

Aperio ImageScope SIS File

Programmer's Reference



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ImageServer is intended for use with the SVS file format (the native format for digital slides created by scanning glass slides with the ScanScope scanner). Educators will use Aperio software to view and modify digital slides in Composite WebSlide (CWS) format.

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Aperio ImageScope SIS File Programmer's Reference

ImageScope is a digital slide viewer from Aperio. It is capable of viewing one or more digital slides scanned on an Aperio ScanScope scanner. It is possible to programmatically invoke ImageScope by making use of a special XML file called an SIS file. This document describes the SIS file format and how to invoke ImageScope.

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SIS File Format

A ScanScope Image Set (SIS) file is an XML file that contains one or more digital slide references and parameters. It looks like the following:

```
<SIS Version="1.0">
  <CloseAllImages/>
  <Image>
    <Authtok>nnnnn</Authtok>
    <URL>//imageserver:82/@token/@12345</URL>
    <X>5769</X>
    <Y>5398</Y>
    <Zoom>1.0</Zoom>
    <Focus>0</Focus>
    <Transform>0</Transform>
    <DefaultMacro>...</DefaultMacro>
    <Title>A New Title</Title>
    <NoInfo/>
    <DataURL>//imageserver:82/@12345</DataURL>
  </Image>
  <Image>
    <Authtok>nnnnn</Authtok>
    <URL>//imageserver:82/@token/@54323</URL>
  </Image>
</SIS>
```

The parameters of the SIS are defined as follows:

Parameter	Needed?	Description
<CloseAllImages/>	Optional	This XML node tells ImageScope to close all currently open images and replace them with the images referenced in the current SIS file.
<Authtok>...</Authtok>	Optional	<p>The alternative to using DataServer's Logon API is to specify the userid and password in the <Authtok> tag in the SIS file. The userid and password are Base64 encoded and then inserted into the XML tree as follows:</p> <pre><Authtok>BASIC Base64Encoded(userid:password) </Authtok></pre> <p>For example:</p> <pre>String encstr = Base64.encode("userid:password"); String tag = "<Authtok>Basic " + encstr + "</Authtok></pre> <p>ImageScope will then forward this information to ImageServer which will then logon to DataServer on behalf of the user. The Authtok will have to be supplied with each <Image> tag in the SIS file. If authentication is turned off then this parameter is not required.</p>
<Image>...</Image>	Required	One or more image references. Each image will be opened within ImageScope.
<URL>...</URL>	Required	This is the actual image reference.

Parameter	Needed?	Description
@@token	Optional	This is the authentication token that is returned by DataServer. It must be included on each DataServer or ImageServer request. Optionally the Authtok tag above can be used instead of this tag.
<X>...</X>	Optional	The X coordinate of the upper left corner of the initial view to be displayed to the user.
<Y>...</Y>	Optional	The Y coordinate of the upper left corner of the initial view to be displayed to the user.
<Zoom>...</Zoom>	Optional	The initial zoom level to display to the user.
<Focus>...</Focus>	Optional	The initial focus level to display to the user. This only applies to 3D Z Stacks.
<Transform>...</Transform>	Optional	The initial rotation of the image. A value of 0 displays the rotation as scanned.
<DefaultMacro>...</DefaultMacro>	Optional	The default analysis macro for the image.
<Title>...</Title>	Optional	Displays a specific title for the image in both the ImageScope title bar and the ImageScope filmstrip.
<NoInfo/>	Optional	Causes ImageScope <u>not</u> to display any PHI for the image (macro image, label image, title, filename, etc.)
<DataURL>...</DataURL>	Optional	Used for Spectrum for Educators

Parameter Details

@@token or <Authtok>

When authentication is turned on there are two ways to authenticate using the SIS file. The first is to programmatically logon to DataServer, retrieve the token and supply it on each URL. The second way is to supply an Authtok node as a child of each Image node.

