated>
```

```
1204   <sru:numberOfRecords>2</sru:numberOfRecords>
```

```
1205   <entry>
```

```
1206     <id>urn:isbn:1840235012</id>
```

```
1207     <title>Don't panic : Douglas Adams and the hitchiker's guide to the galaxy </title>
```

```
1208     <link href="http://www.example.com/xyz" />
```

```
1209     <updated>2009-12-12T12:00:00Z</updated>
```

```
1210     <sru:recordSchema>info:srw/schema/1/dc-v1.1</sru:recordSchema>
```

```
1211     <sru:recordXMLEscaping>xml</sru:recordXMLEscaping>
```

```
1212     <sru:recordData>
```

```
1213       <srw_dc:dc xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:srw_dc="info:srw/schema/1/dc-schema"
1214       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="info:srw/schema/1/dc-
1215       schema http://www.loc.gov/standards/sru/resources/dc-schema.xsd">
```

```
1216         <dc:title> Don't panic : Douglas Adams and the hitchiker's guide to the galaxy </dc:title>
```

```
1217         <dc:creator>Gaiman, Neil.</dc:creator>
```

```
1218         <dc:type>text</dc:type>
```

```
1219         <dc:publisher>London : Titan,</dc:publisher>
```

```
1220         <dc:date>2002</dc:date>
```

1221 <dc:language>eng</dc:language>
1222 <dc:subject>Adams, Douglas, 1952-2001.</dc:subject>
1223 <dc:subject>Adams, Douglas, 1952-2001. Hitch-hiker's guide to the galaxy.</dc:subject>
1224 <dc:subject>Science fiction, English--History and criticism.</dc:subject>
1225 <dc:subject>Novelists, English--20th century--Biography.</dc:subject>
1226 <dc:subject>Prefect, Ford (Fictitious character)</dc:subject>
1227 <dc:subject>Dent, Arthur (Fictitious character)</dc:subject>
1228 <dc:identifier>urn:isbn:1840235012</dc:identifier>
1229 </srw_dc:dc>
1230 </sru:recordData>
1231 <sru:recordPosition>1</sru:recordPosition>
1232 </entry>
1233 <entry>
1234 <id>urn:isbn:1868720721</id>
1235 <title>The hitchiker's guide to the internet : an African handbook </title>
1236 <link href="http://www.example.com/abc" />
1237 <updated>2009-12-12T12:00:00Z</updated>
1238 <sru:recordSchema>info:srw/schema/1/dc-v1.1</sru:recordSchema>
1239 <sru:recordXMLEscaping>xml</sru:recordXMLEscaping>
1240 <sru:recordData>
1241 <srw_dc:dc xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:srw_dc="info:srw/schema/1/dc-schema"
1242 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="info:srw/schema/1/dc-
1243 schema http://www.loc.gov/standards/sru/resources/dc-schema.xsd">
1244 <dc:title>The hitchiker's guide to the internet : an African handbook </dc:title>
1245 <dc:creator>Goldstuck, A.</dc:creator>
1246 <dc:type>text</dc:type>
1247 <dc:publisher>Johannesburg : [S.N.]</dc:publisher>
1248 <dc:date>1998</dc:date>
1249 <dc:language>eng</dc:language>
1250 <dc:identifier>urn:isbn:1868720721</dc:identifier>
1251 </srw_dc:dc>
1252 </sru:recordData>
1253 <sru:recordPosition>2</sru:recordPosition>
1254 </entry>
1255 </feed>

1256 E.2 JSON Extension

1257 When the SRU request indicates a preference for SRU response elements within a JSON response using
1258 the mime type 'application/json' (either through an HTTP 'Accept' header or via an '**httpAccept**'
1259 parameter) it may also designate a particular JSON extension format through the parameter
1260 '**responseType**'.

1261
1262 The default extension format for a JSON reponse as outlined in the example below is designated by the
1263 URI:

1264 ○ info:srw/1/response-type/json

1265

1266 Note that other response types may be possible and may be designated with their own 'response-type'
1267 URIs. If no '**responseType**' parameter is present then the default response type shown here will be
1268 assumed to be requested.

1269

Mime type ('Accept' header or ' httpAccept ' param)	application/json
Response type (' responseType ' param)	info:srw/1/response-type/json

1270

1271 **Example - JSON Response (with SRU Response Elements)**

