



# White Paper

## Optimized Updates for WebDAV

2023 March Release

Copyright © Fabasoft R&D GmbH, Linz, Austria, 2023.

All rights reserved. All hardware and software names used are registered trade names and/or registered trademarks of the respective manufacturers.

No rights to our software or our professional services, or results of our professional services, or other protected rights can be based on the handing over and presentation of these documents.

## Contents

<b>1 Introduction</b>	<b>4</b>
<b>2 Sync Procedure</b>	<b>4</b>
2.1 Outline	4
2.2 Initial Folder Traversal	5
2.3 Query for Changes	5
<b>3 Example</b>	<b>5</b>
3.1 Date Values and Timezone	5
3.2 Credentials	5
3.3 Initial Folder Traversal	6
3.4 Query for Changes	11

## 1 Introduction

Files and folders stored in the Fabasoft Cloud are accessible via WebDAV (<https://tools.ietf.org/html/rfc4918>).

To synchronize files and folders to local devices, a sync client has to do a deep traversal of the folder structure, starting at a user's topmost root folder. To keep the information current repeated traversals of the folder structure must be made.

Using the method outlined in this document, a sync client can query for changes since the last deep traversal enabling up-to-date information with less processing and network bandwidth requirements.

## 2 Sync Procedure

### 2.1 Outline

The following algorithm outlines the interaction with the Fabasoft Cloud repository. The initial folder traversal collects data. Based on this information, queries for a time based delta can be made.

#### Outline

```
var SYNC_DB={};
var SYNC_refdate;
...
function Init(href)
{
  SYNC_refdate = ... read initial refdate from GetChangedObjects web service ...
  while ( ... have folders ... ) {
    LoadFolder(href...);
  }
}

function LoadFolder(href...)
{
  var entities = ... use WebDAV-PROPFIND href with "Depth: 1" ...
  for (var entity of entities) {
    var key = entity.objaddress;
    ... store information for key ...
    SYNC_DB[key].href = entity.href;
    SYNC_DB[key].etag = entity.getetag;
    ... load files ...
    ... push back folders ...
  }
}

function Delta()
{
  var query = {
    refdate: SYNC_refdate;
    objects: [... list of all SYNC_DB keys / all objaddress values ...];
  }
  var response = ... post query as JSON to GetChangedObjects web service ...
  var result = JSON.parse(response);
  for (var idx = 0, cnt = result.objects.length; idx < cnt; idx++) {
```

```

var key = result.objects[idx];
var href = SYNC_DB[key].href;
var etag = SYNC_DB[key].etag;
... Update required, call LoadFolder or load file using etag ...
}
SYNC_refdate = result.refdate;
}

```

## 2.2 Initial Folder Traversal

For optimized updates for WebDAV the client has to read the start date of the traversal (`SYNC_refdate`) from the the `GetChangedObjects` web service.

Using a series of standard WebDAV `PROPFIND` request, information about files and folders is collected. In addition to the standard WebDAV attributes of every `response` entity (`href`, `getetag`, `getlastmodified`, ...) a unique ID is returned (`objaddress`).

For optimized updates for WebDAV the client has to store at least the unique ID of every entity (`objaddress`) together with some entity information (`href`, `getetag`, ...).

## 2.3 Query for Changes

Based on the start date of the initial traversal (`SYNC_refdate`) and the unique IDs of all response entities (`objaddress`) the client may query for changed objects.

The result of the query is a list of changed objects (`objects`) along with their last modification date (`changedates`) and a new reference date (`refdate`).

If a folder is in the result list the folder may have changed (e.g. the name changed or a child was added or deleted) and must be checked / loaded based on the entity tag (`getetag`).

If a file is in the result list it may have changed (e.g. the name changed or the content was changed) and must be checked / loaded based on the entity tag (`getetag`).

Changed entities have to be handled just as it happened during the initial folder traversal (keep `href`, `getetag` and `objaddress` for new entities).

To repeat the query for changes, the client simply updates the `SYNC_refdate` with the recent `refdate` value.

## 3 Example

### 3.1 Date Values and Timezone

The date values used in this interaction with the service are set in UTC/GMT. This behavior may be specified as part of the web service API by using the http-header value of "X-FSC-TZ: 0" or alternatively by adding the url-argument "tz=0".

### 3.2 Credentials

To use WebDAV and the `GetChangedObjects` API a password for applications has to be generated.

? ×
Create Password for Application

Description

Valid for \*  
🔑 Network Drive (WebDAV)

Validity Period \*  
1 Month

Cancel
Next

### 3.3 Initial Folder Traversal

A detailed transcript of the data passed to and from the services is listed using the command line utility `curl`.

