# 1. Online Class Module

An Online Class, a method of E-Learning, comprises all forms of learning and teaching that can be done using the computer and the internet as the communication medium between the tutor and the pupil. It is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio.

E-learning is increasingly being utilized by students who may not want to go to traditional brick and mortar schools due to severe allergies or other medical issues, fear of school violence and school bullying and students whose parents would like to home-school but do not feel qualified. Cyber schools create a safe haven for students to receive a quality education while almost completely avoiding these common problems. Cyber charter schools also often are not limited by location, income level or class size in the way brick and mortar charter schools are.

E-learning is naturally suited to distance learning and flexible learning, but can also be used in conjunction with face-to-face teaching, in which case the term Blended learning is commonly used. Experts argue that E-learning can be fully utilized only after understanding what the ‘E’ stands for; they believe that the ‘E’ should stand for words like exciting, energetic, enthusiastic, emotional, extended, excellent, and educational in addition to "electronic."

### 1.1. History

Early e-learning systems, based on Computer-Based Learning/Training often attempted to replicate autocratic teaching styles whereby the role of the e-learning system was assumed to be for transferring knowledge.

The success of Online Classes is attributed to the fact that the overall product is easy to use and maintain, portable, replicable, scalable, and immediately affordable, and they had to have a high probability of success with long-term cost-effectiveness.

### 1.2. Approaches to e-learning services

E-learning services have evolved since computers were first used in education. There is a trend to move towards blended learning services, where computer-based activities are integrated with practical or classroom-based situations.

**Computer-based learning**

Computer-based learning, sometimes abbreviated to CBL, refers to the use of computers as a key component of the educational environment. While this can refer to the use of computers in a classroom, the term more broadly refers to a structured environment in which computers are used for teaching purposes.

**Computer-based training**

Computer-Based Trainings (CBTs) are self-paced learning activities accessible via a computer or handheld device. CBTs typically present content in a linear fashion, much like reading an online book or manual. For this reason they are often used to teach static processes, such as using software or completing mathematical equations. The term Computer-Based Training is often used interchangeably with Web-based training (WBT) with the primary difference being the delivery method. Where CBTs are typically delivered via CD-ROM, WBTs are delivered via the Internet using a web browser. Assessing learning in a CBT usually comes in form of multiple choice questions, or other assessments that can be easily scored by a computer such as drag-and-drop, radio button, simulation or other interactive means. Assessments are easily scored and recorded via online software, providing immediate end-user feedback and completion status. Users are often able to print completion records in the form of certificates.

CBTs provide learning stimulus beyond traditional learning methodology from textbook, manual, or classroom-based instruction. For example, CBTs offer user-friendly solutions for satisfying continuing education requirements. Instead of limiting students to attending courses or reading printed manuals, students are able to acquire knowledge and skills through methods that are much more conducive to individual learning preferences. For example, CBTs offer visual learning benefits through animation or video, not typically offered by any other means.

**Computer-supported collaborative learning (CSCL)**

Computer-supported collaborative learning (CSCL) is one of the most promising innovations to improve teaching and learning with the help of modern information and communication technology. Most recent developments in CSCL have been called E-Learning 2.0, but the concept of collaborative or group learning whereby instructional methods are designed to encourage or require students to work together on learning tasks has existed much longer. It is widely agreed to distinguish collaborative learning from the traditional 'direct transfer' model in which the instructor is assumed to be the distributor of knowledge and skills, which is often given the neologism E-Learning 1.0, even though this direct transfer method most accurately reflects Computer-Based Learning systems (CBL).

**Technology-enhanced learning (TEL)**

Technology enhanced learning (TEL) has the goal to provide socio-technical innovations (also improving efficiency and cost effectiveness) for e-learning practices, regarding individuals and organizations, independent of time, place and pace. The field of TEL therefore applies to the support of any learning activity through technology.

### 1.3. Communication technologies used in E-learning

Communication technologies are generally categorized as asynchronous or synchronous. **Asynchronous activities** use technologies such as blogs, wikis, and discussion boards. The idea here is that participants may engage in the exchange of ideas or information without the dependency of other participants’ involvement at the same time. Electronic mail (Email) is also asynchronous in that mail can be sent or received without having both the participants’ involvement at the same time. Asynchronous learning also gives students the ability to work at their own pace. This is particularly beneficial for students who have health problems. They have the opportunity to complete their work in a low stress environment.

**Synchronous activities** involve the exchange of ideas and information with one or more participants during the same period of time. A face to face discussion is an example of synchronous communications. In an "E" learning environment, an example of synchronous communications would be a Skype conversation or a chat room where everyone is online and working collaboratively at the same time. Synchronous activities occur with all participants joining in at once, as with an online chat session or a virtual classroom or meeting.

# 2. Architecture

Architecture focuses on the foundation technologies and principles which sustain the Product, including Front-end, Backend and Middleware. Like many successful open source systems, the Moodle structured as a core system, surrounded by numerous plug-ins to provide specific functionality.

Plug-ins in Moodle are of specific types. That is, an authentication plug-in and an activity module will communicate with Moodle core using different APIs, tailored to the type of functionality the plug-in provides. Functionality common to all plug-ins (installation, upgrade, permissions, configuration ...) are, however, handled consistently across all plug-in types.

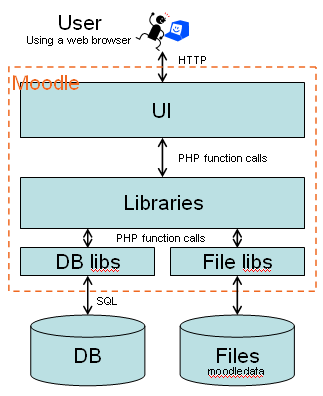
The standard Moodle distribution includes Moodle core and a number of plug-ins of each type, so that a new Moodle installation can immediately be used to start teaching and learning. After installation a Moodle site can be adapted for a particular purpose by changing the default configuration option, and by installing and removing plug-ins.

Physically, a Moodle plug-in is just a folder of PHP scripts (and CSS, JavaScript, etc. if necessary). Moodle core communicates with the plug-in by looking for particular entry points, often defined in the file lib.php within the plug-in.

***2.1. Core components***

* Database abstraction layer
* Roles and Capabilities system for controlling who can do what
* Forms library for creating accessible and secure HTML forms that let users edit things
* File API for managing files stored by Moodle
* The database schema
* What happens when you require config.php
* lib/moodlelib.php
* lib/weblib.php for outputting

***2.2. An Overview of Moodle Architecture***



Moodle core provides the entire infrastructure necessary to build an LMS. It implements the key concepts that all the different plug-ins will need to work with. These include

1. Courses and activities

A Moodle course is a sequence of activities grouped into sections. Courses are organized into a hierarchical set of categories within a Moodle site.

