Blackboard Building Blocks
Technology for Decision-makers

A non-technical discussion of how third party products can be integrated with Blackboard

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Document Purpose

This white paper explores how companies can reach the Higher Education market by integrating their tools, systems and content with Blackboard Learning System and Blackboard Portal System using Building Blocks technology. Independent Software Vendors (ISVs) can use this information to help decide how to best invest in the integration with Blackboard through topics such as:

- Information about the Higher Education landscape
- Blackboard’s role at educational institutions
- Integration points exposed through Building Blocks
- How Building Blocks can support various business and licensing models.

Blackboard Building Blocks™ technology is available today in the industry’s leading e-Education infrastructure Suite:

- Blackboard Learning System™ (Release 6, ML)
- Blackboard Portal System™ (Release 6)
- Blackboard Transaction System™ (Windows, Unix)

Introduction

$5.22 billion—that is the anticipated budget for technology products and services at Higher Education institutions in the United States alone. This is a 5% increase over last year’s $4.95 billion budget.¹ How can companies tap into this market and impact the daily education experience of millions of users?—by integrating with Blackboard Learning System and Blackboard Portal System—the leading Course Management System and Portal powering Higher Education today.

Integration with Blackboard e-Education Suite is provided through a technology called Building Blocks. Building Blocks is the architecture at the heart of the Blackboard software. In concrete terms Building Blocks is a collection of java-based APIs, specifications documents, and an architectural framework, which are documented in a software developer kit (SDK). The Building Blocks SDK is freely available for download from the Building Blocks website.

Before exploring the technology behind Building Blocks and integration with the Blackboard e-Education Suite, some background on the Higher Education market, Blackboard Learning System and Portal System, how Blackboard is used in this and how companies can take leverage integration with Blackboard is provided.

Blackboard Learning System within Higher Education

Blackboard’s core market is within the Higher Education institutions of North America, followed by key international markets including the United Kingdom, the Netherlands, Germany, Austria, Australia and Japan. Blackboard is the market leader within North America with a 46%² market share. Blackboard’s primary competitors in the area of Course Management Systems are WebCT and eCollege.

Academic institutions deploying Blackboard Learning System have two license options:

- Blackboard Learning System Basic – a stand-alone smaller scale version of the Blackboard Learning System. This software does not allow integration with other systems, or
- Blackboard Learning System – enterprise software that is scalable, customizable and enables integration with other systems including authentication, student information systems, or third party applications.

This white paper will focus on the opportunities available through integration with the Enterprise version of Blackboard Learning System.

Institutions encourage (and often mandate) adoption of the Blackboard Learning System across all disciplines and instructors. These same institutions integrate Blackboard with their central authentication technology (e.g., LDAP, Kerberos), and with other core applications on campus including student infor-

mation systems (e.g., PeopleSoft, SCT, Datatel). In doing so, Blackboard Learning System has become part of the institution’s core IT infrastructure and a mission-critical system that instructors and students rely on every day to teach and learn.

The decision to purchase Blackboard Learning System and deploy it institution-wide is made at the President, Provost and CIO levels at institutions of Higher Education, usually with influence from a committee composed of representatives from various key groups on campus (e.g., Academic Technology, Registrar, Faculty Senate).

Blackboard Learning System is licensed to institutions on an annual basis. The license fee is determined by the number of Full Time Equivalent (FTE) students enrolled at the institution. Higher Education prices for the Learning System begin at $25,000 and increases along with the size of the institution. Blackboard Learning System and Blackboard Portal System can be run locally by an institution or hosted by Blackboard Application Service Provider (ASP).

**Why use Blackboard Building Blocks?**

Building Blocks technology enables third party software, hardware and content to integrate with the Blackboard Learning System and Blackboard Portal System. The development of Building Blocks technology and encompassing Program was a direct result of feedback from the Blackboard user community. Clients want to be able to plug best-of-breed tools as well as custom developed applications and systems into their Blackboard system, to tailor it to their specific needs, including IT infrastructure and e-Education architectural plan.

