

Blackboardlearn⁺

Release 9.1 Service Pack 6

Release Notes

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About the Release Notes

The Release Notes provide System Administrators with information about the changes from the previous release, 9.1 Service Pack 5 (9.1 SP5) to this Service Pack, 9.1 Service Pack 6 (9.1 SP6). These changes fall into two categories, changes that impact end users and changes that impact system administrators. The categories are meant to assist you with planning your upgrade to this maintenance release.

The list below provides some highlights of changes that we believe will affect most usage scenarios. Always review the entire document and consider how the information listed below impacts your specific usage patterns.

If you are upgrading to Release 9.1 from Release 9.0, 8.0, 7.x, or CE8, CE4, Vista 8 or ANGEL 7.4, please go to the [Upgrade Center](#) for information targeted to your needs.

Known and Resolved Issues

- [Resolved Issues](#) can affect your end users. While we hope this is positive, review the list for any changes you may want to communicate to your community.
- The [Known Issues](#) list provides a description and targeted path to resolution for issues specific to this release.

End User Impacts

Items that fall into this category will generally be new features or enhancements that will improve the user experience, but may require communication and training. Highlights include:

- Grade Center and Assessment Improvements
 - [Needs Grading](#)
 - [Adaptive Release](#)
 - [Timed Assessments](#)
 - [Interactive Rubrics](#)
- [SCORM Engine Integration](#)
- [Desktop Integration](#)
- [Outcomes Evidence Collection and Alignment Reports](#)
- [McGraw-Hill Connect and Create](#)
- [Google Chrome is now a Compatible Browser](#)

System Administration and Integration Impacts

Items that fall into this category impact the administration of the system, including API integration. A review of Building Blocks, Snapshot or other integrations may be required. For more information on

Highlights include:

- [Software Updates](#)
- [SIS Data Integration Framework](#)
- [Institutional Hierarchy](#)
- [Pre-Upgrade Utility for Linux and Solaris Platforms with an Oracle Database](#)
- System upgrade and performance tuning
 - [Performance and Scalability](#) – Details the latest analysis from our Performance Engineering team and how to tune an installation of this release.
 - [Supported Technologies](#) – Gives an overview of the changes to supported platform technologies and client technologies in this release.
 - [Installation and Upgrade Information](#) – Provides the supported upgrade paths to this release as well as tips for running the updater.

New Features and Enhancements

The Release Notes provide a high-level overview of the new features and enhancements for Release 9.1 SP 6. This release focuses on instructor efficiency, institutional improvement, and extensible learning.

If you are new to Release 9.1, please refer to the “Understanding the Change” document, available for each product through [Behind the Blackboard](#). This is a comprehensive look at the features and functions of Release 9.1 and how they compare to your current production version. Working through the [Upgrade Center](#) will provide a step-by-step planning guide to assist you through this process.

System Administration

Software Updates

Software Updates is located in the System Admin Panel and provides updates specific to your Blackboard Learn installation. If a newer version of Blackboard Learn is available, an indicator will display the number of versions, and you can select which version to download. This includes Service Packs as well as Major Releases. In addition to Blackboard Learn updates, new releases of installed Building Blocks are displayed in Software Updates on the System Admin Panel.

To use Software Updates, Blackboard Learn needs to make a secure HTTP access OUT using port 443 to the following servers:

handle.blackboard.com

softwareupdates.blackboard.com

If you are blocking secure HTTP access OUT from your Learn instance, you will need to configure your firewall to enable access to these servers. If access is unavailable, the error message “Software Updates Module could not contact Blackboard Cloud Services. Please contact customer support.” is displayed.

The Batch UID Can be Used as a Context Identifier for a Basic Learning Tool Interoperability (LTI) Tool Provider

Previously, the only available option for sending context identifiers was to provide the primary key from within the database BBLEARN. You now have a second option, sending the Batch UID, as a context identifier. The Batch UID is a unique number within the Blackboard Learn installation.

Sending the primary key guarantees that no identifying information about the user or course is being exchanged. Sending the Batch UID guarantees that even if the course or user is deleted and re-added, the same identifying information is being sent to the tool provider. However, depending on the usage of the Batch UID at an institution, it is possible that identifying information, such as a student ID number, may be sent to the tool provider. To determine the best method for your institution, contact the tool provider.

Custom Parameters in Basic Learning Tool Interoperability (LTI) Configuration

An XML configuration is no longer necessary in order to add custom parameters for Basic LTI providers. A new field has been added to the Basic LTI Configuration screen, which permits the Administrator to enter the custom parameters.

New Java Process Added

A new Java process called External Exec has been added to Learn SP6. This process runs on all application servers and is responsible for running background tasks such as course copy and archive/restore. These tasks used to run from the main java process. The reason for the addition is due to problems experienced with fork/exec (on a swap-less Linux system) when running some tasks in the main java process. For more information see [Java External Execution Process](#) KB Article.

Web Services Enabled Automatically for Building Blocks

When using Building Blocks that are bundled, or manually installed and depend on Web Services APIs, permissions are automatically enabled.

Page Scroll Location Maintained During Refresh

The page scroll location is maintained on screens that contain scroll bars if a user scrolls before the page finishes loading. For example, if a user deletes the last item in a content folder with numerous items, and scrolls before the page has finished loading, instead of being returned to the top of the page when the page finishes loading, the user maintains the current page scroll location.

Select All

To prevent potentially huge numbers of items being selected, when a user chooses Select All for a list that has multi-select capability, all of the current items on the page are selected. An option is provided that allows all of the items in the list to be selected.

Student Information System Integration Building Block

The Student Information System (SIS) Integration Building Block was designed to help Administrators create courses and authorize users for the Blackboard Learning Management System (LMS). Information provided by the institution is used to create the required entities within the LMS database. The information may come from various sources in varying formats. Once this information is written in an appropriate format, it is loaded into the LMS using the Building Block. This Building Block is intended to provide a simplified alternative to the Blackboard Snapshot tool.

Upgrading to Blackboard Learn from another LMS such as WebCT or Vista is now easier than ever. The Application Administrator has the ability to manage user and course data directly from the UI, whereas the Snapshot tool requires System Administrator access to the application server.

There are three types of Integration available. Although there are three types of Integration, there is not a limit to the number of Integrations a system may have. It is unusual, though possible, to have a variety of Integration types on a single system.

- IMS Enterprise 1.1
- IMS Enterprise 1.1 - Vista
- IMS Learning Information Services (LIS)*

Blackboard recommends that Integrations begin in the Testing status. Selecting this status will allow you to test the Integration, and fix any issues that may arise before committing to the Integration. Once the testing is complete, the status may be set to Inactive or Active. Setting the status to Inactive will bring the data in, however, it will not be visible to users. Setting the status to Active will bring the data in, and it will be visible to users. The status can be changed at any time.

Logging capabilities in an intuitive format are provided as part of the Student Information System Integration Building Block. Logs can be filtered using an advanced search method that includes the type of error, the Integration, and a date range. New log entries are easily visible, with a count attached to the type of log entry. The logs can be refreshed to retrieve the latest count, and details of each type of log.

Note: Creating Organization associations to Institution Nodes using the Institutional Hierarchy SIS Data Integration framework is not supported in SP6. Any attempt to do so will be ignored, and an error logged.

* IMS Learning Information Services (LIS) Integration is a new standard for exchanging information in the context of learning. IMS LIS is required to integrate Blackboard Learn Release 9.1 SP6 with SunGard Banner. At the time of this publication, SunGard's LIS compatible version is still in development.

ActiveMQ

ActiveMQ is an asynchronous message queue technology which includes a broker that runs on a single application server at any one time. This feature is to be used with the SIS integration functionality.

