

Stratos viewer

Instructions and installation guide

The stratos viewer is a web based tool intended to access medical images stored in a PACS.

The viewer is a flash based application that currently loads only one image at a time and provide some basic utilities to work with the image: Move, zoom-in/out, Brightness and contrast adjustment, negative and even measurements (if the necessary Dicom field is present).



The flash viewer is created via AJAX in a section of a HTML page. The whole page is generated by some php scripts.

The user needs to have an already identified patient (this viewer has been created as a part of a bigger environment where the patient is already identified, and it is just an additional tool to examine its medical images).

In order to represent the image information, the viewer uses a gateway to obtain some information of the patient. This information is sent by means of an XML document.

```
<patient date="20071119131627">
  <data patId="9999999" patIdIssuer="" birthdate="AAAA-MM-DD" sex="F" fullName="XXX YYY^ZZZ">
  </data>
  <dicom>
    <study studyUID="1.3.46.670589.26.502446.1.20071119.94121.6037" date="2007-11-19 08:42:52" modalities="CR" description="" numseries="2">
      <series seriesUID="1.3.46.670589.26.502446.2.20071119.94252.7439" series_num="7439" modality="CR" numinstances="1">
        <instance objectUID="1.3.46.670589.26.502446.4.20071119.94315.7439.0" instance_num="0"/>
      </series>
      <series seriesUID="1.3.46.670589.26.502446.2.20071119.94323.7440" series_num="7440" modality="CR" numinstances="1">
        <instance objectUID="1.3.46.670589.26.502446.4.20071119.94343.7440.0" instance_num="0"/>
      </series>
    </study>
    <study studyUID="1.3.46.670589.26.502446.1.20070904.104240.5151" date="2007-09-04 09:48:01" modalities="CR" description="" numseries="2">
      <series seriesUID="1.3.46.670589.26.502446.2.20070904.104801.5989" series_num="5989" modality="CR" numinstances="1">
        <instance objectUID="1.3.46.670589.26.502446.4.20070904.104835.5989.0" instance_num="0"/>
      </series>
      <series seriesUID="1.3.46.670589.26.502446.2.20070904.104837.5990" series_num="5990" modality="CR" numinstances="1">
        <instance objectUID="1.3.46.670589.26.502446.4.20070904.104904.5990.0" instance_num="0"/>
      </series>
    </study>
    <study studyUID="1.3.46.670589.26.502446.1.20070904.104240.5167" date="2007-09-04 09:45:14" modalities="CR" description="" numseries="2">
      <series seriesUID="1.3.46.670589.26.502446.2.20070904.104514.5987" series_num="5987" modality="CR" numinstances="1">
        <instance objectUID="1.3.46.670589.26.502446.4.20070904.104535.5987.0" instance_num="0"/>
      </series>
      <series seriesUID="1.3.46.670589.26.502446.2.20070904.104617.5988" series_num="5988" modality="CR" numinstances="1">
        <instance objectUID="1.3.46.670589.26.502446.4.20070904.104656.5988.0" instance_num="0"/>
      </series>
    </study>
  </dicom>
</patient>
```

This information is used by the php scripts to generate the structure of the viewer page. The patient information is shown (in the image samples that information has been hidden), and the structure of studies and series is shown.

When the user selects a series, the thumbnails of the instances are shown. Such thumbnails are generated by a call to the gateway script, using the necessary parameters to identify the desired instance to be shown. This mechanism needs to be modified in order to show series with a very large number of images.

Once selected the image, the flash viewer is created with some parameters: The identification of

the desired image, and the URL of the gateway. The flash viewer will invoke the gateway to obtain the full size image, and to obtain the XML containing the particular data for such image.

```
<object class='visor'
classid='clsid:d27cdb6e-ae6d-11cf-96b8-444553540000'
codebase='http://download.macromedia.com/pub/shockwave/cabs/flash/swflash.cab#version=7,0,0,0'
id='visorStratos'
align='middle'>
<param name='allowScriptAccess' value='always' />
<param name='movie' value='visorStratos_002.swf' />
<param name='quality' value='high' />
<param name='scale' value='noscale' />
<param name='bgcolor' value='#000000' />
<param name='FlashVars' value='sop_instance_uid=DEMO_1&hostGateway=http%3A%2F%2Fdicom.netpatia.com%2Fstratosviewer%2FpacsGateway.php'>
<embed class='visor'
src='visorStratos_002.swf'
quality='high'
scale='noscale'
bgcolor='#000000'
name='visorStratos'
align='middle'
allowScriptAccess='always'
type='application/x-shockwave-flash'
pluginspage='http://www.macromedia.com/go/getflashplayer'
FlashVars='sop_instance_uid=DEMO_1&hostGateway=http%3A%2F%2Fdicom.netpatia.com%2Fstratosviewer%2FpacsGateway.php'
/>
</object>
```

