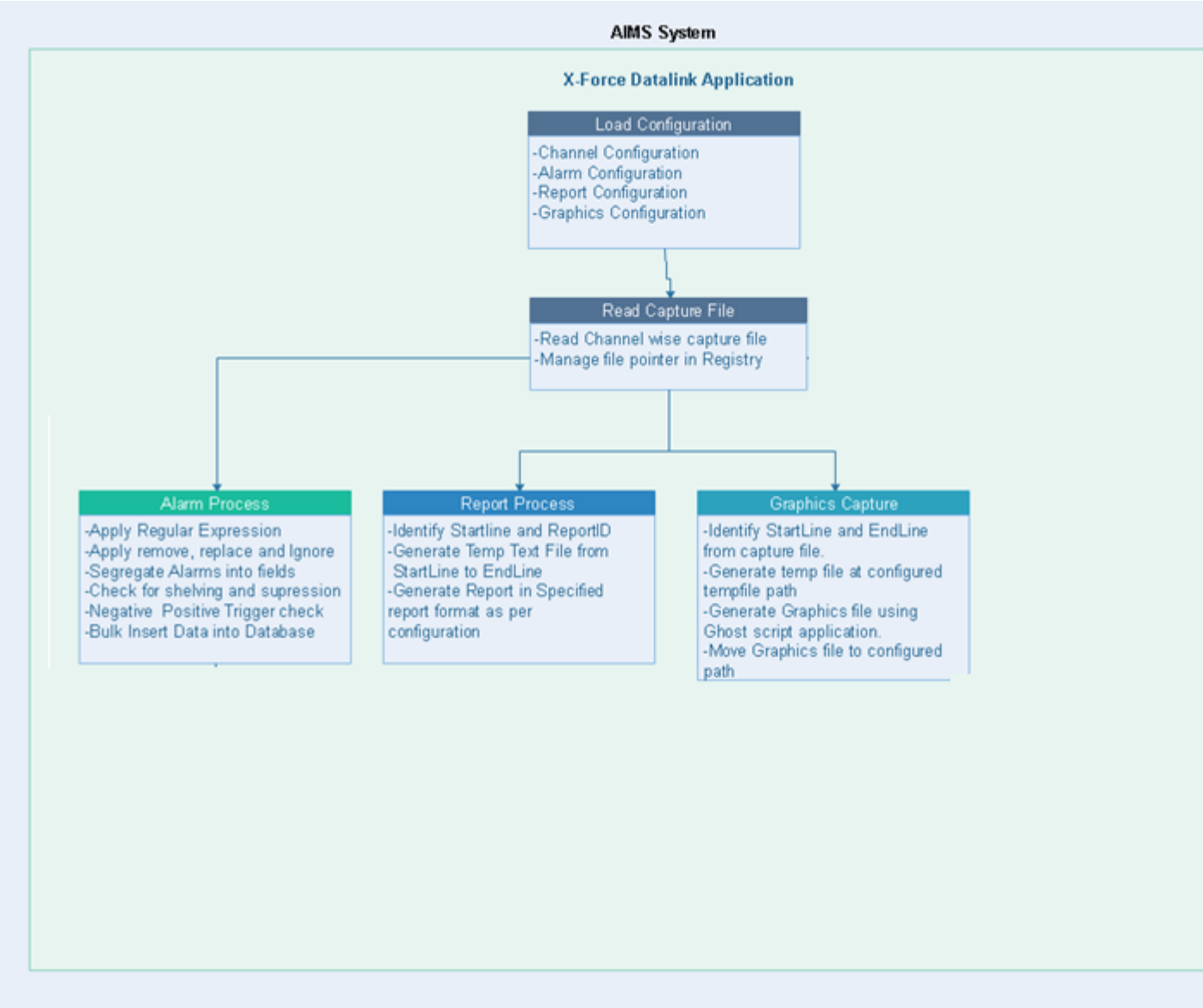
X-Force DataLink Process

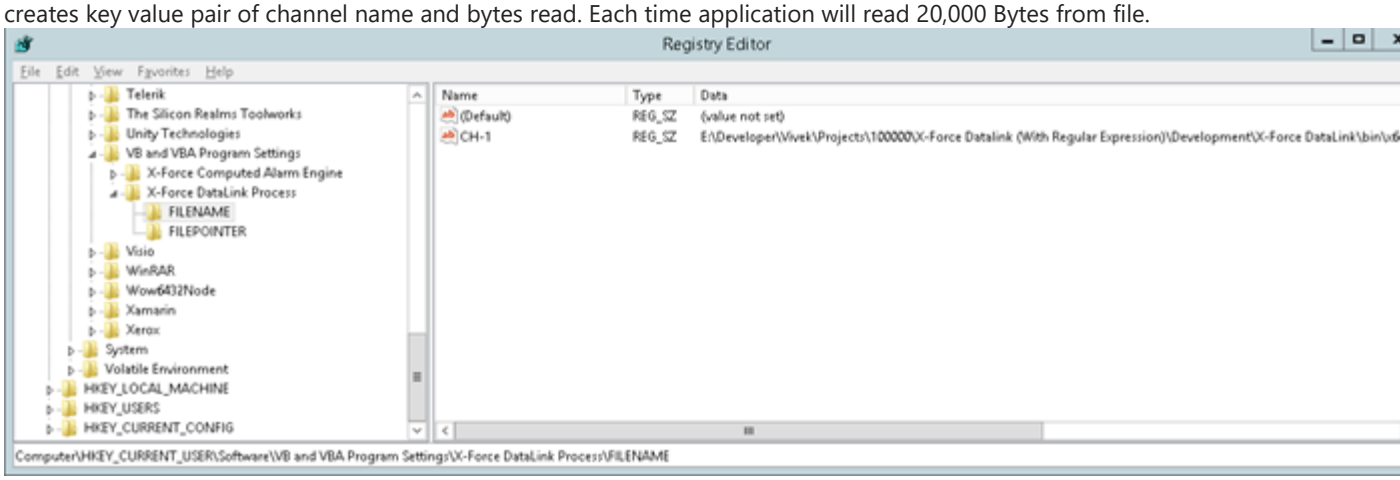
X-Force Datalink application is developed to read captured alarms and manipulate the alarms as per user configuration and store them in Database. X-force Datalink application stores all alarms into a table named “tbl_data_alarm_field”. If we take a look at whole scenario of AIMS, X-Force Datalink application plays very important role.

X-Force Datalink Application uses data (xforce) Database to store the alarms. To run the Datalink Application License file and proper configuration is mandatory. X-Force Datalink Application will enable only those features which are enabled in license file.



Read Capture File

X-Force Datalink application reads capture files in systematic manner. Datalink application uses Registry to keep track of capture file reading. Application writes Registry with application name. Application