XAL at SNS Status Report - 2012

Thomas Pelaia II, Ph.D.

XAL Workshop 2012

December 13, 2012

Developers at SNS

- **Active**
  - **Chris Allen**
  - **Timofey Gorlov**
  - **Tom Pelaia**

- **Occasional**
  - **Sarah Cousineau**
  - **John Galambos**
  - **Andrei Shishlo**
  - **Alexander Zhukov**

Roadmap

- **Continue to support XAL for Operations**

- **Push changes to Open XAL**

Git Source Control
Migrated from Subversion

- **Staged Migrated to Git (late 2011)**

- **Planned migration accelerated by cyber event**

- **Advantages versus Subversion**
  - ✓**Distributed version control**
  - ✓**Works when network unavailable**
  - ✓**Better workflow**
  - ✓**Easier, more powerful branching**
  - ✓**Excellent man pages**

Managed by UT-Battelle
for the Department of Energy

XAL at SNS Status Report - 2012

OAK
RIDGE
National Laboratory

XAL Development Efforts

- **Software Maintenance**

- **New Applications and Services**

- **New Core Tools**

Recent Applications and Services

- **Profile Tools and Analysis**

- **Linac Tune-up**

- **Errant Beam Capture Service**

Recent Core Additions

- **Dispatch package**

- **Key-Value Table Model**

- **Differentiable Operation**

- **JSON Coder**

- **Batch Channel Operations**
  - **Connect, Get**

- **Application Framework Enhancements**

Managed by UT-Battelle
for the Department of Energy

XAL at SNS Status Report - 2012

OAK
RIDGE
National Laboratory

Dispatch Package
gov.sns.tools.dispatch

- **Port of open source libdispatch to Java**
  - **http://libdispatch.macosforge.org**

- **Provides concurrency API**
  - **Global queues including Main queue**
  - **Custom queues**
  - **Serial and concurrent queues**
  - **Sync and Async dispatch operations**
  - **Dispatch Timer**

- **Unifies several Java concurrency APIs**

OAK RIDGE
National Laboratory

Dispatch vs. Java Concurrent

	Dispatch	Java Concurrent
Public Class Count	3	26
Declarative	✔	X
Unified API	✔	X
Queue Barrier	✔	X
Timers	✔	X
Group Synchronization	✔	X

Key-Value Table Model
gov.sns.tools.swing

- **Record based table model**
  - **List data source**
  - **One row per record**
  - **Key Path for each column**
  - **Smart, customizable column titles**
  - **Key Path option for editable state**
  - **Automatic null handling**
  - **Edit event dispatching**
  - **Support for Map records**

