Poly Shark: Cal Poly's Work Flow Engine

Allan Saddi

Arlo C White

Darren Kraker

Ryan Matteson

Agenda

- Why we needed it

- What is workflow

- Design considerations / requirements

- How we built it

- How it's used

Why?

Workflow Pilot: Use Case

- Disability Resource Center
  - Alternate Testing Request

What is workflow?

- Workflow (process definition)
  - A series of activities performed by one or more participants to achieve a specific goal.

- Activity
  - An action that needs to be performed to advance the workflow.

- Participant
  - Person or system component assigned to an activity

What is workflow (cont)?

- **Transition**
  - Changing from one activity to the next

- **Work item**
  - An instance of an activity assigned to a user to perform.

- **Formal parameter**
  - Data that originates outside the workflow and is used to seed the process instance

- **Process variable**
  - Data associated with the workflow that may be manipulated or viewed by participants during activities

Design Considerations

What do I need in a work flow engine?

- Arbitrary activities, e.g. run code, send email, wait for a manual response.

- Activity deadlines/timeouts
  - Do something when a user fails to respond after timeout

- Group assignment
  - Activities assigned to group, only one user needs to accept and complete

What else do I need in a work flow engine ?

- Process versioning
    - Updating your workflow definition doesn't impact current workflows in progress

- Auditing and Administration
    - Log all activities and process state transitions
    - Ability to view or modify process instance

- Attachments

Technical Considerations

Technology considerations

- Java and open source
  - Modular design
- Standards based, XPDL
  - Availability of tools
- WebSphere friendly
- Good documentation and support

Technology considerations (cont)

- Integration with uPortal

- Standalone engine

  - Response and Action requests to external technology stacks i.e Oracle, PeopleSoft

- Client requirements

  - minimize jar file dependencies

- Database compatibility (Oracle)

  - Database agnostic ORM

Contenders

- ObjectWeb Bonita http://bonita.objectweb.org/

- Enhydra Shark http://shark.enhydra.org/

- Open Business Engine http://obe.sourceforge.net/

- WfMOpen http://wfmopen.sourceforge.net/

- OSWorkflow http://www.opensymphony.com/osworkflow/

- JBoss jBPM http://www.jboss.com/products/jbpm

- Apache OFBiz http://ofbiz.apache.org/

- OpenWFE http://www.openwfe.org/

- Kuali http://kuali.org/

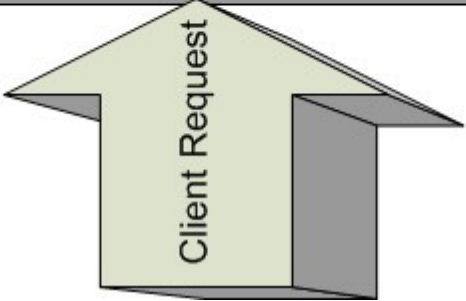# How we built it
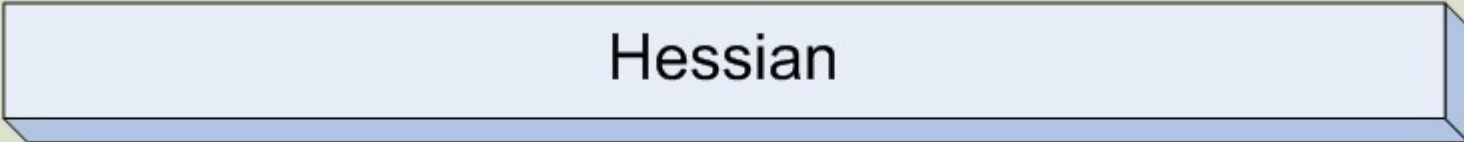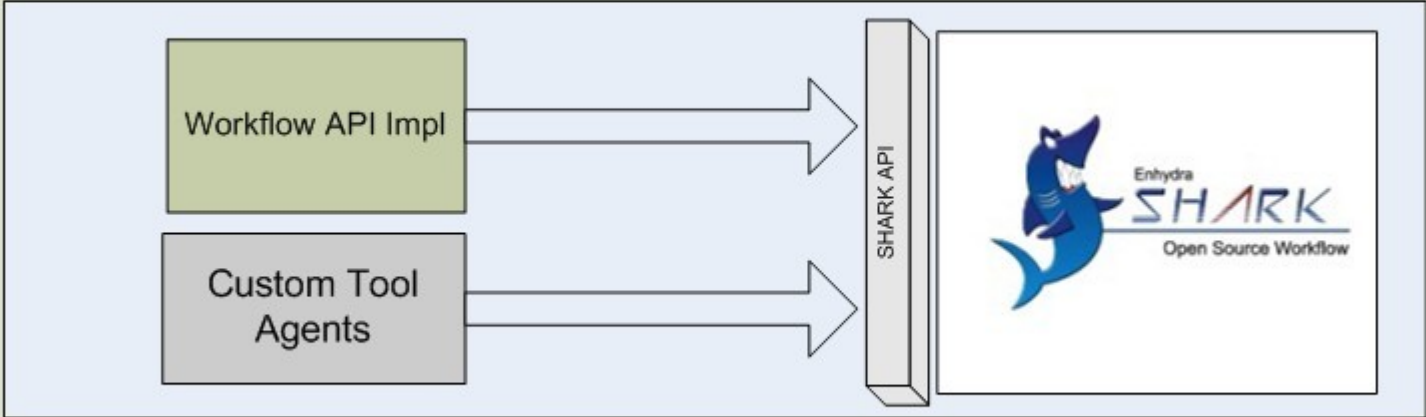
Don't swim with Sharks