1. Users

Users, profile, my Moodle.

Groups and cohorts

1. Enrolments and access control

Contexts, roles, capabilities, and permissions,...

1. Activity and course completion
2. Navigation, settings and configuration
3. Forms library
4. JavaScript library

### Moodle has adopted the [Yahoo User Interface library](http://developer.yahoo.com/yui/3/). There is also a nice system for loading the additional JavaScript files required by each page.

1. Installation and upgrade
2. Logs and statistics

***2.3. How Moodle Code is Organized***

Moodle mostly follows a transaction script approach. That is, suppose you are looking a Forum. The URL will be .../mod/forum/view.php?id=1234. and mod/forum/view.php the PHP script that generates that page. One could argue that transaction script is not an appropriate pattern for an application as complex as Moodle. However, it is a very natural architecture for a PHP application, and Moodle is an aggregate of many different plug-ins, rather than a single complex application.

Behind that basic transaction script approach, a lot of the core functionality has been refactored out into libraries (mostly in the lib folder). This provides elements of a domain model. The Moodle project started before PHP could handle object-oriented code, however, so don't expect an object-oriented domain model, except is some of the more recent parts of the Moodle code.

There are two layers used to separate presentation from the business logic. The outer layer is the theme (see above) which controls the more visual aspects of the Moodle interface. Then there are renderer classes which generate the HTML to be output from the data supplied by the transaction scripts and the domain model. Unfortunately, neither PHP, nor the Moodle architecture, enforces a clear separation of the UI layer. It is possible for sloppy developers to make a mess, and this has happened in the past. The code in the standard Moodle distribution is gradually being cleaned up.

***2.4. Most Important Plug-in Types***

### *Activities and resources*

The individual items that make up a course. The main tools for teaching and learning. For example forum, wiki and quiz, and page, url and IMS content package. Activities are by far the largest type of plug-in in terms of amount of code. A forum or wiki system could be a software project in its own right. Activities and resources are installed in the mod folder.

### *Blocks*

Small bits of functionality that can be added to the sides (normally) of other pages. Many blocks provide views of data that is available elsewhere. Blocks live in the blocks folder.

### *Themes*

The overall visual style of a Moodle site, or of a particular course, or all courses in a category, can be changed by selecting a different theme. Themes live in the theme folder.

### *Language packs*

Moodle is internationalized. That is, you can get language packs for many different languages. Language packs are normally downloaded and installed via the Moodle administration screens, but they can also be downloaded manually from http://download.moodle.org/langpack/2.0/. Administrators can also change any of the standard user-interface strings, if the terms used in the installed language pack are not appropriate.

### *Course formats*

### Control how the structure of the course, a sequence of activities grouped into sections, is presented to the users. Course formats live in the course/format folder.

### *Authentication plug-ins*

### Control how users log in. Moodle can manage usernames and passwords itself, or use those stored in LDAP or another database. Alternatively, Moodle can use a number of single-sign-on schemes. Authentication plug-ins live in the auth folder.

### *Enrolment plug-ins*

### Control which users are enrolled in which courses. Again this can be by synchronizing with another system, perhaps a student information system, or it can be tracked internally by Moodle. Enrolment plug-ins live in the enroll folder. (Moodle was created by an Australian, so enroll is the correct spelling ;-).)

### *Repository plug-ins*

### Ways for users to get content (files) into Moodle, either by uploading from their hard drive, or by getting the file from another location on the Internet, perhaps Drop Box, Google Docs, or Flickr. Repository plug-ins live in the repository folder.

# 3. Moodle Blocks

Blocks are items which may be added to the left, right or centre column (depending upon your theme) of any page in Moodle.

Any block can be made 'sticky' so that it appears in all the contexts below, such as throughout a course or a particular activity.

Blocks can be placed on the side of the screen (if your theme supports it) via the Dock icons ( [Dock to block.png](http://docs.moodle.org/21/en/File:Dock_to_block.png)and [Block to dock.png](http://docs.moodle.org/21/en/File:Block_to_dock.png)).

***3.1. Managing blocks***

### 1. Hiding a block

The hide/show column allows selected blocks to be hidden i.e. they do not appear in any course "Add a block" dropdown menu and cannot be used in any course. To hide a block, click the eye icon so that it changes to a closed eye.

### 2. Instances

The blocks page also lists the number of instance for each block. Clicking on a number results in the list of courses containing that block being displayed.

### 3. Block deletion

Any block (apart from certain protected blocks, such as the Navigation and Settings blocks) can be deleted using the link in the delete column. There is usually no reason for standard blocks to be deleted (they are usually hidden), however non-standard blocks may need to be deleted before upgrading. *NOTE: T o delete a block completely, in addition to deleting it on the blocks page, you also need to remove/delete the actual block folder from the Moodle/blocks folder, otherwise Moodle will reinstall it next time you access the site administration.*

**4. Block Settings**

***3.2. Standard Moodle Blocks***

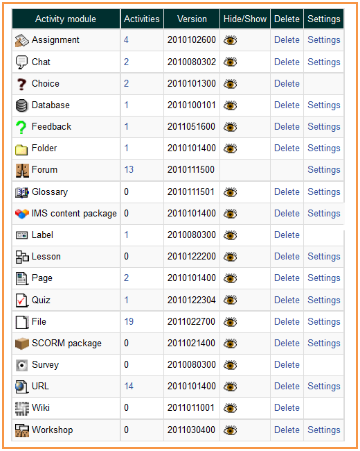
A list of few commonly seen blocks; Some are described in detail with respect to a student/teacher and course conduction example,

* [*Activities*](http://docs.moodle.org/21/en/Activities_block)
  + An activity is generally an interactive learning segment for a student in a course. The teacher adds activities by a pull down menu found in their course's sections when the edit mode is turned on.
  + The Activities block lists and allows navigation between the different activities available in your course (Forums, Quizzes, Assignments, Lesson module and so forth). The activities list will grow as you add activities to your course. Therefore, the first time you enter your course, the only category that is listed is Forums. This is because one forum exists by default – the news forum.
  + Whenever you add a different activity or resource to your course, an icon will appear in this block representing the specific Moodle module. These icons will link to a list of all instances of that modules activity that appear throughout the course.
* [*Admin bookmarks*](http://docs.moodle.org/21/en/Admin_bookmarks_block)
  + The intent of this block is to mark pages so that an administrator role can see them as a list of links. Editing must be turned on for this block to appear, else it is hidden.
  + The intent of this block is to mark pages so that an administrator role can see them as a list of links. Editing must be turned on for this block to appear, else it is hidden.
  + The admin bookmark block should display a link of pages where this block has been added to a context. As of October 2011 it does not.
  + Site administration > Plug-ins > blocks > Manage Blocks then clicking on the number of instances link, will display a list of course where the block has been installed. The front page will not appear on this list.
  + It is possible to set the block display. Properties, just as any other block. The default capabilities are to allow the teacher to view, manage and edit blocks. These can be overridden in any context.
* [*Blog menu*](http://docs.moodle.org/21/en/Blog_menu_block)
  + The blog menu block provides links to
    - View all my entries
    - Add a new entry
    - Add/delete tags (in a pop-up window)

