Massive Open Online Courses
Enhancement to edX-platform

M. Tech. Project Stage-1 Report

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for the degree of
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Abstract

edX is a non-profit MOOC created by Harvard and MIT. Recently, edX source has been
made available to the open source community as different modules such as LMS(Learning
Management System), CMS(Course Management System), edx-ora(Open Response Assess-
ment) and etc. In our study we first concentrated on feature based survey of several learning
management systems in which we included both open sourced and proprietary LMSs then
we concluded with few features which may need to be implemented in edX-platform for bet-
tter performance. Secondly, we presented an approach for adaption of learning styles into
edX and reviewed different learning style models like Kolbs and Felder Silverman model. We
also presented edX in detailed along with its features, complete installation procedure and
different modules which need to be integrated. Later we proposed a model called “Blended
Learning-MOOC Model of IIT Bombay” and it is a new kind of methodology in education
system. Using our model successful completion rate in e-learning can be increased up to its
limits hence, the throughput of the e-learning system will be improved. We believes that
our model is capable for wide use.
Acknowledgements

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Chapter 1

Introduction to MOOC

1.1 MOOC

MOOC stands for “massive open online courses”[50] and is an online education system which aims at a large-scale interactive participation of users with the help of web. MOOC aims to provide quality education with the help of various features like videos, study materials, quizzes and online exams and trying to make it more efficient than traditional education system. In MOOC, “M” stands for Massive which represents scalability of Communities and connections of users, “O” stands for Open which represents that it is at free of cost to everywhere in the World where internet can be accessed, second “O” stands for Online which represents that it can provide a real time interactions between users and finally “C” stands for Courses which represents that different kind of courses can be offered by this system. Consider the following Figure 1.1 (taken from the website - [55]) for better understanding the term MOOC.

![Figure 1.1: Massive Open Online Courses](image)
Being an online web application, the MOOC can offer global network, learning analytics, software development, social media and the main aim of the MOOC is “Community and Connection” and “Scalability” as it is shown in the Figure 1.2 (taken from the website - [56]). At the time of 2002 year, The MIT came up with an application called MIT-OPEN COURSEWARE and at 2006 KHAN ACADEMY came to exist. The first MOOC is CCK08( Connectivism and Connective Knowledge) and it was aims to offer a new theme every week to feed the learners with the help of news letters, video snippets, debates and discussion forum. Some definition of MOOC that I found on the internet are as follows.

1. **Massive:** Unlimited participants.
2. **Open:** Free, not limited by geography, accessible, no prerequisites, content is shared.
3. **Online:** Internet based; may also work with mobile technology.
4. **Courses:** Learning is involved, but grading and other traditional expectations are usually NOT.

![Image of MOOC community connections](image)

Figure 1.2: Typical representation of Scalability

### 1.2 Challenges and Advantages of MOOC

- *The challenges of MOOC to provide higher education:* [51]

  1. Accreditation
  2. Self regulation and motivation
  3. High dropout rate
  4. Standards and grading
  5. Automated grading


6. Peer grading? Teaching assistant grading?

7. The lecture dominates most courses

8. Assuring academic integrity

9. Application in the humanities

10. Learning analytics - a digital portfolio of participants activities?

- The advantages of MOOC as an educational model:

1. Learner can use any online tool that are relevant.

2. People have no access to former higher education can participate.

3. Informal and can be organized easily.

4. Content can be created and shared as the course progresses.

5. Learning will be possible by the collaboration of learners and instructors.

6. Learners are learning from one another by discussion forums and social activities not by the facilitators.

7. Enrolment is open to anybody in the World, no fee, no credentials needed but applicant should have the internet access.

8. Supports career opportunities.

9. peer grading supported.

1.3 Few Existing MOOCs

As I mentioned in the Chapter 1 (Introduction to MOOC) about MOOC that it can be used either in a educational organisations or in a corporate environments where large scale interactive participation can be existed for learning and training process. I listed below a few MOOCs and some of their respective features.

1. Eliademy:

The educators and students can create, share and manage the courses. It is a flexible platform to use in different environments like educational institutes and corporate environments. And it is simple, easy to use. The interface includes new ways of creating courses, viewing course materials and receiving notifications. Using this application one can create an online class room by creating a course and then he/she can invite the students. Some of the features are listed below.
features:

- Sharing and Discussions (forum)
- Newsfeed
- Create courses
- Grading system
- Smart notifications
- Evernote and Sync calendar
- Invitation through mobile
- Student progress tracking

2. Coursera:

Coursera founded by Two Computer Science professors, Andrew Ng and Daphne Koller from Stanford University and it is a profit based platform. Currently (1 Oct 2013) it is offering 427 courses in different areas at free of cost. Some of the main features of coursera are listed below.

features:

- Certification
- Employee recruitment
- Human tutoring or assignment marking
- Enterprises pay to run their own courses
- Forums and peer grading
- Secure assessments
- Applicant screening
- Sponsorships
- Tuition fees
- With dead lines

3. Udacity:

Udacity is a profit based educational organization founded by Sebastian Thrun from Stanford University. Currently it is offering 25 active courses all over the World. At present (1 Oct 2013), it is one of the most desirable learning platform in e-learning environment. Some of the features are listed below.

features:

- Certification
- Students resumes and job match services
- Social networks integration
- Forums
- Employers paying to recruit students
- Sponsored high-tech skills courses
- No dead lines
- Proctored exams

4. OpenupEd:

The main aim of OpenupEd is to offer equity, quality and diversity in open education. So, they have come up with some features.

features:
5. **edX**[14]

edX is a non-profit MOOC created by collaboration of Harvard and MIT. Recently, edX source has been made available to the open source community as different modules such as LMS (Learning Management System), CMS (Content Management System) and other modules which need to be integrated. The main aim of the edX team is to provide access to the quality education around World where internet can be accessed. Some of the features of edX are listed below.

**features:**

<table>
<thead>
<tr>
<th>• Video lectures</th>
<th>• Different files formats</th>
<th>• Online quizzes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Virtual laboratory</td>
<td>• Calendar</td>
<td>• Multi-lingual support</td>
</tr>
<tr>
<td>• Discussion forums</td>
<td>• Wiki</td>
<td>• Progress analytics</td>
</tr>
<tr>
<td>• Emails &amp; Notifications</td>
<td>• Different type of assessments</td>
<td>• Certification</td>
</tr>
<tr>
<td>• edX meet-ups</td>
<td>• Support for large traffic</td>
<td>• etc</td>
</tr>
</tbody>
</table>
Chapter 2

Related Work and Literature Survey

2.1 Some General Features of LMS

A learning management system (LMS) is a software application to deliver e-learning education courses and offers activities like tracking, reporting and administration. It can be used for an organizational training purpose as well as to offer online courses from a well established universities. The most important features of a LMS depends on peculiar requirements of the respective organization and they varies from one organization to another. I listed a list of 99 most useful features\[1\] for a generic learning management system. They are as follows.

1. **Administration**: This feature includes course and program creation, create learning paths, import and export materials, managing users, email settings, site settings and navigation\[2\].

2. **Administrative Reporting**: To track the time, progress, score and report the relative information to all kinds of users.

3. **Assessment Tools Built in**: The assessment tool should be built along with the learning management system and should be automated.

4. **Authentication & Security**: Authentication and security should be provided for different kind of users of the system and also security from the intruders.

5. **Authoring - Courses**: Course creation and management can be provided to encourage the computer assisted learning.

6. **Authoring - 3D Simulation**: It offers virtual reality to the computer simulated environments that can simulate places in the educational system.
7. **Authoring - Gamification**: This is the act of integration of game mechanics or game dynamics into a website.

8. **Authoring - mLearning**: The mobile learning should be supported by an LMS in order to increase the aims like connectability.

9. **Authoring - PowerPoint Conversion**: This feature can implement the collaborative learning by creating power point conversations.

10. **Authoring - Serious Game**: Serious game is designed for primary purpose other than pure entertainment. It is widely used by education, defence, scientific exploration, health care and politics, etc. This is also kind of simulation of the real World.

11. **Authoring - Storyboarding**: It is a kind of act that is organizing a series of images for the purpose of pre-visualizing.

12. **Blended/Hybrid Learning**: The online delivery of various files should be offered by an LMS in an educational system as a part of a regular education to improve the learning of users. Generally blended model includes both face to face traditional methods and online education.

13. **Career Tracking**: Tracking the user career by offering different courses suitable to him and based on his profile and how he do things on the learning objects.

14. **Certification Management**: After the completion of course, certificates should be granted. Certification can be either *proctored* or *honour*.

15. **Certification Tracking**: Issued certificates can be maintained and issued whenever they are required for the authentication and etc.

16. **Classroom Management**: To enhance the e-learning, classroom activities should be managed like real time education and also can overcome the defects in traditional methods like learning style suitability for each user.

17. **Collaboration Management**: Collaboration management can be implemented via *wiki* and *forums* to improve the quality of learning.

18. **Competency Management**: This feature evaluates the strengths and needs of an LMS and implements the required actions to improve the system.

19. **Compliance - 3rd Party Authoring Tools**: This is the way of creating content and sharing on the internet. The example of the Compliance tool is *Elicitus 8.3-content publisher* which convert a PowerPoint content accurately.

20. **Compliance - 3rd Party Teleconferencing Tools**: Teleconferencing tools are needed to conduct meet-ups and to create video counselling, etc.
21. **Compliance - Tin Can API:** This feature also called as Experience API and it will collect the data about the wide range of experiences a person and also activities of a group[18].

22. **Compliance - AICC:** This tool provides the training environment for different kind of organizations with a some guidelines[13].

23. **Compliance Management:** This feature includes quality assurance, privacy act compliance and organization policy implementations.

24. **Compliance - SCORM:** It defines communications between client side content and a host system called the run-time environment[72].

25. **Conferencing:** The live meet-ups can be organized in an efficient manner.

26. **Content Library:** To manage the different formats of content and reusing them.

27. **Content Management:** This feature provides a process of collection, managing and publishing of information in any form of medium.

28. **Course Catalog:** Provides the complete list of available courses.

29. **Course Interactivity:** Wiki, forums and live conferences are used to provide the interactivity between users of LMS. The courses should be interactable.