#### Read initial refdate from server

```
# user and password
export usr="<cloud-user-id>"
export pwd="<cloud-service-password>"

# service url
export svc="https://at.cloud.fabasoft.com/folio"
export svc="$svc/wsjson/FSCOWSSTDSEVICES@1.1001:WebService/GetChangedObjects?tz=0"

# read refdate
curl -u $usr:$pwd -X POST --data-binary '{"refdate":"2016-01-01T00:00:00Z"}' $svc
{
  "refdate": "2016-03-14T10:43:00Z",
  "objects": null,
  "changedates": null,
  "names": null
}
```

#### Initial traversal

```
# user and password
export usr="<cloud-user-id>"
export pwd="<application-password>"

# read root folder
curl -u $usr:$pwd -X PROPFIND -H 'Depth: 1' https://at.cloud.fabasoft.com/folio/webdav/

<?xml version="1.0" encoding="utf-8"?>
<D:multistatus xmlns:D="DAV:" xmlns:lp2="http://schemas.fabasoft.com/swc/">
  <D:response>
    <D:href>/folio/webdav/</D:href>
    <D:propstat>
      <D:prop>
```

```

    <lp2:COOSYSTEM_1_1_objaddress
xmlns:lp2="http://schemas.fabasoft.com/swc/">COO.6505.100.1.211</lp2:COOSYSTEM_1_1_objadre
ss>
    <D:creationdate>2009-08-10T14:29:51Z</D:creationdate>
    <D:getcontentlanguage>de</D:getcontentlanguage>
    <D:getcontentlength/>
    <D:getcontenttype>httpd/unix-directory</D:getcontenttype>
    <D:getetag>"cfe8d07a47fdae19flae64272c86fb71"</D:getetag>
    <D:getlastmodified>Fri, 26 Feb 2016 07:32:54 GMT</D:getlastmodified>
    <D:lockdiscovery/>
    <D:resourcetype>
      <D:collection/>
    </D:resourcetype>
    <D:supportedlock>
      <D:lockentry>
        <D:lockscope>
          <D:exclusive/>
        </D:lockscope>
        <D:locktype>
          <D:write/>
        </D:locktype>
      </D:lockentry>
    </D:supportedlock>
    <D:iscollection>1</D:iscollection>
  </D:prop>
  <D:status>HTTP/1.1 200 OK</D:status>
</D:propstat>
</D:response>
<D:response>
  <D:href>/folio/webdav/Test-Etc</D:href>
  <D:propstat>
    <D:prop>
      <lp2:COOSYSTEM_1_1_objaddress
xmlns:lp2="http://schemas.fabasoft.com/swc/">COO.6505.100.5.1695911</lp2:COOSYSTEM_1_1_obja
ddress>
      <D:creationdate>2016-01-18T14:44:56Z</D:creationdate>
      <D:getcontentlanguage>de</D:getcontentlanguage>
      <D:getcontentlength/>
      <D:getcontenttype>httpd/unix-directory</D:getcontenttype>
      <D:getetag>"faec0018f2ee2514472b0107779ded72"</D:getetag>
      <D:getlastmodified>Fri, 11 Mar 2016 13:44:10 GMT</D:getlastmodified>
      <D:lockdiscovery/>
      <D:resourcetype>
        <D:collection/>
      </D:resourcetype>
      <D:supportedlock>
        <D:lockentry>
          <D:lockscope>
            <D:exclusive/>
          </D:lockscope>
          <D:locktype>
            <D:write/>
          </D:locktype>
        </D:lockentry>
      </D:supportedlock>
      <D:iscollection>1</D:iscollection>
    </D:prop>

