Aperio WebScope and Gallery View

Programmer's Reference

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This document applies to software versions Release 11.0 and later.

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Aperio WebScope and Gallery View Programmer's Reference

This document describes Aperio WebScope and how it can be embedded into second- or third-party web pages. It also describes Gallery View pages and how they may be customized. WebScope provides an HTML user interface which enables users with ordinary web browsers to view ScanScope virtual slides. The pages in Gallery View access virtual slides using the Aperio ImageServer and WebScope.

WebScope and Gallery View are integrated into ImageServer and use APML[1]. This makes it easy to customize Gallery View's APML pages[2].

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Installation

WebScope and Gallery View pages are provided as a standard InstallShield self-installing executable. Aperio ImageServer is required as a prerequisite for the installation. The installation process creates a directory named **C:\Program Files\ScanScope\ImageServer\apml**, which contains APML templates, and **C:\Program Files\ScanScope ImageServer\html**, which contains HTML files, images, and a Flash viewer application.

To test the Aperio WebScope installation, access the following URL from any web browser:

http://www.your-server.com/

[1] The Aperio Markup Language (APML) is documented separately, in the *Aperio Markup Language (APML) Programmer's Reference*.

[2] As of Aperio release 6, WebScope *does not* require an external webserver such as Microsoft IIS and *does not* require Korn shell scripts. Additionally, WebScope now uses *the same port* as ImageServer, so only one port is required for viewing digital slides on the Internet with a web browser.

In some cases you may have ImageServer configured to use a port number other than 80. In this case, access the following URL:

http://www.your-server.com:port/

This should load Gallery View, and you should see the "top level" of images from the ImageServer machine.

Customizing Gallery View Pages

Gallery View pages make use of APML template files. These are text files which use a simple language for substituting information into HTML pages. A detailed description of APML template processing is part of the Aperio ImageServer documentation[3]. This documentation describes the *dictionaries* created by ImageServer which contain information for directories and image files.

Gallery View consists of the following templates:

view.apml	default viewer for directories and image files
header.apml	generates page header for all pages
headscript.apml	contains inner logic of header.apml
footer.apml	generates page footer for all pages
error.apml	formats page displaying error messages
dir.apml	formats directory display
file.apml	formats file display; contains digital slide viewer
fileinfo.apml	formats file information page
bookmark.apml	displays bookmark link from within file display
is.apml	displays page when SIS link but no ImageScope
is.sis	template to generate SIS files (see below)
rss.xml	template to generate RSS feeds (see below)

Any of these templates may be customized and reformatted. Aperio suggests the original templates be saved for comparison purposes and in case of problems. Page header generation is split between **header.apml** and **headscript.apml** to make it easy to customize **header.apml** and leave the header generation logic of **headscript.apml** as is.

In addition, you may create other templates which may be used to display directory or file information. APML template processing is initiated from any standard web browser by entering URLs which have the form **directory/template.apml**. For example:

http://www.mysite.com/images/view.apml

In this example **www.mysite.com** is the domain name of ImageServer, and **/images** is a directory path (relative to the "base" directory for ImageServer, specified by the **–dir** command-line parameter). The dictionary will be filled with information for the **/images** directory and then the template **view.apml** is processed. The generated HTML will be the output of the request.

[3] Aperio ImageServer is documented separately; please see the *Aperio ImageServer Programmer's Reference*.

Here's another example:

http://www.mysite.com:82/images/my_digital_slide.svs/my_viewer.apml

In this example **www.mysite.com** is the domain name of the machine running ImageServer, and **82** is the port number[4]. The file **my_digital_slide.svs** is a digital slide in the **/my_images** directory. The dictionary is filled with information for the **my_digital_slide.svs** image, and then the template **my_viewer.apml** is processed; the generated HTML is the output of the request.

Note: All APML templates and HTML files are cached by ImageServer for performance. To clear the cache, use the RESET command (e.g. while creating and testing templates).

Linking to WebScope

WebScope may be linked from any other web pages in the usual web fashion, simply by copying the URL of a particular "view" from the Location: in a web browser window and creating a link on another page using that URL.