```
1272 {  
1273   "feed": {  
1274     "title": "SRU Records",  
1275     "author": {  
1276       "name": "Clint Courtney"  
1277     },  
1278     "updated": "2009-12-12T12:00:00Z",  
1279     "id": "urn:uuid:a6852153-dc12-4cd9-b3e0-f9ff2ed7f0b3",  
1280     "link":  
1281     "http://z3950.loc.gov:7090/voyager?version=1.1&operation=searchRetrieve&query%3D%22hitchiker's%2  
1282     0guide%22&startRecord%3D1&maximumRecords%3D5&recordSchema%3Ddc",  
1283     "sru:numberOfRecords": 2,  
1284     "entry": [  
1285       {  
1286         "id": "urn:isbn:1840235012",  
1287         "title": "Don't panic : Douglas Adams and the hitchiker's guide to the galaxy",  
1288         "link": "http://www.example.com/xyz",  
1289         "updated": "2009-12-12T12:00:00Z",  
1290         "sru:recordSchema": "info:srw/schema/1/dc-v1.1",  
1291         "sru:recordXMLEscaping": "xml",  
1292         "sru:recordData": {  
1293           "srw_dc:dc": {  
1294             "dc:title": "Don't panic : Douglas Adams and the hitchiker's guide to the galaxy",  
1295             "dc:creator": [  
1296               "Gaiman, Neil"  
1297             ],  
1298             "dc:type": "text",  
1299             "dc:publisher": "London : Titan",  
1300             "dc:date": "2002",  
1301             "dc:language": "eng",  
1302             "dc:subject": [  
1303               "Adams, Douglas, 1952-2001.",  
1304               "Adams, Douglas, 1952-2001. Hitch-hiker's guide to the galaxy",
```

```

1305         "Science fiction, English--History and criticism",
1306         "Novelists, English--20th century--Biography",
1307         "Prefect, Ford (Fictitious character)",
1308         "Dent, Arthur (Fictitious character)",
1309     ],
1310     "dc:identifier": "urn:isbn:1840235012"
1311 }
1312 },
1313 "sru:recordPosition": 1
1314 },
1315 {
1316     "id": "urn:isbn:1868720721",
1317     "title": "The hitchiker's guide to the internet : an African handbook /",
1318     "link": "http://www.example.com/abc",
1319     "updated": "2009-12-12T12:00:00Z",
1320     "sru:recordSchema": "info:srw/schema/1/dc-v1.1",
1321     "sru:recordXMLEscaping": "xml",
1322     "sru:recordData": {
1323         "srw_dc:dc": {
1324             "dc:title": "The hitchiker's guide to the internet : an African handbook /",
1325             "dc:creator": [
1326                 "Goldstuck, A."
1327             ],
1328             "dc:type": "text",
1329             "dc:publisher": "Johannesburg : [S.N.]",
1330             "dc:date": "1998",
1331             "dc:language": "eng",
1332             "dc:identifier": "urn:isbn:1868720721"
1333         }
1334     },
1335     "sru:recordPosition": 2
1336 }
1337 ]
1338 }
1339 }

```

1340 E.3 JSONP

1341 When the SRU request indicates a preference for SRU response elements within a JSONP response
1342 using the mime type 'text/javascript' (either through an HTTP 'Accept' header or via an '**httpAccept**'
1343 parameter) it may also designate a particular JSONP extension format through the parameter
1344 '**responseType**'.

1345
1346 The default extension format for a JSONP reponse as outlined in the example below is designated by the
1347 URI:

- 1348 ○ info:srw/1/response-type/jsonp
- 1349

1350 Note that other response types may be possible and may be designated with their own 'response-type'
 1351 URIs. If no '**responseType**' parameter is present then the default response type shown here will be
 1352 assumed to be requested.

1353

Mime type ('Accept' header or ' httpAccept ' param)	text/javascript
Response type (' responseType ' param)	info:srw/1/response-type/jsonp

1354

1355 **Example - JSONP Response (with SRU Response Elements)**