30. **Coursework Grading:** The grading system will be provided for the students who completes the respective courses.

31. **Custom Learning Vocabulary:** Provides an interface to learn and remember lots of vocabularies which you need to learn and remember.

32. **Custom User Interface:** A customized look and feel for users.

33. **Customizable Branding:** This feature allows users to add their company logo and colour scheme to the web.

34. **Customizable Fields:** The user can modify or add the fields he like on the LMS interface.

35. **Customizable Functionality:** One can add or modify the existing functionality.

36. **Customizable Reporting:** Reports activities like tracking user activities and system activities and their consequences.

37. **Data Import/Export:** By this feature, Data can be imported from the other LMSs and also can be exported.

38. **Data Management:** Provides the services to manage the data as a valuable resource with required level of security.
39. **Development Tracking**: This feature describes collaboration, project management and code hosting for free software like Github.

40. **Document Management**: Document Management System is used to track and store the electronic documents. And it will offer the tracking of versions according to different users.

41. **eCommerce**: Provides an interface to support buying and selling over the internet. It is generally considered as sales aspect of e-business.

42. **eLearning Management**: Maintenance of a complete course from starting to ending with administration, documentation, tracking, delivery of programs and etc.

43. **Event Management**: It involves the creation and development of several events existed in e-learning environment like conferences.

44. **Exam Engine**: The exam engine is responsible for creating tests and quizzes in different ways.

45. **Goal Setting / Tracking**: Putting deadlines to some events and observing constant difference in the results of them by tracking.

46. **Individual Development Plans**: Setting the goals over the next period of time and the results will be analysed under the supervision.

47. **Installation (Hosted, Local, Saas, Cloud)**: Installation of an LMS should be offered in different ways such that the needs of the organizations can be achieved.

48. **Instructor Led Classes**: Offers the environment for practice of training and learning.

49. **Instructor Scheduling**: Instructor scheduling should be automated in order to boost the learning process.

50. **Job Hierarchies**: The hierarchies of roles in a LMS like learners, teachers, teaching assistantship, administrator and etc with their access controls should be specified clearly.

51. **LCMS**: Learning Content Management Systems used for creating the content and maintenance of it in terms of administration, tracking, reporting and etc.

52. **Legacy System Integration**: Integration of traditional methods in educational system to bring the feel of real time education like classes, discussions, exams and etc.

53. **Licensing (Free, Trial, Open Source, Paid)**: The licensing procedure should be mentioned for a LMS to provide services all over the World.

54. **Live Video Presentations**: Live video presentations includes the interactive sessions between different kind of users of a LMS like instructors and students.
55. **Locations Served:** The quality education should reach all over the World and also it is the matter of internet connectivity.

56. **Maintains (Backups):** After deploying of LMS system the maintenance should be provided by the vendors to upgrade the system with current changes of technology.

57. **Mobile Access:** *mLearning* feature should be included in a LMS to provide greater accessibility of e-learning.

58. **Multi-Currency:** Multi-Currency should be supported mainly for proprietary LMSs.

59. **Multi-Language:** To enhance the learning process, regional languages should be supported for ease of use.

60. **Multi-Lingual Courseware:** Courses also can be offered in regional languages.

61. **Multi-Lingual User Interface:** To support regional learning process (Japan, China, etc)

62. **Multi-Organization Structures:** To support different environments like corporate organizations and university education systems. These bodies need different requirements from the LMS.

63. **Multimedia Environment** This feature provides an interface to share multimedia objects like videos, images, PowerPoint slides and etc.

64. **Multiple Delivery Formats:** Supports delivery of files with multiple formats.

65. **Notifications - Email:** Notifications and instant message services will be provided by this course.

66. —bfNotifications - SMS: Mobile Notifications will be provided as instant messages and alerts.

67. **Offline Learning:** In order to reach e-learning to the locations where internet is not accessible, the offline learning should be supported. And also cost for web and traffic on the web can be reduced a little.

68. **Online Learning:** This is the main aim of e-learning to provide quality education all over the World.

69. **Performance Assessment:** The performance of learner can be assessed.

70. **Perpetual Licence:** The licence with no expiry date should be provided.

71. **Platform:** Should run on different operating systems.

72. **Podcast Management:** Different types of teaching methods included by this feature.
73. **Registrar Enrolment:** Provides an authoritative user as an official in a college or university who is responsible for keeping student records.

74. **Registration Management:** Registration activities will be provided with maintenance.

75. **Reporting:** Creating written documents based on the tracked data of all activities in a LMS.

76. **Resource Management:** Provides a way to improve the utilization of all the resources in a LMS system.

77. **Self-Enrolment:** This feature provides an interface for learners to enrol themselves into a course.

78. **Self-Paced:** The instruction methods follow the learner response.

79. **Self-Registration:** This feature provides an interface for outside users to register themselves into a LMS.

80. **Single Sing On:** Provides access for multiple related software systems with single sign-on. It is very useful to an instructor.

81. **Skills Assessment:** This feature is to find the skills of learners they have and to suggest them.

82. **Skills Tracking:** If the founded skills is different from the resulting skill from the tracking then this feature will suggest the learner to motivate him.

83. **Social Learning:** Provides an environment of social context to support observational learning.

84. **Software Development Kit:** Provides a way to develop applications using programming tools.

85. **Student Management:** Managing towards the success and learning of the learners using some methods and strategies.

86. **Student Portal:** To provide the online information about all activities related to the learning.

87. **Student Self Service:** Student can learn by his own by following the links and documents provided by the instructor.

88. **Student Tracking:** The tracking of student learning activities and how he access the learning objects and etc.

89. **Survey Management:** Getting the feedback from the learners to improve the course authorization.
90. **Term License:** Licensing terms should be cleared to the users of an LMS.

91. **Test Building:** The test building should be automated by providing test builder application.

92. **Test Scoring:** Gives the performance of an examinee on a test.

93. **Testing:** Testing for the quality of the services offered by the LMS.

94. **Training Metrics:** The effectiveness of the training programs can be assessed.

95. **Training Tracks:** Training administration, creation and initiates necessary actions to improvement of training process.

96. **User Access Controls:** Different levels of users should have different access controls from administrator to learner.

97. **Users Size Served:** Large number of users should be supported in terms of scalability.

98. **Virtual Classes:** To improve the education systems, the virtual classes should be supported like blended learning.

99. **Waiting Listing:** The waiting list should be provided by a LMS for waiting users to opt a course.

### 2.2 Feature-based survey of various learning management systems

#### 2.2.1 Open source LMSs and their features

The advantages with the open source LMSs are that many developers around the World contribute to fix the bugs which are identified and enhance the product then no need of the maintenance. These LMSs are more convenient to customization based on your requirements of school/organization and also no need of licensing, and hardware costs. This kind of LMSs can be converted into social learning platforms[62]. In the next section I listed more considerable open source LMSs and their respective features.

1. **Moodle:**[23]

Moodle stands for “Modular Object-Oriented Dynamic Learning Environment” and has different features like e-learning platform, filtering system, and etc. It can be used in education, business settings and training and development environments[70][62].

*features:*
2. **.LRN:** (dot learn)

Dot learn is a global community of software developers, educators together to find educational innovations. This application is a complete featured for developing web-based learning. The list of some features are listed below.

*features:*

<table>
<thead>
<tr>
<th>Administration</th>
<th>Assessment</th>
<th>Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Files download</td>
<td>Assignment submission</td>
<td>Expenses tracking</td>
</tr>
<tr>
<td>Online calendar</td>
<td>Quick establishment of courses</td>
<td>Weblogger</td>
</tr>
<tr>
<td>Wiki</td>
<td>Online news and announcement</td>
<td>.LRN e-commerce</td>
</tr>
<tr>
<td>Grading</td>
<td>Easy for first time users</td>
<td>Multilingual support</td>
</tr>
<tr>
<td>Quick establishment of courses</td>
<td>Easy generation of PDFs</td>
<td>News</td>
</tr>
</tbody>
</table>

3. **eFront:**

An icon based user interface is offering by this LMS to support the collaboration and interaction of online learning communities. Also this platform includes tools for the assignment management, internal messaging, forum, chat, and etc. This can be referred to as an alternative to the Moodle. The list of some features are listed below.

*features:*

<table>
<thead>
<tr>
<th>Administration</th>
<th>Skinning via themes</th>
<th>Assignments builders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework dropbox</td>
<td>Progress tracking</td>
<td>Authentication methods</td>
</tr>
<tr>
<td>User tracking</td>
<td>FAQs</td>
<td>Reports generators</td>
</tr>
<tr>
<td>File storage</td>
<td>Slide Presentation</td>
<td>Social tools</td>
</tr>
<tr>
<td>Edit the page</td>
<td>LORS central and management</td>
<td>SCORM</td>
</tr>
<tr>
<td>E-Mail/Bulk mail</td>
<td>Forums</td>
<td>Edx e-commerce</td>
</tr>
</tbody>
</table>
The eFront is a robust platform and it includes several important enterprise functionality to meet the needs of modern enterprise and it supports multilingual environment. Especially suites for medium enterprises and the list of features that supports enterprise environment are listed below.

**features:**

- Organization structure management
- Job positions management
- Skills gap tests management
- User card with training history
- Skills management
- Automatic assignment of courses
- LDAP support
- etc

4. Dokeos:

Dokeos is a corporate learning suite with four components named AUTHOR, LMS, SHOP and EVALUATE. The details about these components given below. This application provides all the features needed for e-learning and blended learning management from authoring to reporting. The following Figure 2.1 shows the features of this system.

Figure 2.1: Features of Dokeos LMS

(a) AUTHOR: This module builds e-learning content based on the Templates based online authoring and rapid learning.
(b) LMS: It handles interaction with learners.
(c) SHOP: This module is to sell course catalog.
(d) EVALUATE: It provides activities of assessment and certification.

**SCORM:** SCORM stands for “Sharable Content Object Reference Model” and is a collection of standards and specifications. It provides communication between client side content and a host system. And also it has a feature called “Package Interchange Format” used to package the content and makes into a transferable ZIP file. In 2004, it released an idea called “sequencing” which is a set of rules to specify the way in which a learner experience the content objects[72].

