Survalent.

Training Manual

SurvalentONE SCADA System Level 1

Module 1 – Introduction, Installation, and Database Preparation

Revision 01

Document Control

Revision	Date of Issue	Author(s)	Reviewer(s)	Brief Description of Change
01	Sep 1, 2022	Duke Hoang		Updated screenshots.

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Abbreviations and Acronyms

Abbreviation	Definition
ADMS	Advanced Distribution Management System
ANSI	American National Standards Institute
AVL	Automatic Vehicle Location
AVR	Automatic Voltage Regulation
BCC	Backup Control Centre
BCS	Backup Control System
CAIDI	Customer Average Interruption Duration Index
CAIFI	Customer Average Interruption Frequency Index
CEMI	Customers Experiencing Multiple Interruptions
CELID	Customers Experiencing Longest Interruption Duration
CHIKM	Customer Hours of Interruption per Kilometer
CIKM	Customers Interrupted per Kilometer
CIM	Common Information Model
CIP	Critical Infrastructure Protection
CSV	Comma Separated Values
CVR	Conservation Voltage Reduction
DMS	Distribution Management System
DMZ	Demilitarized Zone
DNM	Distribution Network Model
DNP3	Distributed Network Protocol
DRS	Disaster Recovery System
DSS	Decision Support System
FLISR	Fault Location, Isolation, and Service Restoration
FTP	File Transfer Protocol
GIS	Geographic Information System
GPS	Global Positioning System
HDMS	Historical Data Management System
ICCP	Inter Control Centre Protocol
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Device
IEEE	Institute of Electrical and Electronics Engineers
IIS	Internet Information Services
IP	Internet Protocol
ISO	International Organization for Standardization
IT	Information Technology
IT	Information Technology

Abbreviation	Definition
IVR	Interactive Voice Response
JSON	JavaScript Object Notation
Km	Kilometers
kV	Kilovolts
LAN	Local Area Network
MAIFI	Momentary Average Interruption Frequency Index
NERC	North American Electric Reliability Corporation
ODBC	Open Database Connectivity
OEM	Original Equipment Manufacturer
OMS	Outage Management System
OPC	OLE for Process Control
OTS	Operations Training Simulator
PDS	Project Development System
QAS	Quality Assurance System
RAM	Random Access Memory
RDBMS	Relational Database Management System
RTU	Remote Terminal Unit
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SNMP	Simple Network Management Protocol
SOAP	Simple Object Access Protocol
SOE	Sequence of Event
SQL	Structured Query Language
TASE.2	Telecontrol Application Service Element 2 (ICCP)
TCP/IP	Transmission Control Protocol/Internet Protocol
VPN	Virtual Private Network
WAN	Wide Area Network
WFMS	Workforce Management System
XML	Extensible Markup Language

Module 1 – Introduction

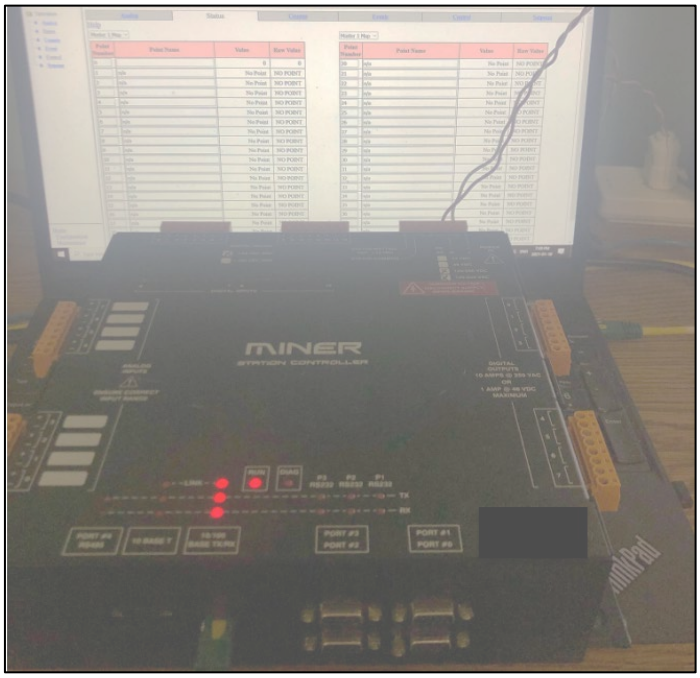
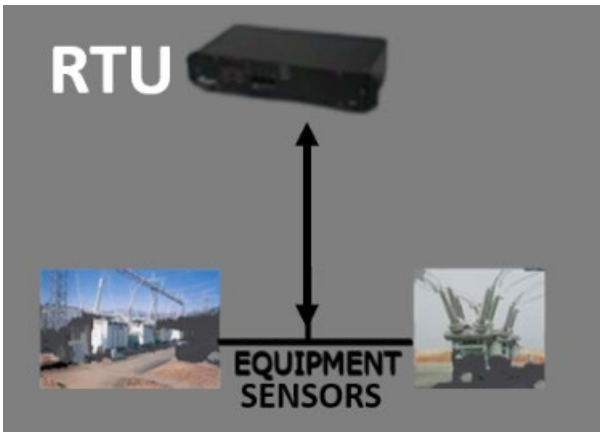
Introduction

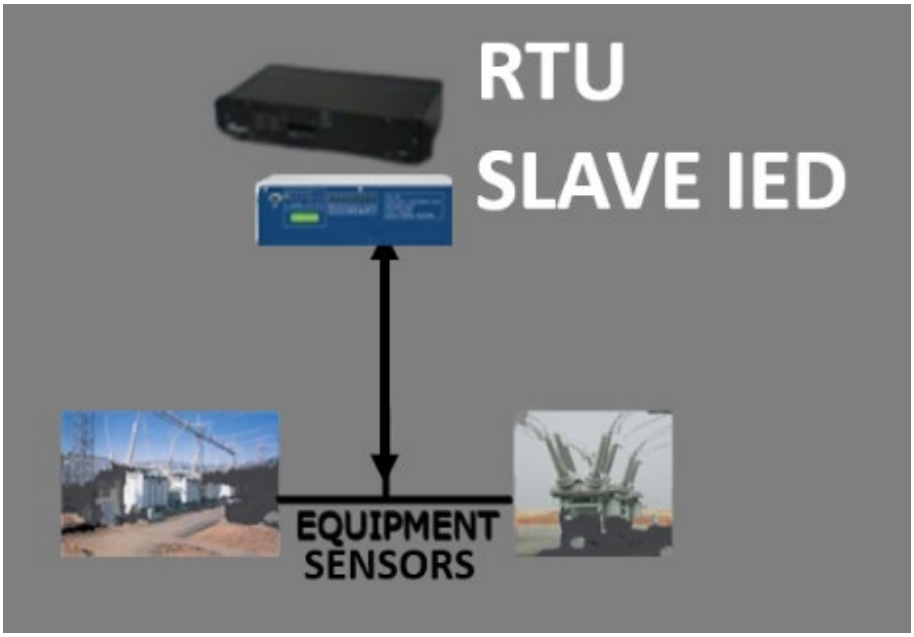
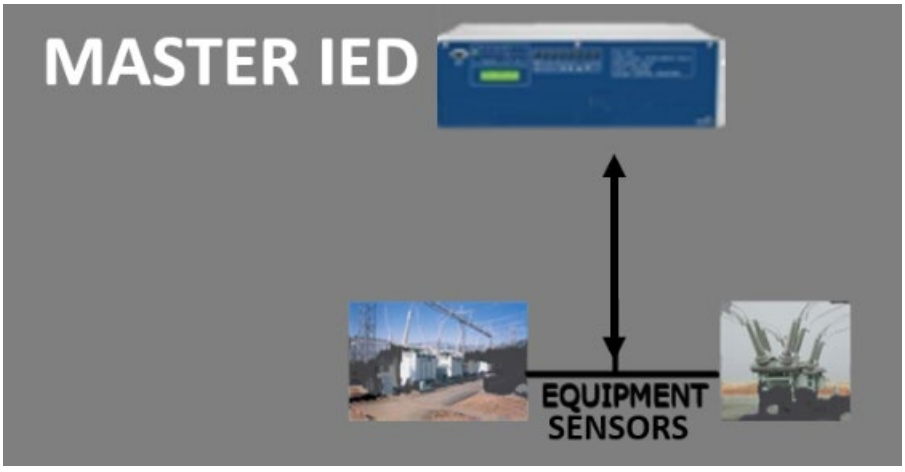
Welcome to Module 1 of the SurvalentONE SCADA System Level 1 course. This course is about:

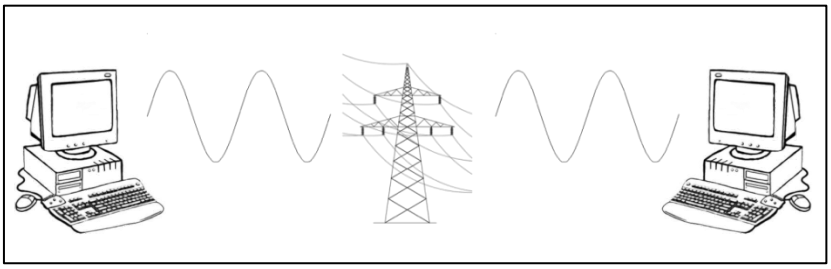
- Connecting all the elements that come between operators and devices in the field.
- Making the experience of monitoring and controlling the network intuitive for the operators.

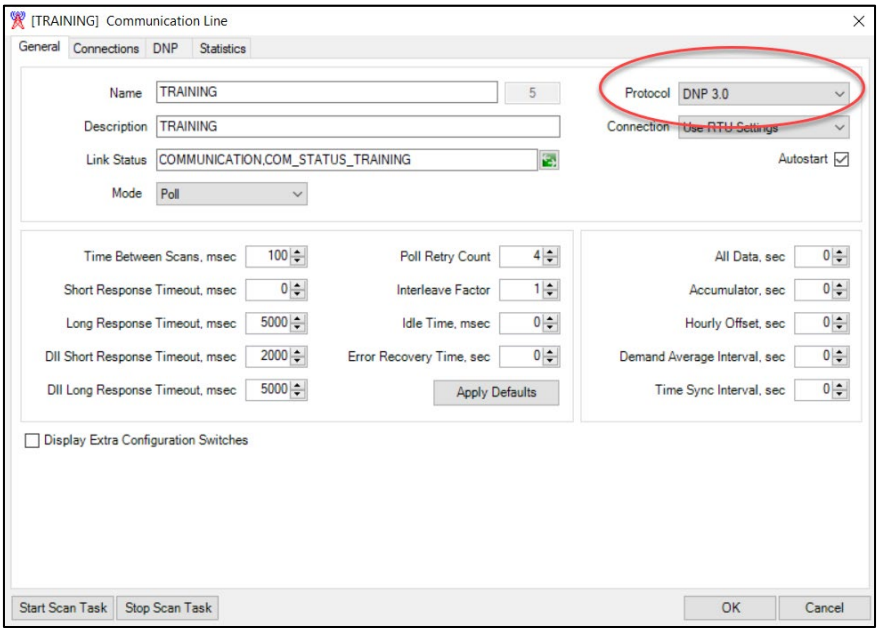
SCOPE	
We will start from the distribution and work our way to the Operations team. The Circuit Breakers in this image can automatically open if they detect fault in the current. They also can be opened or closed manually. There are a limited number of **states** for this equipment that we need to know – often it's just Open or Closed. We refer to equipment with a limited number of **states** as having sensors that are **Status Points.** Another term is **Digital Points** because the Open and Closed are often converted to the digits **0 and 1.**	 **1. Circuit Breakers Provide Status Points**

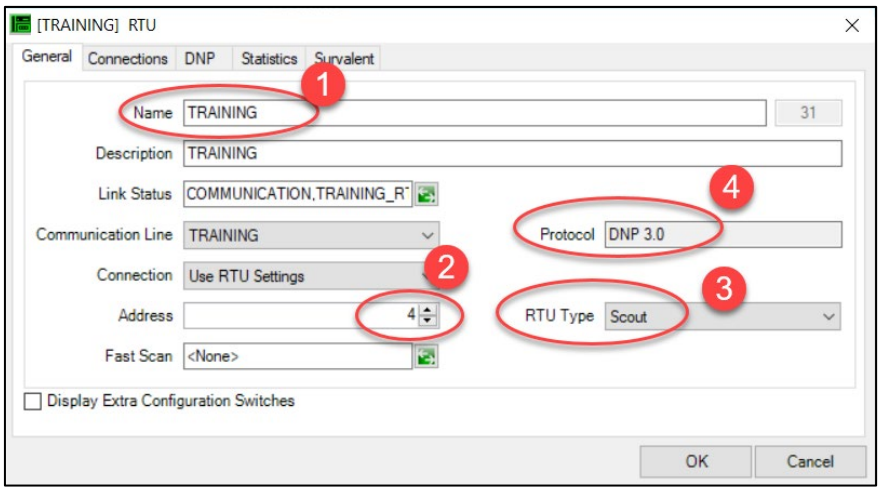
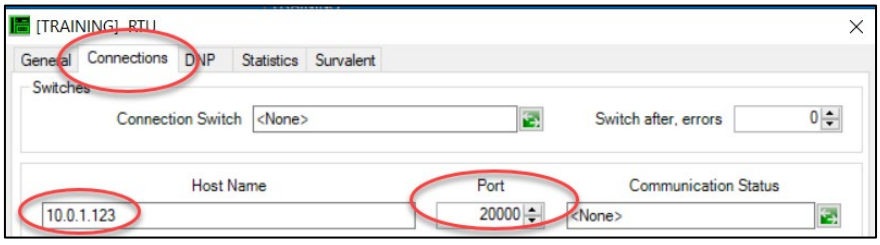
SCOPE	
Other monitored points in system are referred to as **Analog Points**. This is because they are calibrated to be **analogous** to number values. For example, high current or voltage would be given higher number values and low current or voltage would be represented by lower proportional numbers. These are not like the 0 and 1 digits assigned to Status (aka Digital Points). These numbers can range from negative to positive and have many decimal places.	**20 VOLTS is 2 times higher than 10 VOLTS.** **The difference between the voltage is *ANALAGOUS* to the difference between the numbers 10 and 20.** **Therefore, sensors measuring values such as 1500 V are known as *ANALOG POINTS*.**

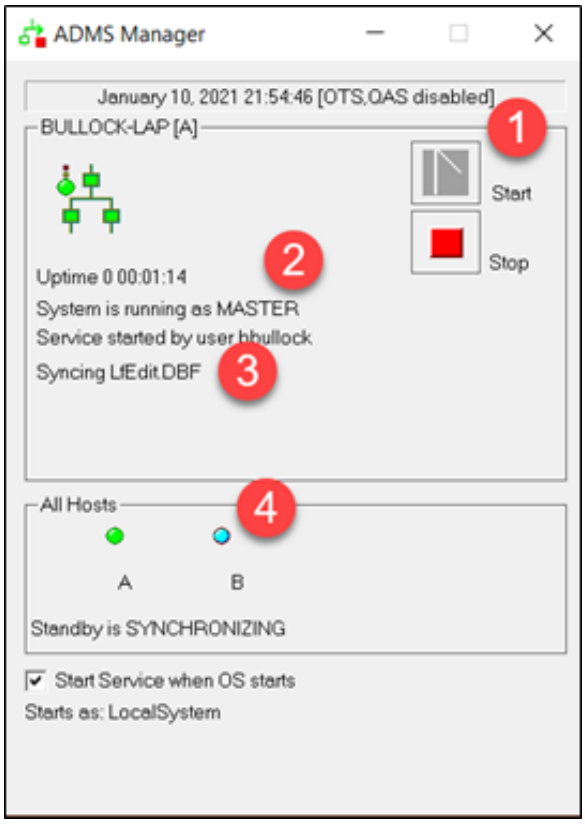
SCOPE	
Digital and Analog points can be manually addressed and adjusted. However, instead of walking up to equipment, a REMOTE TERMINAL DEVICE (RTU) can be used to remotely address these points. This RTU is in a Substation location. It's connected to equipment as well as a computer that is used to set up the RTU.	 **2. RTU and RTU Software**
We have been describing a model where an RTU is connecting to field equipment.	 **3. RTU and Equipment**

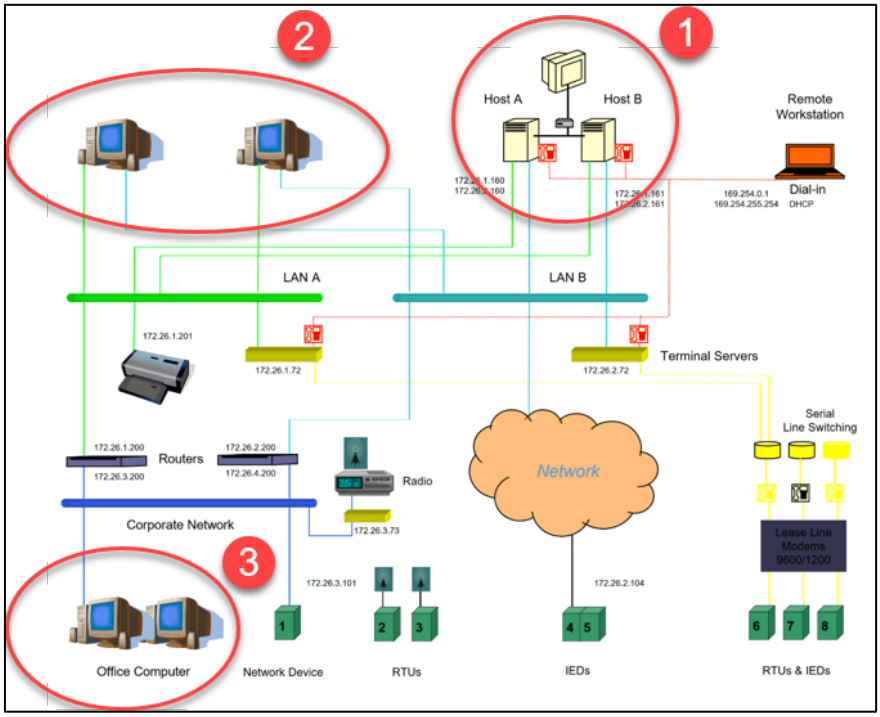
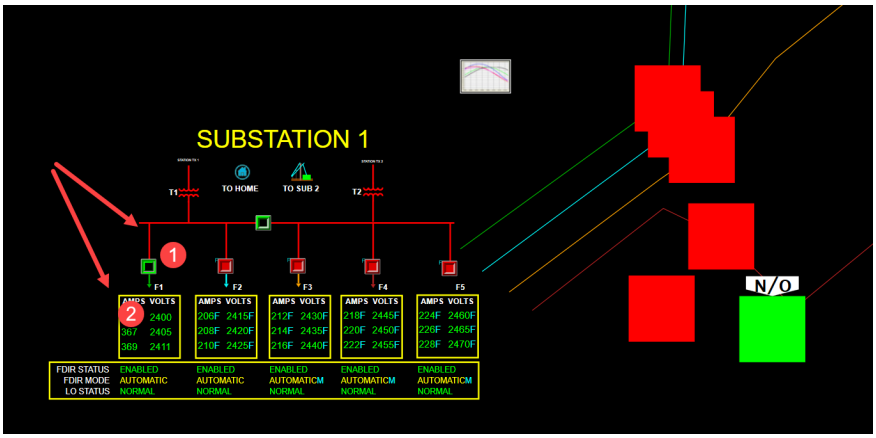
SCOPE	
Before going further, please note that devices called IEDs (Intelligent End Devices) can also connect to RTUs. IEDs offer additional monitoring, protection, and reporting. Frequently the term Relay is associated with how IEDs move information. When an IED is not working independently, it is called a Slave IED.	 **4. RTU and Slave IED**
Since an IED can function on its own without an RTU, they can also be set up as a Master IED. Think of the Master IED as a combination of RTU and Slave IED.	 **5. Master IED with no RTU**

SCOPE	
To connect to the Survalent software, our configuration so far (computer on the left) would have to be able to communicate with a Survalent server (computer on the right). This is true whether our setup on the left is: • RTU only • RTU with Slave IED • Master IED only The communication occurs over Communication lines represented by the wavy lines. The wavy lines could possibly be misleading because they suggest wires and today's communications could be wireless. Possibilities include: • Phone/Cable company wirelines • Fibre Optics • Radio • Microwave	 **6. Communication Line**

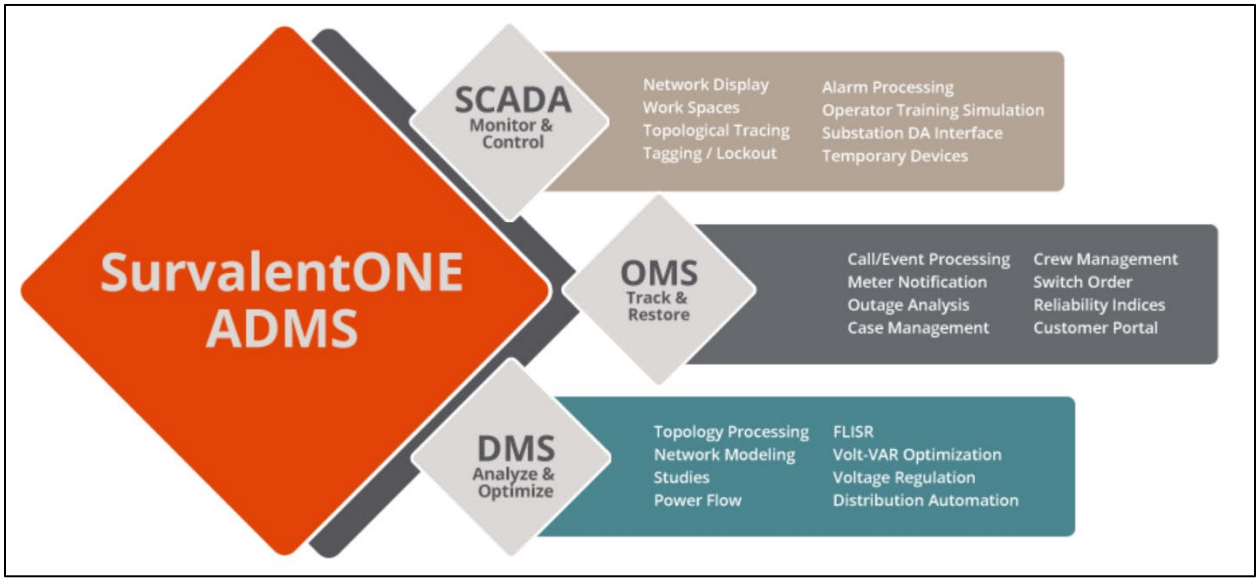
SCOPE	
Now, we can begin discussing Survalent software. For an RTU to communicate with the Survalent Server (aka SCADA Master), the Communication Line must be able to translate between the RTU and the Survalent Server. Survalent Client software – called SCADA Explorer - is required to set up the compatibility. The image to the right shows a set up that would allow our RTU to communicate with the Survalent SCADA Master. We will go into this deeper but for now, note that a protocol has been set. This protocol will be understood by both the RTU and the server. This software can be run from any computer workstation or server in the utility.	 **7. Setting Up the Communication Line Using SCADA Explorer**

SCOPE	
With communication established between the RTU and the SCADA Master, we can now use the same software to tell the SCADA Master all about the RTU. In the first image, we: 1. Named the RTU. 2. Gave it an address to distinguish it from other RTUs that may get attached to our Communication Line. 3. Identified the type of RTU. 4. Once again show the protocol it must be using since the Communication Line was set up using this protocol.	 **8. General Settings for RTU**
In the Connections tab, we enter the Hostname/ IP address of the RTU and the Port number of 20000 is used for DNP.	 **9. RTU Connection Tab**

SCOPE	
With the Communication line in place and the RTU set up, we continue up the path to the Survalent Server (aka SCADA Master). The software we used to enter data about the network was SCADA Explorer. The Software we use to control the service is ADMS Manager. ADMS = Advanced Distribution Management System. Image 10 shows: 1. Stop/Start Button. 2. The system is running. 3. The system is currently synching up to a back-up server. 4. There are 2 servers in this set up. The most common configurations are: • Single Server. • Dual Redundant (shown here). • Quad Redundant.	 **10. ADMS Manager**

SCOPE	
The good news about this image is that there is nothing to memorize as each company network has its own nuances. This is just to show that the information on the SCADA Servers (1) must now be able to reach computers in Control Rooms (2) and/or in other office computers (3).	 **11. Sample Company LAN - Do Not Memorize**
Some users will be using SCADA Explorer. Many others will be using the SmartVU (VU stands for Visual Utility) application to see and control the network visually. The three main applications in this course will be ADMS Manager, SCADA Explorer, and SmartVU.	 **12. SmartVU**

ADMS Manager, SCADA Explorer, and SmartVU are also foundational for more advanced Survalent applications.



