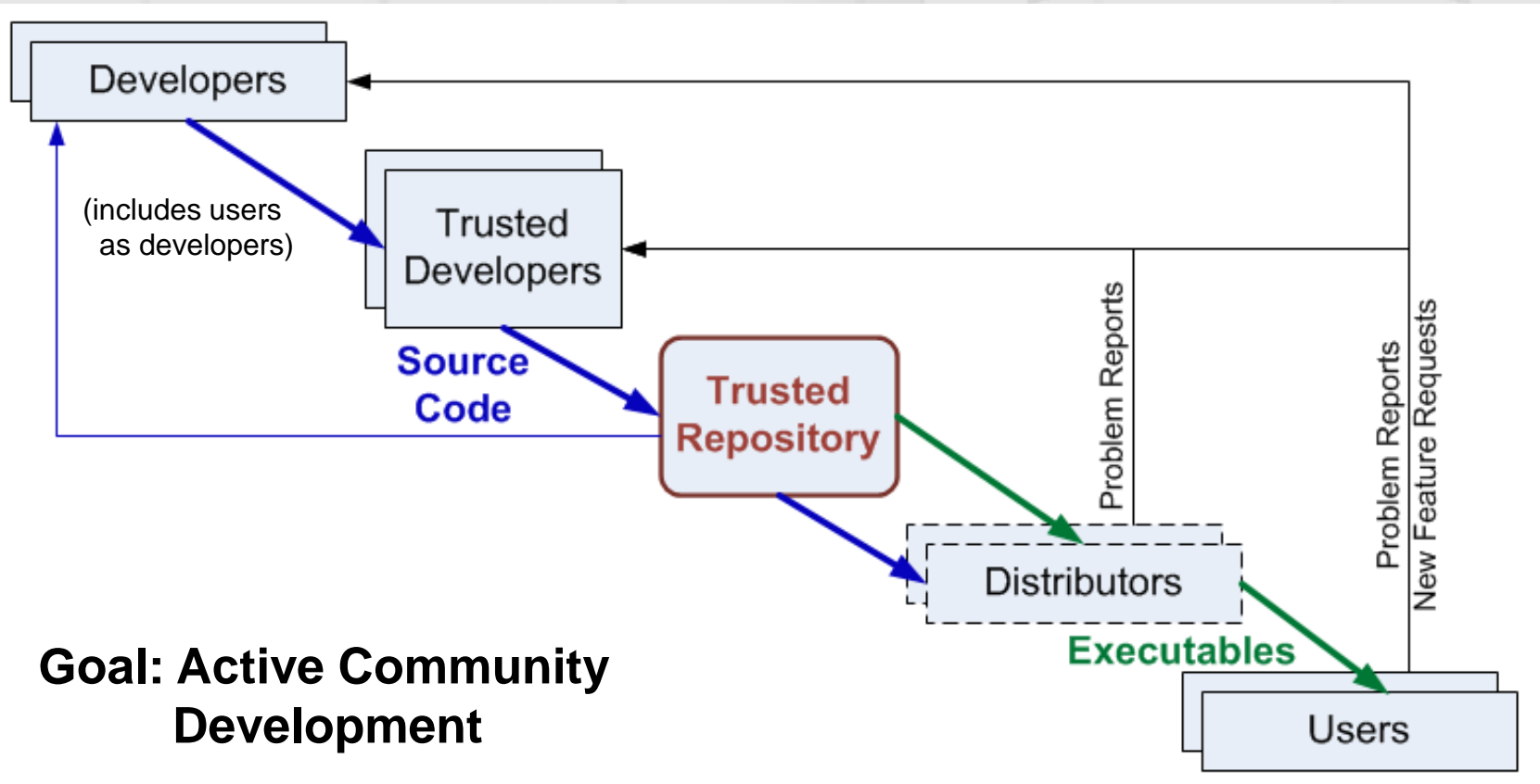


# Using Open Source Software in Synchrophasor Applications

Russell Robertson

March 11, 2013

# OSS Development Model