writes file name and file pointer. In file name it created key value pair of channel name and file name and in file pointer application creates key value pair of channel name and bytes read. Each time application will read 20,000 Bytes from file.



Remove, Replace and Igone

X-Force Datalink application having functionality of remove, replace and ignore from alarm line. This Functionality is used in DataLink application for removing, replacing of ignore unused or junk characters from alarm lines.

Remove: If any user wants to remove some specific part from alarm line, in that case as per remove configuration Datalink application will remove data from alarm line as per configuration.

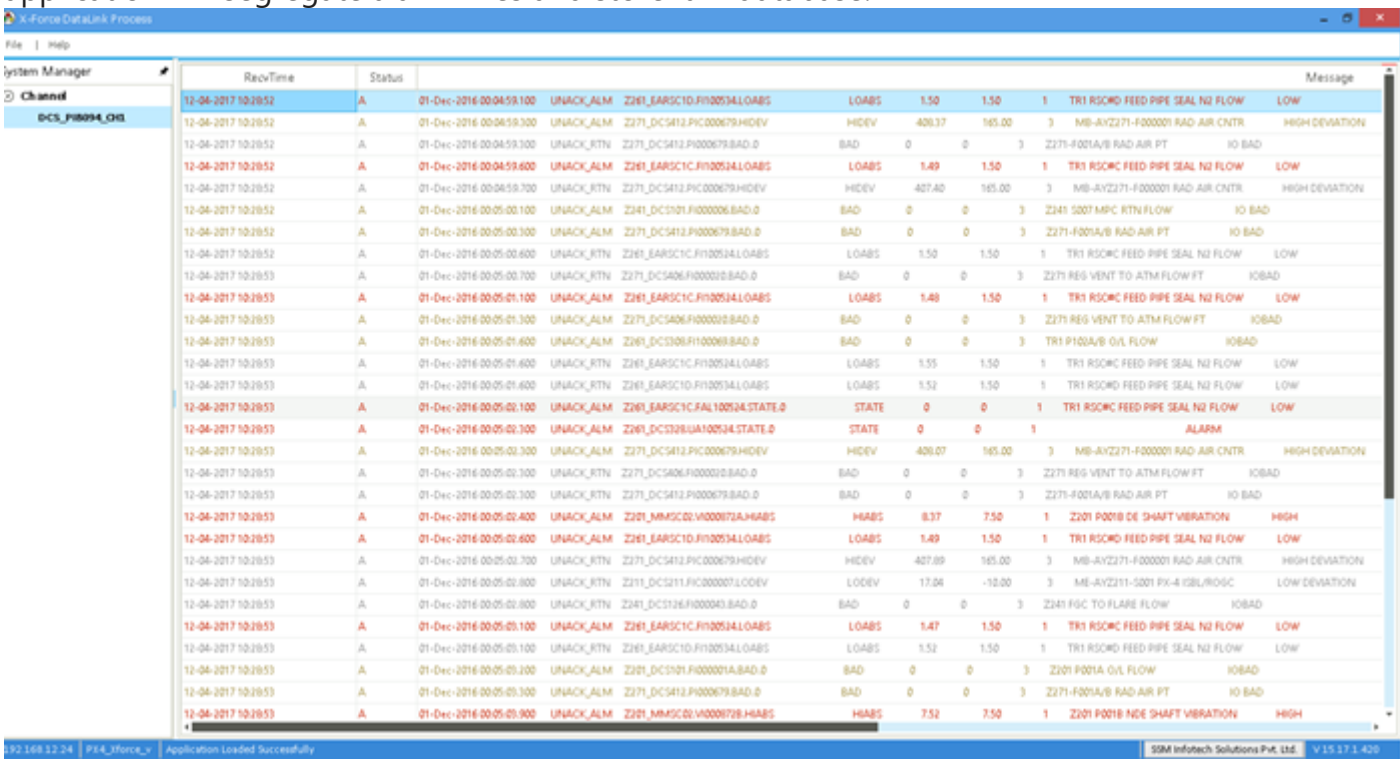
Replace: If any user wants to replace some specific part from alarm line, in that case as per replace configuration Datalink application will replace specific part from alarm line as per configuration.

