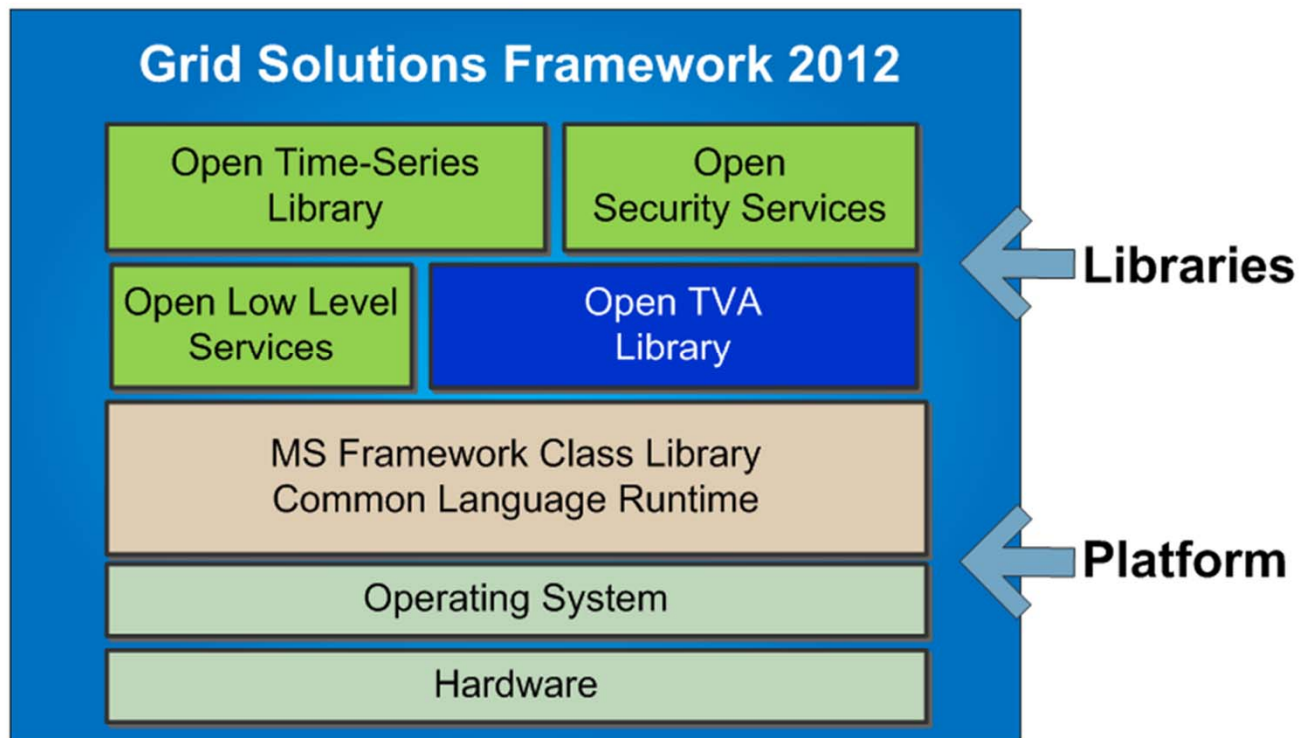
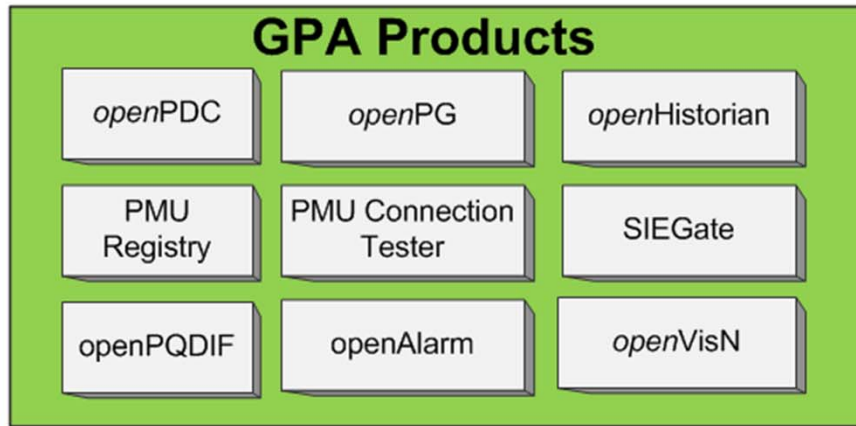


