

IceCore — a portal user interface for workflow execution

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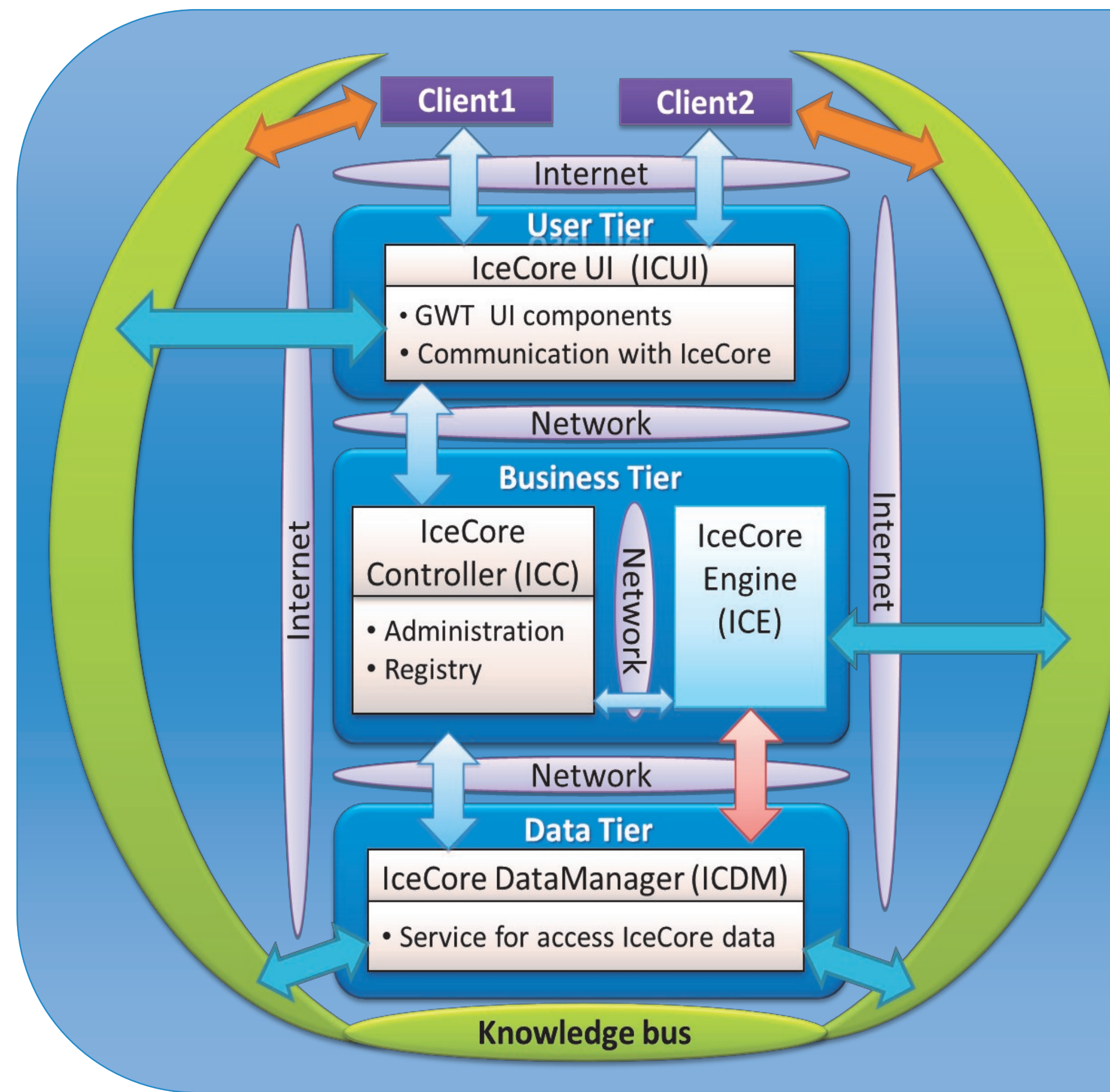
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System Overview

IceCore system consists of four basic functional components that interact together, namely the IceCore User Interface (ICUI), IceCore Controller (ICC), IceCore Engine (ICE) and IceCore Data Manager (ICDM). The fifth element is a knowledge bus which can be described as an intelligent mediator which ties up interoperability with messaging between individual iceCore components like engines, databases and user interfaces.