5. **Sakai:**

Sakai is designed by universities(MIT, Stanford and Berkeley) for universities and is a vibrant community that exits to enhance teaching, learning and research. It achieves this goal by defining needs of academic users, creating software tools and sharing the resources of knowledge and work together to develop Collaboration and Learning Environment. The list of several features of collaboration, teaching and portfolio are listed below[34].

**A list of collaboration features:**

<table>
<thead>
<tr>
<th>Announcements</th>
<th>Drop Box</th>
<th>Email Archive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources</td>
<td>Chat Room</td>
<td>Forums</td>
</tr>
<tr>
<td>Message Center</td>
<td>News / RSS</td>
<td>Poll tool</td>
</tr>
<tr>
<td>Presentation</td>
<td>Profile / Roster</td>
<td>Repository Search</td>
</tr>
<tr>
<td>Schedule</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**A list of teaching features:**

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Grade book</th>
<th>etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module Editor</td>
<td>QTI Authoring</td>
<td></td>
</tr>
<tr>
<td>QTI Assessment</td>
<td>Section Management</td>
<td></td>
</tr>
<tr>
<td>Syllabus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A list of portfolio features:

<table>
<thead>
<tr>
<th>Forms</th>
<th>Evaluations</th>
<th>Glossary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matrices</td>
<td>Layouts</td>
<td>Templates</td>
</tr>
<tr>
<td>Reports</td>
<td>Wizards</td>
<td>Search</td>
</tr>
<tr>
<td>Web Content</td>
<td>WebDAV</td>
<td>Wiki</td>
</tr>
<tr>
<td>Site Setup</td>
<td>MySakai Widgets</td>
<td>etc</td>
</tr>
</tbody>
</table>

**QTI:** IMS Question and Test Interoperability specification (QTI) represents a standard format for the representation of assessment content and results and supports exchange of content between authoring and delivery systems [34].

6. **ATutor:** [33] [28]

ATutor is a Learning Content Management System (LCMS). In ATutor, A stands for accessible, and accessibility which is the best feature in it. The instructor can see the navigation patterns of students and also students can track their own use. It supports career development and academic research in multilingual. A list of several features are given below [62].

**features:**

- Print Compiler to print notes or transcripts of discussions
- SCORM and IMS packages can be imported
- Easy course creation (although difficult with different types of content)
- Easily accessible and adaptable
- The file storage feature has a version control feature to keep track of changes

7. **Canvas by Instructor:** [29]

The Instructor is an educational technology company and developed Canvas learning management system. This LMS can compete with Desire2Learn [69], Blackboard Learning System [35], Moodle [23], and Sakai [30]. The instructor also developed Canvas Network [85] and a massive open online courses. Canvas network provides an open platform to instructors and institutions to share their expertise and institutional experience with the World. In this application a lot of features are working together to make teaching and learning more easier, some of them are listed below [64] [29].
features:

- Canvas app center
- Integrated Media Recorder
- Automated tasks
- Speed grader Annotations
- IOS and Android
- RSS Support
- Speed Grader
- Graphics Analytics Reporting Center
- Outcomes
- Notification preferences
- Ease of use
- User-customizable navigation
- Download and Upload Zip files
- etc

Here Graphic Analytics Reporting Center provides learner data into meaningful insights to improve teaching and learning. The Outcome feature connect each learning outcome to a specific goal, so results can be demonstrated in measurable ways. RSS Support pulls feeds from external sites into courses and push out secure feeds for all course activities.

8. Chamilo:[27]

Chamilo aims to provide the best e-learning and collaboration platform. It is available in two versions, those are Chamilo LMS and Chamilo LCMS but the second one is still under the development phase. The main objective of Chamilo Association are to protect and improve the e-learning and collaboration platform. The people from Chamilo saying that, The user-friendly in Chamilo is better than Moodle[23]. Also this application supports social networking feature and real-time-controlled exam. Chamilo is currently used by more than 3,550,000 students around the World. The list features related to version 1 are listed below[26]

features:

- Administration with SOAP web services
- SCORM and authoring tools
- Multi-institutions mode
- Time-controlled exams
- Embedded social learning network
- International characters (UTF-8)
- Automated generation of certificates
- Timezones
- Tracking of users progress
- etc

9. Fedena:[41][40]

Fedena is a multipurpose school management software in cloud to perform all processes in an institute, right from the admission of new students to generate transfer certificate, when the student completes the studies. It provides user-friendly dashboards with login access to all the teachers, non-teaching staff, parents and manage-
ment body of the respective institute. The list of different kind features provided by Fedena are listed below

**Core features:**

<table>
<thead>
<tr>
<th>Core features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courses and Batches</td>
</tr>
<tr>
<td>Timetable</td>
</tr>
<tr>
<td>Student Admission</td>
</tr>
<tr>
<td>School/Event Calendar</td>
</tr>
<tr>
<td>Employee/Teacher Login</td>
</tr>
<tr>
<td>SMS Alerts</td>
</tr>
<tr>
<td>etc</td>
</tr>
</tbody>
</table>

**Premium features:**

<table>
<thead>
<tr>
<th>Premium features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hostel/Dormitory</td>
</tr>
<tr>
<td>Transportation</td>
</tr>
<tr>
<td>Placement</td>
</tr>
<tr>
<td>Instant Fee</td>
</tr>
<tr>
<td>Blog</td>
</tr>
<tr>
<td>Color Theme</td>
</tr>
<tr>
<td>Disciplinary</td>
</tr>
<tr>
<td>Data Import</td>
</tr>
<tr>
<td>etc</td>
</tr>
</tbody>
</table>

**Integrations with Fedena:**

<table>
<thead>
<tr>
<th>Integrations with Fedena</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Conference</td>
</tr>
<tr>
<td>Google Apps</td>
</tr>
<tr>
<td>Moodle</td>
</tr>
<tr>
<td>Tally</td>
</tr>
<tr>
<td>Payment Gateway</td>
</tr>
</tbody>
</table>

10. **ILIAS:**

ILIAS stands for "Integrated Learning, Information and Work Cooperation System" and was the first Open Source LMS that has been certified as SCORM 1.2 and SCORM 2004 compliant. The main aim of this application is to offer flexible environment for learning and working online with the integrated tools. ILIAS offers a lot of features which are listed below.
features to support personal desktop:

- Listing of selected courses
- Personal Notes
- Personal Workspace
- Calendar
- Personal profile
- External Web Feeds
- Blogs
- Internal Mail
- Bookmark Management
- Internal News
- e-Portfolio
- Personal Learning Progress

features for Learning Content Management and Course Management:

<table>
<thead>
<tr>
<th>Learning Content Management</th>
<th>Course Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Categories</td>
<td>• Enrolment Settings</td>
</tr>
<tr>
<td>• Courses incl. member administration</td>
<td>• Learning Resource Management</td>
</tr>
<tr>
<td>• Groups incl. member administration</td>
<td>• Time triggered/Conditional Access</td>
</tr>
<tr>
<td>• Folders (within courses and groups)</td>
<td>• Learning Progress Tracking for Members</td>
</tr>
<tr>
<td></td>
<td>• Member Gallery and (Google) Map</td>
</tr>
<tr>
<td></td>
<td>• Course News and Announcements</td>
</tr>
</tbody>
</table>

features for Cooperation and Communication:

<table>
<thead>
<tr>
<th>Cooperation</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Group Management</td>
<td>• Internal Messaging</td>
</tr>
<tr>
<td>• Awareness Feature (who is online?)</td>
<td>• Chat</td>
</tr>
<tr>
<td>• vCard Export</td>
<td>• Forum</td>
</tr>
<tr>
<td>• File Sharing</td>
<td>• Podcasting</td>
</tr>
<tr>
<td>• Wiki</td>
<td>• Podcasting</td>
</tr>
<tr>
<td></td>
<td>• Etherpad / Edupad plugin</td>
</tr>
</tbody>
</table>

features for Test/Assessment and Evaluations:

<table>
<thead>
<tr>
<th>Test/Assessment</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Question Types: Multiple choice, fill-in-the-blanks, numerical, matching, ordering, hot spot, essay</td>
<td>• Personalised and anonymous surveys</td>
</tr>
<tr>
<td>• Question Pools for re-using questions in different tests</td>
<td>• Question types: Multiple choice, matrix, open answer</td>
</tr>
<tr>
<td>• Randomization of questions and choices</td>
<td>• Pools for question administration and re-use</td>
</tr>
<tr>
<td>• IMS-QTI Import and Export</td>
<td>• Online report analysis</td>
</tr>
<tr>
<td>• Online exams</td>
<td>• CSV and excel export of survey results</td>
</tr>
<tr>
<td>• Learning progress control</td>
<td>• etc</td>
</tr>
</tbody>
</table>
features for Learning Content / Authoring and Administration:

<table>
<thead>
<tr>
<th>Learning Content / Authoring</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• XML-based learning document format, exports to HTML, XML and SCORM</td>
<td>• Role administration (global roles, local roles, role templates)</td>
</tr>
<tr>
<td>• SCORM 1.2 (Certified for SCORM-Conformance Level LMS-RTE3)</td>
<td>• User administration</td>
</tr>
<tr>
<td>• SCORM 2004 (Certified as LMS for SCORM 2004 3rd Edition)</td>
<td>• Authentication CAS, LDAP, SOAP, RADIUS and Shibboleth</td>
</tr>
<tr>
<td>• AICC</td>
<td>• Individual layout templates / skins</td>
</tr>
<tr>
<td>• OpenOffice.org and LibreOffice Import Tool (eLAIX)</td>
<td>• Support for multiple clients</td>
</tr>
<tr>
<td>• LaTeX-Support</td>
<td>• PayPal payment</td>
</tr>
<tr>
<td>• HTML Site Import</td>
<td>• Didactic templates</td>
</tr>
<tr>
<td>• Wiki</td>
<td>• SOAP Interface</td>
</tr>
<tr>
<td>• File Management (all formats)</td>
<td>• Statistics and learning progress administration</td>
</tr>
</tbody>
</table>

11. **OLAT:**[17]

OLAT stands for ”Online Learning And Training” and is an open learning management system to support higher education sector in order to develop portfolio of products and services in support of teaching, learning and assessment. This application is a course based LMS and provides several features to integrate the learning content into a course. Some of the features of this application are listed below[8]

features:

- • Content managing
- • Different kind of quizzes
- • Podcast
- • Submission module
- • Scalability: runs as cluster
- • Forums
- • Wikis
- • Surveys
- • Grading module
- • Multi-language support
- • File discussions
- • Blogs
- • Chat
- • Time marker for video data
- • OLAT integrates the instant messaging system

12. **Totara LMS:**[20]

Totara LMS is a custom distribution of Moodle and more focused on the requirements of the corporate sector and work based learning. The list of features are listed below[9].
### Features:

<table>
<thead>
<tr>
<th>LMS Features</th>
<th>CLAROLINE Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cloud Technology and Mobile features</td>
<td>• Writing a course description</td>
</tr>
<tr>
<td>• Supports SCORM 1.2, AICC, OLSA</td>
<td>• Publishing documents and files accessible</td>
</tr>
<tr>
<td>• Immediate loading of any file</td>
<td>• Building a learning path</td>
</tr>
<tr>
<td>• 14 languages are supported</td>
<td>• Creating exercises</td>
</tr>
<tr>
<td>• Individual development plans</td>
<td>• Publishing announcements</td>
</tr>
<tr>
<td>• Classroom management</td>
<td>• Collaborating with the wiki</td>
</tr>
<tr>
<td>• Enhanced search</td>
<td>• etc</td>
</tr>
<tr>
<td>• Interfaces with HR and ERP applications and authentication systems such as LDAP and Active Directory</td>
<td></td>
</tr>
<tr>
<td>• Team management</td>
<td></td>
</tr>
<tr>
<td>• Competency management</td>
<td></td>
</tr>
<tr>
<td>• Learning paths</td>
<td></td>
</tr>
<tr>
<td>• Sophisticated reporting</td>
<td></td>
</tr>
<tr>
<td>• Program management</td>
<td></td>
</tr>
<tr>
<td>• Open Badges</td>
<td></td>
</tr>
<tr>
<td>• etc</td>
<td></td>
</tr>
</tbody>
</table>

13. **Claroline:**

Claroline is a collaborative e-learning platform. It released under the GPL open source. Some list of features are listed below.

### Features:

<table>
<thead>
<tr>
<th>LMS Features</th>
<th>CLAROLINE Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Writing a course description</td>
<td>• Writing a course description</td>
</tr>
<tr>
<td>• Administrate public or private forums</td>
<td>• Publishing documents and files accessible</td>
</tr>
<tr>
<td>• Organizing group working</td>
<td>• Building a learning path</td>
</tr>
<tr>
<td>• Informing through the agenda</td>
<td>• Creating exercises</td>
</tr>
<tr>
<td>• Managing assignments</td>
<td>• Publishing announcements</td>
</tr>
<tr>
<td>• Check the statistics of attendance and completion exercises</td>
<td>• Collaborating with the wiki</td>
</tr>
<tr>
<td>• etc</td>
<td>• etc</td>
</tr>
</tbody>
</table>

#### 2.2.2 Proprietary LMSs and their features

Proprietary learning management system is the one that is licensed for a fee for use by an Organisation or an educational institute. Unlike the open source LMSs, the support from the vendor always available for get up and running. Rich documentation provided for the admin staff and users and vendor is accountable for service, updates and support. On the other hand, other proprietary software may require to build a complete system. Customization is not possible with out the vendors presence. Also, these systems are lack of APIs and connectability.

1. **Blackboard Learning System:**

The Blackboard Learning System is web-based server software which contains the features course management system, customizable open architecture, and scalable
design that allows integration with student information systems and authentication
protocols. The main aim of the this application is to develop completely online courses
with few or no face-to-face meetings which were existed in traditional methods. Some
features of this application is listed below[35].

features:

<table>
<thead>
<tr>
<th>Announcements</th>
<th>Chat</th>
<th>Discussions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mail</td>
<td>Course content</td>
<td>Calendar</td>
</tr>
<tr>
<td>Learning modules</td>
<td>Assessments</td>
<td>Assignments</td>
</tr>
<tr>
<td>Grade Book</td>
<td>Media Library</td>
<td>Tracking</td>
</tr>
</tbody>
</table>

2. Desire2Learn:[69]

Desire2Learn is a global leader in cloud(SaaS) learning solutions and providing open
platform to higher education in different sectors. They mostly concentrated on learner
success, creativity, passion and collaboration. Some features are listed below[68]
features:

<table>
<thead>
<tr>
<th>Desire2Learn Learning Environment</th>
<th>Desire2Learn ePortfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desire2Learn Insights</td>
<td>Desire2Learn Learning Repository</td>
</tr>
<tr>
<td>Desire2Learn Campus Life</td>
<td>Desire2Learn Assignment Grader</td>
</tr>
<tr>
<td>Desire2Learn Capture</td>
<td>Global Services</td>
</tr>
</tbody>
</table>

3. eCollege:[76]

Pearson eCollege is a Software as a service provider of e-learning software. Some of
the features of this application is listed below[75].

features:

<table>
<thead>
<tr>
<th>Course management system</th>
<th>Content management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program administration system</td>
<td>IT infrastructure</td>
</tr>
<tr>
<td>Support services</td>
<td>Digital portfolio</td>
</tr>
<tr>
<td>Live video conferencing</td>
<td>etc</td>
</tr>
</tbody>
</table>

Digital Portfolio[6]: Digital portfolio is a collection of evidence together and man-
aged by a user and its includes inputted text, electronic files, images, multimedia,
blog entries and hyperlinks. They demonstrates the user abilities and platform for self expression.
4. **Edmodo:**

Edmodo is a social learning platform for teachers, students and parents. It is also thought as the Facebook of schools by students and teachers. This application also offers that connect with students and help them to understand how online actions will be interpreted. Some of the features of this application is listed below.

**features:**

- Posting assignments
- Embedding video clips
- Post a quiz
- Upload assignments
- Parent access of their pupil account
- Polls for student responses
- Create learning groups
- Create a calendar of events
- Grading system
- Alerts to parents

5. **GlobalScholar:**

This application supports a lot of products related to education and its includes like ERP-enterprise resource planning software solutions and pinnacle suite. Some of the features are listed below.

**features:**

- One-on-one tutoring
- Administration
- Schedules
- Custom grade levels
- homework help or self-paced learning
- Student-centered approach
- Common Core standards
- etc

6. **Informetica:**

Informatica is a learning content management system designed for corporate and government organizations. And this application follows the SCORM standards. Some of the features are listed below.

---

26
features:

| Online reporting and tracking | Meeting Room (chat) |
| Document Share and Online Revisions | WYSIWYG and HTML source editing |
| Extensive file, audio and video upload compatible | AICC and SCORM compliant |
| Time restrained activities | Superior virus protection and data back-up practices |
| Certification issuing and monitoring | six different question formats |
| Skills assessment tools and surveys | Assign different access rights for different users |
| Customizable templates and branding | Optional E-mail utility |
| Optional Webinar and GoToMeeting functions | etc |

7. JoomlaLMS: [31]

JoomlaLMS is a component of Joomla Web Content Management System. It can enable users to create native LMS courses and import SCORM 1.2 [72] and SCORM 2004 courses. Some of the features are listed below [31] [32].

features:

| Creating Online Courses | Forums | Certificates |
| Navigations | Suscription Plans | Payment Plugins |
| Free courses | Promo Codes | Quizzes |
| Final Exams | Student Manager | Quiz Tracking |
| Documents management | Authoring-tools, Quiz Maker | Live conference tool |
| Learning Paths | GradeBook to store grades | Course Statistics |

8. My Big Campus: [38]

This application has an interface like Facebook and it helps to connect together a lot of students and teachers. It offers blended learning to schools to engage on online environment. The collaborative tools are used to connect all the students and teachers so that, the learning environment can be improved up to some extent. Some of the features of this application is listed below [37].
features:

- Educational Resource Library
- Threaded discussions
- File storage in the cloud
- Messaging system
- Calendars with flexible events
- Authenticated user access
- Quick Links to top content
- YouTube videos stripped of peripheral content
- Assignments (view, complete, submit)
- File uploads with virus scanning
- Image uploads with skin-tone analysis
- CIPA-compliant filtering
- Profanity interception
- etc

9. Ning (website):[39]

Ning is an online platform to create social networks. Ning offers customers to create community websites with customization and features such as photos, forums, videos and blogs. The central feature of this application is that anyone can create their own social network for their needs. So, one can create a social network that supports their academic needs and can run it successfully. The Ning community can be integrated with online services like Facebook, Twitter and Google and people can login with their respective accounts of Facebook, Twitter and Google. The source code of the application can be available to the user and then he/she can do modifications and can run the application their own.

10. Sclipo:[45]

Sclipo was the LMS and which offers a fully hosted online campus solution with web applications that support face-to-face and distance education. This project have closed at the end of the 2012. It offers web applications to learn, teach, socialize, administer, promote and sell face to face, content and online education. Some features are listed below.[45]

features:

- Course Manager
- Learning Path
- Private Personal Profile
- Customize the Look & Feel
- Promotions and eCommerce
- Library and Virtual Classroom
- Content in Multiple Formats
- Social Applications
- Privacy Levels of Activities
- Live Sessions
- Discussion Forum
- Desktop Sharing
- Administration
- Content Sharing
- etc

11. Glow (Scottish Schools National Intranet):[49]

This application is managed by Education Scotland and is a collaboration of local authorities, Education Scotland and RM Education. This is a web-delivered and
browser based application and enables access to every place where the internet can access. Some of the features are listed below.

features:

- Glow Meet-Webconferencing
- Glow Forums
- Glow Chat
- Glow Mail
- Glow Groups
- Document Stores
- Glow Blogs
- Glow Wikis
- Glow Messenger
- Glow Learn- VLE
- Discussion Boards
- etc

12. SharePointLMS:

SharePointLMS is a LMS which is based on Microsoft Office SharePoint Server 2007 & WSS3.0 platform and ”.Net-based” application. This application aims at scalability, reliability and security. It is a SCORM 1.2 compliant then user can i import courses of respective types. Some of the features are listed below.

features:

- Advanced documents management tool
- Live conference Tool- VLE
- GradeBook to record the grades
- Blackboard Converter users of Blackboard
- Authoring tools - quiz maker
- Learning Paths
- Course Statistics
- etc

2.2.3 Conclusion of feature-based survey

After gone through various LMSs and MOOCs I considered some of the features which will helps to enhance the edX. One of the problem with this system is that It is all still distance learning process only. So, a lot of aspects are affecting the throughput of the entire learning system. Standford University studied about how the students participates in e-learning and they came up with the four categories of students as mentioned earlier in the Chapter 1. The categories and the respective analytics related to them are presenting in the following Figure 2.2 (taken from the website - [65])

29
Here, we can see that the completion rates for all levels of students are very low but the main aim of e-learning system is to provide quality education all over the World. But still the dropout rate is very high. One of the problem is that users with lack of motivation and interest to the e-learning and the courses. By managing these kind of problems through correct solutions, the e-learning system can be improved hence successful completion rate can be increased. I presented a set of considerable features below. Some of them can be implemented and some of them are need to be enhanced in edX-MOOC.