It may be desirable to link to a *particular* view of a particular virtual slide. The parameters which determine a particular view are the X coordinate within the slide (horizontal), the Y coordinate within the slide (vertical), and the zoom level. These parameters may be added to any virtual slide view URL as follows:

http://www.myserver.com/path/slide.svs/view.apml?X=&Y=&zoom=...

The **X=** parameter specifies the X coordinate, and the **Y=** parameter specifies the Y coordinate. These values position the *center* of the view relative to the entire virtual slide. The center of the slide is X=0.0, Y=0.0. The upper left corner of the slide is X=0.5, Y=0.5, and the lower right corner of the slide is X=-0.5, Y=-0.5.

The **zoom= parameter** specifies the zoom percentage as a decimal number. Zoom=100.0 sets the view to the full resolution of the slide. Zoom=50.0 is 50% zoomed out, or ½ the resolution. A value of zoom=-1 means set the zoom so the entire virtual slide exactly fits in the view area. The viewer supports zoom levels beyond 100%, e.g., zoom=200.0 zooms in beyond the full resolution of the slide.

[4] Previous to release 6 the Aperio WebScope required two port numbers, one for a webserver such as Microsoft IIS, and one for Aperio ImageServer. Customers often used port 82 for ImageServer. As of release 6 Aperio WebScope uses the APML template facility of ImageServer and only one port is required.

The following parameters may be specified on a WebScope URL:

X	- X-coordinate of initial view (default = 0.0)
Y	- Y-coordinate of initial view (default = 0.0)
zoom	- zoom level of initial view (as %, default = -1)
toolbar	- 0/1 – whether to display toolbar (default = 1)
menubar	- 0/1 – whether to display menubar (default = 1)
navwindow	- 0/1 – whether to display navigation window (default = 1)
slider	- 0/1 – whether to display zoom slider (default = 1)
ahide	- 0/1 – whether to display annotations (default =1)

Creating WebScope Links Automatically ("Bookmarks")

WebScope can be used to create links automatically. In WebScope, bring up the menu bar, if hidden, go to the Image menu and select **Custom Bookmark**. This opens a new window which displays a WebScope link. This is a link constructed automatically to the exact view (position and zoom level) of the currently displayed slide. The link can be included in web pages, sent via email, etc.

Embedding WebScope using HTML and JavaScript

WebScope may easily be embedded in second- or third-party web pages using HTML and JavaScript. The following should be included in a web page:

```
<script type="text/javascript">
var vwidth, vheight, nx, ny, nwidth, nheight, zoom;

vwidth = 800 // set width of viewing window
vheight = 600 // set height of viewing window
nwidth = Math.round(vwidth / 3);
nheight = Math.round(vheight / 3);
nx = vwidth - nwidth - 5 - 1;
ny = 5;
zoom = -1;

awvhost="images2.aperio.com"; // set server with image
awvimage="Derm1.svs";  // set image name
awviewer="html/awv.swf";

awvvars =
"awvImagePath=AWVIMAGE.apr&awvX=0.0&awvY=0.0&awvZoom=ZOOM&awvToolbar=1&awvNavWindow=1&
awvSlider=1&awvGetURLBtn=0&awvAppMag=20&awvNavX=NX&awvNavY=NY&awvNavWidth=NWIDTH&awvNa
vHeight=NHEIGHT&awvHideAnnotations=";

function setDim(html) {
 html = html.replace("AWVVARS", awvvars);
 html = html.replace("AWVIMAGE", "http://"+awvhost+"/"+awvimage);
 html = html.replace("AWVIEWER", "http://"+awvhost+"/"+awviewer);
 html = html.replace("VWIDTH", vwidth);
 html = html.replace("VHEIGHT", vheight);
 html = html.replace("NX", nx);
 html = html.replace("NY", ny);
 html = html.replace("NWIDTH", nwidth);
 html = html.replace("NHEIGHT", nheight);
 html = html.replace("ZOOM", zoom);
 document.write(html);
 }
</script>
</head>
<script type=text/javascript>setDim('<object id="theMovie" width=VWIDTH height=VHEIGHT
classid="clsid:D27CDB6E-AE6D-11cf-96B8-444553540000"
codebase="http://download.macromedia.com/pub/shockwave/cabs/flash/swflash.cab#version=
6,0,40,0"><param name="src" value="AWVIEWER"><param name="FlashVars"
value="AWVVARS">')</script>
<script type=text/javascript>setDim('<embed name="theMovie" width=VWIDTH
height=VHEIGHT src="AWVIEWER" FlashVars="AWVVARS" type="application/x-shockwave-flash"
pluginspage="http://www.macromedia.com/shockwave/download/index.cgi?P1_Prod_Version=Sh
ockwaveFlash">')</script>
</embed>
</object>
```

