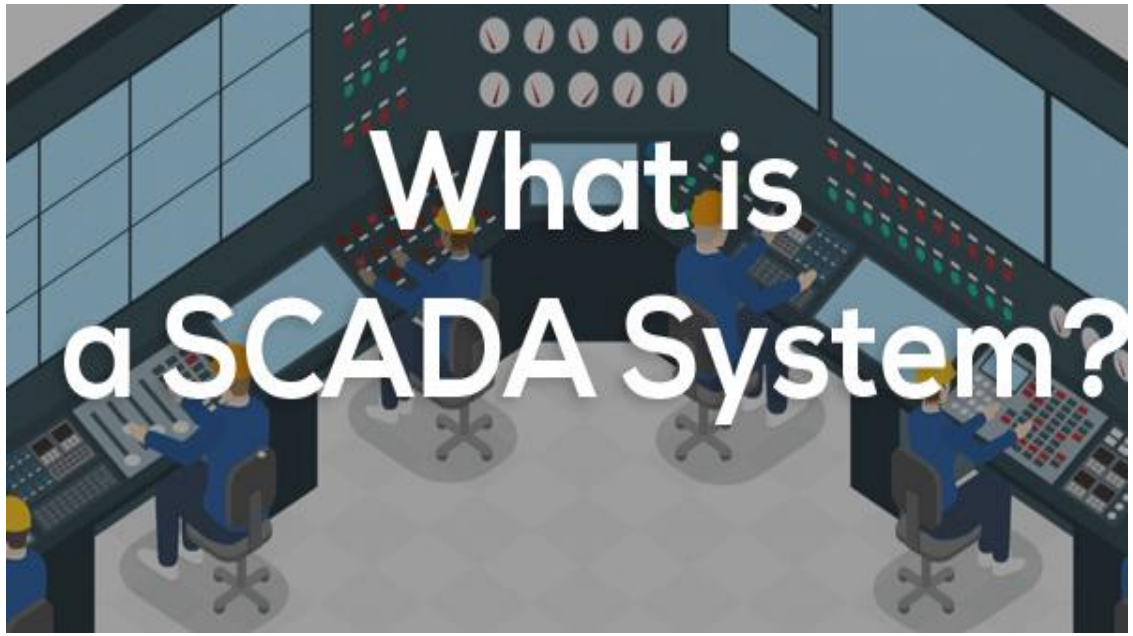
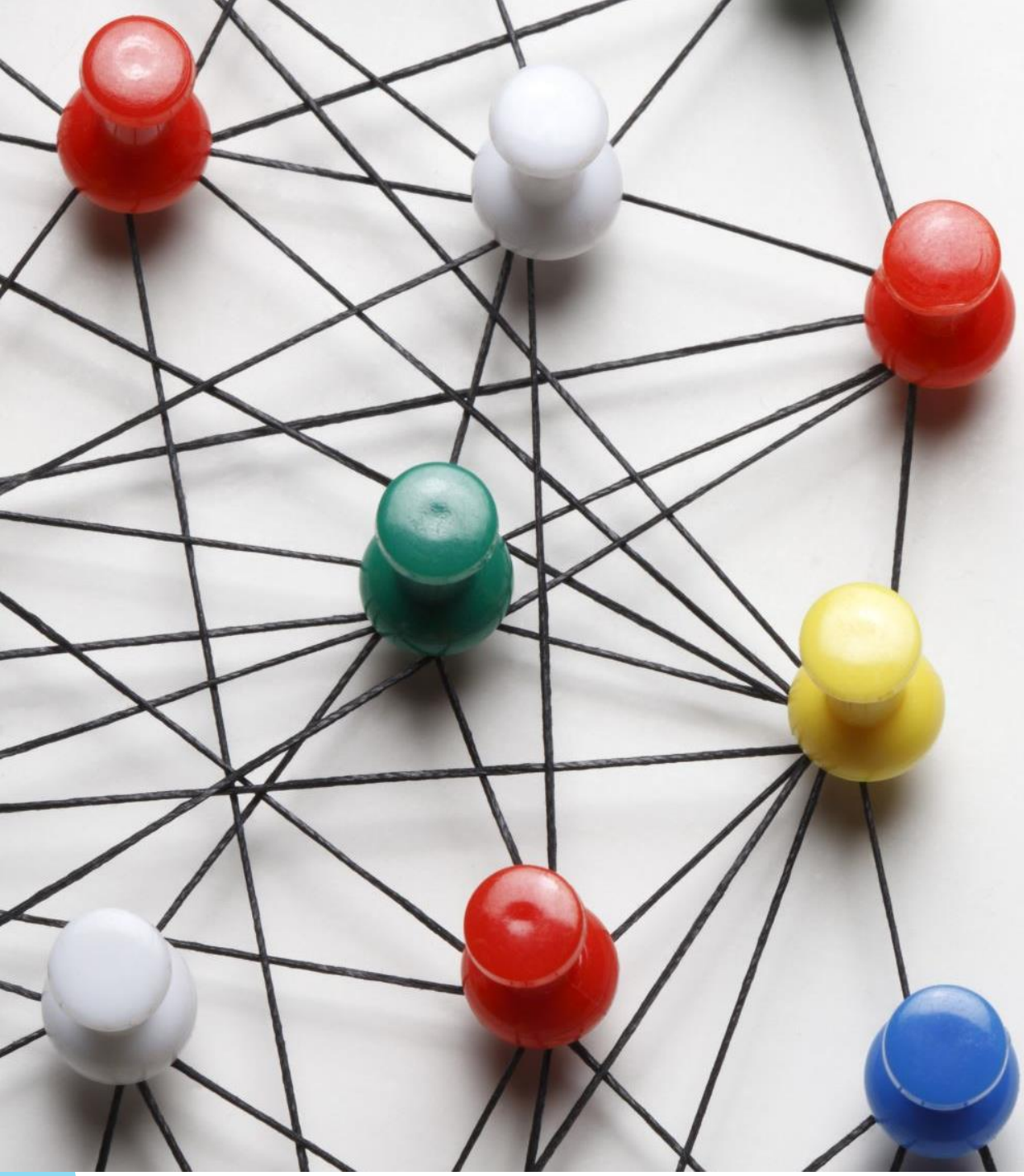
SCADA and Our Water

