

# Oracle Academic Enterprise Solutions

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## Oracle Academic Enterprise Solutions

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## **EXECUTIVE SUMMARY**

A Twenty-First Century education places certain demands on Campus IT departments:

- Information about students, teachers, and classes must be accurate and up-to-date, and it must be accessible to serve academic needs met by a wide variety of applications.
- Students and teachers need flexible online environments in which they can address subject- and student-specific teaching and learning needs.
- Students, teachers, and advisors need access to the increasingly rich data about student performance and interactions so that they can help to ensure student success.

All of these requirements lead in the direction of a highly integrated campus IT environment. Yet the architecture that exists on the typical campus today is poorly suited for this goal, causing exponential increases in resource requirements as new integrations are added.

Oracle proposes the Academic Enterprise architecture as an alternative that will help universities scale their infrastructure to meet these increasingly mission-critical needs. Based on common-sense principles of Service-Oriented Architecture and pervasive use of standards, the Academic Enterprise provides both a complete vision and a practical adoption path for colleges and universities to help their faculty and students succeed using the best support that technology has to offer.

## INTRODUCTION

Ten years ago, the Student Information System (SIS) was the only mission-critical academic application that most campus IT departments had to worry about. Data about student registrations and academic progress was largely self-contained within this single system that was mainly the domain of the registrar. Then colleges and universities began adding Learning Management Systems (LMSs). LMSs provided universities with enterprise systems that could support core academic processes of teaching and learning for the first time, but they needed course and student registration information from the SIS in order to do so. Integration was retrofitted to SISs for this purpose. In many cases, it was custom built and expensive and time consuming to maintain. Nevertheless, because it was just one integration, colleges and universities were able to bear the burden.

**Developing and maintaining multiple point-to-point integrations quickly becomes a complex and resource-intensive exercise for these niche solution providers and the higher education institutions they serve.**

However, that burden is now growing exponentially as technology gets more deeply interwoven into the educational processes. Faculty have begun to recognize that one size does not fit all for online learning environments. They are demanding multiple LMSs on campus to suit different needs. They are asking for adjunct tools such as blogs and wikis. They expect eReserves and other campus systems to be deeply integrated in their online learning environments. They want to teach with powerful tools that are available to average consumers in the cloud—tools such as Flickr and Google Docs. Meanwhile, administrators, parents, and taxpayers alike are demanding more accountability. They want to know that the money invested in the educational system is producing better outcomes for more students. And as more and more of that education is mediated through technology, it only makes sense to harness the data being generated in these online educational interactions to get better visibility into how students are doing and to help support those students better.

Campus IT departments have often struggled to maintain just the one integration between the SIS and the LMS. Now they are facing demands to support dozens of integrations. It is simply not possible for them to meet that demand under the old way of doing things. So rather than being enablers of better education, these departments have become obstacles to it. They need a new way of doing things. They need a new architecture that will break down application silos. One that will create an environment in which the schools' online capabilities could be designed around what particular students, educators and researchers need, rather than what happens to come packaged in the shrink-wrapped software. One that will enable colleges and universities to support their core constituents by quickly adding new teaching and collaboration capabilities, including strategic views into educational performance so institutions can identify key opportunities to better support student success. Oracle calls this architecture the Academic Enterprise and has created a new product team called the Academic Enterprise Solutions (AES) group that is dedicated to advancing the architectural vision.

The Academic Enterprise architecture has certain critical characteristics:

- Adherence to a wide range of technology standards: One of the reasons that campus IT expenses are growing exponentially with the number of integration points is that each point typically is a custom integration requiring special attention and maintenance. The Academic Enterprise emphasizes pervasive use of industry standards in order to minimize these problems. Components are chosen partly for their ability to provide worry-free integration with other academic IT systems via top-quality implementations of standard interfaces.
- Service-Oriented Architecture (SOA): By themselves, standards only go partway toward solving the problems that come with an IT environment of many integrated applications. Colleges and universities still need tools to manage these integrations, ensuring their security and reliability. The Academic Enterprise relies on SOA to provide these management capabilities. Business Activity Monitoring (BAM) tools provide IT administrators with the capabilities that they need to stay one step ahead in this increasingly complex environment.
- Consolidation of Core Capabilities: As more and more point solutions are developed to meet niche needs in the education market, these tools frequently re-invent the wheel. For example, ePortfolios, learning object repositories, eReserves, and digital archives all rely heavily on core content management capabilities which are almost always redundant to those that exist in other niche tools on campus. By stressing the use of standards and SOA, the Academic Enterprise puts an end to this waste of development and maintenance effort by enabling all of these niche tools to assume and build on top of robust, best-in-class implementations of standards such as the Java Content Repository (JCR) and Business Process Execution Language (BPEL).
- Support for Composite Application and Mash-up Development Styles: With pervasive standards, SOA, and the consolidation of core capabilities, academic application developers can be free to focus on building out academic-specific functionality. This is particularly important since education and research processes do not lend themselves to commoditization. Individual schools, individual departments, and even individual teachers and researchers need to be able to tailor their virtual environments to meet their needs. The Academic Enterprise stresses development styles that enable economical and supportable customization. It emphasizes a composite application approach for building core, scalable tools that can be developed by a small team and maintained by a small IT department, while also enabling mash-ups so that, for example, a physics teacher with a little programming capability could build a specialized simulation for her class and plug it into the learning environment without causing stability or data security issues that the IT department needs to worry about.

With these architectural principles in mind, the AES group has focused the Academic Enterprise model on three core areas:

1. **The Source of Truth:** The old model of the SIS as a silo is giving way to a hub model, where core academic data about students and courses can be maintained, reconciled across various component systems, and made available to systems that need it.
2. **The Online Learning Environment:** As with the SIS, the LMS can no longer function as a silo. In fact, the very definition of the LMS is beginning to dissolve as more and more tools become incorporated into the learning environment from various sources both inside and outside the campus IT department.
3. **The Academic Nerve Center:** As more education happens online, there are opportunities to support the educational processes in new ways. By providing students and teachers with dashboards that help them track progress and foresee problems in new ways, the campus community can work better together to help ensure student success.

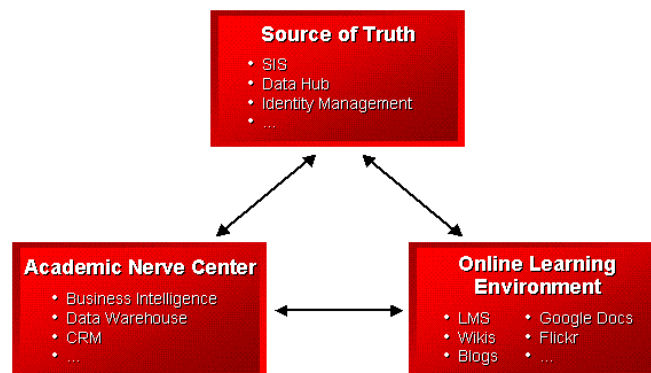
These three elements together comprise the ecosystem that the Oracle's Academic Enterprise model supports.

**The Academic Enterprise architecture supports:**

**Reconciling and rationalizing data about students and courses across IT systems**

**Providing flexible, educationally powerful, and easy-to-maintain online learning environments**

**Tracking student progress and other important academic analytics**



Different schools will want to focus on different corners of the triangle first, depending on their local needs. However, most schools will ultimately need to address all three corners. The remainder of this white paper provides both short- and long-term investments that Oracle customers can make in each corner, as well as some suggested adoption paths.

## THE SOURCE OF TRUTH: MANAGING CORE ACADEMIC DATA

For most colleges and universities, the Student Information System (SIS) is the source of truth for information about students, teachers, and courses. However, in the Academic Enterprise, many applications—ranging from Learning Management Systems (LMSs) to eLibraries to course evaluation systems and many more—need access to this data. Without the ability to share this information, there simply is no academic enterprise.