Along with context-sensitive links for adding an entry about the course or a particular activity;

* [*Blog tags*](http://docs.moodle.org/21/en/Blog_tags_block)
  + The Blog Tags block displays a list of blog tags (keywords describing a blog entry) where font size visually indicates how many blogs are tagged with that keyword. The more frequently used blog tags appear in a larger font size and the least used appear in smaller fonts. This format is sometimes called a "tag cloud".
* [Calendar](http://docs.moodle.org/21/en/Calendar_block)
* [Comments](http://docs.moodle.org/21/en/Comments_block)
* [Community finder](http://docs.moodle.org/21/en/Community_finder_block)
* [Course completion status](http://docs.moodle.org/21/en/Course_completion_status_block)
* [Course overview](http://docs.moodle.org/21/en/Course_overview_block)
* [Course/site description](http://docs.moodle.org/21/en/Course/site_description_block)
* [*Courses*](http://docs.moodle.org/21/en/Courses_block)
* [*Flickr*](http://docs.moodle.org/21/en/Flickr_block)
* [*HTML*](http://docs.moodle.org/21/en/HTML_block)
  + A HTML block is a standard block used to add text or images on a site or course page. The title bar can be left blank.
  + The block is very flexible and can be used for a variety of purposes. It has the standard Moodle HTML editor for formatting text, adding images or creating links, switching to code view and allows any valid HTML markup to be used. This enables embedding video, sounds, Flash, and other files which can add unique elements to a course or site page. You can add multiple HTML blocks to your page.
* [*Latest news*](http://docs.moodle.org/21/en/Latest_news_block)
  + Recent posts made in the News forum will display as a listed item in the Latest News block, along with a link to older archived news.
  + By default, the Latest News block displays 3 news items. This may be changed in the course administration block>Settings>News items to show.
* [*Logged in user*](http://docs.moodle.org/21/en/Logged_in_user_block)
* [*Login*](http://docs.moodle.org/21/en/Login_block)
* [*Main menu*](http://docs.moodle.org/21/en/Main_menu_block)
* [*Mentees block*](http://docs.moodle.org/21/en/Mentees_block)
  + A Mentees block is a FrontPage block that provides mentors with quick access to their mentee(s) profile page(s). A mentor might be a parent for example who has access to their child's information through the link in the block
* [*Messages*](http://docs.moodle.org/21/en/Messages_block)
* *Settings*

# 4. Activity Module in Moodle



***4.1. Managing Activities***

Manage Activities:An administrator can manage Moodle's activity modules for the site in *Settings > Site administration > Plug-ins > Activity modules > Manage activities*, including any contributed modules that have been added.

Number of Activities: The activities column lists how many activities for each module there are on your Moodle site. If you click on a number, the list of courses containing that activity will be displayed.

Version: The numbers against the modules tell you the version (or age) of the module. It is useful to know how up to date each module is and, particularly with contributed modules, it is important to ensure you have the most up to date version that matches your version of Moodle. The first four digits relate to the year of the module.

Hiding a Module: The hide/show column allows selected modules to be hidden i.e. they do not appear in any course "Add an activity" dropdown menu and cannot be used in any course. To hide a module, click the eye icon so that it changes to a closed eye. The Feedback module (which will eventually be replaced by a newer survey module) is hidden by default.

Module Deletion: Apart from the Forum module, any module can be deleted using the link in the delete column. There is no reason for standard modules to be deleted, however contributed modules may need to be deleted before upgrading.

*Note: To delete a module completely, in addition to deleting it on the manage activities page, you also need to remove/delete the actual module folder from the Moodle/mod folder, otherwise Moodle will reinstall it next time you access the site administration.*

Module Settings: Many of the modules have additional settings, mostly enabling default values to be set, which can be accessed via the links in the settings column.

Module Security: An administrator can restrict activity modules so that they do not appear in the "Add an activity" drop-down menu for teachers in *Settings > Site administration > Security > Module security*. The setting only applies to teachers - administrators are always able to add any activity to a course.

The administrator can choose to restrict modules for all courses, requested courses or no courses.

New courses can have the modules restricted by default if the admin checks the box *Restrict modules by default*.

### 5. Open Source Video Conferencing Tools

As mentioned earlier, multiple tools have been assessed based on factors as,

1. Platform Dependency
2. Compatibility
3. System Requirements
4. Installation
5. Configuration
6. Ease of Use
7. Performance

The following tools have been tested,

1. Adobe Lccs (Livecycle Collaboration Service)
2. Flazr
3. Ajax Chat
4. Big Blue Button
5. Openfire - Red5 Chat
6. Redfire 03 & Redfire 06
7. Sparkweb
8. Openmeetings

A detailed description of some of these is provided in this report.

***5.1. Adobe LCCS***

The Collaboration service enables developers to easily add real-time collaboration and social capabilities to their applications. The service is implemented as LiveCycle Collaboration Service. Adobe hosts the service so developers don't have to worry about deployment, maintenance, and scalability.

Using LiveCycle Collaboration Service you can add collaboration to new and existing applications. Some examples of applications with collaborative capabilities include social games, customer service applications, e-learning solutions, and sports broadcasts. LiveCycle Collaboration Service provides the following features:

* Real-time push messaging: Create collaboration-aware components and applications.
* Pre-built components: Accelerate development using white board, chat window, webcam, and other prebuilt components.
* Multimedia streaming: Use audio and video sharing with support for P2P (RTMFP) streaming.
* User management: Detect and change presence, status, and roles.

### Key capabilities

* Easily integrate text chat, whiteboard, webcam, and VoIP functionality.
* Rapidly build and deploy applications with the complete SDK.
* Manage user and session data.
* Build your applications in the best-of-breed mix of onsite and cloud environments.

