

ICT in Pakistani Academia: Potential for Open Source Learning Management Systems



Engr. Prof. Dr. Athar Mahboob, Tamgha-e-Imtiaz
Dean, DHA Suffa University, Karachi

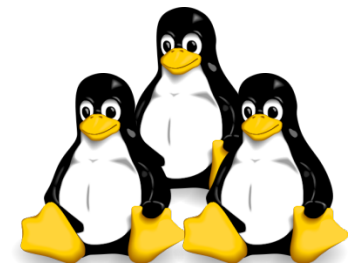
5th ICICT 2013

Institute of Business Administration, Karachi
14-15 December 2013

About Engr. Dr. Athar Mahboob, TI



- Professor, Dean & Director IT, DHA Suffa University, Karachi 2012-2013
- PhD (Information Security & Cryptology), NUST, Pakistan, 2005
- MS & BS (Electrical Engineering), Florida State University, USA, 1995/1992
- Awarded Tamgha-e-Imtiaz (TI) by the President, Islamic Republic of Pakistan on account of valuable contributions to Engineering and Science & Technology Education in the country, 2012
- 25+ years of Teaching, Research, Industrial and Management Experience, 1988-2013
- President Ibn Khaldun Systems: successfully managed more than 50 industrial projects 2005-2012
- Former Head of Computer Science Department, PNEC-NUST, Karachi, 2011-2012
- Former Head of Computer Engineering Department, Sir Syed University of Engineering & Technology (SSUET), Karachi, 1996-2001
- Former Head of Linux Task Force for promotion of Linux and open source software, Ministry of Science & Technology (MoST), Government of Pakistan, 2001-2002
- HEC Approved PhD Supervisor
- Published a book on Cyber Security which is being used as a Textbook in advance universities of USA and Europe, 2011
- Invented: Bitwizard Secure Communication Device for VoIP Phones
- Trained large number of students and professionals in Linux, Cryptography, Information Security and Internet Technologies, 1996-2013
- Published more than 30 research papers in referred international journals and international conferences, 1998-2013



Drivers for a University ICT Strategy

- We are living in the “Knowledge Age”
- A crowded higher education field – around 200 public + private universities in Pakistan
- ICT can be the “game-changer”
- Higher education has a symbiotic relationship with ICT
- ICT is changing learning patterns – universities have to be in harmony with the changing scenario
- ICT with Open Source can allow us to bridge the digital-divide
- We have not only to catch-up but rather to leap-frog ahead of the competition – ICT can allow us to do that
- Modern university is an “online”, “automated”, “paper-less” university

The Information Pyramid

Knowledge resides in **individuals**

Knowledge is the distinctly human attribute. Knowledge allows us to infer, create, judge – makes us the **best creation** of the **supreme creator**

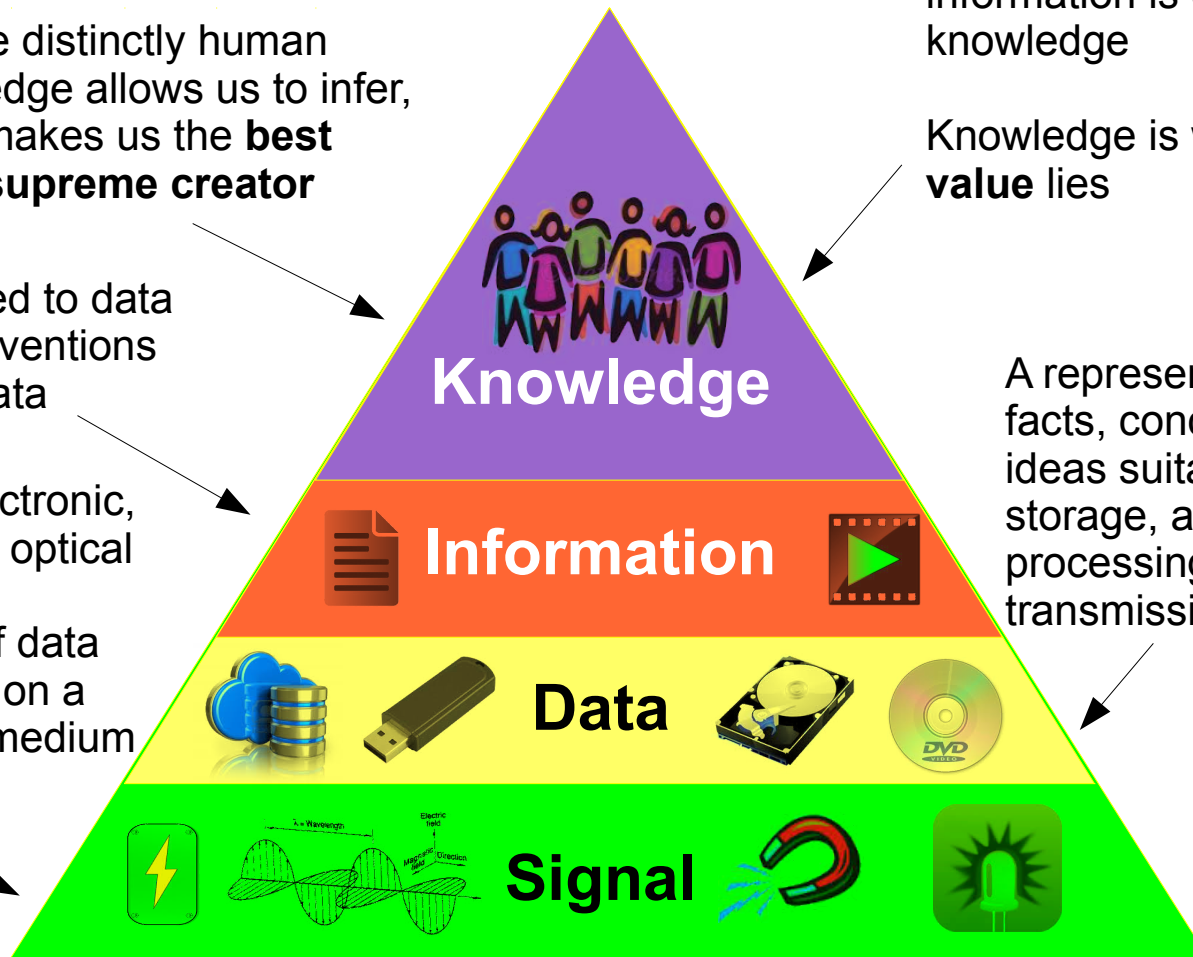
Meaning assigned to data by means of conventions applied to that data

An electrical, electronic, electromagnetic, optical or mechanical representation of data which can travel on a communication medium or be stored

The certainty of some information is called knowledge

Knowledge is where the **value** lies

A representation of facts, concepts and ideas suitable for storage, automatic processing and transmission