- **High Performance Live Record Filtering**

Example Key-Value Table Model
Launcher Application

Create Table Model

```
APP_TABLE_MODEL = new KeyValueFilteredTableModel<App>( new ArrayList<App>(), "label",
"rule.kind", "notes" );
APP_TABLE_MODEL.setMatchingKeyPaths( "label", "rule.kind", "file.name", "notes" );
APP_TABLE_MODEL.setColumnName( "rule.kind", "Kind" );
APP_TABLE_MODEL.setInputFilterComponent( FILTER_FIELD );
```
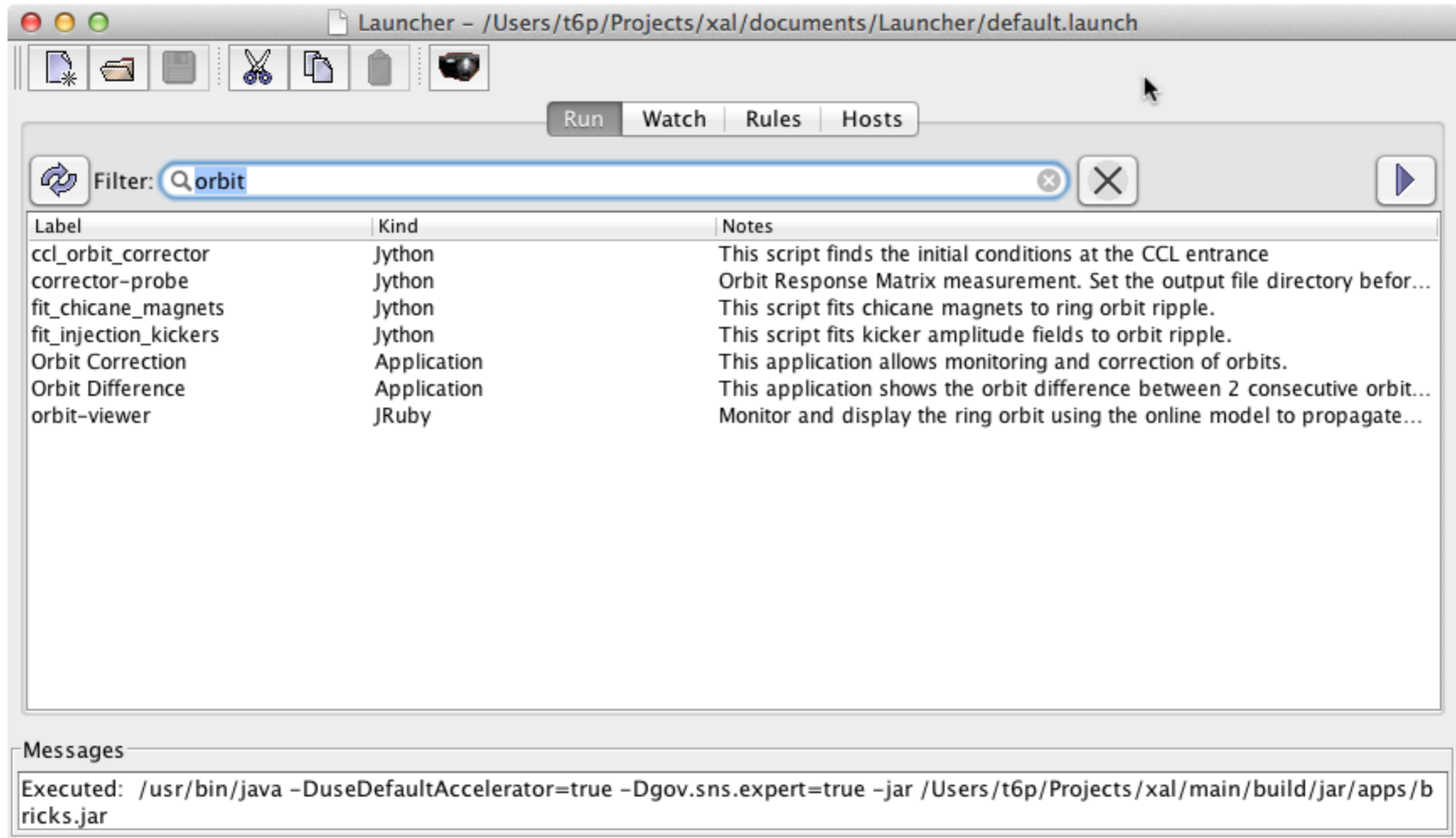
Set Records

```
final List<App> applications = MODEL.getApplications();
APP_TABLE_MODEL.setRecords( applications );
```

Get a Record for a Row

```
final int modelRow = APP_TABLE.convertRowIndexToModel( selectedRow );
final App application = APP_TABLE_MODEL.getRecordAtRow( modelRow );
```

Launcher with Application Table

Key-Value Record Selector

- **Dialog with embedded table of records for selection**

- **Quick filtering**

- **Configurable selection model**

OAK
RIDGE
National Laboratory

Example Key-Value Record Selector
PV Logger Application

Create Record Selector

```
_channelSelector = KeyValueRecordSelector.getInstanceWithFilterPrompt( signals,
mainWindow, "Add Selected Channels", "Channel Filter", "toString" );
_channelSelector.getRecordTableModel().setColumnName( "toString", "Channel" );
```

Show the Dialog and Get Selections

```
final List<String> channelNames = _channelSelector.showDialog();
```

Generic Swing Controllers
gov.sns.tools.swing.controller

- **Extends key-value binding to other Swing components**
  - **Button, Label, Text Field, List, Table**

- **Reduces boilerplate code**

- **Still Experimental**

- **Not ported to Open XAL**

- **Should implement Key-Path Property Change Propagation mechanism**

OAK
RIDGE
National Laboratory

Differentiable Operation

- **Stack based operations**

- **Symbolic Multivariate differentiation**

- **Covers most Java Math functions**

- **Template with Variable Substitution**
  - **Handy for indexed repetitions**

- **Foundation for Error Propagation, Fitting and Optimization**

JSON Coder
gov.sns.tools.coding.json

- **Implements Coder interface**

- **Code and Decode JSON**

- **Many Default Supported Types**
  - **boolean, byte, char, short, int, long, float, double**
  - **null, String, Date**
  - **Array, Vector, ArrayList**
  - **HashMap, Hashtable (string keys)**
  - **StackTraceElement, RuntimeException**
  - **Serializable**