```
1356 callback({
1357     "feed": {
1358         ...
1359     }
1360 })
```

1361 Note that the actual JSON data string is the same as in the previous example.

1362 Web clients such as browsers impose a "same origin" security policy on any executable code which is
 1363 retrieved over the network. This applies also to data structures such as JSON - or JavaScript Object
 1364 Notation. One workaround to this rule which allows for the JSON to be fetched and executed in a so-
 1365 called "cross-site request" is to wrap the JSON in a function call - a format which is known as JSONP
 1366 (JSON with padding). The JSONP mechanism operates by employing a script injection technique which
 1367 fetches the JSON data structure wrapped within a function call (the JSONP) and immediately executes it
 1368 as an argument to the function call supplied. A server may thus need to be able to serve up a JSONP
 1369 response in order to satisfy cross-site requests.

1370 A JSONP response is nothing more than the text wrapper elements "callback(" and ")" placed around the
 1371 actual JSON string, e.g.

```
1372 callback{
1373     "feed": {
1374         ...
1375     }
1376 })
```

1377

1378 Note that the actual function name (here "callback") may be statically or dynamically allocated.

1379 Note also that the mime type changes from 'application/json' to 'text/javascript' as JSONP is technically a
 1380 JavaScript text rather than a JSON object.

1381 **E.4 RSS Extension**

1382 When the SRU request indicates a preference for SRU response elements within an RSS response using
 1383 the mime type 'application/rss+xml' (either through an HTTP 'Accept' header or via an '**httpAccept**'
 1384 parameter) it may also designate a particular RSS extension format through the parameter
 1385 '**responseType**'.

1386 The possible extension formats for an RSS response as outlined in the examples below are designated by
 1387 the URIs:

- 1388 ○ info:srw/1/response-type/rss1.0 (RSS 1.0 - default)
- 1389 ○ info:srw/1/response-type/rss2.0 (RSS 2.0)

1390 Note that other response types may be possible and may be designated with their own 'response-type'
 1391 URIs. If no '**responseType**' parameter is present then the default response type (RSS 1.0) shown in the
 1392 first example will be assumed to be requested.
 1393

Mime type ('Accept' header or ' httpAccept ' param)	application/rss+xml
Response type (' responseType ' param)	info:srw/1/response-type/rss1.0 (default)
	info:srw/1/response-type/rss2.0

1394

1395 E.4.1 RSS 1.0 Extension

1396 This RSS extension type can be used if an RDF-based RSS response is required.

1397