What is SCADA ?

- Supervisory – Operators and maintenance can monitor processes.
- Control – Control station for system can make changes throughout the process.
- Data Acquisition – Historical record keeping and daily, monthly yearly reporting.

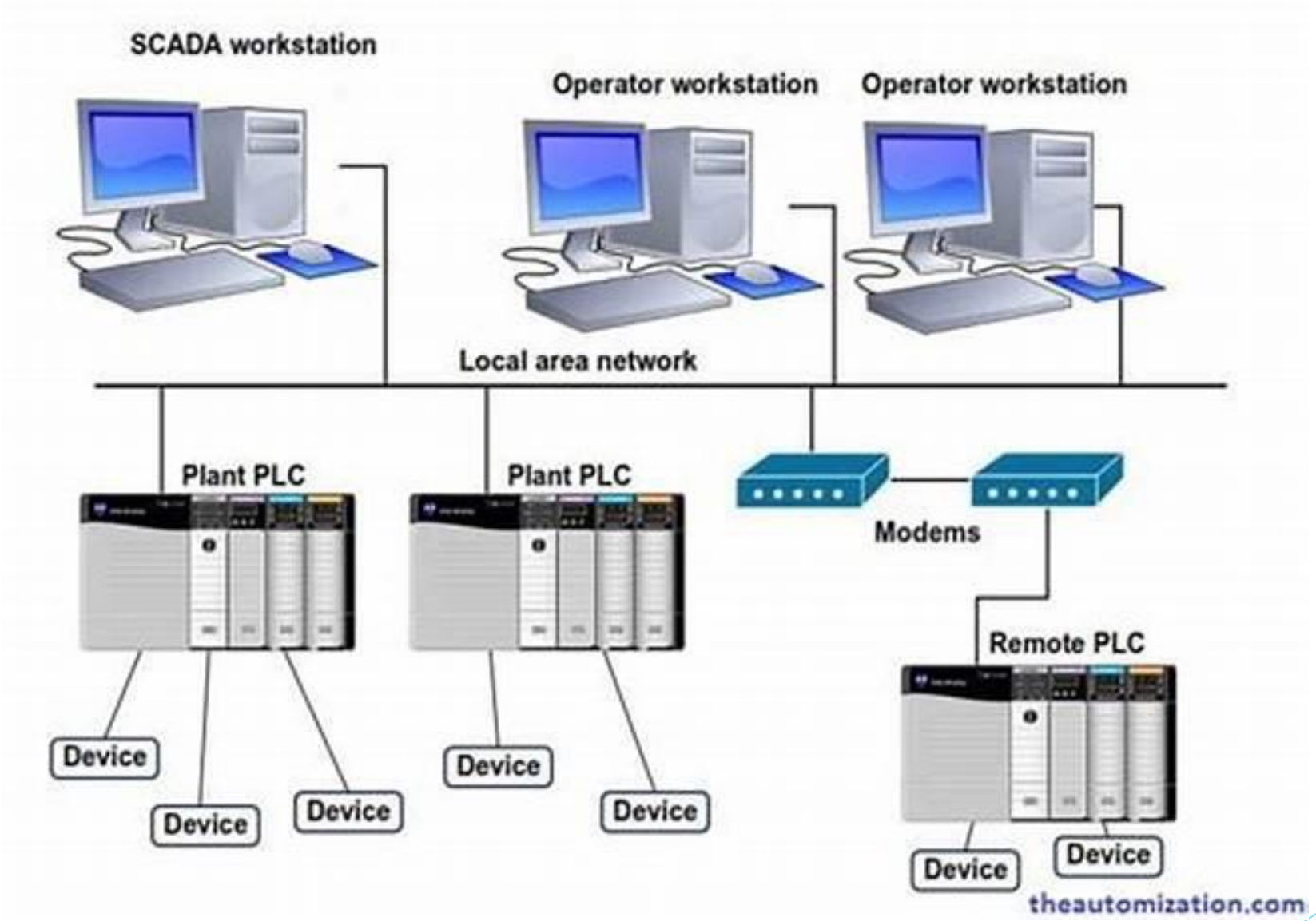


Collection of hardware and software brought together to monitor and control a process system from one or many control stations either local or remote to the system.



The Hierarchy of SCADA

- SCADA Server(s)
- Workstations and Historian
- PLCs, RTUs, HMIs
- Field Devices. (Sensors, VFDs, etc.)

