Business Process Workflows

Susan Hert, Senior Software Engineer
Goals

• Which type(s) of LabKey workflow do you need?
• How do you begin programming with the workflow module?
Overview

Types of Workflow Support in LabKey

Business Process Workflows

Workflow Module

Application Demo

Programming with Workflow

Yes

End

No
Data Integration & Pipeline

Database

Spreadsheets

Other Data Sources

Extract Transform Load (ETL) or Pipeline Job

LabKey Database

LabKey Modules: dataintegration, pipeline
Data Integration

Start

Extract Data

Transform Data

Load Data

Write Logs

End
Data Integration & Pipeline Jobs

- For data workflow
- For long-running, complex processing
- Normalize data from different systems
- Move data in scheduled increments
- Log and audit migration processes
Issue Tracker

Create and Assign Issue → Resolve Issue → ? → Verify and Close Issue

Reopen Issue
Issue Tracker

• For human processes
• Customizable forms for defining parameters of request
• Grid of data related to the issues that can be analyzed as standard LabKey data grids
Workflow, What Is It Good For?

- The work involves both system tasks and human tasks
- There are decision points within the flow
- The flow potentially involves parallel tasks
- There are repeating tasks or tasks that have time limits or activation times
• Business Process Modeling & Notation 2.0
• Graphical notation for representing *business processes*
• Meant to provide a standard notation readily understandable by business stakeholders
• Not intended to represent data flow
Simple Workflow

Permissions Handler and Registry

Exclusive Gateway
... with email
... with data management, timers, event listeners

Data Management

- Create secured data set
- Notify Gatekeepers
- Handle export request
- Update security policy
- Notify User of Approval
- Remove secured data set
- Notify User of Denial
- Finish

Timers:
- Expiration timer

Event Listeners:
- Request Export
... with boundary events and multiple starts

Boundary Events

Start Messages

Automatic task assignment

Document ready

Manual Abstraction

Review Abstraction

Assign Abstractor and/or Reviewer

Data Abstracted

Revision required

Reviewer removed

Manual abstraction?

Review?

Reassign

Revision?
... with parallel tasks

Parallel Gateway
(split & join)
... with conditional parallel tasks

Inclusive Gateway (split & join)
Argos Data Export Request

1. Request Export
2. Create secured data set
3. Notify Gatekeepers
4. Handle export request
5. Review
   - approved
   - denied
6. Update security policy
7. Notify User of Approval
8. Remove secured data set
9. Notify User of Denial
10. Finish
11. Expiration timer
12. Remove secured data set
13. Finish
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<th>Result</th>
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## Data Grids

### Patients 60-69

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</table>

### Request Data Export

Request export of the current data grid

**REASON FOR REQUEST:**

I need this data for my research

**FORMAT:**

Excel (.xlsx)

You will receive an email once your data export request has been reviewed by an administrator.

- CANCEL
- MAKE REQUEST
Argos Data Export Request
## Active Export Requests

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<th>Request ID</th>
<th>Requested</th>
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<th>Expires</th>
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## Inactive Export Requests

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Export Requests

Requested by susanr on 2016-09-28
Columns requested: Coded Id, Disease, Dx Date, Result, Side, Type
Filters applied: Patients with Patient (SurgeryAge) 60-69
User comments: I need this data for my research

Resolution: Pending
Assignee:
Reviewer comments:

Download
Cancel   Save
### Export Requests Details

**Requested by** susanh on 2016-09-28

**Columns requested**
- Coded Id
- Disease
- Dx Date
- Result
- Side
- Type

**Filters applied**
- Patients with
  - Patient (SurgeryAge): 60-69

**User comments**
I need this data for my research

**Resolution**
- Pending

**Assignee**
- Pending

**Reviewer comments**
- Abstraction Admin
- gatekeeper
- susanh

---

### DASHBOARD
- Patients: 282
- Specimens: 553
- Studies: 67

### Active Filters
- In Saved Group
  - (none)
- New Filters
  - (none)
Export Requests

Requested by susan on 2016-09-28
Columns requested: Coded Id, Disease, Dx Date, Result, Side, Type
Filters applied: Patients with Patient (SurgeryAge): 60-69
User comments: I need this data for my research

