XPointer and HTTP Range

A possible design for a scalable and extensible RDF Data Access protocol.

Bryan Thompson
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W3C XPointer Framework 1.0

- Extensible semantics for URI fragment identifiers, e.g., #foo, #element(foo/2), #svgView(0,0,100,100), etc.
  - Each XPointer scheme is has its own QName.
  - W3C schemes are in the default namespace.

- But, the fragment identifier is NOT passed with a normal HTTP request.
- Therefore, the client must GET the representation and *then* applies an XPointer processor to interpret the fragment identifier.
- So, extensible, but not scalable.

XPointer specifies encoding for URI

- The XPointer Framework[1] specifies how a given XPointer expression must be encoded before it may be placed into an external form as the fragment identifier of a URI.
- So, we can choose *any* RDF query notation and the XPointer Framework will tell us how to represent that as the fragment identifier for a URI.

- rdf() – possible name for an XPointer scheme that this group could define triple store data access query language.

- [1] http://www.w3.org/TR/xptr-xpointer/

Normal HTTP Request & Response

http://www.myorg.org/myTripleStore

Request:

```
GET /myTripleStore HTTP/1.1
Host: www.myorg.org
Accept: application/rdf+xml
```

Response:

```
HTTP/1.1 200 Ok
Content-Type: application/rdf+xml

<rdf:RDF … />
```

This request asks for the entire triple store, serialized as RDF/XML.

The HTTP “Range” header

- The HTTP/1.1 protocol defines an extensible request header named “Range”
- The client specifies a “range-unit”, e.g., “xpointer” and a “range-value”, e.g., “rdf(…).”
- The server sends back only the identified sub-resources for the negotiated content type (or a status code indicating an appropriate error).
- So, this looks like ….

RDF data access w/ HTTP Range

GET /myTripleStore HTTP/1.1
Host: www.myorg.org
Accept: application/rdf+xml
Range: xpointer = rdf(
SELECT (?x foaf:mbox ?mbox)
WHERE (?x foaf:name "John Smith") (?x foaf:mbox ?mbox)
USING foaf FOR <http://xmlns.com/foaf/0.1/>
)

HTTP/1.1 200 Ok
Content-Type: application/rdf+xml

<!– **Only the selected sub-graph is transmitted to the client.** -->
<rdf:RDF … />

Pros and Cons.

+1 Bookmarkable
- XPointer expression is just the URI fragment identifier, e.g.,
  - http://www.myorg.org/myTripleStore#rdf(...)
- XPointer specifies how to encode the RDF query into the URI.

+1 Scalable
- Only identified sub-resources are transmitted to the client.

+1 Extensible
- DAWG can define an XPointer scheme for RDF, e.g., rdf().
- Applications can define their own RDF query schemes.
- Same protocol can be used for graph update.

+1 Content negotiation
- Client can request RDF/XML, N3, etc.

Pros and Cons

+1 Low implementation burden

- Machine clients are fine, since this is easy with nearly any HTTP client library.
- Server implementation burden for protocol is small using existing HTTP platforms.

Pros and Cons.

Does not use the query string:

+1 Lots of applications already define a query interface. XPointer will not interfere with these existing interfaces, or even with other XPointer schemes.

+1 Very long query expressions are Ok since query is sent using an HTTP request header.

-1 Browsers can’t do this unless they implement the protocol extension (by mapping the fragment identifier onto the HTTP “Range” request header).

Pros and Cons

? Intermediaries

- Impact on existing intermediaries should be evaluated (in the field).

? Caching

- Servers can use the Vary header to indicate to caches that they may use a given response for all requests with the same Range header field.
- Caching will be an issue if/when we consider graph updates since there are likely to be multiple queries that select the same set of triples.

What is a “sub-resource” for RDF?

- Probably a triple.
- Can be represented in many notations, e.g., RDF/XML, N3, etc.
- Client can request a specific notation (content negotiation).
- Closure – In order for the response to be well-formed in a given notation, it will need to be a set of triples, not just URIs or literals.

- These are query language design issues.