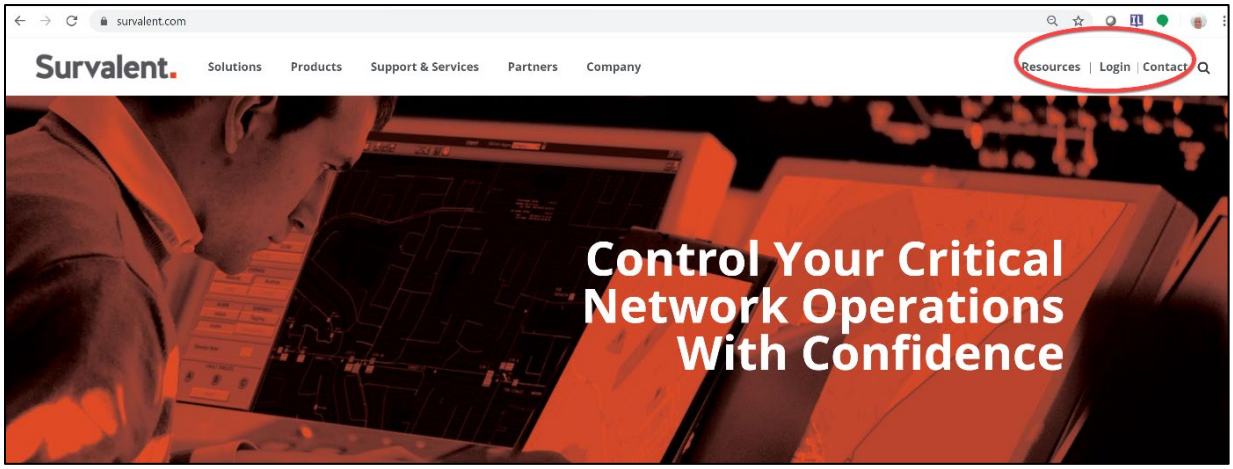
13. Complete ADMS Solution

The complete SurvalentONE ADMS (Advanced Distribution Management System) solution starts off with these three SCADA applications. Once the SCADA software is commissioned, clients may wish to enhance their ability to **Track and Restore** with **OMS** or **Analyze and Optimize** with **DMS**.

The software we will be using over this course, then, is the foundation for a utility's SCADA network and Survalent's ADMS suite of software.

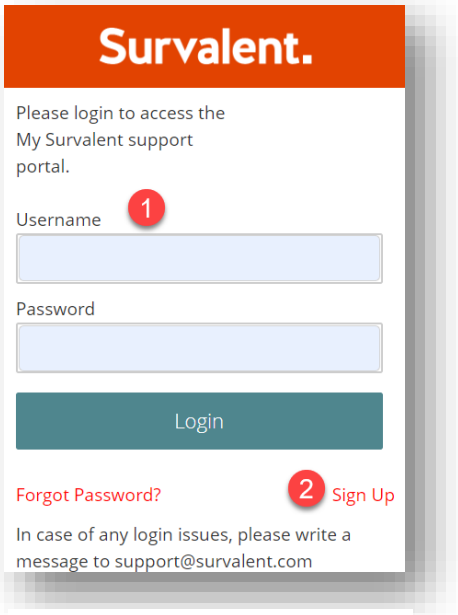
Installation – Getting Started

Survalent software can be located at www.survalent.com. A login is required. Access to this portal requires a valid maintenance agreement. If you are unsure, please contact your Account Executive or Support at support@survalent.com for more information.



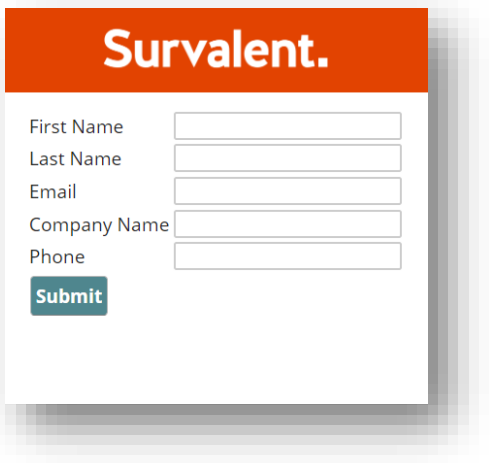
14. Survalent Site

At the login screen, you must provide (1) a valid username and password.

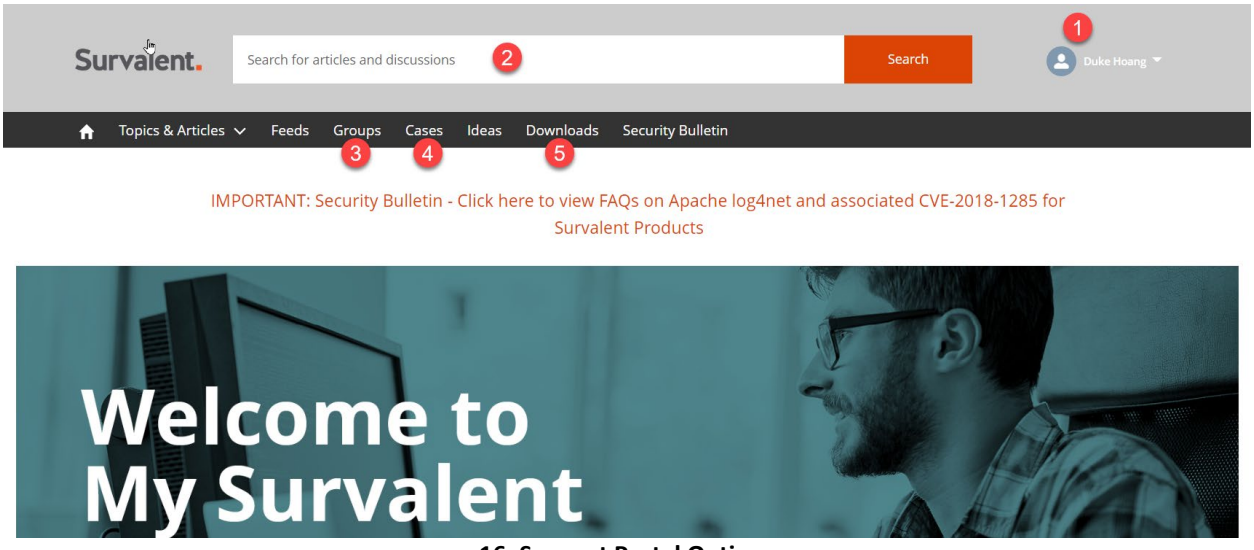


15. Logging In or Signing Up

(2) To sign up, please use a domain from your utility company. Your address will be submitted to your utility for approval.



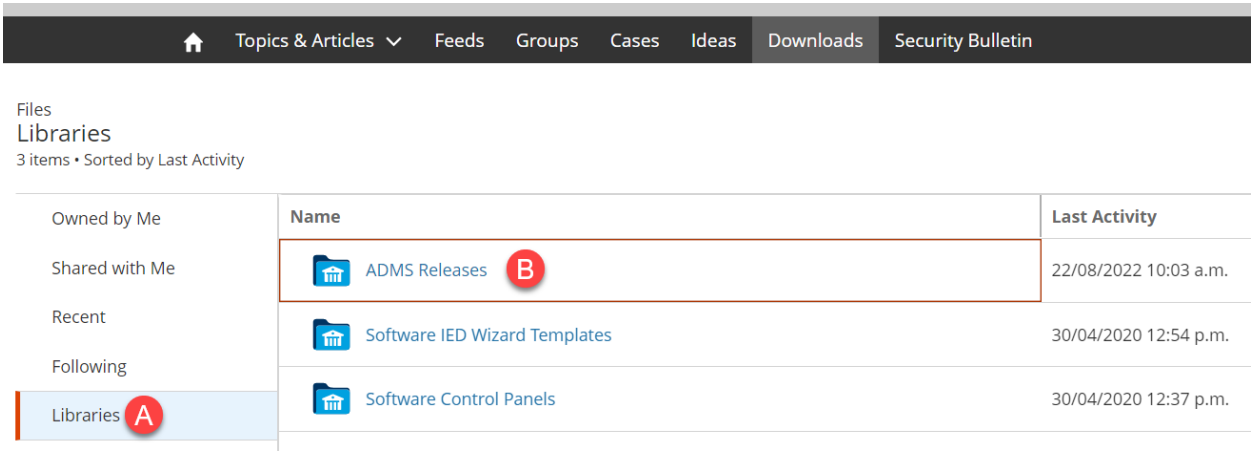
Once you can access the My Survalent Support Portal, there are many options.



16. Support Portal Options

The 5 listed above are:

1. User Profile Preference
2. Search bar
3. Group discussions
4. Opening Cases with our support team.
5. Available software downloads. After clicking Downloads, select (A) Libraries and then (B) ADMS Releases.

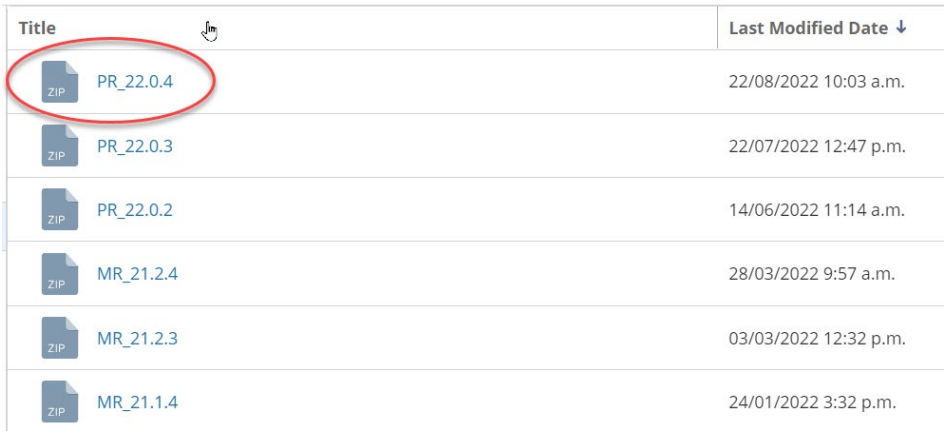


17. Libraries

The compressed folders shown below are prefaced with a PR or an MR:

- A PR is a Product Release. These are typically released once a year and have many new features. A PR also contains a year number. For example, PR 22.X was released in 2022.

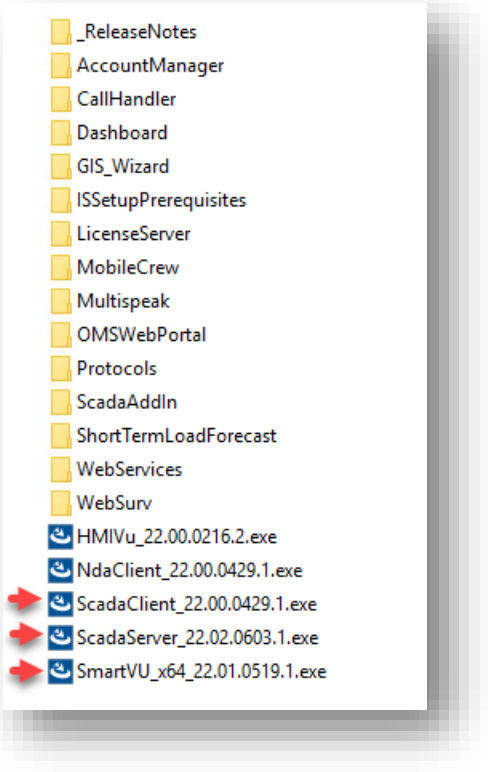
- An MR is a Maintenance Release. These are released several times in a year. They feature minor enhancements to the PR. **MRs are complete installation packages containing all the new features introduced in the PR.** Therefore, MR 22.X will have some enhancements to PR 22.X and the MR 22.X installation package will contain the many feature enhancements released in PR 22.X.



18. Software Versions

If more than 1 Maintenance Release (MR) is released during the year, the later version would be the one with the higher numbers in the subsequent decimal fields.

Upon downloading and extracting the software, we notice that software for the complete SurvalentONE solution is included in the download. The reason for this is to promote the importance of all software being upgraded or installed together. We can only install and operate the software that we are licensed to operate.



19. All ADMS Software

The executable installation files for the 3 applications in this course are identified in Image 19.

- ScadaServer_Setup will install ADMS Manager.
- ScadaClient_Setup will install SCADA Explorer (aka The Client).
- SmartVU_Setup will install SmartVU.

Installing ADMS Manager

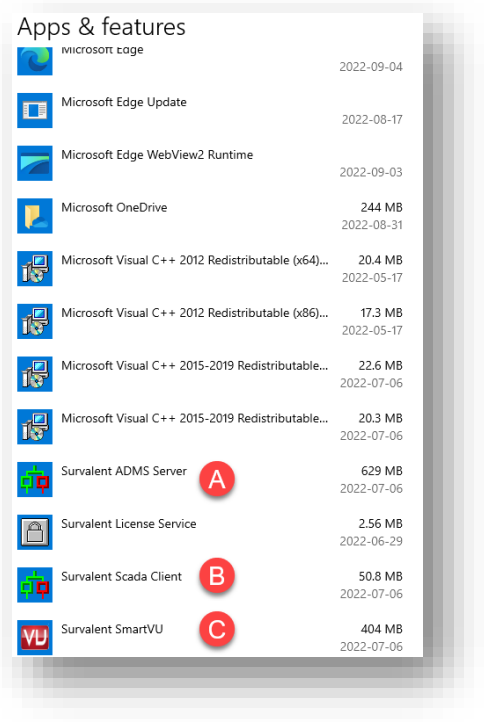
Of the 3 executables, scadaserver.exe which installs ADMS Manager is installed first. The SCADA Master

is the main and central element in the system communicating with both internal network and external distribution components. The illustration below describes the flow of communication and data from a point in the field to the end user (the operator).

Point in Field => RTU => Communication Line => **SCADA Master** => Internal Network => SmartVU=>Operator (SmartVU)

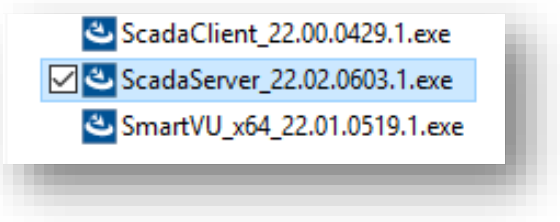
We will now install ADMS Manager on a single SCADA Master System. Instructions for systems with more than one SCADA Master are included at the end of the module.

If Survalent software is already installed, it is recommended that you uninstall the 3 main applications ((A) ADMS Manager, (B) SCADA Explorer, (C) SmartVU)



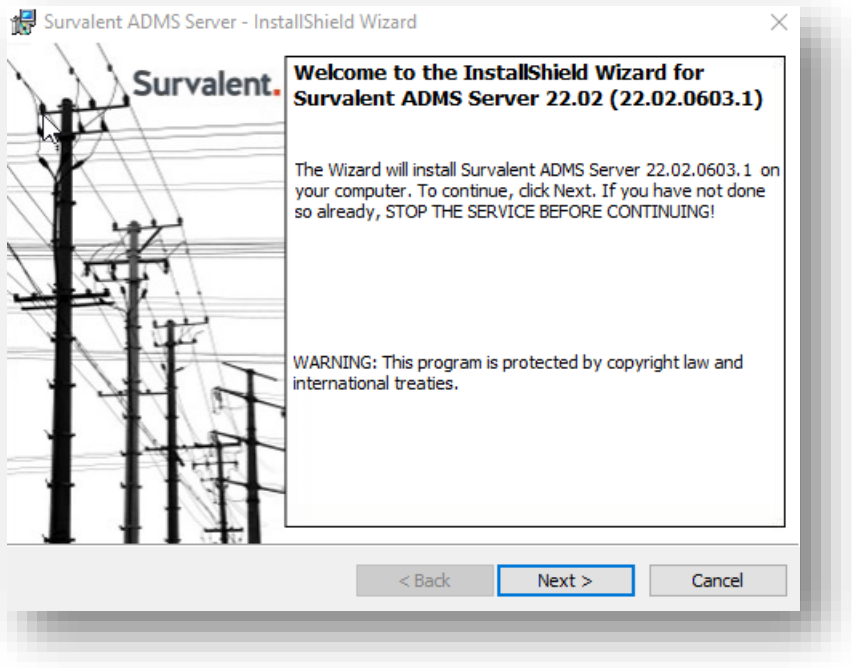
20. Uninstall the 3 Applications First

Start installing the software by double-clicking the ScadaServer Setup file.



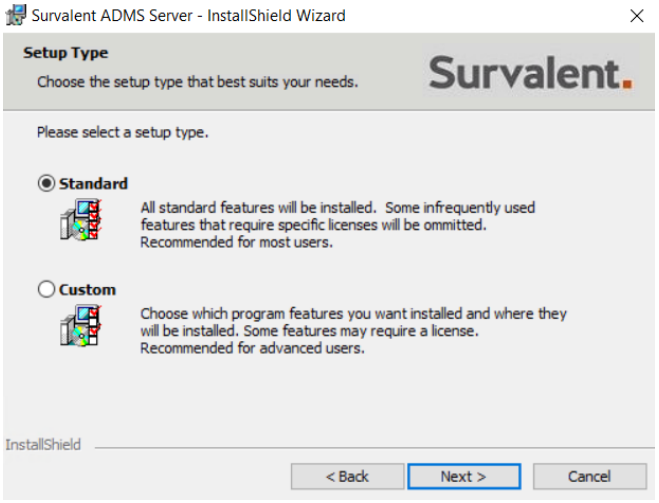
21. Executing SCADA Server Setup

the installation shield appears and advises us to stop the service before proceeding. If we uninstalled the software, we won't have to worry about this step. If we did not uninstall the software, we will have to stop ADMS Manager.



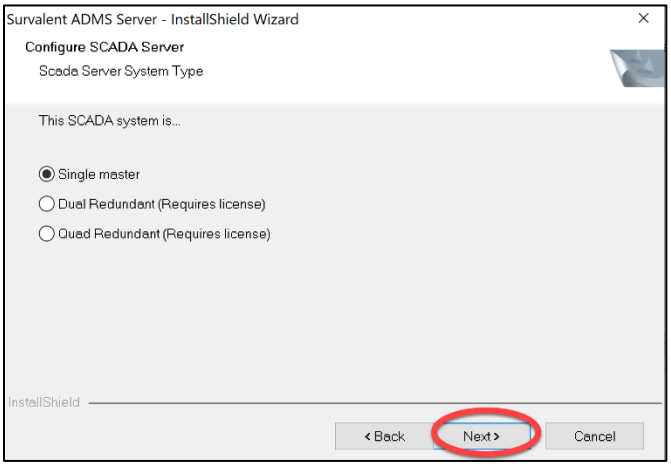
22. Installation Shield for Server

As we move through the typical installation options, we will come across the option to install Standard or Custom components. The Standard option will install all necessary components for your ADMS Server to function. Custom components include advanced features such as PDS (Project Development System), OTS (Operator Training System) and more. Select Standard to proceed with the installation.