Ignore: If any user wants to ignore some specific type of alarm line, in that case as per ignore message configuration Datalink application will ignore alarm line as per configuration. This ignored messages will not be shown in datalink and database.

Alarm Segregation Process

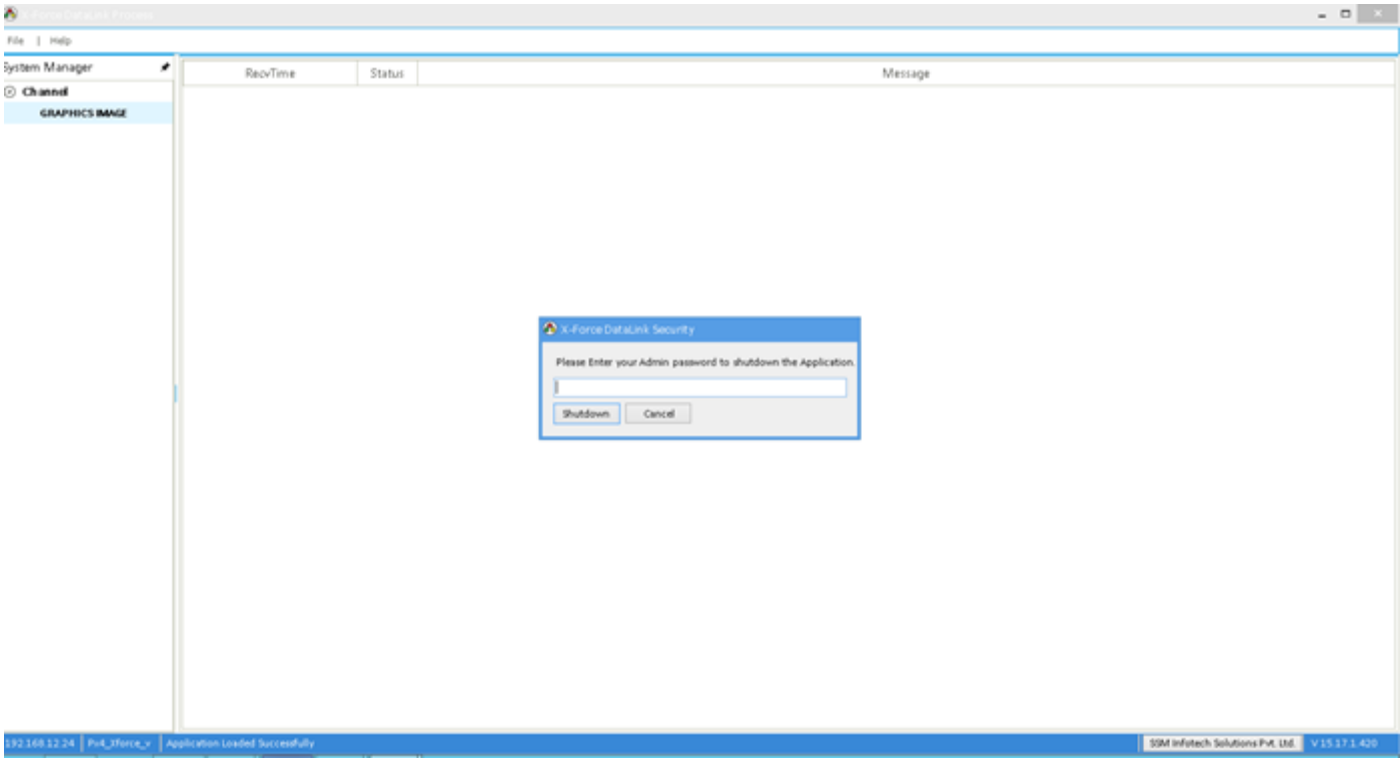
X-force Datalink Application uses regular expression to identify the alarm line and after identification application will assign messagetpye to all configured alarm lines. Here is some general Message types: ALM, RTN, ACK, OPR, SYS, Alarm ON, Alarm OFF, Shelve, Cancel Shelve, Reset Shelve, GroupSuppressON, and CHNG.