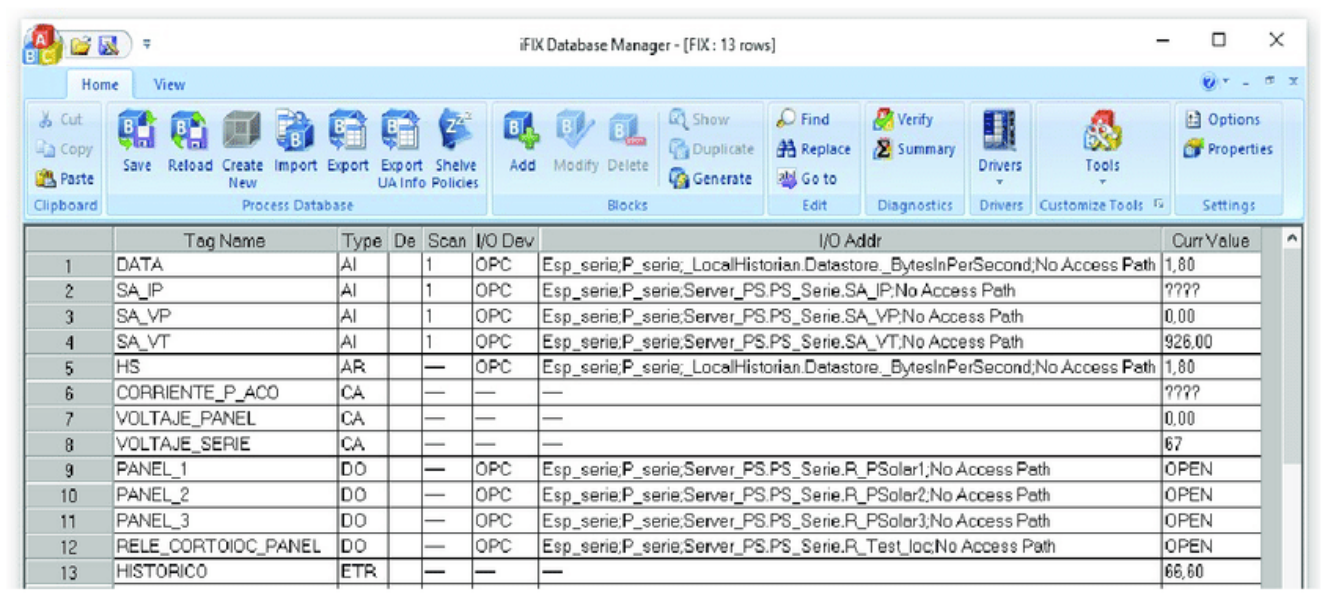

SCADA workstation
Operator workstation
Operator workstation
Local area network
Plant PLC
Plant PLC
Modems
Remote PLC
Device
Device
Device
Device
Device
Device
Device
Device
theautomization.com

SCADA Servers

- Database
- Security
- Alarming
- Feeds clients and Historian Data
- Configuration Mode
- I/O Drivers
- Failover Programming

The Database

- Tag creation and properties
  - I/O, Calculations, Program, etc.
  - Scaling
  - .F_CV, .ACUALM, etc.
- Everything is associated with a Tag
  - Alarms
  - Values
  - Buttons
  - Trends/Historical Data
  - Outside applications



	Tag Name	Type	De	Scan	I/O Dev	I/O Addr	Curr Value
1	DATA	AI		1	OPC	Esp_serie;P_serie;_LocalHistorian.Datastore._BytesInPerSecond;No Access Path	1,80
2	SA_IP	AI		1	OPC	Esp_serie;P_serie;Server_PS.PS_Serie.SA_IP;No Access Path	????
3	SA_VP	AI		1	OPC	Esp_serie;P_serie;Server_PS.PS_Serie.SA_VP;No Access Path	0,00