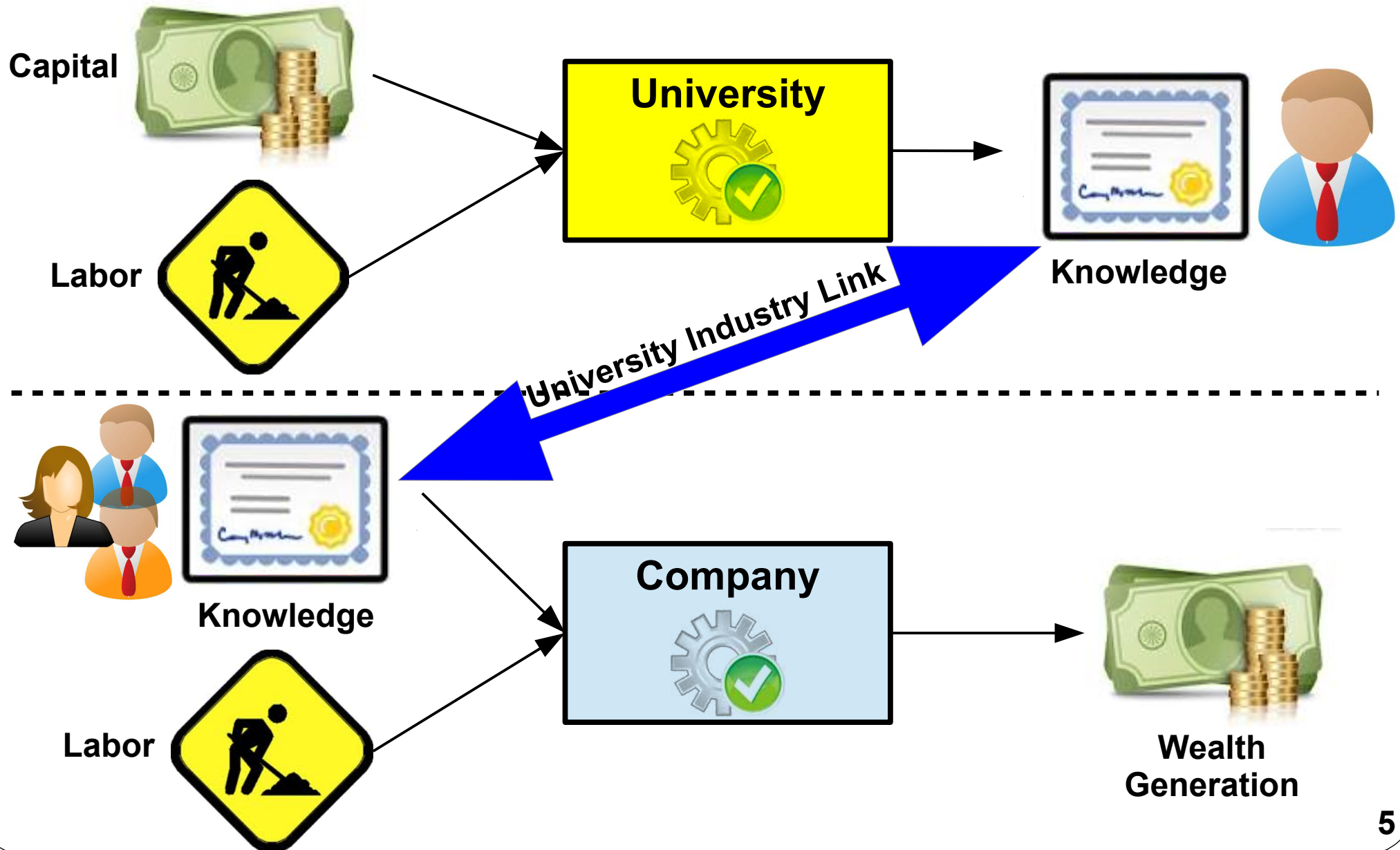


University
Finished
Goods

Raw
Materials
for
University

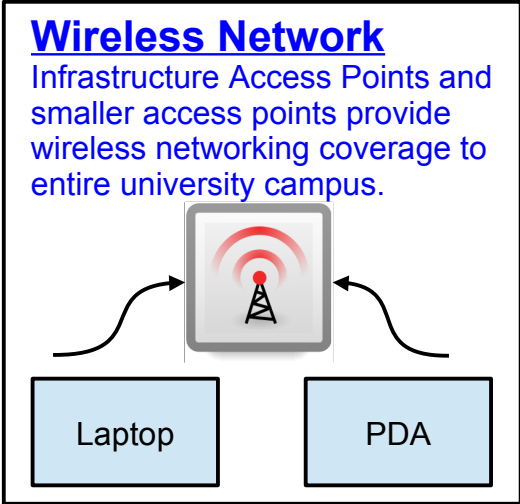
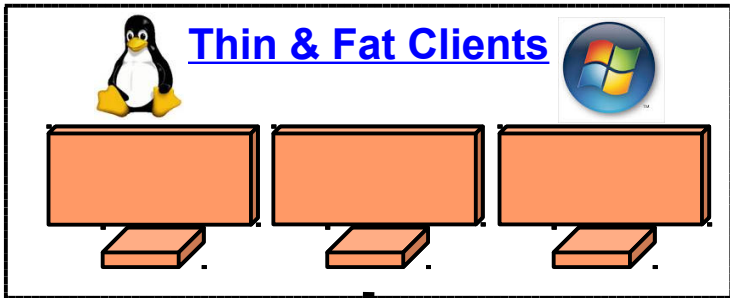
Why is this important for us and part of this discussion?