Architectural Design

- Three –tier architecture extended with knowledge bus
- REST communication between tiers
- Spring Framework
- Hibernate for mapping of model to a relational persistence database
- JSP Portlets with GWT components



Main Components

The IceCore system used for workflow execution follows the Three-Tier Architectural scheme.

User Tier

User connects to the system through the portal UI (ICUI), where the execution of various workflows can be monitored and controlled, and display results to the user.

Business Tier

ICUI communicates with other components via the IceCore Controller (ICC), which is a middleware component holding the component registry. IceCore Engine (ICE) is a web service extension to the underlying execution engine (Kepler or Taverna).

Data Tier

On the bottom-level tier IceCore DataManager (ICDM) handles the data management for both ICUI and ICE.

Figure 3. Diagram of IceCore architectural design

Star Cluster Workflow

This workflow runs an algorithm that aims at locating stellar clusters in the UKIDSS near infrared astronomical database. When the mining has been done, the images of the cluster candidates are fetched from the image database, with SIMBAD database information.

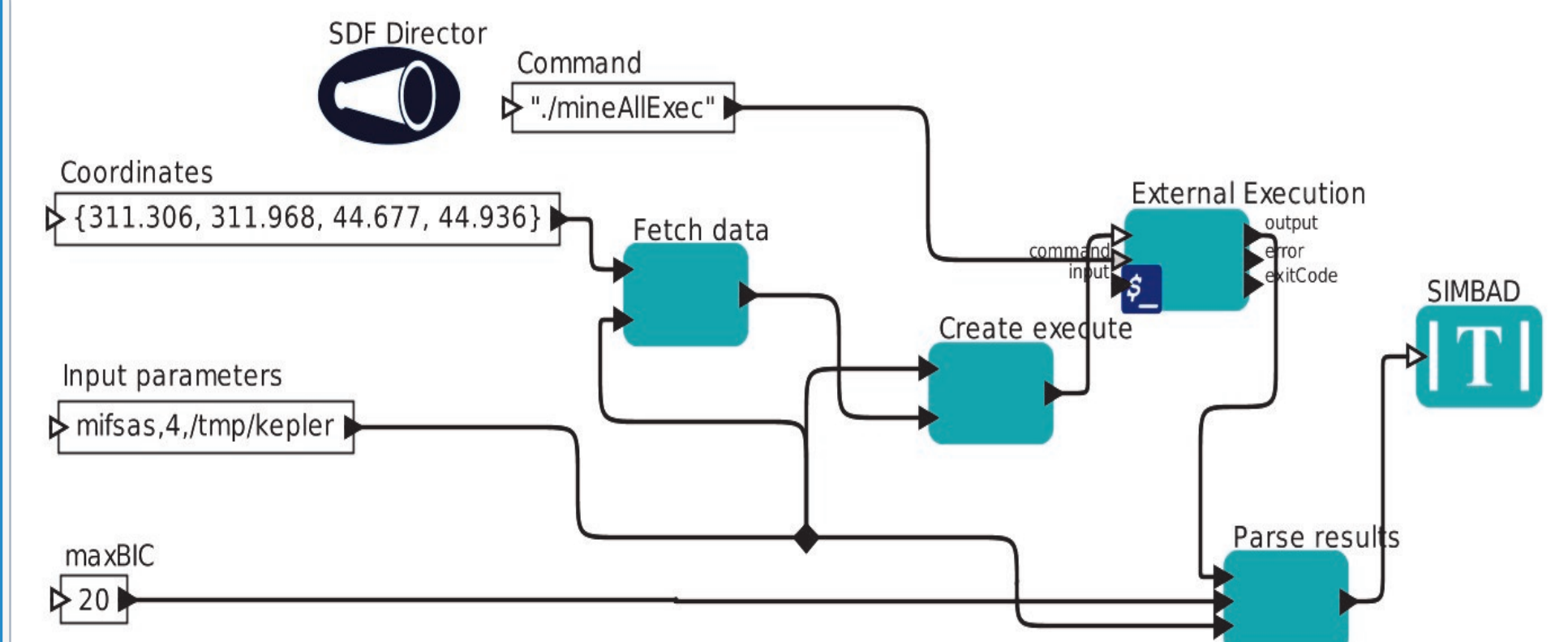


Figure 4 Star Cluster workflow.