<table>
<thead>
<tr>
<th>Course</th>
<th>Auditing</th>
<th>Completing</th>
<th>Disengaging</th>
<th>Sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school</td>
<td>6%</td>
<td>27%</td>
<td>28%</td>
<td>39%</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>6%</td>
<td>8%</td>
<td>12%</td>
<td>74%</td>
</tr>
<tr>
<td>Graduate</td>
<td>9%</td>
<td>5%</td>
<td>6%</td>
<td>80%</td>
</tr>
</tbody>
</table>

2.3 Adaptation of Learning Styles into a LMS

Learning style is one’s learning preference and it conveys that how a learner does like to learn. Generally everybody has their own learning style which differs from others. The main use of the learning style in educational organisations is that the teachers can assess the learning styles of their students and then they can adapt the class room methods to suit each and every student learning style. The general learning styles can be classified as visual, auditory and kinesthetic/tactile. Auditory type learners prefers readings to learn something, visual type learners prefers more like diagrammatic representations, maps and pictures to learn something and kinaesthetic/tactile type learners learns from listening and talking. So many learning style models are proposed by different authors and they came up with different classifications of students based on their learning styles and some of them are given below. Because of the lack of face to face real interactions and suitability of learning style of learner, the successful completion rate of a course are very low. To explain such
things the learners can be divided into 4 categories and are as follows.

1. **Sampling**: The learners belong to this class, just checks things out and try to know what's going on roughly.

2. **Auditing**: These learners are not engaged with the complete course but completes some of the content.

3. **Disengaging**: The learners who start normally and then fall away.

4. **Completing**: The learners who engages through the course and completes successfully.

### 2.3.1 Learning Style Models

1. **David Kolbs model**:

   David Kolbs is an American educational theorist and he proposed a process called *experiential learning* which is a process of learning from experience. The abilities required to learn from the experience are listed below.

   - The learner must be willing to be actively involved in the experience.
   - The learner must be able to reflect on the experience.
   - The learner must possess and use analytical skills to conceptualize the experience.
   - The learner must possess decision making and problem solving skills in order to use the new ideas gained from the experience.

![Figure 2.3: Learning styles classification of Kolbs model](image)

Figure 2.3: Learning styles classification of Kolbs model
Based on the experimental learning theory, he classified the learning process of students into four classes. To get the learning to be effective these four models need to be incorporated. The learners attempt to use all these approaches and the learning style models are as follows.

- **Converger**: These kind of learners are classified by abstract conceptualization and active experimentation. They are good at making practical applications and uses deductive reasoning to solve problems.

- **Diverger**: These are classified by concrete experience and reflective observation. They are good at imagination and come up with new ideas.

- **Assimilator**: These are classified based on abstract conceptualization and reflective observation. They are good at inductive reasoning and creating theoretical models.

- **Accommodator**: These are classified based on concrete experience and active experimentation. They learn by doing things and engaging with others actively.

2. **The Felder-Silverman Learning model**: [12][16]

The Felder-Silverman model classifies the students in different ways as by hearing and seeing, by reflecting and acting, by reasoning logically or intuitively, by memorizing and visualizing pictures. They identified that the learning process in an educational system is a two step procedure which contains reception and processing of information as steps. In the first, external and internal information will available to the learners and in the second step reasoning and memorization will be happened. Then, they came up with the following classification of four classes of learners.

- **Sensing Learners/Intuitive learners:**

  **Related information about both learners:**

<table>
<thead>
<tr>
<th>Sensing Learners</th>
<th>Intuitive Learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Like to learn facts</td>
<td>• Like to discover possibilities and relationships</td>
</tr>
<tr>
<td>• Solves problems by well established methods</td>
<td>• Likes innovation and dislikes repetition</td>
</tr>
<tr>
<td>• Patient with details and good at memorization</td>
<td>• Good at grasping new concepts</td>
</tr>
<tr>
<td>• More practical and careful</td>
<td>• Work faster and innovative</td>
</tr>
<tr>
<td>• Do things which are related to real World</td>
<td>• Do not like things which has memorization needs</td>
</tr>
</tbody>
</table>
• **Visual Learners/Verbal learners:**

The visual learners remember the things best by watching pictures, diagrams, flow, films and demonstrations and the verbal learners learns more from written and spoken explanations.

• **Active Learners/Reflective learners:**


<table>
<thead>
<tr>
<th>Active Learners</th>
<th>Reflective Learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Learn by doing something active with it</td>
<td>• Prefer to think about it firstly</td>
</tr>
<tr>
<td>• Study in a group</td>
<td>• Prefer to work alone</td>
</tr>
<tr>
<td>• Always retain information better</td>
<td>• Thinks about new information</td>
</tr>
<tr>
<td>• Problem solving activities</td>
<td>• Write short summaries of readings</td>
</tr>
</tbody>
</table>

• **Sequential Learners/Global learners:**


<table>
<thead>
<tr>
<th>Sequential Learners</th>
<th>Global Learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>• They try to understand things in sequential steps</td>
<td>• Learn in large jumps without seeing connections</td>
</tr>
<tr>
<td>• Follows logical stepwise paths in finding solutions</td>
<td>• They solve the problem quickly by getting big picture and grouping all the data but they will fail to explain how they did it.</td>
</tr>
</tbody>
</table>

3. **Neil Flemings VAK/VARK model:**

The classification of students based on their learning styles are given below.

(a) Visual learners: think in pictures; visual aids such as overhead slides, diagrams, handouts, etc.

(b) Auditory learners: lectures, discussions, tapes, etc.

(c) Reading-writing preference learners: by reading and writing.

(d) Kinaesthetic learners or tactile learners: active exploration of the world; science projects; experiments, etc.

2.3.2 Conclusion of the learning styles

I found that three common categories of learning styles of students. I am not concluding from the above models, I found these kind of people in my educational career and these styles may be found in a MOOC systems also.
1. **Visual learners:** The one who learns from pictorial representations and visual things. They like attend lectures to learn mostly.

2. **Reading-writing preference learners:** The one who learns from reading a lot of materials only. They do not like to attend lectures.

3. **Experimental learners:** The one who learns from by doing something like attempting assignments without looking at the predefined materials and multimedia files. These learners need to have predefined knowledge to attempt the assignments.

### 2.4 Proposed approach for adaption of learning styles into edX

**Finding Learning Style:** First, we have to find the learner’s learning style among the above three styles. Based on the learner’s learning style the course will be offered. So the question is how to find the learning styles. We can find one’s learning style by providing Learning Styles Questionnaire at the time of registration of the course. These Questionnaire includes a set of questions along with multiple answers. Based on the students responses, we can classify them easily. The student can skip the Learning Styles Questionnaire and can opt for a course called common course which is the basic one.

We will create each course in four times instead of one and four are different from each other. The entire reading materials, multimedia files, assignments, and etc will be provided open for all the students in a repository of MOOC system and any user of the system can access them. This facility is because of when a learner face any difficulty with offered course then he can find the related information in the repository. The final exam will be common to all kind of students. A typical diagrammatic representation of the course creation is shown in the following Figure [2.4]

![Figure 2.4: The Course creation with learning styles](image)

1. **CS101 Visual:** This course includes pictures, overhead slides, diagrams, handouts, video lectures and etc.
2. **CS101_Read/Write**: This course includes all reading materials, online reading links and reference textbook names and etc.

3. **CS101_Experimental**: This course includes assignments, previous exam papers and exercises with different problems and etc.

4. **CS101_Common**: This course will includes everything from the above all three courses. Generally it is a basic one from the traditional classroom methods.

We read some online Learning Styles Questionnaire like [15] and still we will exploring to come up with good Learning Styles Questionnaire which will suits our learning styles. Then we will try to implement them in edX-MOOC and our blended learning model which will be discussed in later chapters.
Chapter 3

edX

edX is a non-profit organization which is founded by the collaboration of Harvard and MIT. It is an open source platform (AGPLv3 licence) to build MOOC with advanced features to make the online education more effective than the traditional classroom methods. edX is developed based on a python web framework called Django Framework[47]. This platform provides an easy and effective way to opt the online courses. This system includes two types of users and those are learners and instructors. This system also offers the provision of certificates in two ways that the first one is proctored and second one is honoured. The assessment strategies which are offered by this system are peer assessment, staff assessment, instructor assessment and AI assessment. Also one can perform analytics based on the collected data to upgrade the system.

The edX-MOOC involves the usage of languages of Python, Ruby, Perl, NodeJS and involves both relational and non-relational database. The database system used by the system is MongoDB and SQLite. MongoDB is used to store the course information and SQLite is used to store the user data.

3.1 Standard features of edX

1. Interactive video lectures which can be downloadable, with subtitles and indexing on subtitles.
2. Upload and download of files with different formats
3. Online quizzes of different types like video embedded quiz and final tests, etc.
4. Virtual Laboratory which supports interactive interface and provides simulation.
5. Calendar based schedule.
6. Multi-lingual support.
7. Discussion forums.
8. Wiki edits for collaborative learning.
9. Progress reports and analytics (barcharts, etc)
10. Different type of assessment systems for submitted assignments (open response questions). The types of assessments are
   (a) Peer Grading
   (b) Self Grading
   (c) Staff grading
   (d) Machine grading
11. Emails and Notifications for users of edX.
12. Provision of certificates in two ways. They are proctored and honour.
13. Registering and deregistering facilities for a course.
14. edX meet-ups - online conferences.
15. Author contacts are available for mailing.
16. Support for a large traffic at a particular time.

