XAL and Open XAL Introduction

Thomas Pelaia II, Ph.D.
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XAL Background

● Developed for SNS

● Environment for building Accelerator Physics Applications and Services
  – Commissioning
  – Operation

● Pure Java

● [http://www.ornl.gov/~t6p/Main/XAL.html](http://www.ornl.gov/~t6p/Main/XAL.html)
Original Core XAL Team

- John Galambos
- Paul Chu
- Chris Allen
- Andrei Shishlo
- Wolf-Dieter Klotz
- Tom Pelaia
- Several other collaborators
Open XAL Background

- Port of XAL
  - Generalized beyond SNS
  - Simpler, more powerful build system
  - Easier maintenance
  - Eliminates compiler warnings with strict checking

- [http://xaldev.sourceforge.net](http://xaldev.sourceforge.net)
Minimal Runtime Requirements

✓ Java J2SE 6
✓ JRuby 1.6
✓ Jython 2.5
Minimal Developer Requirements

✓ JDK 6
✓ Ant 1.7
✓ JUnit 4.10
✓ Git 1.7
✓ JRuby 1.6
✓ Jython 2.5
Application Support

- **Application Framework**
  - Standard Desktop Applications
  - Provides standard application features and hooks
    - copy, cut and paste
    - online help
    - console with persistent logging
    - templates and versioning
  - Common Look and Feel
  - Extensible

- **Bricks GUI Builder**
  - WYSIWYG editor to XML
  - True Model-View-Controller architecture
  - Works with both applications and scripts
Example: Standard XAL Menus

Launcher
Application Categories
Over Five Dozen XAL Applications

- Controls
  - Knobs, SCORE, Loss Viewer, Scan 1D, Scan 2D

- Machine Simulation
  - Virtual Accelerator, MPX

- Machine Characterization
  - Profile Tools and Analysis, SLACS, RTBT Wizard, Orbit Correction
Scripting

- Java Scripting Languages
  - JRuby
  - Jython

- GUI support using Bricks
Service Support

- Service Package
- Abstracts underlying protocols
  - JmDNS for discovery
  - JSON-RPC (Open XAL)
  - XML-RPC (XAL)
XAL Services

- Every Application
- PV Logger
- MPS First Faults
- RF Trip Monitor
- Errant Beam Capture
Accelerator Object Graph
Streamlined Diagram

Accelerator
sequences
timingCenter

TimingCenter
channels

AcceleratorSeq
nodes
sequences

AcceleratorNode
id
channels

Channel
channelName
Channel Access

- Wraps JCA/JNI and JCA/CAJ options
- Batch connection and get requests
- Channel Monitor Correlation
- Transforms for customization
Accelerator Physics Model
Chris Allen’s Implementation

- Probe - Element - Algorithm architecture
- 6D phase space
- Simulation Engines
  - Particle, Envelope, Transfer Map
- Scenario Data Input
  - Design, Live, What-If
Many Generic Tools

Sampling

- Plotting
- Math and Statistics Packages
- Dispatch Package (concurrency)
  - `libdispatch` port
- Multi-algorithm Solver
- Message Center
- Data Adaptor
- Key-Value Table Model
Status

- Continuing XAL Development
- Porting to Open XAL
- Will Transition from XAL to Open XAL