**Factors**

1. Platform Dependency: currently supports Macintosh, Windows (3.1, 95, NT), and UNIX (HP-UX, SunOS (TM), Solaris (r), IBM (R), AIX (R)) platforms.
2. System Requirements: Minimum System Requirements for Macintosh and Power Macintosh Users
   1. Macintosh with a 68020 or greater processor, or a Power Macintosh
   2. 3.5 MB of RAM (5 MB for Power Macintosh) available to Acrobat Reader
   3. Apple System Software version 7.1 or later
3. Installation: Required each Moderator and each Client to have a Adobe LCCS account to be able to login and use web services
4. Configuration: Requires Each Client Computer to download a Adobe SDK file inorder to use its services
5. Ease of Use: Not very easy to use
6. Performance: Flash makes performance a little slow

***5.1.1. Installation - Setup Developer Environment***

1. **Create a developer account**

Access to LCCS's service and SDK is granted through the Developer Portal. You'll need an Adobe ID and a developer account. The developer account is a unique account name that is prepended to your room URL. It MUST be unique from any ConnectNow account name you have, if any. Keep it simple, make it intuitive, and follow standard URL character rules.

* 1. Go to the Developer Portal <https://collaboration.adobelivecycle.com>.
  2. Choose **New Dev? Sign up!**
  3. Fill in the information in the Create a Developer Account dialog.
  4. Choose **Create**. You will be automatically directed to the Developer Portal.

1. **Log in to the Developer Portal**

The Developer Portal provides a way to monitor account and room usage, create new rooms, generate a shared secret (if you're using external authentication) and perform other basic tasks.  
To log in:

* 1. Go to the Developer Portal <https://collaboration.adobelivecycle.com>.
  2. Enter your Adobe ID and log in.

1. **Create a room**

A room is LCCS's name for a virtual location on the service which is represented in your applications and to others as an URL. Clients connect to the room and send and receive messages (data) to other present clients. Think of rooms as meeting places at some URL. While you can create rooms programmatically or via the Room Console, the Developer Portal is a good place to start. Create one now so that you can run the SDK examples and test example code. Your account is initially provisioned with a default room named "myfirstroom".

To create a room:

* 1. In the My Rooms panel, choose **Add**.
  2. Provide a room name (room's root URL, format is: <LCCS root URL>/<account name>/<room name>. The application name is not used in the room URL.).
  3. Choose **Save**. The service automatically creates an empty room based on the default application.

1. **Generate a shared secret key**

A secret key is needed only when you are ready to deploy an application that uses external authentication, thus leveraging your organization's existing authentication infrastructure (e.g. LDAP). You can create your key now or later.

From the Developer Portal you can generate an account shared secret (or create a new one if your existing secret is compromised).

During development and testing, users (usually just developers) either enter as guests with just a username, or enter as a full user with both a username and password. LCCS only understands Adobe ID passwords; therefore, it is the de facto case that when someone enters both a username and password, both must belong to an Adobe ID.

At deployment time however, while some developers will create applications that only need to recognize guest users (who can enter any username), most applications will require some type of authentication. There are two requirements that necessitate the solution that a secret key solves:

* Adobe does not want to know, and you would not want Adobe to know, your users' passwords.
* You will want to create and manage authentication credentials using your own tools and infrastructure (for example, your databases and LDAP servers).

With LCCS's provided external authentication scripts, the shared secret key allows you to take in a username and password, authenticate it on your own system, and then pass it to your client application. The key enables automatic authentication, authentication privacy, and single sign on. When you're ready to set up external authentication, see [Authenticating on your own systems](http://learn.adobe.com/wiki/display/lccs/6.4+Authentication+setup#6.4Authenticationsetup-Authenticatingyourownsystems).

If you have an existing key, creating a new key replaces the old key. Only one key is available for each user with developer credentials; that is, for each account can be associated with one key. Your key is always displayed at the top of the portal's user interface.

To generate a key:

* 1. Go to the Account Details panel.
  2. Choose **Generate**.
  3. When the confirmation dialog appears, choose **Yes**.

1. **Download the LCCS SDK Navigator**

The SDK Navigator contains the zipped SDK, links to instructional videos, tools, sample applications, and other resources to put your project on the fast track to development.

* **Installable SDK components**: SWCs, source code, examples, scripts, and documentation.
* **Links to video tutorials**
* **Running demo applications**
* **Tools**:
  + **Room Console**: Provides a UI-based way monitor and manage templates, rooms, and users.
  + **Local Connection Server**: Enables offline development and testing of non-streaming components so that you can run your applications without connecting to the service.

To do so:

* 1. Choose **Download the SDK**.
  2. Navigate through the installer to install the application to any location.

You can now close the portal. Either write down your account URL and shared secret, or return here when you start developing. You'll need your room URL to do almost anything. You'll need your shared secret when you deploy your application.

1. **Verify your IDE compatibility**

LCCS currently supports (Flex Builder 2 is not supported ):

* 1. Flex Builder 3
  2. Flash CS3 for the Flash-only SDK.
  3. Flash CS4
  4. Flash Builder 4

1. **Install the SDK**

These instructions install the SDK to Flex Builder's plugins/com.adobe.lccs directory so that you can browse the documentation from Flex Builder's help system. The sample applications, SWC libraries, and other resources reside there as well. However, you can choose a location of your choice.

The SDK contains a number of items you will unzip and install to a convenient location where you can access them later, including:

* **Source Code**: Some source code is provided to assist with debugging.
* **Compiled Libraries (SWCs)**: Precompiled SWC files, including Flash Player 9/10/10.1 for both Flex and Flash. One of the primary advantages of these files is their support for RTMFP.
* **Server Scripts**: Provided server integration scripts allow you to automatically connect to LCCS services and manage accounts as well as list, create, and delete rooms and templates. Languages include e Python, Ruby, Cold Fusion, Java, PHP, and Groovy.
* **Sample Applications**: Sample applications provide working code you can install and run. Refer to the LCCS SDK Navigator's Sample Applications directory for more demos.
* **Documentation**: Includes the developer guide, release notes, and readmes.

To install the SDK:

* 1. Start the LCCS Navigator.
  2. Install its zipped SDK resources to any location.
  3. On the Home tab, choose **Save**.
  4. Browse to Flex Builder's plugin directory. For example:
     1. **Windows**: C:\Program Files\Adobe\Flex Builder 3\plugins\
     2. **Macintosh**: /Applications/Adobe Flex Builder 3/plugins/.
  5. Choose **OK**.
  6. Restart Flex Builder.

1. **Installing a debug version of the Flash Player ( Optional )**

The debug version of the Flash player may facilitate application development. Various versions of the debug player are available depending on your platform, whether or not you use Flash Pro, and so on.

The following example describes one possible scenario.