openPDC v1.5

2012 User's Forum Tutorial

J. Ritchie Carroll

8/22/2012



openPDC Version 1.5 Feature List

- Seamless integration with the open phasor gateway (openPG). The openPDC can perform all the functions of the openPG.
- Multicast server and improved source support (receive and transmit for all protocols).
- New extensible statistics engine.
- Updated subscriber API's – with .NET, C++ and Java support.
- An alarming service that will provide automated notifications based on phasor data comparisons to set-points or data control bands.
- Automatic out-of-band historical data “gap filling” in a destination openPDC as might result, for example, during times that communications is lost between a substation and the control center.

openPDC Version 1.5 Feature List

(continued)

- Dynamic switching to a secondary communications connection on failure of the primary connection.
- Security and performance improvements based on findings from testing by vendors and major universities.
- Simple UDP packet splitting (software level) for outputs to accommodate streams greater than 64K (or other user selectable limit)
- Macrodyne G and N support
- IEEE C37.118.2-2012 support
- IEC 61850-90-5 support with missing data statistic for multiple ASDUs

Security Improvements

- Based on reports from Fortity and code level inspections provided by external parties, the openPDC v1.5 includes various new security improvements.
- A majority of code level check-ins into version 1.5 have been related to improvements to security at various levels.

Completely New Socket Layer

- In version 2.0 of the .NET Framework sockets were implemented using the Asynchronous Programming Model prevalent throughout the .NET Framework at that time. The primary issue with the 2.0 Socket was that it consumed excess CPU cycles to perform a single socket I/O operation and allocating much memory to maintain I/O operations on a large number of sockets simultaneously.
- In .NET Framework 3.5 a new method called Event-based Asynchronous Pattern is used efficiently manage a large number of overlapped objects simultaneously.
- Version 1.5 of the openPDC implements this improved socket technology.

Alarming

openPDC Manager - GPA-WS-1\swills

openPDC Manager Current Node: Default

Home Monitoring Devices Adapters Manage

Manage Alarms

1 Tag Name *

2 Signal TVA_SHELBY:ABBS

3 Operation Equal to

4 Alarm Point

5 Tolerance

6 Delay seconds

7 Hysteresis

8 Severity None

9 Description

10 Load Order * 0

11 Enabled

12 Create Associated Measurement

Delete Clear Save

TagName	Operation	Severity	Description	Enabled
FREQ_ALRM	TVA_SHELBY:ABBF > 60.0	High	Frequency upper limit	<input checked="" type="checkbox"/>

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A

Full Error Log

Error Log [Display Settings](#) Refresh Interval: 10

SI No.	Date and Time	Exception Source	Exception Type	Exception Message	Log
17	8/22/2012 11:19:11 AM	Refresh Alarms		No connection could be made	Detail
16	8/22/2012 10:57:40 AM	Refresh Alarms		No connection could be made	Detail
15	8/22/2012 10:57:30 AM	Refresh Alarms		No connection could be made	Detail
14	8/22/2012 10:57:28 AM	Refresh Alarms		No connection could be made	Detail
13	8/22/2012 10:57:20 AM	Refresh Alarms		No connection could be made	Detail
12	8/22/2012 10:57:06 AM	Refresh Alarms		No connection could be made	Detail
11	8/21/2012 3:20:13 PM	Refresh Alarms		No connection could be made	Detail
10	8/21/2012 3:20:03 PM	Refresh Alarms		No connection could be made	Detail
9	8/21/2012 3:19:53 PM	Refresh Alarms		No connection could be made	Detail
8	8/21/2012 3:19:43 PM	Refresh Alarms		No connection could be made	Detail
7	8/21/2012 3:19:33 PM	Refresh Alarms		No connection could be made	Detail
6	8/21/2012 3:12:25 PM	Refresh Alarms		No connection could be made	Detail
5	8/21/2012 3:12:23 PM	No Source	System.InvalidOperationException	Failed to load adapter "ANGUL"	Detail
4	8/21/2012 3:12:22 PM	Refresh Alarms		No connection could be made	Detail
3	8/21/2012 3:12:17 PM	Refresh Alarms		No connection could be made	Detail
2	8/21/2012 3:11:24 PM	No Source	System.InvalidOperationException	Failed to load adapter "ANGUL"	Detail

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Enhanced Screen Performance

Paging screens now work quickly with millions of records!