- Remote EJBs, CORBA, and SOAP

- Shark native SOAP API
  - dependencies on Shark jars
  - not transactionally safe
    - each SOAP call is a transaction, problematic for multiple API calls

Hessian web service protocol

- Transparent

- Operations done on proxies

- Hessian clients for many other language

- Binary
  - Well suited for binary data

Advantages of PolyShark API

- No Shark dependencies within the portal

- Fewer jars to deploy, easier to manage

- Transactions made safe across activities
  - single work units
  - call multiple APIs as needed

Disadvantages

- Need to constantly add functionality to the API that is already found in the Shark API

- Not as efficient as the Shark API
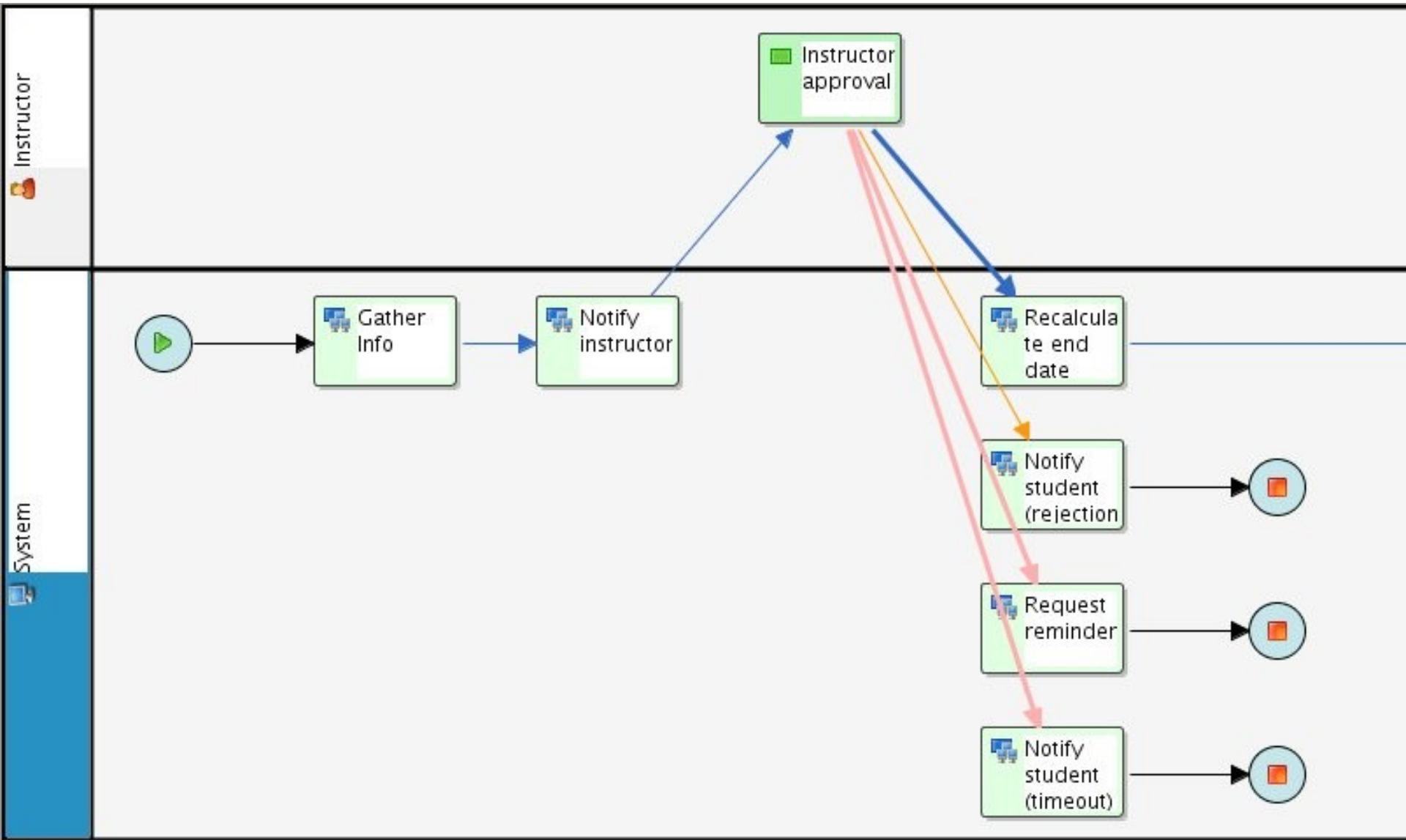 - doesn't support result filtering at the server

