

# Integration of Simple LIMS with Mindray using Mirth Connect

## Problem Statement

Mindray BS-480 is a blood centrifuge machine that physically analyzes the blood samples for its chemical composition. The blood samples from the patients are taken in vials and placed inside the Mindray BS-480 connected with a computer interface. The vials have a barcode stuck to its surface that uniquely identifies the corresponding patient whose blood sample is under consideration.

On the other hand, the storage of the patient data is on a system that is Simple LIMS based on MS Access (generically it is called LIS short in Lab Information System) database system. It has the data that usually contain the identification of the blood giving patients along with the information on the type of the blood tests that are needed.

The Mindray BS-480 machine system and the Simple LIMS database system do not support communication with each other directly. This inability causes the medical staff to log the information of the samples manually. It is a laborious task that takes away the efficiency of health workers. It is inconvenient and time-consuming.

Placement of a middleware healthcare integration engine, in between the communication of the two systems (Mindray BS-480 and the Simple LIMS), acts as a translator. That middleware healthcare integration engine is an open-source integration system called [Mirth Connect](#).

In this white paper, we will find out how to accomplish this task. Once completed it will save time and effort to a significant level for assigning blood sample test results with corresponding patient data.

## The Technologies Involved

The following technologies are involved in this project.

1. **The Mindray BS-480 machine:** It is a machine used for blood testing in medical labs. The blood sample placement takes place in the centrifuge of the blood testing machine in vials, and after a process, the device generates the results.
2. **Simple LIMS:** Simple LIMS is an Access-based LIMS (Laboratory Information Management System) software for small laboratories. It's an open source laboratory (information management) system that allows organizing the workflow, control lab documents, track processing data records ultimately enhancing their existing lab operations.
3. **Mirth Connect:** [Mirth connect](#), a middleware that is an open-source healthcare integration engine that facilitates communication between different systems and applications.

## Overview

As mentioned before, in this project, Mirth Connect is the middleware between Mindray BS-480 machine and Simple LIMS that would lead to the integration of these systems.

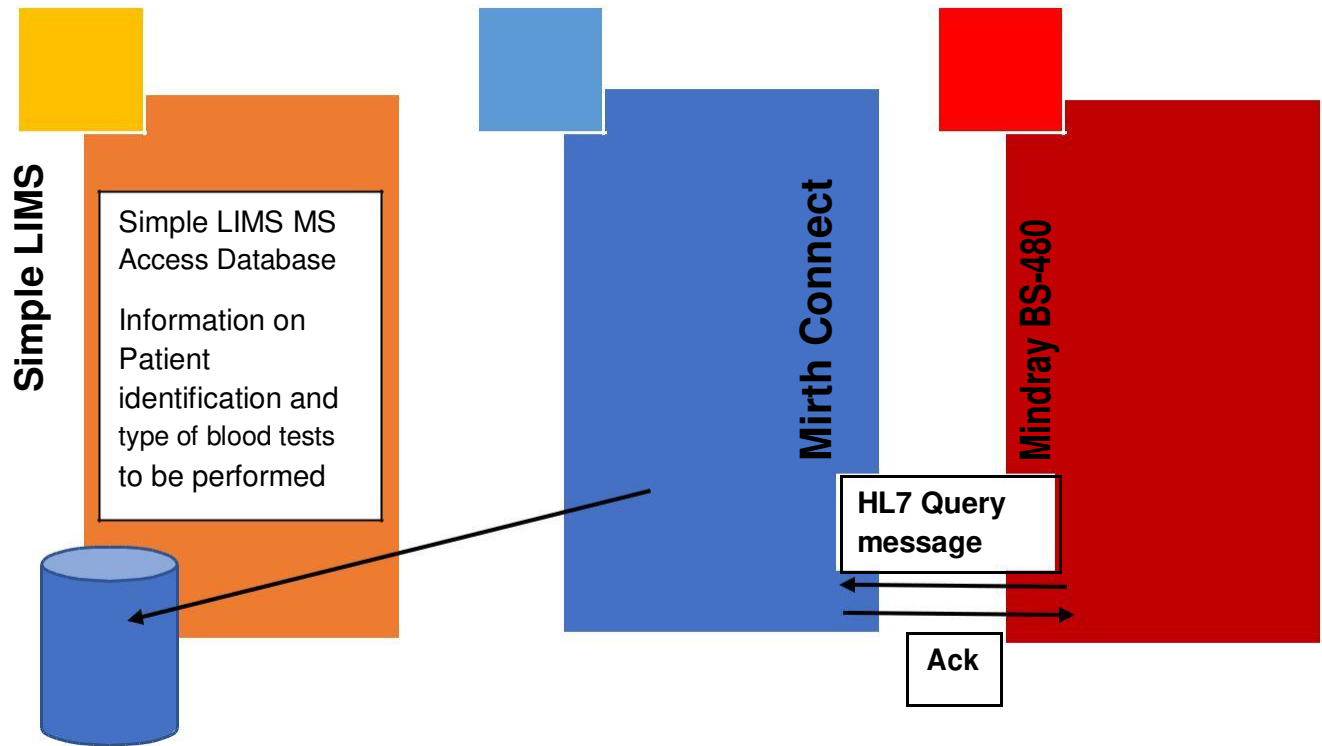
Integration and allowance of communication flow between the Mindray BS-480 machine with Simple LIMS will enable Mindray BS-480 to assign the blood sample reports with the corresponding patients that require a blood test. It will also provide the communication of the blood test results and attach them to relevant patients. It is a scenario, once implemented will save time and effort making the blood testing procedure more efficient and robust.