4	SA_VT	AI		1	OPC	Esp_serie;P_serie;Server_PS.PS_Serie.SA_VT;No Access Path	926,00
5	HS	AR		—	OPC	Esp_serie;P_serie;_LocalHistorian.Datastore._BytesInPerSecond;No Access Path	1,80
6	CORRIENTE_P_ACO	CA		—	—	—	????
7	VOLTAJE_PANEL	CA		—	—	—	0,00
8	VOLTAJE_SERIE	CA		—	—	—	67
9	PANEL_1	DO		—	OPC	Esp_serie;P_serie;Server_PS.PS_Serie.R_PSolar1;No Access Path	OPEN
10	PANEL_2	DO		—	OPC	Esp_serie;P_serie;Server_PS.PS_Serie.R_PSolar2;No Access Path	OPEN
11	PANEL_3	DO		—	OPC	Esp_serie;P_serie;Server_PS.PS_Serie.R_PSolar3;No Access Path	OPEN
12	RELE_CORTOIOC_PANEL	DO		—	OPC	Esp_serie;P_serie;Server_PS.PS_Serie.R_Test_Ioc;No Access Path	OPEN
13	HISTORICO	ETR		—	—	—	66,60

Security

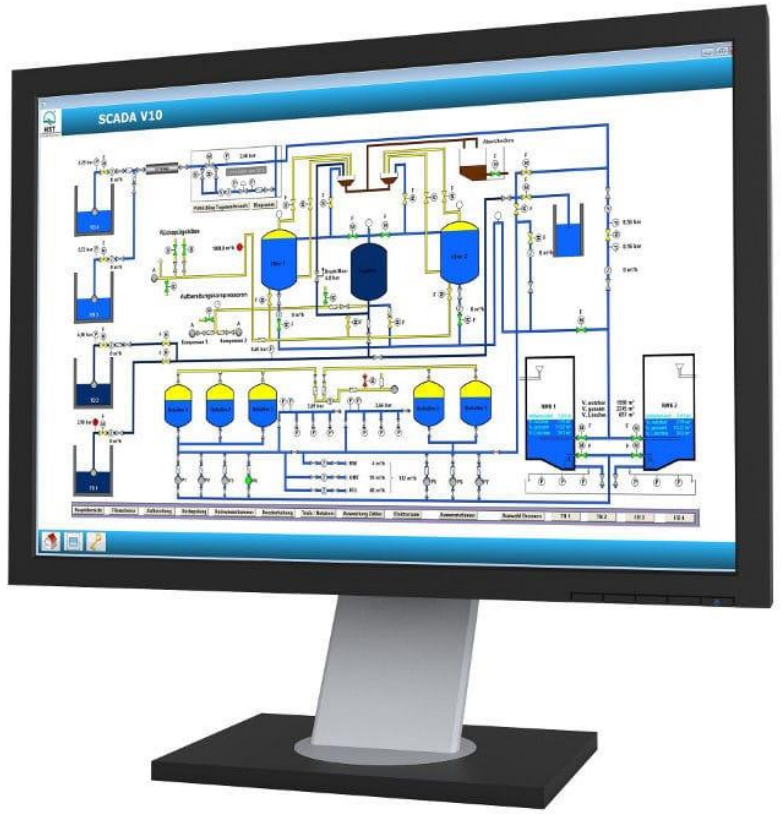
- Configured on server and matched on clients
- User Setup
- Security Groups (Levels of Authorization)
- Cyber Security
  - Starting to be a regulatory topic that will be monitored