Multiplier* Measurement GUID f93c10c9-46b0-4741-ae5c-00ef16acfd21

Delete Clear Save

Search

ID	Description	Internal	Subscribed	Enabled
STAT:17	System Statistic for Amount of memory currently used by this process in mega	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:12	Shelby ABB-521 Dell Positive Sequence Current Phase Angle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
STAT:16	System Statistic for Average percentage of CPU used by this process.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:6	Shelby ABB-521 500 kV Bus 1 Positive Sequence Voltage Phase Angle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:8	Shelby ABB-521 500 kV Bus 2 Positive Sequence Voltage Phase Angle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:10	Shelby ABB-521 Cordova Positive Sequence Current Phase Angle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:7	Shelby ABB-521 500 kV Bus 2 Positive Sequence Voltage Magnitude	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:14	Shelby ABB-521 Lagoon Creek Positive Sequence Current Phase Angle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:3	Shelby ABB-521 Digital Value 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:11	Shelby ABB-521 Dell Positive Sequence Current Magnitude	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:5	Shelby ABB-521 500 kV Bus 1 Positive Sequence Voltage Magnitude	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:13	Shelby ABB-521 Lagoon Creek Positive Sequence Current Magnitude	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:4	Shelby ABB-521 Frequency Delta (dF/dt)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
STAT:15	System Statistic for Percentage of CPU currently used by this process.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:2	Shelby ABB-521 Frequency	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:1	Shelby ABB-521 Status Flags	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PPA:9	Shelby ABB-521 Cordova Positive Sequence Current Magnitude	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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New Adapters

