FHIR DevDays 2017 HL7® FHIR®

EXERCISES

Track: **Imaging**
Tutorial: **Introduction to DICOM & DICOMweb**
Speakers: Brad Genereaux & Mohannad Hussain

The speaker will be in the hands-on area to answer your questions!

During the hands-on portion of the Introduction to DICOM & DICOMweb session, we will explore how data discovery is performed using DICOMweb starting with locating the patient record and ending with image retrieval.

This tutorial will use Internet-based servers, provided courtesy of the Society of Imaging Informatics in Medicine (SIIM, see http://siim.org/hackathon for more information). For your requests to work, please ensure the following http header is included:

HTTP header name	HTTP Header value
`apikey`	`HackathonOrientationSession`

The following exercises are progressive, and each step builds on the previous steps, so you should try them out in sequence. Making HTTP requests as described below can be done with your favourite tools. One prime example is Postman (https://www.getpostman.com/) but other tools can be used too, including command-line tools like cURL.

1. Find the patient in DICOMweb

We will search our example DICOM server (usually known as the PACS or VNA) for a patient named “Joe SIIM” using the following URL:

```
http://api.hackathon.siim.org/dicomweb/studies/?PatientName=SIIM^Joe
```

Notice DICOM’s formatting of the Patient Name. If you wanted to search by last name only, put in SIIM*

2. Discover the study structure in DICOM

Now we turn our attention to the DICOM server (usually known as the PACS or VNA), to discover what resources are within that study via the following URL:

```
http://api.hackathon.siim.org/dicomweb/studies/1.3.6.1.4.1.14519.5.2.1.7777
.9002.198875685720513246512710453733/instances
```

Notice how the DICOM server here defaults to XML. If you want to switch to JSON, use:

HTTP header name	HTTP Header value
`Accept`	`application/json`

Notice how DICOMweb returns “chunks” of data as an HTTP multipart response.

Some attributes of interest:

- SOP Instance UID
- Modality
- Retrieve URL
- Series Number
- Instance Number

3. Let's see some images!

DICOMweb's WADO-RS service allows for retrieval of images using a format like this

```
http://api.hackathon.siim.org/dicomweb/studies/1.3.6.1.4.1.14519.5.2.1.7777.9002.198875685720513246512710453733/series/1.3.6.1.4.1.14519.5.2.1.7777.9002.207203214132667549392101803048/instances/1.3.6.1.4.1.14519.5.2.1.7777.9002.327873213718058651550666129029/frames/1
```

Along with this header:

HTTP header name	HTTP Header value
`Accept`	`multipart/related; type=image/dicom+jpeg`

The /frames/1 part is mandated by our DICOM server implementation and not by the standard. Also notice how the return is again in multipart HTTP.

An alternative is to use the older standard of WADO-URI, which is a lot more widely supported at this time:

```
http://api.hackathon.siim.org/wadouri/?requestType=WADO&contentType=image/jpeg&studyUID=1.3.6.1.4.1.14519.5.2.1.7777.9002.198875685720513246512710453733&seriesUID=1.3.6.1.4.1.14519.5.2.1.7777.9002.207203214132667549392101803048&objectUID=1.3.6.1.4.1.14519.5.2.1.7777.9002.327873213718058651550666129029
```

Should return an image in JPEG format. You could also use PNG by changing the content type URL argument.

4. Bulk retrieval of an entire study in one shot

Say we want to download the entire DICOM study so we can use a local DICOM viewer (e.g. Micro DICOM or DVTk Viewer). The following URL comes to our rescue:

```
http://api.hackathon.siim.org/dicomweb/studies/1.3.6.1.4.1.14519.5.2.1.7777.9002.198875685720513246512710453733
```

Notice how it returns two chunks in an HTTP multipart response. That means the study contained two DICOM objects (could be two images, but they could be other object types). Each part contains the raw (i.e. binary) DICOM data which can be written as-is to a file then opened in the DICOM viewer.