- **Logging:** Events related to this message queue are appended to the `tomcat/catalina-log.txt` file.
- **Peer Discovery:** Peer discovery is performed through multicast. The address, multicast group, and password are configured in the `bb-config.properties` file. For automatic discovery to function properly, multicast must be propagated. All application servers must be able to communicate with each other on the broker port. When cloning an environment, the multicast group and password must be unique to avoid cross-environment communication. Manual peer discovery is possible if multicast isn't appropriate for your institution.

ActiveMQ Configuration

1. To enable checksum and journal corruption checks, edit `blackboard/config/message-queue-service-config.xml` by replacing:

```
<kahaPersistence directory="activemq/messageQueueService/kaha"/>
```

With:

```
<kahaPersistence directory="activemq/messageQueueService/kaha"
checksumJournalFiles="true"
checkForCorruptJournalFiles="true" />
```

2. If you want to use manual peer discovery rather than multicast peer discover, change the client configuration so the `brokerURL` parameter includes the peers directly:

```
<!-- Configuration for client --> <client
brokerURL="failover:nio://yourapplicationserver1:61616,nio://yourapplic
ationserver2:61616,nio://yourapplicationserver3:61616"
useAsyncSend="true" optimizeAcknowledge="true"
optimizedMessageDispatch="true" dispatchAsync="true"
copyMessageOnSend="false" disableTimeStampsByDefault="true"
initConnections="5" maxIdleConnections="5" retryCount="5"/>
```

3. Update the transport connector URI so the broker will listen on all interfaces:

```
<transportConnectors>
<!-- In a multi-appserver environment, only one appserver's broker will
have transports open and will be in charge of dispatching all messages.
The others will wait and fail-over as necessary. The messages
themselves will be load-balanced over all of the consumers (on
different appservers) -->      <transportConnector name="openwire"
uri="nio://0.0.0.0:61616?keepAlive=true" />      </transportConnectors>
```

Verify that the ActiveMQ database tables are not corrupt

1. Open up the latest application logs:
 - `blackboard/logs/bb-services-log.txt`
 - `blackboard/logs/tomcat/catalina-log.txt`
 - `blackboard/logs/tomcat/stdout-stderr-TIMESTAMP.log`
2. Verify that they do not contain error entries indicating ActiveMQ datastore corruption, such as:
"org.apache.kahadb.journal.Journal - Corrupt journal records found"
3. If corruption is evident, proceed to the following steps.
4. Stop services on all application servers.
5. Remove (or rename) the `blackboard/content/vi/bb_bb60/activemq` folder to trigger the recreation of ActiveMQ's tablespaces.
6. Start services on all application servers.

Course Delivery

Needs Grading

Gradable Blogs, Journals, Wikis, and Discussion Board activity can appear in Needs Grading status in the Grade Center and on the Needs Grading page. When an instructor chooses to make an interactive tool gradable, they will also have the option to choose how many interactions will place the item in needs grading status. A Discussion Board forum, for instance, might be set to only appear in Needs Grading status after a student has made three posts, rather than with each individual post.

Timed Assessments

Attempt information for timed assessments includes details on how much time the student spent on the attempt versus how much time was allotted.

Instructors can choose to make the timed assessment save and submit automatically when the timer expires, or to allow the assessment to continue beyond the allotted time.

Test Announcements

If announcements are created for a Test, the date and time of the most recent announcement appears on the Test Options page.

Interactive Rubrics

When creating a rubric, instructors can assign weights to categories, allowing the same rubric to be used across multiple items with different possible points. Rubrics can be imported and exported for use across courses. Existing rubrics in ANGEL and CE8 courses will be converted as part of the course conversion process.

Instructors can associate rubrics when creating gradable content items, including Blogs, Journals, Wikis, Discussion Boards, Assignments, and short-answer, file-response, or essay questions in tests and pools. Rubrics can be associated with multiple items, and all associations can be viewed from the Rubric tool. Multiple rubrics can be associated with an item. The rubrics can be visible to students at any time, or only after grading has been completed.

Instructors can interact with any associated rubric for grading in a grid or list view, and Feedback can be typed for each criteria as well as the entire assessment. Grades calculated using rubrics can be overridden. When a rubric has been used for grading, a report is available to view the results of all content graded with that rubric.

SCORM Engine Integration

Through a co-development partnership with Rustici Software, a new SCORM (Sharable Content Object Reference Model) content player is integrated into Blackboard Learn. This feature will provide users a stable and reliable platform for SCORM content. Along with the new content player is a new report available through the Control Panel to show activity and progress.

Content Management

Limitations to the handling of Course Copy file permission, guest access and Adaptive Release have been resolved and apply to both to Course Files and Content System clients. Below we have described the new capabilities starting with 9.1 SP6 and the steps that must be taken to ensure this functionality works properly moving forward.

Automatic Student Access to Linked Files

Previously, when instructors linked files within a course home directory, an explicit 'All Course Users' permission was granted to the file or directory being linked to allow students to access the files. These permissions are no longer required to allow users to access files within a course as access is implied by the course file link itself.

Those users creating course content are no longer prompted to give read access to all users for newly created items. If a file is linked in a course that a student is enrolled in, they will be able to see it; they will not need explicit read permission. This removes the burden of managing file permissions from content creators and ensures that course guest access functions correctly and mitigates potential problems seen previously with course copy and permissions.

Action Required – Automatic Student Access to Linked Files

No action is required to enable the capability to view the files linked-to by course objects. When accessing the content directly via Course Files/Content Collection, the action required is to remove "All Course Users Read" permissions to correctly enforce the Adaptive Release rules.

Adaptive Release Rules Work on Course Files and Content Collection Items

Prior to Blackboard Learn Service Pack 6, adaptive release rules could not control file access to files stored in Course Files or the Content Collection. This was because when a file attachment was made, instructors were prompted to give read access to all users. The action of granting an explicit permission prevents adaptive release from controlling access to a file.

Due to the file access changes mentioned above, adaptive release can now control access to files linked within courses. Items that are set for release at a later date will not be accessible to students or show up in a search before they are released.

If you're a client who has licensed Content System prior to your 9.1 upgrade, or if you are coming from an existing 9.1 release and therefore used the Course Files feature, additional steps are required to ensure that adaptive release can control access to files. Those clients upgrading from 9.0 or earlier without Content System do not need to do anything to get the benefit of these changes.

Action Required – Revert workaround to enable Adaptive Release Rules on Course Files and Content Collection Items

The required changes involve removing the explicit All Course Users permission from linked files to allow the automatic student access and adaptive release functionality to control access to files. This ensures that students are not able to access or search for files that are not yet available to them.

These steps only need to be performed for courses that have existing linked files that require adaptive release control. In addition, Course Copy can also handle these permissions changes as most clients use course copy to prepare for a new teaching semester, depending on the timing of your SP6 upgrade, these changes likely fit into your existing course lifecycle.

Making the Changes Required for Adaptive Release

In the majority of cases it's sufficient to remove these permissions manually from the Course File Manager. Instructors can perform this on a file-by-file basis where adaptive release control is required only on a small number of files or you can elect to reset the permissions to default for the entire course.

Resetting all permissions to default via the UI involves briefly permitting access to All Course Users to allow the permission to be revoked on all sub-directories and files in one step. In a course requiring adaptive release control of large numbers of files:

1. In the **Course Control Panel**, go to the **File Manager**.
2. At the top of a page, a drop down menu for the course directory will be shown labelled 'Files: <courseid>' or 'Course Content: <courseid>' if you have Content System licensed.
3. Drop down the menu and click **Permissions**.
4. Add a Course User List, select '**All Course Users**' Read permission and elect to Overwrite the existing permissions and click **Submit**.
5. Drop down the menu for the newly granted '**All Course Users**' permission, and select **Delete**. You will be prompted confirming that the permission will be removed from all directories and files.
6. You should be left with three user list permissions (unless you have previously created any custom instructor roles, in which case there will be more than three). Course Builder, Instructor and Teaching assistant all with full manage permissions.