To install the debug version of the Flash player when you are not using Flash Pro:

* 1. Uninstall existing versions of the Flash player as described in <http://kb.adobe.com/selfservice/viewContent.do?externalId=tn_14157&sliceId=1>.
  2. Install the requisite version of the debug player from <http://www.adobe.com/support/flashplayer/downloads.html>. For example, Windows Flash Player 10 ActiveX control content debugger for IE.
  3. Verify the version as described in [9. Verifying your Flash versions](http://learn.adobe.com/wiki/display/lccs/1.2+Set+up+your+developer+environment#1.2Setupyourdeveloperenvironment-9.VerifyingyourFlashversions).

1. **Verifying your Flash versions**

These instructions use Flex Builder. Use steps which are applicable to your IDE.

If you're in doubt about the versions of Flash you are running, check them. To check the version your browser uses, right click on any Flash item and read the following: *About Adobe Flash Player <version>*.

To check the runtime version Flex Builder uses, do the following:

* 1. Choose **Project > Properties**.
  2. Choose **Flex Compiler**.
  3. Verify the Flash version in the HTML wrapper panel.

1. **Project settings**

For each project, point to the appropriate SWC and source code (for debugging) as described in [3. Start a new project](http://learn.adobe.com/wiki/display/lccs/11.1+Building+your+first+application#11.1Buildingyourfirstapplication-3.Startanewproject) in the [Building your first application](http://learn.adobe.com/wiki/display/lccs/11.1+Building+your+first+application) tutorial.

***5.2. Big Blue Button***

Big Blue Button is an [open source](http://en.wikipedia.org/wiki/Open_source) [web conferencing](http://en.wikipedia.org/wiki/Web_conferencing) system developed primarily for distance education. It supports:

* Multiple audio and video sharing
* Presentations with extended whiteboard capabilities - such as a pointer, zooming and drawing
* Public and private chat
* Desktop sharing
* Integrated voip using asterisk or freeswitch
* Support for microsoft office documents using openoffice.
* Users may enter the conference in one of two roles: viewer or moderator.

As a viewer, a user may join the voice conference, share their webcam, raise their hand, and chat with others. As a moderator, a user may mute/unmute others, eject any user from the session, and make any user the current presenter. The presenter may upload slides and control the presentation.

Although its components are open source, the BigBlueButton client depends on a browser plugin for the Adobe Flash platform. The BigBlueButton server runs on Linux and can be installed either from source code or from Ubuntu packages. BigBlueButton is also downloadable as a Virtual Machine (VM) that runs within VMware Player on PC and Unix computers and within VMWare Fusion on Macs.

**Architecture:** Similar to OpenMeetings, BigBlueButton uses red5, an open source implementation of Adobe's Flash Media Server, to support its real-time collaboration. The BigBlueButton server can run within a cloud environment, such as Amazon EC2, but in version 0.70 there were problems with audio delays using the built-in VoIP in such environments. The core developers recently demonstrated improvements to the VoIP in the upcoming BigBlueButton 0.8.

**Factors**

1. Platform Dependency: platform independent implementation for desktop sharing.
2. System Requirements: dual-core machine with at least 2 GB of memory and a 2.0+ Ghz processor for good upstream and downstream bandwidth from the server (recommended - Ubuntu 10.04 32-bit/64-bit on the server )
3. Installation: Very Huge download and installation procedure even for Linux
4. Configuration: Requires a change of much of the code to get a tolerable performance and hence requires too much initial configuration
5. Ease of Use: Slowness makes it difficult to use
6. Performance:

a. The viewers never have access to the conference if it is configured to have to wait for connecting the moderator.

b. Extremely slow.

***5.2.1. Installation (BigBlueButton 0.71a on Ubuntu)***

1. **Install the BigBlueButton apt-get repository key**

First, install the BigBlueButton apt-get repository key and URL (**note:** The URL has changed from 0.70).

 # Install the package key

wget http://ubuntu.bigbluebutton.org/bigbluebutton.asc -O- | sudo apt-key add -  
 # Add the BigBlueButton repository URL and ensure the multiverse is enabled

echo "deb http://ubuntu.bigbluebutton.org/lucid/ bigbluebutton-lucid main" | sudo tee /etc/apt/sources.list.d/bigbluebutton.list

echo "deb http://us.archive.ubuntu.com/ubuntu/ lucid multiverse" | sudo tee -a /etc/apt/sources.list

1. **Install Video Conference Server**

BigBlueButton now lets you choose to use either Asterisk or FreeSWITCH for voice conferencing. We provide configuration packages for both, so it's easy to install either one. We recommend FreeSWITCH.

To install FreeSWITCH:

  sudo apt-get install python-software-properties

sudo add-apt-repository ppa:freeswitch-drivers/freeswitch-nightly-

drivers

sudo apt-get update

sudo apt-get install bbb-freeswitch-config

Or, instead, to install Asterisk (**WARNING: Do not install both**):

sudo apt-get update

sudo apt-get install bbb-voice-conference

1. **Install BigBlueButton**
   1. Type: sudo apt-get install bigbluebutton
   2. Type 'y' and press Enter. Then sit back. After a few moments, if you don't have mysql installed, the mysql package script will ask to specify a password for the mysql 'root' user.
   3. Enter a password for mysql's 'root' user (you'll need to enter it twice). Almost immediately, the package script for bbb-web will prompt you for that mysql root password (shown below). BigBlueButton needs to access the mysql to create a database. Enter the the same password your did a moment ago for mysql.

*Note: The mysql password should not contain the following characters as ! # [ ^ $ ] ( ) as they will cause the bbb-web install script to break*.

* 1. Finally, you'll be prompted to access an End User License Agreement (EULA) for the installation of the Microsoft TrueType Fonts. These fonts help OpenOffice to convert Microsoft Office documents into PDF files.

1. **Do a Clean Restart**

To ensure BigBlueButton has started cleanly, enter the following commands:

    sudo bbb-conf --clean

sudo bbb-conf --check

The output from sudo bbb-conf --check will display your current settings and, after the text, " Potential problems described below ", print any configuration or startup problems it has detected. Normally, there is no text following this message.

***5.3. OpenFire - Red5 Chat***

Openfire (previously known as Wildfire, and Jive Messenger) is an [XMPP](http://en.wikipedia.org/wiki/Extensible_Messaging_and_Presence_Protocol) **server** written in [Java](http://en.wikipedia.org/wiki/Java_%28programming_language%29) and dual-licensed under both a proprietary license and the [Apache License](http://en.wikipedia.org/wiki/Apache_License) 2.0. Openfire supports the following **features**:

* Web-based administration panel
* Plugin interface
* Customizable
* [SSL/TLS](http://en.wikipedia.org/wiki/Transport_Layer_Security) support [[2]](http://en.wikipedia.org/wiki/Openfire#cite_note-1)
* User-friendly web interface and guided installation
* Database connectivity (i.e. embedded [Apache Derby](http://en.wikipedia.org/wiki/Apache_Derby) or other [DBMS](http://en.wikipedia.org/wiki/DBMS) with [JDBC](http://en.wikipedia.org/wiki/JDBC) 3 driver) for storing messages and user details
* [LDAP](http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol) connectivity
* Platform independent, pure [Java](http://en.wikipedia.org/wiki/Java_%28programming_language%29)
* Full integration with [Spark](http://en.wikipedia.org/wiki/Spark_%28software%29)

The proprietary extension to Openfire allows multiple server instances to work together in one clustered environment. This extension is now open source as well (but depends on Oracle Coherence, a commercial product).