The following substitutions are required:

- `awvhost` - path to the server
- `awvimage` - image name

The following substitutions are optional:

`vwidth`	- width of viewing area (in pixels)
`vheight`	- height of viewing area (in pixels)
`nwidth`	- width of navigation window (in pixels)
`nheight`	- height of navigation window (in pixels)
`nx`	- x offset of the navigation window (0 is default)
`ny`	- y offset of the navigation window (0 is default)
`zoom`	- initial zoom setting, -1 is default and fits image in viewer

Including WebScope as Object Without JavaScript

WebScope may be embedded using a stand-alone object tag with the following code:

```
<object id="theMovie" width="1000" height="600" classid="clsid:D27CDB6E-AE6D-11cf-
96B8-444553540000"
codebase="http://download.macromedia.com/pub/shockwave/cabs/flash/swflash.cab#version=
6,0,40,0">
<param name="src" value="http://images2.aperio.com/html/awv.swf"/>
<param name="FlashVars"
value="awvByteHandlerPath=http://images2.aperio.com/&awvImagePath=Derm1.svs.apr&awvX=0
.0&awvY=0.0&awvZoom=-
1&awvToolbar=1&awvNavWindow=1&awvSlider=1&awvAppMag=20&awvNavX=584&awvNavY=5&awvNavWid
th=295&awvNavHeight=183&awvHideAnnotations=0"/>
<embed width="1000" height="600" name="theMovie"
src="http://images2.aperio.com/html/awv.swf"
flashvars="awvByteHandlerPath=http://images2.aperio.com/&awvImagePath=Derm1.svs.apr&aw
vX=0.0&awvY=0.0&awvZoom=-
1&awvToolbar=1&awvNavWindow=1&awvSlider=1&awvAppMag=20&awvNavX=584&awvNavY=5&awvNavWid
th=295&awvNavHeight=183&awvHideAnnotations=0" type="application/x-shockwave-flash"
pluginspage="http://www.macromedia.com/shockwave/download/index.cgi?P1_Prod_Version=Sh
ockwaveFlash"/>
</object>
```

The following substitutions are required:

`src`	- path to awv.swf file
`awvByteHandlerPath`	- path to image server
`awvImagePath`	- path to image[5][6][7]

The following substitutions are optional:

`width`	- width of viewing area (in pixels)
`height`	- height of viewing area (in pixels)
`FlashVars`	- all vars other than awvByteHandlerPath and awvImagePath are optional

[5] To reference the image id rather than the image URI, use the format awvByteHandlerPath= "../@1.apr"
[6] Do not include a slash in front of the path
[7] The ".apr" extension is required after the ".svs" extension or the image id

WebScope FlashVar Parameters

`awvByteHandlerPath`	-	the path to ImageServer (may be left blank if used in conjunction with APML files, otherwise it is required)
`awvImagePath`	-	the path to the virtual slide, passed to ImageServer including subfolders if using the image URI (rather than the image id)
`awvX`	-	X-coordinate of initial view (default = 0.0)
`awvY`	-	Y-coordinate of initial view (default = 0.0)
`awvZoom`	-	zoom level of initial view (default = 100.0)
`awvToolbar`	-	0 or 1, whether to display toolbar (default = 1)
`awvSlider`	-	0 or 1, whether to display slider (default = 1)
`awvNavWindow`	-	0 or 1, whether to display navigation window (default = 0)
`awvNavX`	-	X-offset of thumbnail window (in pixels, default = 0)
`awvNavY`	-	Y-offset of thumbnail window (in pixels, default = 0)
`awvNavWidth`	-	width of thumbnail window (in pixels)
`awvNavHeight`	-	height of thumbnail window (in pixels)
`awvGetURLBtn`	-	0 or 1, whether to display checkmark on toolbar
`awvGetURLBtnURL`	-	URL loaded when checkmark on toolbar is clicked