## Solution

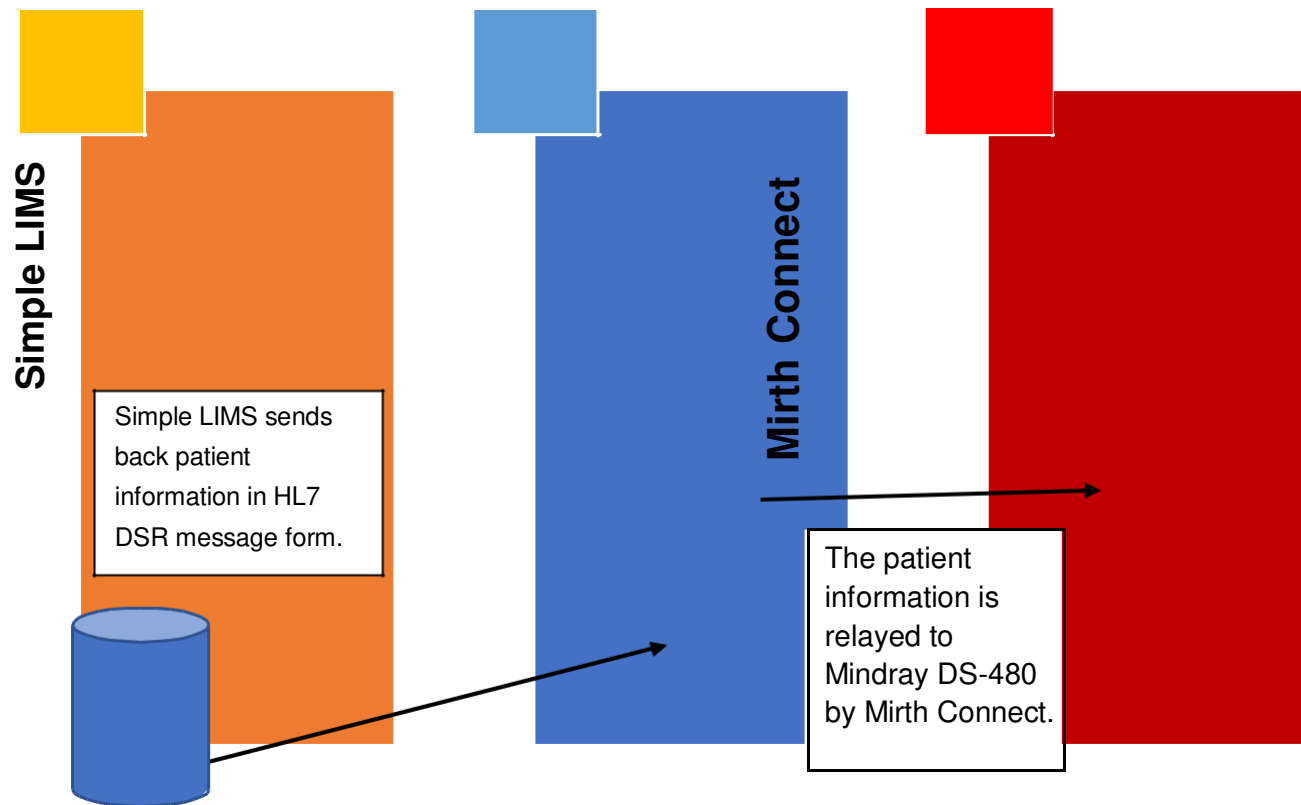
As soon as the Mindray BS-480 processes the blood samples, The PC connected with it will generate a “Query” sent to Mirth Connect. The query asks for the name and the tests needed for the patients' blood.