Unfortunately, many of today's campus applications were designed as silos and maintain their own separate stores of information. Even integrating one LMS with an SIS is more difficult than it should be. As the number of applications requiring student data grows, so does the number of poorly integrated duplicate data stores. This fragmentation can quickly lead to inaccuracy, frustration, and even security risks. Higher education needs an architecture for centrally managing the propagation of this information. But they also need a plan that lets them transition over to this architecture incrementally at a pace that can be supported by their resources.

### The Student Administration Integration Pack (SAIP)

Oracle SAIP 9.0, the first product in the AES product family, provides immediate relief for higher education's SIS/LMS integration challenges while also providing a glide path to a more modern architecture. Based on the forthcoming IMS Learning Information Services (LIS) standard, SAIP 9.0 is the industry's first commercially supported implementation of the standard. It provisions student, teacher, and course information from Oracle Student Administration (SA) via SOAP web services. It provides a variety of batch and event-driven update methods that can be used in combination to ensure timely and accurate synchronization of data between the source of truth and consuming applications.

SAIP 9.0 is first and foremost a practical solution that can work with today's academic applications. Oracle offered to co-chair the IMS working group for the LIS specification in an effort to bring as many industry players to the table as possible. SAIP 9.0 was in integration testing with several major LMS providers—and even some non-LMS providers such as Facebook application vendors—even before the product was released to customers. Further integration testing continues, and Oracle expects SAIP 9.0 to provide tested and supported integration with all of the major LMSs as well as with many other applications being used by colleges and universities today. Furthermore, because SAIP 9.0 runs on PeopleSoft Integration Broker, no new middleware is required. Customers who are running Student Administration 9.0 already have the infrastructure that they will need to run SAIP.

At the same time, because SAIP is SOAP-based and draws on other web service standards, it provides a path to the future. Customers who have or acquire the full-featured middleware such as Oracle BPEL Process Manager will be able to perform content-based routing to multiple targets, for example, sending all courses

**SAIP course and student provisioning provides:**

**Supported, standards-based provisioning of information to the LMS**

**Provisioning of the same data into Web 2.0 applications such as Facebook**

**Planned support for provisioning to LDAP-aware applications**

from the English department to one LMS while sending all courses from the math department to another. Future releases of the SAIP will enhance customers' ability to extract more value from its Service-Oriented Architecture (SOA), particularly in the area of simultaneous integration with multiple consuming applications.

Also planned for a future release of the SAIP is the ability to provision student, teacher, and course information to LDAP. This will enable integration with a variety of campus applications that may never support web services but support LDAP integration today. It also provides colleges and universities with another path to simultaneous synchronization across multiple applications, since the LDAP directory can act as a central store that is provisioned from Student Administration via SAIP.

### **Identity Management (IdM)**

A strong complement to the synchronization of identity-related information that SAIP provides is support for authentication and authorization. Centralizing these IdM functions provides colleges and universities with better security, gives them more control over compliance with privacy regulations such as FERPA, and creates a better user experience for students and teachers. However, like many aspects of the Academic Enterprise, colleges and universities will need to have incremental adoption paths that meet their needs and capabilities. Oracle will provide a number of options to customers.

The simplest option for colleges is to take advantage of the forthcoming LDAP support in SAIP. Most colleges and universities have LDAP systems today. SAIP can provision student, teacher, and course information directly into any standards-compliant LDAP system. In cases where customers have multiple LDAP directories that they choose to maintain separately, Oracle Virtual Directory can merge SAIP data with that of the other campus LDAP directories to provide a unified view to the identity data.

Schools with stronger SOA capability may choose instead to provision information into more robust IdM systems using SAIP's web services. Because the SAIP is based on web service standards such as SOAP and WSDL, it can be integrated with most modern IdM systems, including Oracle's own Identity and Access Management Suite. Oracle will continue to enhance identity management integration options for our customers in future product releases. For example, a future release of PeopleTools is planned to provide support for Security Assertion Markup Language (SAML).