Note: In rare cases, additional steps may be required. The adaptive release functionality requires file links to exist in a table called `cms_resource_link`. Depending on your Learn version history, in some cases, these rows may not exist and so a course copy or an archive/restore will be required for all content items to function properly with adaptive release.

Community Engagement

Institutional Hierarchy

Administrators can create and manage a hierarchy that reflects institutional organization in order to share and delegate administrative duties. Multiple organizational units within an institution can be given varying degrees of independence in order to manage their courses, organizations, and users. Institutions can support multiple organizational units on a single instance of Blackboard Learn.

Administrators with appropriate privileges can create new Nodes in the hierarchy. Courses, organizations, and users are then associated with the node, and an administrator can be assigned with privileges to manage just those associated objects.

Although Administrators can manually create Nodes and associate objects through the user interface, all of the creation and management of Nodes and the association of courses, organizations, and users to Nodes can be managed through data integration with the student information system.

Flexible System Roles can be used in combination with the hierarchy to create a robust delegated administration that reflects the real-world organization of any institution.

Note: The resource bundle properties file `multiinst.properties`, used for customized language packs, is scheduled to be renamed in Blackboard Learn 9.1 Service Pack 8.

Outcomes Assessment

Evidence Collection

Outcomes Assessment users such as assessment coordinators can automatically collect assignments and the related student submissions directly from Blackboard Learn course sections. Once collected, student artifacts of learning can be randomly sampled, evaluated in Outcomes Assessment using a rubric, and reported against. The collection of these student work products in a more automated way greatly eases the burden of assessment on faculty and students, promoting “double-duty” of course work for the purpose of program or institution level assessment.

Evidence is collected into manageable sets and is controlled by Outcomes Assessment users at any level: institution, unit/program, or course. This multi-level approach provides a great deal of flexibility and permits users with different purviews to collect and sample evidence appropriate to their role.

Standard, Objective, and Goal (SOG) Alignment to Course Delivery Content

This enhancement will make it easier for instructors, curriculum designers, and other staff to align content items directly to the appropriate learning outcome. This change will work seamlessly for current Outcomes Assessment clients who have already aligned content to course objectives.

Standard, Objective, and Goal (SOG) Coverage Reports

This new capability will enable users to analyze the extent to which certain standards, objectives, or goals have (or have not) been aligned to the relevant course curriculum. These reports require the alignment of learning outcomes to Blackboard Learn course section content items.

Partner Integration

McGraw-Hill Connect and Create Integration

Instructors will benefit from one-stop teaching and learning through the integration of McGraw-Hill Connect and Create directly within Blackboard Learn. This combination of content and learning tools is easy to use and provides instructors one destination for creating and accessing dynamic online course materials.

McGraw-Hill's solutions, Connect and Create, are now integrated and available directly within Blackboard Learn. Customizable, dynamic educational content and tools from McGraw-Hill enhance and enrich teaching and learning experience. Single sign-on and Grade Center synchronization deliver centralized, immediate access to course content and grades. Compliance with the Family Educational Rights and Privacy Act (FERPA) ensures that student privacy is protected.

Known and Resolved Issues

The list of issues resolved in Blackboard Learn Release 9.1 SP6 is available on the [Resolved Issues Page](#) of the Maintenance Center.

The list of known issues in Blackboard Learn Release 9.1 is available on the [Known Issues](#) page of the Maintenance Center. The Known Issues page provides a list of the issue ID, description, and resolution path. This page is updated regularly with new client-reported issues.

Performance and Scalability

Blackboard continuously invests in making Blackboard Learn more responsive and capable of handling greater volumes of user traffic with each release. This section describes the performance and scalability issues addressed within this release of Blackboard Learn, as well new information about optimizing the configuration

Performance issues occur when application responsiveness for a system not under load fails to meet user expectations. Scalability issues occur when application responsiveness or stability of a page request for a system under load fails to meet user expectations.

Issues are identified by clients through our traditional support channels and as a result of the performance and scalability exercises performed as part of all Service Pack releases.

Performance Issues and Improvements

As part of the release, performance optimizations are introduced back into the product as a result of a customer issue or internally found problem. The Blackboard Performance Engineering team is responsible for refactoring under-performing areas of the application and verifying regression improvements based on the optimization.

Content Exchange

Course archive and export functions were very memory intensive. Their behavior of large in-memory processing has been eliminated by the application of a streaming technique. This improvement targets the processing of assessments, assessment attempts, discussion boards, and course files.

Redundant setting of file permissions while restoring content files has been eliminated to improve performance.

Community

User directory was auto-executing the last search anyone made. This bug in conjunction with the ability to pass an empty string with StartWith search criteria often resulted in unqualified lookup of public users to be executed unnecessarily. The implementation logic has been fixed to eliminate this behavior from consuming large amount of system resources.

Latencies were observed when managing domains from the administrator panel. To improve performance, an SQL query was modified to eliminate loading of unnecessary domains from the database.

Content System

A database index was added to improve the performance of resource link lookups.

Course Delivery

The Grade History page now has pagination to prevent users from loading unnecessary amounts of data all at once.

Assessments with large content were taking up unexpected amount of Java heap space. This resulted in triggering continuous full garbage collections that affected the performance of JVM. An advanced caching mechanism has been introduced to eliminate this problem.

Presentation of the Course Menu as well as My Grades has been refactored to eliminate inefficient implementation logic and retrieval of unnecessary data from the database.

Outdated logic in the Discussion Forum link has been removed to eliminate unnecessary workload to the system.

A procedure stored in the database for managing course Groups had the potential for creating a deadlock condition in high concurrency. Its internal query has been optimized to eliminate the likelihood of deadlock condition occurrence.

IMS Enterprise SIS Integration

Excessive consumption of JVM heap was observed during IMS Enterprise SIS Integration process. Implementation was modified so XML feed objects that were referenced longer than necessary are released much quicker.

Outcomes

Outcomes users were experiencing poor performance when managing distribution list criteria in Blackboard Learn installations with large numbers of person records and distribution lists. An inefficient SQL query has been refactored to fix this issue.

System

A bug was introduced in 9.1 SP4 release that caused session invalidation task to be inefficient. This has been fixed so sessions can be invalidated and cleaned up in timely manner.

The performance of user tab layout creation has been improved by eliminating the usage of an unnecessary database cursor.

Lookup of tab group institution roles now leverages the caching mechanism to reduce the massive number of database queries.

Database indexes were added to improve the performance of EUD notifications, module layout, and links lookups.

An inefficient Announcement lookup database query impacting system performance when large numbers of announcements existed has been optimized to eliminate this issue.

MIME type, text/x-json has been added in the Apache and Tomcat HTTP connector compression configuration to eliminate unnecessarily bloated data from getting passed over the network.

MIME type, application/xml has been added in the Tomcat HTTP connector compression configuration to eliminate unnecessarily bloated data from getting transferred over the network.

Static content that was not leveraging HTTP caching is now cached by browsers.

Inefficient CSS selectors have been eliminated from the default theme template to improve the speed of UI rendering in Web browsers.

The caching mechanism of the system registry entries has been fixed to eliminate the massive number of unnecessary database lookups.

The task `bb.snapshot.session.invalidation` has been introduced, which cleans up temporary data created by an incomplete execution of the snapshot utility. This task should be run on only one application server, and is configured in the `bb-tasks.xml` file.

The task `bb.data.integration.purge` has been introduced, which purges old log entries from the searchable database/index in the integration framework. This task should be run on only one application server, and is configured in the `bb-tasks.xml` file.

The task `bb.data.integration.log.indexprocessor` has been introduced, which updates new log entries in the index used for searching data integration logs in the integration framework. This task should be run on only one application server, and is configured in the `bb-tasks.xml` file.