3.2 Modules of edX-MOOC

In order to build a complete MOOC system to provide an enhanced online learning, there are other modules developed along with LMS and CMS which are developed independently and integrated with edX-platform later. These other modules are classified into two classes namely “Main Modules” and “Extra Modules”. The main modules are compulsory to the edX-platform and they have to integrate to get basic functionality, and the extra modules are needed to enhance the functionality of the whole system. The following sections will explain these modules by their functionality.

3.2.1 Main Modules of edX-MOOC

The main modules of the edX-MOOC system are listed in the following Figure. It includes the main important module edX-platform, edx-ORA, xqueue, xserver, codejail and cs_comment_service. As the edX-MOOC is an open source and it is available on Github website which is a version control system. These all modules can be accessed on Github can be contributed to enhance the edX-MOOC. But one should know all the technologies that are used in edX development and Django Framework well to work with edX-MOOC.
1. **edX-platform**: This is the main module of the edX-MOOC system and it contains the LMS and CMS to form a basic and initial system\[11\]. One has to install this module at the beginning stage and then integrate the remaining modules which are required to form a complete system.

2. **cs_comments_service**: The functionality of this module is to provide the discussion forums for the users. Also, users can vote for a post and nested commenting services also supported by this module.

3. **codejail**: To protect the system from external users, this module provides security by creating a sandbox which executes the untrusted code from the users.

4. **xqueue**: This module provides an interface between the LMS and external grading system.

5. **xserver**: This module accepts the code from the users of LMS and execute them by using courseware graders.

6. **edX-ORA**: ORA stands for “open response assessor” and allows peer, instructor, and AI assessment of problems on the edX-platform.

### 3.2.2 Extra Modules of edX-MOOC

The extra modules are developed to enhance the online learning process and to build a complete edX-MOOC system. This class of modules includes EASE, discern, djeventstream, edxanalytics, ed-insights and loghandlersplus\[54\]. The following Figure 3.2 represents the extra modules of the edX-MOOC system.
1. **ed-insights:** It is a framework for development of analytics platform.

2. **edxanalytics:** This module is a analytics platform which has built based on the ed-insights module. This application performs the analytics on the edX data and generates meaningful statistics.

3. **discern:** This is an extra module to provide the service of grade arbitrary free text responses from the system.

4. **ease:** EASE stands for enhanced AI scoring engine. This module is used in machine grading of the open response answers.

5. **loghandlersplus:** This module is needed to provide functions on log file from the LMS to provide it to edxanalytics module.

6. **djeventstream:** This module takes the log events from the loghandlersplus module and generates appropriate Django signals for the edxanalytics.

7. **xblock:** This module will be included in the system and is used for provides a component architecture for building coursewares.

Apart from the above mentioned modules, there are other modules presented on the Github website which are under development stage.

### 3.3 edX-platform and its Components

The edX-platform is the main module in edX-MOOC and it contains two different main components called LMS and CMS. LMS stands for learning management system and CMS
stands for course management system. The LMS offers an interface to the students to opt the courses and CMS offers the interface to instructors to create courses and manage. The following Figure 3.3 (taken from the website - [59]) shows the main components of the edX-platform.

![Main components of edX-platform](image)

**Figure 3.3: Main components of edX-platform**

### 3.3.1 LMS

LMS is basically providing an interface to the learners to register and to opt the different kind of courses. This has also been build based on the Django framework. I am presenting some pictures that are taken from the LMS of edX-platform.

1. The following Figure 3.4 is the home page of edX-platform LMS. As you can see in the figure, one can register to opt the courses. The logos presented at the bottom of the figure are of different educational institutes and leads to their respective websites.

![Home page of edX-platform LMS](image)

**Figure 3.4: Home page of edX-platform LMS**

2. The following Figure 3.5 shows dashboard after the student opted a course. As you can see in the figure, one can view the course or can change the credentials of the account.

![Dashboard of edX-platform LMS](image)
3. The following Figure 3.7 shows the different links on top of the picture which are Courseware, Course info, Discussion, Wiki, Progress, Syllabus/Textbooks, Schedule and Resources. But here, Discussion module is installed successfully as a standalone application and need to be integrated with edX-Platform.

Some features of edX-platform LMS:

<table>
<thead>
<tr>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-paced learning</td>
</tr>
<tr>
<td>Online Test and assignments</td>
</tr>
<tr>
<td>Subtitles of videos</td>
</tr>
<tr>
<td>Search</td>
</tr>
<tr>
<td>Activation emails</td>
</tr>
<tr>
<td>No of students enrolled in a course</td>
</tr>
<tr>
<td>Online discussion groups</td>
</tr>
<tr>
<td>Circuit schematic builder</td>
</tr>
<tr>
<td>Saved sessions</td>
</tr>
<tr>
<td>Registering and unregistering of the courses</td>
</tr>
<tr>
<td>Essay Assessments</td>
</tr>
<tr>
<td>Recommended courses</td>
</tr>
</tbody>
</table>

Figure 3.5: Dashboard of a student after opted the course

Figure 3.6: Information of a course to the student
3.3.2 CMS - Studio

The CMS stands for Course Management System and allows the instructor to create the course. It is providing various features to the instructor to add various contents in created course. The following Figure 3.7 shows the interface of CMS-Studio to the instructor.

![CMS-Studio Interface](image)

**Figure 3.7: Information of a course to the student**

Some features of CMS-Studio:

- Adding Videos
- Import & Export Course
- Live View & Preview
- Course Updates
- Creating Assignments
- Add Course Team
- Adding Grading Policy
- Uploading Static Pages

One can upload a transcript file along with the video lectures. The assignments can be created in several formats which are *open response, multiple choice response, checkbox response, string response, numerical response, formula response, image response, custom response and schematic response.*
Chapter 4

Blended Learning - MOOC Model of IIT Bombay

Motivation: The main aim of this model is to provide a better education to universities and university affiliated colleges where the quality education is not available. To explain the problem of traditional classroom methods in some educational environments, I am presenting myself as an example here as follows. I completed my B.Tech from a college namely JNTU vizianagaram campus affiliation under JNTU Kakinada(Andhra Pradesh). What happened with me when I was in the first year of my B.Tech, I had to opt for a course called computer programming. So, my instructor for that course was a person who had just completed his B.Tech and joined as a faculty member in my college. He did not have any experience in teaching methods and good knowledge in that course too. I had to follow his all lectures throughout the semester and ended up with a little learning and bad credits. So, later I learned the programming from the online readings, online video lectures and etc with the help of web.

Our aim is to providing a quality education to such kind of educational environments through our Blended Learning - MOOC Model of IIT Bombay. The detailed paper on this model is awaited. The approach that we follow, related architectural and technical issues, and other information are given below in later sections.

4.1 Introduction to Blended Learning

Blended learning is a learning process that is facilitated by the effective combination of different modes of delivery, models of teaching styles of learning and applying them in an interactive meaningful learning environment. The model of blended learning brings together of online and face-to-face classroom components. Different learning problems require different solutions as each learner has a unique learning style and unique requirement which we presented in the Chapter 4(Related Work and Literature Survey). Here, the modes of delivery includes two kinds that face-to-face learning and online learning. Online learning
may includes mobile learning along with the e-learning. The blended learning mostly depends on analysis of the learners requirements, the level of understanding, the nature and location of the learners and resources available. The blended learning changed the way of learning activities like perceiving and delivering the information. The advantages of this model is that the passive learning environment will become an active learning environment. It brings learners together along with instructors to support collaborative learning through interactive content which will create high interest, accountability and real assessment. Even corporate bodies are moving from classroom training to blended learning because of the benefits of costs and savings, optimizing resources, scale, speed and throughput. This application has implemented in University in Botswana, University of Central Florida, University of Salford, Charles Strut University and etc. The advances in technology will have an impact on emerging models of blended learning. Consider the following Figure 4.1 as a representation of basic blended learning model.

![Blended Learning Model](image)

Figure 4.1: The Blended Learning Model

4.2 Blended Learning - MOOC Model of IIT Bombay

Blended learning refers to any time students learns, at least in part, at a brick-and-mortar facility and through online delivery with student control over time, place, path, or pace. The IIT Bombay may offer two kinds MOOCs in the coming year(2014) as shown in the following Figure 4.2. The first one is general MOOC system which is like the rest of edX-MOOCs and open for all over the World. The second one is our Blended Learning - MOOC Model of IIT Bombay and the main aim of this system is to offer quality education in Indian universities and university affiliated colleges to improve the learning of individual learner in India through our model with the help of edX and later we will look for the worldwide adaption with a proposal of our model to MIT and Harvard people who developed the edX-MOOC.
4.2.1 Detailed explanation of our Model

The successful completion rate in e-learning industry is around 5% of the whole participants. This happens because of the lack of motivation and interest as there will be no supervision. The question we got is *How to improve the throughput of elearning environment?* in terms of successful completion rate. Then we come up with this model as one of the solution to the mentioned problem. I am explaining the process of sequential steps as below. We are considering this method as a new kind of education system in the World and we believe that there is no existence for such kind of method on the Earth. The course offering in India from IIT Bombay will be happened after a successful implementation and deployment of our model at IIT Bombay.

**Blended Learning - MOOC Model of IIT Bombay:**

1. Prof. Deepak B. Phatak will offer a course namely CS101-Computer Programming and Utilization from IIT Bombay.

2. We will approach the respective universities and university affiliated colleges in India with our proposal.

3. The proposal includes that the students in that universities and university affiliated colleges should opt for this course instead of local offering course and it is mandatory to each and every student under the predefined terms of conditions.

4. Agreed universities will get the approval to opt the course by their students and provision of certification by IIT Bombay.

5. Now it is the time to train the instructors of respective agreed universities and university affiliated colleges by the *Super-instructor* - Prof. Deepak B. Phatak.