Alarming

- Change of state in a tag that requires attention and acknowledgement.
- 2 Main Types
  - Analog
  - Digital
- Catch Attention
  - On HMI/Client
  - In “Alarm Tab”
- Alarm History is stored for troubleshooting and historical purposes.
- NOT FOR REMINDERS

Workstations/Clients

- Get data from the SCADA Server.
- Pictures (pages) configured on a Server.
- Most operators work off a Client SCADA.
- Do not have failover capabilities.
- Can be anywhere with a SCADA network access.
  - Security must be considered



Historian

- Stores data received from the Tag Database on SCADA server.
  - Tags must be added to historian to start storage.
- Can provide data to workstations for trending and historical purposes.
- Can used with information management software/systems to generate reports.
- Any tag added to a historian can be trended on historian.
  - Not all historian data is added as a viewable trend on workstations.

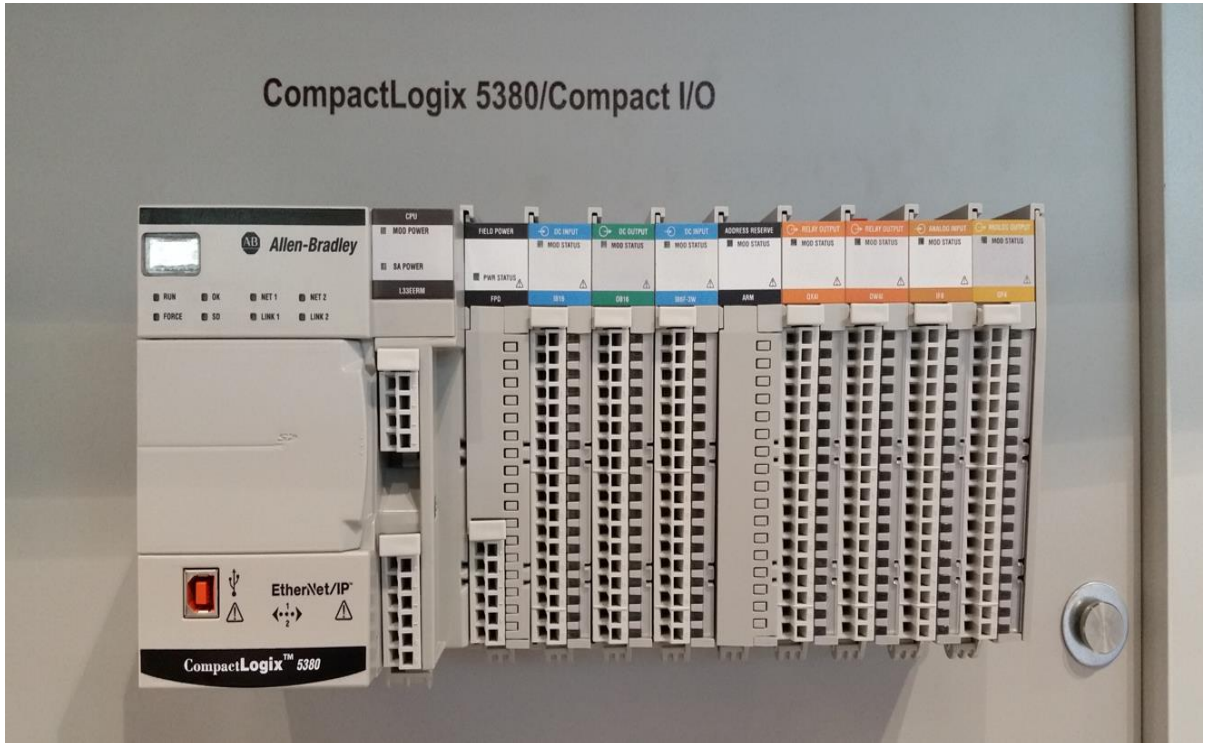
HMIs

- Human Machine Interface
- Monitor and control away from workstations
- Usually tied to a specific machine, location, or part of a process.