```

1398 <?xml version="1.0" encoding="UTF-8"?>
1399 <rdf:RDF xmlns:sru="info:srw/xmlns/1/sru-2-0-v1" xmlns:atom="http://www.w3.org/2005/Atom"
1400     xmlns:dc="http://purl.org/dc/elements/1.1/"
1401     xmlns="http://purl.org/rss/1.0/"
1402     xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
1403   <channel rdf:about=" urn:uuid:a6852153-dc12-4cd9-b3e0-f9ff2ed7f0b3">
1404     <title>SRU Records</title>
1405     <link>http://z3950.loc.gov:7090/voyager?version=1.1&operation=searchRetrieve&query%3D%
1406     22hitchiker's%20guide%22&startRecord%3D1&maximumRecords%3D5&recordSchema%
1407     3Ddc</link>
1408     <sru:numberOfRecords>1509</sru:numberOfRecords>
1409     <items>
1410       <rdf:Seq>
1411         <rdf:li rdf:resource="http://www.example.com/xyz"/>
1412         <rdf:li rdf:resource="http://www.example.com/abc"/>
1413       </rdf:Seq>
1414     </items>
1415   </channel>
1416   <item rdf:about="http://www.example.com/xyz">
1417     <title>Don't panic : Douglas Adams and the hitchiker's guide to the galaxy </title>
1418     <link>http://www.example.com/xyz</link>
1419     <updated>2009-12-12T12:00:00Z</updated>
1420     <sru:recordSchema>info:srw/schema/1/dc-v1.1</sru:recordSchema>
1421     <sru:recordXMLEscaping>xml</sru:recordXMLEscaping>
1422     <sru:recordData>
1423       <srw_dc:dc xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:srw_dc="info:srw/schema/1/dc-schema"
1424       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="info:srw/schema/1/dc-
1425       schema http://www.loc.gov/standards/sru/resources/dc-schema.xsd">
1426         <dc:title> Don't panic : Douglas Adams and the hitchiker's guide to the galaxy </dc:title>
1427         <dc:creator>Gaiman, Neil.</dc:creator>
1428         <dc:type>text</type>

```

1429 <dc:publisher>London : Titan,</dc:publisher>
1430 <dc:date>2002</dc:date>
1431 <dc:language>eng</dc:language>
1432 <dc:subject>Adams, Douglas, 1952-2001.</dc:subject>
1433 <dc:subject>Adams, Douglas, 1952-2001. Hitch-hiker's guide to the galaxy.</dc:subject>
1434 <dc:subject>Science fiction, English--History and criticism.</dc:subject>
1435 <dc:subject>Novelists, English--20th century--Biography.</dc:subject>
1436 <dc:subject>Prefect, Ford (Fictitious character)</dc:subject>
1437 <dc:subject>Dent, Arthur (Fictitious character)</dc:subject>
1438 <dc:identifier>urn:isbn:1840235012</dc:identifier>
1439 </srw_dc:dc>
1440 </sru:recordData>
1441 <sru:recordPosition>1</sru:recordPosition>
1442 </item>
1443 <item rdf:about="http://www.example.com/abc">
1444 <title>The hitchiker's guide to the internet : an African handbook /</title>
1445 <link>http://www.example.com/abc</link>
1446 <updated>2009-12-12T12:00:00Z</updated>
1447 <sru:recordSchema>info:srw/schema/1/dc-v1.1</sru:recordSchema>
1448 <sru:recordXMLEscaping>xml</sru:recordXMLEscaping>
1449 <sru:recordData>
1450 <srw_dc:dc xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:srw_dc="info:srw/schema/1/dc-schema"
1451 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="info:srw/schema/1/dc-
1452 schema http://www.loc.gov/standards/sru/resources/dc-schema.xsd">
1453 <dc:title>The hitchiker's guide to the internet : an African handbook /</dc:title>
1454 <dc:creator>Goldstuck, A.</dc:creator>
1455 <dc:type>text</dc:type>
1456 <dc:publisher>Johannesburg : [S.N.],</dc:publisher>
1457 <dc:date>1998</dc:date>
1458 <dc:language>eng</dc:language>
1459 <dc:identifier>urn:isbn:1868720721</dc:identifier>
1460 </srw_dc:dc>
1461 </sru:recordData>
1462 <sru:recordPosition>2</sru:recordPosition>
1463 </item>
1464 </rdf:RDF>

1465 E.4.2 RSS 2.0 Extension

1466 This RSS extension type can be used if a generic RSS response is required.

```
1467 <?xml version="1.0" encoding="UTF-8"?>
1468 <rss version="2.0"
1469     xmlns:sru="info:srw/xmlns/1/sru-2-0-v1"
1470     xmlns:atom="http://www.w3.org/2005/Atom">
```