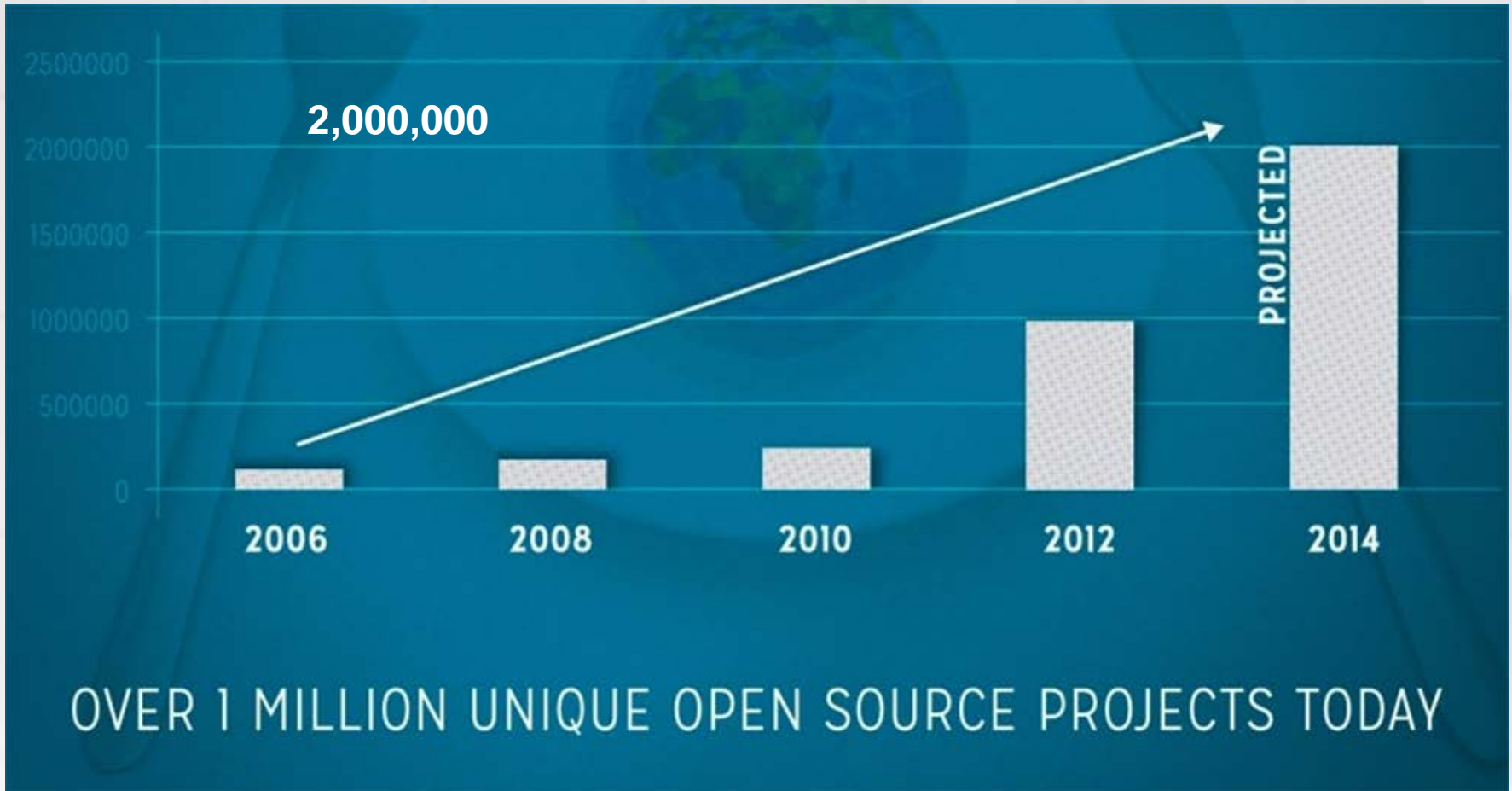


# Black Duck OSS Survey

- An annual survey on the future of open source software
- From 822 respondents in April 2013
  - 42% vendors, 58% non-vendor