23. Standard vs Custom

Next, notice the option of how your servers are configured. To start, please select Single Master.



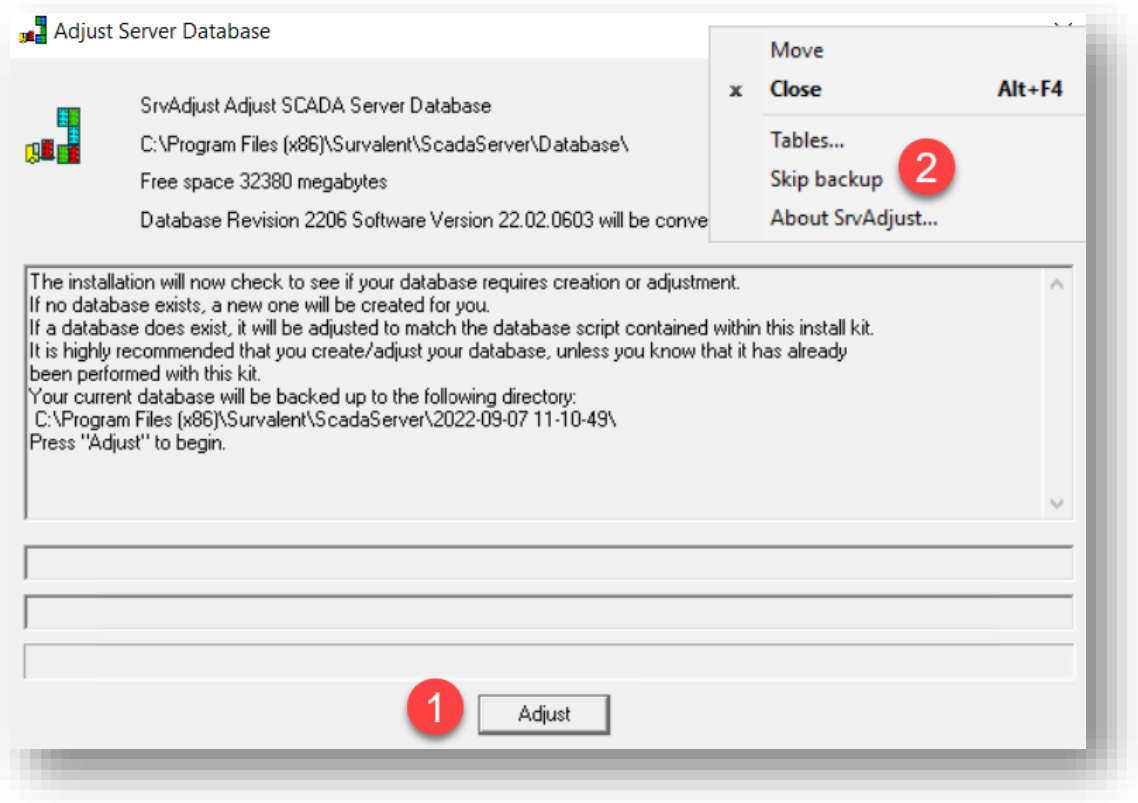
24. Single vs Multiple Servers

The next screen will be the Adjust Server routine, which does the following:

- It looks for an existing database.
- If a database does not exist, it will create one with minimal elements such as a default user so that we can get started building your database.

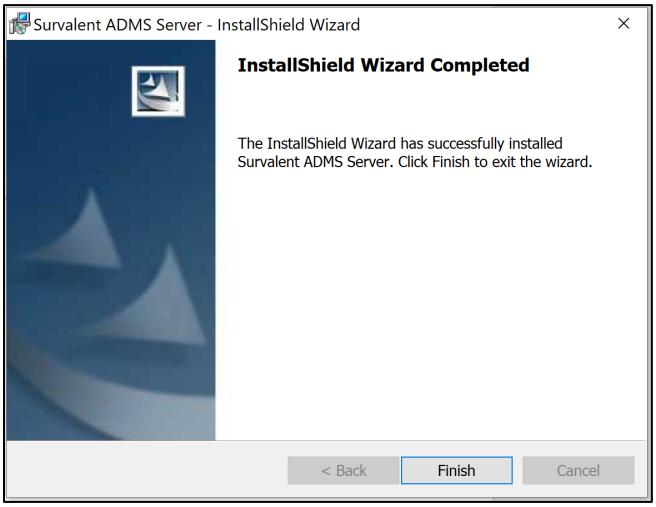
- If a database does exist, it checks to see if it is compatible with the new software and, if not, it will make the necessary adjustments.
- If a database does exist, it will back it up while making the checks mentioned in the previous point. Note: In time, if we are confident that we have a recent back-up, we can right-click the title bar and select Skip BackUp (2), otherwise continue by clicking the (1) Adjust button.

This routine runs automatically when we install new Survalent software. It can also be run manually and should be run anytime a new combination of database and software are configured. This does not include making changes using SCADA Explorer.



25. Adjust Server

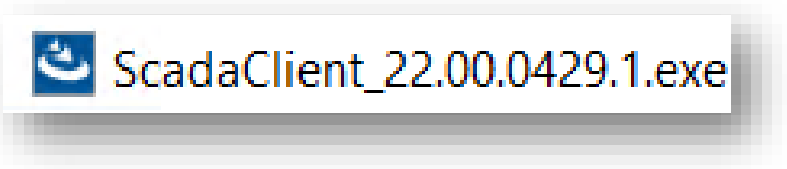
After the adjustment, the installation of ADMS Manager is complete.



26. ADMS Manager Installation Completed

Installing SCADA Explorer

Next, double-click the ScadaClient executable which will install SCADA Explorer.

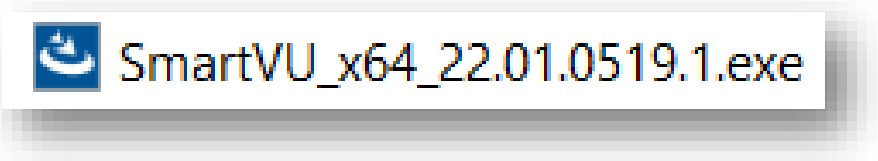


27. Client Executable

Please accept all the default options until the installation is completed.

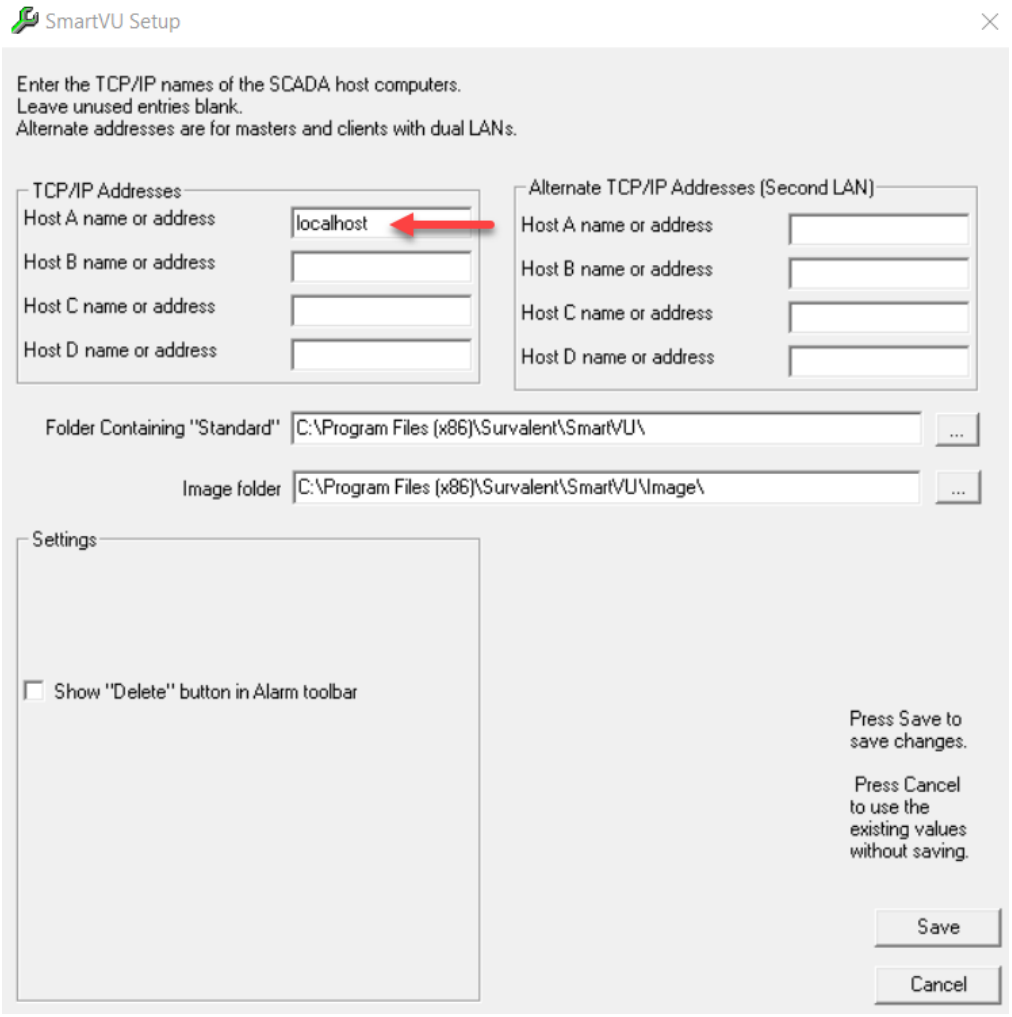
Installing SmartVU

The third software to be installed is SmartVU. Please double-click its executable.



28. SmartVU Executable

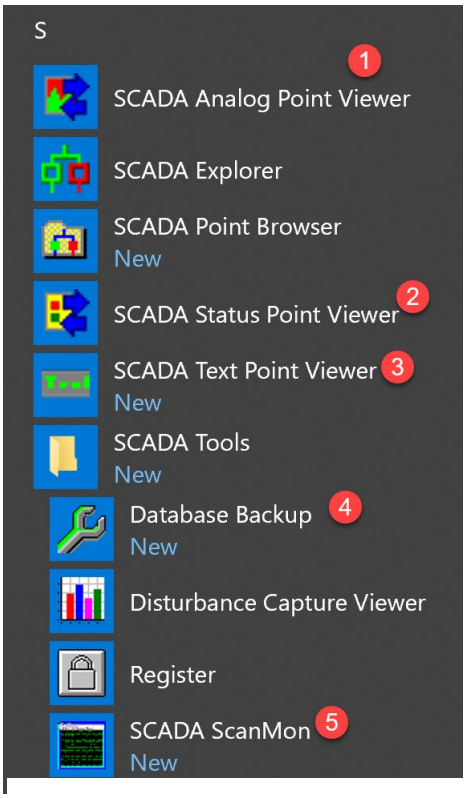
SmartVU and SCADA Explorer connect to the ADMS Manager. Use the boxes shown to enter in the TCP/IP addresses or names of the server or servers should your utility have more than one.



29. Enter Server Address

Additional Programs We Will be Using

After installing the 3 applications, we will notice other programs in the Survalent folder. We will be using some of these in this course:



30. Additional Programs

1. The SCADA Analog point viewer allows us to view and perform actions on all the analog points in the system. It does not have the rich map views like SmartVU.

2. The SCADA Status point viewer provides the same functionality as the Analog point viewer but for status points.

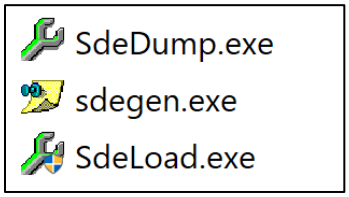
3. Some devices provide text instead of status or analog values. The SCADA text point viewer allows us to view and perform actions on all your text points.

4. Database Backup is an application that backs up the database.

5. ScanMon is a tool for testing performance.

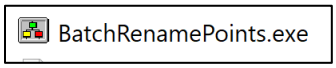
Many other tools have been installed. We will focus on three of them that can be found on the ScadaServer folder

- Before software version 21.2 - C:\Program Files (x86)\quindar\ScadaServer or
- Software version 21.2 and over - C:\Program Files (x86)\Survalent\ScadaServer



SdeDump allows us to move database points to Excel where we can edit them and use SdeLoad to put the edited points back in the system. A third tool within the ScadaServer folder – Win2Sde– is used for file conversion and validation during this process.

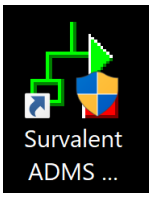
31. Dump and Load



BatchRenamePoints.exe renames multiple database points.

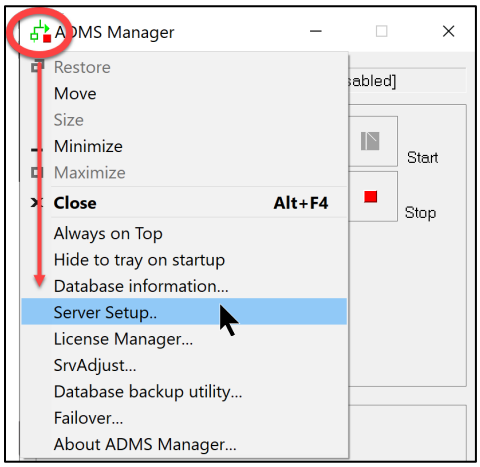
32. Batch Rename

Licensing



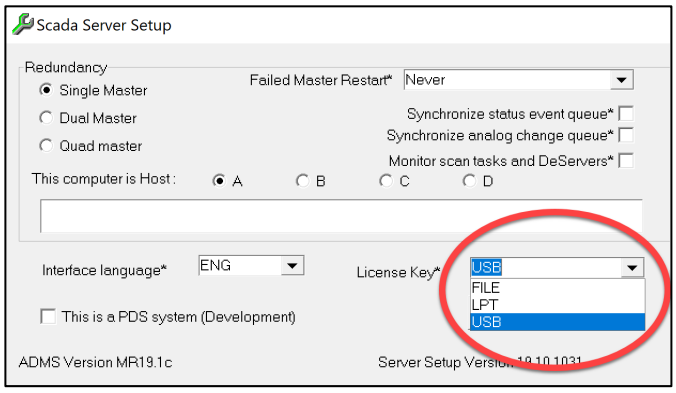
Upon installing the software, the ADMS Manager icon appears on the server desktop.

33. ADMS



Click on the icon beside the title and then select Server Setup.

34. Server Setup



Check the License Key field.

File means Survalent has installed a file with license information.

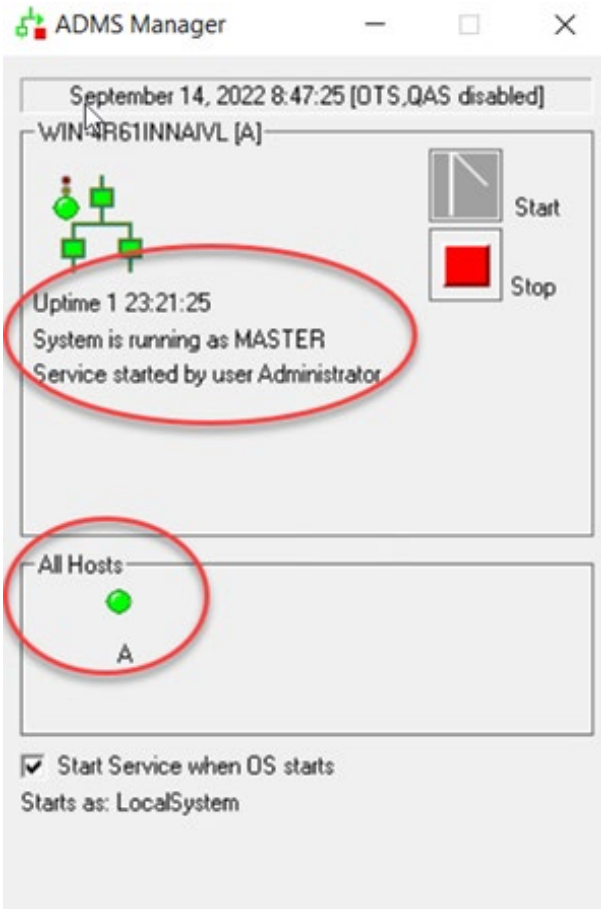
USB means Survalent has provided an external dongle with license information (see next page). LPT was used as another connection for licensing.

35. License Options

The Survalent USB dongle fits into a USB port and will display a red light to show when the driver is functioning.

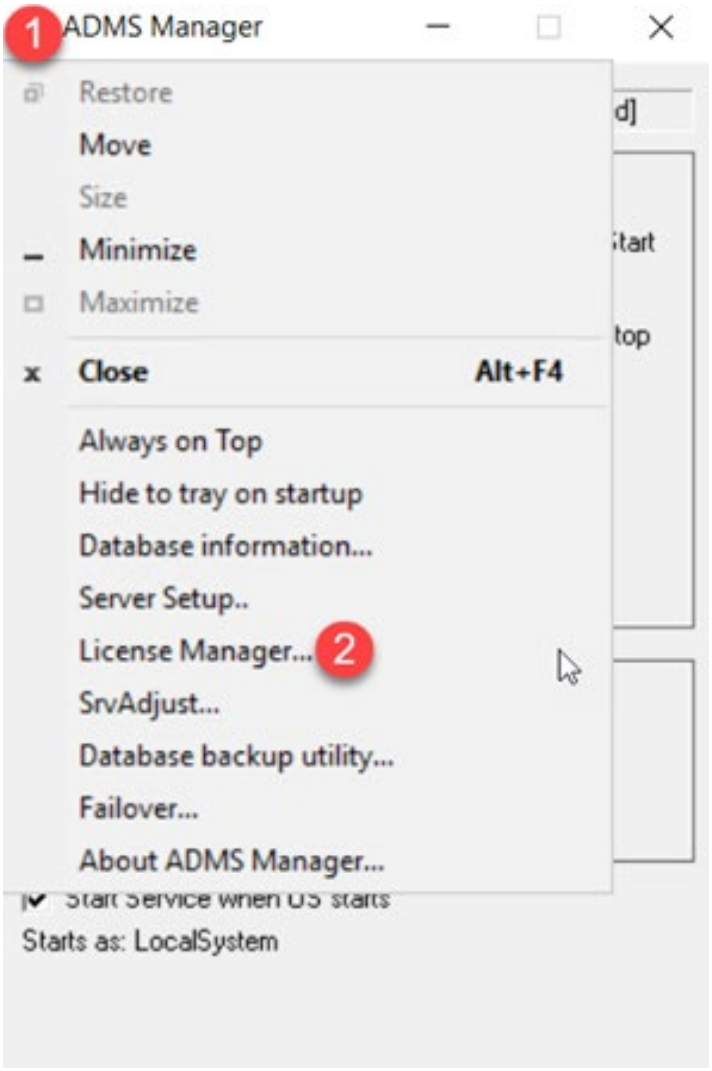
36. Dongle

Finally, image 38 also shows that the system is a Single Master and that this computer is Host A. With these settings in place, we should be able to click the Start button and start the SCADA Master as shown.



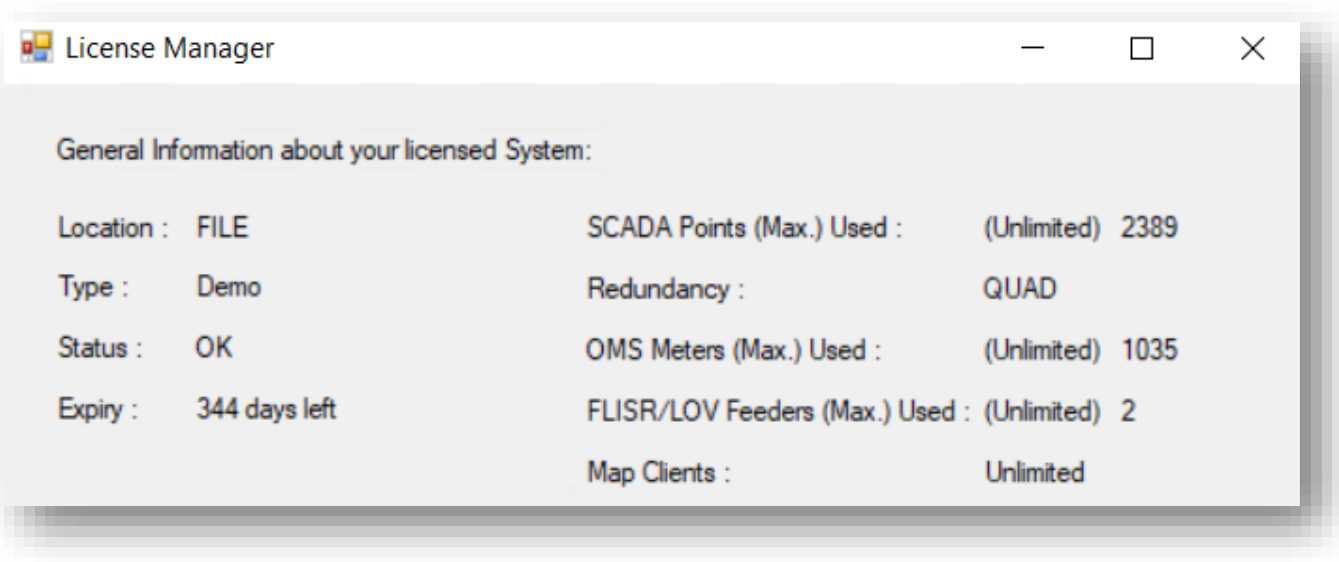
37. ADMS Running

To see what we are licensed to run, click the (1) top left corner and choose (2) License Manager as shown below.



