



Integration between the MacLearningEnvironments' SearchParty Application and HarvestRoad's Hive®

Choosing to Integrate via Standards

Summary

The O.K.I.[™] Repository OSID includes interfaces for integration among applications (consumers) and repository content (providers). Applications use the OSID to gain access to content in a manner that hides the technical detail by which that content is provided. This allows the application to integrate simply with a wide range of content providers without including the complexity inherent in supporting heterogeneous means of communication and data exchange. The application is also insulated from technology changes made by providers which leads to a longer useful lifetime for an application and thereby a greater return on investment.

Recently, Apple Educational Marketing and MacLearningEnvironments.org (MLE.org) have been working with HarvestRoad, an Australian software developer specializing in content management solutions for eLearning. One joint plan was to have MLE.org build a Mac OS X application (SearchParty) that could search content in the HarvestRoad Hive®, a content store. The goal was to show the application and Hive working together. MLE.org chose to develop a native Mac OS X application, written in Objective-C, rather than a cross-platform application written in Java[™]. While the Java application would work on both Mac OS X and Windows, Objective-C programs can leverage the Cocoa developer frameworks native to Mac OS X thus speeding development time, allowing more focus on the user experience and the application functionality. SearchParty was to use a proprietary API provided by HarvestRoad (Java Hive API - JHAPI). This effort had an aggressive timetable and required some Objective-C/Java bridge work, but was not perceived to have a high degree of technical risk.

In parallel, HarvestRoad had become aware of O.K.I.[™] through meetings of the IMS Global Consortium. HarvestRoad had committed to develop a pilot implementation of the Repository OSID atop Hive. HarvestRoad also provides Hive Explorer for RELOAD Editor, a client application that works with a Hive and the popular

open source tool RELOAD Editor, to provide content package assembly, disassembly, meta-data editing and automated batch operations on content. HarvestRoad also committed to accessing other vendors' content systems that offered an OSID implementation.

Part of the way through the SearchParty effort, MLE.org and HarvestRoad made the decision to replace integration that had been using the Java API mechanism with the Repository OSID. MIT also agreed to help with some OSID engineering technical support. SearchParty was reworked to use OSIDs in place of JHAPI, HarvestRoad engineers completed their Repository OSID implementation, and as a result, the SearchParty application and Hive were successfully integrated. As a significant windfall, other content exposed via OSID was immediately available to SearchParty. This became a strong demonstration of the viability and value of interoperation through standards. And the project was ahead of the original schedule!

MLE.org was able to demo SearchParty at Apple's World Wide Developer Conference. In quick succession, MLE.org and HarvestRoad demonstrated their integration as well as integration with other clients and content at the IMS Quarterly Meeting, a Sakai meeting, and Alt-i Lab. O.K.I. has been working with Giunti Interactive Labs whose client application, Learn eXact® Packager, works with OSIDs and whose content store, eXact Lobster, allows access via OSID. At Alt-I Lab, HarvestRoad's Explorer and Hive were working with Giunti Interactive Labs' Packager and Lobster. HarvestRoad and Giunti Interactive Labs, formerly positioned solely as competitors, were now working together. Now they are pursuing new joint opportunities in accounts where customers want to mix components from both vendors. This now allows them to pursue new joint opportunities in accounts where customers want to mix components from both vendors and where both companies are willing.

Additional Background

The Open Knowledge Initiative (O.K.I.TM) is a MIT-led, community effort to improve interoperability among applications and the enterprise system services on which they depend. The initial focus has been on higher education and eLearning, but the initiative's service-oriented architecture is applicable outside these domains. O.K.I. provides Open Services Interface Definitions (OSIDs): contracts between service consumers and providers. The OSIDs are well-defined integration boundaries that leave flexibility in the hands of developers. The OSIDs are neutral with regard to programming language¹ and implementation detail. There are OSIDs for common services such as authentication, authorization, hierarchy, scheduling, and workflow and eLearning services such as repository, assessment, grading, and course management. The OSID currently witnessing the greatest level of interest and adoption is the Repository OSID. Repository defines objects such as a Repository Manager, Repositories, Assets, and their metadata as well as methods for managing object lifecycle, data maintenance, and searching.

For tool developers, O.K.I. offers a standards-based repository content integration strategy. Supporting a technology-neutral OSID saves the tool developer from the complexity of understanding and tracking many disparate technologies. By implementing OSID consumer support, each tool developer gains immediate access to any content for which OSID provider implementation is available, subject to the content vendor's licensing requirements.