### **Master Data Management (MDM)**

The SAIP supports the synchronization of core academic data between the SIS as the source of truth and multiple consuming applications via a standards-compliant, cost-effective, and vendor-supported solution. This is a dramatic improvement over what most colleges and universities have today. However, it still results in redundant stores of information across multiple applications—stores that always



run the risk of falling out of synch. Furthermore, as the Academic Enterprise grows richer, it is no longer safe to assume that the SIS will be the sole source of truth for this data. For example, colleges and universities may use Customer Relationship Management (CRM) systems to track key information about their students. Likewise, multi-campus systems where each campus maintains its own SIS instance will therefore have information about the student body fragmented across these various instances, which can cause major challenges for cross-registration and other inter-campus functions. Sooner or later, many schools will want to centralize and cleanse these information stores. Again, this functionality is distinct from yet complementary to IdM.

The solution to this problem is to consolidate this data into a single source of truth using Master Data Management (MDM) technology such as data hubs. Oracle provides a range of industry-leading MDM products. In particular, the Oracle Customer Hub will be extended in order to meet academic-specific requirements and integrate it with PeopleSoft Student Administration via Oracle-supported web service integration packs. Over time, Oracle will continue to extend the range of academic data that the Oracle Customer Hub will support as the Academic Enterprise evolves.

## **THE ONLINE LEARNING ENVIRONMENT: MEETING NEW EDUCATIONAL NEEDS**

Teaching students is not like manufacturing widgets. Both the range of subjects and the range of students require support for an extraordinarily broad array of what could be called educational “business processes.” For example, histology professors and art history professors teach with images, but the specifics of the ways in which they do are so different from each other that they probably need two very different kinds of image annotation tools in their respective online learning environments. This is one major reason why the majority of colleges and universities have failed to completely standardize on one centrally managed LMS. In fact, the number of “rogue” online learning environments set up by individual academic departments or even individual professors is increasing—a trend that has been accelerated by the wide range of freely available Web 2.0 collaboration technologies in the cloud. And yet, there remain compelling reasons for colleges and universities to provide centralized support for a unitary system, including duplication of support effort as well as privacy and security concerns.

Oracle is promoting the evolution of the online learning environment architecture beyond the monolithic groupware that is the current-generation LMS and toward a flexible Learning Management Operating System (LMOS). Drawing on both the composite application approach becoming popular in enterprise toolkits such as Fusion Middleware and the mash-up approach that is becoming popular on the consumer web, the LMOS would provide a centrally managed, enterprise-ready core while enabling the easy creation of multiple highly customized and personalized learning environments. The LMOS consists of a 3-tiered architecture

with enterprise data storage and access on the bottom, business logic for both generic capabilities such as chat and education-specific capabilities such as grading in the middle, and an easily customizable, mash-up friendly presentation layer on the top.

**Online learning environments in the future will store all content in standards-compliant content repositories such as Oracle Universal Content Management or Oracle Beehive. LMSs such as Sakai and Moodle are already moving in this direction today.**

### **The Bottom Tier: Managing Content and Other Data**

Information in an LMS can be considered content, and many LMS tools require content management functionality. Homework drop boxes require review workflows. ePortfolios require versioning and publishing capabilities. Even the text of a discussion post should be considered content and managed accordingly. Current-generation LMS developers have had to build content management capabilities piecemeal over time. At this point, most mainstream LMSs have some sort of content repository. However these tools are only opportunistically integrated with the main LMS and are missing some of the functionality and reliability that can be expected of a modern dedicated content repository product. In contrast, all content-centric tools in an LMOS architecture will store content in a standards-compliant repository and draw on the content management capabilities provided by that repository.

Oracle Universal Content Management (UCM) is an ideal foundation for an LMS, providing robust content management capabilities well beyond those that exist in today's LMS and add-on products, including digital asset management, content lifecycle management, mobile content access, and much more. Learning environment developers building on UCM will be able to take industry-leading content management capabilities for granted and focus instead on education-specific functionality. Oracle offers a second alternative for a content repository in the form of Oracle Beehive, which includes a content repository that is compliant with the Java Content Repository (JCR) standard. Beehive customers can leverage their investment by using it as the content store for their LMOS.