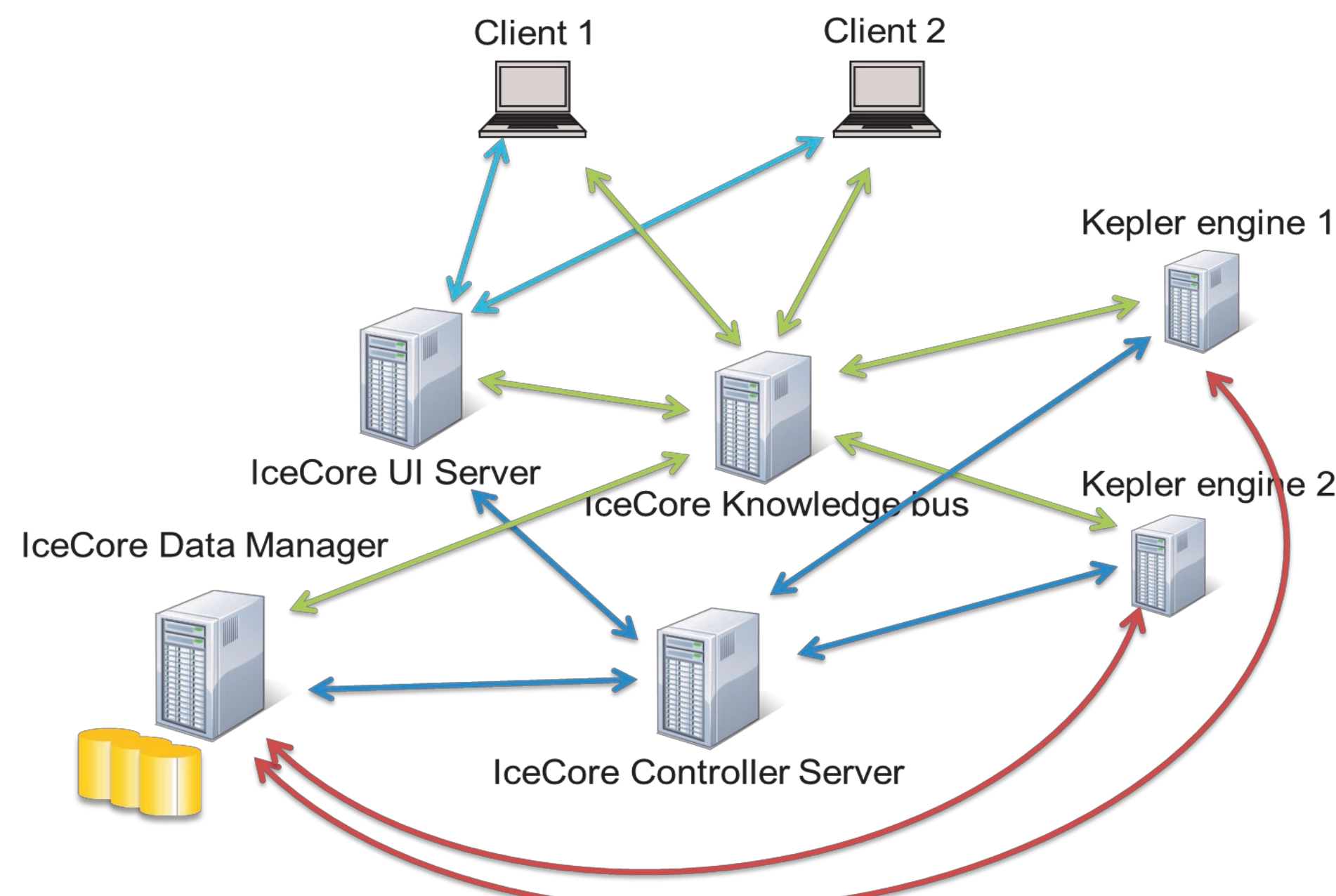


Figure 1. Implementation of distributed Ice Core System.

Diagram of scalable system where different components are separated to own service modules. The architecture allows replacing and adding new components easily in system.

ICUI – IceCore Portal User Interface

IceCore User Interface provides a tailored GUI to open and run workflows in various workflow engines, monitor the execution of workflows and view results via a portlet.