Blackboard clients are always looking for ways to:

- enhance the teaching and learning experience within Blackboard,
- enable easier classroom and student management,
- automate many of the time-intensive processes required to keep the institution running.

Third party software that meets these needs through integration with Blackboard is in demand.

Integrating third party software with Building Blocks technology enables that software to take advantage of the trusted and highly recognized Blackboard brand within Higher Education. Integrating with Blackboard gives ISVs direct access to an established and growing client base – today’s nearly 600 Enterprise client base is anticipated to increase to 900 by the end of 2003. From an operational standpoint, integration with Blackboard simplifies and encourages adoption of third-party applications.

Below is a chart showing Blackboard license sales and projections for 2003.
The following sections highlight the various ways that third party software can be integrated with Blackboard Learning System and Blackboard Portal System.

Overview of the Blackboard e-Education Suite

Blackboard Learning System and Blackboard Portal System offer institutions a powerful and flexible way to enhance the education experience.

Blackboard Learning System

Blackboard Learning System is a robust setting for content management and sharing, online assessments, student tracking, assignment and portfolio management, and virtual collaboration. The Blackboard Learning System is well recognized for its ease of use and scalability, allowing clients to achieve widespread adoption in a supported environment. And like all of Blackboard’s systems, the Blackboard Learning System is designed to integrate with existing administrative and authentication systems.

Blackboard Learning System ML

Blackboard Learning System ML™ enables users to experience the Blackboard system in their preferred language(s). The multi-language functionality of the system permits a culturally enriched and tailored online setting for all users. The platform is fully Unicode-architected, enabling the system to recognize content written in virtually any language as determined by the end user, instructor or system administrator. Blackboard Learning System ML is licensed separately from the Blackboard Learning System.

Blackboard Portal System

Blackboard Portal System unites disparate Web-services and develops a strong sense of education community online. The system aggregates information in portal modules that are tailored to the unique preferences and roles within the organization. The result is a customized palette of personalized Web-based services in one seamless environment. From checking course announcements to participating in an online lecture series, the Blackboard Portal System makes life easier for both the individual and the institution. The enterprise platform includes: virtual common areas, centralized content management, “context” through customization, and communication and exchange tools.

Blackboard Transaction System is the leading provider of transaction processing systems to colleges, universities and corporations. More than 450 clients rely on Blackboard’s Transaction System debit account feature to deliver convenient, secure and efficient campus auxiliary services to students, faculty and staff. Integration with Blackboard Transaction System is not detailed in this white paper. If you are interested in learning more about integrating with the Blackboard Transaction System please visit

Learning System Integration Points: Blackboard User Interface

Portal Integration

After logging into Blackboard a user sees their “My Institution” Page with a personalized collection of different portal modules displayed. In the illustration below James has logged into Blackboard and can see at a glance all the announcements and calendar items for each of the classes in which he is enrolled. He can also see who else is online in the Who’s Online mod-
ule, and find out what is new in any of his courses using the What’s New module. These last two modules were developed using the Building Blocks technology and added to the Blackboard system by the System Administrator.

Creating a portal module is a great way to gain top level access to, or provide personalized status about your tool or application to each user in the Blackboard Portal System.

The Building Blocks Software Development Kit (SDK) provides information about how to use the same user interface elements for custom Building Blocks as are used throughout the core Blackboard system software. By taking advantage of the Blackboard look and feel, you can seamlessly integrate your application within Blackboard encouraging rapid adoption by Blackboard users.

Course Integration: Tools

Blackboard Learning System has many tools that meet the basic needs of educators and students however, institutions also look for tools to complement or enhance the Blackboard teaching and learning environment. Using Building Blocks technology third party best-of-breed assessment engines, discussion boards, collaboration tools, virtual laboratories, and more can be integrated with the Blackboard course environment.

From the Portal page James can click on the My Courses module and enter the Geography is Destiny course in which he is enrolled. Within the Course Tools area the instructor has enabled a number of Blackboard native tools (e.g., calendar, view grades, personal information page) as well as third party tools integrated as Building Blocks (e.g., What’s New, Glossary, Science Toolkit).