The task `bb.er.evidence.collection` has been introduced, which automatically collects assignment evidence meeting defined criteria by the system at a pre-defined time. All relevant information about the assignment and its submissions, including grade data, will be collected and stored in the repository and available for use in all appropriate evidence sets. This task should be run on only one application server, and is configured in the `bb-tasks.xml` file.

The service `blackboard.exec.ExecServer` has been added to run background tasks, which were previously run from the main Blackboard Java process. The separation of services is to address the forking issue introduced in the 9.0 release. The service runs on all application servers, using port 8016 and is configured in the `bb-config.properties` file.

Note: If the service is stopped, or otherwise disabled, the Blackboard environment will also be stopped.

Recommended Deployment Approach

64-Bit Deployments

Release 9.1 is the first release to offer an entire application and database footprint using 64-bit addressable memory. To take advantage of more addressable memory, Blackboard strongly encourages clients to deploy using 64-bit operating systems (OSs) and sub-components (Java and SQL Server or Oracle). As part of the 64-bit deployment, Blackboard encourages clients to take advantage of larger Java Virtual Machines (JVMs) that range from 4GB to 32GB in size. The preferred size varies from 4GB to 8GB, but performance testing has been conducted with acceptable performance as high as 32GB.

Customers should begin migrating away from single server Tomcat cluster deployment. Tomcat clustering on a single server was introduced for scalability purposes when the Blackboard Learn architecture was 32-bit and customers wanted the ability to increase their memory usage beyond the limitation of a single JVM capability. With the option to virtualize on both 32-bit and 64-bit, Blackboard's benchmarking efforts have moved away from single server Tomcat cluster deployments. Customers can achieve similar performance in a virtual environment on the same physical server with multiple virtual instances as with a bare metal configuration with many Tomcat cluster nodes. The difference in configurations is a smaller demand on the Apache or IIS web server fronting the Tomcat instance(s). The option to deploy a 64-bit JVM with larger heap sizes has suppressed the need for customers to run in a single server cluster option.

Blackboard recommends that customers consider a deployment approach consisting of larger 64-bit JVMs that are distributed across physical servers with the option to virtualize the hardware to take advantage of the CPU and Memory capacity of these systems.

Database Availability Options

Customers should also consider database availability options such as Microsoft SQL Server Active/Passive or Oracle RAC One Node, which is a single instance of Oracle RAC running within one node in a cluster. Additional nodes can be added within Oracle RAC to address scalability. In general, both offerings are more around high-availability and will have limited or no capability to improve performance.

For More Information

For more information about the SQL Server Failover capabilities of Blackboard Learn, contact Blackboard Consulting.

For information about running Blackboard Learn with RAC, see [Oracle RAC Support on UNIX](#) in [Blackboard Help for Administrators](#).

For more information about deploying Blackboard Learn, see the [Hardware Sizing](#) topics in [Blackboard Help for Administrators](#).

Recommended JVM Tuning Set

For every Service Pack, the Blackboard Performance Engineering team spends many hours studying the transactional and systemic performance of Blackboard Learn and whether particular tuning sets will have a positive or negative impact on performance or scalability.

This section provides the recommended Java Virtual Machine (JVM) tuning set as executed in the Blackboard Performance Engineering laboratory against Release 9.1 Service Pack 6. Customers are strongly encouraged to deploy their application environments in a 64-bit configuration using the recommended 4GB or larger tuning set.

Blackboard recommends using the following tuning set for 8GB JVMs (64-bit) on Windows, Linux, and Solaris systems with 4 CPUs using Java 1.6. These recommended settings are managed within the `bb-config.properties` file.

```
bbconfig.min.heapsize.tomcat=8192m
bbconfig.max.heapsize.tomcat=8192m
bbconfig.max.permsize.tomcat=384m
bbconfig.max.stacksize.tomcat=320k

bbconfig.jvm.options.extra.tomcat=-XX:NewSize=2048m -XX:MaxNewSize=2048m
-XX:SurvivorRatio=4 -XX:+UseConcMarkSweepGC -XX:+UseParNewGC -XX:+UseTLAB
-XX:ParallelCMSThreads=2 -XX:ParallelGCThreads=4 -XX:+UseCompressedOops
-XX:+PrintVMOptions -XX:+PrintGCDetails -XX: +PrintGCTimeStamps
-XX:+PrintGCTaskTimeStamps -XX:+PrintCommandLineFlags
-XX:+PrintGCApplicationStoppedTime -XX:+PrintGCApplicationConcurrentTime
-XX:+DisableExplicitGC
```

The below formulas are applied to derive the suggested tuning set. Please note that `NewSize` and `MaxNewSize` can take a range of values for optimal performance by dividing `bbconfig.max.heapsize.tomcat` property value by either 4 or 3.

```
-XX:NewSize = (bbconfig.max.heapsize.tomcat) / 4
-XX:MaxNewSize = (bbconfig.max.heapsize.tomcat) / 4
-XX:ParallelGCThreads = <#cpus < 8 ? #cpus : 3 + ((5 * #cpus) / 8) >
-XX:ParallelCMSThreads = (ParallelGCThreads + 3) / 4
```

Guidance for 32-bit configurations is also included below, however, to achieve the best performance and scalability, 32-bit environments are not recommended for use in production situations. 32-bit Windows and Red Hat Enterprise Linux deployments are limited to JVM sizes no greater than 1.7GB of addressable memory. This consists of the main heap area (Old and New Space) plus the permanent space. For 32-bit configurations with a 1.4GB heap size, Blackboard recommends changing the following parameter values in the recommended tuning set:

```
-Xms1400m -Xmx1400m -XX:NewSize=350m -XX:MaxNewSize=350m
```

Understanding the Settings

Additional performance tuning may be required for certain configurations depending on how much memory is available and what other processes are running. Some of the parameters below can be changed to match your particular environment and improve overall performance.

For More Information

For more information about the SQL Server Failover capabilities of Blackboard Learn, contact Blackboard Consulting.

For information about running Blackboard Learn with RAC, see the *Blackboard Learn Server Administrator Guide* available on [Behind the Blackboard](#).

For more information about deploying Blackboard Learn, see the *Blackboard Learn Hardware Sizing Guides* for Dell and Sun Deployments in the Upgrade Kit available on [Behind the Blackboard](#).

Supported Technologies

In every release, Blackboard devotes time and resources to make Blackboard Learn run on the latest operating systems, databases, and browsers available, with the goal of creating a system that is more manageable, more stable, and more user friendly.

This section highlights the major changes to the Supported Technologies and Browsers for this release. For the most up-to-date information, see [Blackboard Learn Release 9.1 SP6 Supported Technologies and Browsers](#) available on the [Maintenance Center](#) on [Behind the Blackboard](#)

The following sections highlight the new Platform and Client configurations tested for this release using the following support terms:

- **Certified:** Fully supported technology with highest level of testing before release.
- **Compatible:** Fully supported technology with minimal level of testing before release.
- **Unsupported:** Unsupported technology because it is either impossible or not tested.