Red5 Video Chat is a full FLASH video chat with audio and video support made using Open Source RED5 technology and Flash : You do not need to purchase expensive solution such as Flash Media Server. If you have your own server, deploy the RED5 server side solution, and install our Red5 Video chat. It supports

* No plugin to be installed
* Video webcam
* Audio chat
* Private Messages
* Registration process
* No duplicate entries
* Full customized design
* Multi langage chat
* is watching me feature
* 4 webcams
* Invite for chat
* Rooms

**Factors**

1. Platform Dependency: Completely Independent
2. System Requirements: The server should be a high configuration which is dependent on the load that is expected by the number of clients
   1. **Web server with PHP/mySQL** (we use PHP/mySQL for database connections between the Flash application and the database that stores infos about registered chat users): if you want a chat without connection, you can remove this feature. If you do not need authentification, you do not need PHP/MySQ.
   2. **Windows or Linux dedicated server:** we need to install and run RED5 solution on your server. For this you need a dedicated server that allows you to install JAVA applications. If you do not have any dedicated server, including 120 Gigas of HardDisk, remote desktop access and 100 mega of bandwith.
3. Installation: Requires PHP and MYSQL and the setup of the Red5 Server
4. Configuration: Requires the PHP files to be modified to the MYSQL database and the Server to be Configured to our own server
5. Ease of Use: Easy to Use and customize
6. Performance: It is fast as it is only the basic services that are provided.
7. Existing Errors: Requires other methods to support logging in and choosing the chat partners and other specifications
8. Future Enhancement: Should be made to a ready made chat application with easily customizable options. HTML5 or something should be used as Flash is becoming obsolete.

***5.3.1. Installation - Openfire ( Windows )***

* 1. **Download Openfire** from <http://www.igniterealtime.org/downloads/>.
  2. **Run the Openfire installer**. The application will be installed to c:\Program Files\Openfire by default.

*Note: the .tar.gz build does not contain a bundled Java runtime (JRE). Therefore, you must have JDK or JRE 1.5.0 (Java 5) or later installed on your system -* [*http://java.sun.com*](http://java.sun.com)*.*

* 1. **Database** - if you choose to use an external database, you must prepare your database for Openfire.

1. **Setup** - Use the built-in web-based setup tool to setup and verify the server configuration.
2. The default port for the web-based admin console is 9090.
3. If you are on the same machine as Openfire, the following URL will usually work: <http://127.0.0.1:9090>.
4. Add http://127.0.0.1 address to Internet Explorer's Trusted Sites list, if Enhanced Security configuration is enabled in Internet Explorer.
5. Initial setup and administration can also be done from a remote computer using LAN IP address instead or hostname if it is resolvable by the remote computer.
6. **Admin Console** - use the web-based admin tool to manage the server.

Run openfire.exe in the bin/ directory of your Openfire installation or Run the graphical launcher provided in the Start Menu.

***5.3.2. Installation - Red5Chat***

1. **Download red5chat** from <https://sourceforge.net/projects/freered5chat/files/>. Server files and client files can be found in the archive.
2. **Server:**  
   1. Copy "chat" directory to "webapps" of your Red5. Example: /usr/share/red5/webapps  
   2. Restart your Red5.  
   The source code is available if you want to customize the plugin.
3. **Client:**  
   1. If you have installed Red5 at localhost:5080 you may use flash/index.html and flash/red5chat.swf.  
   2. .fla and .as source files are in flash/source directory.

***5.4. Redfire 0.0.03 & Redfire 0.0.06***

Redfire - Open Source XMPP + RTMP Collaboration Platform based on Red5 and Openfire

Redfire is a new plugin for Openfire that embeds the Red5 server and provides audio/video stream tools for XMPP application development. It replaces the old red5 plugin for Openfire and the previous Redfire web app for

**Red5 server**

**Key features**

* **An RTMP server (Red5) that can be used to deliver audio/video media along side XMPP** messaging and signalling.
* **A plugin for Spark.**
* **A SIP-based soft phone that uses RTMP protocol developed in Flex.**
* **A Java web start application that** captures **and publishes the desktop screen as an RTMP video stream.**
* **2 person audio/video conversation web page**
* 12 persoon audio/video conferencing web page

**Factors**

1. Platform Dependency: Client systems can be of any platform
2. System Requirements: The server should be a high configuration which is dependent on the load that is expected by the number of clients
3. Installation: Requires Openfire and Redfire acts as a plugin for it along with the Spark plugin.
4. Ease of Use: Easy to Use and customize
5. Performance: It is fast as it is only the basic services that are provided
6. Existing Errors: Requires other methods to support logging in and choosing the chat partners and other specifications
7. Future Enhancement: Should be made to a ready made chat application with easily customizable options. HTML5 or something should be used as Flash is becoming obsolete.

***5.4.1. Installation - Openfire ( Windows )***

1. Download OpenFire from <http://www.igniterealtime.org/projects/openfire/>
2. Windows Run the Openfire installer. The application will be installed to **c:\Program Files\Openfire** by default.
3. **Setup the Database :** Openfire can store its data in an embedded database or you can choose to use an external database such as MySQL or Oracle. If you would like to use an external database, you must prepare it before proceeding with installation.
4. **Setup the Server :** A web-based, "wizard" driven setup and configuration tool is built into Openfire. Simply launch Openfire (platform-specific instructions below) and use a web browser to connect to the admin console. The default port for the web-based admin console is 9090. If you are on the same machine as Openfire, the following URL will usually work: [http://127.0.0.1:9090](http://127.0.0.1:9090/). Initial setup and administration can also be done from a remote computer using LAN IP address instead or hostname if it is resolvable by the remote computer. Windows Server administrators should add http://127.0.0.1 address to Internet Explorer's Trusted Sites list, if Enhanced Security configuration is enabled in Internet Explorer. Otherwise they will get a blank screen.
5. **Admin Console :** After completing the above steps, Openfire will be configured and you can use the web-based admin console to administer the server. The URL should be the same as you used to setup the server unless you changed the port during the setup.