```

```

    <D:status>HTTP/1.1 200 OK</D:status>
  </D:propstat>
</D:response>
</D:multistatus>

# read folder "Test-Etc"
curl -u $usr:$pwd -X PROPFIND -H 'Depth: 1'
https://at.cloud.fabasoft.com/folio/webdav/Test-Etc/

<?xml version="1.0" encoding="utf-8"?>
<D:multistatus xmlns:D="DAV:" xmlns:lp2="http://schemas.fabasoft.com/swc/">
  <D:response>
    <D:href>/folio/webdav/Test-Etc/</D:href>
    <D:propstat>
      <D:prop>
        <lp2:COOSYSTEM_1_1_objaddress
xmlns:lp2="http://schemas.fabasoft.com/swc/">COO.6505.100.5.1695911</lp2:COOSYSTEM_1_1_obja
ddress>
          <D:creationdate>2016-01-18T14:44:56Z</D:creationdate>
          <D:getcontentlanguage>de</D:getcontentlanguage>
          <D:getcontentlength/>
          <D:getcontenttype>httpd/unix-directory</D:getcontenttype>
          <D:getetag>"faec0018f2ee2514472b0107779ded72"</D:getetag>
          <D:getlastmodified>Fri, 11 Mar 2016 13:44:10 GMT</D:getlastmodified>
          <D:lockdiscovery/>
          <D:resourcetype>
            <D:collection/>
          </D:resourcetype>
          <D:supportedlock>
            <D:lockentry>
              <D:lockscope>
                <D:exclusive/>
              </D:lockscope>
              <D:locktype>
                <D:write/>
              </D:locktype>
            </D:lockentry>
          </D:supportedlock>
          <D:iscollection>1</D:iscollection>
        </D:prop>
        <D:status>HTTP/1.1 200 OK</D:status>
      </D:propstat>
    </D:response>
  <D:response>
    <D:href>/folio/webdav/Test-Etc/Audio/</D:href>
    <D:propstat>
      <D:prop>
        <lp2:COOSYSTEM_1_1_objaddress
xmlns:lp2="http://schemas.fabasoft.com/swc/">COO.6505.100.2.12635429</lp2:COOSYSTEM_1_1_obj
address>
          <D:creationdate>2016-03-11T13:44:03Z</D:creationdate>
          <D:getcontentlanguage>de</D:getcontentlanguage>
          <D:getcontentlength/>
          <D:getcontenttype>httpd/unix-directory</D:getcontenttype>
          <D:getetag>"2fb256fc3e02e77d9a1fd8c3191d6605"</D:getetag>
          <D:getlastmodified>Fri, 11 Mar 2016 13:46:58 GMT</D:getlastmodified>
          <D:lockdiscovery/>
          <D:resourcetype>

```



```

    <D:collection/>
  </D:resourcetype>
  <D:supportedlock>
    <D:lockentry>
      <D:lockscope>
        <D:exclusive/>
      </D:lockscope>
      <D:locktype>
        <D:write/>
      </D:locktype>
    </D:lockentry>
  </D:supportedlock>
  <D:iscollection>1</D:iscollection>
</D:prop>
<D:status>HTTP/1.1 200 OK</D:status>
</D:propstat>
</D:response>
</D:multistatus>

# read folder "Test-Etc/Audio"
curl -u $usr:$pwd -X PROPFIND -H 'Depth: 1'
https://at.cloud.fabasoft.com/folio/webdav/Test-Etc/Audio/

<?xml version="1.0" encoding="utf-8"?>
<D:multistatus xmlns:D="DAV:" xmlns:lp2="http://schemas.fabasoft.com/swc/">
  <D:response>
    <D:href>/folio/webdav/Test-Etc/Audio</D:href>
    <D:propstat>
      <D:prop>
        <lp2:COOSYSTEM_1_1_objaddress
xmlns:lp2="http://schemas.fabasoft.com/swc/">COO.6505.100.2.12635429</lp2:COOSYSTEM_1_1_obj
address>
          <D:creationdate>2016-03-11T13:44:03Z</D:creationdate>
          <D:getcontentlanguage>de</D:getcontentlanguage>
          <D:getcontentlength/>
          <D:getcontenttype>httpd/unix-directory</D:getcontenttype>
          <D:getetag>"ad93b8af64f0a64b9d1a407664fe37f8"</D:getetag>
          <D:getlastmodified>Fri, 11 Mar 2016 13:46:58 GMT</D:getlastmodified>
          <D:lockdiscovery/>
          <D:resourcetype>
            <D:collection/>
          </D:resourcetype>
          <D:supportedlock>
            <D:lockentry>
              <D:lockscope>
                <D:exclusive/>
              </D:lockscope>
              <D:locktype>
                <D:write/>
              </D:locktype>
            </D:lockentry>
          </D:supportedlock>
          <D:iscollection>1</D:iscollection>
        </D:prop>
        <D:status>HTTP/1.1 200 OK</D:status>
      </D:propstat>
    </D:response>

