

Web-based Distributed Authoring and Versioning (WebDAV)

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Agenda

- WebDAV goals
- Functionality
- Concepts
- Operations
- WebDAV operation examples
- Demo
- Is WebDAV RESTful?

Goals (1 of 2)

- The stated goal of the WebDAV IETF working group, from the group's charter: “define the HTTP extensions necessary to enable distributed web authoring tools to be broadly interoperable, while supporting user needs”.
- The WebDAV protocol's aim was to make the Web a writable, collaborative medium, in line with Tim Berners-Lee's original vision.

Goals (2 of 2)

- From the DAV FAQ: “... people working on DAV have had goals which extend beyond simple web page authoring.”
- Additional goals (from the FAQ):
 - A network filesystem for the Internet, that operates on entire files at a time, and performs well in high-latency environments.
 - A protocol for manipulating the contents of a document management system via the Web.
 - Support of remote software development teams.
 - Leverage the success of HTTP in being a standard access layer for a wide range of storage repositories. HTTP provides read access, while DAV provides write access.

Functionality

- Locking: Both exclusive and shared write locks are supported. Locks address the overwrite problem, where two or more editors write to the same resource without first merging changes.
- Properties: Metadata, persisted as XML, are associated with each resource.
- Namespace manipulation: Resources may be copied or moved. Collections (similar to directories) may be created and listed.
- Versioning support was left out of WebDAV, and was later defined by the DeltaV specification.

WebDAV Concepts

- Resources
- Properties
- Collections
- Locks

WebDAV Concepts: Resources

- The concept of a resource is the same as that found in HTTP. A resource is the referent (“target”) of any URI.

WebDAV Concepts: Properties

- A property is a name-value pair that contains descriptive information (metadata) about a resource.
- Properties are persisted as XML.

WebDAV Concepts: Collections

- A collection is a resource that contains a set of URIs, called member URIs, which identify member resources.
- A collection is essentially a directory within the server's namespace.

WebDAV Concepts: Locks

- Locks provide a mechanism for serializing access to a resource. WebDAV defines locking only for write access to a resource.
- WebDAV supports two kinds of locks on a resource:
 - Exclusive: lock is only granted to a single user. Eliminates the need to merge changes from multiple users.
 - Shared: multiple users may receive the lock. The shared lock informs other collaborators that a user may be working on a resource. Implies that this user trusts that his collaborators will not overwrite his work.

WebDAV Operations

- WebDAV adds the following methods to HTTP:
 - PROPFIND – retrieve properties from a resource. Also overloaded to allow retrieval of the contents of a collection.
 - PROPPATCH – set and/or remove properties on a resource.
 - MKCOL – create a collection (directory).
 - COPY – copy a resource from one URI to another.
 - MOVE – move a resource from one URI to another.
 - LOCK – put a lock on a resource.
 - UNLOCK – remove a lock from a resource.

WebDAV Operation Examples: PROPFIND (1 of 2)

- Retrieve the specified properties for the <http://www.foo.bar/file> resource:

- Sample request:

```
PROPFIND /file HTTP/1.1
Host: www.foo.bar
Content-type: text/xml; charset="utf-8"
Content-Length: xxxx

<?xml version="1.0" encoding="utf-8" ?>
<D:propfind xmlns:D="DAV:">
  <D:prop xmlns:R="http://www.foo.bar/boxschema/">
    <R:bigbox/>
    <R:author/>
    <R:DingALing/>
    <R:Random/>
  </D:prop>
</D:propfind>
```

WebDAV Operation Examples: PROPFIND (2 of 2)

– Sample response:

HTTP/1.1 207 Multi-Status

Content-Type: text/xml; charset="utf-8"