X-force Datalink Application Identify the Alarms as per user configuration of regular expression and identify its MsgId (Id of Regular Expression). Based on MsgId DataLink application will segregate alarm lines and store it in database.



Security

For Security purpose X-Force Datalink Application will ask for password on exit of the application which will prevent application shutdown from unauthenticated users.



Sequence and Trigger Identification

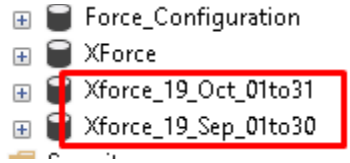
In AIMS we are using Sequence to generate notifications in critical condition. Sequence configuration contains all the information of critical condition and condition wise action (SMS, Calling, Mail etc.). Sequence is a combination of trigger and Sequence.

There are two type of trigger. One is negative trigger and Positive trigger. Datalink Application will check all sequence and trigger possibilities on each alarm line. If any Sequence is satisfied for any alarm line then for that alarm line column Seqid will be updated by datalink application.

Dynamic Database Creation

For storing alarms and events application uses SQL database. Datalink application have ability to create database at runtime as per configuration. There are total 3 database frequecies are available which are Daily, Weekly and Monthly. Whenever any alarms & Events recived in datalink application, it will be processed as per alarm configuration and after that those alarms will be inserted dynamically created database.

If user have configured daily as database frequency from alarm web, also user have to provide list of tables and views to be created in new dynamic database. In this case application will create daily database, this dynamic database will contain only selected tables and views.



Graphics Capture

X-Force Datalink Application also having feature of capturing graphics. Firstly user have to do graphics capture configuration using X-Force alarm Configurator application. After that configuration Datalink application will identify either channel is configured for graphics or not. Application will look for start line and end line of graphics report. Application will generate one text file which contains captured alarms from start line to EndLine.
For generating image file from captured data, "Ghost Script" application is used. This application will convert data into image file. Datalink application will give command to this application and generate graphics at configured location.

Production Report Process

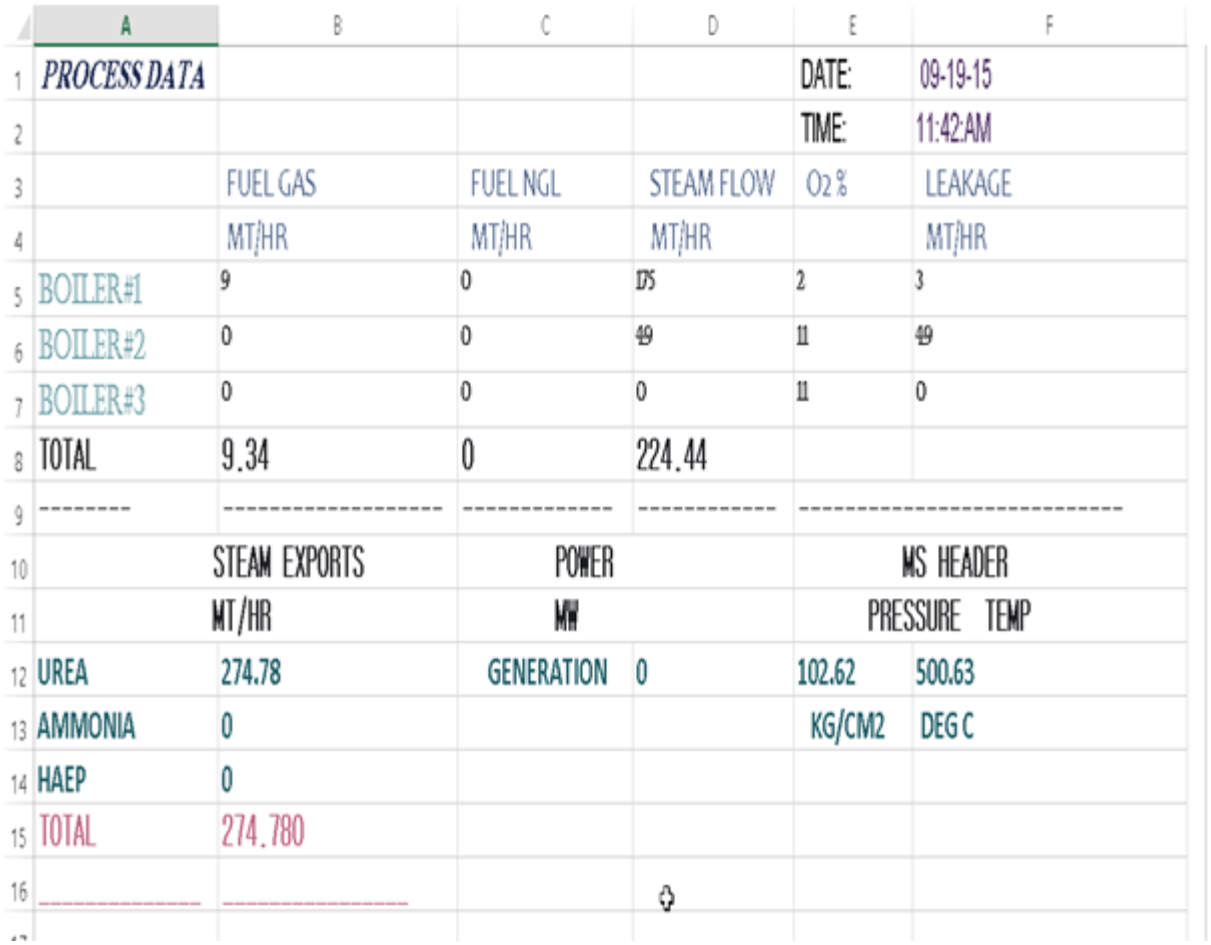
X-Force Datalink Application can generate report as per user configuration and generate report in specific format. X-Force Datalink Application can generate reports in different formats as listed:
1. XLS
2. XLSX
3.HTML
4. XDF
5. TXT