As with content management, current-generation LMS developers end up re-inventing the wheel with calendar management. Most LMSs have basic scheduling capabilities so students can track assignment due dates, class times, and other course-related scheduling information. However, enterprise calendaring applications are extremely complex to develop. Furthermore, they are of limited value if they do not integrate all of a person's calendar information. As a result, LMS developers spend significant time and energy building calendar capabilities that are inferior to more generic market alternatives and provide limited value because they are siloed. In an LMOS, education-specific calendaring functions such as selective release of content or homework drop box due dates would be built on top of a calendar standard such as calDAV and store content in a standards-compliant enterprise calendar repository. Oracle Beehive provides robust support for the full range of calendar standards and is well suited for university-wide use.

## **The Middle Tier: Educational and Collaboration Services**

As with content management and calendaring, today's LMS developers are often forced to spend significant development time re-implementing standard collaboration capabilities. In some cases this may make sense. For example, educational discussions are varied and demanding enough in their form that an education-specific discussion forum may be called for in some situations. In other cases, however, the duplicated effort produces more cost than benefit. An LMOS will allow colleges, universities, and online learning environment developers to mix and match services, drawing on existing capabilities whenever practical and building specialized services only when appropriate. These capabilities will be available not as bolt-on afterthought tools but as core services that enable online learning environments to be assembled as composite applications.

Oracle WebCenter Services and Oracle Beehive provide strong support for this vision. As Fusion technologies, they are built with composite application assembly in mind. WebCenter Services can provide capabilities such as wikis, tagging, and RSS syndication. Beehive provides best-in-class support for bedrock communications standards such as the Extensible Messaging and Presence Protocol (XMPP) and Internet Message Access Protocol (IMAP) as well as capabilities such as group task management.

## **The Top Tier: Mashing Up the Learning Environment**

While LMS developers have been struggling to re-implement existing enterprise software, the consumer web has been zooming ahead. More and more, teachers and students are interested in enriching their learning environments with an ever-increasing array of innovative Web 2.0 services. And they are not waiting for the LMS vendors to catch up. They are starting to cobble together their own learning environments by integrating web "gadgets" or "widgets" into weblogs or social software platforms. The more technically savvy of them are even mashing up data feeds from services like Google Maps and Flickr or even OpenSocial. The LMOS will support this innovation by providing a mash-up friendly presentation layer of standard HTML and Javascript, and by exposing the core LMOS services for mashing up via these same technologies.

Oracle UCM provides an ideal environment for extending these capabilities. Different classes can be managed as individual sites, giving educators a palette of user-friendly tools for custom tailoring many different micro-learning environments all on the same enterprise-grade back end. Faculty and support staff can test versions of these environments before publishing them to the students, and can roll back to previous versions if something goes wrong. Administrators can grant teachers and students different levels of control over the environment, allowing open editing in some areas while locking down areas such as global navigation to maintain ease of centralized support.

In addition, Oracle Ensemble—now part of WebCenter Services—enables campus administrators to take a wide range of campus web applications written in any

**Oracle Fusion Middleware  
provides a variety of tools for supporting  
mashup-friendly Web 2.0 learning  
environments.**

number of programming languages, integrate them into a common security model with the learning environment, and “widgetize” their pages for a unified user experience. It can also wrap any widget or page within the LMOS and present it as a standards-compliant portlet.

In cases where external Web 2.0 services are being integrated into the environment, Oracle SAIP 9.0 can help. Even before its release, Oracle began testing SAIP integration with Inigral’s Schools on Facebook application as a first test of exactly these use cases. With SAIP, colleges and universities will be able to extend the edges of the LMOS further into the cloud. In the future, they will be able to go even further by supporting single sign-on via Oracle IdM technologies.

### **Sakai 3 as the Reference Implementation**

Oracle continues to support customer choice by promoting the LMOS as an open architecture based on open standards. The only way that colleges and universities will achieve the kind of flexible learning environments that teachers and students are demanding is if there is a high degree of interoperability that can lower IT support burdens and licensing costs enough to make such an environment practical. This necessarily means focusing on standards-based integration across a wide variety of vendors and open source projects rather than bespoke integrations and one-to-one vendor relationships.