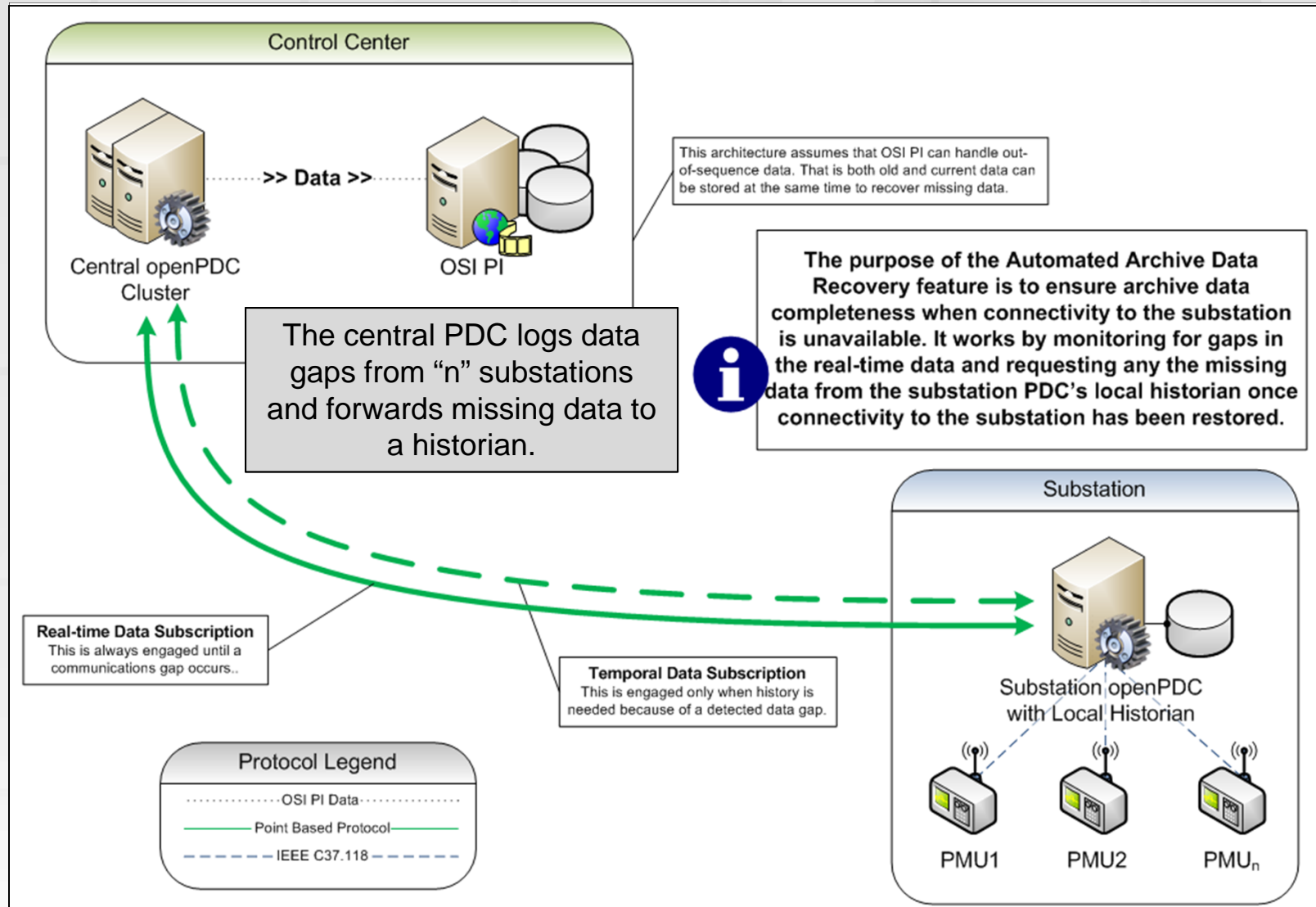
- DNP3 input adapter
- Native OSI-PI input and output adapters built using SDK for best speed
- Dynamic Calculator
- Enhanced CSV adapters with high-resolution timer and transverse formatting support
- 1-Second Frequency Averager

Tool Enhancements...