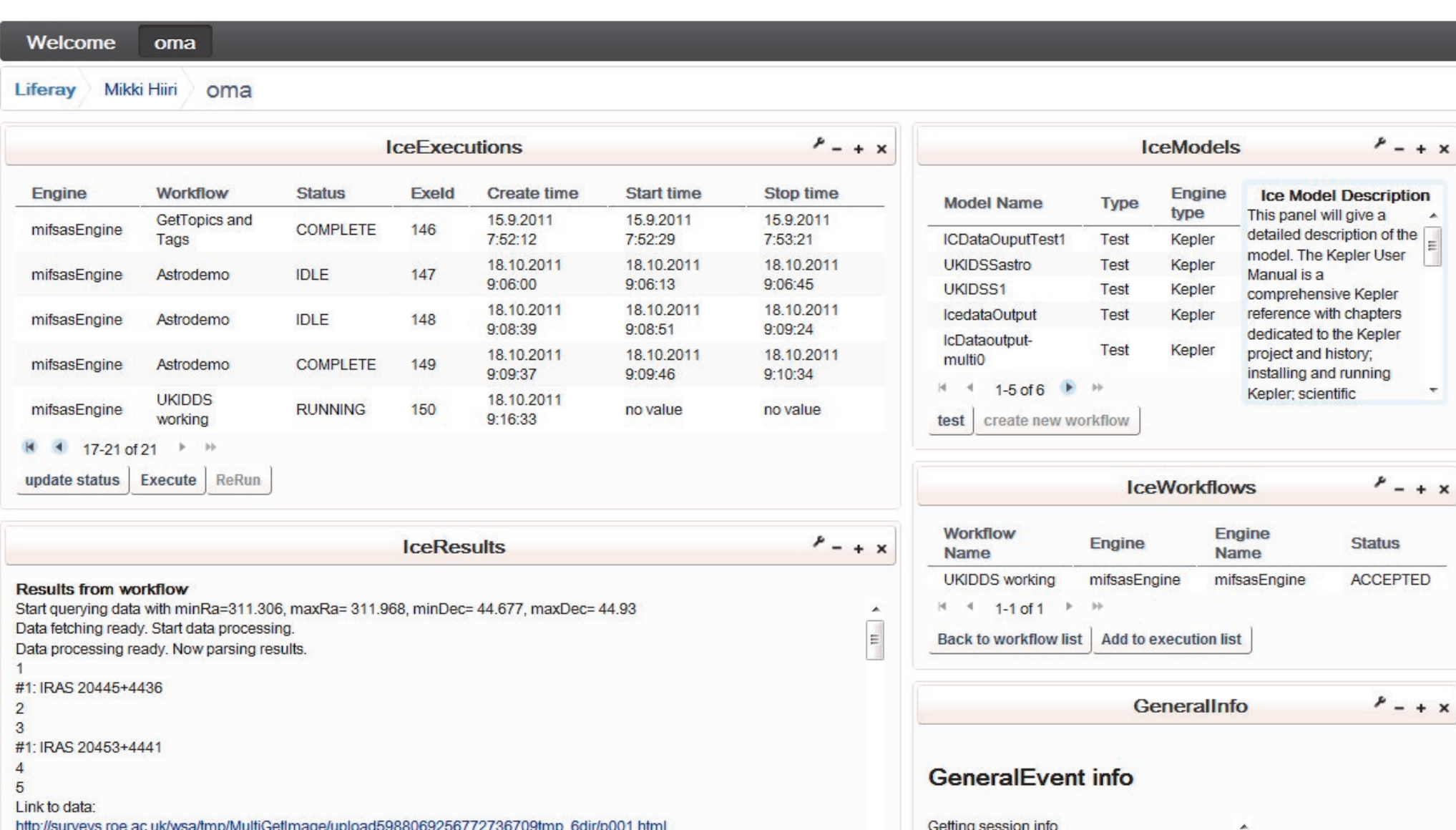


Figure 2. View from Liferay portal with IceCore portlets.