This Reports are generated at specified path as per user configuration and Formatting. Report Generation functionality of DataLink application is based on start line and EndLine of configured report.
At the First Application will segregate the alarm lines and then apply remove, replace and ignore functionality. After that application will find the start line of the report from capture file. When start line will found, application have report id by using report id application

performs further process for report and generate report. Report will not generate till EndLine not found.

After Report generation Application will check for report mail or print. If Report Mail is enabled then applicbajation will generate Xml file for Report in Mail folder with Report file as Attachment and same for printer, application will generate print file for Report in print named folder. Application also inserts all report lines into database.

Generated Report



	A	B	C	D	E	F
1	PROCESS DATA				DATE:	09-19-15
2					TIME:	11:42:AM
3		FUEL GAS	FUEL NGL	STEAM FLOW	O2 %	LEAKAGE
4		MT/HR	MT/HR	MT/HR		MT/HR
5	BOILER#1	9	0	175	2	3
6	BOILER#2	0	0	49	11	49
7	BOILER#3	0	0	0	11	0
8	TOTAL	9.34	0	224.44		
9	--------	----------	----------	----------	----------	
10		STEAM EXPORTS	POWER		MS HEADER	
11		MT/HR	MW		PRESSURE	TEMP
12	UREA	274.78	GENERATION	0	102.62	500.63
13	AMMONIA	0			KG/CM2	DEG C
14	HAEP	0				
15	TOTAL	274.780				
16	_____	_____				

Shelving and Suppression

In simple term shelving and suppression is nothing but keep alarm on silent mode for specific time(default 8 hours) of interval. this suppressed alarms are identified seperatly by AIMS applications. Any report or any application at presentation level will not display this suppressed or shelved alarms.

Shelving

Shelving Configuration:
Alarm Configuration Should be there with MsgType:Shelve, CancelShelve and ResetShelve.
Action: Shelve, CancelShelve and ResetShelve.
Shelving Process:
Action:*Shelve*
-> Application will insert
Chid,FieldNames,FieldValues,SuppressType,OFFEventstamp,Status,ShelveDuration in tbl_Config_SuppressList
Note: SuppresType='S', OFFEventstamp='Eventstamp of Alarm', Status='Shelve', SelveDuration='you will Get from alarmline (Colulmn Name Limit)'. Application will insert all the alarms with suppress alarm = 2.

Action:*CancelShelve*

-> Application will Update ONEventstamp,Status in tbl_Config_SuppressList
Note: SuppressType='S', ONEventstamp='Eventstamp of Alarm', Status='CancelShelve'

Action:*ResetShelve*
-> Application will Update ONEventstamp,Status in tbl_Config_SuppressList
Note: SuppressType='S', ONEventstamp='Eventstamp of Alarm', Status='resetshelve'

Alarm Configuration should be look like below SS.

