*Fabasoft*®

# White Paper
## Optimized Updates for WebDAV

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# Contents

# 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.

```
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
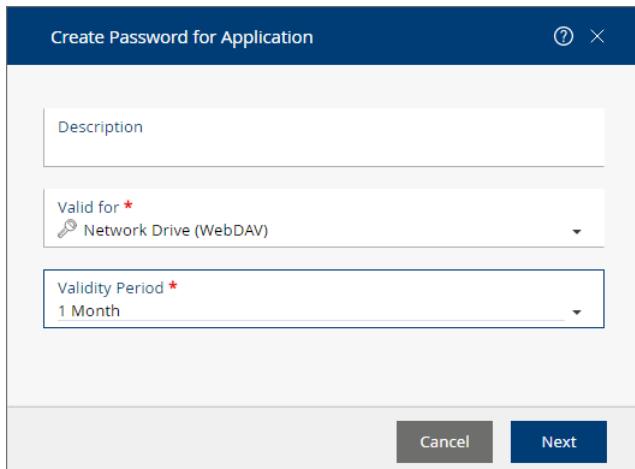
## 3.1  Date Values and Timezone

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.

## 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/FSCOWSSTDSERVICES@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_objaddre
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>"cfe8d07a47fdae19f1ae64272c86fb71"</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>
```

```xml
  <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.fabasoft.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.fabasoft.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/FSCOWSSTDSERVICES@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"
   ]
}
```