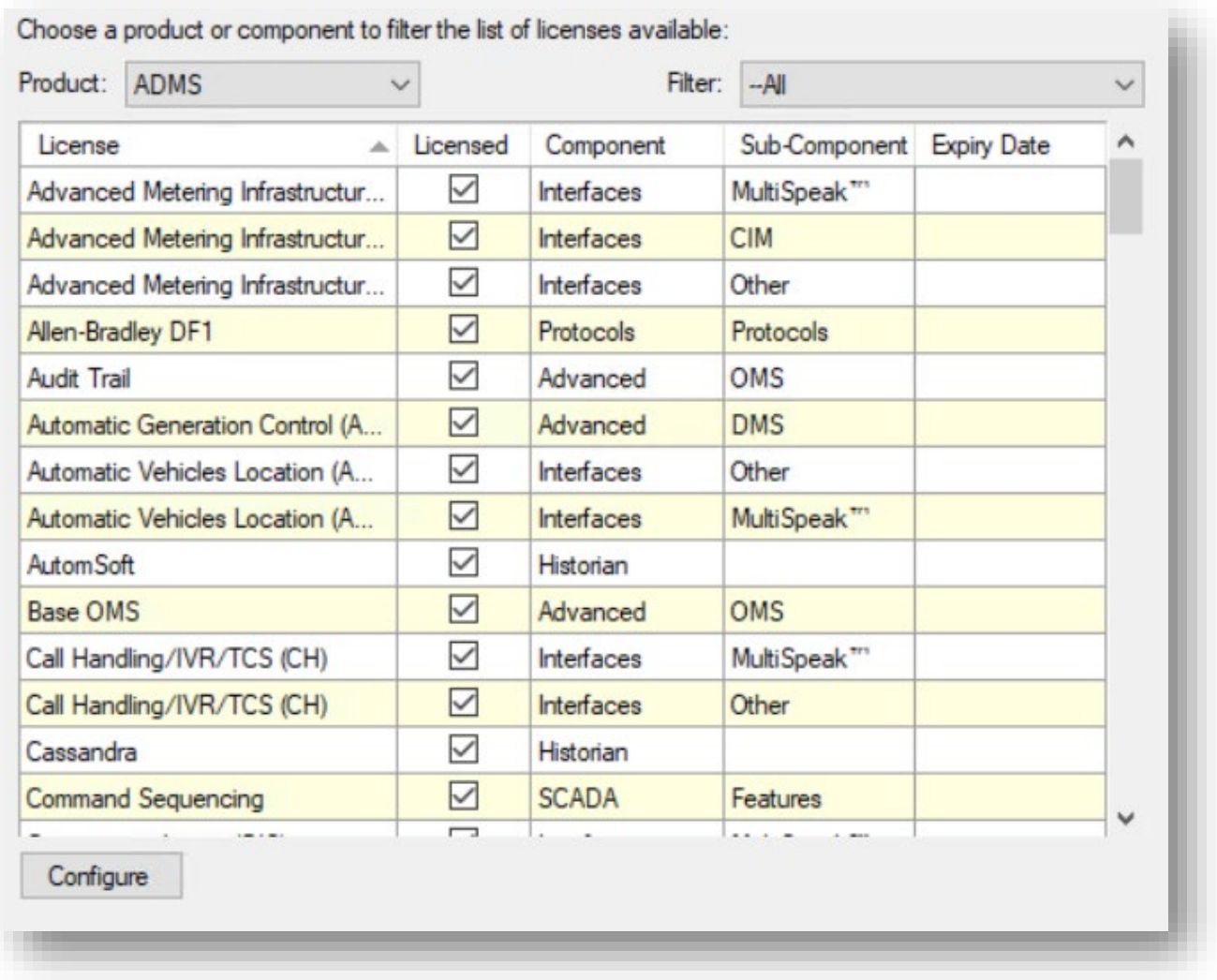
38. Accessing License Manager

The below image provides the breakdown of the status, type, expiry and SCADA points that is allotted.



39. License Information

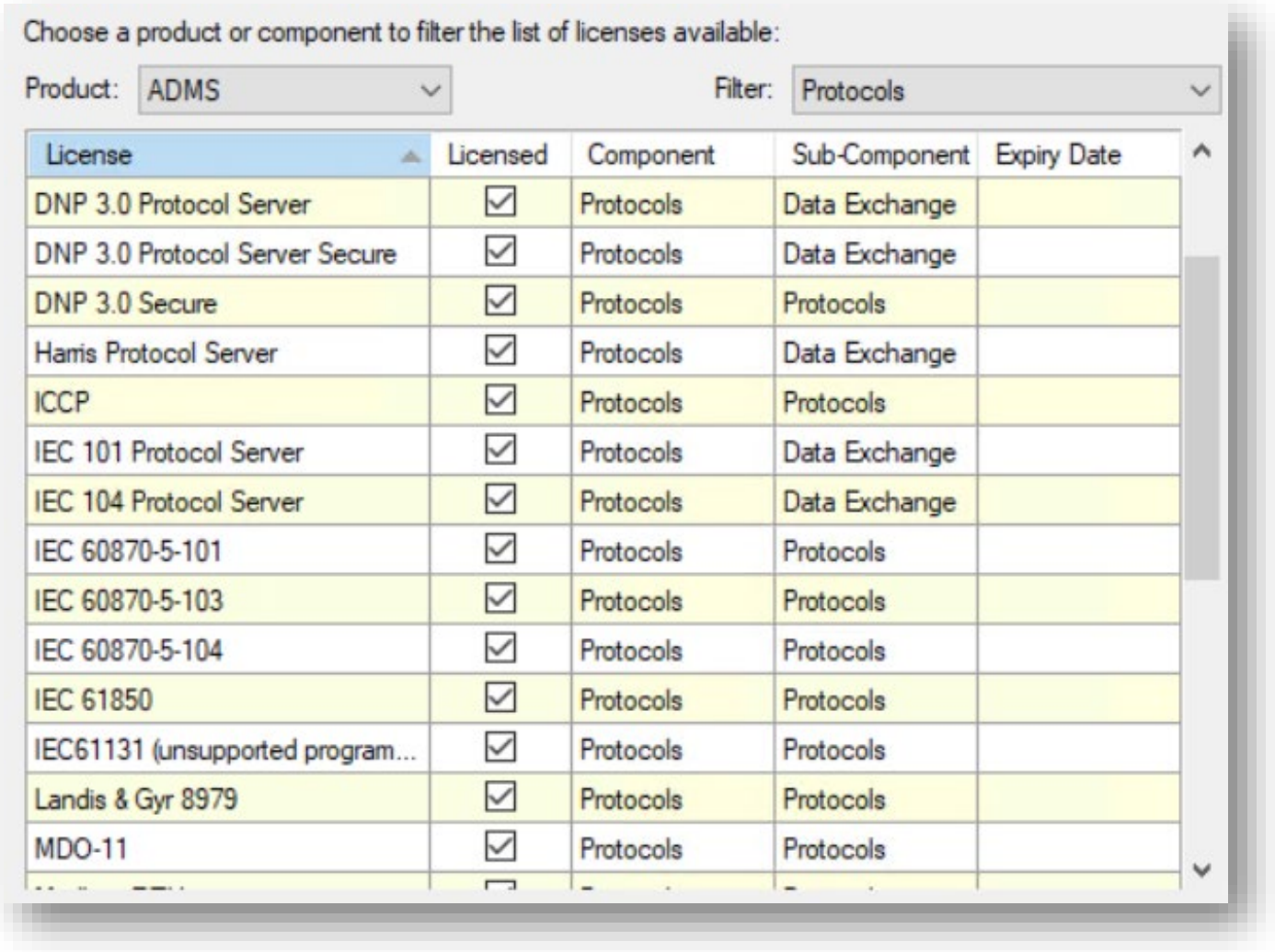
This list will provide a complete list of products and features that are licensed on your workstation.



40. License Features

Our License Manager has many navigational tools, for example clicking on the drop-down menu will allow you to filter what licenses you have at your disposal for certain aspects such as Protocols, Interfaces, and other features. For example, in the protocol section you can see all the protocols available and which protocols your system is currently licensed to use.

The protocols define what language does the equipment use to communicate with each other. Choosing DNP 3.0, Modbus, or IEC 61850 is usually dependent on where we are located. For example, DNP 3.0 is widely used in North America and IEC 61850 is widely used in Europe, Latin America, Mexico and Asia.

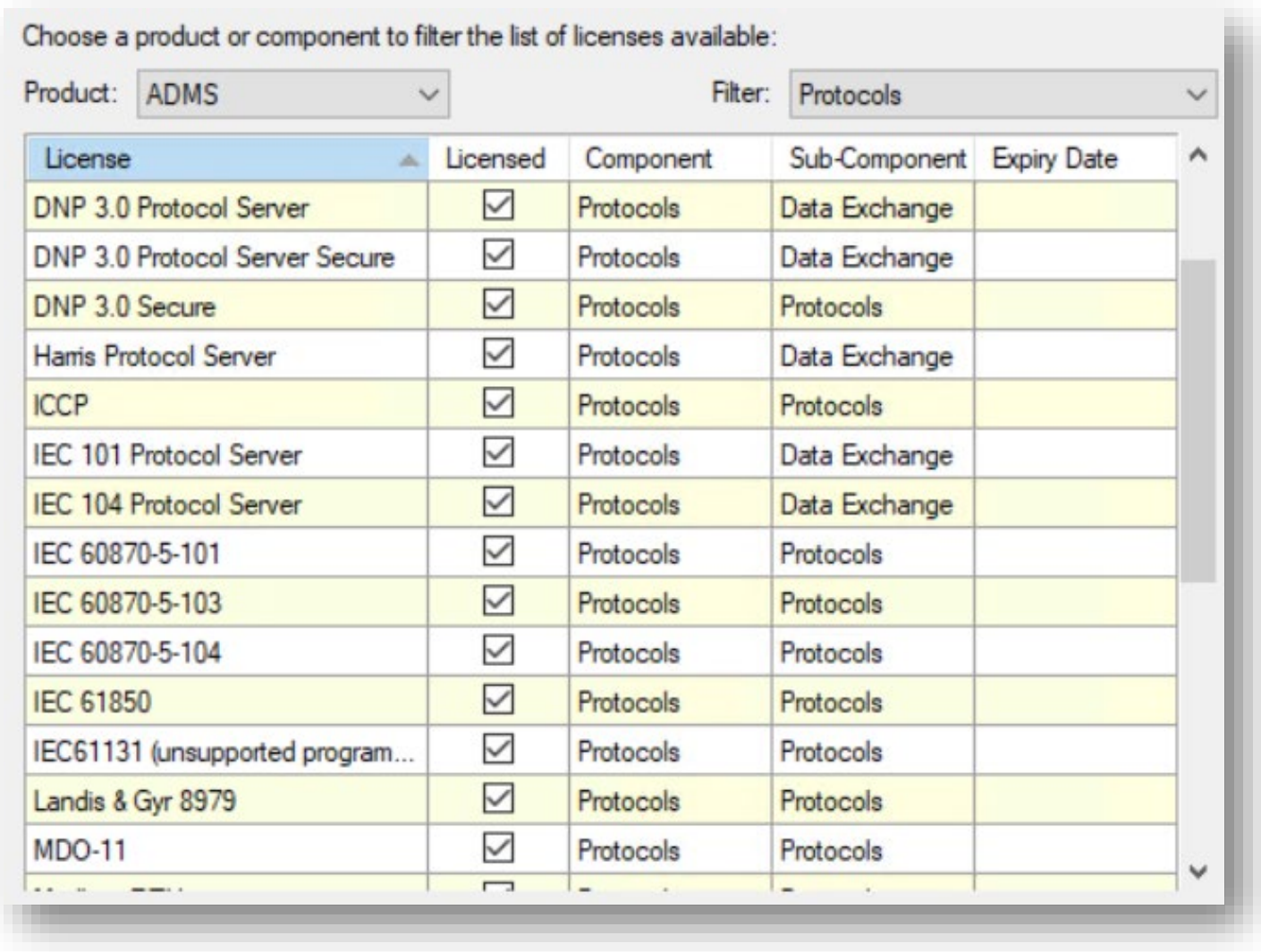


41. Protocols

In your own system, you can expect a few of the boxes to be checked. Having a few interfaces checked (licensed) makes talking to applications from other vendors possible. For example, for Survalent OMS (Outage Management System) we would want to connect to an AMI (Automatic Meter Interface) System.

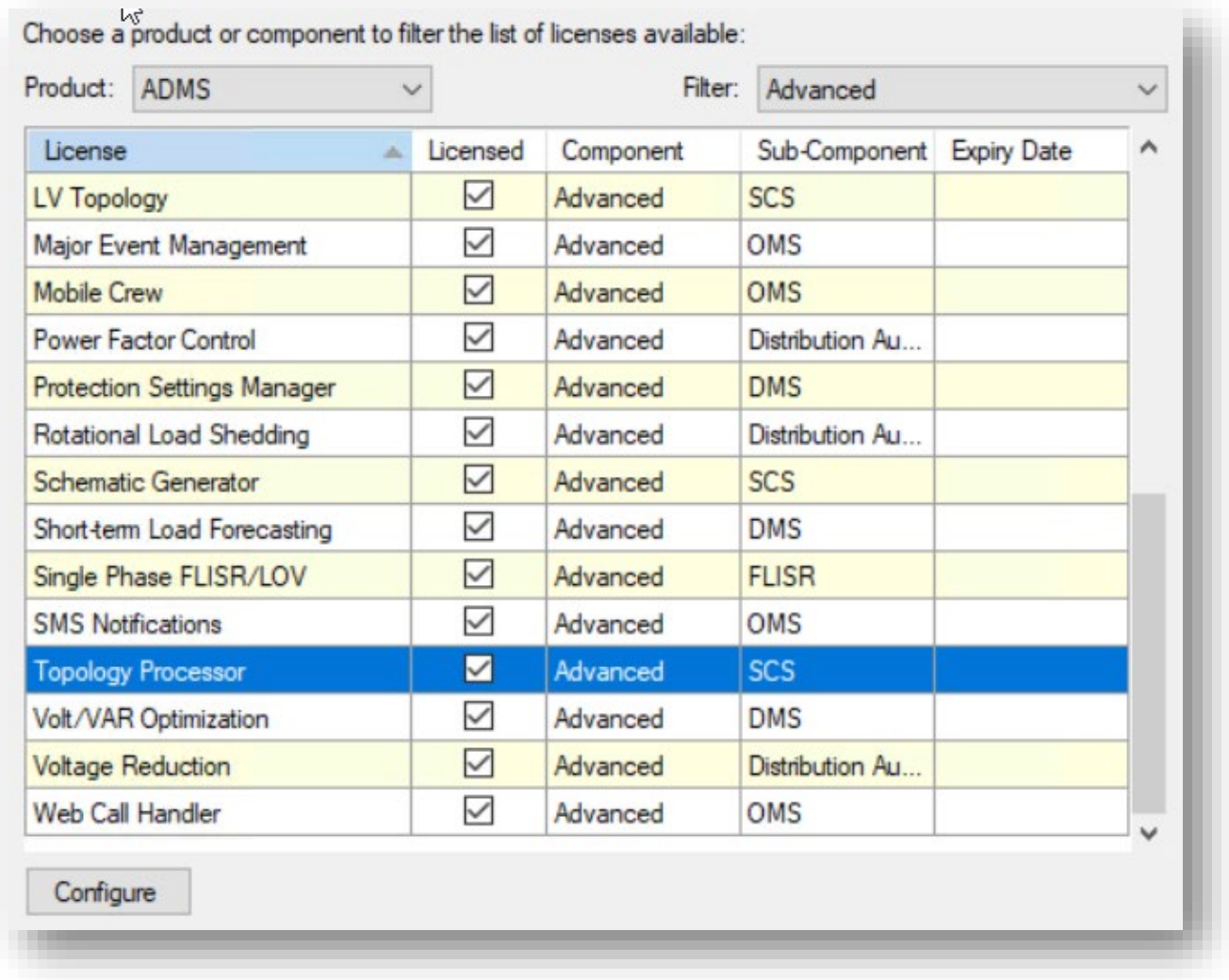
Survalent software can interface with Multispeak which is the "industry-wide standard for realizing the potential of enterprise application interoperability".

Maybe your utility needs Survalent to interface with CIM (Common Information Model) which is more prevalent outside of North America.



42. Interfaces

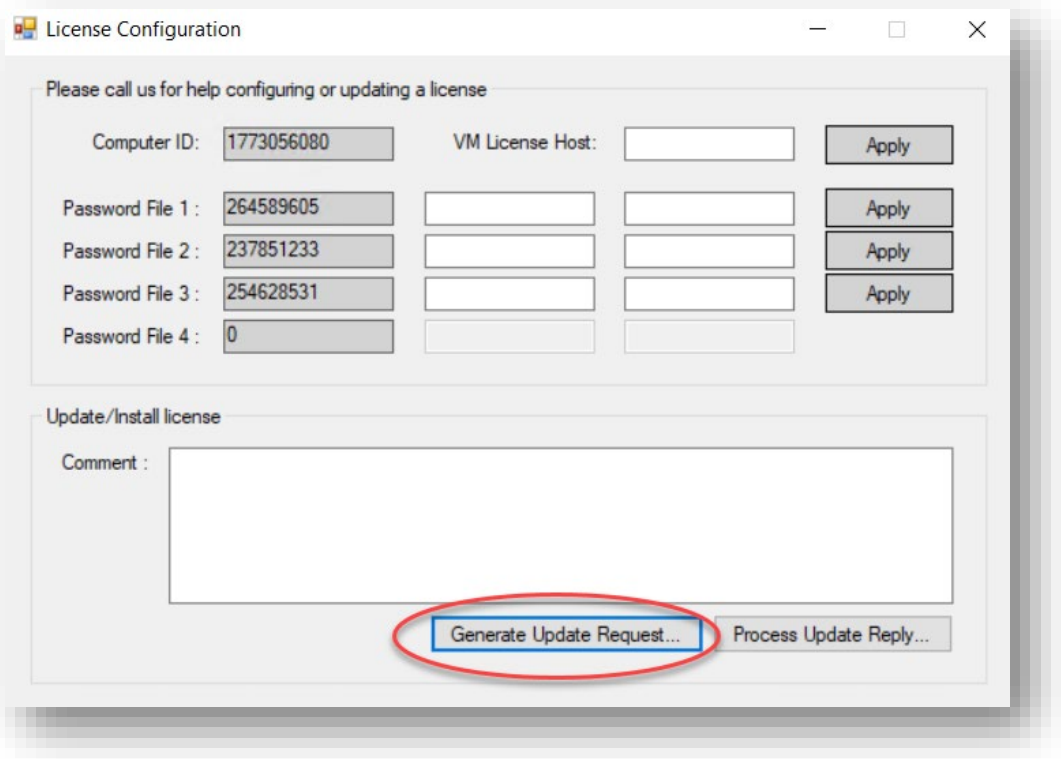
Looking at the image on the next page, the filter drop-down menu has options for the OMS and DMS products in the SurvalentONE ADMS package. Also, the Advanced filter category showcases important features like Topology Processor (dynamic maps showing energized, de-energized, paralleled flows) that are also seen in basic SCADA systems.



43. Advanced License Information

The configure button at the bottom allows Survalent to quickly update a client's USB (dongle) license or file-based license.

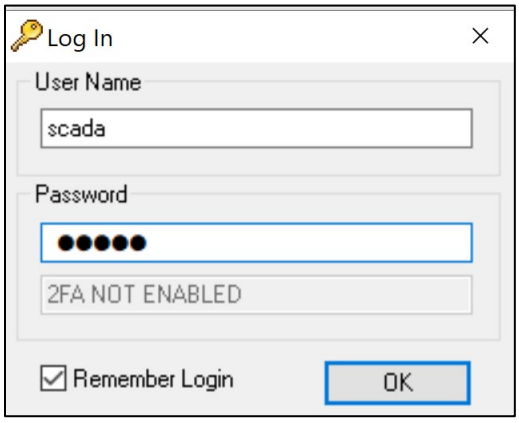
Should your system be licensed via a USB Dongle, you can click on Generate Update Request, a *.urq file will be created which can be sent to Survalent. You should reach out to Support@survalent.com for information on updating your license/services.



44. Updating a License

Licensed and Linked?

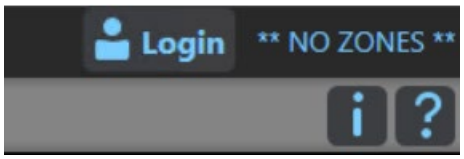
If the licensing is good and the applications are configured properly, we can now log into SCADA Explorer. If we see the same of the server at the bottom right of SCADA Explorer shaded in green, we are successfully connected and ready to go.



45. Logging in to SCADA Explorer

46. Successful Login

Once you have started SmartVU, at the top right corner, you will see the login button. Click Login and use the word 'SCADA' for the username and password fields.