Chid	FieldNames	FieldValues	SuppressType	OFFEventstamp	ONEventstamp	Status	ShelveDuration	LastSuppressId	deleted
2	Tagname,Alarmtype	180TS111_AN,ALM	S	2016-02-04 11:00:00.0...	2016-02-11 14:07:40....	CancelShelve	8	NULL	False
2	Tagname,Alarmtype	300FI101,LO	S	2016-02-05 09:43:19.0...	2016-02-05 09:43:23....	ResetShelve	8	NULL	False
2	Tagname,Alarmtype	SDOORO1_AN,ALM	S	2016-02-05 13:06:05.0...	2016-02-11 14:24:30....	CancelShelve	8	NULL	False
2	Tagname,Alarmtype	850XA001_AN,ALM	S	2016-05-27 14:06:48.0...	2016-05-27 14:08:35....	ResetShelve	8	NULL	False
2	Tagname,Alarmtype	120XI331,IOP	S	2016-02-10 17:04:47.0...	2016-02-11 15:54:58....	CancelShelve	8	NULL	False
2	Tagname,Alarmtype	380GD003,HH	S	2016-02-01 14:34:16.0...	2016-02-01 14:36:55....	CancelShelve	8	NULL	False
2	Tagname,Alarmtype	180XS380A_AN,ALM	S	2016-02-01 14:35:43.0...	2016-02-11 13:22:43....	CancelShelve	8	NULL	False

Suppression

Suppression Configuration:
Alarm Configuration for Suppression: MsgType can be AlarmON or AlarmOFF, Action can beON or OFF
tbl_Config_Message_Method

MsqType	MsqData	Action
AlarmON	(?i)(103).*(Alarm ON).*	ON
AlarmOFF	(?i)(103).*(Alarm OFF).*	OFF

Suppression Process:
Action:OFF
Application will insert Chid,FieldNames,FieldValues,SuppressType,OFFEventstamp,Status,ShelveDuration in tbl_Config_SuppressList
Note: SuppressType='AlarmOFF', OFFEventstamp='Eventstamp of Alarm', Status='OFF'. Application will insert all the alarms with suppress alarm = 1

Action:ON
-> Application will Update ONEventstamp,Status and Suppresstype in tbl_Config_SuppressList
Note: SuppressType='AlarmON', OFFEventstamp='Eventstamp of Alarm', Status='ON'

FieldNames	FieldValues	SuppressType	OFFEventstamp	ONEventstamp	Status
Tagname	160PDI107_M1,	OFF	2016-02-01 10:58:51.0...	2016-02-01 10:58:51....	AlarmOFF
Tagname	160PDI153_M1,	OFF	2016-02-01 10:58:51.0...	2016-02-01 10:58:51....	AlarmOFF
Tagname	160PI105_M1,	OFF	2016-02-01 10:58:51.0...	2016-02-01 10:58:51....	AlarmOFF
Tagname	160PI106_M1,	OFF	2016-02-01 10:58:51.0...	2016-02-01 10:58:51....	AlarmOFF
Tagname	160PI151_M1,	OFF	2016-02-01 10:58:51.0...	2016-02-01 10:58:51....	AlarmOFF
Tagname	160PI152_M1,	OFF	2016-02-01 10:58:51.0...	2016-02-01 10:58:51....	AlarmOFF
Tagname	160PI186_M1,	OFF	2016-02-01 10:58:51.0...	2016-02-01 10:58:51....	AlarmOFF

Group Suppression

Using this feature user can configure and suppress particular group of alarms for a particular time of interval.
Group Suppression Configuration:
Alarm Configuration for Group Suppression
MsgType can be GroupSuppressON,GroupSuppressOFF
Action can be ON, OFF

Group Suppresion Process:
Action:OFF
Application will insert Chid,FieldNames,FieldValues,SuppressType,OFFEventstamp,Status,ShelveDuration in tbl_Config_SuppressList
Note: SuppressType='GroupOFF', OFFEventstamp='Eventstamp of Alarm',
Status='GroupSuppressON'. Application will insert all the alarms with suppress alarm = 1

Action:ON
Application will Update ONEventstamp,Status and Suppresstype in tbl_Config_SuppressList
Note: ONEventstamp='Eventstamp of Alarm', Status='GroupSuppressOFF'

Manual Suppression

Manual Suppression: If any user wants to suppress alarms based on tagname in AIMS then user have to do manual suppression tag configuration from alarm web.

SP will check all the selected tag entry in tbl_config_supressList. If any selected tag not found in table then sp will make entry in that table
SP Execution: exec Sp_InsertManualSupressionTagList 'SHELL_xforce' ,'160PDI153_M1','850STD001'
SP Result:select * from (Select 'Tagname' as FieldNames ,Data as FieldValues, 'OFF' as SuppressType, 'AlarmOFF' as Status ,'2019-02-21 14:45:31.060' as Eventstamp from [StringtoRows] ('160PDI153_M1')) as tmp_ManualSupressionTagList

MERGE dbo.tbl_Config_SuppressList AS target
USING (SELECT '160PDI153_M1,') AS source (FieldValues) ON (target.FieldValues = source.FieldValues)
WHEN NOT MATCHED THEN INSERT (FieldNames,FieldValues,SuppressType,Status,OFFEventstamp,Deleted)
VALUES ('Tagname','160PDI153_M1,','OFF','AlarmOFF','2019-02-21 14:45:31.090','false');

