Triple Redundancy SCADA system with Omron PLCs

How It Started

Redundancy is one of the compulsory features for SCADA engines. The main objective of implementing redundancy for industrial automation is to double the reliability of your SCADA system by allowing them to run in pair for mission critical operations.

In this application, Ecava IGX is required to triple the reliability with triple redundancy. Basically, the configuration for redundancy is as simple as adding all the peers in the list and then clone the existing project into each of the involved peer machine. The project files and configuration are identical it is only necessary to maintain one project instead of three.

The Setup

Other than Ecava IGX SCADA engine, the setup also involves different models of Omron PLCs, i.e. CJ1M, CJ2M, and NJ01. Each of the server machine will be connected to all three Omron PLCs for operation and communicate via Omron FINS protocol.

Three server machines will be configured as redundancy peers, and they will be playing the role as primary, secondary and tertiary servers. All three of them will be in sync with each other to ensure all live and archived data are identical. Basically, each of them serves as a backup of each other. For instance, when the primary server is down, then secondary server shall takeover until it is recovered. The tertiary server shall behave the same for similar case.

In a redundant SCADA system, database takes the essential responsibility to ensure the system is "always up" by performing data syncing job. To achieve data sync in the optimum way, Ecava's engineer configured an additional database specially for syncing job. This approach is to ensure the data syncing job is independent and will not be interrupted by ordinary logging tasks. These databases are called Redundancy database.

The network architecture is simple and straightforward, where Ethernet network will consists of 3 servers, and 3 PLCs, interconnected to each other. The configuration for PLCs and redundancy peers are shown in detail in the original article.

As usual, Ecava team setup the complete system in staging area to perform different stages of tests. The lineups of the mentioned Omron PLCs of different models are being programmed and connected, as shown below.

(From left: NJ01, CJ2M, CJ1M)

All of the Omron PLCs are programmed with logic which can be supervised and controlled on the HMI screens. The screenshot below shows one of the operations i.e. the basic traffic light mimic, in which it operates according to PLCs' programs.
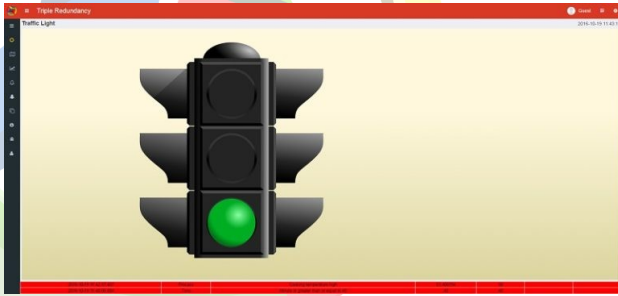
The Hardware / Software:

Server Machines: Hewlett Packard 8300E CMT
OS: Microsoft Windows Server 2008 R2 Enterprise

PLC (Programmable Logic Controllers): Omron
CJ1M, CJ2M, NJ01
Protocol: Omron FINS protocol

SCADA: Ecava IGX
IO tags: 1000 tags

Database: PostgreSQL Database

Download Ecava IGX

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