DRAFT

Proposed Digital Architecture for Video/Moving Image Object

This document describes the video/moving image content model (a.k.a object architecture) and associated structure map, slated for implementation in RUcore release 3.0. While there are some fundamental similarities to other object architectures, there are unique issues that a moving image object poses, which must be addressed for effective object preservation. These notes are the culmination of discussion and consideration among various working groups collaborating in RUcore development, including the RUcore advisory committee, the Audio/Video Standards Working Group (AVWG), and the Software Architecture Working Group (SW-ARCH).

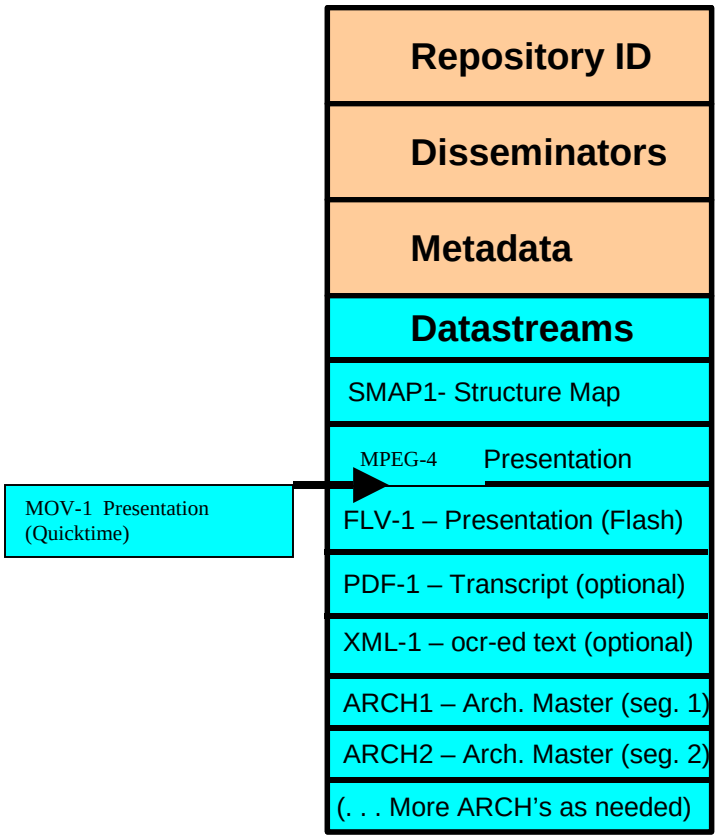
Moving Image Object Architecture

As with other objects, multiple files may be created that are logically part of the same information resource. A typical repository object will include a preservation master file, one or more associated presentation files in different file formats, and xml containing object metadata. Moving images, however, have an inherent tendency to produce exceptionally large preservation datastreams, larger than any other object type that RUcore has endeavored to ingest. Typically, an uncompressed, full-frame video file will take up 10 GB of disk space for each half hour of recorded Standard Definition (as opposed to High-Definition) video. This is problematic in that the RUcore infrastructure can currently accept files no larger than 2GB, and future upgrades for large file ingest capability will only extend this limit to 4GB.

To circumvent this inherent limit and still adhere to our mandate to archive preservation-grade video, we propose an object architecture that incorporates segmented TAR files for the ARCH datastreams. This design takes advantage of a capability in the TAR format to separate the archive into multiple segments of equal file size; the grouped segments can be later concatenated in order to reconstruct the original archive datastream that is encapsulated in the TAR. If we limit the TAR segments to a figure that is comfortably below the datastream size limit (e.g. 1.9GB per segment), we can allow the FEDORA-based infrastructure to treat such extremely large video archive objects as an object containing multiple smaller datastreams, assuring file integrity for future retrieval. The guidelines for the video object content model are the following:

- Both presentation and archival files will be created offline, i.e. not generated automatically via the WMS pipeline.
- Archival masters will be segmented and formatted as TAR files with a size less than 2GB.
- Datastream IDs for the archival masters will be ARCH1, ARCH2, etc up to as many as needed to ingest all the files for the archival master.
- The offline preparation process will constrain the presentation file sizes to less than 2 GB, both for practical download reasons and given the above current RUcore file ingest limit. Reasonable download sizes will be achieved via compression, framerate sampling, and reducing the resolution.
- Presentation file formats can be MPEG-4, Quicktime or Flash Video with datastream IDs respectively of MPEG4-1, MOV-1 and FLV-1.