Platform Technologies

32-bit Server Configurations

	Application Server/JDK 1.6	SQL Server 2005 (32-bit)	SQL Server 2008 (32-bit)	SQL Server 2008 R2 (32-bit)	Oracle 10gR2 (32-bit)	Oracle 10gR2 (32-bit)
Windows Server 2003 SP2 (32-bit)	Compatible (32-bit JDK)	Compatible	Compatible	Compatible	Unsupported	Unsupported
Red Hat Enterprise Linux Server 4 (32-bit)	Unsupported	Unsupported	Unsupported	Unsupported	Unsupported	Unsupported
Red Hat Enterprise Linux Server 5 (32-bit)	Compatible (32-bit JDK)	Unsupported	Unsupported	Unsupported	Compatible	Compatible for Basic Edition licenses

64-bit Server Configurations

	Application Server/JDK 1.6	SQL Server 2005 (64-bit)	SQL Server 2008 (64-bit)	SQL Server 2008 R2 (64-bit)	Oracle 10gR2 (64-bit)	Oracle 11gR1 (64-bit)	Oracle 11gR2 (64-bit)
Windows Server 2003 SP2 (64-bit)	DATABASE ONLY	Compatible	Compatible	Unsupported	Unsupported	Unsupported	Unsupported
Windows Server 2008 (64-bit)	Certified (64-bit JDK)	Unsupported	Certified	Certified	Unsupported	Unsupported	Unsupported
Windows Server 2008 R2 (64-bit)	Certified (64-bit JDK)	Unsupported	Certified	Certified	Unsupported	Unsupported	Unsupported
Red Hat Enterprise Linux Server 4 (64-bit)	Unsupported	Unsupported	Unsupported	Unsupported	Unsupported	Unsupported	Unsupported
Red Hat Enterprise Linux Server 5 (64-bit)	Certified (64-bit JDK)	Unsupported	Unsupported	Unsupported	Compatible	Compatible	Certified
Sun Solaris 10 (64-bit SPARC)	Certified (64-bit JDK)	Unsupported	Unsupported	Unsupported	Compatible	Compatible	Certified

Configuration Notes:

- Microsoft® SQL Server 2005 must be installed with SP3 or above.
- Microsoft SQL Server 2008 must be installed with SP1 or above.
- Windows Server 2003 should be installed with SP2 or above.
- Windows Server 2003 64-bit can be used to host the SQL Server Database but the application server in such configurations should be Windows Server 2003 32-bit. Run Windows 2008 in order to run a 64-bit Windows app server.

Non-English Operating Systems and Databases

Non-English operating systems and databases (such as a Chinese-language version of Oracle), are considered compatible with Blackboard Learn.

Oracle RAC

Blackboard offers support for RAC with all versions of Oracle supported by Blackboard. For information about running Blackboard Learn with RAC, see [Oracle RAC Support on UNIX](#) in [Blackboard Help for Administrators](#).

Oracle 11gR2 Errors

Oracle 11gR2 contains two bugs that cause errors.

The first bug displays errors when importing content or restoring course packages. To prevent this error, as an Oracle user, run the following command:

```
alter system set "_optimizer_push_pred_cost_based"=false scope = both;  
alter system set cursor_sharing=EXACT scope=both;
```

The second bug returns an error that reads:

```
ORA-00918: COLUMN AMBIGUOUSLY DEFINED Bug 9219636: ORA-00918: COLUMN  
AMBIGUOUSLY DEFINED IN 11.2.0.1
```

To prevent this error, apply the Oracle patch bundle 11.2.0.1 number 9259407.

Hybrid Configurations

Red Hat/Solaris hybrid configurations have not been tested and are not supported.

SSL Configuration

Blackboard strongly recommends running the Secure Sockets Layer (SSL) protocol to secure communication between a Blackboard Learn Web/App server and a client machine. If SSL is not used, authentication may be compromised. For more information, see [About SSL and SSL Choice](#) in [Blackboard Help for Administrators](#).

Client Technologies

Blackboard's support of Google Chrome and Mozilla Firefox differs from the other supported browsers. Chrome and Firefox are following a rapid release strategy and releasing updates every 6 or so weeks. Chrome requires an automatic upgrade for end users, whereas Firefox offers the option to turn off the automatic upgrade. Blackboard has decided to support Chrome and Firefox in the broad sense meaning we will accept issues on both browsers and strive to resolve issues on Blackboard Learn as appropriate.

Blackboard has conducted testing using the Stable Channel of Chrome (Chrome 10) and the Final Release Channel of Firefox (Firefox 4) during testing of this release. We resolved browser related issues at the time of releases, but cannot guarantee the compatibility of future versions. We will conduct testing on the latest browsers and Blackboard Learn releases to provide timely information on browser compatibility.

Windows Client Configurations

	Internet Explorer 9	Internet Explorer 8	Internet Explorer 7	Firefox (Final Release Channel)*	Firefox 3.6	Google Chrome (Stable Channel)**
Windows XP (32-bit)	Unsupported	Compatible	Unsupported	Compatible	Compatible	Compatible
Windows Vista (32-bit)	Certified	Compatible	Unsupported	Certified	Compatible	Compatible
Windows Vista (64-bit)	Compatible	Compatible	Unsupported	Compatible	Compatible	Compatible
Windows 7 (32-bit)	Certified	Compatible	Unsupported	Certified	Compatible	Certified
Windows 7 (64-bit)	Compatible	Compatible	Unsupported	Compatible	Compatible	Compatible

Mac OSX Client Configurations

	Safari 5.0	Safari 4.0	Firefox (Final Release Channel)*	Firefox 3.6	Google Chrome (Stable Channel)**
Mac OSX 10.5 "Leopard"	Compatible	Compatible	Compatible	Compatible	Compatible
Mac OSX 10.6 "Snow Leopard"	Certified	Compatible	Certified	Compatible	Certified

*The Firefox Release Channel is the fully tested version by Mozilla and intended to be the most stable. This channel is updated roughly every 6 weeks. For further detail on Firefox, please review the material available at <http://blog.mozilla.com/blog/2011/04/13/new-channels-for-firefox-rapid-releases/>.

**The Chrome Stable Channel is the fully tested version by Google and intended to be the most stable as the name implies. This channel is updated roughly every 2-3 weeks for minor releases and 6 weeks for major releases. For further detail on Chrome, please review the material available at www.chromium.org.

Accessibility and JAWS

Blackboard strives to make all its products as accessible as possible. JAWS for Windows 11 and 12 were used during accessibility testing for SP6.

JRE Support

Blackboard Learn requires the latest version of Sun JRE 6. The JRE can be downloaded from <http://www.oracle.com/technetwork/java/javase/downloads/index.html>. Windows System Administrators who want to provide auto-download for users can find the .cab file link for the appropriate JRE at <http://www.oracle.com/technetwork/java/javase/autodownload-140472.html>.

No Longer Supported

The following technologies are not supported:

- Internet Explorer 6, 7
- Firefox 1.x, 2.0, 3.0, and 3.5
- Safari 2.0, 3.0, 3.1, 3.2 and any version on Windows
- Mac OSX 10.3, 10.4 "Tiger"
- Java 5, although it may continue to work

Deprecation of Supported Technologies

The following technologies are deprecated as of 9.1 SP6 and will be removed from support with the release of 9.1 SP8. Deprecation is a standard software practice to notify the community of future removal of support. These technologies are still tested and expected to perform in the intervening releases until the release in which they are removed from support.

- De-supporting the following technologies as previously communicated on February 22, 2011. Link to the [Support Bulletin](#).
 - 32-bit configurations will no longer be supported starting with the release of 9.1 Service Pack 8.

- Windows Server 2003 will no longer be supported starting with the release of 9.1 Service Pack 8.
- Tomcat Clustering will no longer be supported and related code support will be removed with the release of 9.1 Service Pack 8.

Virtualization

VMware® ESX Server 4 (Linux® and Windows®) is the only configuration Certified by Blackboard for Release 9.1.

Blackboard supports other virtualization solutions as long as Blackboard and the hypervisor support the guest operating system.

In addition to VMware, Blackboard has experience with Citrix XenServer 5.5, Solaris 10 Zones and Red Hat® Enterprise Linux® 4 & 5 Xen™.

Installation and Upgrade Information

For information about fresh installations of Blackboard Learn 9.1 SP6, see [Installing Blackboard Learn](#) in [Blackboard Help for Administrators](#).

For information about upgrading to Blackboard Learn Release 9.1 SP6, see the [Upgrade Center](#) or find the *Upgrade Kit* for your current version in the [Document Library](#).

