libdmapsharing

An Open Source Implementation of the DMAP Protocol

W. Michael Petullo

September 10, 2009

About Me

- Day job is with the US Army

About Me

- Day job is with the US Army
- Linux since '97, Red Hat since 4.2 & Fedora from the beginning
- Worked with David Zeuthen to implement support in HAL for encrypted disks

About Me

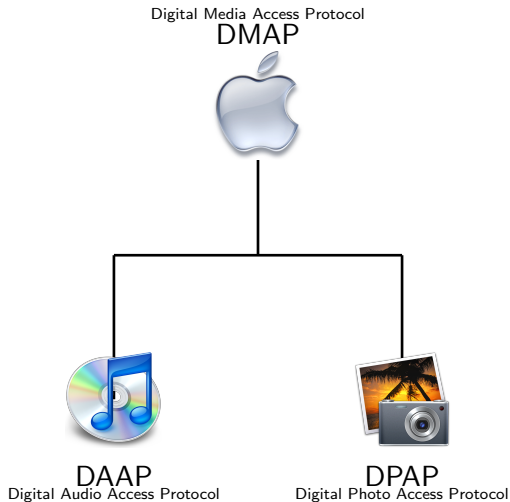Kerberos Server

LDAP Server

File & Time Machine Server

DMAP Server

- ▶ Day job is with the US Army
- ▶ Linux since '97, Red Hat since 4.2 & Fedora from the beginning
- ▶ Worked with David Zeuthen to implement support in HAL for encrypted disks
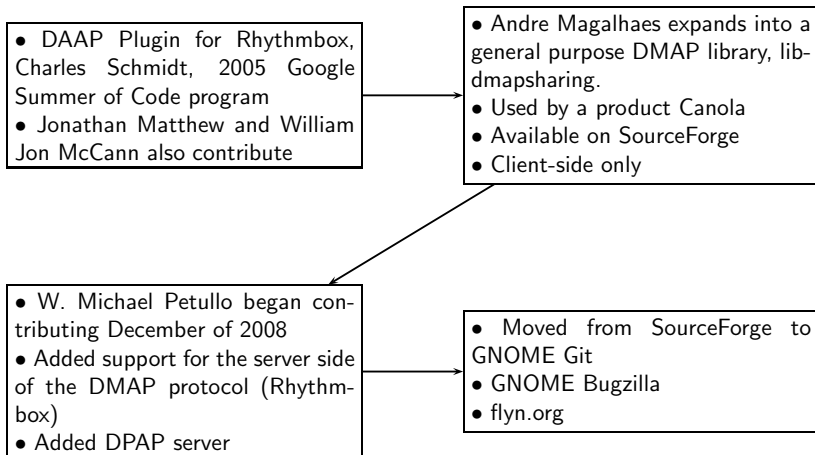- ▶ Currently working on integrating Mac OS X clients with Fedora servers[1]

The DMAP Family of Protocols

Digital Media Access Protocol
DMAP

DAAP
Digital Audio Access Protocol

DPAP
Digital Photo Access Protocol

libdmapsharing Pedigree

- DAAP Plugin for Rhythmbox, Charles Schmidt, 2005 Google Summer of Code program
- Jonathan Matthew and William Jon McCann also contribute

- Andre Magalhaes expands into a general purpose DMAP library, libdmapsharing.
- Used by a product Canola
- Available on SourceForge
- Client-side only

- W. Michael Petullo began contributing December of 2008
- Added support for the server side of the DMAP protocol (Rhythmbox)
- Added DPAP server

- Moved from SourceForge to GNOME Git
- GNOME Bugzilla
- flyn.org

DAAP HTTP Session, iTunes 8 and dmapd

Step 1: Interrogate basic server capabilities (e.g., supports query)

- Server Info.
- Content Codes
- Login
- Update
- Databases
- Database Items
- Containers
- Container Items
- Update
- User Select
- Get Media

Request

```
/server-info
```

Response

```
HTTP/1.1 200 OK
Date:  Tue, 09 Sep 2009 23:52:49 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:  181
msrv....mstt........mpro........apro...
.....minm....Media Appliancemsau.....
...
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 2: Interrogate supported content codes (binary markup)

- ▶ Server Info.
- ▶ Content Codes
- ▶ Login
- ▶ Update
- ▶ Databases
- ▶ Database Items
- ▶ Containers
- ▶ Container Items
- ▶ Update
- ▶ User Select
- ▶ Get Media

Request

