

How FactoryTalk (FT) Batch communicates with FactoryTalk Historian SE

B.Sc. (Honours) in Instrument Engineering

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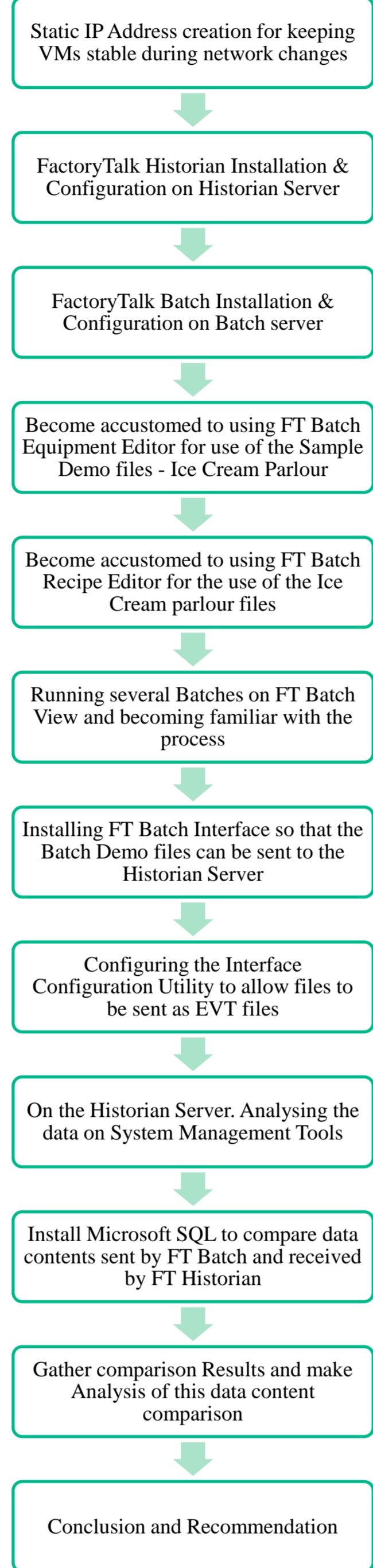
Introduction & Motivation for Project

Introduction

Rockwell Automation is a company that plays a major role to many clients in the Life Sciences Industry. In the Life Sciences Industry, it is extremely important to keep records of Batches that were made in case any deviations occur. Clients want batches to be made in a consistent manner, using a manufacturing procedure which has been validated against an approved design, and for which certain key parameters and steps have been submitted to the regulator(s). These regulators consist of the Food and Drug Administration (FDA) in the US, and their counterparts worldwide. It is critical for the client and FDA that the correct product is produced. This is where Rockwell's Historian and Batch software comes into play.