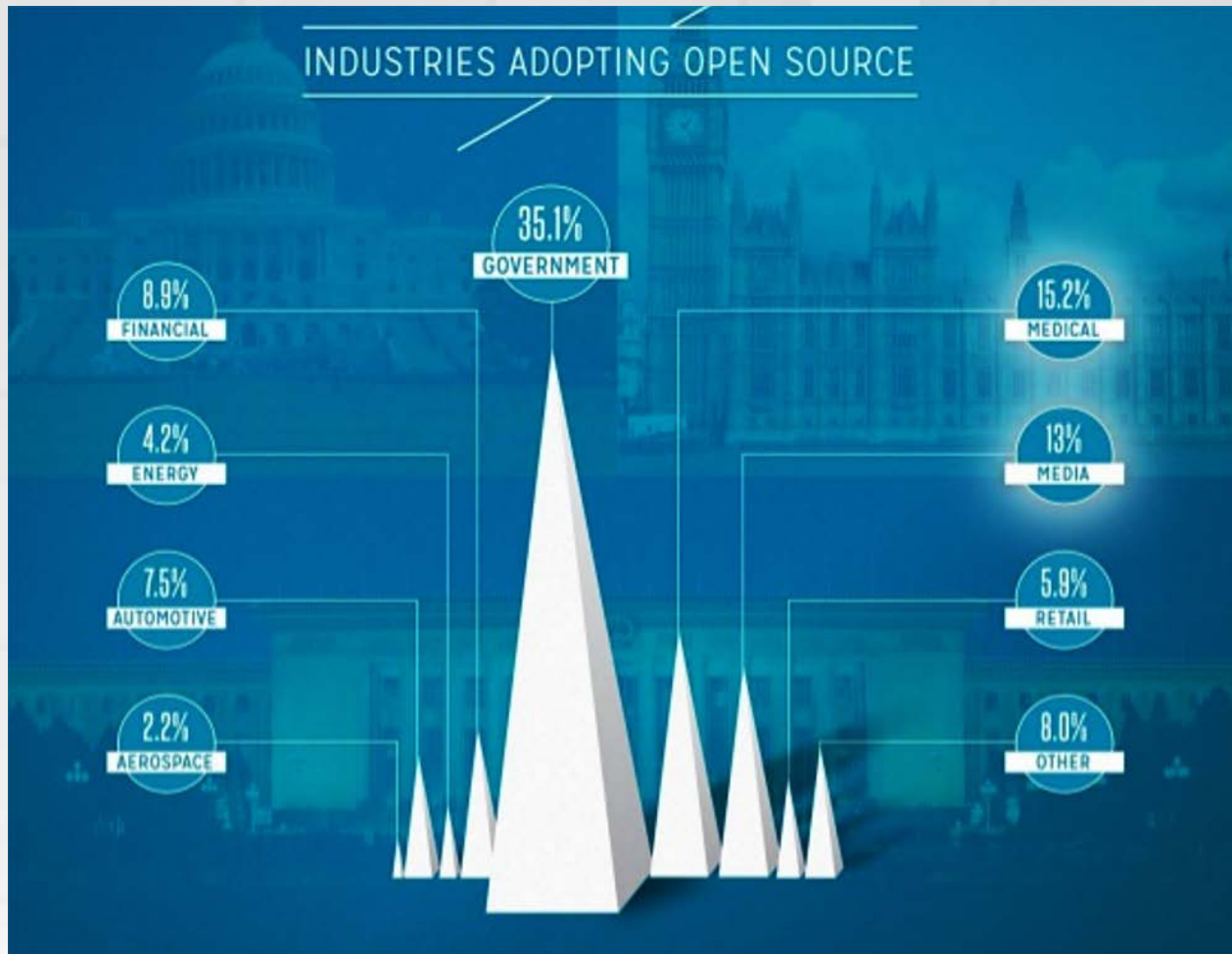
<http://www.slideshare.net/blackducksoftware/the-2013-future-of-open-source-survey-results>