***5.4.2. Installation - Redfire 0.0.06***

**1. Download Redfire 0.0.06** from <http://code.google.com/p/redfire/downloads/detail?name=redfire-370-0.0.0.zip&can=2&q>=

**2. Stop Openfire**

**3. Unzip redfire-x.x.x.x.zip** and **copy** the redfire.war file to the OPENFIRE\_HOME/plugins directory

**4. Restart Openfire**

**5.** From a browser, **go to** <http://your_openfire-server:9090/redfire>

***5.5. OpenMeetings***

OpenMeetings is software used for presenting, online training, web conferencing, collaborative whiteboard drawing and document editing, and user desktop sharing. OpenMeetings is suitable for any work environment. In developing and IT departments as well as in schools, universities and other educational institutions. In short, in every scenario where Job and location independence play an important role. The product is based on OpenLaszlo RIA framework and Red5 media server, which in turn are based on a bunch of open source components. Communication takes place in meeting rooms which are set to different communication, security and video quality modes. The recommended database for backend support is MySQL. The product can be set up as an installed server product, or used as a hosted product. OpenMeetings is used for web conferencing in FOSS e-learning solution Moodle and Atutor. It was first integrated as a replacement for the proprietary, Flash server based, video conference tool in Dokeos and started from there as an independent open-source application (only developed by Sebastian Wagner at the time). **It is available as hosted service or you download and install a package on your server with no limitations in usage or users.**

The software is translated in over 30 languages and counting. All the user needs is a Flash Plugin.

OpenMeetings implements the following **features**:

* Audio Video conferencing
  + Audio + Video
  + Audio Only
  + Video Only
  + Picture Only
  + change video-/audio-quality
* Meeting recording
  + Recorded sessions can be downloaded as AVI/FLV files
* Screen sharing
* Collaborative document editing
* Private Message Center
  + Send users messages and organize them in folders.
  + The booked event automatically is in your and the participants calendar, changes to that event will be populated to all users booked to the event
* Calendering
  + Plan your conferencing and invite attendees from OpenMeetings or External.
  + The invited attendees will recieve an E-mail with details to the meetings and a link with a secure hash to the conference room.
  + Share your calendar with your contacts.
* Polls and Voting
  + With yes/no or 1-10 questions, let the user vote and see the voting results.
* Chat and whiteboarding
  + You can save each whiteboard instance as a file. The file is located in the File-Explorer and can be drag n’ drop’ed to the whiteboard again and organized like any other document, image or folder
  + Drawing, writing, Drag&Drop, Resizing, Images (Drag&Drop from Library), Symbol(s).
* User and room management
* Backup
  + You can backup the whole user-generated data including files uploaded by the users in a single ZIP file and import that ZIP into a new installation of OpenMeetings again.

### Advantages:

* Real Open Source
* Recordings can be downloaded as AVI/FLV
* Chat and private messaging
* Calendar with Notification System (EMail or Ical)
* Multicolor Interface and easy branding and 30++ Languages and Language Editor
* SOAP-Integration API
* Ready to run LDAP and MS Active Directory Support

**Factors**

1. Platform Dependency: Windows, MacOS or Linux
2. Compatibility: Platform independent
3. System Requirements: The server should be a high configuration which is dependent on the load that is expected by the number of clients
4. Installation: A basic server startup Batch file (shell file for Linux) and then server side direct installation.
5. Configuration: Minimum tweaks to make the performance faster. These can be ignored for most part for usages over the intranet.
6. Ease of Use: Very easy and self-explanatory in usage and installation
7. Performance: Desktop Sharing is extremely fast (compared to all other tools we tried) as it is Java WebStart application and directly runs on the client without any need of installation.
8. Future Enhancement: More options on restricting the usability on users.

***5.5.1. Installation***

1. **Download OpenMeetings** from [http://code.google.com/p/OpenMeetings/](http://code.google.com/p/openmeetings/).
2. **Unzip the folder** and save where you want your server to be placed.
3. If your system does not have **Java Runtime Environment 6**, download JRE6 from <http://www.oracle.com/technetwork/java/javase/downloads/jre-6u29-download-513650.html> select the download file for Windows x86 Kernel jre-6u29-windows-i586-iftw-k.exe.
4. **Run red5.bat**.
5. **Run web installer** <http://127.0.0.1/OpenMeetings/install>.
6. To **run OpenMeetings** on web browser [http://127.0.0.1/OpenMeetings](http://127.0.0.1/openmeetings)
7. **From client** run OpenMeetings on web browser [http://serverprivateip/OpenMeetings](http://serverprivateip/openmeetings).

***5.5.2. Improving Performance***

1. Linux Operating System provides higher performance on most servers.
2. To use the optimum of performance from your server there is a start-script for red5 available that does some basic settings in the JVM. It is called red5-highperf.sh. It is recommended to use that script for production and high-load scenarios.

#!/bin/bash  
  
if [ -z "$RED5\_HOME" ]; then export RED5\_HOME=.; fi  
  
# Previous option set  
export JAVA\_OPTS="-Xrs -Xms512M -Xmx1024M -Xss128K -XX:NewSize=256m -XX:SurvivorRatio=16 -XX:MinHeapFreeRatio=20 -XX:+ExplicitGCInvokesConcurrent -Djava.net.preferIPv4Stack=true -Xverify:none"  
  
# start Red5  
echo "Setting Hi Performance Options"  
exec $RED5\_HOME/red5.sh >> $RED5\_HOME/log/jvm.stdout 2>&1 &

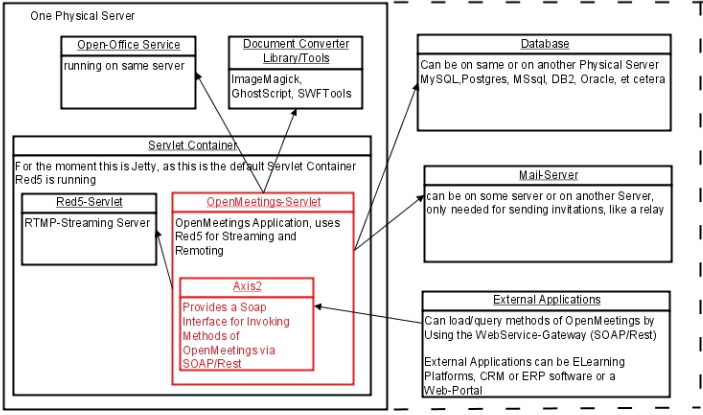
You have to exclude the "-XX:+UseConcMarkSweepGC" param from the default red5-highperf.sh to make it functional! However if you are a performance expert you might also play with the values to find perfect matches for your use-case.