- **Custom type support**

Example JSON Coding
JRuby Testing

Encode JSON

```
json = JSONCoder.defaultEncode( object )
```

Decode JSON

```
regen = JSONCoder.defaultDecode( json )
```

OAK
RIDGE
National Laboratory

Batch Channel Connect

- **Submit connection requests for batch of channels**

- **Optionally block with timeout until all connections are resolved**

- **Listeners get notified when connection status changes for a channel**

- **Get exception for a channel**

Batch Channel Get

- **Submit Get requests for batch of channels**
  - Efficient get requests processed in parallel
  - Get value or value, status and timestamp

- **Request connections as needed**

- **Optionally block with timeout until all requests are resolved**

- **Listeners get notified when get requests complete for a channel**

- **Get record or exception for a channel**

OAK RIDGE
National Laboratory

Example Batch Channel Get Request

Create Get Request and Submit

```
final BatchGetValueTimeRequest batchAsyncRequest = new
BatchGetValueTimeRequest( batchAsyncChannels );
batchAsyncRequest.submit();   // submit the request now to capture without delay
```

Wait for Completion

```
batchAsyncRequest.waitForCompletion( _batchRequestTimeout );
```

Get a Record for a Channel

```
final ChannelTimeRecord record = batchAsyncRequest.getRecord( channel );
```

Application Framework
New Features

- **Document Templates**

- **Startup dialog**

- **Document History**

- **Menu definition additions**

Managed by UT-Battelle
for the Department of Energy

XAL at SNS Status Report - 2012

OAK
RIDGE
National Laboratory

Document Templates

- **Easy reuse of a configuration**
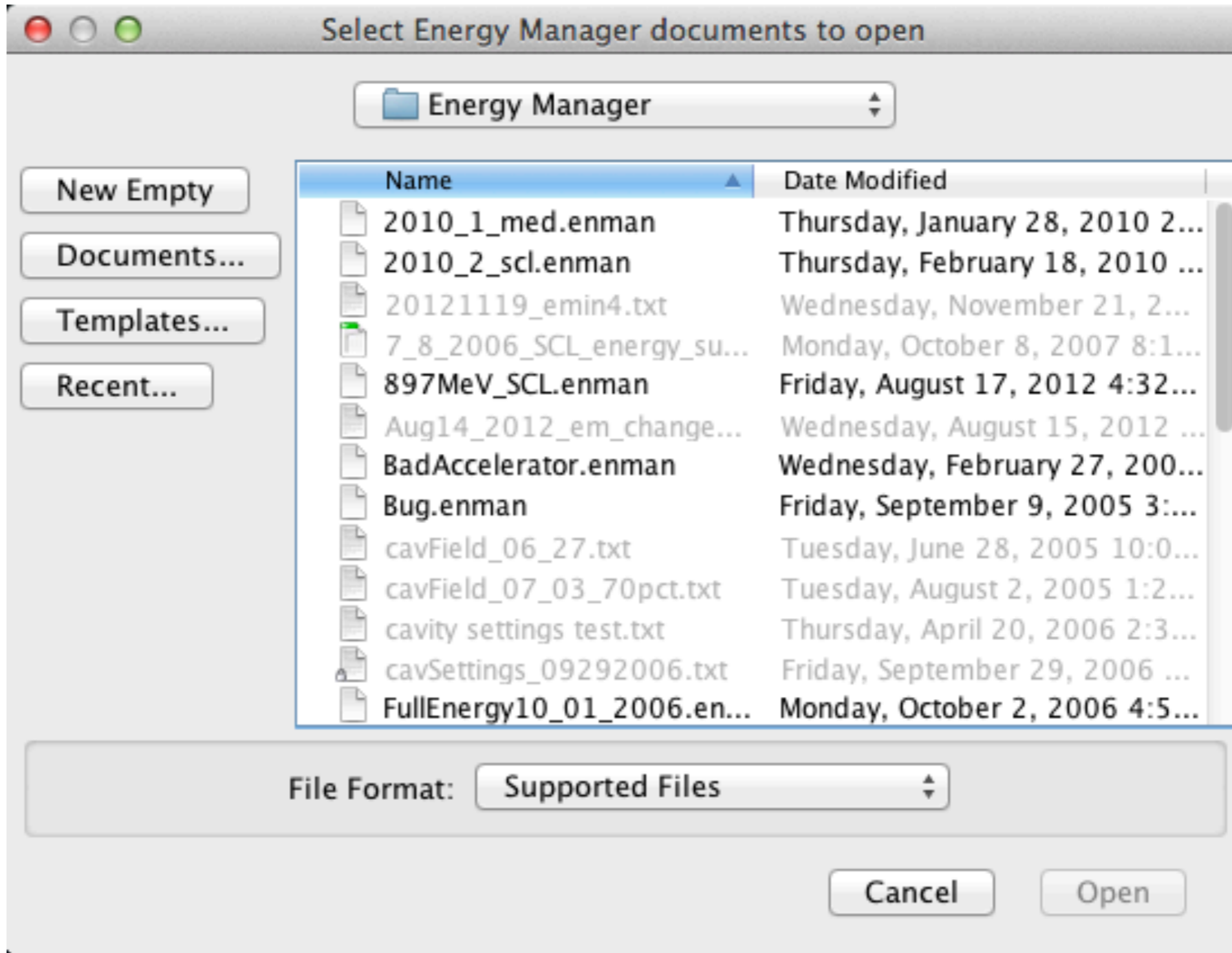
- **Opening any document as a template creates a copy**