# OSS on a strong growth curve



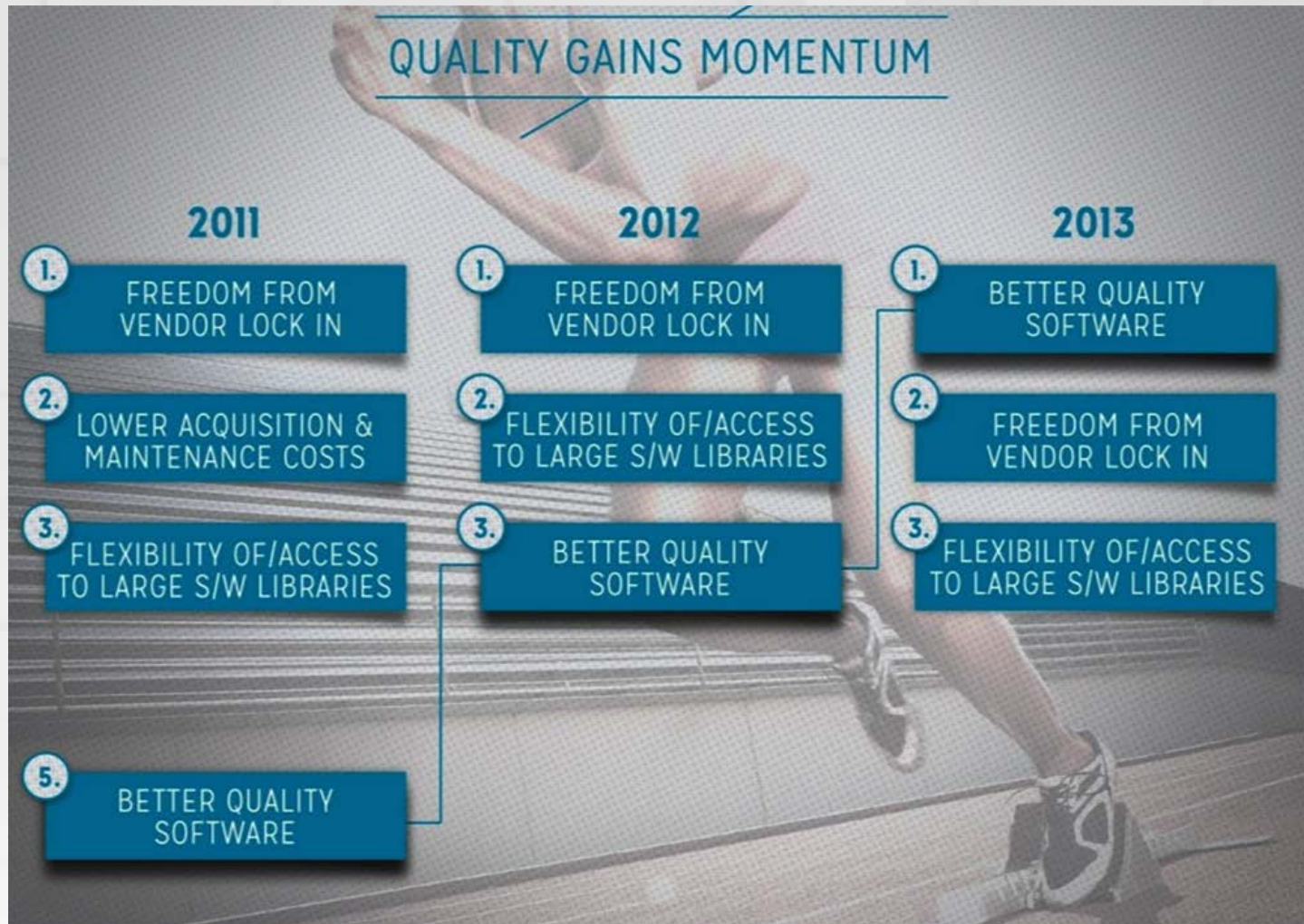
Source: Black Duck Software. *The 2013 Future of Open Source Software Survey Results*

