Versioning linked data with Memento
Discover prior versions of a resource in ONE Record

In ONE Record environment, linked data resources are updated in real time and generally only their latest state is available for retrieval. In consequence, supply chain stakeholders often need to snapshot a current state of data, for example for a Shipment Logistics Object, and they need to know which version of data was used for that snapshot. Every time a snapshot is triggered successfully, a new version entry is created by the versioning service on the ONE Record Server.

There are few existing studies and proposed solutions for versioning linked data resources. This document introduces the approach used by the ONE Record standard based on the Memento Protocol.

What is Memento Protocol?

Memento is defined in the IETF RFC 7089 as an implementation of the time dimension of content negotiation, as defined by Tim Berners Lee in 1996.

Memento Protocol aims to bring time-based access to Web resources using HTTP capabilities. Essentially, Memento is an attempt to permit users to view any Web resource as it looked like on a given date in the past.

ONE Record uses Memento Protocol concepts for accessing versions of stored linked data resources.

What are the components of Memento Protocol?

Memento Protocol defines four types of Web resources:

 Original Resource

An Original Resource is a Web resource for which we want to find a prior version.

In ONE Record, the Original Resource is a linked data resource – a Logistics Object – published on a ONE Record Server in the Internet of Logistics.

For any given Original Resource several Mementos may exist, each one reflecting a frozen prior state (snapshot) of the Original Resource.

 Memento

A Memento is a Web resource that represents a prior version of the Original Resource, i.e. that encapsulates what the Original Resource was like at some time in the past.

In ONE Record, a Memento contains a snapshot of the data at a certain moment in time.

 TimeGate

The TimeGate is a resource providing access to prior states of the Original Resource using datetime negotiation. It "decides" on the basis of a given datetime, which Memento best matches what the Original Resource was like around that given datetime.

When negotiating with the TimeGate, the ONE Record Client uses an **Accept-Datetime** header to express the desired datetime of a prior/archived version of the Original Resource it wishes to

retrieve. The TimeGate responds with a **HTTP Link header** containing the location of a matching Memento of the resource closest to the datetime sent by the client in the request header.

The response will also include a **Memento-Datetime** header informing the ONE Record Client about when the snapshot of the resource was taken.

If the resource did not yet exist at that time, the server will respond with the appropriate **HTTP 404 NOT FOUND** status code.

TimeMap

A TimeMap is a resource that lists links to all of the stored states for a resource along with their timestamps: the Original Resource itself, its TimeGate, as well as its Mementos alongside with their timestamps. In a nutshell, TimeMaps are exposed by systems that host prior versions of Original Resources and allow for batch discovery of Mementos.

Original Resources, TimeGates and Mementos can make TimeMaps discoverable by providing an HTTP Link header with a relationship type of "timemap".
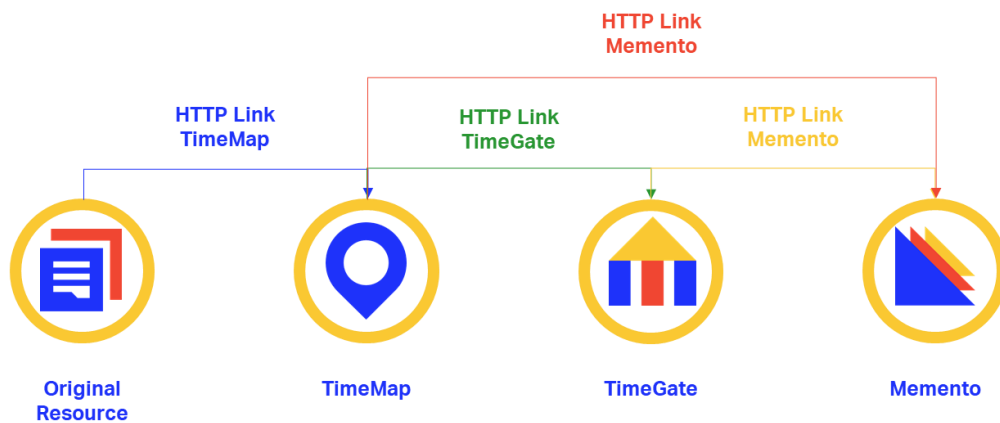
Conclusion

Versioning of Logistics Objects is important for ONE Record as it legally binds data at a given moment in time.

An important advantage in using Memento Protocol in the ONE Record environment is that it closely mirrors linked data principles by using HTTP and content-negotiation for version retrieval. It is a well-documented solution which offers excellent discoverability through clear references and it can be easily integrated with existing linked datasets.

Because Memento Protocol specifies different categories of resources, ONE Record can provide a distributed architecture by enabling prior version access for original resources hosted on different servers served by separate hosts.

More info at https://www.iata.org/one-record/.

Memento components overview