```
/content-codes
```

Response

```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:49 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:  5656
mccr....mstt........mdcl....mcnm.......
.mcna....mcty......mdcl....mcnm....mdcl
....mcna....dmap.dictionarymcty......
...
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 3: Login and receive session ID

- ► Server Info.
- ► Content Codes
- ► Login
- ► Update
- ► Databases
- ► Database Items
- ► Containers
- ► Container Items
- ► Update
- ► User Select
- ► Get Media

Request

```
/login
```

Response

```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:49 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:  32
mlog....mstt........mlid........
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 4:

- ▶ Server Info.
- ▶ Content Codes
- ▶ Login
- ▶ Update
- ▶ Databases
- ▶ Database Items
- ▶ Containers
- ▶ Container Items
- ▶ Update
- ▶ User Select
- ▶ Get Media

Request

`/update?session-id=`*ID*`&revision-number=`*R*

Response

```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:50 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:  32
mupd....mstt........musr........
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 5: Retrieve database identifiers

- ▶ Server Info.
- ▶ Content Codes
- ▶ Login
- ▶ Update
- ▶ Databases
- ▶ Database Items
- ▶ Containers
- ▶ Container Items
- ▶ Update
- ▶ User Select
- ▶ Get Media

Request
`/databases?session-id=`*ID*`&revision-number=`*R*

Response
```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:50 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:  144
avdb....mstt........muty.....mtco......
..mrco........mlcl....mlit....miid.....
...mper...........minm....Media Applia
ncemimc........mctc........  ...
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 6: Retrieve database item identifiers and metadata

- ▶ Server Info.
- ▶ Content Codes
- ▶ Login
- ▶ Update
- ▶ Databases
- ▶ Database Items
- ▶ Containers
- ▶ Container Items
- ▶ Update
- ▶ User Select
- ▶ Get Media

Request

```
/databases/1/items?type=music&meta=all
   &session-id=ID&revision-number=R
```

Response

```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:50 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:  1070666
LIST OF ALL MUSIC METADATA
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 7: Retrieve container (playlists) identifiers

- ▶ Server Info.
- ▶ Content Codes
- ▶ Login
- ▶ Update
- ▶ Databases
- ▶ Database Items
- ▶ Containers
- ▶ Container Items
- ▶ Update
- ▶ User Select
- ▶ Get Media

Request

```
/databases/1/containers?meta=dmap.itemid,
    ...&session-id=ID&revision-number=R
```

Response

```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:54 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:  11581
aply....mstt........muty.....mtco..
......mrco........mlcl....mlit....m
iid........mper...........minm....
Media Appliancemimc........abpl....
.mlit....miid........mper..........
..minm....Playlist Namemimc........
...
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 8: For each playlist, get item identifiers

- Server Info.
- Content Codes
- Login
- Update
- Databases
- Database Items
- Containers
- Container Items
- Update
- User Select
- Get Media

Request

```
/databases/1/containers/1/items?type=music
  &meta=...&session-id=ID&revision-number=R
```

Response

```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:54 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:  108547
MAPPING BETWEEN CONTAINER ID AND ITEM ID
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 9:

- ▶ Server Info.
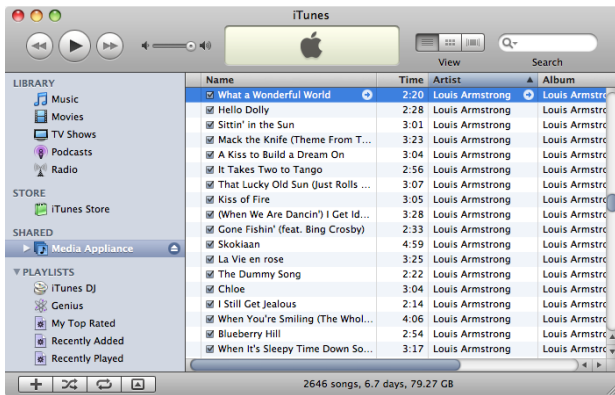- ▶ Content Codes
- ▶ Login
- ▶ Update
- ▶ Databases
- ▶ Database Items
- ▶ Containers
- ▶ Container Items
- ▶ Update
- ▶ User Select
- ▶ Get Media