# Energy On the Low-Side of Use



Source: Black Duck Software. *The 2013 Future of Open Source Software Survey Results*

# Business Drivers for OSS



Source: Black Duck Software. *The 2013 Future of Open Source Software Survey Results*

# Other Outcomes of OSS Development



Source: Black Duck Software. *The 2013 Future of Open Source Software Survey Results*

# WHY ENGAGE DIRECTLY WITH AN OPEN SOURCE COMMUNITY

1.

REDUCE  
YOUR OWN  
DEVELOPMENT  
&  
MAINTENANCE  
COSTS

2.

ATTRACT &  
RETAIN TOP  
DEVELOPMENT  
TALENT

3.

INFLUENCE  
PROJECTS

Source: Black Duck Software. *The 2013 Future of Open Source Software Survey Results*



# Engaging in OSS

- Create a new open source project
  - Select a license
  - Pick a web-based OSS hosting service
- Contribute to an open source project that already exists
  - Understand governance / community culture
  - Engage
  - Periodically review benefits / continued participation

# New Project - Select a License

- **Popular business friendly licenses**
  - Apache (License 2)
  - MIT
  - BSD
  - Eclipse
  - Mozilla
  - CPL (Common Public License)

# New Projects - OSS Hosting

## FEATURES

- **CodePlex (2006)**  
35K projects, 151K users
  - **Bitbucket (2008)**  
94K projects, 1M users
  - **SourceForge (1999)**  
430K projects, 3.4M users
  - **Github (2008)**  
11M repositories, 5.2M users
  - **Google Code (2006)**  
*Not Reported*
- Bug Tracking
  - Web Hosting
  - Discussion Forum
  - Mailing List Mgmt
  - Binary Release Posting
  - Version Control / SCM
    - Subversion
    - MS TFS
    - Git

# Contributing – Synchrophasor OSS

## GPA

- Grid Solutions Framework
- openPDC
- SIEGate (openPG)
- openHistorian
- PMU Connection Tester
- Phasor Data Stream Splitter

## OTHERS

- Synchrophasor Analytics (Kevin Jones, Dominion)
- Macomber Map (Mike Legatt, ERCOT)
- OpenPMU Project (Queens Univ. / KTH)
- Cisco/SISCO open source synchrophasor framework
- iPDC (India)
- More ??

# Tools Becoming Available to Gauge OSS quality

Ohloh | BLACK DUCK Open HUB

Follow@ Ohloh Ohloh Meta SIGN IN

PROJECTS PEOPLE ORGANIZATIONS <sup>BETA</sup> TOOLS CODE

Discover, Track and Compare Open Source


synchronphasor


Indexing 661,794 open source projects


<http://www.ohloh.net/>

# Ohloh Results for openPDC

**openPDC** Compare

*Analyzed 4 days ago* **1.3M** lines of code  High Activity

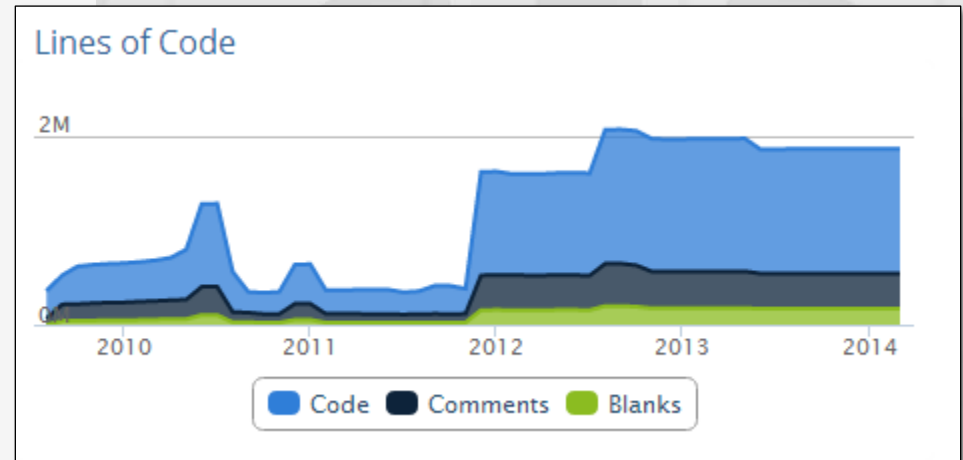
 The open source phasor data concentrator is a system that is used to manage, process and respond to dynamic changes in fast moving streaming phasor data. More specifically, the openPDC can process any kind of data that can be described as "time-stamped measured values". These measured values are simply numeric quantities that have been... [\[More\]](#)