Knowledge, Labor and Capital – the Eco System



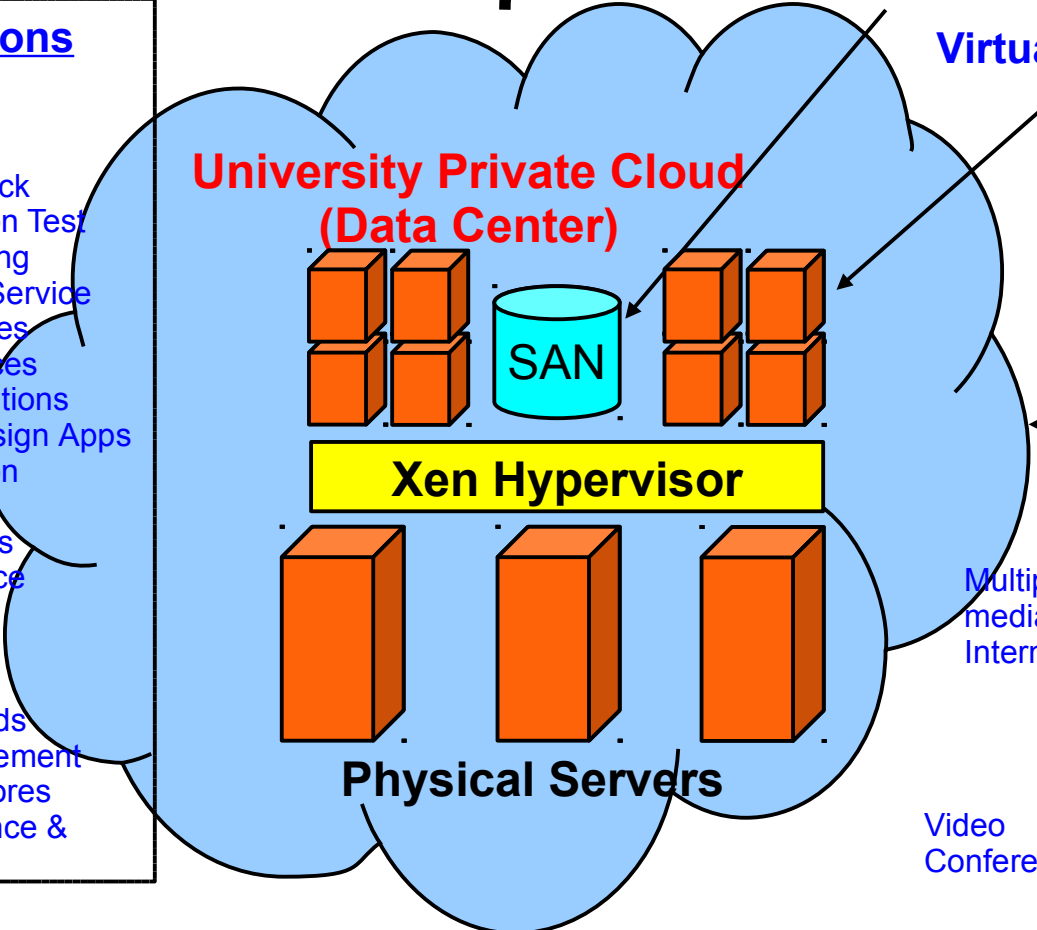
Typical University Private Cloud

High Speed Campus Network
 800+ network nodes in 8 segments covering all offices and Labs at the University connecting to a High Performance Network Core



- IT Applications**
- LMS
 - Email
 - Timetable
 - Student Feedback
 - Online Admission Test
 - Instant Messaging
 - Network Mgmt Service
 - Directory Services
 - Terminals Services
 - Desktop Applications
 - Engineering Design Apps
 - Online Admission Application
 - Storage Services
 - Video Conference Service
 - ERP
 - Accounting
 - Student Records
 - Library Management
 - Inventory & Stores
 - Time, Attendance & Leave Mgmt

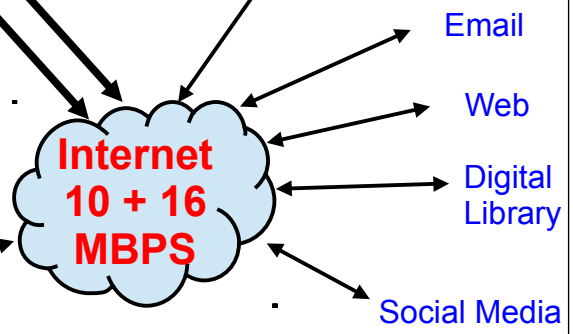
University Data
 ERP, LMS, Email



Virtual Private Network – VPN
 VPN access to university Network for employees and business partners. Through VPN all enabled IT services can be accessed securely from any remote location

Multiple redundant media high-speed Internet Links

Video Conferencing



The Modern University System

- **Semester System** (based on National and International Standards) – Modular Approach
- **Rigorous:** Continuous Assessment
- Each Course is a **COMMUNITY** lead by the **TEACHER**
 - LMS helps the community collaborate and communicate
 - LMS helps in maintaining transparency w.r.t teacher and students
 - LMS augments/empowers the teacher – does not replace him/her
- Feedback helps to stabilize the system and Feedback improves quality

Students' Services with IT

- Register for courses
- Access resources available all over the world to enhance learning
- Get course materials, assignments, tests and grades
- Interact with teaching staff and fellow students through forums
- Get financial information – dues
- Get News about activities such as seminars, events, the department, university
- Can use his/her PDA, Laptop anywhere on campus to get access to services
- Can use all services from home or any other location through secure VPN
- Can communicate and collaborate – today learning is collaborative and social

Faculty's Services with IT

- Can communicate with students beyond the classroom
- Can document their efforts through availability of course materials online for everyone to see
- Can communicate and collaborate with their colleagues throughout the global academia
- Can access research information repositories like HEC Digital Library
- Can use technology and tools to enhance their teaching effectiveness and satisfaction
- Manage research and projects using world-class project management system

Linux and Open Source & Some Misconceptions

- Open source is a viable business model - business model is based on services alone:
 - Implementation
 - Customizations
 - Training
 - Documentation
 - Support
- A fair and consumer friendly business model for software because:
 - Software is heavily reuse oriented and incrementally developed
 - Software is infinitely replicable
- Open source is free software !
 - Software is free, *people are not* !
 - Free as in “freedom” not necessarily as in “free beer”
- Open source is a better software engineering methodology
 - “Given enough eye-balls, all bugs are shallow” - Linus' Law*

Moodle Learning Management System

- Open Source Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE).
- PHP (LAMP/WAMP) Web Application - Ubiquitous
- Rock Solid
- Modular, Extensible
- Has beaten many a commercial LMS
- Very large community

Moodle Quick Start: Use bitnami Moodle Stack



Moodle

BitNami Moodle provides a one-click install solution for Moodle. Download [installers](#) and [virtual machines](#) or run your own Moodle server in the cloud.

Moodle is a Course Management System that is designed using sound pedagogical principles to help educators create effective online learning communities. It can scale from one computer to a 50,000-student university and is used in over 175 countries.

Homepage: moodle.org

Installer

Moodle 2.4.2 for Linux 64-bit



Install Moodle on your own Laptop or Server.

[View all operating system and download options](#)

Virtual Machine

Moodle on VMware



Run a Moodle virtual appliance in your virtual infrastructure.

[View all operating system and download options](#)

Cloud Server

Moodle on Amazon, Azure



Run your own Moodle server in the cloud with our hosting platform or using a pre-built image for Amazon, Azure and other providers.

<http://bitnami.org/stack/moodle>

Moodle Out of the Box


- Course Event Calendar
- Distribution of Lecture Notes and Reading Material
- Grade Book to maintain student grades for assignments, quizzes, hourly exams, projects, etc.
- Tests and Quizzes
- Homework Assignment and Collection
- Student Attendance Recording
- Feedback Module to help the teacher receive evaluation of his/her teaching
- Course Discussion Forums
- Course Wiki

Moodle with University Theme

atharmahboob - Yahoo! Mail x DSU Learning Management ... x +

lms.dsu.edu.pk g gnome screenshot

Most Visited Facebook logo Getting Started Latest Headlines DHA Suffa University ... Welcome to Faceboo...


 **DHA Suffa University**
-With enlightening vista for top quality Education

Home


Navigation


- Home
 - Moodle Video Tutorial (DSU Local Area Network)
 - Moodle Video Tutorial (Link on YouTube)
 - ...le Guide For Teachers, Trainers and Administrators
 - Moodle Tool Guide for Teachers
 - Moodle User Manual V2
 - Using Moodle by O'Reilly 2e
 - Review Demo Course 1
 - Review Demo Course 2
 - Courses


DSU Learning Management System


 Moodle Video Tutorial (DSU Local Area Network)


This video tutorial demonstrates how Moodle is used by Carin Univeristy. It demonstrates best practicies and how faculty members can leverage features in Moodle.