Request

```
/update?session-id=ID&revision-number=R
  &delta=D
```

Response

```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:55 GMT
Content-Type:  application/x-dmap-tagged
DMAP-Server:  libdmapsharing1.9.0.10
Content-Length:
ANOTHER UPDATE
```

DAAP HTTP Session, iTunes 8 and dmapd

Step 10: User selects a song

- ▶ Server Info.
- ▶ Content Codes
- ▶ Login
- ▶ Update
- ▶ Databases
- ▶ Database Items
- ▶ Containers
- ▶ Container Items
- ▶ Update
- ▶ User Select
- ▶ Get Media

DAAP HTTP Session, iTunes 8 and dmapd

Step 11: Media file transfer using HTTP

- ▶ Server Info.
- ▶ Content Codes
- ▶ Login
- ▶ Update
- ▶ Databases
- ▶ Database Items
- ▶ Containers
- ▶ Container Items
- ▶ Update
- ▶ User Select
- ▶ Get Media

Request

`/databases/1/items/ID.mp3?session-id=ID`

Response

```
HTTP/1.1 200 OK
Date:  Tue, 08 Sep 2009 23:52:58 GMT
DMAP-Server:  libdmapsharing1.9.0.10
Accept-Rangers:  bytes
Transfer-Encoding:  chunked
Connection:  Close
Content-Type:  application/x-daap-tagged
...
```

Example DAAP Server Code

1. Implement *DAAPRecord*, *DMAPContainerDb* and *DMAPDb*
2. Create a *DAAPShare* object:

```
loop = g_main_loop_new (NULL, FALSE);

factory = DMAP_RECORD_FACTORY (
            my_daap_record_factory_new ());

db = DMAP_DB (my_build_db (factory));

playlist_db = DMAP_CONTAINER_DB (my_build_playlist_db ());

share = DMAP_SHARE (daap_share_new ("My Music",
                                    NULL, /* Password */
                                    db,
                                    playlist_db,
                                    "audio/mp3"));

g_main_loop_run (loop);
```

Example DAAP Client Code

1. Implement *DAAPRecord*
2. Create a *DMAPMdnsBrowser* object
3. Write *service added* and *connected* callbacks

```
loop = g_main_loop_new (NULL, FALSE);

browser = dmap_mdns_browser_new (
            DMAP_MDNS_BROWSER_SERVICE_TYPE_DAAP);

g_signal_connect (G_OBJECT (browser),
                "service-added",
                G_CALLBACK (service_added_cb),
                NULL);

dmap_mdns_browser_start (browser, &error);

g_main_loop_run (loop);
```

Example DAAP Client Code (Continued)

```
service_added_cb (DMAPMdnsBrowser *browser,
                  DMAPMdnsBrowserService *service,
                  gpointer user_data)
{
  factory = DMAP_RECORD_FACTORY (my_daap_record_factory_new ());
  conn = DMAP_CONNECTION (daap_connection_new (service->name,
                          service->host, service->port,
                          FALSE, db, factory));
  dmap_connection_connect (conn,
                           (DMAPConnectionCallback) conn_cb,
                            db);
}

conn_cb (DMAPConnection *connection, gboolean result,
         const char *reason, DMAPDb *db)
{
  dmap_db_foreach (db, (GHFunc) my_record_action, NULL);
}
```

Transcoding using GStreamer

- Audio may be transcoded from an on disk format before being streamed to a client
- Satisfies picky clients like iTunes or the Roku SoundBridge
- GStreamer allows storage in any format supported by a GStreamer plugin

Future of libdmapsharing

- ▶ Continue developing dmapd[2]
- ▶ Red Hat Bugzilla #491497, Review Request: dmapd, A server that provides DAAP and DPAP shares
- ▶ GNOME Bugzilla #566852, Move DAAP code to use common libdmapsharing
- ▶ GNOME Bugzilla #566851, Request DPAP support in gThumb
- ▶ Bindings for Python, C#, etc (Target Tangerine, Banshee and F-Spot)
- ▶ Target media appliance manufacturers

---

[2]http://www.flyn.org/projects/dmapd/

Unsolved Problems

- ▶ Can not use a libdmapsharing-based client to connect to an iTunes server

Thank You

DAAP Documentation

- ?[3]

Rhythmbox Team

- Charles Schmidt
- Jonathan Matthew
- William Jon McCann

Canola Team

- Andre Magalhaes

---

[3]http://tapjam.net/daap/