6. We will select some places in India based on a poll from all instructors and their convenience. We will conduct the face-to-face(brick-and-mortar) method to well train the instructors. This may include activities like introduction to Unix OS, programming tutorials, grading system and etc.
7. The entire information related to the course will be provided as e-documents and multimedia files by IIT Bombay only. This will save up to 70% of the instructors of respective colleges and this time will be utilized effectively to meet each student in person by the instructor. The respective instructor does not need to prepare the materials and other things for every day classes.

8. Assignments, quizzes, final exams and Lab work also will be conducted by IIT Bombay under supervision of local instructors. For these activities the respective colleges should have a predefined Computer Laboratory because most of the students may not effort the cost a personal computer.

9. The grading system will play an important role in Assignments. Prof. Deepak B. Phatak followed an approach for 3 years when he offered the course re CS101-Computer Programming and Utilization called peer to peer evolution and we are going to implement this method in our model.

10. In peer to peer evaluation, students will grade themselves first and also graded by other selected students. Finally they will be graded by local instructors while communicating with them face-to-face and it is a different from the traditional classroom method called viva.

11. 20% of the total marks will be given by the local instructor and graded using peer to peer method which is mentioned above. Remaining 80% of the marks will be given by IIT Bombay only.

12. After the completion of final exams, the correction and grading process will be done at same places where the local instructors would be trained or it may happen with the help of an online grading system.

13. After the successful completion of the grading process, the grades and statistics will be sent to respective colleges and these grades will be considered in the students transcripts.

4.2.2 Advantages and challenges of our model

Advantages of our model:

1. Elimination of duplicate work of local instructors.

2. Local instructors will spend more time with students face-to-face in person to improve the student learning.

3. A better training from the Super-instructor to local instructors because some of local instructors may less confident about teaching methods and other odds.

4. Better teaching from well established university - IIT Bombay to learners.
5. Better learning of each student when it compares with past learning.

6. Successful completion rate can be increased up to 99% because it is mandatory for every one.

7. Minimum pass grade is guaranteed because of students may afraid of the standards of IIT Bombay.

**Challenges of our model:**

1. Does edX-MOOC supports our MOOC-model with a given hierarchy of different users or not ?

2. Architectural, Technical and Administration issues of our model with edX.

3. What database tables are need to be modified and what new tables need to be created in existing edX-MOOC ?

4. Agreement with different universities and their affiliated colleges.

5. Implementation, testing and deployment of our model.

6. Assurance of academic integrity

7. Automated grading.

**4.2.3 Levels of hierarchy in our model**

Generally private colleges are affiliated from any well established educational organization. So we are going to offer our CS101 course for such kind of self deemed universities. Then we can cover all the colleges under that particular deemed university. For example I certified for my under-graduation program from a university namely *JNTU Kakinada* and this university has more than hundred affiliated colleges. This university will gives the final exam paper of 80% to all those colleges[10]. What happens here, somebody is teaching somewhere but the final exam paper comes from somewhere. Here there no communication between the person who sets final exam paper and the respective students. So, they follow previous year papers on that course simply and they will pass with out a true learning. This may be called as *learning less examination passing* and it will effect the student career in badly.

I am the proof of a student from such kind of colleges. You may ask why you chose that college ? and did not you crack the JEE ? kind of questions, but I believe that every action is the result of sequential process i.e, it depends on so many things like family background and past followed education methods and etc. We are proposing our model to benefit each and every student who are willing to learn more. I am presenting our model as a diagrammatic representation in the following Figure[1][3]
Figure 4.3: A typical diagrammatic representation of our model with different levels
4.2.4 Conclusion of our Blended Learning Model

One can easily understand from the Figure 4.3 that how we will reach each and every student through our model. We are considering it as a new kind of methodology in educational history and also we believed that this kind of systems are not existed in the World yet. Still we have to explore a lot of things related to architectural and technical aspects along with Django Framework. The main question for us is Does the current edX-MOOC supports our model or not ? if not we have to enhance the edX system and the detailed paper on this model is awaited.
Chapter 5

Problem Statement

5.1 Motivation and Problem Statement

Motivation: The main aim of the edX-MOOC is to provide quality education all over the World where internet can be accessed. The edX is a new MOOC and still getting enhancement every day by the contribution of people from all over the World to offer better education. The dropout rate in e-learning industry is very high because of the lack of motivation and self interest of learners. To improve the successful completion rate in e-learning process, we came up with a new method of education called “Blended Learning - MOOC model of IIT Bombay”. If time permits us, we will consider the adaption of learning styles into General edX-MOOC system.

Problem Statement:


2. Integration of main modules and extra modules which are mentioned in the Chapter 3 (edX)with edX-platform to build a complete system. The modules are cs_comments_service, codejail, xqueue, xserver, edX-ORA, ed-insights, edxanalytics, discern, loghandler-splus, ease, djeventstream, xblock.

3. Adaption of learning styles into edX-MOOC.

4. Still, if time permits us after the completion of above 3 tasks, we will try to implement the following features(concluded from the Chapter 2) in edX-MOOC with the help of Django Framework and required technologies. The details about django framework is given below in the later sections. The features can be created as a django application and can be integrated with edX-platform.

features:

- Learning paths
- Better navigations
- Self paced learning
- Offline learning
- PowerPoint presentation authoring
- SMS alerts
- Mobile access
- Competency management
5.2 Introduction to Django Framework

Django is a high level python based web framework. With the help of few lines of code one can build a complex web applications. Django follows Model-View-Controller(MVC) and it is like Model-View-Template. The explanation of MVT is as follows.

- **Model:** Model is a python script file(model.py) and is responsible for creating database and user has to specify each table as a class with required attributes in `model.py` file.

- **View:** View contains the set of functions with its definitions which are called from `urls.py` file. Basically `url.py` contains set of urls requests by a user from the web browser and corresponding function call.

- **Template:** After obtaining required data from the database in order to give response to the web browser, the data is merged with related template and return to the web browser.

The following Figure 5.1 shows the architecture of the django framework.
5.2.1 Creation of an example application using Django Framework

When we create any application, we should take care about the following factors. They are 1) Isolation 2) Determinism 3) Similarity. The isolation says that the created application should be isolate from rest of the system because to avoid unknown dependencies. The Determinism is about dependency management. The similarity means that creating different virtual environments separate from the day to day work. The flow of information in django framework is shown in the Figure 5.2 First we have to create virtual environment to start any project in django and the procedure is as follows.
Procedure to create an application:

Step 1: Go to the home directory and execute the following commands.

```
home\$ mkdir tutorial
   \$ virtualenv ./tutorial/
   \$ ls tutorial

// there will be four folders as follows
bin include lib local
// bin has the isolated python version from the system.

tutorial\$ source bin/activate
```

Step 2: To start any project or application install Django first (version should be mentioned if required). So, create a text file called requirements.txt in the home folder of virtual environment. This file will include all dependencies of our application. This file will contains first line as "Django==1.5" to install Django Framework of version 1.5. Execute the following command.

```
```
\$ pip install -r requirements.txt
//pip is a package manager for python.

//And also you can specify the url of Django in the requirements.txt file as follows

http://www.djangoproject.com/m/releases/1.5/Django-1.5.tar.gz

Step 3: Time to create the new project follow the given commands

bin\$ django-admin.py startproject <project_name>

// consider the project name is "addressbook".

bin\$ ls
// the following files will be there.

_init_.py   settings.py   url.py   wsgi.py

//In my project I would like to create an application called "contacts" which will store the contacts of my friends. After that go to the settings in addressbook folder and edit it. change the following as given

\$ python manage.py startapp contacts
// It will have the following files

_init_.py   model.py   test.py   views.py

\$ nano addressbook/settings.py

DATABASES = {
    'default': {
        'ENGINE': 'django.db.backends.sqlite3',
        'NAME': 'addresses.db',
    }
}
Step 4: Create the model which will match with database in contacts. edit the models.py file add the models.

\$ nano contacts/models.py
   // Example model is given below

======================================================================
class Contact(models.Model):

    first_name = models.CharField(max_length=255)

    last_name = models.CharField(max_length=255)

    email = models.EmailField()

    def __str__(self):
       return self.first_name + " " + self.last_name

======================================================================

Now its time to synchronize added models with database using following command. It will ask for creating super-user.

\$ python manage.py syncdb

// Add the contacts to settings.py in addressbook as given below.

\$ nano addressbook/settings.py

INSTALLED_APPS = (  
    'django.contrib.auth',  
    'django.contrib.contenttypes',  
    'django.contrib.sessions',  
    'django.contrib.sites',  
    'django.contrib.messages',  
    'django.contrib.staticfiles',  
    # Uncomment the next line to enable the admin:  
    # 'django.contrib.admin',  
    # Uncomment the next line to enable admin documentation:  
    # 'django.contrib.admindocs',  

55
'contacts',

perform synchronization again.

\$ python manage.py syncdb

Step 5: We can interactive shell to interact with the code by following command

\$ python manage.py shell

// We can test our application to know how it works and for debugging purpose.

Step 6: Writing views which will contain the function definitions called from url.py file. Edit the view.py in contacts folder and write the required functions.

\$ nano contacts/views.py

class ContactListView(ListView):

    model = Contact
    template_name = 'contact_list.html'

class CreateContactView(CreateView):

    model = Contact
    template_name = 'edit_contact.html'

def get_success_url(self):
    return reverse('contacts-list')

// Using url.py, we are saying to the django that when you get a request, load the related python code and execute it. edit the url.py file and write the function definitions.

\$ nano addressbook/url.py
urlpatterns = patterns('',
    url(r'^$', contacts.views.ContactListView.as_view(), name='contacts-list'),
    url(r'^new$', contacts.views.CreateContactView.as_view(), name='contacts-new'),
)

Step 7: We need to create templates now. The example contact_list html is as follows

<h1>Contact!</h1>

<ul>
    {% for contact in object_list %}
    <li>{{ contact }}</li>
    {% endfor %}
</ul>

Step 8: Run this application as local by running the following command.

    \$ python manage.py runserver

    // Open the contacts in web browser with local host address 8000.
5.3 Integration Procedure for Modules of edX-MOOC

We tried to integrate a module called cs_comments_service. So I am presenting the procedure here. And we will give the remaining modules and their integration procedures in the stage.