IceExecutions Portlet

Displays all available workflows with status information. Each workflow can be executed in a chosen workflow engine.

| IceExecutions | | | | | | |
|---------------|--------------------|----------|-------|--------------------|--------------------|--------------------|
| Engine | Workflow | Status | Excid | Create time | Start time | Stop time |
| mifasEngine | Astrodemo1 | IDLE | 109 | 8.4.2011 11:27:22 | 8.4.2011 11:27:26 | 8.4.2011 11:27:58 |
| mifasEngine | Astrodemo1 | COMPLETE | 118 | 14.4.2011 10:56:14 | 14.4.2011 10:56:36 | 14.4.2011 10:57:10 |
| mifasEngine | GetTopics and Tags | COMPLETE | 119 | 14.4.2011 11:07:25 | 14.4.2011 11:07:37 | 14.4.2011 11:08:24 |
| mifasEngine | Astrodemo1 | COMPLETE | 120 | 14.4.2011 11:13:25 | 14.4.2011 11:13:49 | 14.4.2011 11:14:25 |
| mifasEngine | GetTopics and Tags | READY | 121 | 5.5.2011 13:21:02 | no value | no value |

Figure 1. List of active workflows. If the status of workflow is COMPLETE the start and end times of execution will be available to monitor actual running times.

IceResults Portlet

Results can be examined by selecting an application from the list. The list contains applications which are registered to *knowledge bus*. Knowledge bus acts as mediator and delivers messages from producer workflow to the results portlet.

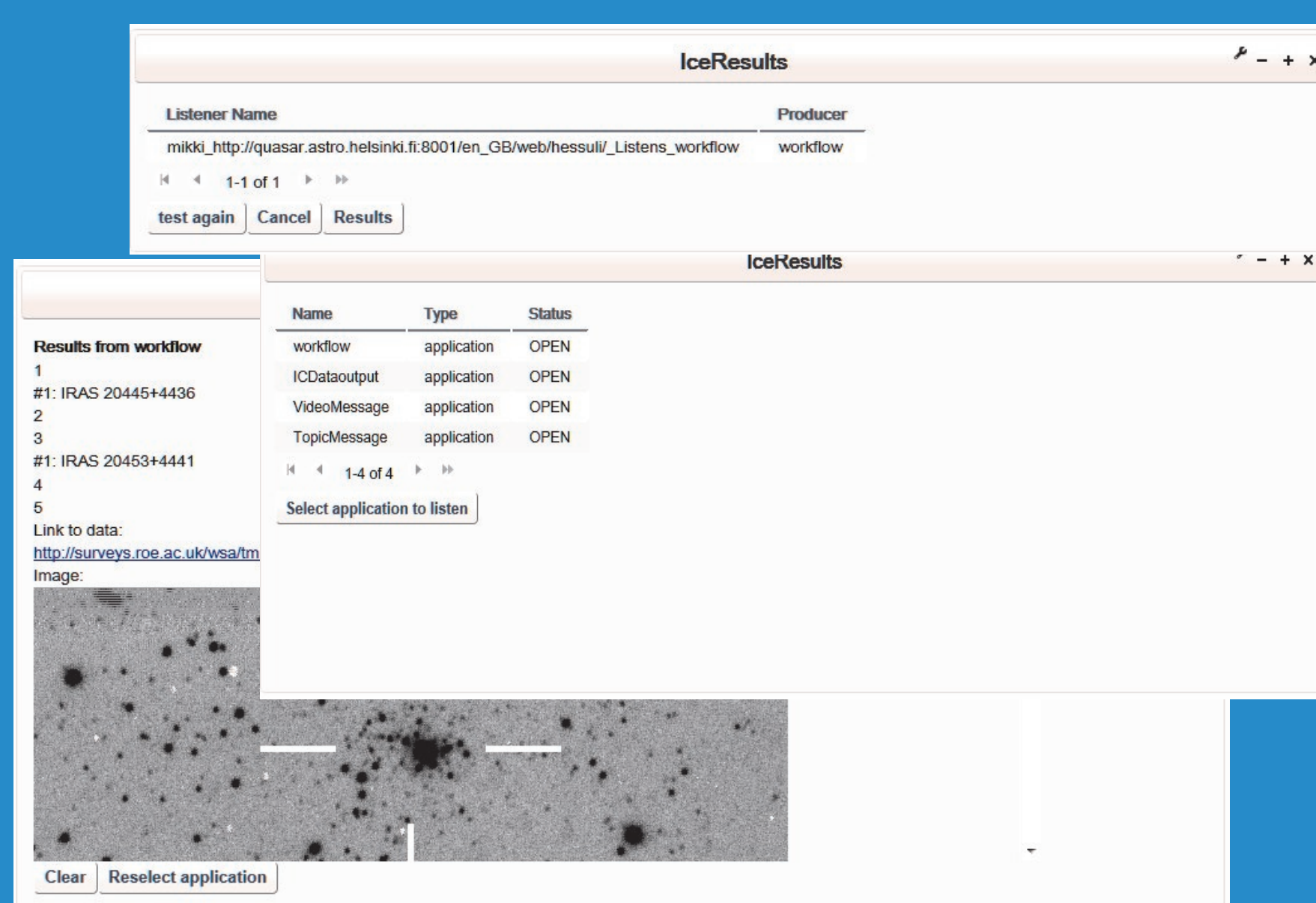


Figure 3. Ice Results portlet. Results from an example workflow. The results can be text, hyperlinks or images.