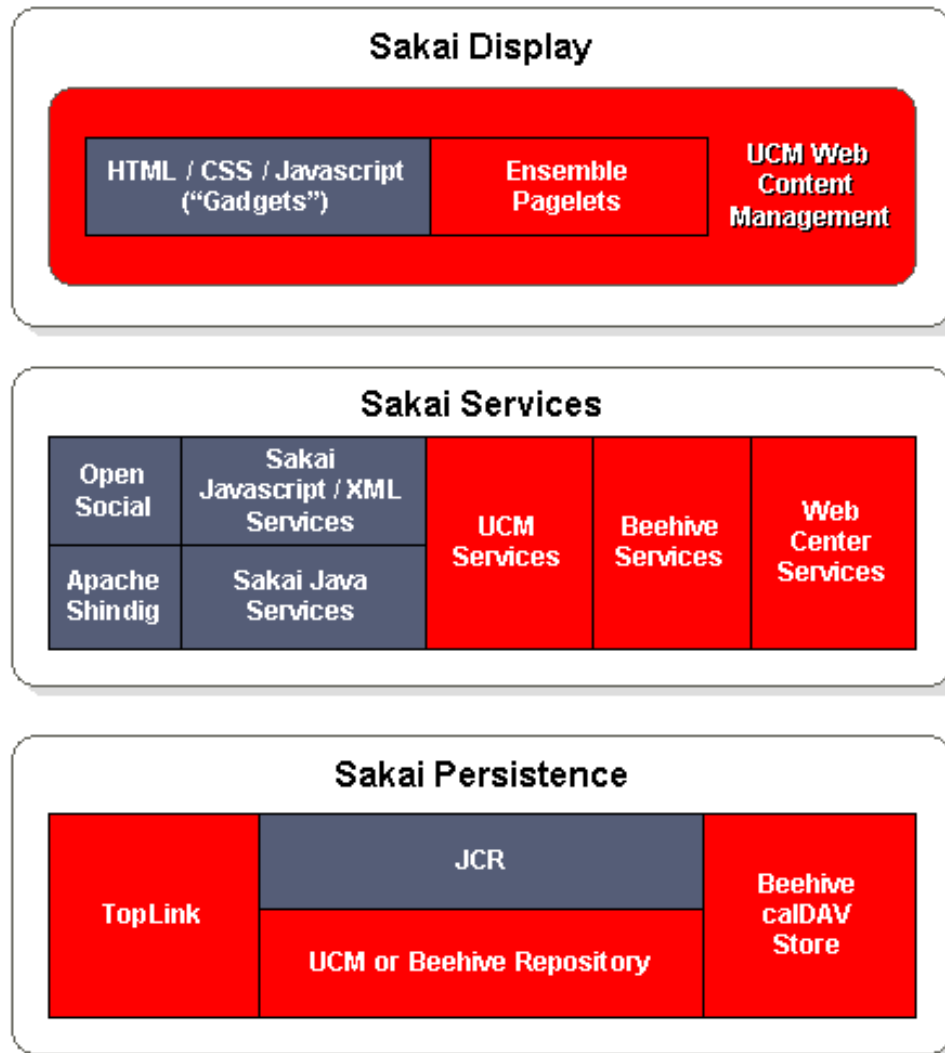
This is one of the main reasons why Oracle has chosen the planned 3.0 release of Sakai as the reference implementation for integration with Oracle products, having already chosen Sakai 2.6 as the reference integration with SAIP. Sakai 3.0 is expected to support standards integration far beyond current-generation LMSs and to be highly compatible with Oracle’s vision of the LMOS architecture:

- All content-centric services in Sakai will rely on the JCR standard to store and manipulate content in any repository compliant with that standard.
- Scheduling information will be integrated with external calendaring systems via the calDAV standard.
- Education and collaboration tools will expose services via several different bindings, including JSON, for construction of composite applications as well as mash-ups.
- The Apache Shindig container will be integrated to support OpenSocial services alongside Sakai services.
- A wide range of standard collaboration protocols such as XMPP and IMAP will be supported.
- The architecture will be extensible, supporting the addition of new services.
- All Sakai pages will be entirely HTML, Javascript, and CSS, and will heavily utilize JSON and Asynchronous Javascript and XML (AJAX).