Resolution: Pending
Assignee: gatekeeper
Reviewer comments:

CANCEL SAVE

DASHBOARD
PATIENTS
SPECIMENS
STUDIES
ASSAYS
REPORTS

282 Patients
553 Specimens
67 Studies

Active Filters
In Saved Group
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New Filters
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Export Requests Details

Requested by susan on 2016-09-28
Columns requested: Coded Id, Disease, Dx Date, Result, Side, Type
Filters applied: Patients with Patient (SurgeryAge): -60-69
User comments: I need this data for my research
Resolution: Approved
Assignee: gatekeeper
Reviewer comments: I approve this message

CANCEL  SAVE
Argos Data Export Request

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Filters applied  Patients with Patient (SurgeryAge): -60-69
User comments  I need this data for my research
Reviewer comments  I approve this message
Workflow Engine

• Activiti BPM Platform (activiti.org)
• Embedded library, configurable with Spring Beans
• Large subset of BPMN 2.0 standard implemented
Workflow Module

• **API**
  – wrapper around Activiti objects
  – interfaces and base classes for various types of workflow activities

• **Database** – workflow schema in which Activiti tables are created

• **Resources** – workflow process definitions
Workflow Module

- Permissions Handler
- Email Notifier
- System Task Runner
- Boundary Event Handlers
My Lab Workflow Process

- Timer Boundary
- Events
- Exclusive Gateway
- Inclusive Gateway
- Email Notification

Start
- Notify Scientists
- Run Assay
- Review Results
- Archive Results
- End
Incorporating a Workflow Process

- Create a process definition
- Start a new workflow process
Create a Process Definition

• **Location:**  
  `<module>/resources/workflow/model`

• **Name:**  
  `<processKey>.bpmn20.XML`

e.g.

`labWorkflow/resources/workflow/model/labWorkflow.bpmn20.xml`
Activiti Modeler
WorkflowService s = ServiceRegistry.get(WorkflowService.class);

Map<String, Object> vars = new HashMap<>();
vars.put("initiatorId", uidString);
vars.put("container", container);

s.startWorkflow("module", "processKey", "Description of process", vars, container);
Enhancing a Workflow

• Associate system task classes
• Define and register a permissions handler
• Register email templates
Associate System Task Classes

- Define Java class to do the task
- Update process definition to reference class

```xml
<serviceTask id="archiveResults"
activiti:class="org.labkey.workflow.delegate.SystemTaskManager">
...
</serviceTask>
```
Define & Register Permissions Handler

- **Extend** `org.labkey.api.workflow.PermissionsHandler`
- **Implement**
  - `getCandidateUserPermissions(WorkflowTask)`
  - `canView(WorkflowProcess)`
  - `canView(WorkflowTask)`
  - `canStartProcess(String)`
  - ... etc.
API Methods

- StartProcess
- RemoveProcessInstance
- ProcessInstanceData
- ProcessInstanceListData
- UpdateVariables
- TaskData
- CompleteTask
- ClaimTask, DelegateTask, AssignTask
- . . .
Things to Remember

• The process definition is part of the program
• Get data about the work from the workflow module; get data about what is being worked on elsewhere
• Use process and task variables to tie them together
• Be careful of serialization
## Which Flow is Right for You?

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<tr>
<th>Data Integration or Pipeline</th>
<th>Issue Tracker</th>
<th>Workflow</th>
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<tbody>
<tr>
<td>• Data processing</td>
<td>• Human processes</td>
<td>• Business process with most flexibility</td>
</tr>
<tr>
<td>• Define extraction source</td>
<td>• Define custom fields</td>
<td>• Define process</td>
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<tr>
<td>• Define transformation</td>
<td>• Define and populate lookup tables or lists</td>
<td>• Add UI for human tasks</td>
</tr>
<tr>
<td>• Define load target</td>
<td></td>
<td>• Add actions for system tasks</td>
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</table>