Creating Syndication "Feeds" Using RSS

RSS is a standard way of creating a "table of contents" for a website. (RSS stands for "really simple syndication.") Programs called RSS readers or [sometimes] feed readers display the table of contents. Some popular web browsers like Firefox have RSS support built in, and there are many free and commercial programs available[8].

Using RSS enables you to easily tell when a website has changed, and to see the pages or items on the website which are new or modified. Gallery View enables an RSS feed to be created for any directory or image file served by ImageServer. Directories have feeds with an item for each file in the directory. Image files have a single item for the file.

RSS readers allow users to "subscribe" to a particular feed. This gives the user easy access to every item in the feed. It also alerts the user every time the feed has changed. So as new images are added into a directory, they automatically appear in the user's feed reader.

RSS feeds are generated by appending "/rss.xml" to the ImageServer path for a directory or file:

http://www.mysite.com/images/rss.xml
http://www.mysite.com/images/myimage.svs/rss.xml

The first example above shows the URL for an RSS feed for the /images directory. The second example shows the URL for an RSS feed for the myimage.svs file located in the /images directory.

[8] There are many online resources which explain what RSS is and how it can be used. Just enter "what is RSS" into your favorite search engine.

Linking to Aperio ImageScope – SIS Files

Aperio has two ways to view Virtual Slides—WebScope, which is Flash-based and integrates into web pages, or ImageScope, which is a FREE Windows desktop program (downloadable from **www.aperio.com/download**). Each way has advantages. WebScope is cross-platform, and users can view slides without any downloads or installations. ImageScope is faster and has many features which WebScope does not have, including the ability to view multiple slides at once, image color/gamma adjustment, etc. However ImageScope does require that users download and install software.

When you visit a gallery of slides online, such as Aperio's slide gallery or the galleries at http://www.scanscope.com, you will notice images are displayed with a dark green link labeled **(open with ImageScope)**. Clicking these links causes ImageScope to be launched on your desktop to view the associated slide.

In case you're wondering how this works, here's the magic. ImageScope supports a kind of file—a .SIS file—which is a text file that lists one or more images to be opened. This file functions like a pointer. If you open ImageScope with a SIS file it simply opens each of the files listed in the file. (SIS stands for "ScanScope Image Set.")

There are [at least] two use cases for SIS files. The first is they make it easy to create web links for ImageScope. To link to a Virtual Slide, you create a SIS file that contains the Virtual Slide's path and link that on your website. When someone clicks the link it causes the SIS file to be downloaded, Windows opens the application associated with the file (ImageScope), and then ImageScope opens the image. This works nicely because SIS files are so small.

It is possible to link directly to Virtual Slides—the SVS files—but this causes the entire file to be downloaded into a local directory, and then ImageScope is launched. It will work on a local network—although not well!—however it won't work on a wide-area network at all.

The same "indirect file" technique used by ImageScope with SIS files is used by Windows MediaPlayer and RealPlayer to point to streaming movies.

The other use case for SIS files is when there are multiple images associated with a case. Each case can have a single SIS file associated with it that lists all the virtual slides for the case. Opening the SIS file causes ImageScope to open all the virtual slides for the case at once.

Creating SIS File Links Automatically ("Bookmarks")

WebScope can be used to create links to ImageScope slide views automatically. When a digital slide is displayed in WebScope, slide out the menu bar and select Image | Custom Bookmark. This opens a new window which displays an ImageScope link. This is a link constructed automatically to the exact view (position and zoom level) of the currently displayed slide. The link can be included in web pages, sent via email, etc.