As soon as the Mirth Connect receives the query, it sends an acknowledgment message back to Mindray BS-480 machine which is merely a confirmation of the “Query” message confirming that it is received.

When Mirth Connect receives the "Query," it contacts the Simple LIMS and asks for the patient information, including the name of the patient and the required type of test for the patients' blood.



Once that information arrives at Mirth Connect from the Simple LIMS (in the form of HL7 DSR-message), it relays it to the Mindray BS-480 computer interface.



The Mindray machine sends the results of the tests on the blood samples back to Mirth. Technosoft developers have created a Mirth interface that locally stores the information on the file system. Below is a snapshot of the code behind the Mirth interface.

Status	Destination	Id	Connector T
Enabled	Step#1: Destination-DatabaseWriter	2	JavaScript Writer
Enabled	Step#2: SimpleLims-Integration	6	JavaScript Writer

Connector Type: JavaScript Writer  Wait for previous destination

**Destination Settings**

Queue Messages:  Never  On Failure  Always

Advanced Queue Settings:  Retries

Validate Response:  Yes  No

Reattach Attachments:  Yes  No

**JavaScript Writer Settings**

```

JavaScript:
1 globalChannelMap.put('Step1', false);
2 var databaseDriver = globalChannelMap.get('databaseDriver');
3 var dbConnUrl = globalChannelMap.get('dbConnUrl');
4 var dbUserName = globalChannelMap.get('dbUserName');
5 var dbUserPwd = globalChannelMap.get('dbUserPwd');
6 var dateString = DateUtil.getCurrentDate('yyyy-MM-d H:m:s');
7 var dbConn = DatabaseConnectionFactory.createDatabaseConnection(databaseDriver, dbConnUrl, dbUserName, dbUserPwd);
8
9 function FixQueryString(x) {
10     var pos = x.lastIndexOf(',');
11     return x.substring(0, pos) + ',';
12 }
13
14 var msgHeaderColumnValues = "" + $('messageHeader_sendingApplication_namespaceId') + "," +
15     "" + $('messageHeader_sendingFacility_namespaceId') + "," +
16     "" + $('messageHeader_receivingApplication_namespaceId') + "," +
17     "" + $('messageHeader_receivingFacility_namespaceId') + "," +
18     "" + $('messageHeader_dateOrTimeOfMessage_time') + "," +
19     "" +
20     "" + $('messageHeader_messageType_messageCode') + "," +
21     "" + $('messageHeader_messageType_triggerEvent') + "," +
22     "" + $('messageHeader_processingId_processingId') + "," +
23     "" + $('messageHeader_versionId_versionId') + "," +
24     "" + ',';
25
26 var patientColumnValues = "" + $('patientIdentification_setId_value') + "," +
27     "" + $('patientIdentification_patientId_id') + "," +
28     "" + $('patientIdentification_patientIdentifierList_idNumber') + "," +
29     "" + $('patientIdentification_patientName_secondAndFurtherGivenNames') + "," +
30     "" + $('patientIdentification_dateOrTimeOfBirth_time') + "," +
31     "" + $('patientIdentification_sex_value') + "," +
32     "" + ',';
33

```

In the next step, another Mirth interface is written by Technosoft software engineers that stores the relayed patient data to the Simple LIMS database (which is the Blood sample results). The snapshot below shows the code to the second Mirth interface.

## Edit Channel - ZainMed-Inbound-R01

Summary | Source | Destinations | Scripts (1)