Motivation

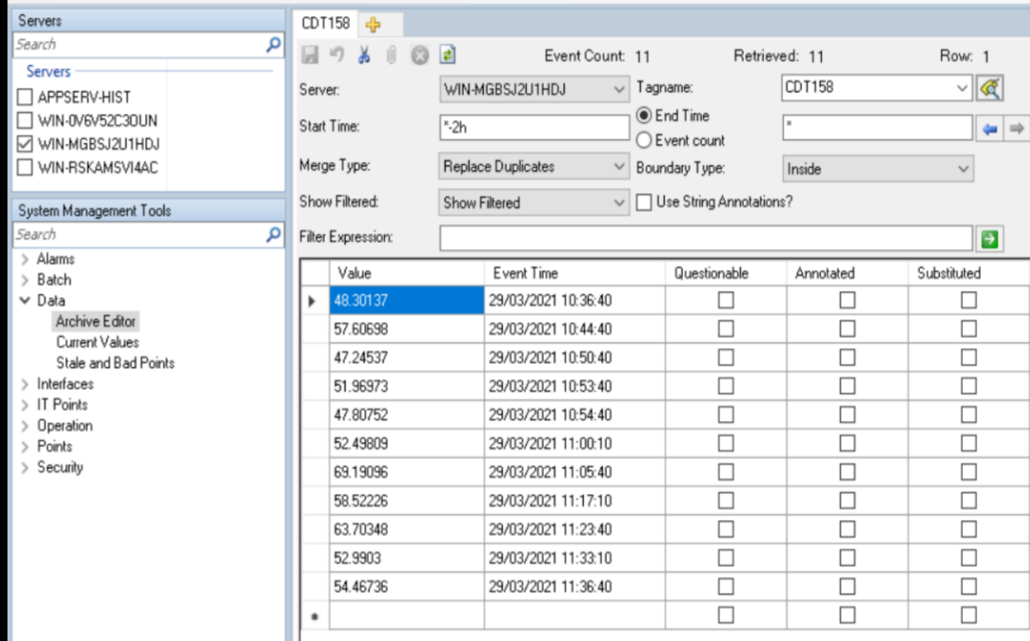
This project investigated the communication of data from FT Batch to FT Historian SE. Traditionally, after a batch records data, the log is stored in SQL, but it is undetermined how this works for FT Historian SE. This project required FT Historian to be set up and configured using manuals provided by Rockwell. The installation of FT Batch was also investigated using manuals provided by Rockwell, with example demos that run on the FT Batch Virtual Machine. Rockwell project milestones were to become familiar with Batch and Historian Software, plus Compare how two different types of Historian applications (FT Historian and SQL) store the same data.



Experimental Method

FT Historian

After creating a Virtual Machine to store the Historian Server, the FT Historian Installation & Configuration manuals were used to correctly install and set up the Historian Server to receive data from the FT Batch Server. The System Management Tools (SMT) on the Historian Server is where data was received and analysed. Mappings and Trusts have to be created on the Historian Server so that when the Batch Interface sends data, the Historian Server can recognise and verify the trustee that commenced the data exchange. This data is then analysed to determine its content and how this information is displayed.

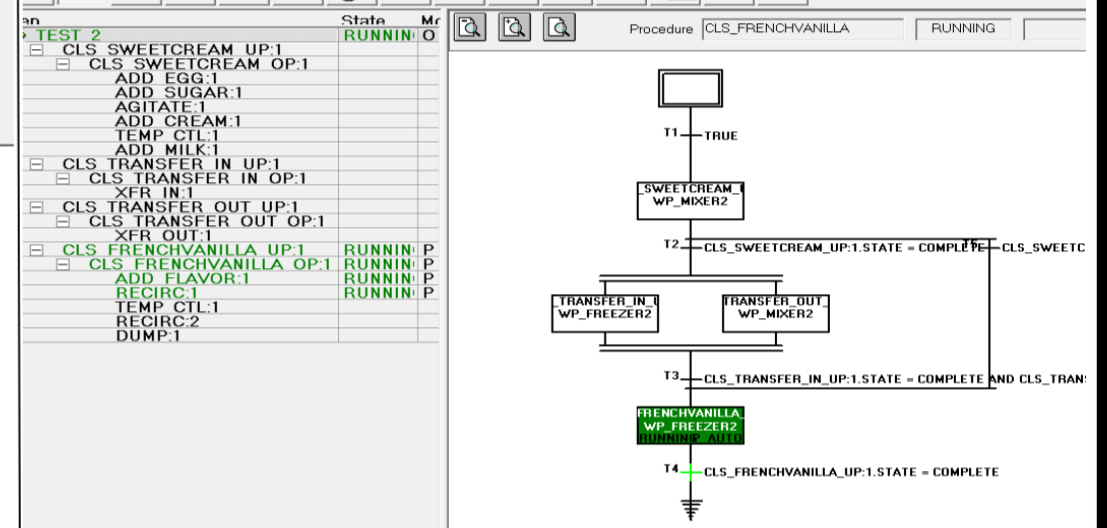


FT Historian Batch Interface

The FT Historian Batch Interface is an interface designed for FactoryTalk Historian SE. It takes data from **FactoryTalk Batch** event journals (EVT files) and sends it into the **Historian batch database**. Using the Interface Configuration Utility (ICU), the Batch Interface is assigned with the Demo EVT Files, and the destination is set (Historian Server). Once the Interface is Writable, data can be sent. This is where the Mappings and Trusts must be applied on the Historian server so that the Batch Interface can send data without rejection.