Content-Length: xxxx

```
<?xml version="1.0" encoding="utf-8" ?>
<D:multistatus xmlns:D="DAV:">
  <D:response>
    <D:href>http://www.foo.bar/file</D:href>
    <D:propstat>
      <D:prop xmlns:R="http://www.foo.bar/boxschema/">
        <R:bigbox><R:BoxType>Box type A</R:BoxType></R:bigbox>
        <R:author><R:Name>J.J. Johnson</R:Name></R:author>
      </D:prop>
      <D:status>HTTP/1.1 200 OK</D:status>
    </D:propstat>
    <D:propstat>
      <D:prop><R:DingALing/><R:Random/></D:prop>
      <D:status>HTTP/1.1 403 Forbidden</D:status>
      <D:responsedescription> The user does not have access to the DingALing
property.
      </D:responsedescription>
    </D:propstat>
  </D:response>
  <D:responsedescription> There has been an access violation error.
</D:responsedescription>
</D:multistatus>
```

WebDAV Operation Examples: PROPPATCH (1 of 2)

- Set the specified properties for the <http://www.foo.com/bar.html> resource:

- Sample request:

```
PROPPATCH /bar.html HTTP/1.1
```

```
Host: www.foo.com
```

```
Content-Type: text/xml; charset="utf-8"
```

```
Content-Length: xxxx
```

```
<?xml version="1.0" encoding="utf-8" ?>
```

```
<D:propertyupdate xmlns:D="DAV:" xmlns:Z="http://www.w3.com/standards/z39.50/">
```

```
  <D:set>
```

```
    <D:prop>
```

```
      <Z:authors>
```

```
        <Z:Author>Jim Whitehead</Z:Author>
```

```
        <Z:Author>Roy Fielding</Z:Author>
```

```
      </Z:authors>
```

```
    </D:prop>
```

```
  </D:set>
```

```
  <D:remove>
```

```
    <D:prop><Z:Copyright-Owner/></D:prop>
```

```
  </D:remove>
```

```
</D:propertyupdate>
```

WebDAV Operation Examples: PROPPATCH (2 of 2)

– Sample response:

```
HTTP/1.1 207 Multi-Status
Content-Type: text/xml; charset="utf-8"
Content-Length: xxxx
<?xml version="1.0" encoding="utf-8" ?>
<D:multistatus xmlns:D="DAV:" xmlns:Z="http://www.w3.com/standards/z39.50">
  <D:response>
    <D:href>http://www.foo.com/bar.html</D:href>
    <D:propstat>
      <D:prop><Z:Authors/></D:prop>
      <D:status>HTTP/1.1 424 Failed Dependency</D:status>
    </D:propstat>
    <D:propstat>
      <D:prop><Z:Copyright-Owner/></D:prop>
      <D:status>HTTP/1.1 409 Conflict</D:status>
    </D:propstat>
    <D:responsedescription> Copyright Owner can not be deleted or
    altered.</D:responsedescription>
  </D:response>
</D:multistatus>
```

WebDAV Operation Examples: MKCOL

- Create the <http://www.server.org/webdisc/xfiles/> collection:
 - Sample request:
`MKCOL /webdisc/xfiles/ HTTP/1.1`
`Host: www.server.org`
 - Sample response:
`HTTP/1.1 201 Created`

WebDAV Operation Examples: COPY

- Copy the resource <http://www.ics.uci.edu/~fielding/index.html> to the location <http://www.ics.uci.edu/users/f/fielding/index.html>, overwriting the existing resource at the destination:
 - Sample request:

```
COPY /~fielding/index.html HTTP/1.1
Host: www.ics.uci.edu
Destination: http://www.ics.uci.edu/users/f/fielding/index.html
```
 - Sample response:

```
HTTP/1.1 204 No Content
```

WebDAV Operation Examples: MOVE

- Move the resource
<http://www.ics.uci.edu/~fielding/index.html> to the location
<http://www.ics.uci.edu/users/f/fielding/index.html> (there is initially nothing at the destination resource):
 - Sample request:

```
MOVE /~fielding/index.html HTTP/1.1
Host: www.ics.uci.edu
Destination: http://www.ics.uci.edu/users/f/fielding/index.html
```
 - Sample response:

```
HTTP/1.1 201 Created
Location: http://www.ics.uci.edu/users/f/fielding/index.html
```