#### *Performance Options*

|  |  |
| --- | --- |
| **Option and Default Value** | **Description** |
| -XX:+AggressiveOpts | Turn on point performance compiler optimizations that are expected to be default in upcoming releases. (Introduced in 5.0 update 6.) |
| -XX:CompileThreshold=10000 | Number of method invocations/branches before compiling [-client: 1,500] |
| -XX:LargePageSizeInBytes=4m | Sets the large page size used for the Java heap. (Introduced in 1.4.0 update 1.) [amd64: 2m.] |
| -XX:MaxHeapFreeRatio=70 | Maximum percentage of heap free after GC to avoid shrinking. |
| -XX:MaxNewSize=size | Maximum size of new generation (in bytes). Since 1.4, MaxNewSize is computed as a function of NewRatio. [1.3.1 Sparc: 32m; 1.3.1 x86: 2.5m.] |
| -XX:MaxPermSize=64m | Size of the Permanent Generation.  [5.0 and newer: 64 bit VMs are scaled 30% larger; 1.4 amd64: 96m; 1.3.1 -client: 32m.] |
| -XX:MinHeapFreeRatio=40 | Minimum percentage of heap free after GC to avoid expansion. |
| -XX:NewRatio=2 | Ratio of new/old generation sizes. [Sparc -client: 8; x86 -server: 8; x86 -client: 12.]-client: 4 (1.3) 8 (1.3.1+), x86: 12] |
| -XX:NewSize=2.125m | Default size of new generation (in bytes) [5.0 and newer: 64 bit VMs are scaled 30% larger; x86: 1m; x86, 5.0 and older: 640k] |
| -XX:ReservedCodeCacheSize=32m | Reserved code cache size (in bytes) - maximum code cache size. [Solaris 64-bit, amd64, and -server x86: 48m; in 1.5.0\_06 and earlier, Solaris 64-bit and and64: 1024m.] |
| -XX:SurvivorRatio=8 | Ratio of eden/survivor space size [Solaris amd64: 6; Sparc in 1.3.1: 25; other Solaris platforms in 5.0 and earlier: 32] |
| -XX:TargetSurvivorRatio=50 | Desired percentage of survivor space used after scavenge. |
| -XX:ThreadStackSize=512 | Thread Stack Size (in Kbytes). (0 means use default stack size) [Sparc: 512; Solaris x86: 320 (was 256 prior in 5.0 and earlier); Sparc 64 bit: 1024; Linux amd64: 1024 (was 0 in 5.0 and earlier); all others 0.] |
| -XX:+UseBiasedLocking | Enable biased locking. For more details, see this[tuning example](http://www.oracle.com/technetwork/java/tuning-139912.html#section4.2.5). (Introduced in 5.0 update 6.) [5.0: false] |
| -XX:+UseFastAccessorMethods | Use optimized versions of Get<Primitive>Field. |
| -XX:-UseISM | Use Intimate Shared Memory. [Not accepted for non-Solaris platforms.] For details, see [Intimate Shared Memory](http://www.oracle.com/technetwork/java/ism-139376.html). |
| -XX:+UseLargePages | Use large page memory. (Introduced in 5.0 update 5.) For details, see [Java Support for Large Memory Pages](http://www.oracle.com/technetwork/java/javase/tech/largememory-jsp-137182.html). |
| -XX:+UseMPSS | Use Multiple Page Size Support w/4mb pages for the heap. Do not use with ISM as this replaces the need for ISM. (Introduced in 1.4.0 update 1, Relevant to Solaris 9 and newer.) [1.4.1 and earlier: false] |
| -XX:+UseStringCache | Enables caching of commonly allocated strings. |
| -XX:AllocatePrefetchLines=1 | Number of cache lines to load after the last object allocation using prefetch instructions generated in JIT compiled code. Default values are 1 if the last allocated object was an instance and 3 if it was an array. |
| -XX:AllocatePrefetchStyle=1 | Generated code style for prefetch instructions. 0 - no prefetch instructions are generate\*d\*, 1 - execute prefetch instructions after each allocation, 2 - use TLAB allocation watermark pointer to gate when prefetch instructions are executed. |
| -XX:+UseCompressedStrings | Use a byte[] for Strings which can be represented as pure ASCII. (Introduced in Java 6 Update 21 Performance Release) |
| -XX:+OptimizeStringConcat | Optimize String concatenation operations where possible. (Introduced in Java 6 Update 20) |

1. Usage of layout is nice but it needs more views just for layouting. In a simple scenario thats okay, but in the openmeetings app itself most of the views are set **absolute** by x and y cause this reduces the total amount of views instancing (=making views dynamically like we do) is time critical .. if you create or destroy too many views at one time the browser hangs and cpu will be at 100%.
2. Try to use as less views as possible
3. Use at less constraints as possible
4. Use $once{ .. } instead of ${ .. } or use setters and getters
5. Don't use canvas.setAttribute('myvar','foo') just use canvas.myvar='foo'
6. Whenever it is not necessary (it will throw some events which are useless if you don't have any constraints pointing to 'myvar' and which will cost performance)

# 6. OpenMeetings Architecture



# 7. How to Integrate

# The college now contains

# A running Moodle on Xampp server

# An email server

# Now a Red5 Server is required which will run Openmeetings

# The Clients will need to only access the Moodle server

# So the Xampp Server will be made public and the Openmeetings Server will be made on the localhost so that the required action can be done only through Moodle and the clients will not be able to access Openmeetings directly

***Pesit Server***

**Email Server**

**Red5 Server (running OpenMeetings)**

**XAMPP Server (running Moodle)**

# 8. Future Enhancements

Many more enhancements can be added to this project to make it much more useful and attractive. As one of the primary reasons for this analysis has been to find the ideal tool for the college e-learning site, we plan on creating a plug-in for direct integration with Moodle Server. We are also looking for ways to increase the performance so that the process of web chatting or desktop sharing is seamless and independent of the number of users.

We would also like to integrate our previous projects (Automatic Notes Creation and Real-time Video Editing) so that the entire process of E-Learning and E-Course-Creation can be all done on one website and we can share this as an open source package with Moodle.

**9. Bibliography**

1. <http://moodle.org/>
2. Beginning XML, 4th Edition, David Hunter ISBN 13:978-81-265-1303-1
3. [www.w3schools.com/](http://www.w3schools.com/)
4. <http://www.red5.org/>
5. Internet & World Wide Web How to Program, 4th Edition, Dietel & Dietel
6. <http://web-conferencing.no1reviews.com/google-open-meetings.html>
7. <http://www.red5chat.com/>
8. <http://www.igniterealtime.org/projects/openfire/>
9. <http://flazr.com/>