**7** current contributors  0 Reviews

**13 days** since last commit **1** users on Ohloh

[Mostly written in C#](#) [Licenses: EPL-1.0](#)

- ... has had 5,777 commits made by 22 contributors representing 1,309,620 lines of code
- ... is mostly written in C# with a very well-commented source code
- ... has a codebase with a long source history maintained by a large development team with decreasing Y-O-Y commits
- ... took an estimated 363 years of effort (COCOMO model) starting with its first commit in August, 2009 ending with its most recent commit 13 days ago



# Multiple Ways to Participate in Synchrophasor OSS

Get  
Engaged

- Public / Guest
- \_\_\_\_\_
- Networking (Forums)
- Follower
- Editor
- Developer
- Coordinator (Project owner)

# Guest – Download/Experiment



HOME SOURCE CODE **DOWNLOADS** DOCUMENTATION

## openPDC v2.0 Release

<b>Rating:</b> No reviews yet	<b>Released:</b> Feb 14, 2014
<b>Downloads:</b> 1176	<b>Updated:</b> Feb 14, 2014 by <a href="#">ritchiecarroll</a>
<b>Change Set:</b> 89117	<b>Dev status:</b> Stable 

**RECOMMENDED DOWNLOAD**

 [Synchrophasor.Installs.zip](#)  
application, 18470K, uploaded Feb 14 - 827 downloads

**OTHER AVAILABLE DOWNLOADS**

HOME SOURCE CODE **DOWNLOADS**

Files | History | Patches

- ▶ BuildProcessTemplates
- ▶ Contributor Resources
- ▶ Hadoop
- ▶ Historian
- ▶ Releases
- ▼ Synchrophasor
  - ▶ Current Version
  - ▼ Current Version-VS2012
    - ▶ Build
    - ▼ Source
      - ▶ Applications
      - ▶ Data
      - ▶ Dependencies
      - ▶ Documentation
      - ▶ Libraries
      - ▶ Tools
        - LICENSE.txt
        - NOTICE.txt
        - openPDC.snk
        - Synchrophasor.sln
        - Synchrophasor.testrunconfig
        - Synchrophasor.vsmmdi
        - Synchrophasor.vssscc
        - Synchrophasor2.vsmmdi

<https://www.codeplex.com/>



# Register and Network

HOME SOURCE CODE DOWNLOADS DOCUMENTATION **DISCUSSIONS** ISSUES PEOPLE

[New Thread](#) | [Modify Discussion](#)

**Please Note:** The answers to many problems and questions, especially if you are new to the openPDC, can be found in the [Getting Started](#) and [FAQ](#) pages.

**Feb 25** [help with the historian playback utility](#)

8:08 AM (2 posts)

FIRST POST: [felipefreitaz](#) wrote: Hello, I'm new and I need to read a .d archive and convert it to ...

LATEST POST: [staphen](#) wrote: Hello [felipefreitaz](#), For converting archives to CSV, I would say y...

---

**Jan 29** [Running Hadoop Jobs on OpenPDC data](#)

11:05 AM (3 posts)

FIRST POST: [tseabra](#) wrote: I am a 2nd year Electrical Engineering student and along with a pro...