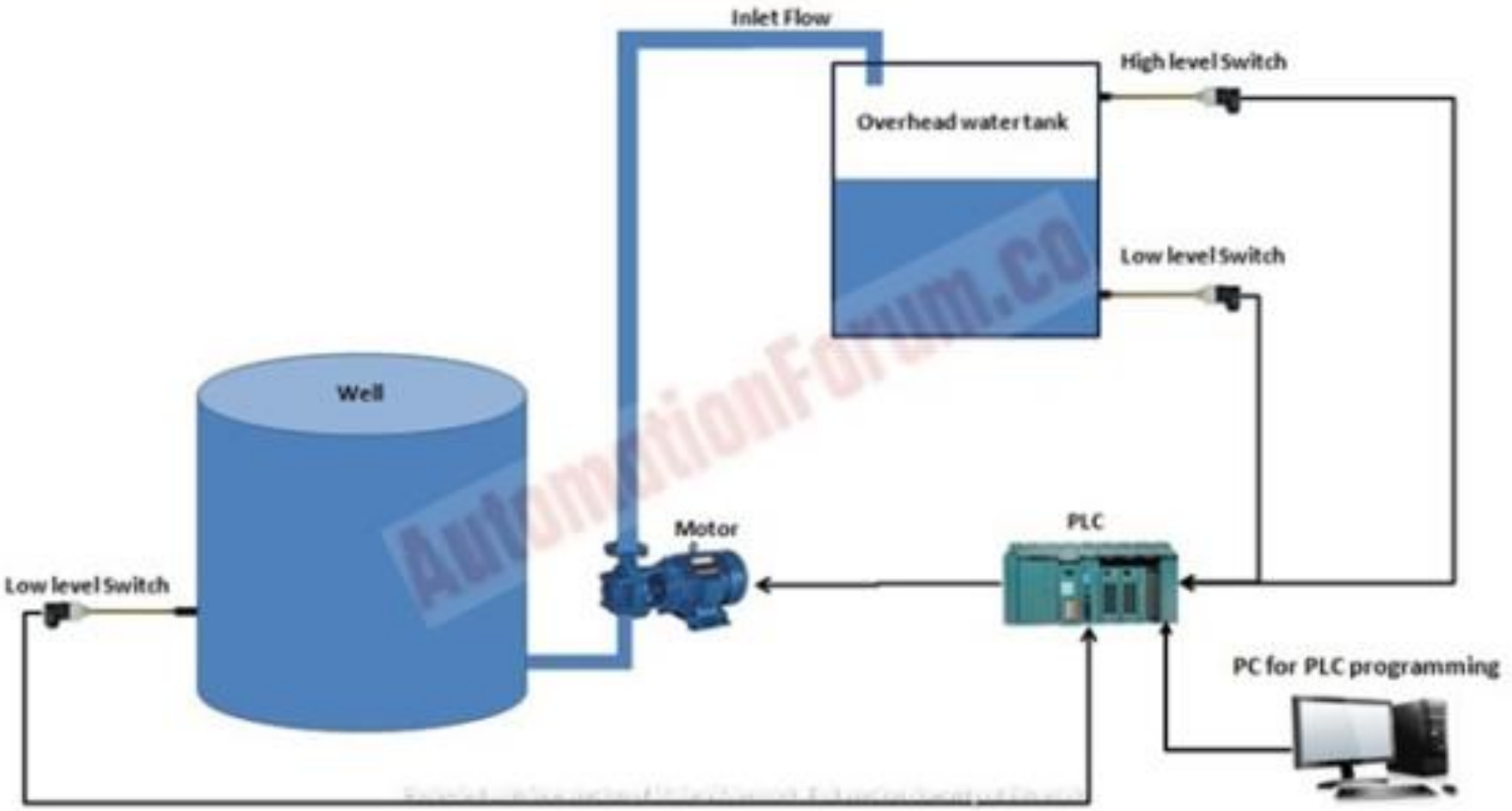
PLCS & RTUs

- Remote Terminal Units
- Programmable Logic Controller
- “Connection” between hardware and software.
- Field Devices connect to these units.