- User home pages will feature an iGoogle-like user experience, including support for Google Gadgets.

As such, Sakai 3.0 is expected to provide a fully realized, enterprise-quality core for an Oracle-integrated LMOS architecture:

Because Sakai has a commercial-friendly open source license, both private source



LMS vendors and other open source projects can study the details of Sakai's implementation and even re-use the code. And since Sakai is created by and for the educational community, the core development community is made up of universities that intimately understand the educational processes that an online learning environment must support. As such, Sakai 3.0 is expected to be an excellent base for not only a production-ready implementation of an LMOS but also an appropriate reference implementation.

## THE ACADEMIC NERVE CENTER: ENSURING STUDENT SUCCESS

Good integration and flexible learning environments are of limited use if students, teachers, and advisors do not have access to the data necessary to assure students that they are on paths to success and that their support network is doing everything possible to help them. The Academic Enterprise is not complete until data about the students' progress can be made available, interpretable, and useful.

### Getting the Data, Mining the Data

A wealth of raw data that can be used to monitor and support student success already exists today in the SIS. But it has to be made available in a form that allows actionable information to be extracted from that data. PeopleSoft Campus Solutions Warehouse (CSW) provides a mature solution for sifting through volumes of historical information from PeopleSoft Student Administration. Providing star schemas with many ETL maps, many conformed dimensions, and many fact columns, CSW enables colleges and universities to ask and answer questions such as, "Do students for class X that have taken prerequisite Y really do better than students who have not taken the prerequisite? Has that changed over time? If so, what has been the trend?" Finding answers to questions like these enables colleges and universities to maximize the choices that students have while still helping them to make the decisions that will help them to be successful. Future versions of CSW will support more out-of-the-box analytical capabilities focused on academic outcomes. Customers may also choose to extend CSW to integrate with other SIS products by providing their own ETL maps.

These capabilities can be enhanced with the addition of Oracle Data Mining, in cases where college administrators do not know all the variables that may be relevant to answer the questions they have. For example, they may want to know which factors about a student (e.g., high school GPA, standardized test scores, GPA in major, etc.) are most predictive of the student staying in college and completing a degree program. Oracle Data Mining in combination with CSW can help to answer these sorts of questions and surface them in flexible and useful reports via Oracle Business Intelligence Enterprise Edition (OBIEE) or as key performance indicators to be embedded in the SIS. Oracle is also considering the possibility of providing pre-packaged predictive models as part of the product offering in this area.

Of course, there is also rich data to be mined in other academic systems. Unfortunately, while the online learning environment has a wealth of data about student progress, most of that data is walled off in a silo within today's colleges and universities. If the LMS's limited range of embedded analytics do not meet the need, then campus IT departments will have to develop expensive custom Extract, Transfer, and Load (ETL) routines in order to get the data out of the LMS before they can do anything with it.

Oracle SAIP takes the first step in breaking down this barrier. SAIP 9.0 supports final grade import into SA from any IMS LIS-compliant LMS. In addition, Oracle

**Oracle Campus Solutions  
Warehouse helps universities fine-tune pre-  
requisites and programs of study to  
maximize student success..**

ensured that the LIS specification supports fine-grained outcomes integration. Future versions of the SAIP will support import of detailed course grading data from the electronic grade books in the online learning environments.

Beyond grades, the online learning environment is rich with course participation data. This data, when combined with data in the SIS such as transcripts and standardized test scores, can be used to predict longer-range outcomes such as graduation. As a first step toward making this kind of analysis practical and affordable, Oracle has become a founding member of the IMS Targeted Retention Systems working group. Consisting of both academic experts and vendors, this group seeks to identify requirements and best practices for combining LMS and SIS data in the service of identifying at-risk students. Eventually, this work should lead to specifications ranging from an architecture of privacy for preventing abuses of the data to standardized data extraction methods. As these standards develop, Oracle customers will be able to more affordably utilize their LMS data by accessing it from the source system through OBIEE or by storing it in Campus Solutions Warehouse.