Once the James clicks on a link to one of the Building Blocks, for example the Glossary, the body of the page refreshes and displays the glossary entries. The click could have opened up the Glossary in a new window, or taken James to a completely different tool or website—the design of the integration is up to the third party developer. Notice that the developer of the Glossary tool elected to re-use the Blackboard breadcrumb trail design (directly above the course title in the screenshot above) and other user interface elements to ensure that the integration was as seamless as possible.

Course Integration: Gradebook

Blackboard Learning System has a gradebook in each course that is tied into the native Blackboard assessment engine. The Building Blocks APIs allow third party assessment engines, survey tools and information systems to integrate with the gradebook to insert as well as extract grade information.
Course Integration: Tool and Course Management

From the Instructor perspective, tool and course management are done through the Control Panel within each course. On this page the Instructor can manage all aspects of their course including which native Blackboard and Building Blocks tools are enabled, as well as accessing the Instructor view of these tools. For example the Glossary tool management interface (Glossary Manager) is accessible through a link in the Control Panel. After clicking on the link the Instructor can edit and manage the Glossary entries.

The Control Panel is an ideal place to integrate tools that are for Instructors only, or require administration or management by the Instructor.

Course Integration: Content Areas and Content Management

From the course Control Panel the Instructor can author content, upload content from external authoring tools or link to content stored in other tools (e.g., media servers, content management systems). Access to these Building Blocks is through the standard Blackboard Add Content interface.

In the example below the integration between Blackboard and the AOI WYSIWYG Editor Building Block shows how the Building Block takes advantage of the native Blackboard look and feel. Note that it is available from the pull-down menu, along with a variety of other native Blackboard tools. Content authored using the AOI WYSIWYG Editor is shown in the first element labeled “What is a GIS?,” content authored in the native Blackboard environment is listed below. Both items have an brand icon to the left of the content, and content management buttons (Modify, Copy and Remove) on the right.

Integration Points: Authentication

Blackboard clients look for seamlessly integrated solutions. This means ensuring that users authenticate just once – to Blackboard. The Building Blocks APIs allow developers to create Building Blocks that seamlessly share authentication information from Blackboard with the integrated third party software. Strategies for passing authentication information include, but are not limited to:

- Identifying the Blackboard System as a trusted site. All user requests originating from a link in Blackboard will be trusted by the third party software. This can be implemented through firewall positioning, trusted URL encoding, or shared secrets, checksums or tokens.
- Authentication through context passing. User requests from Blackboard can pass along information about the user including user name,
user id, as well as their role (a.k.a., context) within Blackboard system or the course. For example, user requests could pass to the third party system the username, the course id, and that the user was a student in the course. The third party system can take this information and compare it with information about the user stored within the third party system. Different information and features can be presented to users who are students versus those who are instructors in a course.

Integration Points: Data Mining and Content Pulls

A valuable part of integrating with Blackboard is not just creating a seamless end user experience; it is using the APIs to better understand how users are interacting with the system and third party tools. Using the Building Blocks APIs developers can gather information about who uses the software, when and how often. Reports generated from system statistics are valuable for determining how to better manage the system, target information to users, and to more accurately license and price third party software.

Building Blocks and Business Models

Flexibility, a hallmark of the Building Blocks technology, supports a variety of business concerns and business models.

Distribution Mechanisms

The Building Blocks Catalog located on the Blackboard Web site is the first place that Blackboard clients and sales team members will look to for information about Building Blocks. It is the primary source for discovering and downloading Building Blocks. Catalog entries contain information about the Building Block, license fees, required hardware and software, and may contain the software for download or point the user to the developer’s website for more information.

There is no charge for posting an entry to the catalog. This is an easy, no-cost way to advertise and distribute Building Blocks.

The Building Blocks Catalog is also available directly from the Blackboard System Administrator interface. Close integration between the Catalog and the Blackboard Learning System encourages the discovery of new Building Blocks and adoption of them.