How to use PolyShark

- Define the process (process definition)

- Collect initial data (formal parameters)

- Manage the workflow

Define the process

- XPDL describes the process design

  - Participants

  - Activities

  - Transitions

    - tie activities together

  - Applications (Tool agents)

    - Something the server does, send email, insert into db

- Creating a process always uses the latest version

    - effective dating on process definition

Enhydra JaWE

```xml
<Participant Id="instructor_part" Name="Instructor">
    <ParticipantType Type="HUMAN" />
    <ExtendedAttributes>
        <ExtendedAttribute Name="DynamicParticipant"
            Value="instructor_username" />
    </ExtendedAttributes>
</Participant>

<Activity Id="instructor_approval"
    Name="Instructor approval">
<Description>
Approve or deny this alternate testing request.
If approved, supply exam delivery information.
</Description>

<Performer>instructor_part</Performer>
<StartMode>
  <Manual/>
</StartMode>
<Deadline Execution="ASYNCHR">
    <DeadlineCondition>
        reminder_deadline
    </DeadlineCondition>
    <ExceptionName>REQ_REMINDER</ExceptionName>
</Deadline>
```

Collect data through web forms

- Custom XSL (formal parameters)

- XForms

  - Comprised of separate sections that describe what the form does, and how the form looks.

  - Allows for flexible presentation options

- Auto Generated form (Do nothing)

  - process variables already specified

Disability Services

New Alternate Testing Request

Instructor Participant Override

Enter username of person to act as instructor for this request: [_____]

Course [_____ ▼]

Phone [_____]

Comment [_____]

Accommodations

Extended Time ⦿ 1.5x

Setting ⦿ Small group

Accommodations ☐ Enlarged Print
☐ Adaptive computer with Dragon Naturally Speaking
☐ Adaptive computer with Jaws
☐ Adaptive computer with Kurzweil
☐ Adaptive computer with Zoom Text

Exam Information

This exam information has been filled with the default times for the class you selected. You should take the exam at the same date and time as the class unless otherwise agreed upon with your instructor.

☐ **Final Exam** (Check this box if this request is for a final exam)

Date of exam [_____]   Why can't I choose the exam date I want?
You are able to violate the 5-day requirement because you are a DRC Staff member.
Students will be unable to submit requests for exams less than 5 business days away.