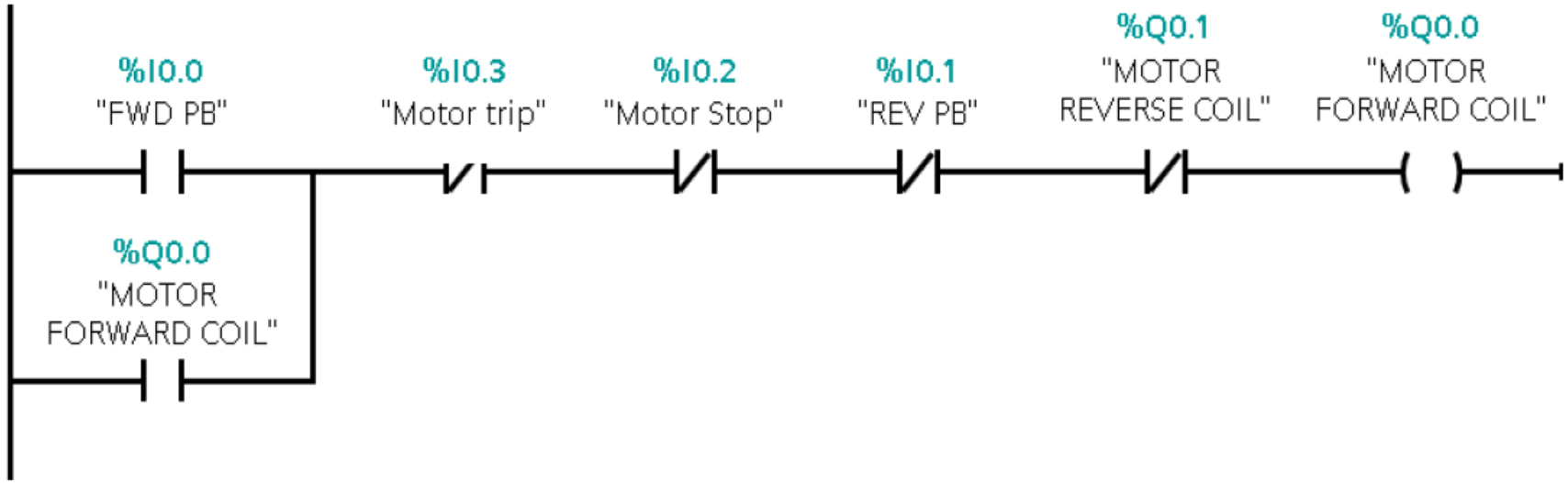
PLCs and RTUs cont.



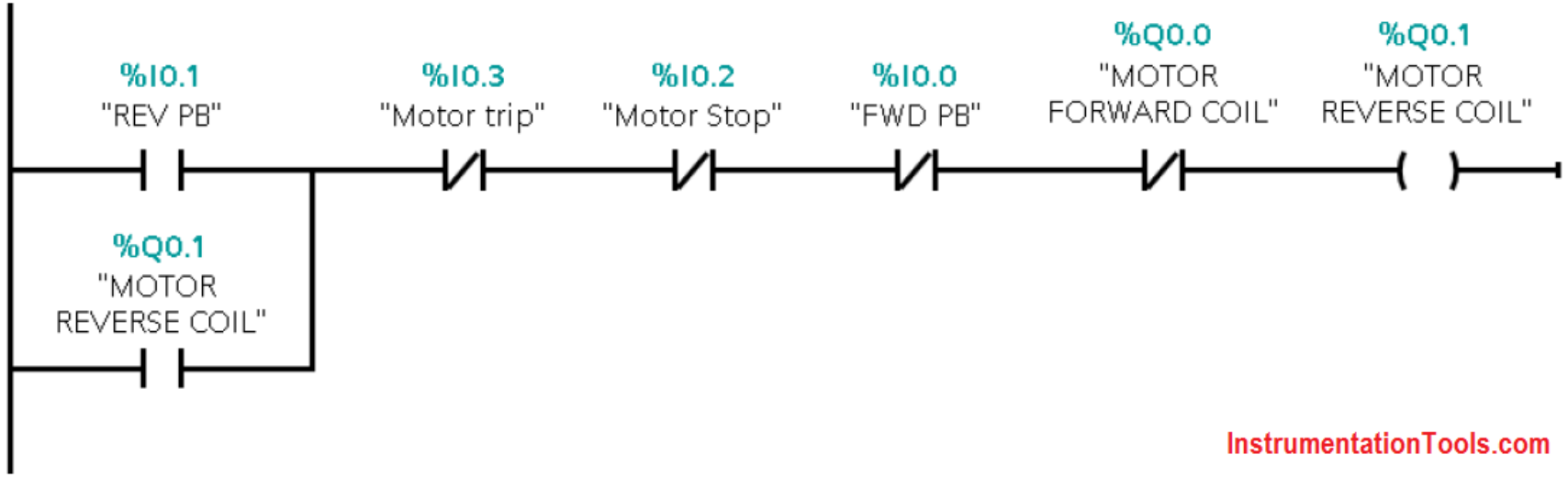
- I/O Capabilities
- Programmable
- Everything should happen in the PLC