MERGE dbo.tbl_Config_SuppressList AS target
USING (SELECT 'VIVEK,') AS source (FieldValues) ON (target.FieldValues = source.FieldValues) WHEN NOT MATCHED
THEN INSERT (FieldNames,FieldValues,SuppressType,Status,OFFEventstamp,Deleted) VALUES ('Tagname','VIVEK,','OFF','AlarmOFF','2019-02-21 14:45:31.103','false');

Operator Bit Process

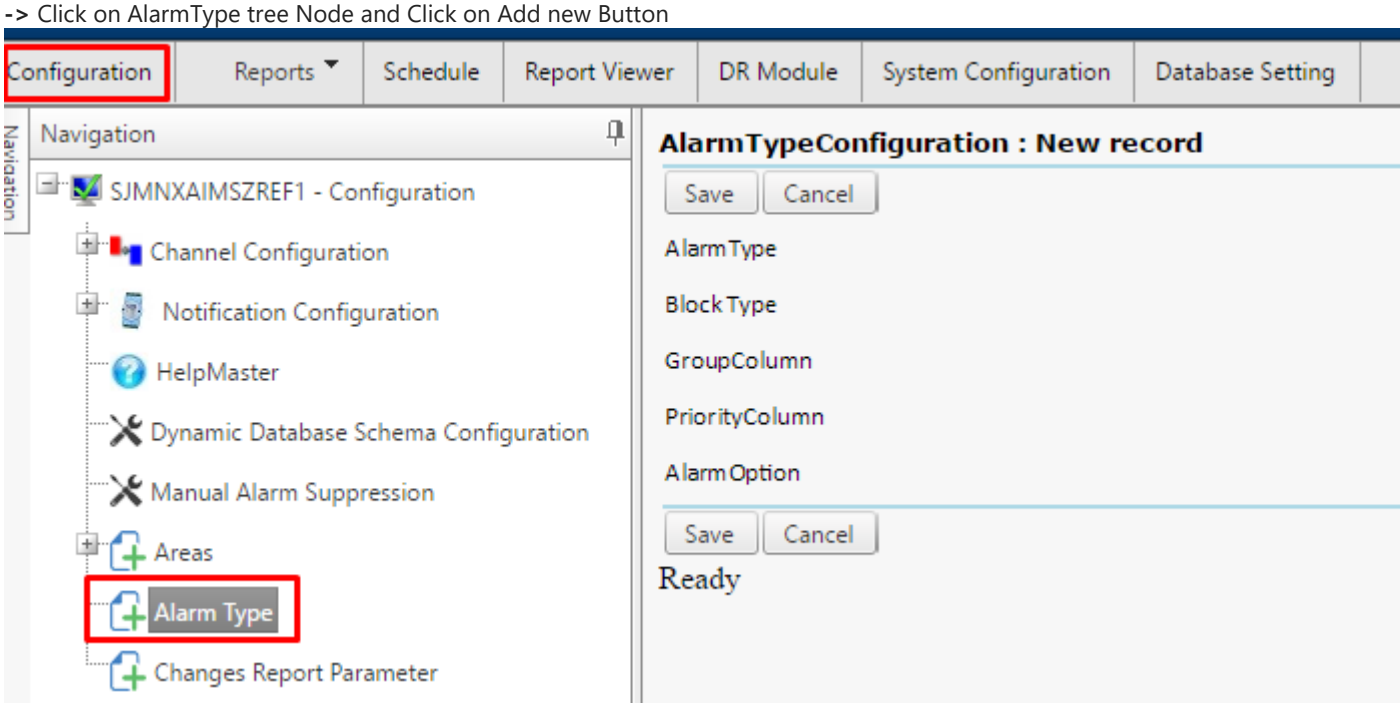
Some terms to understand before starting Operator Bit Calculation Module.
OPRBIT: To identify the alarm is visible to which operators in the plant
ICC: One type of Capture file Which contains Information like Any Tag T1 is assinged to any Operator OP1.

Steps of Operator Bit Calculation:

1- Read ICC data from capture File and Import data in Database. This Will Make Block Wise(One Field of Capture File) wise Tables in Database.
2- Process ICC Data and Insert into BlockType wise Tables(E.g. AIN, CIN, AIN_CSV, CIN_CSV)
3- Calculate OPRBIT and Save Data in Block Wise Tables
4- Now When any alarm with MessageType ALM,RTN Will Come, In this alarm there will be some Tagname and AlarmType. Application should fetch Operator Bit Details from the database for the particuler TagName and AlarmType.