Allotted class time in minutes [_____]

Exam start time [_____] **Exam end time**

Time Requested in minutes

📥 Submit Request   ← Cancel

Create Workflow

- Process required input

- Create process instance

  - Work flows are versioned

- Identifier for every process definition id

  - logical mapping of data elements

```
...
 map.put("student_phone",
  runtimeData.getParameter("studentPhoneNumber"));

 WorkflowEngine workflowEngine =
  WorkflowEngineFactory.getWorkflowEngine();

 workflowEngine.createProcessInstance("dkraker",
  "DRC_ALT_TESTING", map);

...
```

View my worklist

- Fetching / Manage work list

- Process instance management

- Remote web service API (Hessian)
  - get activity
  - get process creation date

```java
WorkflowEngine workflowEngine =
  WorkflowEngineFactory.getWorkflowEngine();

processes =
  workflowEngine.getMyProcessInstances("dkraker"),
  "DRC_ALT_TESTING");

for (ProcessInstance processInstance : processes) {

 data.append(processInstance.getCreatedTime().getTime());
...
```

Dashboard

- Worklist
  - Display pertinent activities and status
- Forms
  - Simple form submission of current forms
- My Processes
  - List of previous and current activities
- Administrative
  - Workflow level view of current or completed process instances

Workflow Dashboard

Worklist | My Processes | Forms | Admin

Worklist for dkraker (as of 04/23/2008 12:31 PM)   Refresh

Work Item	State	Created	Accepted
Instructor approval	In Progress	04/23/2008 11:34 AM	04/23/2008 11:59 AM

Faculty Approval

Approve*	[dropdown ▼]	**Please make a selection.**
Comments	[text area]	
Phone #	[text field]	

Phone number instructor can be reached at if any questions arise during exam

Also allowed
☐ open book
☐ notes
☐ formula sheet
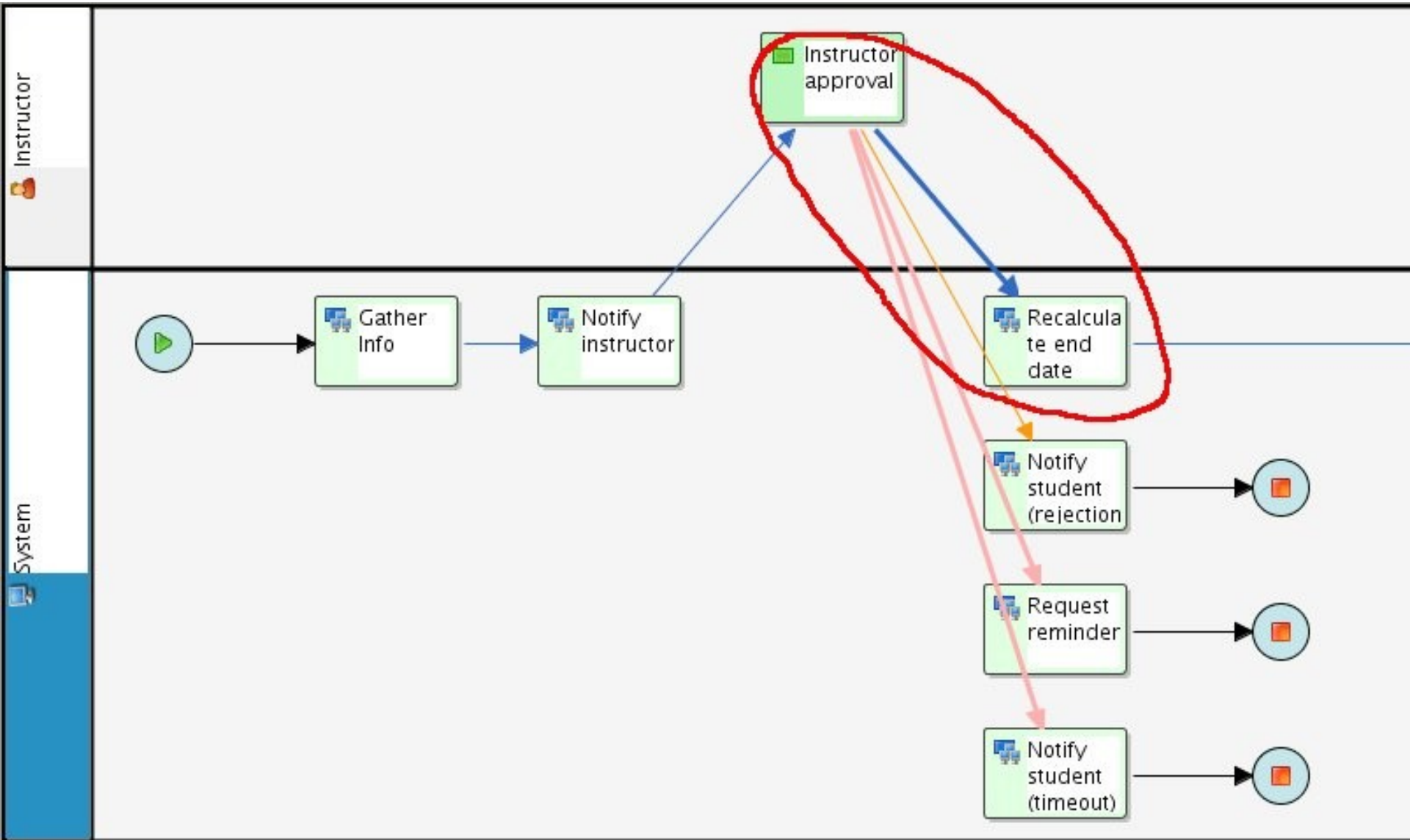☐ periodic chart
☐ calculator
☐ dictionary
☐ Internet
☐ Blackboard