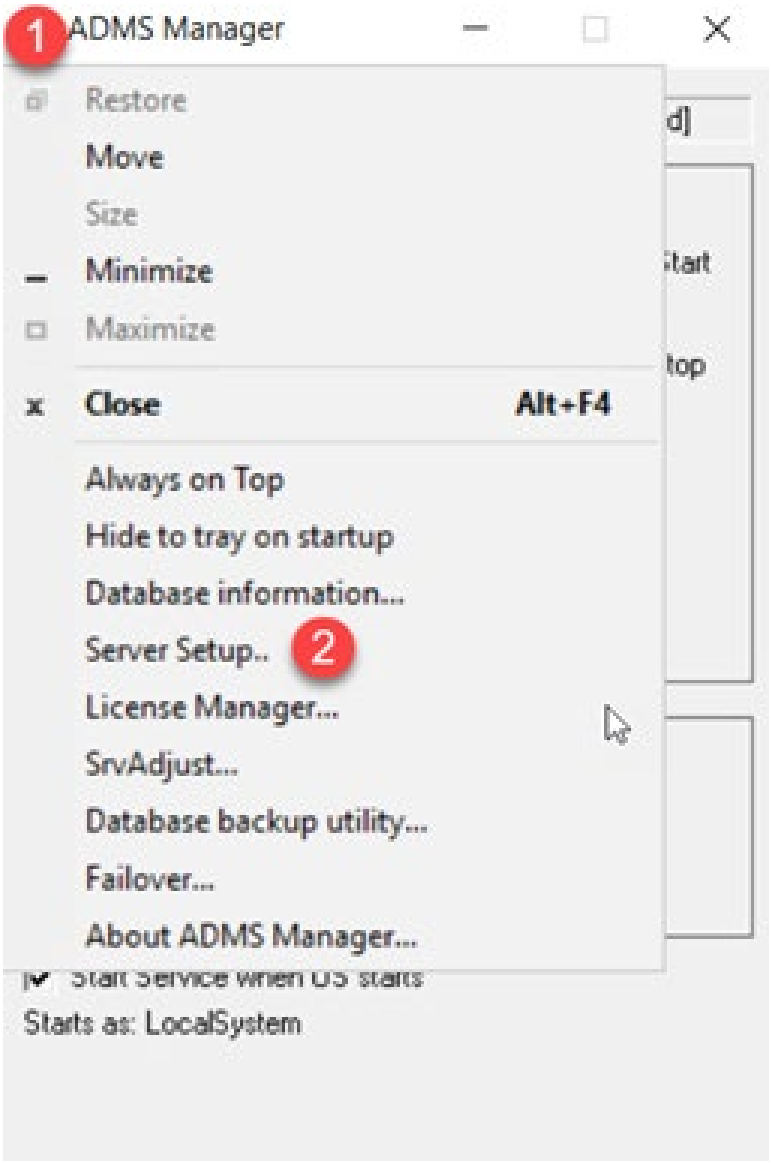


1.37 Successful Login to SmartVU

We will look at some reasons why we may not have been successful login in the next sections dealing with directory structure. When understanding directory structure, it's fundamental to understand that the database and graphics are in separate locations.

Database Directory

Let's begin by opening the (1) ADMS Manager and selecting (2) Server Setup.



47. Server Setup

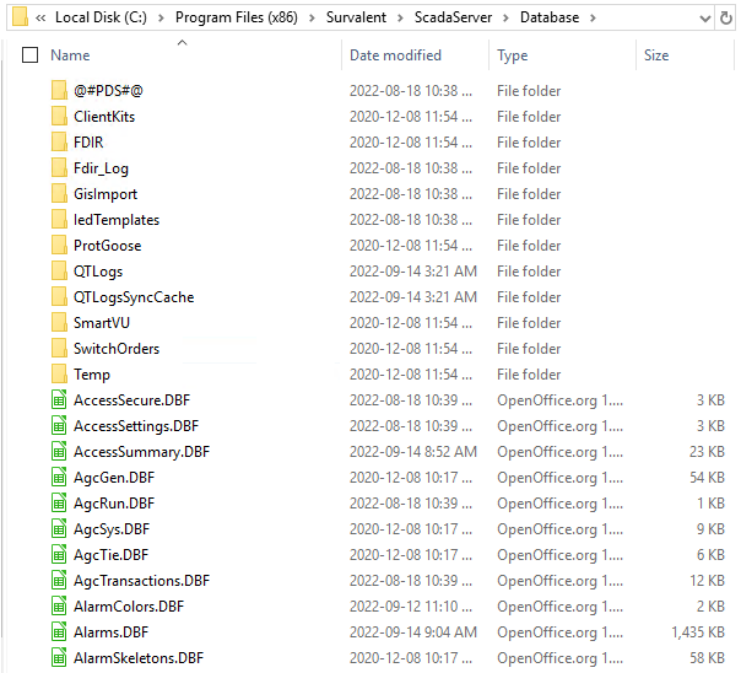
Our two-word summary for ADMS Manager is System Management. Entries in Server Setup dictate how the system will run. The path entered into the database folder must be where the database is located, or the system will fail.

We can put whatever path we want here but the default system installation is to place the database in the path below. On older systems you might see a directory path that contains a "quindar" folder as in

picture (A). Quindar was the company that became Survalent. In newer versions of Survalent's software starting with version 21.2 or higher with a fresh installation, the new directory will be listed below (B).

48. Database Path

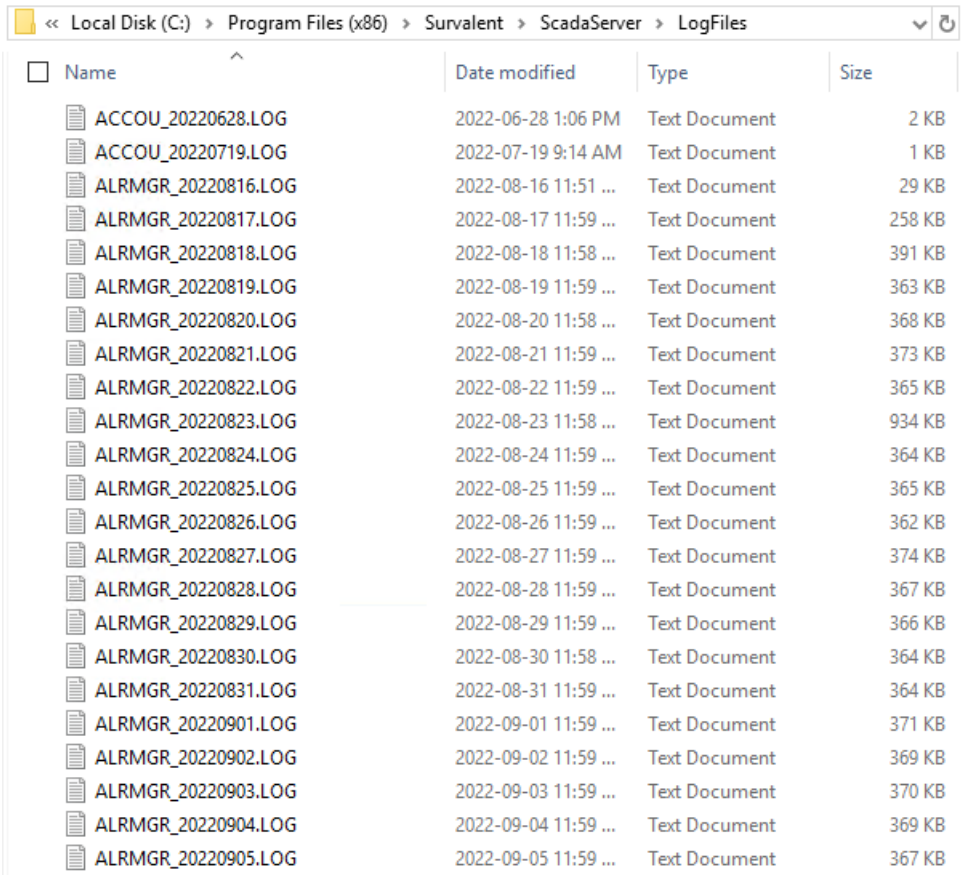
The Database folder under ScadaServer then is critical to the system running effectively. If our company is running dual or quad redundancy, we will be able to failover if something happens to the primary server; however, it is also extremely important to make additional (daily if possible) back-ups that can be stored separately (even offsite if possible).



49. DBFs and Other Folders in Database

The ScadaServer folder also contains many logfiles. The image below shows that new logs have begun. These would contain possible information essential to troubleshooting should the system fail the database process.

In this SurvalentONE SCADA System Level 1 course, we just need an awareness that they exist and that Survalent Support may request us to find them and send a copy. In the SurvalentONE SCADA System Level 2 course, we will take a closer look inside the logs.

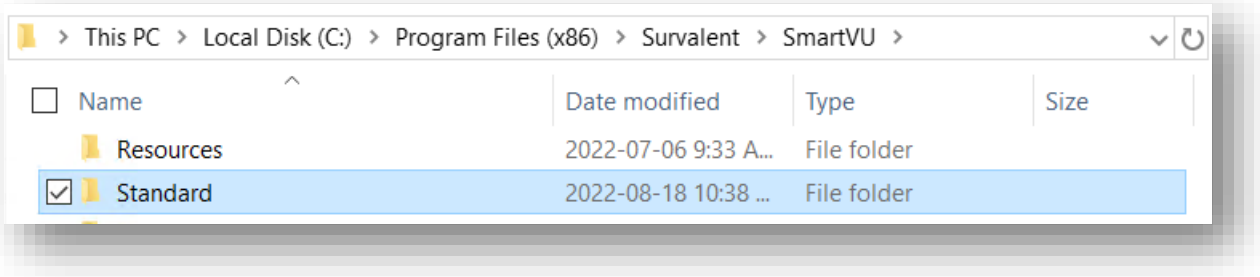


50. List of Log Files

Graphics Directory

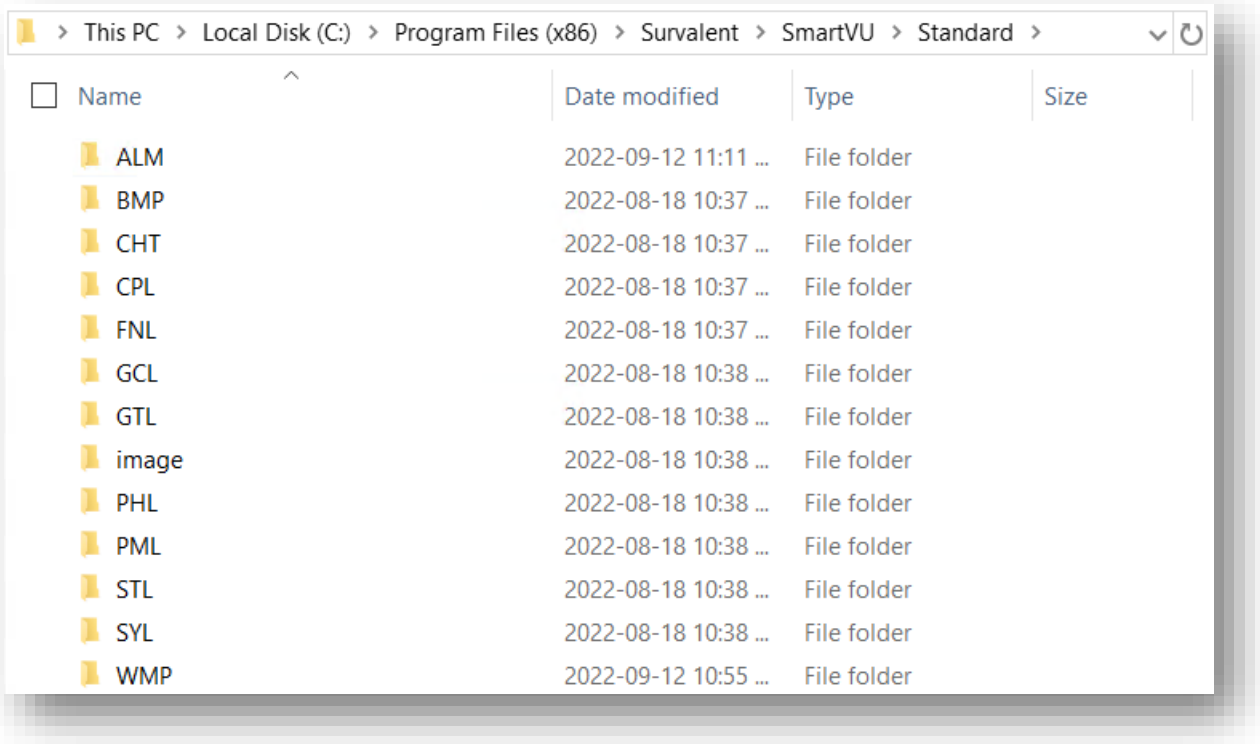
Later in this module, we will walk through the steps of backing up the database. Because the directory structures are totally different, we will **NOT** be backing up the SmartVU maps when we back up the database.

All the map graphics for SmartVU are located in a folder called Standard. Unlike the database folder which is installed on a server, the Standard folder can be found on EVERY workstation that accesses SmartVU.



51. Standard Folder for SmartVU

When opening up the Standard folder, we see more folders that each represent different graphical elements.

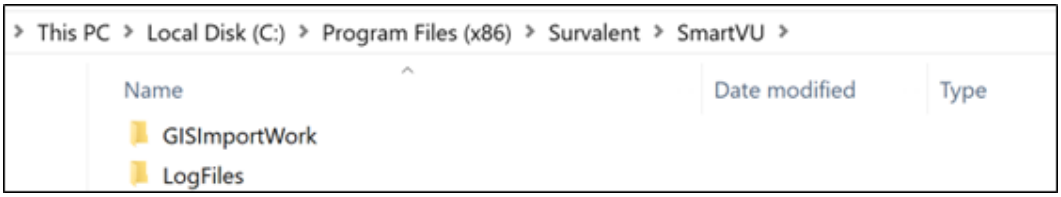


52. Graphical Elements

Below is a quick summary of the information contained in these graphic folders.

ALM	Contains Alarm configuration settings for Operators.
BMP	Contains all BMPs, GIFs, JPEGs, and PNGs used to support map info.
CHT	Trend Graph definition files.
CPL	Control Panels.
FNL	Fonts.
GCL	Colors.
GTL	Color Tables.
IMAGE	Large Images (Level 2 program covers this in more detail).
IML	Pixmaps grandfather from World View (which SmartVU replaced).
PHL	These are used to convert the files in BMP into Photo Images.
PML	Pmacros.
QRY	Shortcuts that refer to documents.
STL	Symbol Tables.
SUBMAPS	Submaps (Level 2 program covers these in more detail).
SYL	Symbols.
TEMPLATES	Templates.
WMP	Maps

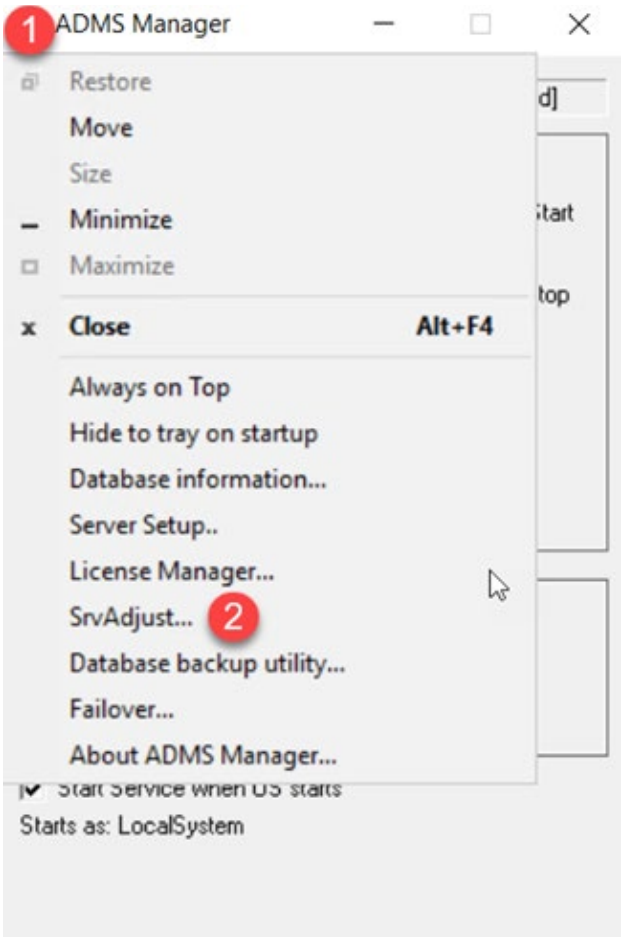
There is a another folder called Logfiles that monitor SmartVU activity. Like the database log files, these can be very useful for tech support.



53. Logs for SmartVU

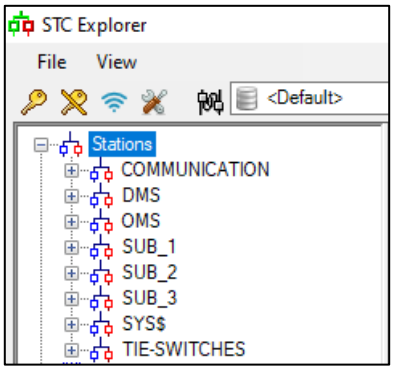
At this point we have seen how the software were installed. The next set of screenshots will assume that our workstation has the correct training database and graphics folder.

Anytime changes to the database folder, we need to run the (2) Server Adjust program. Image 55 shows how to manually run Server Adjust by clicking on (1) the top right corner of ADMS Manager. When running it, we must Stop the ADMS Manager.



54. Server Adjust

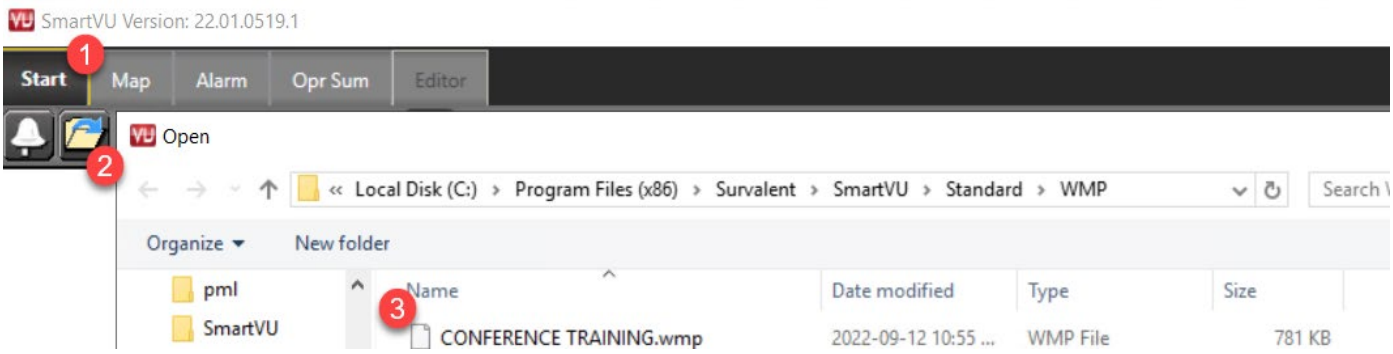
If we successfully changed the database folder, we will see the stations shown on the next page when we log into SCADA Explorer (remember to restart the server).

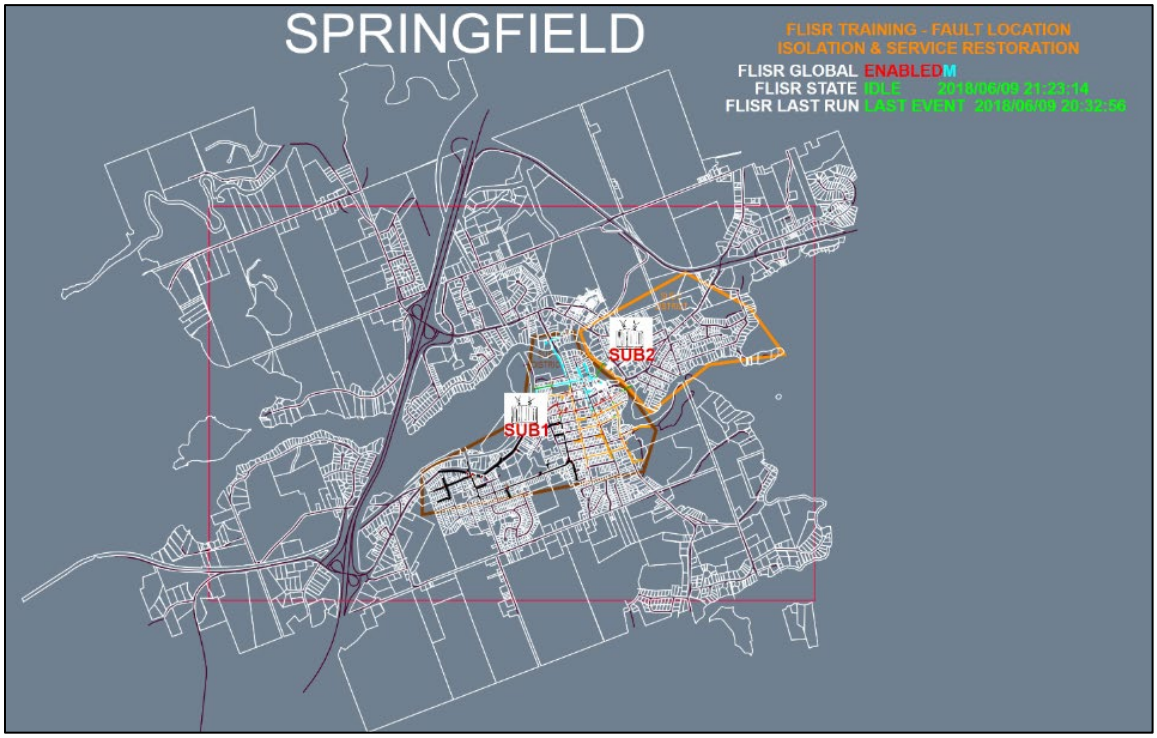


55. Database Replaced

If we successfully changed the standard folder so SmartVU can load the training map, we will now be able to now navigate to the training map (called Conference Training) upon logging into SmartVU. Note that the map is found in the Standard\WMP folder. Image 58 shows the map successfully launched. (1) Click onto Start, (2) open folder and then (3) select your map.