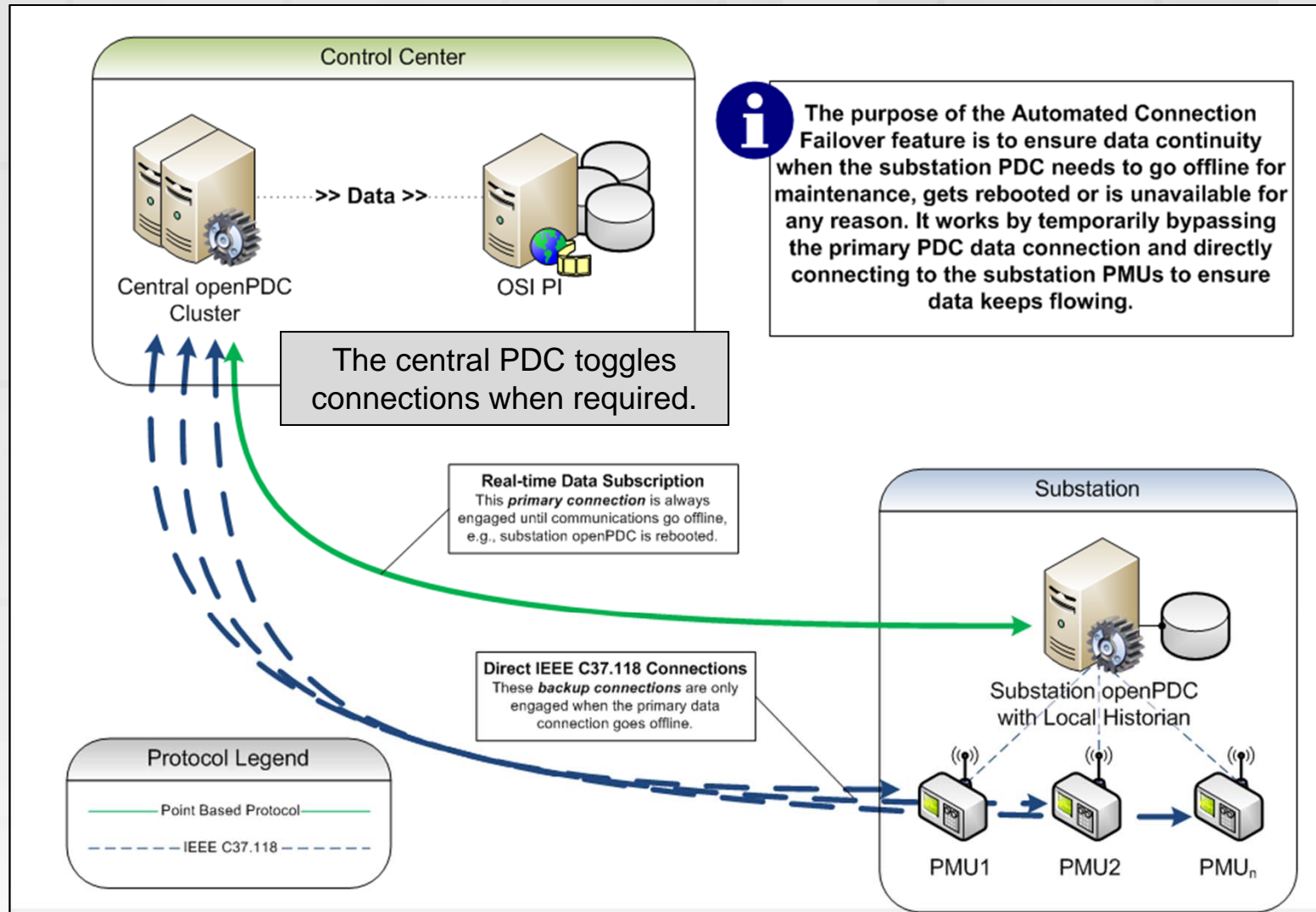
The screenshot displays the 'Historian Playback / Export Utility v1.1.178' interface. It features several key components:

- Input Selection:** Includes 'Archive Location' (C:\Program Files\openPG\Statistics), 'Search Phrase' (with 'Clear' and 'Find' buttons), and a list of system statistics (STAT:1 to STAT:10) with checkboxes. STAT:2 is selected.
- Output Selection:** Shows 'Output Channel' (TCP, UDP, File, Serial) with 'File' selected. The 'Filename' is 'Users\Ritchie\Desktop\Output.csv'. There are options for 'Append export to existing file' and 'Output data in binary format' (unchecked) vs 'Output data in plain-text format' (checked). A template for the plain-text format is provided: `{0:Source}-{1:ID},{2:Name},{3:Synonym1},{4:Time},{5:UnixTime},{6:Value},{7:Quality},{8:Description}`. There are also options for 'Process data as fast as possible' (checked) and 'Process data at 0 samples per second'.
- Time Range:** 'Start Time (in UTC): 08/22/2012 11:31:38' and 'End Time (in UTC): 08/22/2012 11:36:38'.
- Messages:** A large black area for displaying messages.
- Historian Data Viewer:** A window in the background showing a line chart of data over time, with a y-axis value of 59.98 and x-axis labels at 6:29 PM, 6:30 PM, and 6:31 PM.
- Archives:** A sidebar showing 'TVA_SHELBY:ABBF'.
- Data Table:** A table listing various data points such as 'Shelby ABB-521 Cordova Positive Sequence Current Phase Angle', 'Shelby ABB-521 Dell Positive Sequence Current Magnitude', etc.
- Chart Resolution:** A control for 'Chart resolution: 100 samples'.
- Start Button:** A 'Start' button at the bottom right of the utility window.

Automated Historical Data Synchronization



Automated Connection Failover



Thank You for *Your* Contributions!

- Updates
- Enhancements
- New Screens
- New Features
- Bug Fixes

Version 1.5 of the openPDC includes more externally provided open source contributions than any other version to date!