 Moodle Video Tutorial (Link on YouTube)

 Moodle Guide For Teachers, Trainers and Administrators


 Moodle Tool Guide for Teachers

 Moodle User Manual V2

 Using Moodle by O'Reilly 2e

 Review Demo Course 1

You may enroll yourself in this course. This course can serve as an example of how to setup your own course in Moodle. To enroll yourself you must use the self enrollment link in the settings box, once you enter this course via clicking on the URL above.

 Review Demo Course 2

This is another demo course. It hosts more diverse content and will help you in exploring Moodle further. In order to access all the resources in this course you will need to click the self enrollment link in the settings box, once you enter the course via clicking on the URL above.

The DSU Learning Management System is based on a widely used open source software Moodle. It is designed to provide a platform for students to interact with faculty members on a course-wise basis.

Calendar

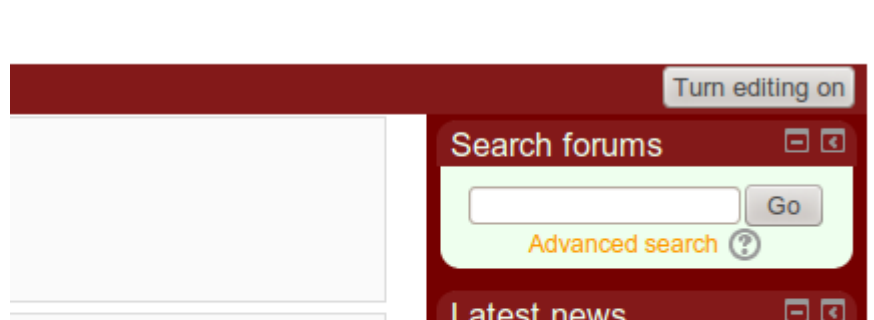
March 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

You are not logged in. (Login)

4


















Turn Editing On ...



Magic starts when the teacher “Turns Editing On”





































[+ Add an activity or resource](#)

31 December - 6 January

-  dsu_virtual_conference_room       
-  Test Quiz 1        

[+ Add an activity or resource](#)

7 January - 13 January

-  First Programming Assignment        
- This is the First Programming Assignment
-  testing mathjax        
- $3 + 3 \times (4)^5$
-  stack_quiz        
-  lab1        

[+ Add an activity or resource](#)

Additional Moodle Components – Create Impact

- **EJS:** Easy Java Simulations
- **VPL:** Virtual Programming Lab
- **BBB:** Big Blue Button
- **STACK:** Computer Algebra System
- **Turnitin** integration

Moodle Activities & Resources

Add an activity or resource

Select a module to view its help

ACTIVITIES

- Assignment
- Attendance
- BigBlueButtonBN
- Chat
- Choice
- Database
- EJSApp
- External Tool
- Feedback
- Forum
- Glossary
- HotPot
- Lesson
- OpenMeetings
- Quiz
- SCORM package

Callout boxes:

- Class Attendance
- BigBlueButton Video Conferencing
- Easy Java Simulations
- Student Feedback

Buttons: Add, Cancel

Add an activity or resource

Select a module to view its help

RESOURCES

- Quiz
- SCORM package
- Survey
- Turnitin Assignment
- Virtual programming lab
- Wiki
- Workshop
- Book
- EJSApp booking system
- File
- Folder
- IMS content package
- Label
- Page
- RecordingsBN
- URL

Callout boxes:

- Online Test
- Turnitin Assignment
- Virtual Programming Lab
- Pre-recorded Lecture

Buttons: Add, Cancel

What is EJS?

Demos/Examples
Credits
Links
Webcasts/Video
[EJS Users' Group](#)

Installation

Download
EJS Workspaces
Running EJS
Conditions of Use

Documentation

EJS Console
EJS Interface
Description Panel
Model Panel
View Panel
Deployment
Digital Libraries
Elements Reference
Advanced Topics
Moodle Support
[EJS Modelling Forum](#)

What is EJS?

Easy Java Simulations is a software tool ([java code generator](#)) designed for the creation of discrete computer simulations.

A discrete computer simulation, or simply a computer simulation, is a computer program that tries to reproduce, for pedagogical or scientific purposes, a natural phenomenon through the visualization of the different states that it can have. Each of these states is described by a set of variables that change in time due to the iteration of a given algorithm.

All this means that EJS is a program that helps you create other programs; more precisely, to create scientific simulations.

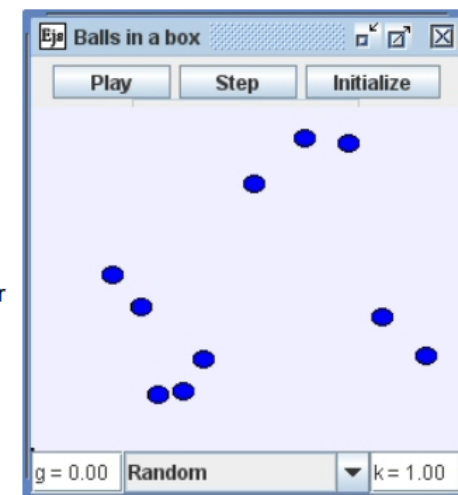
There exist many programs that help create other programs. What makes EJS different from most other products is that EJS is not designed to make life easier for professional programmers, but has been conceived by science teachers, for science teachers and students. That is, for people who are more interested in the content of the simulation, the simulated phenomenon itself, and much less in the technical aspects needed to build the simulation.

Easy Java Simulations is a modeling and authoring tool expressly devoted to this task. It has been designed to let its user work at a high conceptual level, using a set of simplified tools, and concentrating most of his/her time on the scientific aspects of our simulation, asking the computer to automatically perform all the other necessary but easily automated tasks.

Nevertheless, the final result, which is automatically generated by EJS from your description, can, in terms of efficiency and sophistication, be taken as the creation of a professional programmer.

In particular, EJS creates Java applications that are platform independent, or applets that can be visualized using any Web browser (and therefore distributed through the Internet), which read data across the net, and which can be controlled using scripts from within web pages.

Because there is an educational value in the process of creating a simulation, EJS can also be used as a pedagogical tool itself. With it, teachers can ask their students to create a simulation by themselves, perhaps by following some guidelines which provided by the instructor. Used in this way, EJS can help students make their conceptualizations explicit. Used in groups, through [social constructionism](#) improve the students abilities to discuss and communicate about science , learning to be scientist instead of learning about it.