LATEST POST: [smafra](#) wrote: Hello, We are writing some code in python to read the .d files in...

---

**Jan 22** [Real-time Monitoring](#)

7:54 PM (3 posts)

FIRST POST: [dcroix](#) wrote: Hello, I am new to the world of PMU's and am learning everyday. I...

LATEST POST: [dcroix](#) wrote: Ritchie, Thanks for the recommendations! Yes the software provides...

CONFIGURE VIEW

Filter

Unanswered or

TOPIC: All To Gener

Discussion notifi

To keep up with new email notifications o

# Register and Log/Track Issues

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 Show only items I created
 [Go to item #](#)

KEYWORDS	STATUS	REASON CLOSED	TYPE	IMPACT	RELEASE	ASSIGNED TO	COMPONENT
<input type="text"/> <b>ADD</b> -- None --	All Open (not closed) Proposed Active Resolved Closed	All Unassigned Fixed	All Unassigned Feature Issue Task	All Unassigned Low Medium High	All Unassigned August 2010 openPC June 2010 openPDC October 2010 openP openPDC v1.0 Relea:	All Unassigned abhiramb ajstadlin alexandrunc alexfoggia	All Unassigned Base Setup l Configurati Data Structu Historian Ac





**RESULTS**

Status  CHANGE 1-10 of 23 items Previous 1 2 3 Next Showing 10 25 items

<input type="checkbox"/>	VOTES	ID	TITLE	ASSIGNED TO	STATUS	REASON CLOSED	TYPE	IMPACT	UPDATE DATE
<input type="checkbox"/>	1	11545	Switching windows when adding devices to output stream results in devices becoming unselectable	staphen	Proposed		Issue	Low	Jan 30 at 4:15 PM
<input type="checkbox"/>	1	11544	Searching in output stream -> Add device clears selection	staphen	Proposed		Issue	Low	Jan 30 at 4:13 PM

# Add / Edit Documentation

HOME SOURCE CODE DOWNLOADS DOCUMENTATION DISCUSSIONS ISSUES PEOPLE LICENSE

Page Info | Change History (all pages)  New Page |  Edit Page |  Delete Page |  Un-follow (109)

» User's Documentation

- » Getting Started
- » Frequently Asked Questions
- » Use and Configuration Guides
- » Overview of the openPDC Management System
- » How to Use the openPDC Manager
- » The GEP Subscription Tester **NEW**
- » Using a "Gateway Style Connection" between openPDCs and/or openPGs
- » Controlling UDP data loss **UPDATED**
- » Remote Console Security **NEW**
- » Help Me Choose Diagrams
- » Configuration File Settings
- » Setting for Uniform CPU Utilization
- » openPDC Console Commands to Adjust Configuration Settings
- » openPDC OSI-PI Adapters **NEW**
- » Data Quality Monitoring Adapters
- » Adapter Connection String Syntax
- » openHistorian 1.0 Archive Size Calculator
- » Distributed Historian Setup Notes
- » Automated Archive Data Recovery Operation (a.k.a., Missing Data Gap Filling)
- » Automated Connection Failover Operation
- » Adjusting Output Stream Labels to Meet ISO Naming Standard
- » PMU Connection Tester (accessed via host site)
- » How to Manually Configure the openPDC
- » How to Bulk Apply line-to-line Sqrt(3) Adjustment to all Voltage Magnitudes
- » Single Page Overview

Search Wiki & Documentation

SYSTEM REQUIREMENTS

































































FOR USE

- .NET 4.0

FOR DEVELOPMENT

- Visual Studio 2010 (Team Edition)