Apple Educational Marketing approached HarvestRoad because of their reputation for scalability, strong presence within the eLearning market, and non-Microsoft-centric technical approach. Apple Educational Marketing teamed with HarvestRoad and another Australian technology company, EtechGroup, who provide a standards-based learning management system

to create the Global Learning Object Repository Initiative (GLORI). GLORI is a real-time global learning exchange based on eLearning standards and has several primary and secondary schools and universities involved as initial eLearning members.

One of the near-term goals for MacLearningEnvironments.org was to create a repository search tool that showcased Mac OS X innovations like the Cocoa frameworks and other cool technologies available only on Mac OS X but built for interoperability via open specifications and standards, exactly where the OSID offered greatest value.

SearchParty began as a Cocoa application written in Objective-C. HarvestRoad has a JavaTM application programming interface for Hive (JHAPI). JHAPI can be called from Objective-C with a language bridge. The MLE.org developer built a first version of the application, named SearchParty, using this bridge approach.

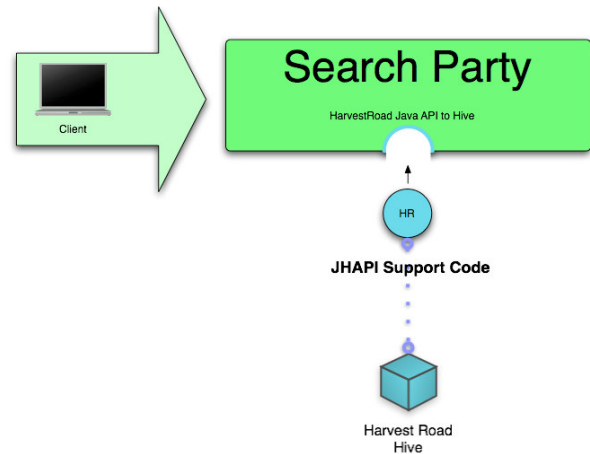


Figure 1: Original Plan Using Java API for Hive

¹ The programming language-neutral form of an OSID is called an XOSID. There are bindings of the XOSIDs for JavaTM, Objective-C, and PHP. Other languages bindings are in development.

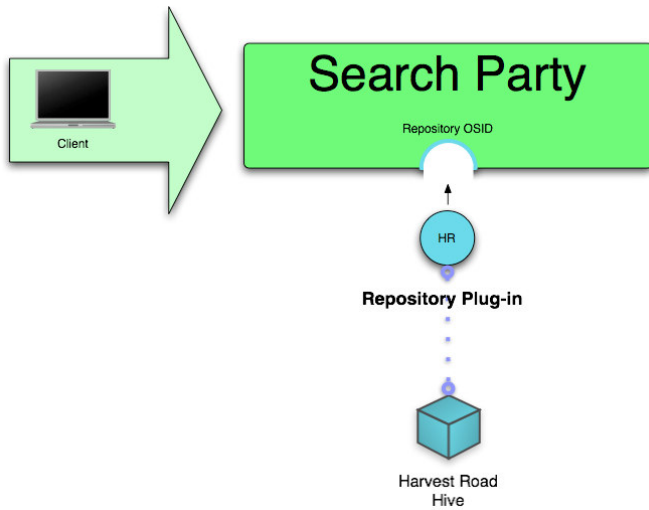


Figure 2: Substituting OSID for JHAPI

In parallel, HarvestRoad had heard of O.K.I. through meetings of the IMS Global Learning Consortium. HarvestRoad asked Scott Thorne, the principal architect of O.K.I., to speak at its inaugural Hive International User Group conference in Perth. HarvestRoad also contacted Verben Consulting, a specialist in applying O.K.I. as a strategic business direction, to prepare a marketing and technical analysis of what O.K.I. could do for HarvestRoad. Subsequently, HarvestRoad began an effort to implement the Repository OSID atop Hive. Apple Educational Marketing had also been in discussions with MIT about O.K.I. In the Spring, folks from Apple

Educational Marketing, MIT / O.K.I., and Mac-LearningEnvironments.org sat down to explore how these separate threads of activity might weave together. Everyone agreed that supporting O.K.I.'s Repository OSID atop the Hive and from within SearchParty offered attractive value as a good integration point with the additional benefit that the Hive could be accessed from other applications and SearchParty could work with other content providers.

The challenge was more "when" than "if". Mac-LearningEnvironments and HarvestRoad were already working down the JHAPI path and time was short before a key rollout. *Why take a risk on changing technical direction?* Engineers with O.K.I., HarvestRoad, and MLE.org got together and were encouraged after looking at what could already be demonstrated in terms of interoperability.