Branding

Building Blocks provides multiple opportunities for third party software brands to be clearly visible to users. Blackboard encourages Building Block developers to establish brand through a “look and feel” unique to their software application by incorporating distinctive color schemes, user interface textures and icons within the Building Block.
Pricing/Licensing Models

Building Blocks available today tend to fall into one of the following categories. These categories take into account existing market presence of the third party software and how third parties might plan to license the software:

- Self-contained product – this is an application or tool that otherwise does not exist outside of Blackboard. In this case the application software and the Building Block are one entity that is uploaded into the Blackboard system. Examples of this include the Dictionary & Thesaurus tool, Glossary tool and the Who’s Online portal module. Developers offering self-contained products will want to charge for their Building Block.

- Promotional Tool – this is a Building Block that is given away for free in order to stimulate or promote the sale of the larger application or system to which the Building Block connects. Third party software applications that do not have a large presence in Higher Education institutions and are looking to enter the market may find this a great way of gaining the attention of Blackboard clients.

- Add-on product value opportunity – in this situation the third party product may have significant market adoption within Higher Education and perhaps the overlap between Blackboard and the third party product is high. In this case third parties may be looking for a reason to go back to an existing account and expand upon their original sale. Developers in this situation may wish to charge for the Building Block that links their application with Blackboard.

Because Blackboard clients are familiar with the annual subscription licensing model, it is recommended that you employ licensing models that are complementary to it.

Building Blocks also accommodates the per-seat licensing model. The technology enables developers to limit the number of users, or seats activated through license keys, user PINs or dynamic resolution of user information. Third party developers are encouraged to develop per-seat pricing for large installations and to consider site-wide pricing.

How to Get Started

1. Review the Building Blocks Software Development Kit (SDK) to determine if the integration between Blackboard and your application is feasible. The SDK and information about the Building Blocks technology is available at http://www.blackboard.com/dev/index.htm

2. Join the Blackboard Developer Network (BbDN) and obtain a Building Blocks Developers License. To enroll go to http://www.blackboard.com/dev/enroll.htm

- Launched in 2001 the BbDN is a dynamic online community that has grown to include 115 academic and commercial institutions using the Building Blocks APIs to develop integrations to third party software. Membership in the BbDN grants developers access to white papers, sample code, discussion boards, a knowledge base, and early access to pre-release Blackboard software.

- The Developers License is a full-featured version of the Blackboard Learning System and Portal System. It comes complete with all the APIs, java classes and two Virtual Installations. This license is limited to 25 users and courses.

3. Develop your Building Block. Keep in mind that most successful Building Blocks share the following characteristics:

- They are easy to install.

- The user experience is seamless between the two systems, for example, the user does not have to re-authenticate to access the third party software from within Blackboard.

- The user experience is consistent as they transition from Blackboard to the third party software in terms of interaction paradigms, metaphors, look and feel.

- Documentation is complete and support
responsibilities are clearly defined between Blackboard and the third party.

4. Post your Building Block to the Building Blocks Catalog. Submission information is at http://www.blackboard.com/dev/Submission.htm

**Partner Opportunities**

The primary way that Blackboard enters into partnerships is through the Building Blocks Program. The first step in a partnership is for the third party to develop a Building Block. As adoption of the Building Block within the market increases Blackboard looks to deepen the relationship with the third party. Typical partnerships can grow into referral or reseller relationships over time. Although rare, Blackboard may wish to OEM the third party software and incorporate it into the Blackboard core code, or private label the third party software and sell it as part of the Blackboard e-Education Suite.

**Information about Blackboard Inc.**

Blackboard Inc. was founded in 1997 with a vision to transform the Internet into a powerful environment for the education experience. The company traces its roots to its original teaching and learning software platform, CourseInfo, which was created within the education community.

Clients: 2,800 client institutions in more than 60 countries. In total, more than 6 million individuals use Blackboard products as a part of their daily academic life.

Revenues 2002: $69.2 million. Blackboard Inc has been EBITDA profitable since November 2002.

Employees: 450 based primarily in Washington, DC, Phoenix, Boston, Amsterdam.