The resulting architecture for moving image objects would appear as follows:



Structure Map
If technically feasible, it may be decided to implement a rather sophisticated disseminator not unlike that of audio objects that would provide a "table of contents"-like functionality for the moving image object. Doing so would require that the video object have a known set structure that can be easily dissected into index points. If such a structure is not feasible for that particular object, we will have a default structure map and the user will not be required to provide any structure in the WMS input process. A default disseminator will allow the user to play the video file in 5, 10, or other generic time increments.

The capability for a custom structure map should be built into WMS in R4.0. The user should be able to provide a logical file structure, very similar to the table of contents for a book. A sample of a logical structure map for a video file is shown below. A custom disseminator will provide the user the ability to select any logical segment to be played. For example, if the user selected "Highlights", the flash video file would be fast-forwarded to the segment of the video clip from 5 minutes to 13 minutes (for example) and would be extracted and played (see div1.2 below).

```
<METS:structMap TYPE="logical">
<METS:div ID="div1" FORMAT="Interview" TYPE="MovingImage"
LABEL="Former Governor Florio reflects on his political
career">

     <METS:div ID ="div1.1" TYPE ="" LABEL =" Former
     Governor Florio reflects on his political career "
     ORDER ="0">
     <METS:fptr>
     <METS:area FILEID ="" BEGIN ="00:00" END ="2:17:00" />
     </METS:fptr>
     </METS:div >

     <METS:div ID ="div1.2" TYPE ="" LABEL ="First days in
     office" ORDER ="1">
     <METS:fptr>
     <METS:area FILEID ="" BEGIN ="05:00" END ="13:00" />
     </METS:fptr>
     </METS:div >

     <METS:div ID ="div1.3" TYPE ="" LABEL ="Taxes and
     Turmoil" ORDER ="2">
     <METS:fptr>
     <METS:area FILEID ="" BEGIN ="00:00" END ="52:00" />
     </METS:fptr>
     </METS:div >

     <METS:div ID ="div1.4" TYPE ="" LABEL ="Life after
     governorship" ORDER ="3">
     <METS:fptr>
     <METS:area FILEID ="" BEGIN ="53:00" END ="1:39:00" />
</METS:fptr>
  </METS:div >
```

Optional Text Transcripts for Moving Image clips

It is possible that certain moving image objects may have an accompanying text transcript. This file should be considered as another manifestation, an additional datastream contained within the object. For presentation purposes, the text transcript will be captured in PDF format. The archival master for the transcript can be .txt, .rtf, or .xml and this file should be encapsulated in the tar file, possibly in its own datastream. Note that the xml text that is used for full text searching can be either supplied as an upload or the text file can be generated automatically by having the pipeline run OCR on the images of the transcript (this pipeline capability to be included in R2.0). This approach is equivalent to how we are treating the ocr-ed text for books.

Architecture-related Metadata

The architecture related fields that must be included in the metadata are: 1) The typeOfResource is “MovingImage”, 2) the objectArchitecture is “Video”, 3) objectArchitecture is replicated in the first level div TYPE attribute of the structure map (see below) and 4) the genre

can take on various forms, including “interview,” “lecture,” or “event.” There may be other genres.

```
<METS:mets xmlns:METS=http://www.loc.gov/METS/
xmlns:loc="http://www.loc.gov/">
     <METS:structMap ID="1" TYPE="logical" LABEL="default">
          <METS:div ID="S1-1" ORDER="1" TYPE="MovingImage">
</METS:div>
      </METS:structMap>
</METS:mets>
```

Release Notes

For RUcore R3.0, the Workflow Management System will support the default structure map. R4.0 will include the custom structure map and a corresponding disseminator.