



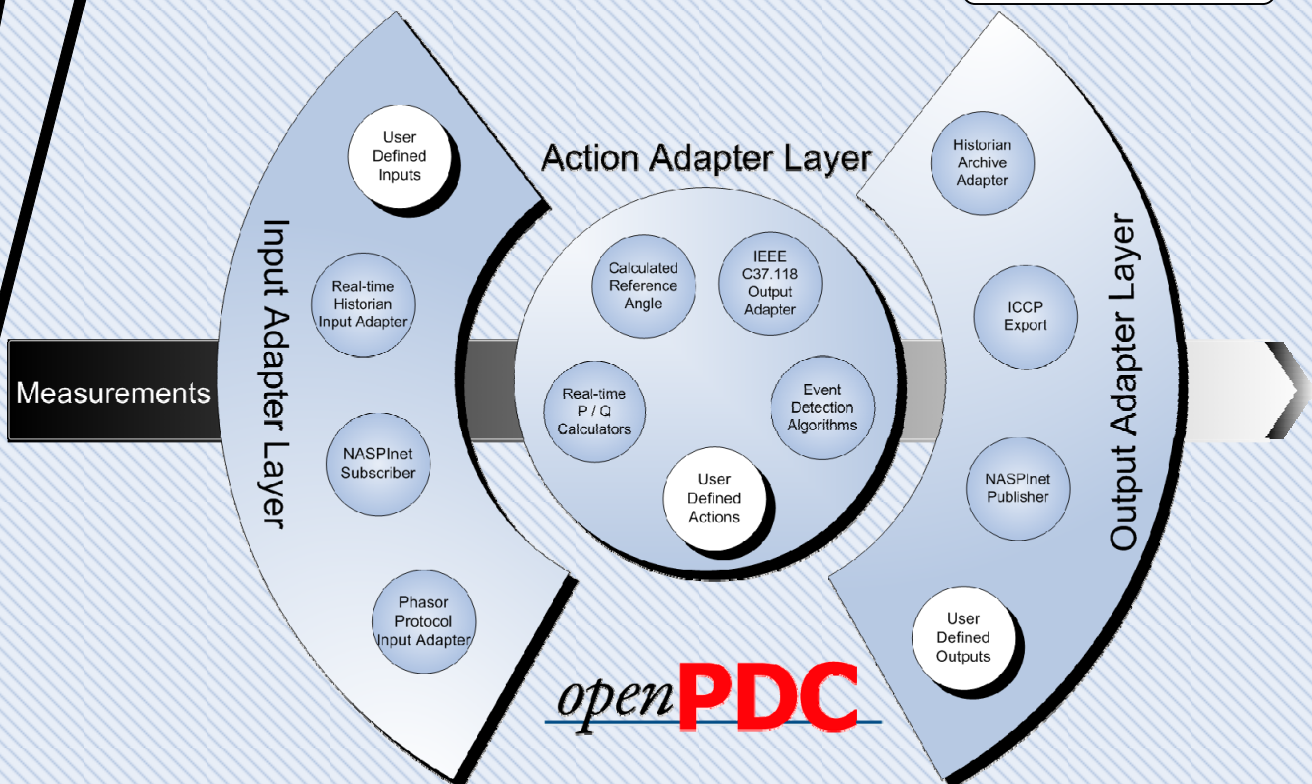
openPDC

The *Open Source*
Phasor Data Concentrator

<http://openpdc.codeplex.com>

TVA began development of a Phasor Data Concentrator (PDC) in 2004 to advance the efforts of the Eastern Interconnection Phasor Project (EIPP). With the help of this system the EIPP continued to expand and is now under NERC oversight as the North American Synchrophasor Initiative (NASPI). TVA has made this PDC available to the public as an open source project called the openPDC. It is our hope that this code will be used to support the development of the smart grid and accelerate the global use of synchrophasors as an enabling technology for both vendors and the electric power system industry as a whole.

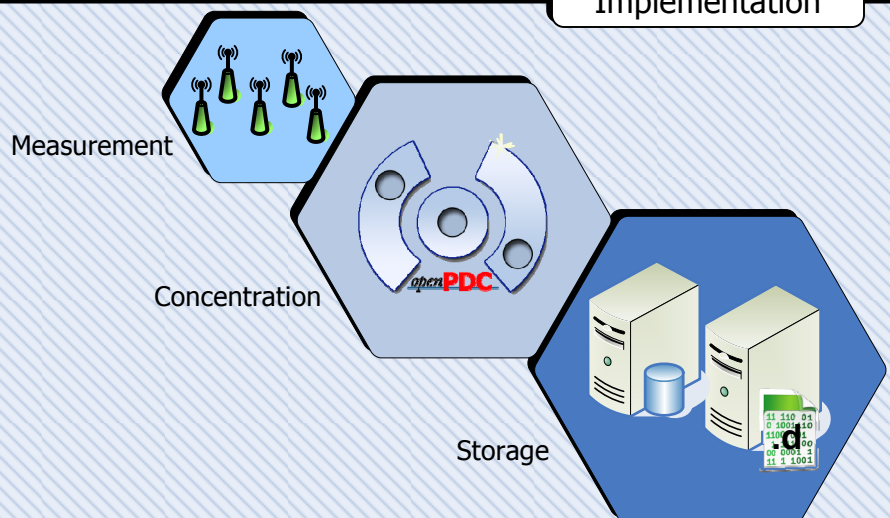
Abstract Data Flow



Implementation

Source Code

- Over 300,000 lines of code in 640+ object oriented C# and Java classes spanning 22 projects in 4 solutions.
- Over 6% of code is structured development comments used to create help files that are integrated within Visual Studio.
- Full source code for the PMU Connection Tester included.





Features

The features of the openPDC include:

- **Maturity** – in production since 2004, collecting data from a diverse range of synchrophasor measurement devices.
- **Performance** – proven operability with over 120 PMUs, with design expectations to support 200+ devices on a single computer (up to hardware limits).
- **Scalability** – expandable through addition of hardware and distribution of major system components.
- **Extensibility** – designed to be completely extensible through plug-in adapters developed using .NET technology.
- **Reliability** – components can be deployed as Windows services, which automatically accommodate operation in both fail-over and load-balanced clusters.
- **Interoperability** – assured optimal compatibility with forthcoming NERC Phasor Concentration System, planned for 2010.
- **Open Source** – all source code is made available with Web-based repository for team development and is fully documented with integrated help for APIs. Software is made available through a carte blanche software license.
- **Standard Protocols** – full-duplex phasor API supporting the following protocols: IEEE C37.118 (v1.0 and Draft 6), IEEE 1344, BPA PDCstream, FNET, SEL Fast Message and Macrodyne.
- **Multiple Databases** – system configuration can be stored in practically any database or in XML. Fast native driver support for: SQL Server, My SQL, Oracle, OleDb and ODBC data sources.
- **Archiving and Storage** – support for most historians (such as, OSI-PI, Instep) through output plug-in adapters. Also includes local archiving support that writes files in the binary “.d” file format that can be used by Hadoop to perform “big-data” analytics.
- **Configuration Management** – system management is handled with the included Web-based Silverlight application that can be deployed for remote configuration (eliminating need for direct access hardware).