BlockName and GroupColumn Configuration

As a user, System should have functionality to configure and store BlockName and GroupColumn Configuration.
To configure Blockname and Group Column please follow the below steps.
-> Open Alarm Web, Goto Configuration menu
-> Click on AlarmType tree Node and Click on Add new Button



-> Add configuration of BlockType and Alarm Type from Alarm Web

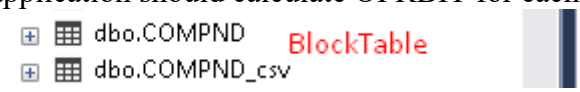
Note: This configuration data will be provided by end user

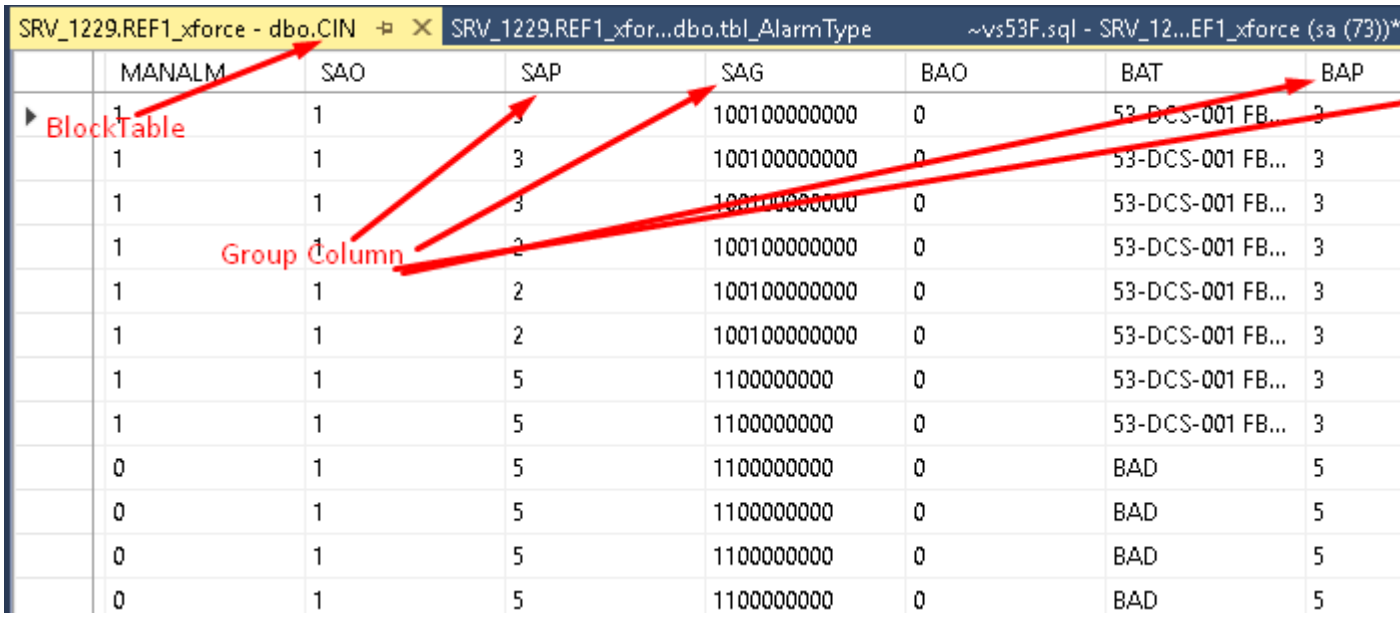
IMPORT ICC Files Into Database

-> As a user, Application Should read ICC Capture files from the captured Alarm Folder. After that application should segregate Left side and Right side data and dump data into the CSV files. CSV file name should be same as name of "Type" in Capture file which is in below Screenshot.

```
NAME    = 53CP01 STA
   TYPE    = COMPND
   DESCRP =
   PERIOD = 1
```

-> After that application should create table in Database with same Name as CSV file Name and import all CSV data in the table.(e.g Table name should be COMPND_CSV).After that application should calculate OPRBIT for each and every Group Column of BlockTable.





MANALM	SAO	SAP	SAG	BAO	BAT	BAP
1	1	3	100100000000	0	53-DCS-001 FB...	3
1	1	3	100100000000	0	53-DCS-001 FB...	3
1	1	3	100100000000	0	53-DCS-001 FB...	3
1	1	2	100100000000	0	53-DCS-001 FB...	3
1	1	2	100100000000	0	53-DCS-001 FB...	3
1	1	2	100100000000	0	53-DCS-001 FB...	3
1	1	5	1100000000	0	53-DCS-001 FB...	3
1	1	5	1100000000	0	53-DCS-001 FB...	3
0	1	5	1100000000	0	BAD	5
0	1	5	1100000000	0	BAD	5
0	1	5	1100000000	0	BAD	5
0	1	5	1100000000	0	BAD	5

Calculate Operator Bit and Dump Into Database

First thing is, User have to enable Operator bit calculation feature in channel configuration using alarm web.

-> After configuration of channel, Application should read capture file.
-> While Processing Capture fil, application should fetch OPRBIT from the Block Tables for the all alarms having Message Type ALM and RTN.
-> If any Tag name and Alarm Type configuration not found then application should consider 0 as OPRBIT for that particular alarm.
-> Application should import alarms into database with its Oprbit Value in tbl_data_alarm_field as shown in attached Screen Shot.