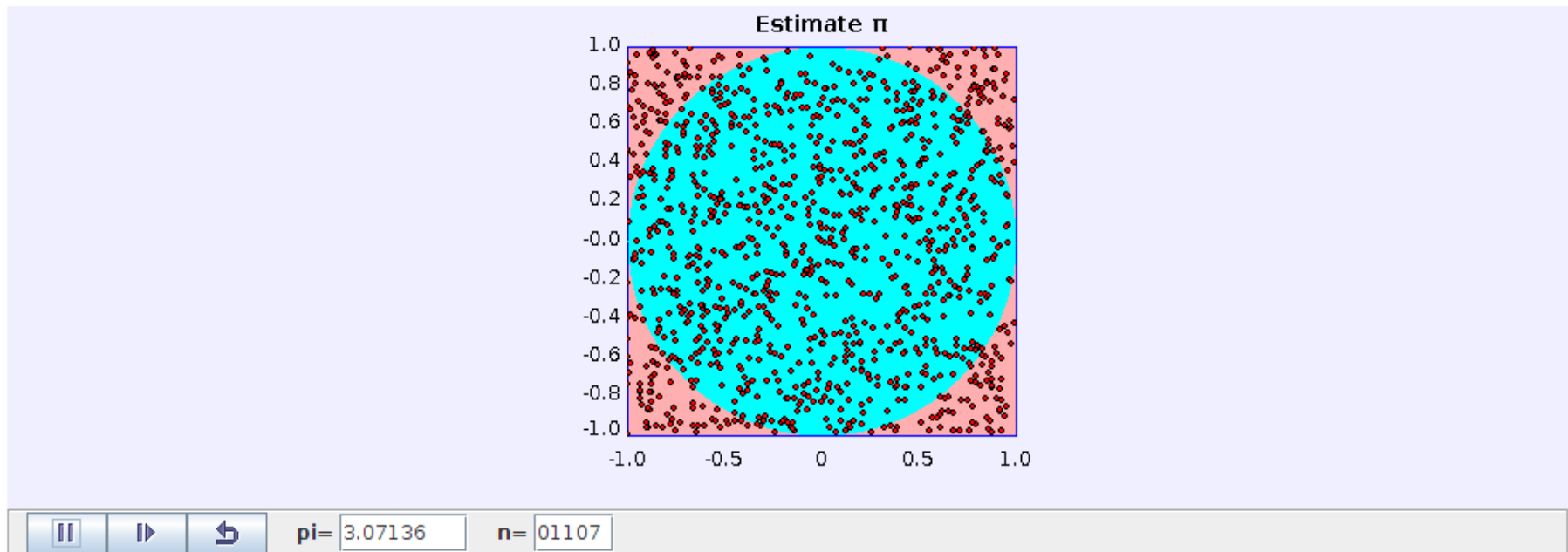
A simulation of balls colliding in a box.

<http://www.um.es/fem/EjsWiki/Main/WhatIsEJS?>

Easy Java Simulations Example - 1

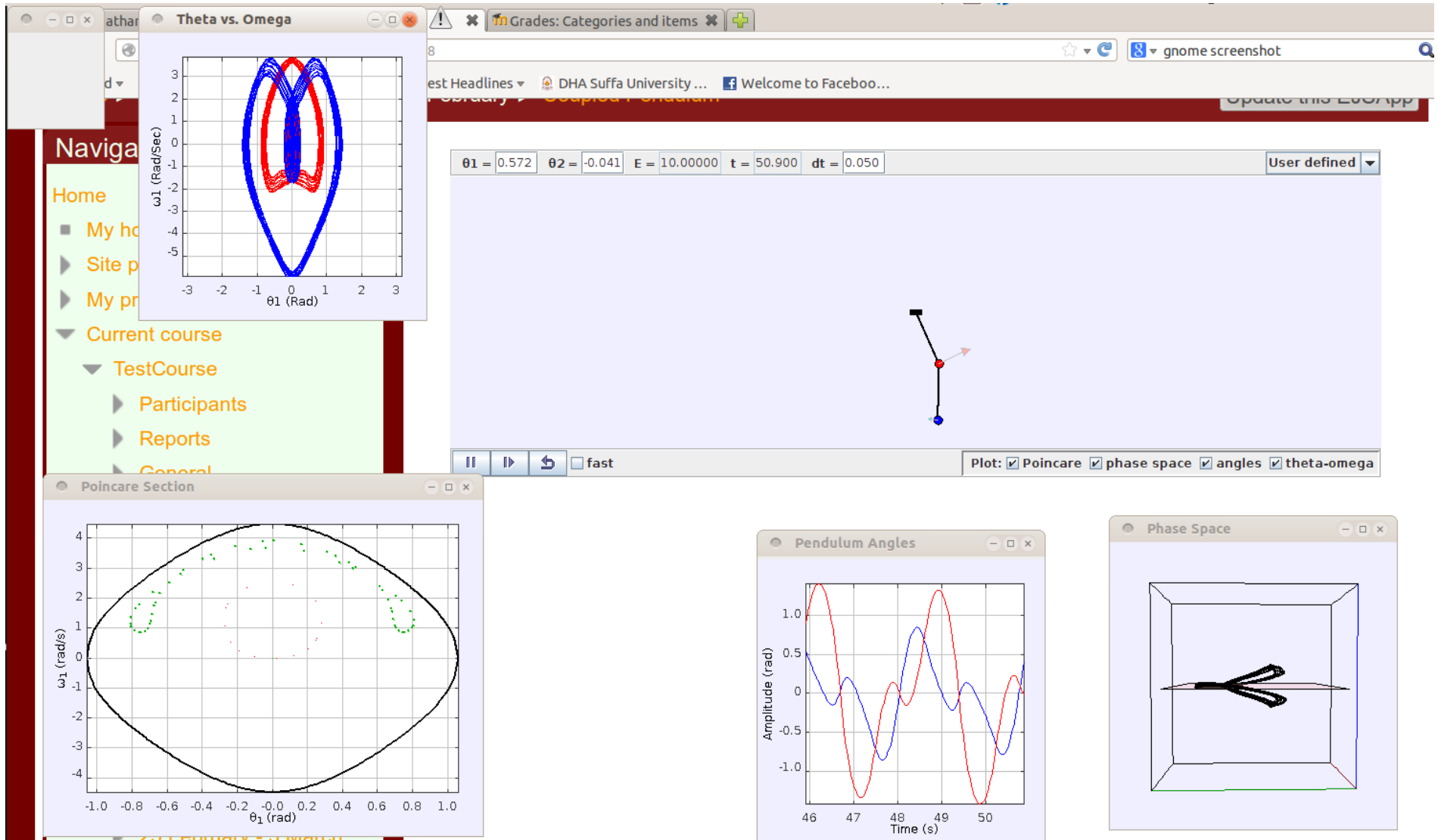
February ► Monte Carlo Method for calculation of π

Update this EJSApp



Easy Java Simulations

Example - 2

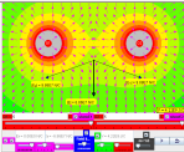



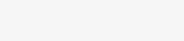

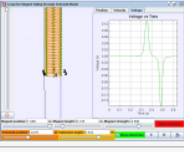


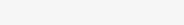



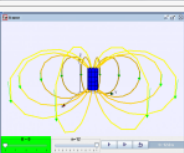



Collaborative Community of EJS

(3 unread) - atharmahboob ... Collaborative Community o... Grades: Categories and items