Inlet Flow
High level Switch
Overhead water tank
Low level Switch
Well
Motor
PLC
Low level Switch
PC for PLC programming

Network 1 : MOTOR FORWARD OPERATION



Network 2 : MOTOR REVERSE OPERATION



Field Devices

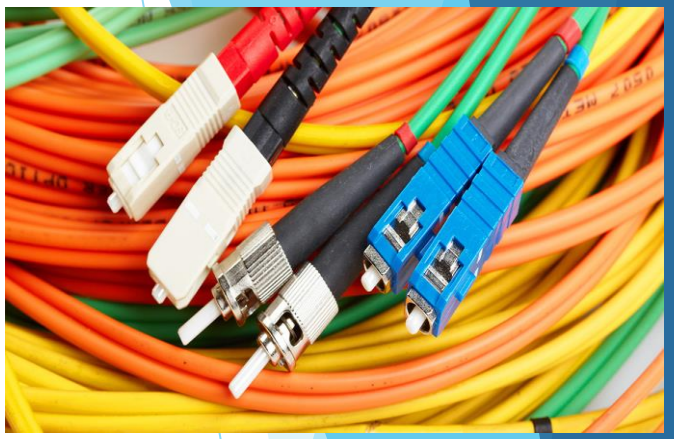
- Instrumentation
  - Pressure
  - Level
  - Flow
  - Water Quality
  - Temperature
  - Weight
  - Gas Sensors
  - Etc.
- VFDs
  - Large Applications (Pumps, Large Mixing Basins)
  - Small Applications (Chemical Pumps, Chemical Mixers, etc.)
- Calibrations
  - Record Keeping

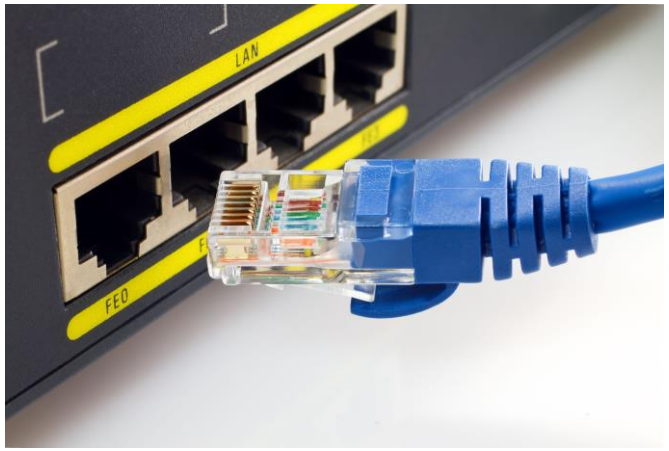
Back-Up Power

- Emergencies and Planned outages
- UPS (Uninterruptible Power Supply)
- Generators
- Batteries
  - Some pieces of equipment require to retain programming.
    - Drives
    - PLCs
    - Etc.

Communications

- Protocols
  - Modbus TCP, Ethernet TCP/IP, etc.
- Media
  - Cellular
  - Radios
  - Fiber
  - Ethernet/Copper
  - Internet – AVOID





Thank you!