IceModels Portlet

Displays the list of workflow models. Users may review available models and their description and create new workflow instances into the workflow portlet.

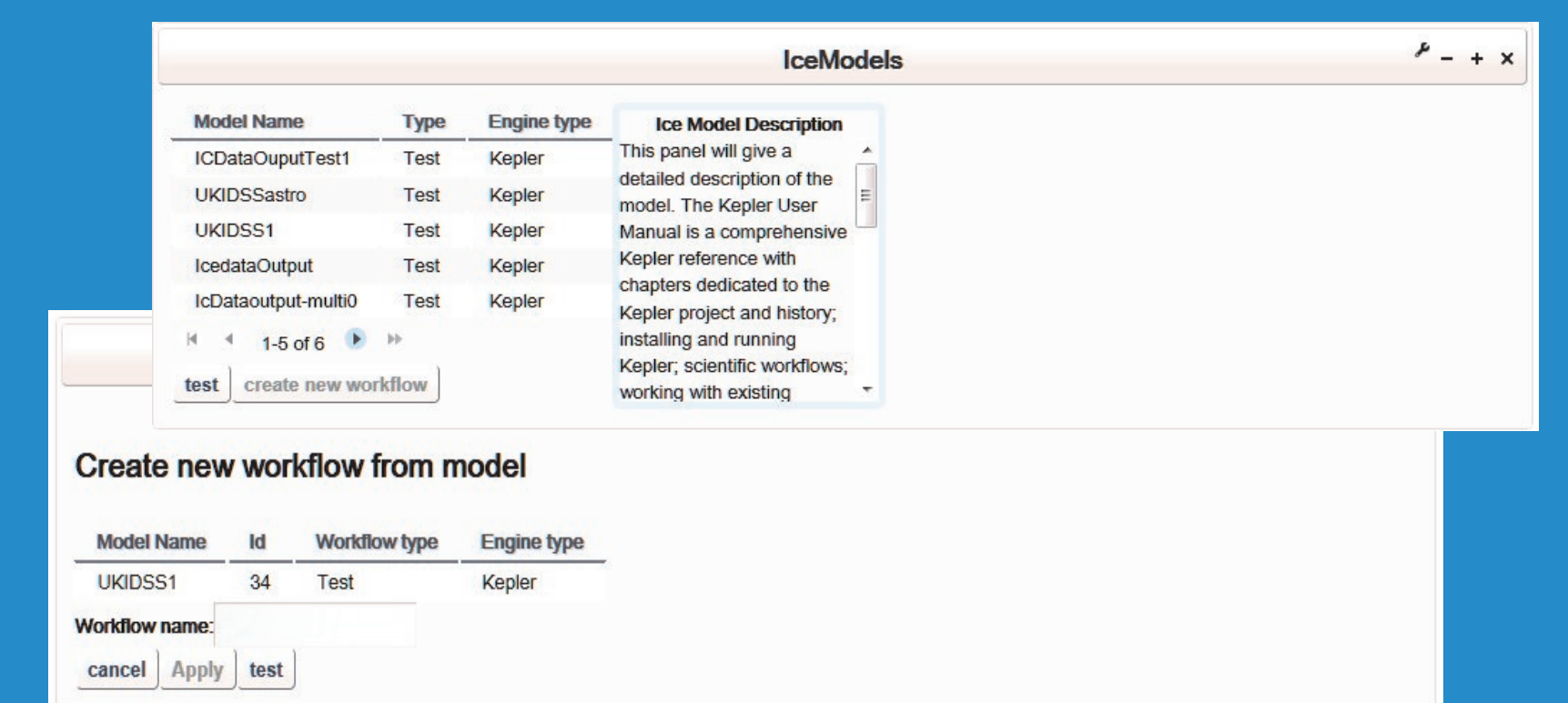


Figure 2. Ice models portlet gives information of available Ice models to create new ice workflow instances. Selected workflow model will be added into available workflows by a descriptive name that user can give to the model.