WebDAV Operation Examples: LOCK (1 of 2)

- Create an exclusive write lock on the resource <http://webdav.sb.aol.com/workspace/webdav/proposal.doc>

- Sample request:

```
LOCK /workspace/webdav/proposal.doc HTTP/1.1
Host: webdav.sb.aol.com Timeout: Infinite, Second-4100000000
Content-Type: text/xml; charset="utf-8"
Content-Length: xxxx
Authorization: Digest username="ejw", realm="ejw@webdav.sb.aol.com",
    nonce="...", uri="/workspace/webdav/proposal.doc", response="...",
    opaque="..."
```

```
<?xml version="1.0" encoding="utf-8" ?>
<D:lockinfo xmlns:D='DAV:'>
  <D:lockscope><D:exclusive/></D:lockscope>
  <D:locktype><D:write/></D:locktype>
  <D:owner>
    <D:href>http://www.ics.uci.edu/~ejw/contact.html</D:href>
  </D:owner>
</D:lockinfo>
```

WebDAV Operation Examples: LOCK (2 of 2)

– Sample response:

```
HTTP/1.1 200 OK
Content-Type: text/xml; charset="utf-8"
Content-Length: xxxx

<?xml version="1.0" encoding="utf-8" ?>
<D:prop xmlns:D="DAV:">
  <D:lockdiscovery>
    <D:activelock>
      <D:locktype><D:write/></D:locktype>
      <D:lockscope><D:exclusive/></D:lockscope>
      <D:depth>Infinity</D:depth>
      <D:owner>
        <D:href>
          http://www.ics.uci.edu/~ejw/contact.html
        </D:href>
      </D:owner>
      <D:timeout>Second-604800</D:timeout>
      <D:locktoken>
        <D:href>
          opaquelocktoken:e71d4fae-5dec-22d6-fea5-00a0c91e6be4
        </D:href>
      </D:locktoken>
    </D:activelock>
  </D:lockdiscovery>
</D:prop>
```

WebDAV Operation Examples: UNLOCK

- Remove the lock, identified by the specified lock token, from the resource

<http://webdav.sb.aol.com/workspace/webdav/info.doc>

– Sample request:

```
UNLOCK /workspace/webdav/info.doc HTTP/1.1
Host: webdav.sb.aol.com
Lock-Token: <opaquelocktoken:a515cfa4-5da4-22e1-f5b5-00a0451e6bf7>
Authorization: Digest username="ejw", realm="ejw@webdav.sb.aol.com",
  nonce="...", uri="/workspace/webdav/proposal.doc", response="...",
  opaque="..."
```

– Sample response:

```
HTTP/1.1 204 No Content
```

Sources

- RFC 2518: HTTP Extensions for Distributed Authoring – WebDAV (<http://webdav.org/specs/rfc2518.html>)
- WebDAV article on Wikipedia (<http://en.wikipedia.org/wiki/WebDAV>)
- DAV FAQ (<http://webdav.org/other/faq.html>)
- Some WebDAV extensions (not discussed in this presentation):
 - RFC 3253: Versioning Extensions to WebDAV (DeltaV; <http://www.webdav.org/specs/rfc3253.html>)
 - RFC 3744: WebDAV Access Control Protocol (<http://www.webdav.org/specs/rfc3744.html>)

Demo

- WebDAV server: Jakarta Slide (<http://jakarta.apache.org/slide>)
- WebDAV client: DAV Explorer (<http://www.davexplorer.org>)

Is WebDAV RESTful?

- Yes. WebDAV is an HTTP extension, and it simply defines new verbs for HTTP.
- However, Roy Fielding has commented that “the PROP* methods conflict with REST because they prevent important resources from having URIs and effectively double the number of methods for no good reason.” See an archive of his post at <http://www.mail-archive.com/microformats-rest@microformats.org/msg00189.html>
- Do any of WebDAV’s new methods violate the principles of REST? Thoughts?