The parameters to consider are:

sop_instance_uid: Unique identifier of the image. The above example, is just a dummy name (DEMO_1) for demonstration purposes.

hostGateway: The URL to be invoked in order to obtain the different information: The XML describing the image and the image itself. This gateway performs all the communication and connection to the storage system. In this example, the gateway is <http://dicom.netpatia.com/stratosviewer/pacsGateway.php>

Gateway invocation parameters and information returned:

To obtain the full size image:

```
<gateway>?sop_instance_uid=<sop_instance_uid>
```

To obtain a thumbnail of the image:

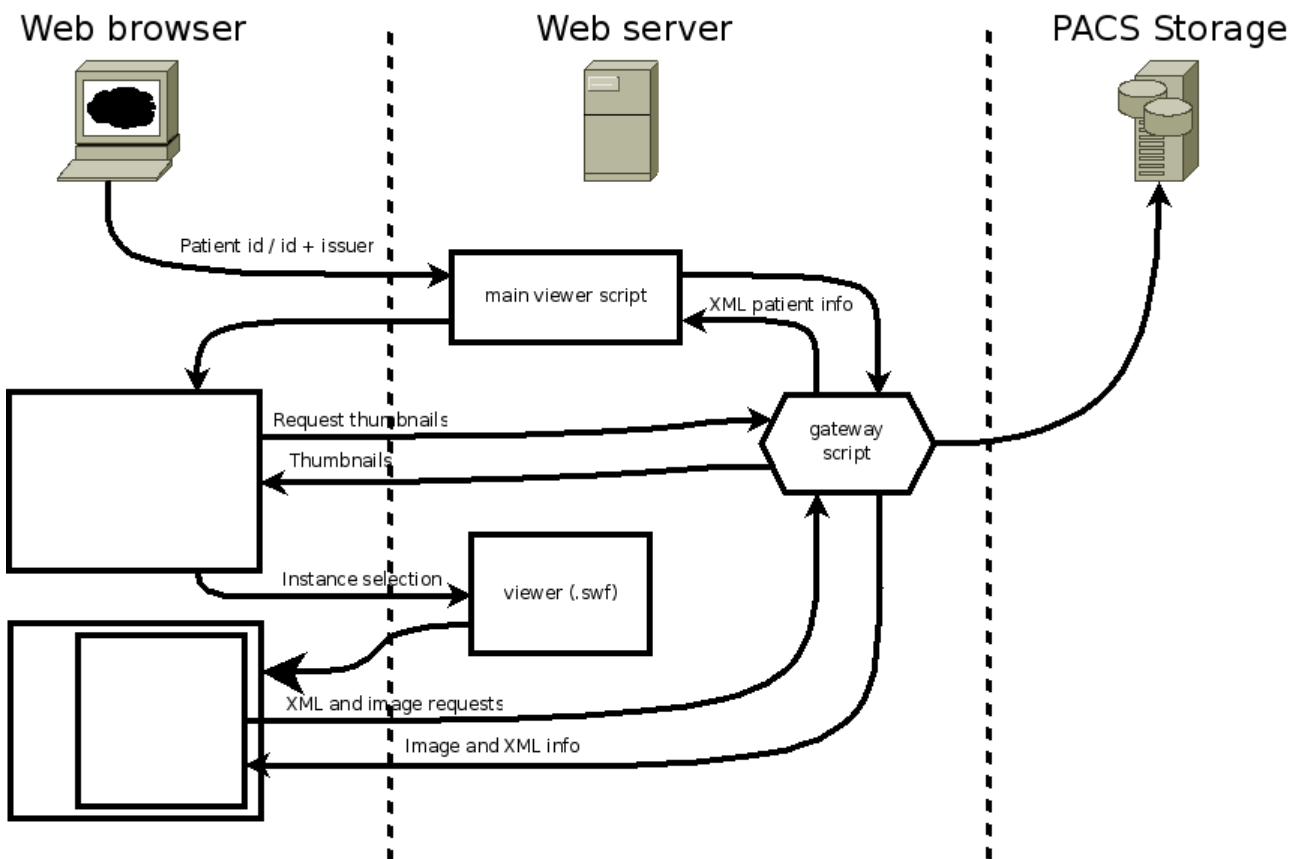
```
<gateway>?sop_instance_uid=<sop_instance_uid>&thumb
```