- **Templates subdirectory reserved for templates**

OAK
RIDGE
National Laboratory

Application Startup Dialog

- **Automatic for document based applications**
  - **Configurable**

- **Quick Access to Templates, Recent Documents, Documents**

- **Avoid creating unused empty documents**

Example Startup Dialog
Energy Manager

Document History

- **Timestamped document copy recorded with every save operation**

  - **Saved under .versions directory in application's document folder**

  - **Any version of a document can be opened using "Open Version…" menu item in the File menu**

- **Ideal for manual logging**

- **Allows for data recovery**

- **Reduces file clutter in document directory**

- **Consistent timestamp naming for documents**

New Menu Definition Features

- **Dot notation replaces underscores for field reference**
  - **More natural syntax**
  - **Old notation deprecated but still supported**
  - **Most applications modified to use new notation**
  - **Only notation supported in Open XAL**

- **Positional anchors for relative placement of menus and menu items**
  - **Position specified using "before" and "after"**
  - **Eliminates redundancy**
  - **Embraces future additions**

OAK
RIDGE
National Laboratory

Example: Orbit Correction Menubar

Old Style	Positional
```# customize the menubar` `menubar = file edit accelerator orbit view window help`  `# define the orbit menu items` `orbit.menu = add_live add_diff add_snapshot add_logged` `import_document_orbit define_orbit –` `display_flatten_window`  `# define the orbit menu label` `orbit.label = Orbits`  `# define Special menu item labels` `add_live.label = Add Live Orbit` `add_diff.label = Add Difference Orbit` `add_snapshot.label = Add Snapshot Orbit` `add_logged.label = Add Logged Orbit` `import_document_orbit.label = Import Document Orbit` `define_orbit.label = Define Orbit` `display_flatten_window.label = Flatten Orbit`  `# define the menu item actions` `add_live.action = add–live–orbit` `add_diff.action = add–diff–orbit` `add_snapshot.action = add–snapshot–orbit` `add_logged.action = add–logged–orbit` `import_document_orbit.action = import–document–orbit` `define_orbit.action = define–orbit` `display_flatten_window.action = display–flatten–window```	```# customize the menubar` `accelerator.after = orbit`  `# define the orbit menu items` `orbit.menu = add_live add_diff add_snapshot add_logged` `import_document_orbit define_orbit –` `display_flatten_window`  `# define the orbit menu label` `orbit.label = Orbits`  `# define Special menu item labels` `add_live.label = Add Live Orbit` `add_diff.label = Add Difference Orbit` `add_snapshot.label = Add Snapshot Orbit` `add_logged.label = Add Logged Orbit` `import_document_orbit.label = Import Document Orbit` `define_orbit.label = Define Orbit` `display_flatten_window.label = Flatten Orbit`  `# define the menu item actions` `add_live.action = add–live–orbit` `add_diff.action = add–diff–orbit` `add_snapshot.action = add–snapshot–orbit` `add_logged.action = add–logged–orbit` `import_document_orbit.action = import–document–orbit` `define_orbit.action = define–orbit` `display_flatten_window.action = display–flatten–window```

Main　File　Edit　Accelerator　Orbits　View　Window　Help

Managed by UT-Battelle
for the Department of Energy

XAL at SNS Status Report - 2012

OAK
RIDGE
National Laboratory

Summary

- **Maintenance of XAL**

- **Continued XAL Development**

- **Porting to Open XAL**

- **Will Transition from XAL to Open XAL**