Programmatic Logon to DataServer

To retrieve a valid authentication token the programmer needs to call DataServer and supply a userid and password in order to retrieve the token. DataServer has a Logon SOAP interface for this purpose. The following code snippet illustrates how to do this:

```
long Logon( refLogger& inLogger, const char* inHost, const int& inPort, const char*
inUser, const char* inPswd, string& outToken )
{
    long          stat;
    char          xml[1024];
    char          buffer[1024];
    string        response;
    StringValue   strresult;
    long          lrc;
    CApdbLib      apdb;

    _snprintf( xml,
              sizeof( xml ),
              "<UserName>%s</UserName><PassWord>%s</PassWord>",
              inUser,
              inPswd );

    stat = apdb.SendXMLMessage( "/Aperio.Security/Security2?Logon",
                                xml,
                                inHost,
```

```

                                inPort );

if( stat != 0 )
    return( RetCode_Failure );

// Get response
stat = apdb.get_XMLResponse( response );

// Response is formatted as follows:
// <LogonResponse>
//     <LogonResult>
//         <ASResult>0</ASResult>
//         <ASMessage></ASMessage>
//     </LogonResult>
//     <Token>C-1kydZbN-VraZk0hIqm-ykLVQsrNOSI</Token>
//     <UserData>
//         <UserId>22</UserId>
//         <FullName>ssread</FullName>
//         <LoginName>ssread</LoginName>
//         <PassWord>ssread</PassWord>
//         <Privileges><AdminUser>False</AdminUser></Privileges>
//     </UserData>
// </LogonResponse>

if( stat != 0 )
    return( RetCode_Failure );

// Check ASResult for possible error
lrc = GetTagValueFromXML( response.c_str(), "ASResult", strresult );
if( lrc != RetCode_OK )
{
    return( lrc );
}

if( strresult.AsInteger() == apdbLogonFailed )
    return( RetCode_LogonFailed );
else
if( strresult.AsInteger() == apdbClassNotSupported )
    return( RetCode_OK );
else
if( strresult.AsInteger() != 0 )
    return( RetCode_Failure );

// Pluck out the token
lrc = GetTagValueFromXML( response.c_str(), "Token", strresult );
if( lrc != RetCode_OK )
    return( lrc );

outToken = strresult.AsConstChar();

return( RetCode_OK );
}

```

After the logon is successful the token needs to be inserted into each URL reference in the SIS file as follows: @@token or:

```
<URL>//imageserver:82/@@token/@12345</URL>
```

Authtok Logon

The <Authtok> node can be used to accomplish the same task. The userid and password are Base64 encoded and then inserted into the XML tree as follows:

```
<Authtok>BASIC Base64Encoded(userid:password)</Authtok>
```

For example:

```
String encstr = Base64.encode( "userid:password" );
String tag = "<Authtok>Basic " + encstr + "</Authtok>
```

ImageScope will then forward this information to ImageServer which will then log on to DataServer on behalf of the user. The Authtok will have to be supplied with each <Image> tag in the SIS file.

<X> and <Y>

These are pixel coordinates within the digital slide. X and Y represent the upper left coordinate of the initial view. These coordinates are always relative to the full resolution image. Positive X is to the right. Positive Y is down. Default is -1 for both.

<Zoom>

This is the zoom level of the initial display to the user. A value of 1 is full resolution. A value less than 1 zooms out, a value greater than 1 zooms in. A value of -1 tells ImageScope to use the user's preferred default zoom level.

This parameter can be used to place the initial view of the digital slide at an appropriate zoom level. If a slide was scanned at 20x it could be opened at full resolution <Zoom>1</Zoom> or at 5x resolution <Zoom>0.25</Zoom>. Default value is -1.

<Focus>

This is the initial focus level of a 3D Z Stack. Z Stacks are SVS files that capture multiple layers in order to emulate focus control. Most digital slides do not contain multiple Z layers. The default value is 0 which is the middle of the Z Stack layers.

<Transform>

This parameter tells ImageScope to rotate the image as follows:

<Transform> value	Meaning
0	No transform
1	rotate 90 degrees right (clockwise)
2	rotate 180 degrees
3	rotate 90 degrees left (counter-clockwise)
4	flip vertical
5	rotate 90 degrees right, flip
6	flip horizontal
7	rotate 90 degrees left, flip

<DefaultMacro>

This defines the default Image Analysis macro for the image.

<Title>

This title will override the image name and will be displayed on the ImageScope title bar and in the filmstrip underneath the thumbnail image.

<NoInfo>

This instructs ImageScope to remove all patient information. Macro images, label images, window title and filename will not be shown.

<DataURL>

This provides a second URL for accessing image data (annotations, algorithms). This is used with CWS files when the main URL is for Apache but there is also an ImageServer running to access annotations and algorithms.

Invoking ImageScope

ImageScope can be invoked from your application by creating an SIS file on the fly and then calling the Windows ShellExecute API as follows:

```
ShellExecute(NULL, "open", "generated.SIS", NULL, NULL, SW_SHOWNORMAL);
```


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