```

```

<D:response>
  <D:href>/folio/webdav/Test-Etc/Audio/Ode%20to%20Joy.mp3</D:href>
  <D:propstat>
    <D:prop>
      <lp2:COOSYSTEM_1_1_objaddress
xmlns:lp2="http://schemas.fabasoftware.com/swc/">COO.6505.100.5.2535086</lp2:COOSYSTEM_1_1_obja
ddress>
      <D:creationdate>2016-03-11T13:43:22Z</D:creationdate>
      <D:displayname>Ode to Joy.mp3</D:displayname>
      <D:getcontentlanguage>de</D:getcontentlanguage>
      <D:getcontentlength>47008530</D:getcontentlength>
      <D:getcontenttype>audio/mpeg</D:getcontenttype>
      <D:getetag>"056ecacb366d60e4f94605416f20e24e"</D:getetag>
      <D:getlastmodified>Fri, 11 Mar 2016 13:44:03 GMT</D:getlastmodified>
      <D:lockdiscovery/>
      <D:resourcetype/>
      <D:supportedlock>
        <D:lockentry>
          <D:lockscope>
            <D:exclusive/>
          </D:lockscope>
          <D:locktype>
            <D:write/>
          </D:locktype>
        </D:lockentry>
      </D:supportedlock>
      <D:iscollection>0</D:iscollection>
    </D:prop>
    <D:status>HTTP/1.1 200 OK</D:status>
  </D:propstat>
</D:response>
<D:response>
  <D:href>/folio/webdav/Test-Etc/Audio/Welcome.txt</D:href>
  <D:propstat>
    <D:prop>
      <lp2:COOSYSTEM_1_1_objaddress
xmlns:lp2="http://schemas.fabasoftware.com/swc/">COO.6505.100.6.2535092</lp2:COOSYSTEM_1_1_obja
ddress>
      <D:creationdate>2016-03-11T13:46:58Z</D:creationdate>
      <D:displayname>Welcome.txt</D:displayname>
      <D:getcontentlanguage>de</D:getcontentlanguage>
      <D:getcontentlength>10</D:getcontentlength>
      <D:getcontenttype>text/plain</D:getcontenttype>
      <D:getetag>"f7111e8429bfcd4b39bd471421b816d0"</D:getetag>
      <D:getlastmodified>Fri, 11 Mar 2016 13:47:32 GMT</D:getlastmodified>
      <D:lockdiscovery/>
      <D:resourcetype/>
      <D:supportedlock>
        <D:lockentry>
          <D:lockscope>
            <D:exclusive/>
          </D:lockscope>
          <D:locktype>
            <D:write/>
          </D:locktype>
        </D:lockentry>
      </D:supportedlock>

```

```
<D:iscollection>0</D:iscollection>
</D:prop>
<D:status>HTTP/1.1 200 OK</D:status>
</D:propstat>
</D:response>
</D:multistatus>
```

From the response to the calls above the following data is collected.

## refdate

```
2016-03-14T10:43:00Z
```

## href

## objaddress

/folio/webdav/	COO.6505.100.1.211
/folio/webdav/Test-Etc/	COO.6505.100.5.1695911
/folio/webdav/Test-Etc/Audio/	COO.6505.100.2.12635429
/folio/webdav/Test-Etc/Audio/Ode to Joy.mp3	COO.6505.100.5.2535086
/folio/webdav/Test-Etc/Audio/Welcome.txt	COO.6505.100.6.2535092

From this data, the following input JSON is generated.

## JSON

```
{ "refdate": "2016-03-14T10:43:00Z",
  "objects": [
    "COO.6505.100.1.211",
    "COO.6505.100.5.1695911",
    "COO.6505.100.2.12635429",
    "COO.6505.100.5.2535086",
    "COO.6505.100.6.2535092" ]
}
```

## 3.4 Query for Changes

### Query for changes

```
# show input
cat query.txt
{ "refdate": "2016-03-14T10:43:00Z",
  "objects": [
    "COO.6505.100.1.211",
    "COO.6505.100.5.1695911",
    "COO.6505.100.2.12635429",
    "COO.6505.100.5.2535086",
    "COO.6505.100.6.2535092" ]
}

# user and password
export usr="<cloud-user-id>"
export pwd="<cloud-service-password>"

# service url
```

```

export svc="https://at.cloud.fabasoft.com/folio"
export svc="$svc/wsjson/FSCOWSSTDSEVICES@1.1001:WebService/GetChangedObjects?tz=0"

# call get changed objects (zero changes)
curl -u $usr:$pwd -X POST --data-binary "@query.txt" $svc
{
  "refdate": "2016-03-14T12:22:38Z",
  "objects": null,
  "changedates": null,
  "names": null
}

# call get changed objects after the Welcome.txt document was changed (one change)
curl -u $usr:$pwd -X POST --data-binary "@query.txt" " $svc
{
  "refdate":"2016-03-14T12:29:54Z",
  "objects":"COO.6505.100.6.2535092",
  "changedates":"2016-03-14T12:29:41Z",
  "names":"Welcome"
}

# call get changed objects after yet another change: a document was added to the Audio
folder (two changes)
curl -u $usr:$pwd -X POST --data-binary "@query.txt" " $svc
{
  "refdate":"2016-03-14T12:35:55Z",
  "objects":[
    "COO.6505.100.6.2535092",
    "COO.6505.100.2.12635429"
  ],
  "changedates":[
    "2016-03-14T12:29:41Z",
    "2016-03-14T12:35:49Z"
  ],
  "names":[
    "Welcome",
    "Audio"
  ]
}

```