Enabled | z.StepS1: Détdn tdF-DdtabéseV#Rtér

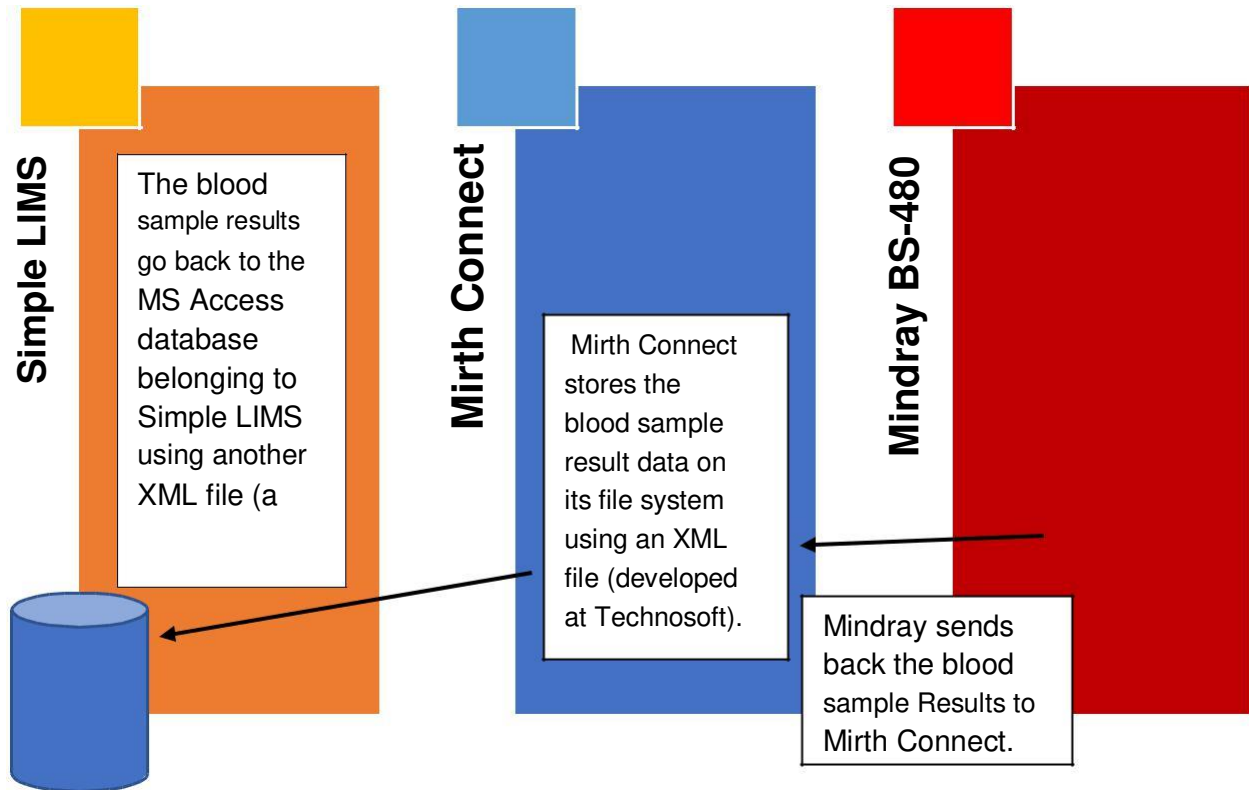
ID	Script Name
2	JavaScript Writer

Current Queue Type: y @ Wait for previous destination

Queue Messages: Never Available /éys  
Advanced Queue Settings: 0 Retries  
Yield After Resyn: 0 / No  
Reattach After Completion: Yes No

### JavaScript Writer Settings

```
JavaScript: 1 // At the start of Step 1: Update this at the end of Step 2
2
3 var step1 = globalChannelMap.get('Step1');
4 if (step1 == (false))
5 {
6     logger.error("Step-#2 Error Occurred Please Check Database Connection");
7 }
8
9
10
11
12
13 globalChannelMap.put('Step2', false);
14
15 if
16 {
17     var databaseDriver = globalChannelMap.get('databaseDriver');
18     var dbConnUrl = globalChannelMap.get('db-connection-simple?!.S');
19     var dbName = globalChannelMap.get('dbName');
20     var dbUserName = globalChannelMap.get('dbUsername');
21     var dbUserPwd = globalChannelMap.get('dbUserPwd');
22     var createdDateStr = DateUtil.getCurrentDate('yyyy-MM-dd HH:mm:ss');
23     var dbConn = DatabaseConnectorFactory.createDatabaseConnection(databaseDriver, dbConnUrl, dbUserName, dbUserPwd);
24     var sqlDatePattern = globalChannelMap.get('sqlDatePattern');
25     var msgPattern = globalChannelMap.get('h17DatePattern');
26     var storeResults = true;
27 }
28
29
30
31
32
33
34 //Status
35
36 //Current
37
38
39
```