IceWorkflows Portlet

Displays a list of actual workflow instances which are created from existing IceModels. A wizard style portlet will guide user to select workflow to be added in execution list of runnable workflows.

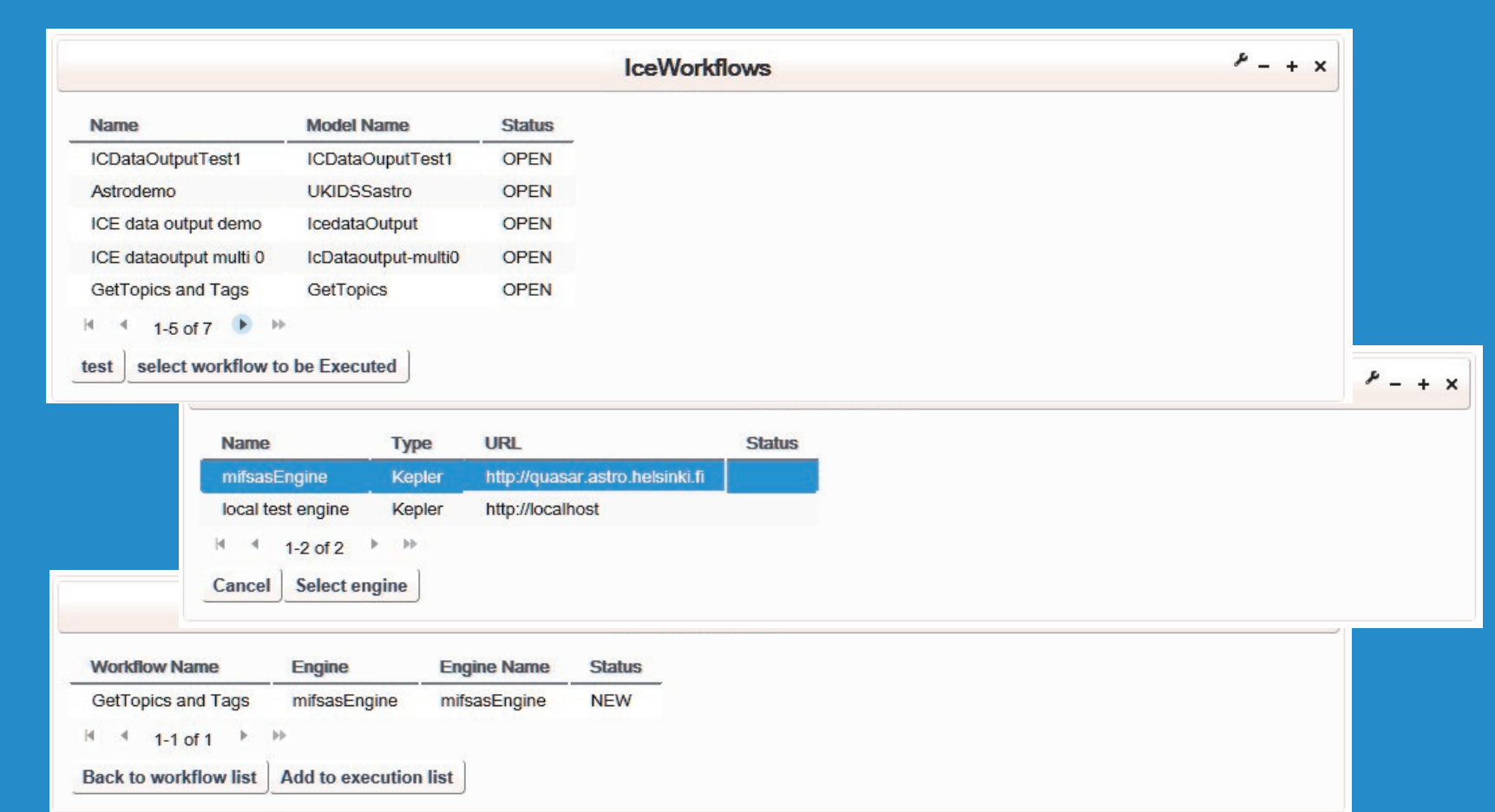


Figure 4. Ice Workflow selection portlet with available workflows and selection of the engine which is used to execute the workflow.