Versioning for HTTP Resources

draft-toomim-httpbis-versions-00

Michael Toomim
Braid.org
Invisible College
IETF 120, Vancouver
Review from IETF 118

Braid-HTTP: Four independent extensions to HTTP. From *state transfer* to *state synchronization*.

1. Versioning
2. Subscriptions
3. Patches
4. Merge-Types

Today!
HTTP resources change over time. Each change to a resource creates a new **version** of its state.

**Version history** can be **linear**

**Distributed system history** forms a **DAG**
Resource Versioning in HTTP today

1. Last-Modified

   Last-Modified: Sat, 6 Jul 2024 07:28:00 GMT

2. ETag

   ETag: W/"2u34fa7yorz0"

3. Additional URLs e.g. in WebDAV, Memento, Link Relations

   https://unpkg.com/braid-text@0.0.18/index.js
## Limits of Today's Versioning

<table>
<thead>
<tr>
<th>Feature</th>
<th>Last-Modified</th>
<th>ETag</th>
<th>Additional URLs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store &amp; Access History</td>
<td></td>
<td></td>
<td>✅</td>
</tr>
<tr>
<td>Marks Time vs. Contents</td>
<td>✅</td>
<td></td>
<td>✅</td>
</tr>
<tr>
<td>Branching (Distributed) Time</td>
<td></td>
<td></td>
<td>~</td>
</tr>
<tr>
<td>Independent of URL Allocation</td>
<td>✅</td>
<td>✅</td>
<td></td>
</tr>
<tr>
<td>Customizable Time Formats</td>
<td></td>
<td></td>
<td>~</td>
</tr>
</tbody>
</table>
Abilities of Generalized Versioning

• Incremental RSS Updates
• Git repo as website
• CDN with historical archive
• Apply PATCH at old versions
  • Rebase for other clients
• Send PUT/PATCH/POST edits while offline
• Collaborative Editing
Design Goals

• Version marks **point in time**
• Time can **branch** and **merge** (distributed)
• History of versions can be **stored** and **accessed**
• **Extensible** to new time **formats** (optimizable!)
• Additional URLs not required

**Discussion:** Is the WG interested in this problem?
Resource Versioning Proposal

- **Version:** and **Parents:** headers
  - Version = set of Version IDs
- **Version ID** = unique string identifying an edit
- **Version-Type:** defines format of string (optimizations!)
- Extend **GET/PUT/POST/PATCH** with version semantics
**Version:** and **Parents:** headers

<table>
<thead>
<tr>
<th>Method</th>
<th>Path</th>
<th>Headers</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUT</td>
<td>/foo</td>
<td>Version: &quot;dkn7ov2vwg&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parents: &quot;ajtva12kid&quot;, &quot;cmdpvkpll2&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;Hello world!&quot;</td>
</tr>
<tr>
<td>GET</td>
<td>/foo</td>
<td>Version: &quot;dkn7ov2vwg&quot;</td>
</tr>
<tr>
<td>HEAD</td>
<td>/foo</td>
<td>HTTP/1.1 200 OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Version: &quot;dkn7ov2vwg&quot;</td>
</tr>
</tbody>
</table>
Varieties of **GET**

<table>
<thead>
<tr>
<th>GET /foo</th>
</tr>
</thead>
</table>
| GET /foo  
Version: "dkn7ov2vwg" |
| GET /foo  
Parents: "ajtval2kid" |
| GET /foo  
Version: "dkn7ov2vwg"  
Parents: "ajtval2kid" |
Varieties of PUT/POST/PATCH

PUT /foo

PUT /foo
Version: "dkn7ov2vwg"

PUT /foo
Parents: "ajtval2kid"

PUT /foo
Version: "dkn7ov2vwg"
Parents: "ajtval2kid"
GET /foo
Version: "3"
Parents: "1a", "1b"

HTTP/1.1 104 Multiresponse
Current-Version: "3"

HTTP/1.1 200 OK
Version: "2"
Parents: "1a", "1b"

"Hello!"

HTTP/1.1 200 OK
Version: "3"
Parents: "2"

"Hello World!"
Advanced features via Version-Type

Version-Type: vector-clock
Version: "{mike: 5, seph: 10, greg: 3}"

Version-Type: rle
Version: "mike-573"
Parents: "mike-400"

Version-Type: git
Version: "1d5f89f8843b33b91d62bf95877e46b23fd86741"
Parents: "1cf6ab4ed836d4d7308ac93edbc6fd18a69ef88f"

Enables **1000x** history compression!
Example: Resumeable Uploads

PUT /something
Current-Version: "900"
Version-Type: bytestream
Content-Length: 900

<binary data of length 900>

HEAD /something
Parents: "0"

200 OK
Parents: "0"
Version: "500"

For a bytestream: Version = length-of-stream!

How much have you received?
I have up to 500!
Example: Git

GET /repo/readme.md

HTTP/1.1 200 OK
Content-Type: text/markdown
Version-Type: git
Version: "9531a9702af0d90dd489050ed8e25f87912a9252"
Parents: "3a4c361f8e0349fe4b25c1ff46ebec1ce66e60f"
...

Implemented in Production

This is live updating over Braid-HTTP! These are what the messages look like.

YES! Nice. ^(-v-)^ =)
Versioning of HTTP Resources

Discussion:

• Q1: Interest in problem?
• Q2: Is a solution feasible?
• Q3: Adopt work?