### **Reaching Students**

Simply knowing that students may be at risk isn't enough. Colleges and universities will need to reach out to these students in a coordinated way, and learn from their outreach experiences to improve their results. Once again, the Academic Enterprise enables comprehensive access to data in order for the academic support network to help students achieve success.

The first step in this process is providing high-quality self-service help. Oracle Enterprise CRM for Higher Education offers a support module that enables customers to provide students with organized information on topics ranging from how to use their LMS to what academic preparation makes the most sense for a given career path. These knowledge bases can be easily managed and monitored for use and effectiveness. They also can provide escalation paths for students who need more personalized help. And once that person-to-person contact is made—whether through the help desk, the student's academic advisor, or the career counseling center—the record of that contact can be maintained so that the student's entire support network at the college will have a more complete picture of the student's needs and aspirations during future support conversations.

The effectiveness of the CRM system can be greatly enhanced when it is integrated with analytics. For example, students who are identified as being at-risk via data mining the CSW could be targeted for support campaigns in the CRM. If the customer also owns the CRM warehouse, then the data regarding these campaigns can be cross-referenced against historical student retention information to determine which interventions have been most effective in boosting student retention as well as to fine tune future interventions.

**Oracle Enterprise CRM can help at-risk students find the help they need and make sure the university's support resources are fully utilized.**

## ADOPTION PATHS

There can be no one single adoption path for all of these solutions because different colleges have different priorities and capabilities. Schools will start on different points of the Academic Enterprise triangle and proceed at different paces. That said, there are best practices that reduce the number of possible paths to a manageable set of logical choices.

Oracle recommends that its customers start down the path of the Academic Enterprise by adopting SA 9 and the SAIP 9.0. These products provide foundational coverage for all three points on the triangle. SA is already the trusted source of truth for academic data in many colleges and universities. With the addition of SAIP, customers can provision course and student information into a wide range of online tools as part of a flexible online learning environment, from the LMS to a campus-hosted wiki to a Facebook application. SAIP 9.0 can also allow faculty to submit final grades from the LMS back to SA, where it is accessible to students and advisors to track their academic progress.

**Customers interested in the Academic Enterprise architecture should start by adopting SAIP. From there, they have a range of possible adoption paths depending on their priorities.**

From there, customers have a range of options. For those with an urgent need to respond to requests for a richer range of tools in the learning environment, a logical next step would be to add identity management, including some provisioning capability. For campuses that rely heavily on existing LDAP directories, it may make sense to integrate them with SAIP using OVD. Other campuses may choose to implement Oracle Identity and Access Management Suite for more robust provisioning and other capabilities. Other customers may address the same problem somewhat differently by adopting an LMOS-friendly learning environment such as Sakai 3 and integrating it with products such as Oracle UCM and Oracle Ensemble. This latter option makes more sense as a first step for customers who are planning to migrate from their current LMS anyway.

Other customers may be relatively satisfied with their online learning environment and have a more urgent need to focus on tracking and improving student success. In those cases, adopting and implementing Oracle CSW or Oracle Enterprise CRM for Higher Education would provide campuses with the ability to extract more value from their SA installations. Naturally, each of these products can meet a range of other needs as well, which may also influence order of adoption. For example, customers that also need to improve the responsiveness of their IT help desk may choose to adopt the CRM before the CSW, even though both products can help address the goal of supporting student success.

Once these investments have been made, then customers may want to look at deepening their capabilities further on one or more points of the triangle with investments in products like OBIEE, Oracle Data Mining, or the Oracle Customer Hub. They may choose to enhance their online learning environments with Oracle Beehive or Oracle WebCenter Services. And as their reliance on SOA increases, they may choose to invest in Oracle SOA Suite to help them monitor and manage their growing portfolio of web services.



## **CONCLUSION**

Today's technology provides unprecedented opportunities to create a virtuous feedback loop in which students and teachers interact in flexible online learning environments and the data from those interactions is analyzed and fed back to the students and their academic support network to help them work together toward the students' ongoing success. But in order to achieve that potential, colleges and universities need a practical, scalable architecture that their IT departments can support and extend as the academic support needs of the campus evolve. Oracle's Academic Enterprise is that architecture.



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