56. Locating the Map





57. Training Map

RESERVATIONS

As a utility grows and gets more experienced Survalent Administrators, they will find that the current structure for SmartVU does not serve them well.

Recall that every computer using SmartVU has its own Standard folder. The richness of the graphics used in SmartVU make this necessary. The program would slow down significantly if all the graphics and changes to the graphics had to be constantly downloaded. For administrators, this is not ideal because:

- Anytime they draw new elements on the map, they will have to walk to every computer to install the updated Standard folder.
- There is also a very real possibility that changes made by one administrator could overwrite changes made by another administrator.

The issues on outlined above can be solved through using Reservations. With Reservations:

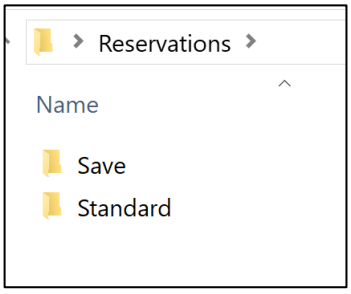
- All users maintain a copy of the Standard folder on their workstations.
- However, another version of the Standard folder exists that is accessible by everyone.
- The shared version is the latest published version of the utility maps.
- When an administrator wants to draw or change map elements, they Reserve the element in the shared folder.
- Reserving the map means that no other administrator can write to the element if it is still reserved by the first administrator.
- When the edits are completed, the editing administrator can publish the new map so it is available to all the users.
- They then release the map so subsequent changes can be made by other administrators.
- End users will not notice any changes while they are working because, when they start up the system, they are offered the latest map and they keep that map on their workstation for the duration of their login. The next time they log in, they will again be offered the latest map.

Over the next pages, we will configure our system to use Reservations and we will continue to use Reservations throughout the course.

1. To begin, find a location that all users can access. This could be a common location like your desktop.

2. Create an empty folder called Reservations.

3. Inside Reservations, add an empty folder called Save.



58. Configuring Reservations

Also note that there is a Standard folder in the Reservations folder. This should be a copy of the most current Standard folder in the system.

When we complete the steps on these next few pages, all users will be synched up with this Standard folder when they log into SmartVU.
Anytime an administrator makes changes to their Standard folder, they will publish the changes to the Standard folder in Image 59. Thereafter, people logging into SmartVU will be offered the newly published Standard folder.

The Save folder is not accessed directly. When a new Standard folder is published, a copy of the old Standard is saved in Save as a back-up in case the new Standard causes widespread issues.

So far, we have only created the folders. Remember that SCADA Explorer writes to the database. The changes we have made needed to be entered into SCADA Explorer so they get reported to the system. Please see Image 60 to see the steps.

1. Find the System folder.

2. Locate WV/SmartVU Parameters (recall WV or World View preceded SmartVU).

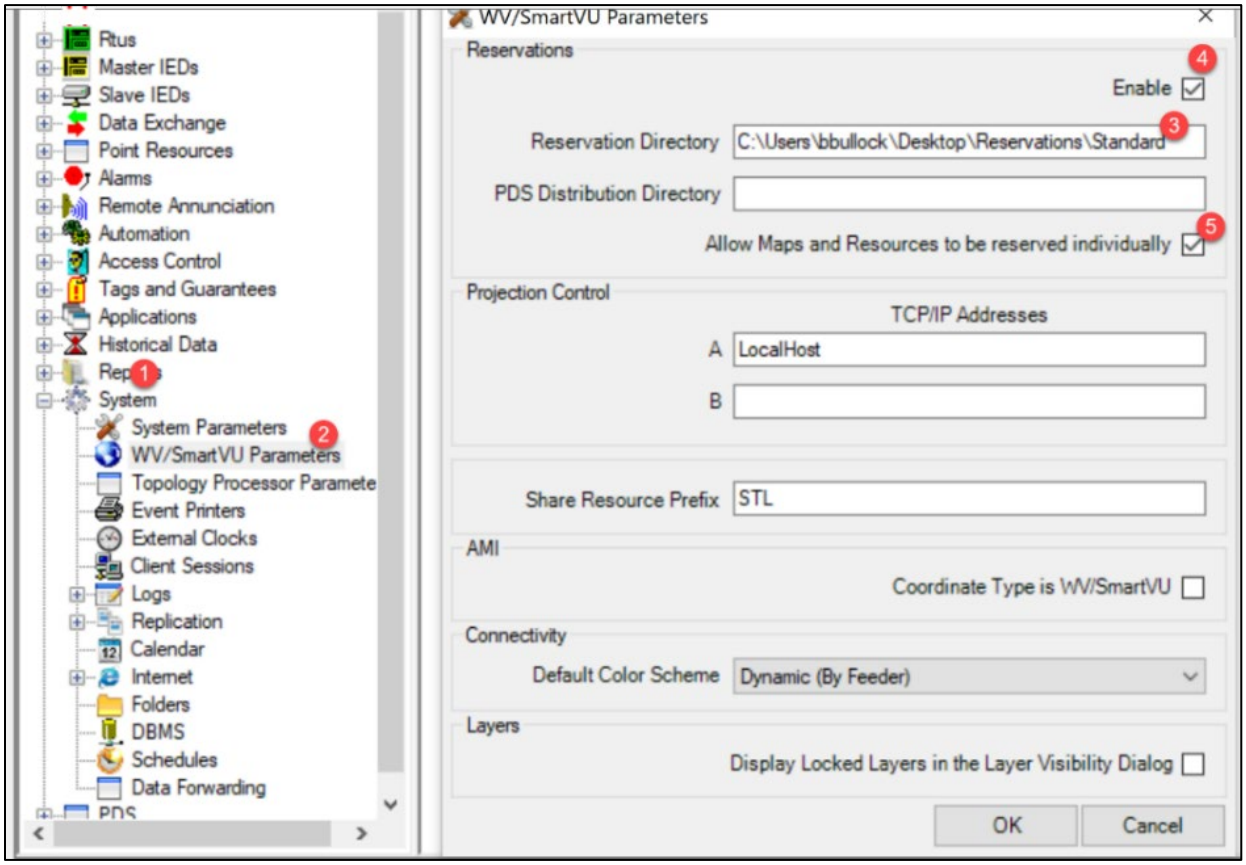
3. Enter the path of the shared Reservations folder (it helps to copy and paste).

4. Check Enable.

5. Check to Allow Maps and Resources to be Reserved Individually.

Note: The PDS option under reservations parameters refers to a feature called PDS (Project Development System) which is a more detailed Reservation product in that it reserves more than SmartVU maps. PDS allows users to create projects that reserve Graphics, Database Items, and Line Sections used for showing energized and de-energized segments on the map.

PDS requires an additional license in order to function.



59. Explorer Modifications

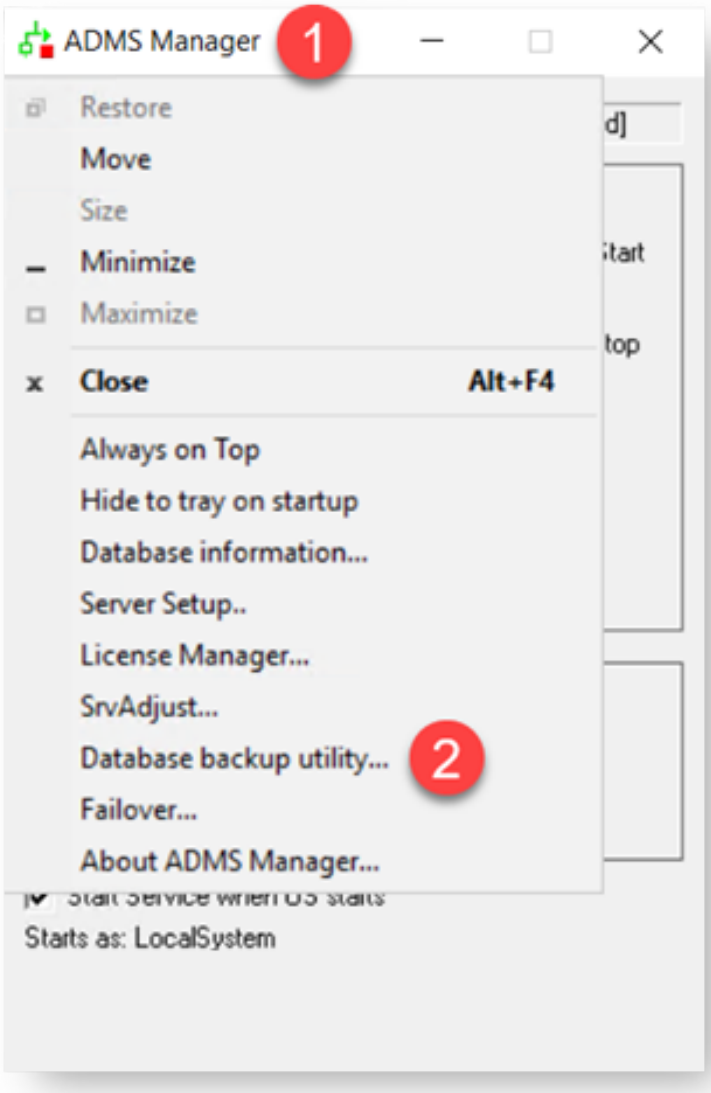
Backing Up

We have learned that the Standard and the Database folders are the two most important folders in the Survalent system and both must be backed up. They are in different locations.

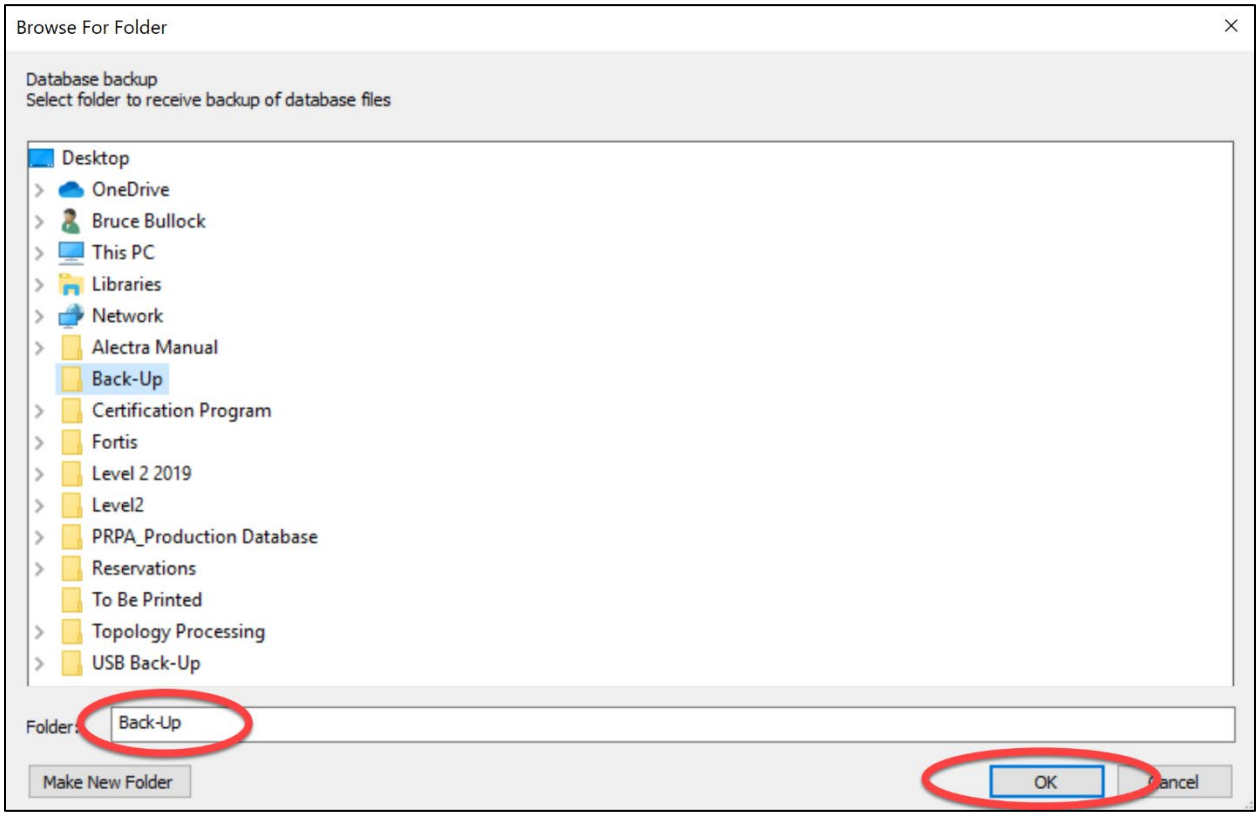
The Standard folder – if we are using Reservations – is in a shared location. It should be copied daily

The Database folder is found in the c:\Program Files (x86)\Quindar\ScadaServer folder or c:\Program Files (x86)\Survalent\ScadaServer. You can manually copy out this folder to another location.

The Database backup utility can be found by clicking on the icon on the (1) ADMS Manager title bar and then (2) selecting Database backup utility.



60. BackUp Utility

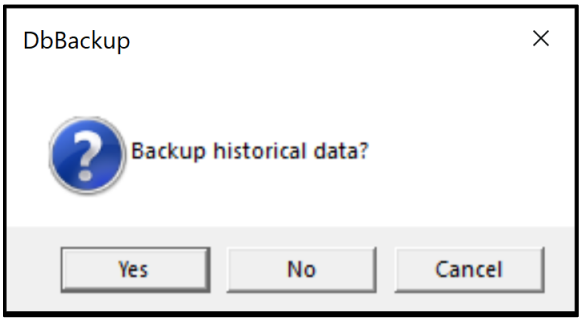


61. Selecting the Back-Up Folder

Before clicking OK, we should confirm that we have selected the correct backup folder.

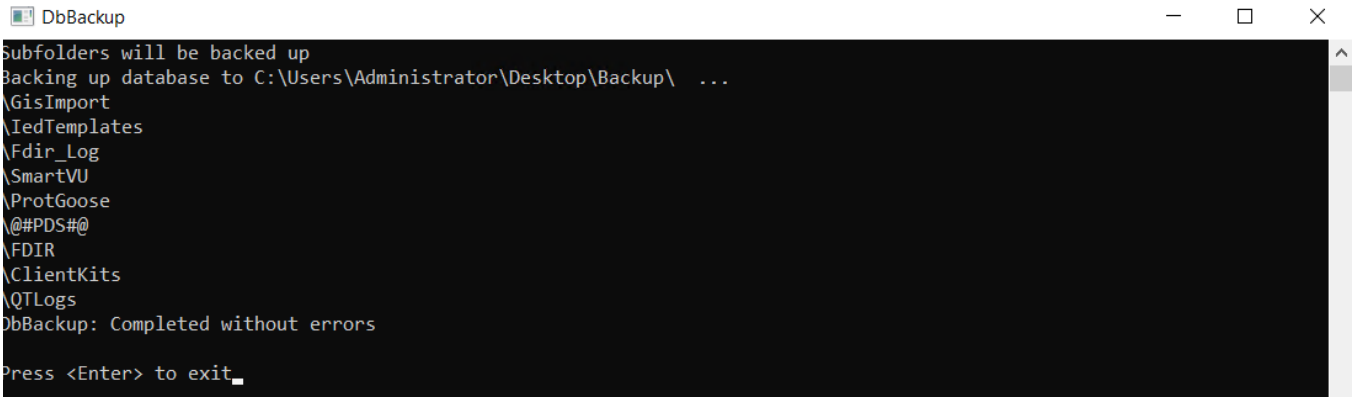
Back-up everything by answering Yes to the questions that pop up (See image 63 below)

These questions were created in case the Survalent Support Team wants a back-up copy of the database. Support probably would not need the Historical Data and other Sub Folders.



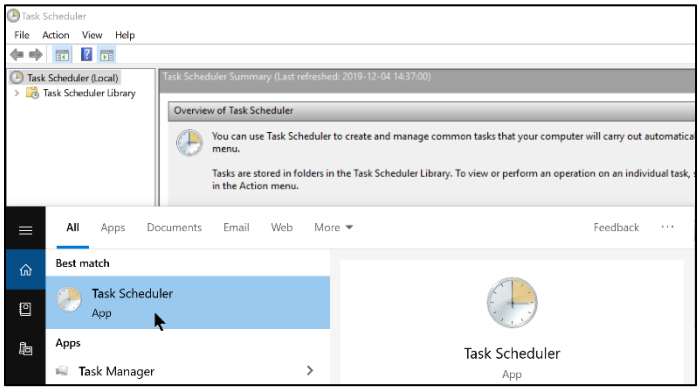
62. Say Yes to perform the Backup

A Command Prompt style window updates us on the backup status and, when completed, we will find an exact copy of our Database Folder in our backup folder.



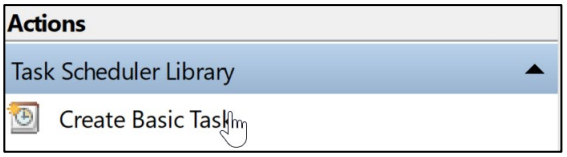
63. Process Completed

An advantage to using the backup utility instead of simply copying the file is that the procedure can be automated using a Servers Task Scheduler. We can go ahead and setup that right now. To start, find and launch the OS Task Scheduler.



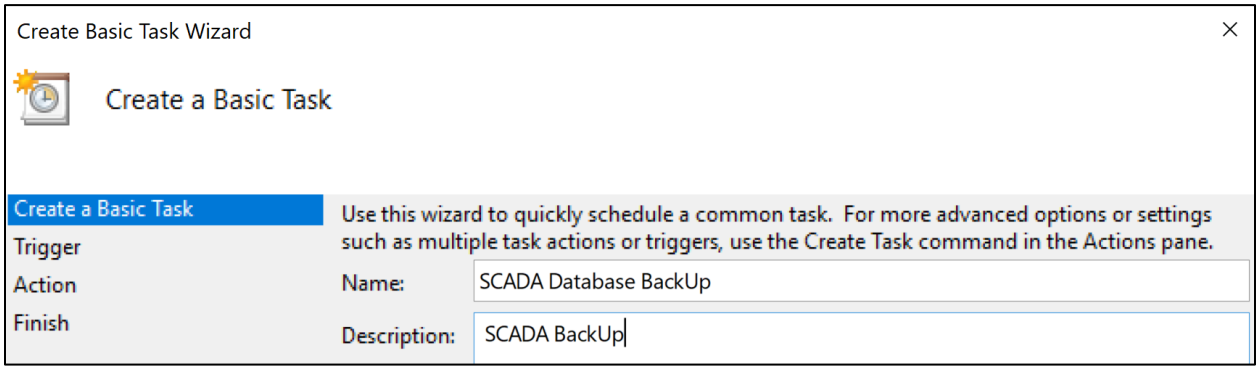
64. Task Scheduler

Look for Actions and then Create a Basic Task.



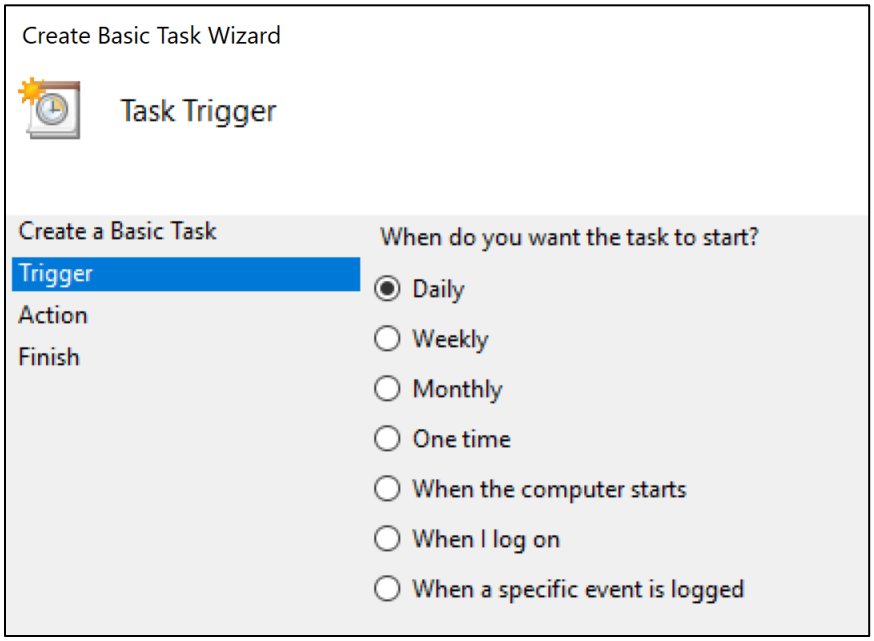
65. Creating a Basic Task

Give the task a name and click Next.