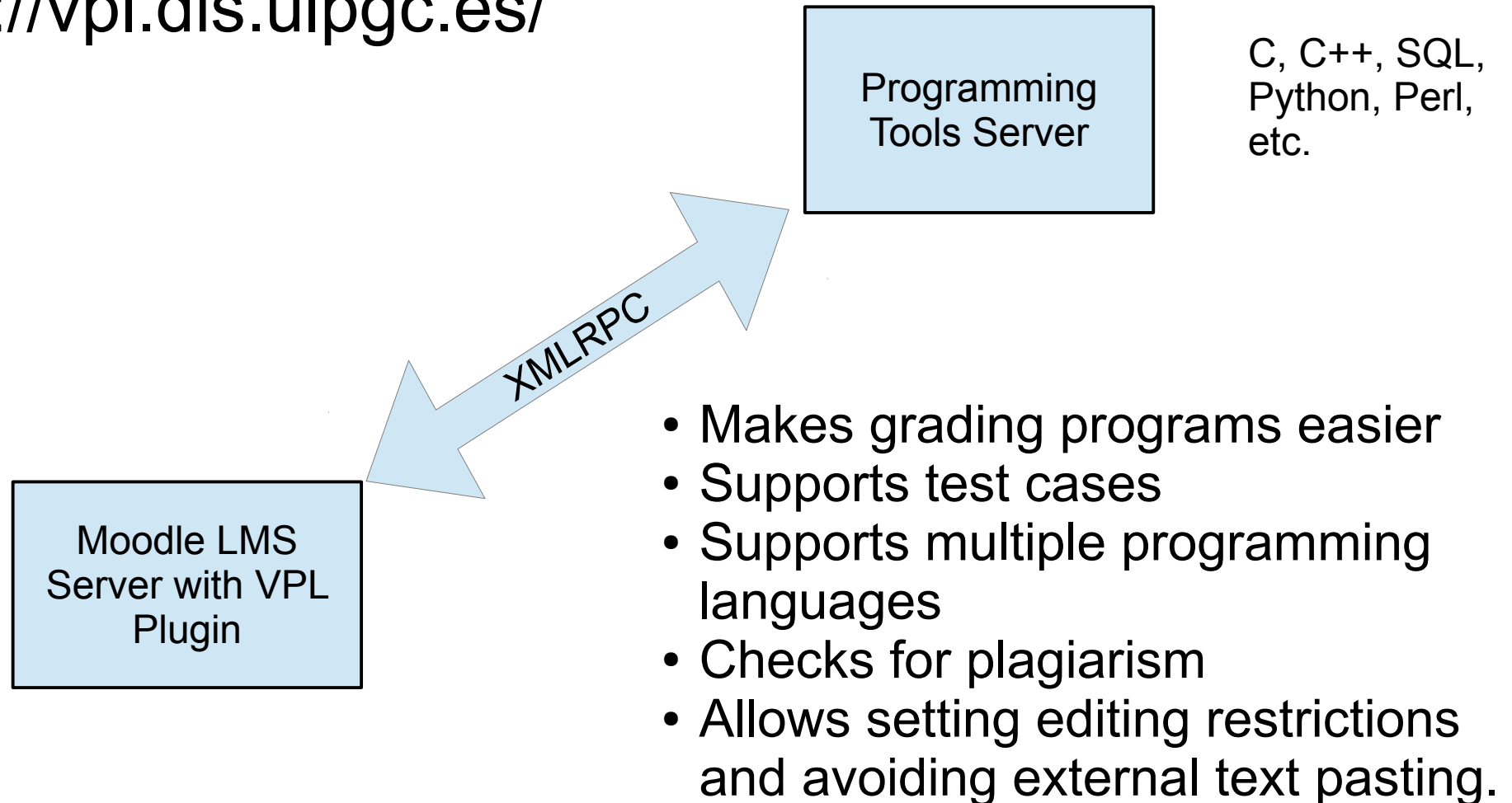
www.phy.ntnu.edu.tw/ntnujava/index.php?board=28.0

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	Ejs Open Source 2 Charge Model with Field Vector, Field Lines, Potential Visual	lookang	11	4089	February 20, 2013, 01:02:59 pm by lookang	
	Ejs open source java applet 1D collision carts with realistic collision	lookang	4	2098	February 19, 2013, 01:05:56 pm by lookang	
	Speed for Secondary Maths	engrg1	0	263	February 17, 2013, 02:36:39 pm by engrg1	
	Ejs Open Source Long Magnet Falling Through solenoid Model Java Applet by LTL	lookang	8	2765	February 14, 2013, 10:09:19 am by lookang	
	Primary School Speed Time	engrg1	6	2420	February 08, 2013, 07:01:56 pm by engrg1	
	Ejs Open Source Coulomb Force Model Java Applet	lookang	0	293	January 30, 2013, 05:01:02 pm by lookang	
	Cooling/Heating Curve Remixed	engrg1	8	2769	January 02, 2013, 01:18:50 pm by engrg1	
	Ejs Open Source Bar Magnetic Field Lines Model Java Applet	lookang	7	1896	December 20, 2012, 06:55:06 pm by Fu-Kwun Hwang	

Virtual Programming Lab

<http://vpl.dis.ulpgc.es/>



Plagiarism checker

Navigation

- Home
 - My home
 - Site pages
 - My profile
- Current course
 - TestCourse
 - Participants
 - Reports
 - General
 - Week 1: Lectures 1 to 3
 - The First Hourly Test
 - Test Presentation
 - Lecture 1
 - Write a summary of lectures 1 to 3
 - Quiz 1
 - Attendance
 - Homework No. 3
 - Feedback on my teaching
 - A programming assignment
 - Programming Assignment 1**
 - Description
 - Submissions list
 - Similarity
 - Help Session

File Edit Options

prog1.c

```
1 #include <stdio.h>
2
3 int main()
4 {
5     int x, y;
6
7     printf("Enter two integers separated by space:\t");
8
9     scanf("%d %d", &x, &y);
10
11     printf("The sum of %d and %d is %d and their product is %d\n",
12
13     return 0;
14 }
15
16 }
17
18
19
20
21
22
23
24
25
26
27
28
29
```

Console 1 - connected

Enter two integers separated by space: |

Transferring data from lms.dsu.edu.pk...

Program can be edited online

Compiled program running

BigBlueButton – In Action

The screenshot shows the BigBlueButton web interface. The browser tabs include 'atharmahboob - Yahoo! Mail', 'Collaborative Community o...', 'Course: Test Course', 'BigBlueButton', and 'Math Quiz'. The address bar shows 'bbbserv.dsu.edu.pk/client/BigBlueButton.html'. The interface features a 'Users' panel with a table listing participants, a 'Listeners' panel with a microphone icon, a 'Video dock' showing a video of 'Athar Mahboob (you)', and a 'Chat' panel with a message: 'Welcome to Big Blue Session 1!'. The main content area displays a 'Welcome to BigBlueButton' message with a logo and two video thumbnails: 'The Precision Approach' and 'Requirements'. Below the thumbnails are 'Teacher Overview' and 'Student Overview' buttons. The 'Teacher (moderator):' section lists permissions: 'You can mute/unmute anyone by clicking their microphone icon.', 'You can lock a student's audio (they can't unmute/mute).', and 'You can mute all/unmute all (does not change those locked)'. The 'Student:' section lists permissions: 'You can mute/unmute yourself.' and 'You should mute yourself during the lecture to minimize background noise.' The bottom of the interface shows a navigation bar with a back button, '1/1', a forward button, a zoom slider (100% to 400%), and a 'Send' button.

Role	Name	Status
	Athar Mahboob (y)	

Welcome to BigBlueButton

If it's your first time using this software, we recommend you to watch the following videos.