To obtain the image scaled to fit in a 2880x2880 frame:

```
<gateway>?sop_instance_uid=<sop_instance_uid>&reduced
```

To obtain the XML describing the image:

```
<gateway>?sop_instance_uid=<sop_instance_uid>&xml
```



This is the XML corresponding to a single image. The viewer does not really need such an amount of information.

```

<?xml version='1.0' encoding='ISO-8859-1'?>
<cabecera>
  <grupo id='0002'>
    <elemento id='0000' value='168' />
    <elemento id='0001' value='00\01' />
    <elemento id='0002' value='ComputedRadiographyImageStorage' />
    <elemento id='0003' value='[1.3.51.5146.1682.20070426.1095904.1]' />
    <elemento id='0010' value='JPEGLossless' />
    <elemento id='0012' value='[1.2.40.0.13.1.1]' />
    <elemento id='0013' value='[dcm4che-1.4.7]' />
  </grupo>
  <grupo id='0008'>
    <elemento id='0005' value='[ISO 2022 IR 6]' />
    <elemento id='0008' value='[DERIVED\PRIMARY]' />
    <elemento id='0012' value='[20070426]' />
    <elemento id='0013' value='[095904]' />
    <elemento id='0016' value='ComputedRadiographyImageStorage' />
    <elemento id='0018' value='[1.3.51.5146.1682.20070426.1095904.1]' />
    <elemento id='0020' value='[20070426]' />
    <elemento id='0022' value='[20070426]' />
    <elemento id='0030' value='[115027]' />
    <elemento id='0032' value='[115047]' />
    <elemento id='0050' value='[2007426114729195]' />
    <elemento id='0060' value='[CR]' />
    <elemento id='0070' value='[Agfa-Gevaert]' />
    <elemento id='0080' value='[HOSPITAL DE SANTIAGO APOSTOLI]' />
    <elemento id='0090' value='(no value available)' />
    <elemento id='1010' value='[ADCCPRX]' />
    <elemento id='1030' value='[columna vertebral]' />
    <elemento id='103e' value='[C.COMPLETA 3]' />
    <elemento id='1040' value='[RADIOLOGIA]' />
    <elemento id='1050' value='(no value available)' />
    <elemento id='1060' value='(no value available)' />
    <elemento id='1070' value='(no value available)' />
    <elemento id='1080' value='(no value available)' />
    <elemento id='1090' value='[ADC_5146]' />
  </grupo>
  ...
</cabecera>

```

Installation:

Just uncompress the files on a public directory of your web viewer. The gateway script has been written to interact with a DCM4CHEE PACS installed over a MySQL database. If you are using this Dicom storage system, edit the file named 'config.php' to include the configuration data of your environment.

If you are using another PACS system you will have to write your own gateway script to provide the viewer with the necessary XML and images.

How to compile:

The flash viewer has been developed using a FAMES environment (Flashout, ASDT, MTASC, Eclipse, swfmill). I do not ever know if such code can be compiled using the Adobe environment. If you are interested in compiling it yourself, you can start having a look at these addresses:

http://osflash.org/getting_started_with_fames

<http://www.actionscript.com/Article/tabid/54/ArticleID/towards-open-source-flash-development/Default.aspx>

If you do not want to compile the flash viewer, a .swf file is included in the releases.

TODO:

Web environment:

- Modify the scripts to support other databases.
- Changes in the XML information in order to use the DCM4CHE toolkit instead of the DCMTK one.
- Avoid dependencies of additional external utilities (wget, iconv). Done since version 0.1.2
- Provide a better mechanism to handle series with a large number of images.

Flash viewer

- Support for rotation of images
- Implement a tool to measure angles
- Improvements on the user interface
- Optimized for the particular needs of the different modalities: US, CT, MRI, ...
- Support for multiframe objects.