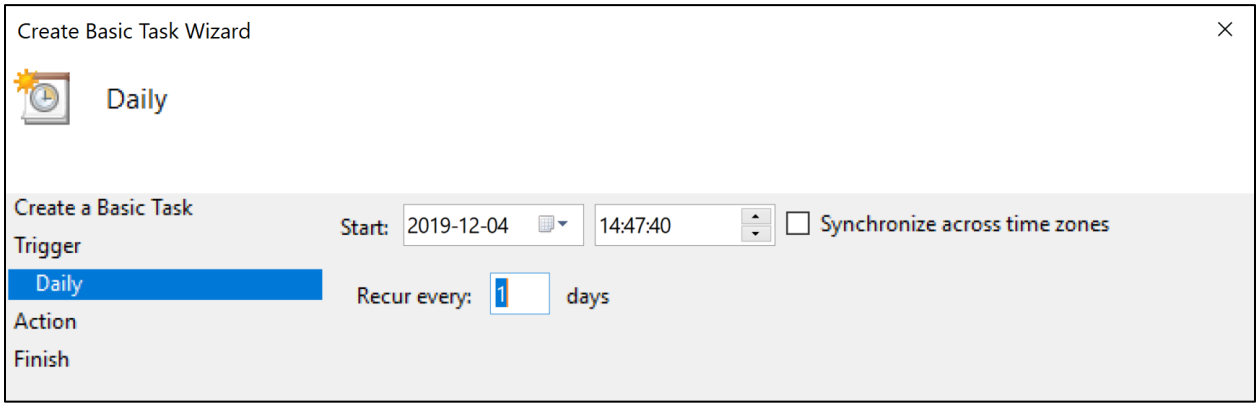
66. Naming the Task

Select a Daily BackUp and then click Next.



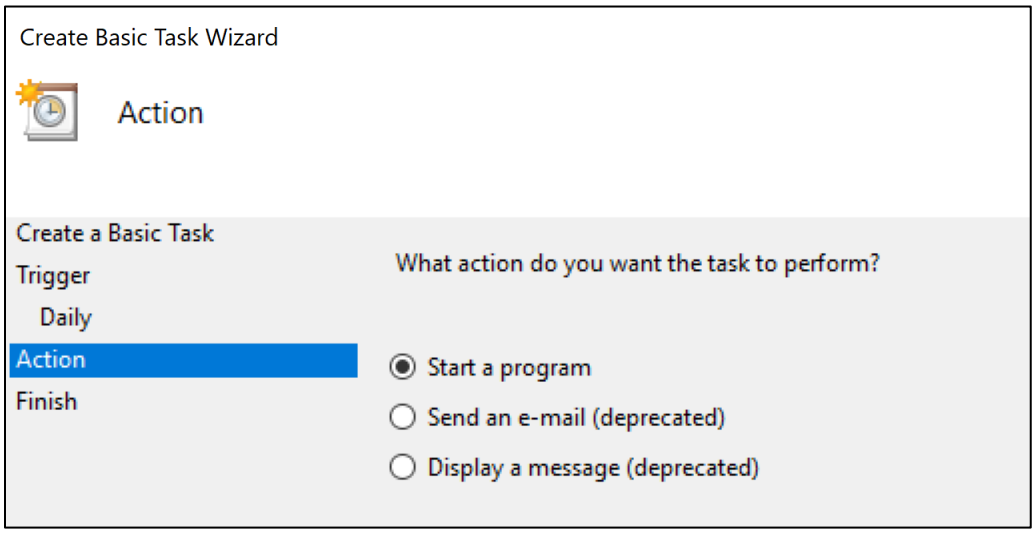
67. Daily BackUp

Next, we select the time we wish the backup to occur and then click Next.



68. Selecting the Time of Day

For action, we want it to start a program. Click Next.



69. Selecting the Action

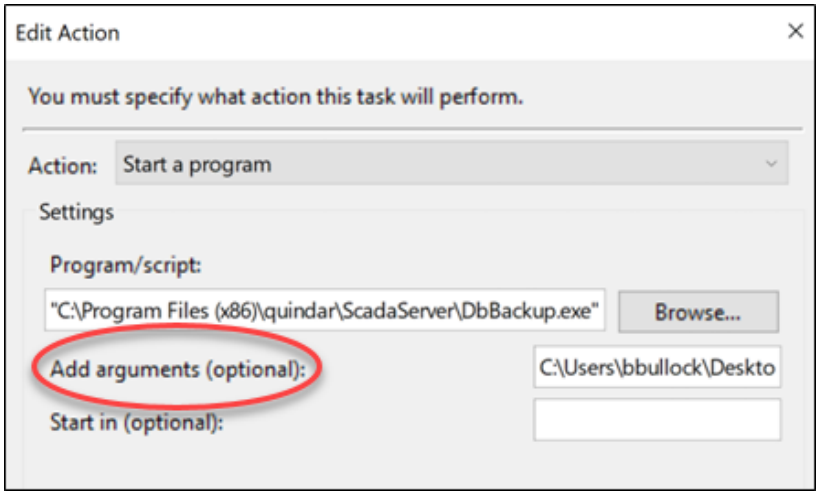
Browse to the DbBackup.exe program.

When the time comes to run the program, we won't get the back-up unless we configure the arguments. These are the questions the program asks us when we run it manually:

1. Where is the backup folder?
2. Do we back up the history?
3. Do we back up the subfolders?

In the image below, the complete arguments cannot be seen. They should be entered similarly as shown here:

Add Arguments field: C:\Users\<user account>\Desktop\BackUp [/hist] [/subfolders]



70. Configuring the Arguments

The backups will now be automated to run at the time we selected.

Multiple Servers

The installation shown earlier in this section assumed that there was only one master server. Next, we will cover installing and updating software if when there is more than 1 server.

SCADA REDUNDANT SERVER SOFTWARE UPGRADE PROCEDURE

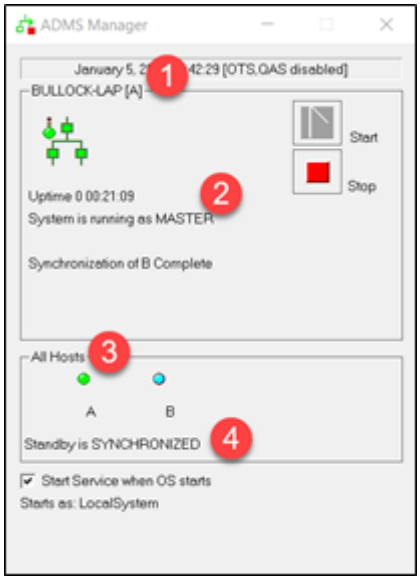
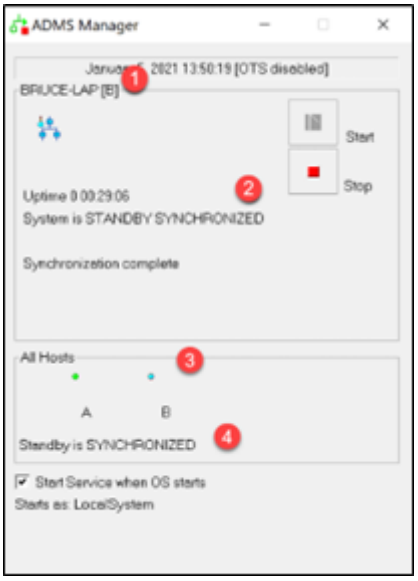
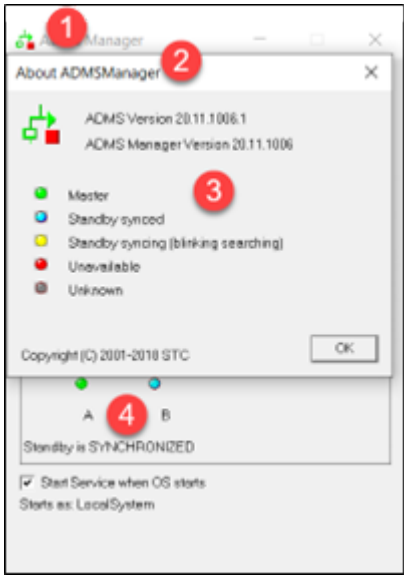
The following outlines a procedure for updating a Dual Redundant SCADA system with minimal disruption to normal operations and Historical Data collection. For more information see the SM-400 System Manager's Guide. Survalent Tech Support can also be contacted via email at support@survalent.com.

Generally, the procedure is:

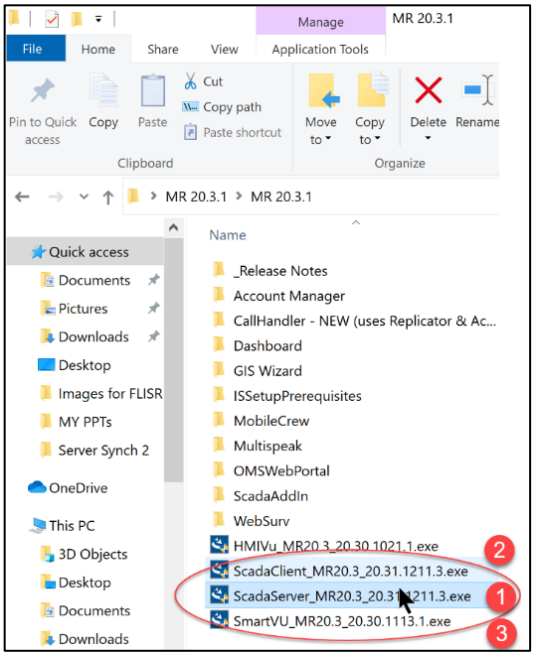
- If there is Quad (4 server redundancy), turn off HOSTS C and D if neither of them is running as Master.
- Upgrade the Standby Host first.
- Confirm everything is operating correctly.
- Upgrade the Master.
- Synchronize the Master and Standby.
- If there is Quad Redundancy, upgrade the 3rd (Host C) and 4th (Host D) servers and synch them.

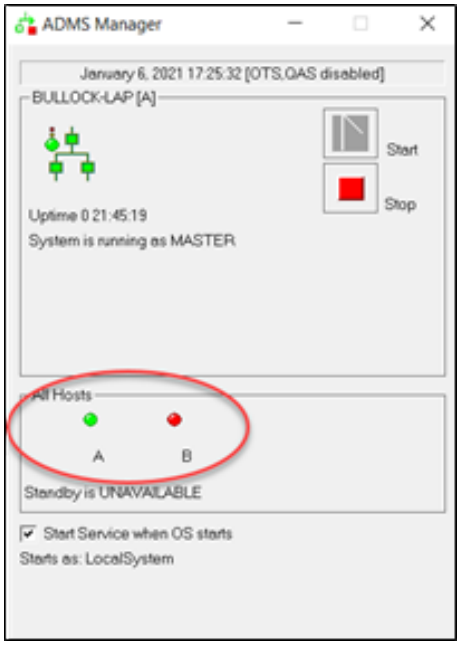
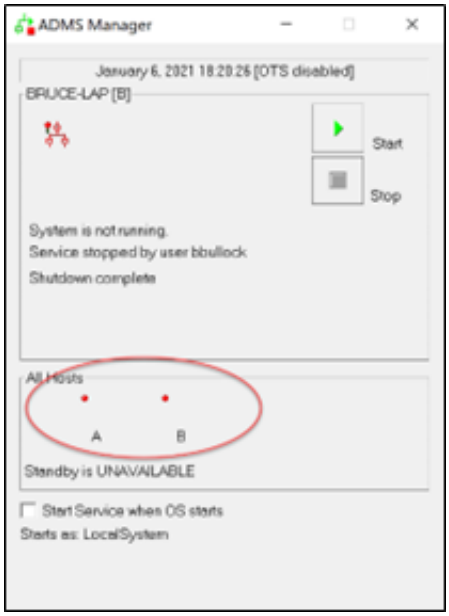
- Upgrade workstations.

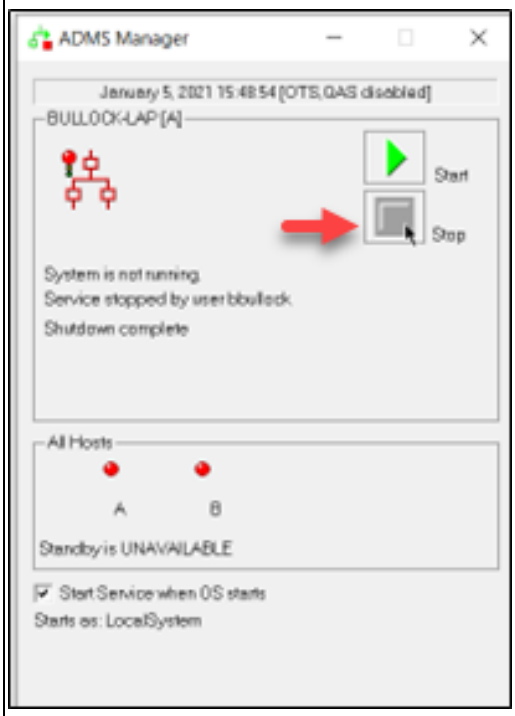
The next few pages provide a closer look at the servers during this process. In these images, Host A refers to the Master and Host B refers to a Standby Server.

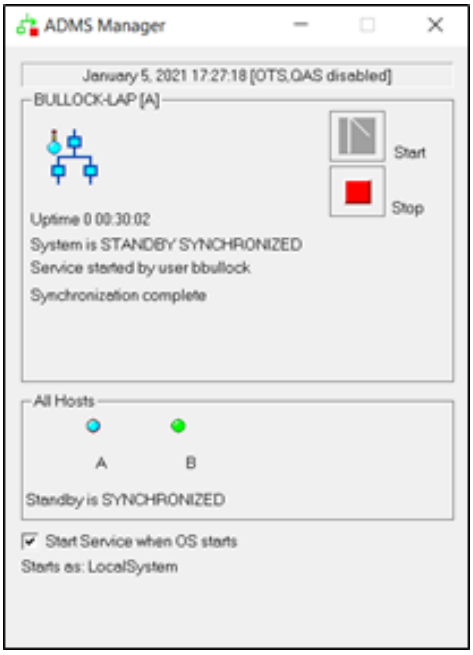
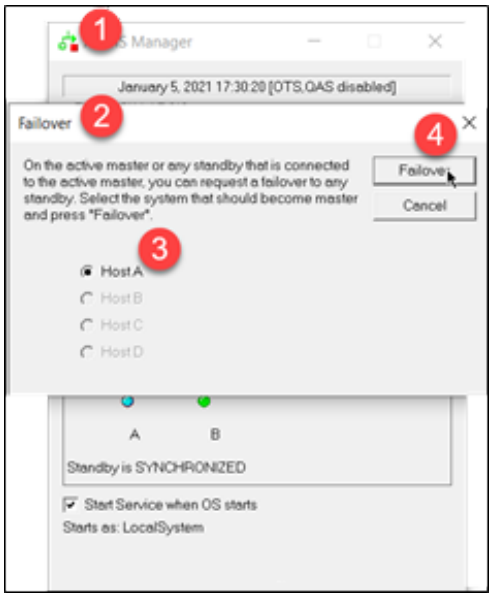
STEP #	HOST A	HOST B	COMMENTS
1	 **71 - Host A**	 **72. Host B**	Before starting, let's note the differences between Host A and Host B. If we click the icon (1), we can select *About ADMS Manager* to see what the host colors indicate (e.g., Green = Master and Light Blue = Synched up Standby).  **73. Server Color Code**

STEP #	HOST A	HOST B	COMMENTS
2	 **74. Database Backup Utility**		Earlier this module, we covered backing up the database. Even if we do frequent back-ups, it only takes a minute or two to take another back-up of the current Master before beginning the procedure.
3		 **76. Disabling Auto Start**	We start our work on Host B (Hosts C and D should be off at this point). After shutting down any SCADA programs (e.g., SCADA Explorer, SmartVU) that may be running on the server: 1. Stop Host B. 2. Remove the check beside *Start Service When OS Starts*. 3. Confirm we don't want ADMS Manager to run when the Operating System starts. 4. Close the ADMS Manager. **Step 2 is very important because we don't want Host B to communicate with Hosts A (and C and D) until we confirm the upgrade was successful.**

STEP #	HOST A	HOST B	COMMENTS
4		 **75. The 3 Main Applications**	The three major applications are installed in this order: 1. ScadaServer (aka ADMS Manager) gets installed first. 2. ScadaClient (aka SCADA Explorer) is next. 3. SmartVU is third.
5		 **76. Restarting Host B**	We can now Restart Host B, by restarting the workstation.

STEP #	HOST A	HOST B	COMMENTS
6	 **77. Still Master**	 **78. No Synching**	While this process is ongoing, HOST A has continued being the SCADA Master. Note that when we restart HOST B that there is no synching due to Step 3. If we didn't take that step, HOST A would be updating HOST B with a database that hasn't been adjusted with the new software version on HOST B. This often causes errors. For the same reason, on a quad redundancy system, Hosts C and D (if they are being used) are still off.

STEP #	HOST A	HOST B	COMMENTS
7	 **79. Stopping Host A**	 **81. Host B as Master**	It's now time to stop HOST A. **Do this before starting up HOST B** as we do not want synchronization. For these few seconds, there will be no SCADA service. Start up HOST B. It will be Master. Before it becomes Master, we will see it looking for other servers. Since there are none running there will be a brief Connection Error message for a few seconds (not shown). Remember to check the box to *Start Service When OS Starts.* **Now we confirm that Explorer and SmartVU are working as expected.**

STEP #	HOST A	HOST B	COMMENTS
8.	 **82. Reboot Host A**		If everything is working well on Host B (Step 7), we can now install the same three applications on Host A (review Step 4). We can now reboot Host A. Note how it synchs to Host B. Host B remains Master. Note that it is now synched to Host B as Host B is Master (it's been running as Master longer). Step 4 can now be applied to Hosts C and D if applicable. After installation and reboot, these hosts will also synch with the Master.
9.	 **83. Failover**		We can make Host A the master by using the Failover routine as shown. This routine can be run from any synched server. (1) Open ADMS Manager, click on the top right hand corner to select Failover (2) Failover screen will appear (3) Select Host A (4) Click on Failover button

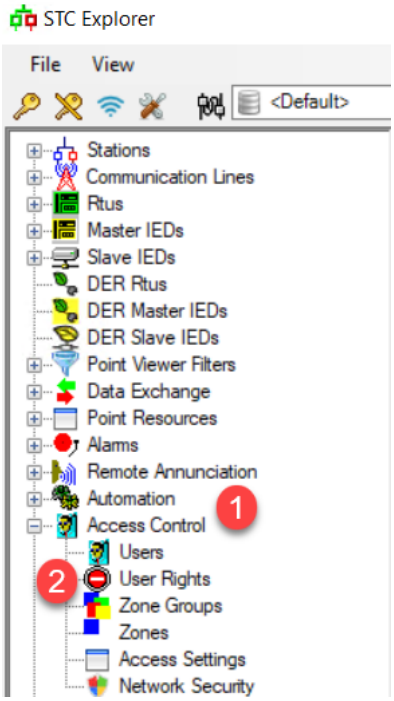
STEP #	HOST A	HOST B	COMMENTS
10.	Finally, SCADA Explorer and/or SmartVU can be installed on workstations as required.		

Database Preparation

We will use the time remaining in this module to get the database prepared for future modules.

User Rights

What do we want end users to access? What do we want them to do? These questions get answered in SCADA Explorer as shown below.



Step 1: Under STC Explorer, expand (1) Access Control and click (2) User Rights.

84. Accessing User Rights

We will find some extreme settings here. A group that will let someone do everything and a group that prevents someone from doing anything. Double-click AllRights.

85. Rights Options

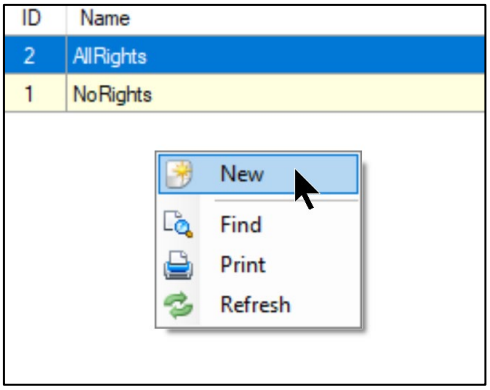
Since the group is called AllRights, there should be no surprise that most options are checked. Someone belonging to this group can do almost anything in the system.

86. All Rights Example

Since these are extreme examples, we realize we will be configuring Rights for people in between being able to do everything and not being able to do anything. These Rights groups could be called Operators, Managers, Dispatch etc.

To set up a new Rights group:

- Find a blank space below the existing groups.
- Right-click
- Select New



87. New Rights Group

Users

How do we associate the end users with these group rights? We already know one user named Scada. Let's see what they are entitled to do in the system.

Also, under Access Control, is the Users folder.