```

1471     xmlns:dc="http://purl.org/dc/elements/1.1/"
1472 >
1473     <channel>
1474         <title>SRU Records</title>
1475         <description/>
1476         <link>http://z3950.loc.gov:7090/voyager?version=1.1&operation=searchRetrieve&query%3D%
1477         22hitchiker's%20guide%22&startRecord%3D1&maximumRecords%3D5&recordSchema%
1478         3Ddc</link>
1479         <atom:link rel="self"
1480         href="http://z3950.loc.gov:7090/voyager?version=1.1&operation=searchRetrieve&query%3D%2
1481         2hitchiker's%20guide%22&startRecord%3D1&maximumRecords%3D5&recordSchema%3
1482         Ddc"/>
1483         <pubDate>Sat, 12 Dec 2009 12:00:00 GMT</pubDate>
1484         <sru:numberOfRecords>1509</sru:numberOfRecords>
1485         <item>
1486             <title>Don't panic : Douglas Adams and the hitchiker's guide to the galaxy </title>
1487             <description/>
1488             <link>http://www.example.com/xyz</link>
1489             <guid>urn:isbn:1840235012</guid>
1490             <pubDate>Sat, 12 Dec 2009 12:00:00 GMT</pubDate>
1491             <sru:recordSchema>info:srw/schema/1/dc-v1.1</sru:recordSchema>
1492             <sru:recordXMLEscaping>xml</sru:recordXMLEscaping>
1493             <sru:recordData>
1494                 <srw_dc:dc xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:srw_dc="info:srw/schema/1/dc-
1495                 schema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
1496                 xsi:schemaLocation="info:srw/schema/1/dc-schema http://www.loc.gov/standards/sru/resources/dc-
1497                 schema.xsd">
1498                     <dc:title> Don't panic : Douglas Adams and the hitchiker's guide to the galaxy </dc:title>
1499                     <dc:creator>Gaiman, Neil.</dc:creator>
1500                     <dc:type>text</dc:type>
1501                     <dc:publisher>London : Titan,</dc:publisher>
1502                     <dc:date>2002</dc:date>
1503                     <dc:language>eng</dc:language>
1504                     <dc:subject>Adams, Douglas, 1952-2001.</dc:subject>
1505                     <dc:subject>Adams, Douglas, 1952-2001. Hitch-hiker's guide to the galaxy.</dc:subject>
1506                     <dc:subject>Science fiction, English--History and criticism.</dc:subject>
1507                     <dc:subject>Novelists, English--20th century--Biography.</dc:subject>
1508                     <dc:subject>Prefect, Ford (Fictitious character)</dc:subject>
1509                     <dc:subject>Dent, Arthur (Fictitious character)</dc:subject>
1510                     <dc:identifier>urn:isbn:1840235012</dc:identifier>
1511                 </srw_dc:dc>
1512             </sru:recordData>
1513             <sru:recordPosition>1</sru:recordPosition>
1514         </item>
1515     </item>

```