Direct Upgrade Paths

The following releases can be upgraded directly to Blackboard Learn 9.1 SP6.

- Blackboard Learn Release 9.1 Service Pack 4 (Build 9.1.40071.3)
- Blackboard Learn Release 9.1 Service Pack 5 (Build 9.1.50119.0)
- Blackboard Learn Release 9.0 Service Pack 6 (Build 9.0.670.0)
- Blackboard Academic Suite Release 8.0 SP7 (Build 8.0.494.5)

Indirect Upgrade Paths

Previous Version	Suggested Path
9.1 GA, SP3 Build number 9.1.30151.0	<ol style="list-style-type: none"> 1. Upgrade to 9.1 SP4. 2. Upgrade to 9.1 SP6.
9.1 GA SP2	<ol style="list-style-type: none"> 1. Increment through the service packs to 9.1 SP4. 2. Upgrade to 9.1 SP6.
9.1 GA, SP1	<ol style="list-style-type: none"> 1. Increment through the service packs to 9.1 SP4. 2. Upgrade to 9.1 SP6.
9.0 GA, SP1, SP2, SP3, SP4, SP5	<ol style="list-style-type: none"> 1. Increment through the service packs to 9.0 SP6. 2. Upgrade to 9.1 SP6.
8.0 GA, SP1, SP2, SP3, SP4, SP5, and SP6	<ol style="list-style-type: none"> 1. Increment through the service packs to 8.0 SP7. 2. Upgrade to 9.1 SP6.
7.3 SP2	<ol style="list-style-type: none"> 1. Upgrade to 8.0 SP7. 2. Upgrade to 9.1 SP6.
7.3 SP1	<ol style="list-style-type: none"> 1. Upgrade to 7.3 SP2. 2. Upgrade to 8.0 SP7. 3. Upgrade to 9.1 SP6.
7.3 GA	<ol style="list-style-type: none"> 1. Upgrade to 7.3 SP1. 2. Upgrade to 7.3 SP2. 3. Upgrade to 8.0 SP7. 4. Upgrade to 9.1 SP6.
7.2 SP1	<ol style="list-style-type: none"> 1. Upgrade to 7.3 SP2. 2. Upgrade to 8.0 SP7. 3. Upgrade to 9.1 SP6.

Previous Version	Suggested Path
7.2 GA	<ol style="list-style-type: none">1. Upgrade to 7.2 SP1.2. Upgrade to 7.3 SP2.3. Upgrade to 8.0 SP7.4. Upgrade to 9.1 SP6.
7.1 SP2 or later	<ol style="list-style-type: none">1. Upgrade to 7.3 GA.2. Upgrade to 7.3 SP1.3. Upgrade to 7.3 SP2.4. Upgrade to 8.0 SP7.5. Upgrade to 9.1 SP6.
7.1 GA and SP1	<ol style="list-style-type: none">1. Upgrade to 7.1 SP2.2. Upgrade to 7.3 GA.3. Upgrade to 7.3 SP1.4. Upgrade to 7.3 SP2.5. Upgrade to 8.0 SP7.6. Upgrade to 9.1 SP6.
7.0.x	<ol style="list-style-type: none">1. Upgrade to 7.0 SP1.2. Upgrade to 7.1 SP2.3. Upgrade to 7.3 GA.4. Upgrade to 7.3 SP1.5. Upgrade to 7.3 SP2.6. Upgrade to 8.0 SP7.7. Upgrade to 9.1 SP6.
6.3.x	<ol style="list-style-type: none">1. Upgrade to 6.3 SP2.2. Upgrade to 7.0 SP1.3. Upgrade to 7.1 SP2.4. Upgrade to 7.3 GA.5. Upgrade to 7.3 SP1.6. Upgrade to 7.3 SP2.7. Upgrade to 8.0 SP7.8. Upgrade to 9.1 SP6.

Paths for Importing and Restoring Courses

The following table identifies the supported paths for importing or restoring a Course that was exported or archived from Blackboard Academic Suite. Certified paths are fully tested and supported by Blackboard. Compatible paths are not fully tested but should function correctly based on past performance.

Note: Paths for importing and restoring Courses are not backward compatible. Courses may be imported or restored to a newer version, but Courses from a newer version may not be imported or restored to an earlier version.

Source	Support
Blackboard Learn Release 9.1	Certified
Blackboard Learn Release 9.0	Certified
Blackboard Academic Suite Release 8	Certified
Blackboard Academic Suite Release 7	Certified
Blackboard Academic Suite Release 6	Certified
Blackboard ML	Certified
Blackboard 5.5*	Certified
Blackboard 5.0*	Compatible
CourseInfo 4	Not Supported
Blackboard Vista and CE 8.0.5 or higher	Certified
Blackboard Campus Edition 4.1.7	Certified

*Blackboard 5 and Blackboard 5.5 did not include an Archive and Restore function. Courses from these releases may be imported but Courses cannot be restored with user data and interactions intact.

Upgrading Server Software

Server software must meet certain requirements before installing Blackboard Learn. The following items are important to keep in mind when setting up the server software:

- The database is run on a separate server when using two or more servers. In a Windows environment, the appropriate client tools for the database must be installed on the Application server or servers when using a configuration with two or more servers. For Linux and Solaris configurations, the database client tools are shipped with the application and must not be installed separately.
- If running on Windows, when installing the Java SE Development Kit (JDK), make sure that both the JDK and the JRE components are installed to different locations. Also, ensure that there are no spaces in the path name to either the JDK or the JRE.
- If running on Windows, support for .NET APIs and .NET Building Blocks has been removed from Blackboard Learn in Release 9.1. If you are using .NET APIs and Building Blocks, they will not work in Release 9.1. Replace them with comparable Web Services and Java Building Block APIs. For more information about the available APIs, see the API documentation available on <http://www.edugarage.com>.
- If running on Solaris, ensure that the Swap space for the operating system is 0.5 – 1.5 times the amount of physical RAM on the server. For more information, see http://www.sun.com/bigadmin/content/submitted/swap_space_impact.jsp.

Before Running the Updater

Pre-Upgrade Utility for Linux and Solaris Platforms with an Oracle Database

Part of the 9.1 SP6 upgrade applies a change to the `gradebook_log` table, which may take a long time on large Oracle databases. To reduce the required downtime, Blackboard has developed a Pre-Upgrade Utility that can be run on the live production system before taking it down for the 9.1 SP6 upgrade.

Blackboard recommends that all institutions on Linux and Solaris platforms with an Oracle database containing more than 5 million records in their `gradebook_log` table run this utility. The utility can also be run on systems with fewer records. Running the utility will save significant downtime during the upgrade process. This utility does *not* apply to institutions running on a Windows platform with an SQL Server database.

To find out how many records you have in the `gradebook_log` table, follow these steps:

1. Log in to SQL*Plus as `bblearn` (or `bb_bb60`).
2. Run the query `select count(1) from gradebook_log;`

Blackboard recommends that this utility be run during a period of lower system activity, as it will update every row in the `gradebook_log` table. For customers with more than 5 million records in the `gradebook_log` table, this utility may take over an hour to complete. For users with 100 million records, the process may last over 24 hours.

For Managed Hosting clients, Managed Hosting will assess the need to run the utility and will coordinate with you appropriately.

For self-hosted clients, more information can be found in the [Pre-Upgrade Utility README](#) or the [Pre-Upgrade Utility Download page](#). You will need to be on one of the [direct upgrade paths](#) to the latest 9.1 release to run this utility.

While the utility is running, the number of Oracle archived redo logs will increase.

The "ORA-01555: snapshot too old: rollback segment number ... too small" error may occur while the utility runs. Work with your local Oracle database administrator to ensure there is enough space in the `UNDOTBS` tablespace. An article, "[How To Size UNDO Tablespace For Automatic Undo Management](#)", is available on the [Oracle Metalink](#).