SIS File Format

SIS files are small XML files. They have the following format:

```
<SIS version="1.0">
      <Image>
            <URL>path</URL>
            <X>initial X offset</X>
            <Y>initial Y offset</Y>
            <Zoom>initial zoom value</Zoom>
      </Image>
      <Image>
            ... another image, if desired ...
      </Image>
</SIS>
```

There can be one or multiple **<Image>** tags in a file, in which case multiple images are specified. Each image's **<URL>** may be specified as one of the following:

```
C:/directory_path/file.ext
            - Windows file (only useful locally)
\\server\directory_path\file.ext
            - path to file on Windows network share (backward slashes)
//domain/directory_path/file.ext
            - path to file on remote ImageServer (forward slashes)
```

The last format is the one typically used on a website.

The <X>, <Y>, and <Zoom> parameters are optional; if not specified, the image will be centered and opened with ImageScope's default zoom value. The *initial X offset* and *initial Y offset* specify the coordinates of the *center* of the image, and are relative to the upper left corner of the image, with X running across and Y running down. These offsets are given in pixels relative to the base zoom level of the image. The *initial zoom value* specifies the magnification of the image, a value of 1.0 means 100% (full resolution), a value of .25 means 25% ($1/16^{th}$ resolution). It is possible to specify values greater than 1.0 to zoom in "beyond" full resolution.

One final note—it isn't always necessary to actually create the SIS files; the SIS data can also be generated programmatically. For example, Gallery View pages generate the SIS data dynamically with an APML template named **is.sis**. This enables ImageScope to be launched for any file served by ImageServer with a URL of the form:

http://www.mysite.com/path/image.svs/is.sis

Customizing the WebScope Logo

The Aperio logo that appears at the bottom right of the WebScope window can easily be replaced by a custom logo that is appropriate for your institution or company.

Note: The default Aperio logo is 200 by 86 pixels, but you can change the dimension definition to fit your logo.

1. Save the graphic file you want to use as the logo with the file name **logo** in PNG, GIF, or JPG format. (Only the GIF and PNG format support image transparency, which is necessary if you want to create a logo with a transparent background. Also note that WebScope is a Flash application, and PNG format works best with Flash.)
2. Place the logo in the <Aperio master installation folder>\ImageServer\html folder.
3. Next you need to edit the logo.lml file in the same folder, but first you need to make sure it is writable. In Windows Explorer right-click on the logo.lml file and select **Properties**. Clear the **Read Only** check box and click **OK**.
4. open the logo.lml file in a text editor like notepad. It will appear as XML like this

```
<xml>
   <image>
      <!-- Image Name, including extension. I.e. logo.png, logo.gif, or logo.jpg -->
    <child attribute="Name" value="logo.png" />
      <!--  Width and Height of image in pixels, use actual image size. These numbers will
not resize the image  -->
    <child attribute="Width" value="200" />
    <child attribute="Height" value="86" />
      <!-- Padding determines distance between logo and edge of viewer in pixels -->
    <child attribute="PaddingRight" value="5" />
    <child attribute="PaddingBottom" value="5" />
      <!-- ImageAlpha sets the amount of transparency using a number between 1 to 100. Zero
equals completely clear and 100 equals no transparency. -->
    <child attribute="ImageAlpha" value="50" />
   </image>
</xml>
```

In order to make sure your new logo matches what WebScope is expecting, you must edit the following:

- Name (if the graphic file is not named logo.png)
- Width (in pixels)
- Height (in pixels)

Other options include:

- PaddingRight and PaddingBottom – You can adjust the right and bottom padding to set how far the image is from the edge of the viewer.
- ImageAlpha – ImageAlpha controls the translucency of the logo. This is different from true image transparency, which you would use, for example, to exclude the white background on an image as in our example logo. The alpha setting will not get rid of the white background, only make it translucent to whatever degree is set. The value can be from 0 to 100 with 0 being invisible and 100 being fully visible. This means if you do not want to have the logo visible at all, you can set the ImageAlpha to 0.

Restart ImageServer from the Aperio Service Manager to see your logo in WebScope.

Important Notes

Changing the width and height values in the lml file does not resize the logo. These settings must match the logo's actual dimensions for this feature to work as intended.

After changing the logo.lml file, make sure you restart the ImageServer service before using WebScope so ImageServer will pick up the changed settings.