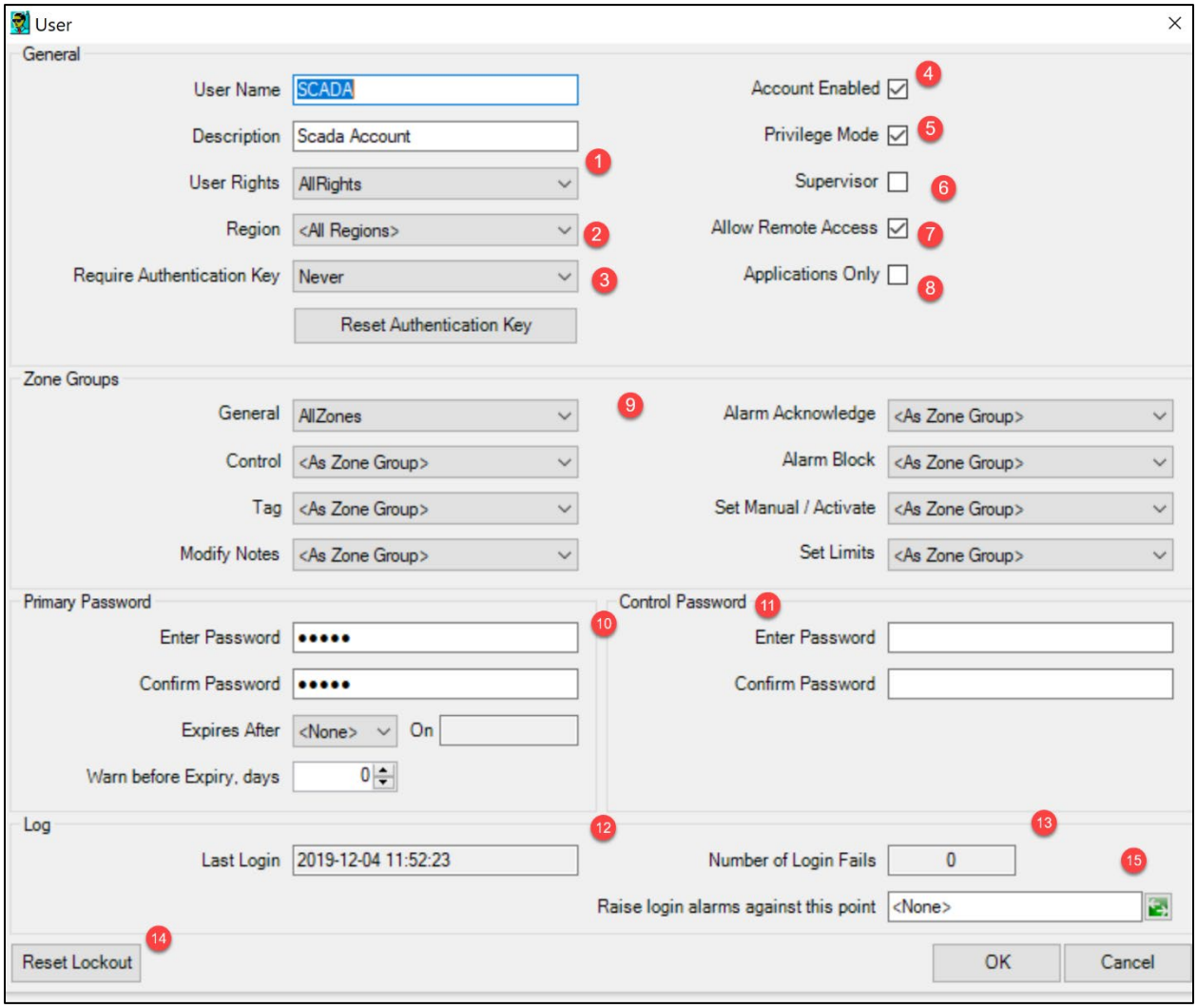
88. Users Folder

- We see the SCADA user and we learn that they are part of the AllRights group.
- SCADA can also issue controls in AllZones (more info on Zones to come).
- SCADA is also a "Privileged" user. We will soon see some settings in the system that only apply to "Privileged" users.
- Finally, the user called "SCADA" is currently enabled. Accounts can be disabled without having to be deleted if the user will not be using the system for a while.

User Name	Description	User Right	Zone Group	Privilege	Enabled	ID
SCADA	Scada Account	AllRights	AllZones	☑	☑	3

89. Summary of SCADA Permissions

To edit SCADA or learn more about SCADA, let's double-click the name.



90. User Details

Please find on the next page a list of the User Fields that we will be working with in this course.

1. Set/Edit User Rights.	9. Zone Permissions (covered later).
2. Regions are an OMS permission.	10. Password rules.
3. 2 Factor Authentication e.g. Google	11. A separate password for Controls.
4. Enable/Disable Account.	12. Last successful login.
5. For settings with privilege status.	13. Number of failed login attempts.
6. Currently not being used.	14. Reset Locked Out User.
7. Can connect from outside network.	15. Used if Alarms set for failed logins.
8. Skip LDAP requirement for user.	

Exercise

In-class exercise: Create a user and give them a set of permissions. Log into SCADA Explorer and SmartVU as the new user.

Zones and Zone Groups

Zone Scenario 1:

- Our utility is divided into 4 areas – North, South, East, West.
- Our employees and the points we monitor in SCADA all belong to one of these areas.
- For example, SCADA works in the North Area but a breaker in the Main Street station is in the South Area.
- We want to keep employees in one area from operating equipment in another area.

This first example is straightforward but will prepare us for when the scenario gets more complicated.

- We would start in SCADA Explorer.
- Go to Access Control.
- Select Zones.

91. Zone Settings

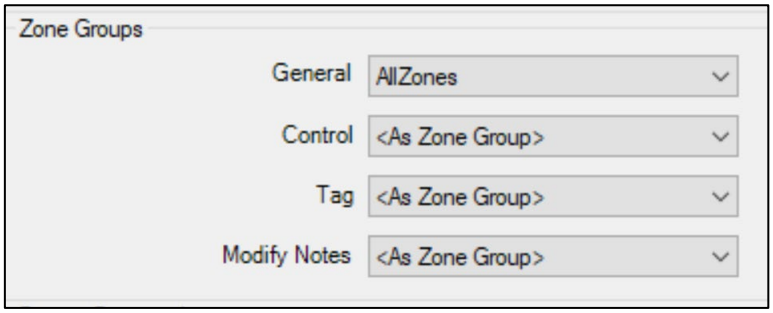
On the right side of the screen, right-click and choose to create the 4 zones shown.

9	North
10	South
11	East
12	West

92. 4 Zones

However, when we go back to the Users folder, we see that people (and equipment too) are not put into Zones. They are put into Zone Groups.

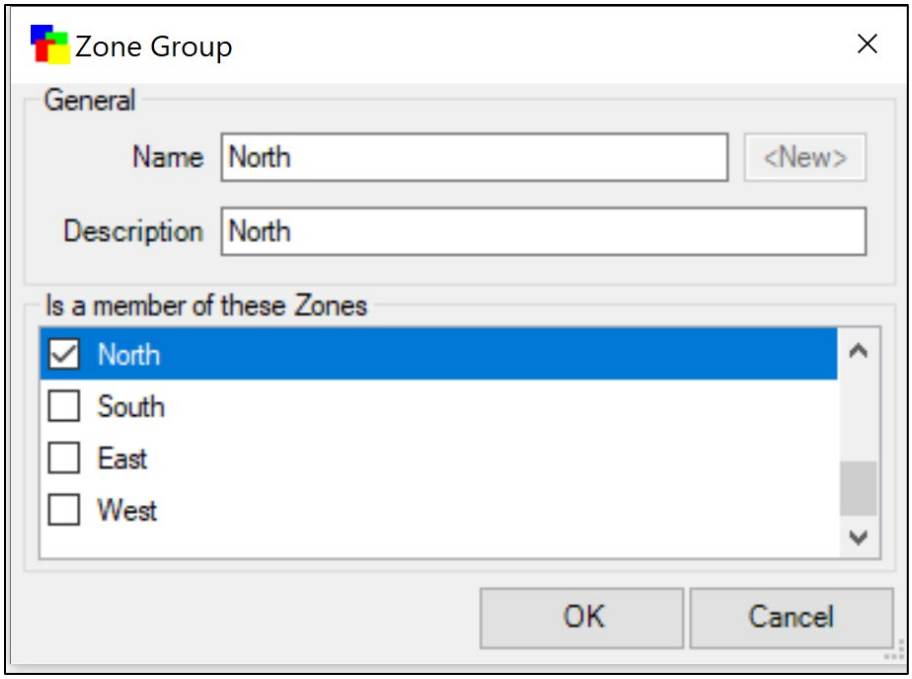
93. Users Get Connected to Zone Groups



Zone Groups are also located under Access Control.
Right-click on the right side to create new zone groups.

94. Creating Zone Groups

Configure the four groups just like the one shown for the North area on the next page. Note that we placed the North Zone in the North Zone Group.



95. North Zone Group

It's easy to follow that, if SCADA is in the North Zone group and the equipment is in the North Zone group, then SCADA will be able to access the equipment.

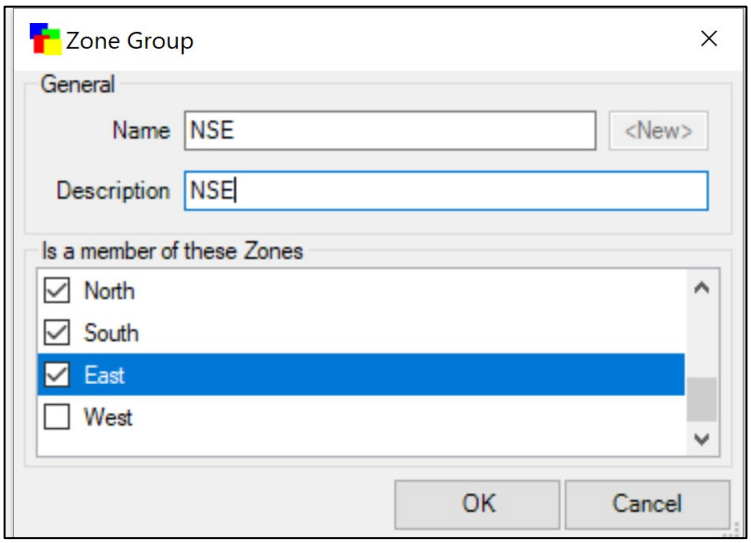
In our scenario, the breaker is in the South Zone Group. The only reason why SCADA cannot access the breaker is that the North Zone group does not share any Zones with the South Zone group.

Zone Scenario 2 – Adding Complexity:

In time, SCADA has gained the seniority and trust to work in the South and East Zones in addition to the North Zone.

This is solved by creating a new Zone Group.

This new group for the 3 areas work (see image



gives permissions where SCADA can on next page).

96. More Complex Zone Groups

SCADA moves into NSE group. The equipment is fixed and remains in the South Zone Group.

South	NSE
South ← →	North South East

Since there is a matching zone between the South Zone Group and the NSE Zone Group, SCADA can now control points in the South Zone Group.

To summarize:

- **Zones** are used determine a utility employee's ability to control equipment.
- However, employees and equipment are not placed in Zones, they are placed in **Zone Groups.**

- If there is a zone match (any match) between an Employee's Zone Group and the Equipment Zone group, the employee and control the equipment.

- Generally, equipment will remain in the same Zone Group during its lifetime but an employee can be placed/promoted into more and more complex Zone groups.

Exercise

In-class exercise: The scenario we used was based on Geography (North, South, East, West).

Zones can also be created based on product (Electricity, Water, Gas) or on skill (High Voltage, Low Voltage).

1. Create a scenario based on the examples in the previous paragraph.
2. If one isn't already created, create a Zone Group called All Zones and put every zone in the All-Zones Zone group.

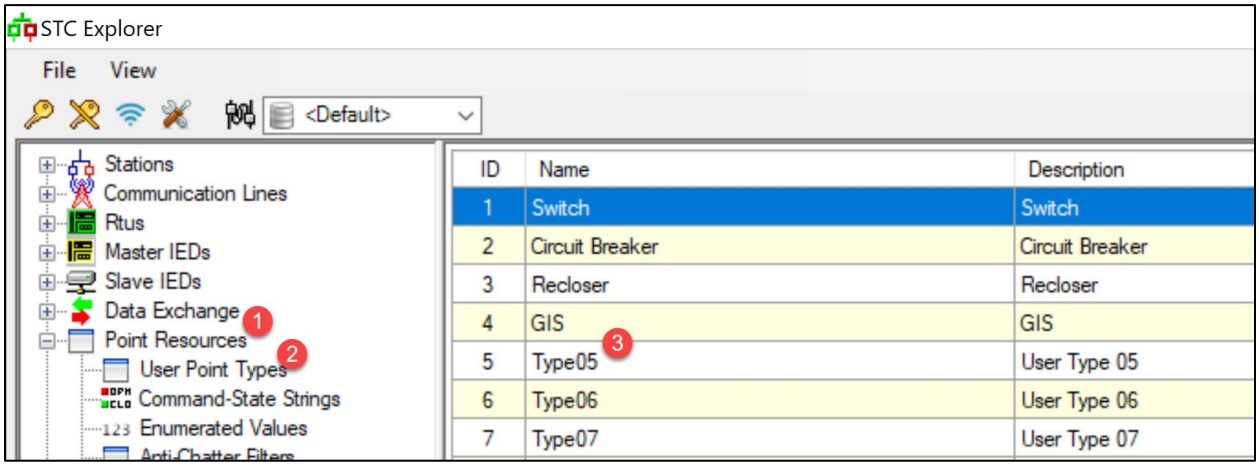
User Point Types

Before adding points to the database, it is useful to define the points first.

The settings in User Point types (2) under Point Resources (1) will not affect functionality but they will improve reporting.

Types set here become dropdown options when new points are created. Instead of calling a Circuit Breaker a Type05 point (3), we can see the utility has created an option for Circuit Breaker.

Other possibilities are Pseudo Points, Stations, and Tie Breakers.



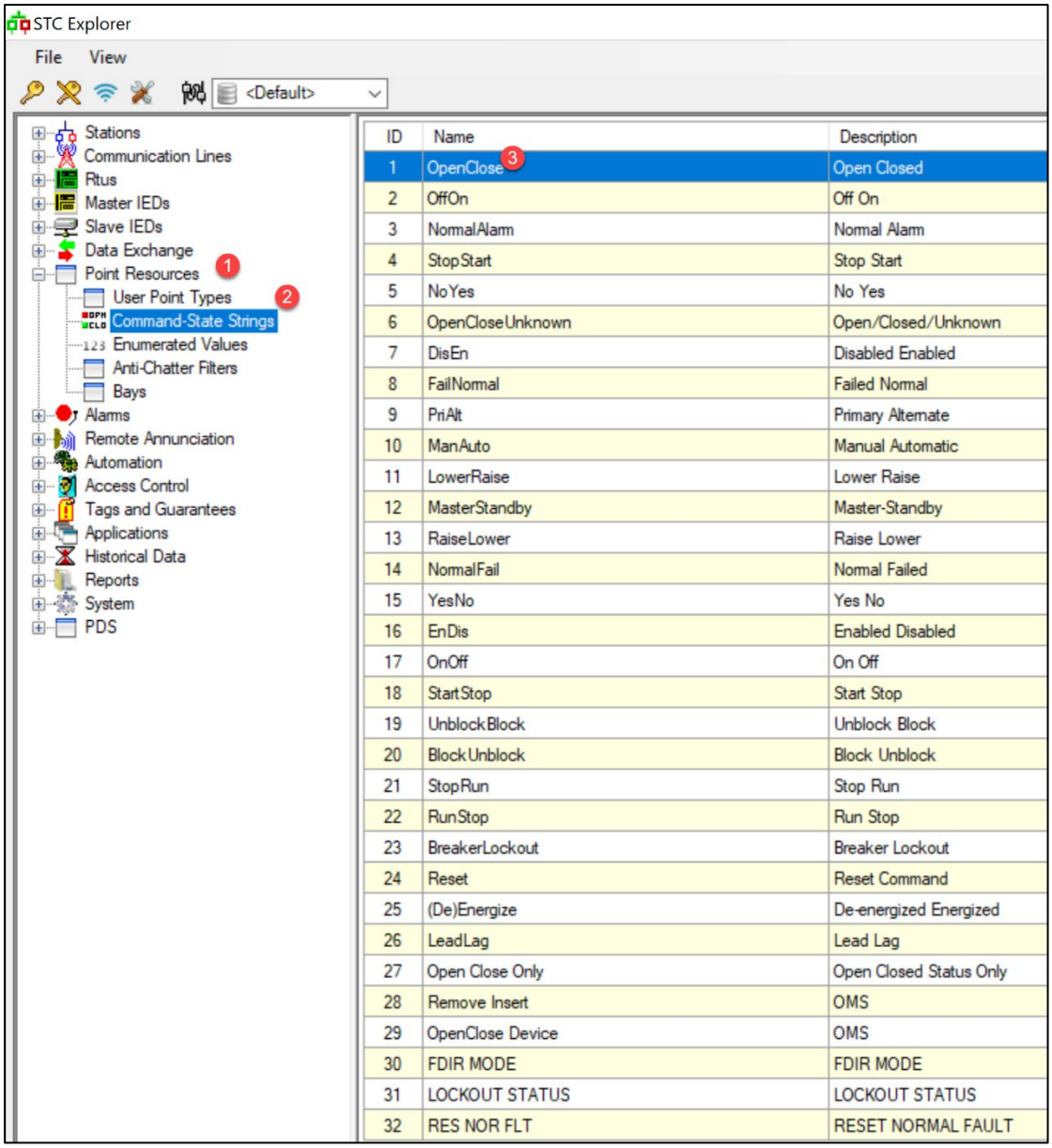
97. Setting User Point Types

Command State Strings

Even though Survalent supplies many Command-State strings (2), it's worth checking to see if there are any that we may need that are not listed.

Like Point Types, it's a good practice to check before adding elements to the database.

See image below for the location.



ID	Name	Description
1	OpenClose	Open Closed
2	OffOn	Off On
3	NormalAlarm	Normal Alarm
4	StopStart	Stop Start
5	NoYes	No Yes
6	OpenCloseUnknown	Open/Closed/Unknown
7	DisEn	Disabled Enabled
8	FailNormal	Failed Normal
9	PriAlt	Primary Alternate
10	ManAuto	Manual Automatic
11	LowerRaise	Lower Raise
12	MasterStandby	Master-Standby
13	RaiseLower	Raise Lower
14	NormalFail	Normal Failed
15	YesNo	Yes No
16	EnDis	Enabled Disabled
17	OnOff	On Off
18	StartStop	Start Stop
19	UnblockBlock	Unblock Block
20	BlockUnblock	Block Unblock
21	StopRun	Stop Run
22	RunStop	Run Stop
23	BreakerLockout	Breaker Lockout
24	Reset	Reset Command
25	(De)Energize	De-energized Energized
26	LeadLag	Lead Lag
27	Open Close Only	Open Closed Status Only
28	Remove Insert	OMS
29	OpenClose Device	OMS
30	FDIR MODE	FDIR MODE
31	LOCKOUT STATUS	LOCKOUT STATUS
32	RES NOR FLT	RESET NORMAL FAULT

98. Command State Strings

In the example on the last page, we see that we have the Open and Close string (3) for devices that have two states – either they are open or closed.

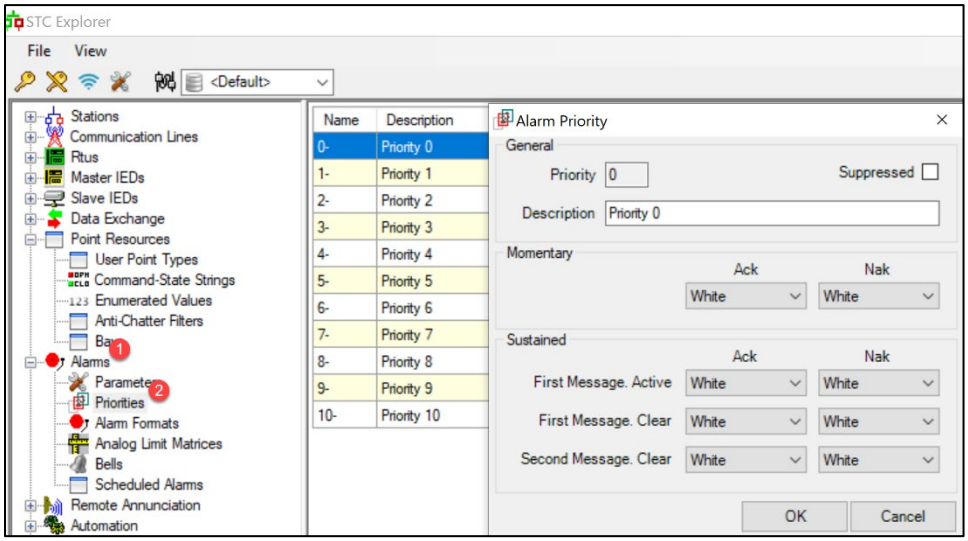
To edit, you can click on a string.

To add a new string, right click on the right side and select New.

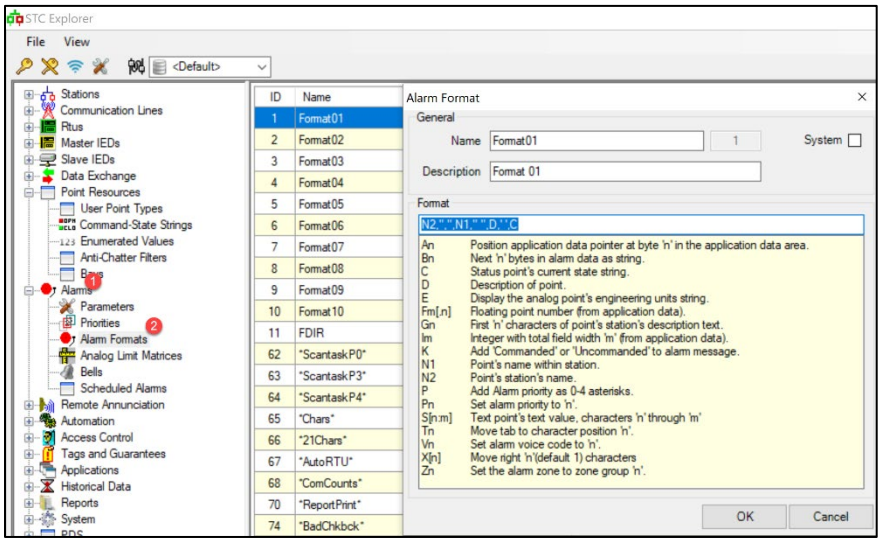
Alarm Priorities and Formats

Checking the Alarm Priorities and the Alarm Formats is a good idea before proceeding as well.

These items will show us the colors and the words that the Operators will encounter if a point goes into an Alarm state.



99. Alarm Priorities



100. Alarm Formats

This brings Module 1 to a close. Module 1 ended with us preparing the database for all the elements we will be adding. For the next module, will be preparing graphical elements for our map preparation.