Other [text field]

```xml
<xf:group>
<xf:label>Faculty Approval</xf:label>
<xf:select1 ref="instructor_decision">
<xf:label>Approve</xf:label>
<xf:item>
<xf:label>Yes</xf:label>
<xf:value>YES</xf:value>
</xf:item>
<xf:item>
<xf:label>No</xf:label>
<xf:value>NO</xf:value>
</xf:item>
<xf:item>
<xf:label>With modifications</xf:label>
<xf:value>WITH_MODS</xf:value>
</xf:item>
</xf:select1>
```

Approve: YES

```xml
<Transition From="instructor_approval"
    Id="drc_alt_testing_tra1" To="alt_testing_act3">
    <Condition Type="CONDITION">
      !"NO".equals(instructor_decision)
     </Condition>
</Transition>

<Application Id="calc_end_date">
  <FormalParameters>
    <FormalParameter Id="exam_end_date" Mode="OUT">
     <DataType>
        <BasicType Type="DATETIME" />
     </DataType>
    </FormalParameter>

 <ExtendedAttributes>
    <ExtendedAttribute Name="ToolAgentClass"
        Value="org.enhydra.shark.toolagent.JavaClassToolAgent" />
    <ExtendedAttribute Name="AppName"

Value="edu.calpoly.workflow.drc.alttest.toolagent.CalcEndDate" />
  </ExtendedAttributes>
</Application>
```

API

ProcessInstance

```java
public String getProcessId();
public String getId();
public String getName();
public String getDescription();
public ProcessInstanceState getState();
public int getPriority();
public String getRequester();
public List<ProcessVariable> getVariables();
public ProcessVariable getVariableByName(String name);
public Date getCreatedTime();
public Date getStartedTime();
public Date getFinishedTime();
public String getXFormsFile();
```

ProcessVariable

```java
public String getName();
public String getDescription();
public ProcessVariableType getType();
public Object getValue();
public boolean isReadOnly();
```

ProcessInstanceState

```java
public boolean isOpen() {
public boolean isClosed() {
```

Security

- Uses Groups and Permissions with uPortal

- Granular control

  - Create, view, edit, terminate, reassign

- Per work flow

- Remote API Security

  - Basic Authorization over SSL

DEMO

Disability Services

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Course [▼]

Phone [   ]

Comment [   ]

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📄 Submit Request   ← Cancel

Workflow Dashboard ↗ _ □ ✕

| **Worklist** | My Processes | Forms | Admin |

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Also allowed
☐ open book
☐ notes
☐ formula sheet
☐ periodic chart
☐ calculator
☐ dictionary
☐ Internet
☐ Blackboard

Other [text field]

Exam Delivery Info

To Test Site*
Test needs to be available at least one day prior to exam

○ Email to drctesting@calpoly.edu
○ Fax: 756-5451
○ Instructor brings to DRC
○ Student brings exam to test site
● DRC picks up from department office

Pick-up Information

Tests need to be at your department office by 2:00 PM at least ONE day prior to the exam date.

Test pick-up date* [text field]

Comments [text area]

Questions?

Ryan Matteson

rmatteso@calpoly.edu

Darren Kraker

dkraker@calpoly.edu