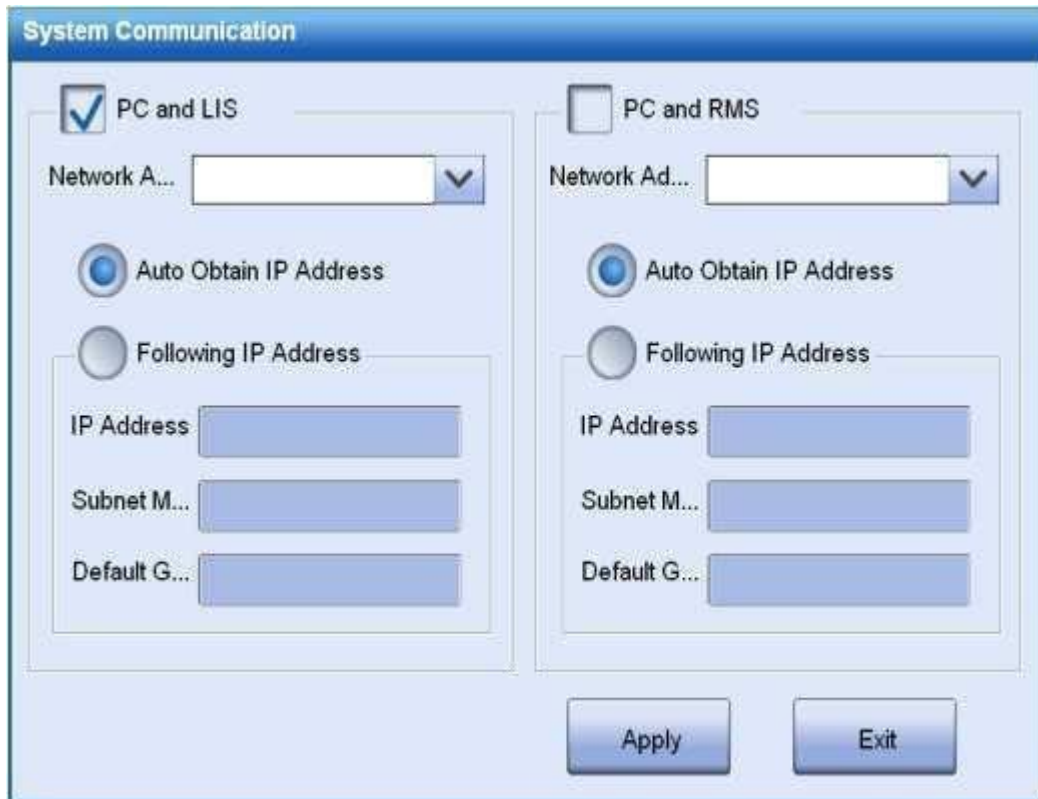
## Mindray Connection Configurations

The set up of the connection between Mindray BS-480 machine PC and the Simple LIMS host computer via Mirth Connect machine requires the execution of the following steps. Please note that the acronym, Simple LIMS stands for LIS (Laboratory Information System) in the following references.

1. The **Utility-System Setup** Chosen.
2. **Instrument F1** is selected.
3. **4 Com Setup** is selected. The **System Communication** window will display.

The relay of communication between Mindray to Simple LIMS, we need to configure the following Graphical User interface (GUI).





4. The default **PC and LIS** check mark remain as is.
5. Assure that you chose the network connection in the **Network Adaptor** Area.
6. Entry of **Auto-Obtain IP Address** radio button or the **IP Address, Subnet Mask** and the **Default Gateway** for the Mirth Connect server for connection configurations.
7. Click "**Apply.**"
8. Clicked the **Exit.**

## Conclusion

The solution provides elimination of manual work and speeds up the chemical analysis of the blood of patients. It can be a milestone achievement in enhancing efficiency while saving time, effort and administrative overhead.

Technosoft is an organization that deals with healthcare IT related projects at a low cost without any compromise in quality. This Mirth Connect integration was one of the projects that were undertaken and successfully carried out at Technosoft for one of its esteemed clients. Technosoft has a considerable track record in providing solutions to problems like these coming up with ideas and inspirations that make the lives of people more comfortable and more convenient.

The IT professionals at Technosoft are well skilled, and they know their craft for development and configuration of software apps.

If you have an Information Technology problem in the healthcare niche, we like to hear from you. Share your issues with us and get solutions that will reflect quality and compliance with all the strict healthcare standards, laws and regulations in countries like the United States.

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