Oracle Bug 6970071 affects Oracle 10.2.0.4 with the recycle bin active. The best approach is to apply 10.2.0.5, where the fix is included.

Complete instructions for running the utility are available in the `README.TXT` file.

As with any upgrade activity, running the utility on a test system first is recommended.

Note: If the utility is not used, the 9.1 SP6 upgrade will work, but it may take hours or days to complete

Windows Server 2008 IIS 7 Roles and Features Configuration

Windows Server 2008 uses IIS 7. Before installation of Blackboard Learn 9.1, IIS 7 needs to be configured with specific Role Services and other settings.

3. Install the IIS 7 Role in Windows Server 2008 Server Manager and configure Role Services:
 - A. Click **Start** and select **Administrative Tools** then select **Server Manager**.
 - B. Click **Roles**, and under the **Roles Summary** heading, click **Add Roles**.
 - C. From the list of displayed roles, select **Web Server (IIS)**.
 - D. Click **Next**.

At a minimum, the following five (5) role services must be installed under Web Server (IIS) in addition to the default role services:

- Role Services > Web Server > Application Development > ISAPI Extensions
- Role Services > Web Server > Application Development > ISAPI Filters
- Role Services > Management Tools > IIS 6 Management Compatibility > IIS 6 Metabase Compatibility
- Role Services > Management Tools > IIS 6 Management Compatibility > IIS 6 WMI Compatibility
- Role Services > Management Tools > IIS 6 Management Compatibility > IIS 6 Scripting Tools

To enhance performance, troubleshooting, and offer additional web server configuration options, Blackboard recommends that the following role services also be installed under Web Server (IIS):

- Role Services > Web Server > Common HTTP Features > all five (5) role services enabled
- Role Services > Web Server > Application Development > all seven (7) role services enabled
- Role Services > Web Server > Security > all eight (8) role services enabled
- Role Services > Management Tools > all three (3) role services enabled
- Management Tools > IIS 6 Management Capabilities > all four (4) role services enabled.

Of the role services listed under Web Server (IIS) the following will be of the most interest:

- Role Services > Common HTTP Features > HTTP Redirection (to allow for HTTP redirection, in the event that the site is renamed)
- Role Services > Security > Windows Authentication (to allow for Active Directory integrated authentication)
- Role Services > Security > IP and Domain Restrictions (to allow for greater control of web server access)
- Role Services > Performance > Dynamic Content Compression (to allow for enhanced performance)

- E. Select **Windows Process Activation Service (.NET Environment)**, and then click **Add Required Role services**.

4. Disable the Default Web Site:
 - A. Click **Start** select **Administrative Tools** then select **Server Manager**.
 - B. From the left menu, click the plus sign next to **Roles** to expand the tree.
 - C. Click the plus sign next to **Web Server IIS**, and then click **Internet Information Services (IIS) Manager**.
 - D. Under the **Connections** heading, click plus sign next to the **%HOSTNAME%**, and then click the plus sign next to **Sites**.
 - E. Right-click **Default Web Site** and from the drop-down menu select **Manage Web Site**, then select **Stop**.
5. Back up the current IIS 7 configuration and verify.
 - A. `%windir%\system32\inetsrv\appcmd.exe add backup "Blackboard Pre-Change"`
 - B. `%windir%\system32\inetsrv\appcmd.exe list backup`
6. Modify the IIS 7 configuration to permit double escaping within URLs (applies to all sites).
 - A. `%windir%\system32\inetsrv\appcmd set config /section:system.webServer/Security/requestFiltering - allowDoubleEscaping:True`
7. Modify the IIS 7 configuration to allow upload files greater than 20MB in size, specified in bytes (applies to all sites).
 - A. `%windir%\system32\inetsrv\appcmd set config - section:requestFiltering - requestLimits.maxAllowedContentLength:104857600`
8. Back up the current IIS 7 configuration and verify.
 - A. `%windir%\system32\inetsrv\appcmd.exe add backup "Blackboard Post-Change Backup"`
 - B. `%windir%\system32\inetsrv\appcmd.exe list backup`
9. Restart the IIS service.
 - A. Click **Start** and select **Administrative Tools** then select **Server Manager**.
 - B. From the left menu, click the plus sign next to **Configuration** and then click **Services**.
 - C. From the list of services, right-click **World Wide Web Publishing Service** and select **Restart**.

IIS Configuration Editing Notes

Blackboard recommends that you do not manually edit the `%windir%\system32\inetsrv\config\applicationHost.config` file to configure these options. This will result in errors that require a backup and restore of the last known good backup of the IIS 7 configuration that was managed by the IIS.

If you manually backed up the `applicationHost.config` file, restoring this manual backup and restarting IIS 7 will not fix errors generated by manually editing this file to configure IIS 7.

By default, IIS 7 will check every two minutes for changes to the configuration files and will automatically create backups of them, maintaining a history of ten backups. Use the oldest of these backups to restore IIS 7 to a working state.

```
%windir%\system32\inetsrv\appcmd.exe list
backup%windir%\system32\inetsrv\appcmd.exe restore backup
"CFGHISTORY_0000000021"
```

Once the configuration has been restored and verified through web browser access, use the appcmd utility to configure the necessary features of IIS 7 as described in the section above.

If this approach does not solve the problem with IIS 7 generating errors, remove and then reinstall the IIS 7 Role.

If you need to reinstall the IIS 7 Role, you can use the

`%BLACKBOARD%\tools\admin\WebsiteReinstall.bat` command to re-establish the Blackboard Web site within IIS. Then install the IIS 7 Role in Windows Server 2008 Server Manager and configure Role Services.

Upgrading to Blackboard Learn 9.1 SP6

Upgrade Documentation

Blackboard provides Upgrade documentation for each of the following products in [Blackboard Help for Administrators](#):

- [Blackboard Learn Release 9.0](#)
- [Blackboard Academic Suite 8.0](#)
- [CE 4](#)
- [CE 8](#)
- [Vista 8](#)

Provide New License

Contact Blackboard Client Operations to [request a new license key](#) file (`bb-license.xml`) for Blackboard Learn Release 9.1. Make sure to do so well in advance of the upgrade. It is important to obtain a new license file to ensure the upgrade includes new features and functions.

Save the new license file in the same directory as the updater. Be sure not to confuse the new license with the old license file.

During the upgrade, when the installation prompt presents the following options: Update, Provide new License file, Uninstall Blackboard Learn, and Uninstall appserver, select **Provide new License file**.

Warnings for Customizations and Configuration

Running the Updater on an existing system will reset many back-end and user interface customizations. Examples and warnings describing specific known issues are included here.

Examples of affected back-end settings include:

- `JAVA_HOME` system environment variable
- SSL and custom authentication settings
- Settings in the `bb-config.properties`, `authentication.properties`, and `wrapper.conf` files

Examples of affected user interface settings and other affected areas include:

- Course Settings (which control the Course Menu)
- Building Block availability
- API hosts information
- Module and Tab availability, role settings, and custom layouts

Customizations will need to be reapplied after the upgrade. To make this process easier, create a detailed document outlining all existing customizations.

Note: Any configuration files removed by the upgrade will be placed in the `blackboard_directory>/backups/<upgrade_timestamp>` directory. Use these files as a guide when updating the new configuration files to reapply your previous customizations.