Integration of cs_comments_service:

Step 1: Clone the cs_comments_service repository from the github using the command given below in the edx_all directory.

```
$ git clone https://github.com/edx/cs_comments_service.git
$ cd cs_comments_service/
```

Step 2: If you see a prompt asking "Do you wish to trust this .rvmrc file?", type "y". Any error like "Gemset cs_comments_service does not exist" run the following commands.

```
$ rvm gemset create cs_comments_service
$ rvm use 1.9.3@cs_comments_service
```

//Install the required packages using following command.

```
$ bundle install
```

// Creates database indexes by following command

```
$ bundle exec rake db:init
```

// Generate seeds (basically some random comments in Latin) by following command

```
$ bundle exec rake db:seed
```
// Now go to the cs_comments_service/config/application.yml and
Put the api_key there. The api_key can be any random combination
of alphabets. Now go to the edx-platform directory. In that go to
the lms/envs/dev.py file.

============================================================
Add the following line in that file at line 32:
MITX_FEATURES[ENABLE_DISCUSSION_SERVICE] = True
Also add the same API_KEY value which you added above in the
application.yml file in the line 123:
COMMENTS_SERVICE_KEY = "PUT_YOUR_API_KEY_HERE"
============================================================

______________________________________________________________________________
Step 3: Its done! Launch the app now

-----------
$ ruby app.rb
-----------
//The cs_comments_service module has now been integrated with your
edx-platform. Now open the new terminal window.

//Activate the edx-platform virtual environment and go to the
edx-platform directory and run the following commands.

// Again start the LMS server with the command

-----------
$ rake lms[cms.dev]
-----------
Chapter 6

Conclusions

Today, there are so many moocs are existed in the World, but still the successful completion rate of each and every one is around 5% and less than that figure. And the throughput of the e-learning industry also too bad even with an advanced technology. So, we would like to implement our model Blended Learning - MOOC Model of IIT Bombay with help of edX-MOOC open source in India. Later we will approach related people for the World wide use. By following our model one can improve the successful completion rate up to its limits. If time permits us, we will also consider adaptation of learning style model through our proposed model into edX. Still, if we get the time we will look for implementation of give features in the Chapter 5( Problem Statement) for edX-platform.
Appendices
Appendix A

Installation Procedure for edX-platform

There are two types of configurations with edX deployments, the fullstack and shortstack. The full stack includes the components of LMS, CMS(studio), Xqueue/Xserver(student code submissions), Forums/elasticsearch/ruby(discussion forums). On the other hand shortstack includes LMS and CMS only. So, I am presenting the installation of shortstack which is useful for the development environment. The following instructions are to help you to install the edX platform in a standalone machine behind the proxy. After installation, if you want to modify the functionality of the edX or if you want to integrate other modules with edX, you have to know Django framework, Python and other technologies which are required. The people who are proxy free can follow the direct installation procedure suggested on the Github[11] and can be installed just by running a script less than a couple hours.

I struggled to install edX-platform at initial stage, but with the help of Mr. Dhaustageer(system admin, DIL lab, Kresit), I made the following procedure to install edX-platform successfully.

- **Step1:** At first, set the proxy information as shown below.

1. Add the following lines to ‘‘bashrc” with suitable modifications
   (home\$ sudo nano .bashrc).

```
export https_proxy=https://<username>:<password>@<port_addres>:<portnumber>/
export http_proxy=http://<username>:<password>@<port_addres>:<portnumber>/
```

2. Edit visudo and add following line to it(home\$ sudo visudo)

```
Defaults env_keep="http_proxy https_proxy ftp_proxy"
```

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3. Edit the `wgetrc` file and add the following lines to it with appropriate modification (etc/\$ sudo nano wgetrc):

```bash
export https_proxy=https://<username>:<password>@<port_address>:<port_number>/
export http_proxy=http://<username>:<password>@<port_address>:<port_number>/
```

Not to add:: uncomment--------> "use_proxy = on" in wgetrc file

4. Edit the environment file and add the following lines to it with appropriate modification (etc/\$ sudo nano environment):

```bash
http_proxy="http://<username>:<password>@<port_address>:<port_number>/"
https_proxy="https://<username>:<password>@<port_address>:<port_number>/"
ftp_proxy="ftp://<username>:<password>@<port_address>:<port_number>/"
socks_proxy="socks://<username>:<password>@<port_address>:<port_number>/"
```

5. Edit the apt.conf file and add the following lines to it with appropriate modification (etc/apt/\$ sudo nano apt.conf):

```bash
Acquire::http::proxy "http://<username>:<password>@<port_address>:<port_number>/";
Acquire::https::proxy "https://<username>:<password>@<port_address>:<port_number>/";
Acquire::ftp::proxy "ftp://<username>:<password>@<port_address>:<port_number>/";
Acquire::socks::proxy "socks://<username>:<password>@<port_address>:<port_number>/";
```

- **step2:** Clone the edX-platform repository by running the following command.

```bash
sudo apt-get update
sudo apt-get -y install git vim
mkdir ~/edx_all
cd ~/edx_all
git clone https://github.com/edx/edx-platform.git
cd edx-platform
```

- **step3:** Install the edX Requirements by running the following commands.
sudo apt-get install git python-software-properties
sudo add-apt-repository -y ppa:chris-lea/node.js
sudo add-apt-repository -y ppa:chris-lea/node.js-libs
sudo add-apt-repository -y ppa:chris-lea/libjs-underscore
sudo apt-get -y update

wget https://get.rvm.io | bash -- -s stable --ruby --autolibs=enable
--auto-dotfiles

source /home/<username>/.rvm/scripts/rvm  // specify the username
rvm install 1.9.3-p374
rvm use "1.9.3-p374@edx-platform" --create
rvm rubygems latest
gem install bundler
bundle install --gemfile Gemfile
export WORKON_HOME=$HOME/.virtualenvs
source /etc/bash_completion.d/virtualenvwrapper
mkvirtualenv -a "$HOME/.virtualenvs" --system-site-packages
edx-platform

curl -sL -o numpy.tar.gz http://downloads.sourceforge.net/
    project/numpy/NumPy/1.6.2/numpy-1.6.2.tar.gz

curl -sL -o scipy.tar.gz http://downloads.sourceforge.net/
    project/scipy/scipy/0.10.1/scipy-0.10.1.tar.gz

tar xf numpy.tar.gz
tar xf scipy.tar.gz
rm -f numpy.tar.gz scipy.tar.gz
cd numpy-1.6.2
python setup.py install
cd ..
cd scipy-0.10.1
python setup.py install
cd ..
rm -rf numpy-1.6.2 scipy-0.10.1

cd $HOME/.virtualenvs/edx-platform/lib/python2.7/site-packages
curl -O http://pypi.python.org/packages/source/d/distribute/
distribute-0.6.28.tar.gz

//Note:: in the above step you may need to download that package manually and run the blow commands in the current directory.
tar -xzvf distribute-0.6.28.tar.gz
cd distribute-0.6.28/
python setup.py install
cd ..
rm distribute-0.6.28.tar.gz
pip install -r ~/edx_all/edx-platform/requirements/edx/pre.txt
cd ~/edx_all/edx-platform/
rvm use "1.9.3-p374@edx-platform"
sudo apt-get install phantomjs

npm config set strict-ssl false
npm config set registry "http://registry.npmjs.org/"
vim ~/edx_all/edx-platform/requirements/edx/github.txt

//Note:: add https protocol with git protocol.
(example: -e git+https://github.com/edx/
django-staticfiles.git@6d2504e5c8#egg
=django-staticfiles)

rake install_prereqs
cd ~/edx_all
pip install argcomplete
cd ~/edx_all/edx-platform
bundle install
```bash
rake install_prereqs
cd ~/edx_all
mkdir db log data
cd ~/edx_all/edx-platform

rake django-admin[syncdb]
rake django-admin[migrate]
rake cms:update_templates

To run CMS
-----------------------------
rake cms[dev,0.0.0.0:8001]
-----------------------------

To run LMS
-----------------------------
rake lms[cms.dev,0.0.0.0:8000]
-----------------------------

=============================================================================
$ In the web browser, open the LMS and CMS as a local host with port numbers 8000 and 8001 respectively.

• step4: Note:: You can’t login in lms using email id and password which you created at the time of installation(super-user). You have to create new user and activate the account, then login. Every time you’re ready to work on the project, just run hte following lines and then run the LMS and CMS.

=============================================================================
\bin\bash --login
rvm use "1.9.3-p374@edx-platform" --create
workon edx-platform
cd ~/edx_all/edx-platform

To run CMS
-----------------------------
rake cms[dev,0.0.0.0:8001]
-----------------------------

To run LMS
-----------------------------
rake lms[cms.dev,0.0.0.0:8000]
```

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• **Step5-Email Configuration:** In order to send emails, modify the following files in edX-platform for CMS and LMS.

```bash
vim ~/edx_all/edx-platform/cms/envs/common.py
```

Go to the email portion. Should start with a comment, # Email
Change `EMAIL_BACKEND` to `'django.core.mail.backends.smtp.EmailBackend'`
Change the `DEFAULT_FROM_EMAIL` to the email you want to use. Similarly, for `DEFAULT_FEEDBACK_EMAIL` and `SERVER_EMAIL`

Set `EMAIL_HOST` to the host of your choice
Set `EMAIL_HOST_USER` to your email id and `EMAIL_HOST_PASSWORD` to your password.
Set `EMAIL_PORT` to the port your server uses
Set `EMAIL_USE_TLS` to True

This may look like as shown below.

```python
EMAIL_BACKEND = 'django.core.mail.backends.smtp.EmailBackend'
DEFAULT_FROM_EMAIL = 'srinu@cse.iitb.ac.in'
DEFAULT_FEEDBACK_EMAIL = 'srinu@cse.iitb.ac.in'
SERVER_EMAIL = 'srinu@cse.iitb.ac.in'
EMAIL_HOST = 'smtp-auth.iitb.ac.in'
EMAIL_HOST_USER = 'ldapusername'
EMAIL_HOST_PASSWORD = 'ldappassword'
EMAIL_PORT = 25
EMAIL_USE_TLS = 'true'
ADMINS = (
    ('edx Admins', 'srinu@cse.iitb.ac.in'),
)
```

For LMS edit the following file and follow the above step for LMS

```bash
vim ~/edx_all/edx-platform/lms/envs/common.py
```
Bibliography


