Integrating OsiriX in a HIS/RIS environment

OsiriX is a DICOM Viewer, aka PACS Workstation, but it is not a HIS or a RIS software. If you have such software installed, it can be useful to 'control' OsiriX or ‘get’ informations from/to another application:
- an application running on the same computer. For example a Java application or a Web based software
- an application running on the same computer, but in a different environment. For example in Windows OS, in Parallels or VMware Fusion software.
- an application running on a different computer on the same network. For example a web server application, like an ASP software.

This application should be able to control OsiriX to facilitate the integration. For example, the other application should be able to:
- Check if a study is available in the OsiriX Database
- Open a specific study, and display the images
- Delete a study
- ...

With OsiriX 3.0, we introduced a very easy and powerful protocol for such control. OsiriX integrates now an HTTP server with an XML-RPC protocol. It means that any software/computer that knows your network address can execute methods in OsiriX. These methods can be built-in in OsiriX or added in plugins. To turn the XML-RPC HTTP server, go to the Listener Preferences window in OsiriX.

Supported Messages in OsiriX

For now, only few basic messages are supported. If you need more, write a simple plug-in (see below). If you think that you plugin should be included in OsiriX, contact me (rossetantoine@osirix-viewer.com). The source code of this support is in XMLRPCMethods.m file.

```
Method: DBWindowFind
Parameters:
request: SQL request, see 'Predicate Format String Syntax' from Apple doc.
table: OsiriX Table: Image, Series, Study
execute: Nothing, Select, Open, Delete
execute is performed at the  study level: you cannot delete a single series of a
study
Example: {request: "name == 'OsiriX'", table: "Study", execute: "Select"}
Example: {request: "(name LIKE '*OSIRIX*')", table: "Study", execute: "Open"}
Response: {error: "0", elements: array of elements corresponding to the request}
```

```
Method: CloseAllWindows
Parameters: No Parameters
Response: {error: "0"}
```

```
Method: OpenDB
Parameters:
path: path of the folder containing the 'OsiriX Data' folder
if path is valid, but not DB is found, OsiriX will create a new one
Example: {path: "/Users/antoinerosset/Documents/"}
Response: {error: "0"}
```

```
Method: SelectAlbum
Parameters:
name: name of the album
Example: {name: "Today"}
Response: {error: "0"}
```

```
Method: GetDisplayed2DViewerSeries
Parameters: No Parameters
Response: {error: "0", elements: array of series corresponding to displayed win-
dows}
```

```
Method: GetDisplayed2DViewerStudies
Parameters: No Parameters
Response: {error: "0", elements: array of studies corresponding to displayed win-
dows}
```

```
Method: Close2DViewerWithSeriesUID
Parameters:
uid: series instance uid to close
Example: {uid: "1.3.12.2.1107.5.1.4.51988.4.0.1164229612882469"}
Response: {error: "0"}
```

```
Method: Close2DViewerWithStudyUID
Parameters:
uid: study instance uid to close
Example: {uid: "1.2.840.113745.101000.1008000.37915.4331.5559218"}
Response: {error: "0"}
```

```
Method: CMove
Parameters:
accessionNumber: accessionNumber of the study to retrieve
server: server description where the images are located (See OsiriX Locations Pref-
erences)
Example: {accessionNumber: "UA876410", server: "Main-PACS"}
Response: {error: "0"}; -1: server not found, -2 server not responding, -3 no study
found
```

You need to send these messages in XML format: for example `Close2DViewerWithStudyUID`, with parameters: `{uid: "1.2.840.113745.101000.1008000.37915.4331.5559218"}` corresponds in XML to:

```
<?xml version="1.0"?>
<methodCall> <methodName>Close2DViewerWithStudyUID</methodName>
<params>
<param>
<value><struct>
<member>
<name>uid</name>
<value><string>1.2.840.113745.101000.1008000.37915.4331.5559218</string></val
ue>
</member>
</struct></value>
</param>
</params>
</methodCall>
```

If you send non-ASCII characters (like é, ç ä, ...), use UTF-8 encoding:

```
<?xml version="1.0" encoding="UTF-8"?>
```

Do you think that a method is missing? Contact us, we will add it for you.

How to add your own message protocol to OsiriX?

If you need to add specific functions and behavior in OsiriX for your XML-RPC messages, you can write a simple plug-in. Thanks to the XML support in Cocoa environment (NSXMLDocument), it is very easy to add your own method in OsiriX. An example is available in the Plugins folder of the OsiriX source code: XML-RPC-Plugin. In this plug-in, two new messages are added to OsiriX:

- exportSelectedToPath - {path:"/Users/antoinerosset/Desktop/"}
- openSelectedWithTiling - {rowsTiling:2, columnsTiling:2}

As you see in the source code, a unique plug-in can support multiples messages and parameters decoding is easy:

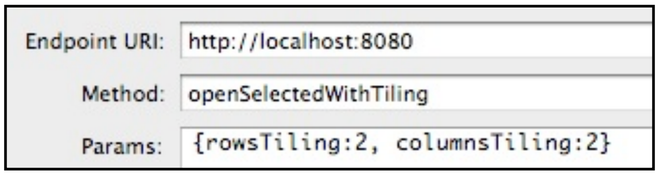
```
if( [[httpServerMessage valueForKey: @"MethodName"] isEqualToString: @"exportSelectedTo-
Path"])
{
     NSXMLDocument *doc = [httpServerMessage valueForKey:@"NSXMLDocument"];

     NSError      *error = 0L;
     NSArray *keys = [doc nodesForXPath:@"methodCall/params//member/name" error:&error];
     NSArray *values = [doc nodesForXPath:@"methodCall/params//member/value" error:&error];
     if (1 == [keys count] || 1 == [values count])
      {
            int i;
            NSMutableDictionary *paramDict = [NSMutableDictionary dictionary];
            for( i = 0; i < [keys count]; i++)
                  [paramDict setValue: [[values objectAtIndex: i] objectValue] forKey: [[keys
objectAtIndex: i] objectValue]];

            // Ok, now, we have the parameters -> execute it !

            NSMutableArray *dicomFiles2Export = [NSMutableArray array];
            NSMutableArray *filesToExport;

            filesToExport = [[BrowserController currentBrowser] filesForDatabaseOutlineSelec-
tion: dicomFiles2Export onlyImages:YES];
            [[BrowserController currentBrowser] exportDICOMFileInt: [paramDict
valueForKey:@"path"] files: filesToExport objects: dicomFiles2Export];

            // Done, we can send the response to the sender

            NSString *xml = @"<?xml
version=\"1.0\"?><methodResponse><params><param><value><struct><member><name>error</name><val
ue>0</value></member></struct></value></param></params></methodResponse>";
            // Simple answer, no errors

            NSError *error = nil;
            NSXMLDocument *doc = [[[NSXMLDocument alloc] initWithXMLString:xml
options:NSXMLNodeOptionsNone error:&error] autorelease];
            [httpServerMessage setValue: doc forKey: @"NSXMLDocumentResponse"];
            // To tell to other XML-RPC that we processed this order
            [httpServerMessage setValue: [NSNumber numberWithBool: YES] forKey: @"Processed"];
     }
}
```

How to send an XML-RPC Message?

You are writing an application and you want to communicate with OsiriX. Hence you need to send an XML-RPC message to OsiriX: send the XML message through a HTTP POST procedure.

There is a nice little **XML-RPC Client**: http://www.ditchnet.org/xmlrpc/. This software allows you to test your messages with OsiriX:

- Start OsiriX, and activate the HTTP Server in the Listener Preferences
- Start XML-RPC Client, and enter your own address: http//localhost:8080 (don't forget the 'http://' prefix)
- Enter the method name and the parameters:



Endpoint URI:	http://localhost:8080
Method:	openSelectedWithTiling
Params:	{rowsTiling:2, columnsTiling:2}

- And click Execute button. OsiriX will then try to execute the message and send back an answer in XML format to the sender.

Other software are available to edit XML messages: TextMate is great (http://macromates.com/). It allows you to validate your XML message.

Sending an XML message through a HTTP POST is easy in many languages:

In Cocoa framework:

```
NSString *xml = @"<?xml version=\"1.0\"?>";
NSError *error = nil;
NSXMLDocument *doc = [[[NSXMLDocument alloc] initWithXMLString:xml
options:NSXMLNodeOptionsNone error:&error] autorelease];

NSData *data = [doc XMLData];
NSMutableURLRequest *request = [[[NSMutableURLRequest alloc] initWithURL:url
cachePolicy:NSURLRequestReloadIgnoringCacheData timeoutInterval:60.0] autorelease];
[request setHTTPMethod:@"POST"];
[request setHTTPBody:data];
[request setValue:[NSString stringWithFormat:@"%d", [data length]]
forHTTPHeaderField:@"Content-Length"];

NSURLConnection *conn = [[[NSURLConnection alloc] initWithRequest:request delegate:self]
autorelease];

while (![conn isFinished])
{
[[NSRunLoop currentRunLoop] runMode:NSDefaultRunLoopMode beforeDate:[NSDate distantFuture]];
}

// The answer from the HTTP Server

NSError *error = nil;
NSXMLDocument  *reply = [[[NSXMLDocument alloc] initWithData:[conn data]
options:NSXMLNodeOptionsNone error:&error] autorelease];
```

For Apache:
http://ws.apache.org/xmlrpc/

In Applescript:
http://developer.apple.com/documentation/AppleScript/Conceptual/soapXMLRPC/chapter2/chapter_2_section_3.html

In other languages (RealBasic, VBasic, C, .NET, #C, ...)
http://www.xmlrpc.com/directory/1568/implementations

To test a XML-RPC message from a file, use the curl tool from the console.app:

```
curl -d @/Users/antoinerosset/Desktop/test.xml "http://localhost:8080"
```