Teacher (moderator):

- ✓ You can mute/unmute anyone by clicking their microphone icon.
- ✓ You can lock a student's audio (they can't unmute/mute).
- ✓ You can mute all/unmute all (does not change those locked).

Student:

- ✓ You can mute/unmute yourself.
- You should mute yourself during the lecture to minimize background noise.

Chat

All +

Welcome to **Big Blue Session 1!** 03:09

To understand how BigBlueButton works see our [tutorial videos](#).

To join the audio bridge click the headset icon (upper-left hand corner). **Please use a headset to avoid causing noise for others.**

The maximum duration for this session is 240 minutes.

Integrates with Moodle
Uses Red5 Streaming Video Server
Multiparty video conference session
Chat
Shared Whiteboard

(c) 2012, BigBlueButton build 3944-2012-06-18 - For more information see <http://www.bigbluebutton.org/>.

Uploading Lecture Presentation

BigBlueButton - Mozilla Firefox

en (1:29) 2:58 AM Athar Mahboob

Yahoo! Mail Collaborative Community o... Course: Test Course BigBlueButton

bbbserv.dsu.edu.pk/client/BigBlueButton.html

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English Help Logout

Users

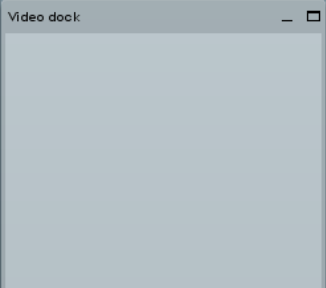
Role	Name	Status
	Athar Mahboob	

Switch Presenter

Listeners

Athar Mahboob

Mute Mute All



Welcome to BigBlueButton

If it's your first time using this software, we recommend you to watch the following videos.

Upload Presentation

File:

Progress: 54% uploaded.

Teacher (moderator):

- ✓ You can **mute/unmute** anyone by clicking their microphone icon.
- ✓ You can **lock** a student's audio (they can't unmute/mute).
- ✓ You can **mute all/unmute all** (does not change those locked).

Student:

- ✓ You can **mute/unmute** yourself.
- You should **mute** yourself during the lecture to minimize background noise.

Chat

All +

Welcome to **Big Blue Session 1!** 02:56

To understand how BigBlueButton works see our [tutorial videos](#).

To join the audio bridge click the headset icon (upper-left hand corner). **Please use a headset to avoid causing noise for others.**

The maximum duration for this session is 240 minutes.

BigBlueButton

atharmahboob - Yahoo! Mail Collaborative Community o... Course: Test Course BigBlueButton

bbbserv.dsu.edu.pk/client/BigBlueButton.html

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English Help Logout

Role	Name	Status
	Athar Mahboob	

Switch Presenter

Listeners

Athar Mahboob

Mute Mute All

Video dock

DSU IT Architecture and Services

High Speed Campus Network
500+ network nodes in 8 segments covering all offices and Labs at DSU connecting to a High Performance Network Core

Thin Clients

Wireless Network
Infrastructure Access Points and smaller access points provide wireless networking coverage to entire DSU campus.

Laptop PDA

DSU Private Cloud
SAN
Xen Hypervisor
Servers

DSU Data

DSU Firewall

Virtual Private Network - VPN
VPN access to DSU Network for Faculty and Students. Through VPN all IT services can be accessed securely from any remote location

Internet 10 + 10 MBPS

Email
Web
HEC Digital Library
Social Media 10
PERN Video Conferencing

Chat

All +

Welcome to **Big Blue Session 1!** 02:56

To understand how BigBlueButton works see our [tutorial videos](#).

To join the audio bridge click the headset icon (upper-left hand corner). **Please use a headset to avoid causing noise for others.**

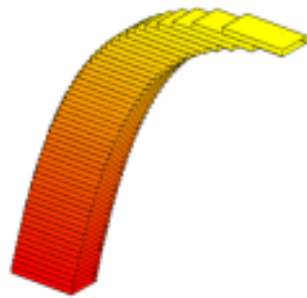
The maximum duration for this session is 240 minutes.

Send

(c) 2012, BigBlueButton build 3944-2012-06-18 - For more information see <http://www.bigbluebutton.org/>.

STACK -

<http://www.stack.bham.ac.uk/>



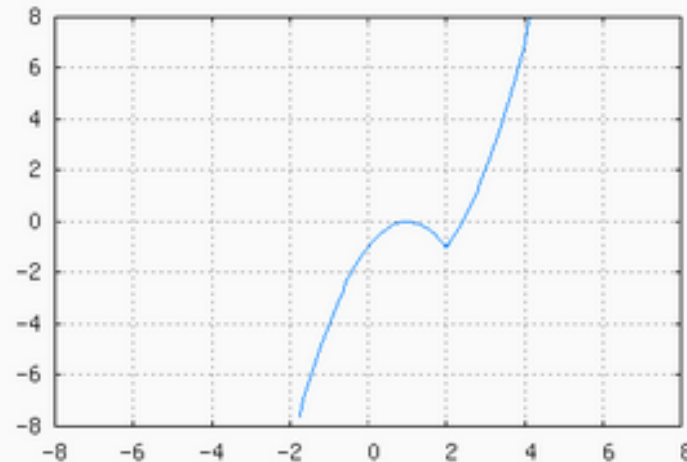
*S*ystem for
*T*eaching and
*A*ssessment using a
*C*omputer algebra
*K*ernel

STACK is an open-source system for computer-aided assessment in Mathematics and related disciplines, with emphasis on formative assessment.

Contact us: [e-mail](#).

The function shown in the graph below is of the form

$$x|x - a| + b.$$



Give an algebraic expression for this function.



[Demo](#)



[Download](#)



[Docs](#)

STACK in action as Moodle Quiz

Browser tabs: aatharmahboob - Yahoo! Mail, Collaborative Community o..., Course: Test Course, Math Quiz

Address bar: lms.dsu.edu.pk/mod/quiz/attempt.php?attempt=32

Navigation: Home > TestCourse > 11 February - 17 February > Math Quiz > Preview

Quiz navigation

- 1
- Finish attempt ...
- Start a new preview

Navigation

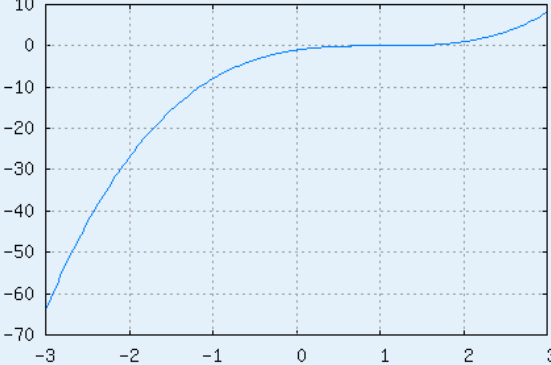
- Home
 - My home
 - Site pages
 - My profile
- Current course
 - TestCourse
 - Participants
 - Reports
 - General
 - Week 1: Lectures 1 to 3
 - 21 January - 27 January
 - 28 January - 3 February
 - 4 February - 10 February
 - 11 February - 17 February
 - test1
 - Math Quiz**
 - Info
 - Results
 - lab1
 - 18 February - 24 February
 - 25 February - 3 March
 - 4 March - 10 March
 - 11 March - 17 March

Question 1

Not yet answered
Marked out of 1.00

Flag question
Edit question

Tidy question | Question tests & deployed versions



Differentiate

with respect to

$(x - 1)^3$

x

Check

Next

Uses MathJax to render LaTeX

Quality Math

The screenshot displays a Moodle quiz page with a sidebar navigation menu on the left and a main content area. The sidebar includes 'Quiz navigation', 'Navigation', and 'Home' sections. The main content area shows 'Question 1' with a graph of a cubic function, the instruction to 'Differentiate' the function $(x-1)^3$ with respect to x , and the user's input $3*x^2-6*x+1$. The system has interpreted the input as $3 \cdot x^2 - 6 \cdot x + 1$. A 'Check' button is visible below the interpretation.