Mashups and Firewall Warning

Bidirectional communication to Web Services that control the APIs for Mashups is required for running Mashup searches. If you are running Blackboard from behind a firewall as a test server or for security reasons, you will need to open the firewall to use this feature. To open bidirectional communication to Mashup Web Services, you must configure your firewall to allow responses from the API hosts. Information from the hosts is available at these locations:

Flickr – <http://www.flickr.com/services/api/>

YouTube – <http://gdata.youtube.com>

SlideShare – <http://www.slideshare.net>

Acxiom Warning

The IdentifyX Building Block is no longer bundled with Blackboard Learn. Clients who are upgrading from Blackboard Academic Suite 8.0 or Blackboard Learn 9.0 and then upgrade to Blackboard Learn SP6 must deactivate IdentifyX v1.1.3 prior to upgrading. After upgrading, download and install the newest version of IdentifyX, v1.1.6 available from [Blackboard Extensions](#). Clients that upgrade from a Learn 9.1 release are already using IdentifyX, v1.1.6.

Echo 360 Warning

The Echo 360 Building Block will no longer be bundled with Blackboard Learn as of 9.1 SP6. Those institutions that have downloaded the Echo360 client and are actively using it may continue to do so with support from Echo360. However, no new instances will be permitted or supported. Echo360 recordings may still be integrated into a Learn course using links. To learn more about how your school can work with Echo360's Lecture Capture solutions, visit their website at www.echo360.com.

New York Times Warning

New York Times content modules will no longer be bundled with Blackboard Learn Community Engagement.

SafeAssign Warning

Institutions choosing to archive courses from a legacy production installation and then restore the courses to a new 9.1 instance will lose some of the data associated with SafeAssign, specifically SafeAssignments in restored courses and the student submissions to those SafeAssignments will be inaccessible. In addition, this option could potentially create a privacy issue where some students would be able to see submissions that are not their own.

To avoid these issues, when SafeAssign is heavily used, Blackboard recommends that one of the other two upgrade paths be selected: In-Place Upgrade or Fresh Install – Data Migration.

If your institution chooses the archive/restore option, you will need to have the existing SafeAssign institution database copied from the previous installation to the new installation. Please open a ticket with Client Support to request this copy after the new production installation is complete.

Custom Themes Warning

Significant changes were made to the application markup and CSS in Release 9.1 to support new features and accessibility standards. These changes can cause customized themes and color palette changes created in earlier releases to malfunction as well as fail to apply styles to new features.

Comments have been added to the CSS files to make them easier to read and understand. These comments identify new elements and elements that are no longer used. Extraneous selectors have been removed.

View changes in the [Theme CSS from Blackboard Learn 9.1 SP5 and from Blackboard Learn 9.1 SP6](#) in this document.

Previous Content Management Clients Warning

If your institution is planning to upgrade directly from Blackboard Learn 9.0 or earlier please be aware of possible complications with Content Management. Clients who have previously licensed the Content Management module, but no longer have such a license, may encounter problems when upgrading to Release 9.1. This occurs because of lingering schemas in the database that require a Content Management license. Because of these lingering schemas, the installer is unable to upgrade the database properly and will fail.

If your institution's database has lingering schemas from a previous Content Management license you must obtain the appropriate uninstaller script from Blackboard Client Support to remove these schemas before upgrading to 9.1.

Load-Balanced Systems Warning

The Updater must be run on each Application server and the Collaboration server on a load-balanced system. After running the Updater the first time, choose the Update an App Server for all other Application servers and the Collaboration server. This option will upgrade the application files without making any of the database changes.

Language Pack Changes Warning

To ensure consistency across releases, the Blackboard Learn Updater will compare the existing en_US language pack against the version that is being installed. The differences are noted and output in a file called `bundle_diff.txt`. This file is added to the `blackboard/backups/<updater_time_stamp>` directory. Use this file to review the text differences between releases and make upgrades to any custom Language Packs.

Running the Updater on Windows

Before you run the updater, run through this brief checklist:

- Make sure that no other service is running on the appserver and keeping Port 80 open.
- Make sure the default website in IIS is stopped.
- Make sure the installer is not validating against another server or load-balancer.

For complete details see KB Article [Upgrade Fails with Port 80 Already in Use](#)

Follow these steps to run the Updater on Windows:


1. Make sure that the JAVA_HOME system environment variable points to a full Java SDK, version 1.6.x. The path cannot contain spaces. For example: C:\JDK6.
2. Place the Updater file in the desired location, and then double-click the Updater file to launch the Updater.

A welcome message appears with a reminder to read the release notes and the installations instructions completely before updating.

3. Click **Next** to continue.
4. Confirm the installation and content directories for your environment, and then click **Next**. Load-balanced systems should use the correct UNC path for your content directory.

For those clients with Content Management and the `/courses` area turned off, a warning appears displaying a message that the `/courses` content area must be turned on to successfully upgrade. Although not recommended, the `/courses` area can be disabled again after upgrade, but it must remain on during upgrade.

5. At the next prompt, select **Provide new license file**, and then click **Next**.
6. If the server does not already have a **Server Type** value, the **Server Type** screen appears. Properly categorize the server and click **Next**.
7. When a message appears displaying the changes that will be made when the Updater runs, carefully verify the changes. You will not be able to undo the changes after you start the upgrade.
8. Click **Next** to start the upgrade.

 **WARNING!** If you launched the Updater from the command line, do not close the command line window or any of the other windows that pop-up during the upgrade as this will cause the Upgrade to fail and may leave the database in an indeterminate state.

Important Note: To ensure that adaptive release rules are functioning correctly, courses created prior to Blackboard Learn Service Pack 6 need to be copied, imported, or restored after upgrading. This process updates all links to content within a course and removes specific read permissions from students. Updating the links provides students with access to all files they had previously been granted access to. Removing specific read permissions prevents students from accessing content that they are not allowed see while honoring adaptive release rules.

Running the Updater on UNIX (Red Hat and Solaris)

Before you run the updater, run through this brief checklist:

- Make sure that no other service is running on the appserver and keeping Port 80 open.
- Make sure the default website in apache is stopped.
- Make sure the installer is not validating against another server or load-balancer.

For complete details see KB Article [Upgrade Fails with Port 80 Already in Use](#)

Follow these steps to run the Updater on UNIX.

1. Place the Updater file in the desired location.
2. Open a command-line prompt as the root user and navigate to the directory that holds the Updater.
3. Issue the following command to launch the Updater:

```
$JAVA_HOME/bin/java -jar <updater_file>
```

If using the X Windows System (X11) or a similar GUI solution and the DISPLAY variable is properly configured, the Updater will launch in GUI mode.

Note: The following steps assume that the command-line Updater is used.

4. A welcome message appears with a reminder to read the release notes and the installations instructions completely before updating.
5. Press ENTER to continue. Instructions appear for navigating through the Updater prompts. The Updater, in most cases, will provide a default value in brackets.
6. Press ENTER to accept the default and continue, or enter a different value. Press ENTER to continue after entering a new value.

The first Updater prompt asks for the directory where Blackboard will be found.

7. Press ENTER to accept the default, or enter a new value and then press ENTER. If Blackboard Learn is not found in the directory provided, the Updater attempts to install at the given location.
8. At the next prompt, type 1 for “1 – Upgrade and Convert” and press ENTER.

For those clients with Content Management and the `/courses` area turned off, a warning appears displaying a message that the `/courses` content area must be turned on to successfully upgrade. Although not recommended, the `/courses` area can be disabled again after upgrade, but it must remain on during upgrade.

9. If the server does not already have a Server Type value, the Server Type screen appears. Properly categorize the server and press ENTER.
10. When a message appears displaying the changes that will be made when the Updater runs, carefully verify the changes. You will not be able to undo the changes after you start the upgrade.
11. Press ENTER to start the upgrade.

Important Note: To ensure that adaptive release rules are functioning correctly, courses created prior to Blackboard Learn Service Pack 6 need to be copied, imported, or restored after upgrading. This process updates all links to content within a course and removes specific read permissions from students. Updating the links provides students with access to all files they had previously been granted access to. Removing specific read permissions prevents students from accessing content that they are not allowed see while honoring adaptive release rules.