```

1516     <title>The hitchiker's guide to the internet : an African handbook /</title>
1517     <description/>
1518     <link>http://www.example.com/abc</link>
1519     <guid>urn:isbn:1868720721</guid>
1520     <pubDate>Sat, 12 Dec 2009 12:00:00 GMT</pubDate>
1521     <sru:recordSchema>info:srw/schema/1/dc-v1.1</sru:recordSchema>
1522     <sru:recordXMLEscaping>xml</sru:recordXMLEscaping>
1523     <sru:recordData>
1524         <srw_dc:dc xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:srw_dc="info:srw/schema/1/dc-
1525 schema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
1526 xsi:schemaLocation="info:srw/schema/1/dc-schema http://www.loc.gov/standards/sru/resources/dc-
1527 schema.xsd">
1528         <dc:title>The hitchiker's guide to the internet : an African handbook /</dc:title>
1529         <dc:creator>Goldstuck, A.</dc:creator>
1530         <dc:type>text</dc:type>
1531         <dc:publisher>Johannesburg : [S.N.],</dc:publisher>
1532         <dc:date>1998</dc:date>
1533         <dc:language>eng</dc:language>
1534         <dc:identifier>urn:isbn:1868720721</dc:identifier>
1535         </srw_dc:dc>
1536     </sru:recordData>
1537     <sru:recordPosition>2</sru:recordPosition>
1538 </item>
1539 </channel>
1540 </rss>
1541

```

1542
1543

Appendix F. Interoperation with Earlier Versions (non-normative)

1544

F.1 Operation and Version

1545
1546
1547
1548

Earlier versions of the protocol (versions 1.1 and 1.2) included request parameters 'operation' and 'version', and response element <version>. These are removed from version 2.0. This section is included to describe (1) differences imposed by their removal; and (2) how version 2.0 servers may interoperate with clients running earlier versions that include them.

1549

F.1.1 Differences Imposed by their Removal

1550

F.1.1.1 Operation – Request Parameter

1551
1552
1553
1554

Earlier versions as well as this version of SRU express the concept of an operation: a searchRetrieve operation, a scan operation, and an Explain operation are defined. A searchRetrieve or scan request carries a mandatory operation parameter whose value is 'searchRetrieve' or 'scan' respectively, allowing these operations to be distinguished, so that they can both be supported at a single network endpoint.

1555
1556
1557
1558
1559
1560

This specification defines the searchRetrieve operation and there is also a scan operation (a separate specification [5]). However there is no operation parameter for either. As for earlier versions, searchRetrieve and scan may be supported at a single network endpoint because it is heuristically possible to distinguish these operations: A request is a scan request if and only if it includes a scanClause parameter; it is a searchRetrieve request if and only if it contains EITHER a query parameter OR a queryType parameter.

1561
1562
1563

However, if a new operation were to be defined, or a new version of searchRetrieve or scan, then it may no longer be possible to heuristically distinguish these operations and then it may be necessary to define the operation parameter for one or more operations.

1564

F.1.1.2 Version – Request Parameter and Response Element

1565
1566
1567
1568

In earlier versions a version request parameter and response element were defined because it was assumed that multiple versions might be supported at a single endpoint. With version 2.0, the version request parameter and response element are removed and it is EXPLICITLY ASSUMED that there will be different endpoints for different versions.

1569

F.1.2 Interoperation

1570
1571

Following are guidelines for interoperation with implementations of earlier versions where the operation or version parameter or element is used.

1572
1573

- A client operating under version 2.0 of SRU SHOULD include NEITHER of the request parameters 'operation' or 'version'.

1574
1575
1576
1577

- **If a server is operating under version 2.0 and the version parameter is included in a received request, and the server supports the requested version:** It may, if it chooses, process the request under that version. However, details of how these parameters are treated are beyond the scope of this standard.

1578
1579
1580
1581
1582
1583
1584

- **If the version parameter is included in a received request, and the server does not support the requested version:** the request should be rejected and a fatal diagnostic included. (The server may be able to supply the response according to the requested version – even though it does not in general support that version. If the server is willing and able to issue the failure response according to the requested version, then it should do so. However it is not required to do so, and, unfortunately, failure to do so will probably mean that the response cannot be interpreted by the client.)

- 1585
- **If the operation parameter is included in a received request:**
- 1586
- If the value of the operation parameter is searchRetrieve, the server may ignore it.
- 1587
- If the value of the operation parameter is other than searchRetrieve, the server may
- 1588
- reject the request (with a fatal diagnostic) or may, if it chooses, process the request;
- 1589
- however details of how the request should be processed are out of scope.
- 1590

1591 **F.2 Replacement of resultSetIdleTime with resultSetTTL**

1592 Earlier version of SRU include the response element <resultSetIdleTime>. In version 2.0 this element is
1593 removed and the response element <resultSetTTL> is defined.

1594 Implementors of SRU 2.0 servers who had previous familiarity with earlier SRU versions are cautioned
1595 that <resultSetIdleTime> is no longer a valid response element. SRU 2.0 clients should be prepared to
1596 accept <resultSetTTL> in the response.

1597 The earlier versions included the request parameter resultSetTTL and the response element
1598 <resultSetIdleTime>, with different semantics. During development of version 2.0 it was concluded that
1599 this mismatch in the request parameter and (apparently) corresponding response element was a flaw, it
1600 had caused considerable confusion, and it should not be perpetuated in version 2.0. It was believed to be
1601 serious enough a flaw that it should be corrected even though this would cause some incompatibility
1602 between versions.

1603 Thus version 2.0 defines the request parameter [resultSetTTL](#) and corresponding response element
1604 [<resultSetTTL>](#)

1605 **F.3 recordPacking and recordXMLEscaping**

1606 In version 2.0, the recordPacking request parameter, as well as the <recordPacking> subelement of
1607 <record> in the response, that had been in earlier versions, are renamed recordXMLEscaping. In
1608 addition, a new recordPacking request parameter is introduced with an entirely different meaning.

1609 Servers should be prepared to accept the new recordXMLEscaping parameter, and also to recognize the
1610 new meaning of the recordPacking parameter. Clients should be prepared to accept the new
1611 <recordXMLEscaping> element in the response.