All parties decided to take the risk. Working together, SearchParty was modified to support the Repository OSID and JHAPI was removed. HarvestRoad worked to complete their OSID Repository implementation. Things went very well and Apple Educational Marketing demonstrated MLE.org's SearchParty as an example of the integration benefits of the OSID at an IMS quarterly meeting ahead of schedule. What's more, the immediate benefit of other applications using the Hive was demonstrable.

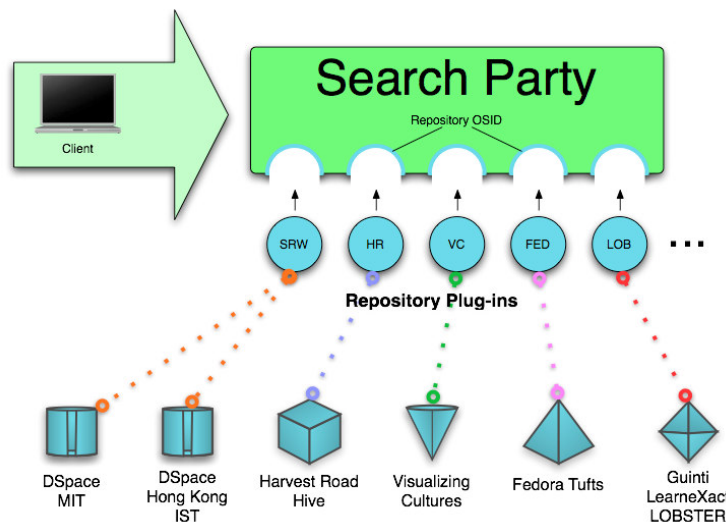


Figure 3: SearchParty Client has Immediate Access To Additional Content

Among the client applications that plug in Repository OSID implementation are the Visual Understanding Environment (VUE), a concept mapping tool developed by Tufts University, Twin Peaks II, a search tool written for Sakai, HarvestRoad Explorer and HarvestRoad Explorer with RELOAD, Giunti Interactive Labs Learn eXact Package, and Visualizing Cultures, a web application used at MIT.

Among the content sources available through OSID implementation are the Black Ships and Samurai image collection from MIT, the Tufts Digital Library, the Celebrate network of repositories, the eduSource Canada network of repositories, the HarvestRoad Hive, the Giunti Interactive Labs Learn eXact Lobster, any SRW site and any DSpace site supporting SRW, the Resource Discovery Network, and a variety of pilots and proofs of concept.

In time for the commencement of a Sakai convention a couple of weeks later, SearchParty was working with multiple content sources and the Hive was integrated with several clients, including Sakai. A week or so later, SearchParty and Hive were part of a multi-way interoperability demo at the IMS Alt-I Lab meeting in Sheffield, England. Users saw information going into and coming out of Hive with several tools. Hive was also integrated with Giunti's Learn eXact package and Giunti's Lobster with Hive Explorer. SearchParty was now additionally searching DSpace via a SRW OSID plugin. Everyone could see the benefits, and this all happened ahead of the original timetable for building a JHAPI-based, single app / single content provider. The integration worked so well that HarvestRoad and Giunti, often competitors, are exploring joint opportunities.

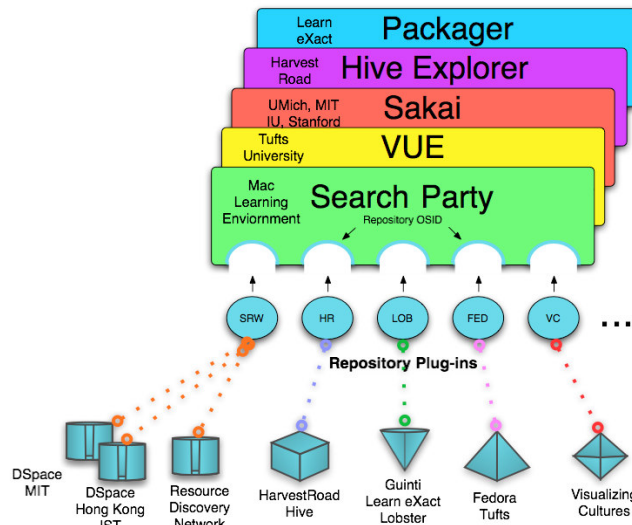


Figure 4: Multiple Clients Access Content From Multiple Sources

In this case study, we have seen the cumulative benefits that accrue from using standards. As the number and variety of content made available through OSIDs grows, so does the value of tools that work with OSIDs. OSIDs offer a further advantage because they are implementation-neutral technology. That technology can be a web service or something else and the consuming tool is no wiser and, more importantly, needs no additional vendor-specific support code.