FT Batch

Once the Virtual Machine for the Batch server is set up, the FT Batch manual was used to Install and Configure the server to enable data to be sent from the Batch Interface to the Historian server. The Batch server is required to access the Sample Demo files for testing purpose's. These sample files are accessed through the Equipment Editor and Recipe Editor to generate a Sequential Function Chart (SFC) in Batch View. This is where the Batch is executed and data can be observed. Once the Batch Server has successfully run Batches of the Sample Demo, the EVT Files from the demo can be configured in the FT Historian Batch Interface in order to be sent to the Historian Server.



Microsoft SQL Database

FactoryTalk Event Archiver gathers data from the batch record files (EVT files) created by the FT Batch Server and stores the data in a SQL Server database. The FT Batch Server establishes an electronic batch record for every batch on the Batch List. FactoryTalk Event Archiver inserts a unique identifier with date and time stamp information for each event in the database. FactoryTalk Event Archiver writes data to the BatchHis SQL table in the BatchHistory database. The SQL Studio was used in this project to compare Data gathered on the Historian server with original data that was sent from the Batch Interface on the Batch Server.

Investigation & Results

Historian SMT Data

When the files are received on the Historian Server, they are accessed in the SMT. From here the Current Values of the point can be displayed in a tabular form. The Archive Editor can specifically choose a point to observe and analyse its data. The figure below displays the values of the TEMP_SP from the batch. As observed by the dates, for every batch completed a new record was made.

Value	Event Time	Questionable
1 DEG C	01/04/2021 10:09:50	<input type="checkbox"/>
1 DEG C	01/04/2021 10:19:27	<input type="checkbox"/>
1 DEG C	06/04/2021 15:02:20	<input type="checkbox"/>

Microsoft SQL Data

The SQL Database automatically tabularises the Batch EVT files. Queries can be applied to the table to specify specific data points the user wants to observe.

```
SELECT [RecordID]
FROM [BatchHistory].[dbo].[batchhis]
where DescriptAPI like '%temp_sp%' and Unit = 'WP_Freezer2'
```

This Query displays the same data displayed in the Historian SMT.

UniqueID	BatchID	Recipe	Descript	Event	DescriptAPI	EventAPI	PValueAPI	EU
04-01 10:09:50.000	3	TEST_1	3:CLS_FRENCHVANILLA:CLS...	TEMP_SP	Recipe Value	TEMP_SP	Recipe Value	1
04-01 10:19:27.000	4	TEST_2	4:CLS_FRENCHVANILLA:CLS...	TEMP_SP	Recipe Value	TEMP_SP	Recipe Value	1
04-06 15:02:20.000	8	TEST_2	8:CLS_FRENCHVANILLA:CLS...	TEMP_SP	Recipe Value	TEMP_SP	Recipe Value	1

Comparison

As shown in the Figures, the SQL (Figure with Red border) displays more information than the SMT Archive Editor (Left Figure). The SQL Database allows the data from several batches to be displayed together easily. The Historian SMT shows values for several batches but against Time rather than Batch number.

Conclusion

Both sets of FT Historian and FT Batch Software were installed and configured successfully. This was done in a virtualised environment (two VM's). Data was received by Historian from the Batch Interface. The data was read and can be analysed against timestamps. The Batch data was applied to SQL where the database created a Table - batchhis. Queries could be made to analyse specific data points. These data points on SQL are organised against Batch Numbers. The project was completed on schedule and demonstrates that Historian can interpret Batch data and offers another analysis option rather than SQL.

References

- [1]. FactoryTalk Historian SE, Installation and Configuration Guide, Rockwell Automation Publication, August 2018
- [2]. FactoryTalk Batch, Installation and Configuration Guide, Rockwell Publication #BATCH-GR011E-EN-P