# Contribute Code

 <b>abhiramb</b> Project Member since Aug 15, 2013	 <b>brsaoasantos</b> Project Member since Feb 6, 2014	 <b>gurudatha</b> Project Member since Feb 26, 2012	 <b>Ivanfretti</b> Project Member since Aug 13, 2010	 <b>paul_trachian</b> Project Member since Oct 7, 2009	 <b>sdegange</b> Project Member since Oct 9, 2012
 <b>ajstadlin</b> Project Member since Jun 9, 2010	 <b>cgoodwin</b> Project Member since Oct 7, 2009	 <b>itidevelopment</b> Project Member since Dec 4, 2012	 <b>mbrahmbhatt</b> Project Member since Jul 19, 2010	 <b>prasanthgs</b> Project Member since Dec 30, 2011	 <b>sdgilliam</b> Project Member since Oct 5, 2012
 <b>alexandrun</b> Project Member since Jul 25, 2011	 <b>cheka</b> Project Member since Apr 15, 2011	 <b>JiahuiGuo07</b> Project Member since Aug 15, 2013	 <b>mhauer</b> Project Member since Oct 7, 2009	 <b>rbobba</b> Project Member since Jan 18, 2011	 <b>srikantaggarwal</b> Project Member since Feb 3, 2012
 <b>alexfglia</b> Project Member since May 15, 2012	 <b>davidcallaghan</b> Project Member since Aug 15, 2013	 <b>jimbeasley</b> Project Member since Nov 12, 2010	 <b>mkylet</b> Project Member since Aug 22, 2012	 <b>rejigeorge</b> Project Member since Sep 13, 2013	 <b>standre</b> Project Member since Oct 7, 2009
 <b>amitku</b> Project Member since Dec 17, 2013	 <b>davidrod</b> Project Member since May 24, 2011	 <b>jmartinbeg</b> Project Member since Jun 1, 2010	 <b>mousnix</b> Project Member since Nov 18, 2009	 <b>RenanG</b> Project Member since Feb 2, 2011	 <b>stevenalowe</b> Project Member since Sep 10, 2012
 <b>andyhill</b> Project Member since Dec 16, 2009	 <b>dbconrad</b> Project Member since Feb 26, 2013	 <b>jpatterson</b> Project Member since Oct 7, 2009	 <b>mthakkar</b> Project Member since Oct 7, 2009	 <b>rushin_gop</b> Project Member since Jul 12, 2010	 <b>StevenChisholm</b> Project Member since Oct 7, 2011
 <b>Apichartps</b> Project Member since Nov 29, 2012	 <b>dkholine</b> Project Member since Nov 9, 2012	 <b>kade98002</b> Project Member since Oct 7, 2011	 <b>MUTH_PALANIAPPAN</b> Project Member since Nov 29, 2012	 <b>ryanzuo</b> Project Member since Oct 7, 2009	 <b>swilliam26</b> Project Member since Jul 13, 2012
 <b>arkrohne</b> Project Member since Aug 9, 2011	 <b>eheine</b> Project Member since Oct 7, 2009	 <b>KaushikGandhi</b> Project Member since Feb 14, 2013	 <b>nayem1</b> Project Member since Dec 27, 2012	 <b>sadu</b> Project Member since Aug 15, 2013	 <b>teavch</b> Project Member since Dec 17, 2013
 <b>armena</b> Project Member since Oct 8, 2009	 <b>felmendorf</b> Project Member since Feb 13, 2013	 <b>kevinjones</b> Project Member since Jun 1, 2012	 <b>NeST_Software</b> Project Member since Aug 15, 2013	 <b>sagarjena</b> Project Member since Oct 25, 2011	 <b>Tony_WSU</b> Project Member since Sep 19, 2013
 <b>BasePointer</b> Project Member since Jan 13, 2014	 <b>galenriley</b> Project Member since Dec 16, 2009	 <b>kimduho</b> Project Member since May 12, 2010	 <b>nischal</b> Project Member since Apr 21, 2010	 <b>salveraniket</b> Project Member since Jan 27, 2011	 <b>trosenberg</b> Project Member since Nov 17, 2010
 <b>bmotteler</b> Project Member since Oct 7, 2009	 <b>GavinEHolden</b> Project Member since Oct 3, 2012	 <b>kpsriram</b> Project Member since Dec 17, 2013	 <b>oootos</b> Project Member since Nov 1, 2011		