Quiz navigation

1
Finish attempt ...
Start a new preview

Navigation

Home

- My home
- Site pages
- My profile
- Current course
 - TestCourse
 - Participants
 - Reports
 - General
 - Week 1: Lectures 1 to 3
 - 21 January - 27 January
 - 28 January - 3 February
 - 4 February - 10 February
 - 11 February - 17 February
 - test1
 - Math Quiz**
 - Info
 - Results
 - lab1
 - 18 February - 24 February
 - 25 February - 3 March
 - 4 March - 10 March
 - 11 March - 17 March
 - 18 March - 24 March
 - 25 March - 31 March
 - 1 April - 7 April
 - 8 April - 14 April
 - 15 April - 21 April
 - 22 April - 28 April

Moodle – Turnitin Integration / 1

Adding a new Turnitin Assignment to 1 January - 7 January

General

Turnitin Assignment Name*

Summary* Required

Font family | Font size | Paragraph |

B *I* U ABC x_2 x^2 |

| | HTML ABC

Path: p

Display description on course page

Submission Type*

Number of Parts

Maximum File Size

Student Originality Reports

Moodle – Turnitin Integration / 2

Turnitin Advanced Options

Allow Late Submissions

Report Generation Speed

Store Student Papers

Check against stored student papers

Check against internet

Check against journals, periodicals and publications

Exclude Bibliography

Exclude Quoted Material

Exclude Small Matches

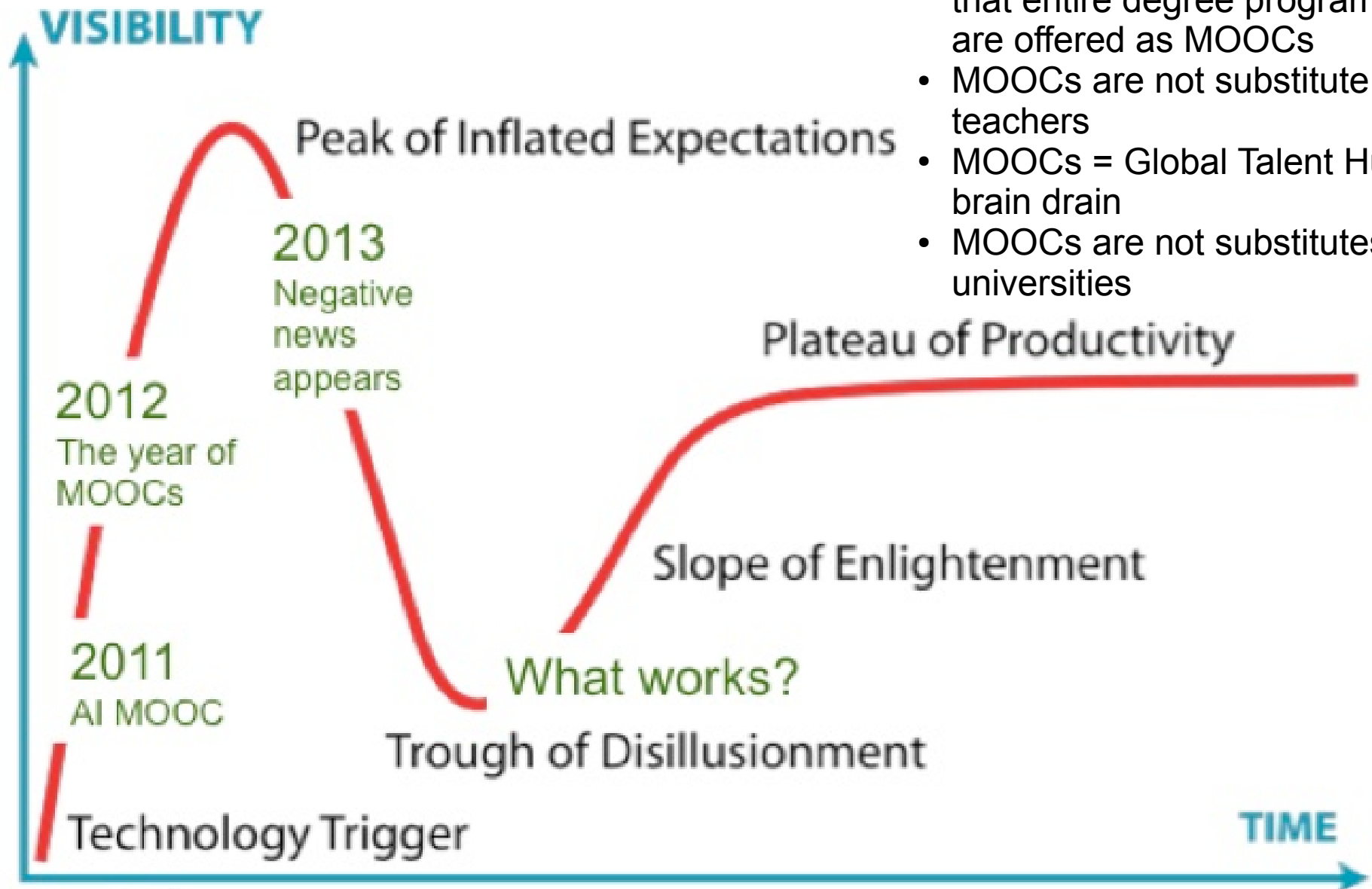
Grade

Grade

Grade category

MOOCs: Gartner Hype Cycle

- Many experts wrongly believe that entire degree programs are offered as MOOCs
- MOOCs are not substitute for teachers
- MOOCs = Global Talent Hunt = brain drain
- MOOCs are not substitutes for universities



Conclusion

- A Learning Management System (LMS) or Virtual Learning Environment (VLE) can be used to create a community of learners led by teachers
- These systems can be used to augment the traditional classroom teaching or alternatively they may be used as a building block for Massive Online Open Courses (MOOCs)
- Open source Learning Management Systems such as Moodle offer great potential benefits and closely match the requirements and economics of Pakistani Academia
- Open source learning management systems can augment traditional teaching practices and thus contribute in enhancing the quality of higher education in Pakistan
- More than out of the box version of Moodle needed - use of specialized add-on modules related to Video Conferencing, Shared Whiteboards, Virtual Programming Lab, Computer Algebra Systems, Advanced Online Testing, Plagiarism detection and Use of CBT Modules within Moodle
- Create an LMS with high impact at low cost

Thank You !!!