

# User Guide for vLAB

June 29, 2015

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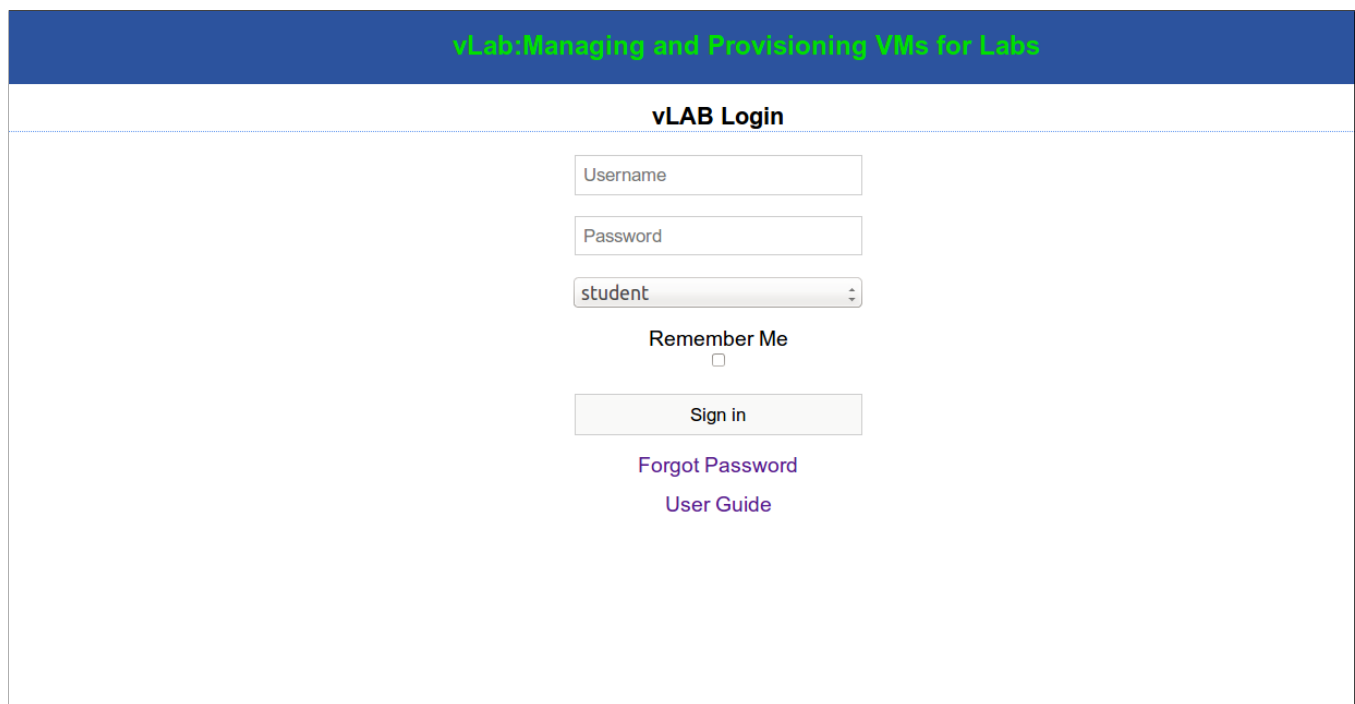
# vLAB

## Managing and Provisioning VMs for Labs

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## 1 Administrator

### 1.1 Login



The screenshot shows the vLAB Login interface. At the top is a dark blue header with the text "vLab:Managing and Provisioning VMs for Labs" in green. Below the header is a white box titled "vLAB Login". Inside this box, there are four input fields: "Username", "Password", and a dropdown menu currently showing "student". Below these fields is a "Remember Me" checkbox, which is currently unchecked. At the bottom of the input section is a "Sign in" button. Below the button are two links: "Forgot Password" and "User Guide", both in purple text.

Any student or instructor can login to the system using his/her IITB LDAP-ID and administrator can login to the system using the credentials which s/he got at installation time. Choose your type i.e student,instructor or administrator while login. Forgot password is only for Administrator(s). After login, based on the user type, homepage will be shown in the browser.

## 1.2 Instructor Homepage

The screenshot shows the vLab:Managing and Provisioning VMs for Labs Instructor Homepage. The page has a blue header with the title "vLab:Managing and Provisioning VMs for Labs" and a green sidebar on the left with navigation links. The main content area has three tabs: "System Information", "System Status" (selected), and "Delete Course". The "System Status" tab displays three panels: "Registered Course(s)", "Template Information", and "Enrollment Information".

Registered Course(s)	
#Registered Courses	: 2
Course Number 1	: CS101
Instructor for CS101	: Sushmita Bhattacharya
Template for CS101	: ServerTemplate.qcow2
Course Number 2	: CS102
Instructor for CS102	: Sushmita Bhattacharya
Template for CS102	: ServerTemplate.qcow2

Template Information	
Template #1	: ServerTemplate.qcow2
OS in Template#1	: Ubuntu Server 14.04
Username	: user
Password	: password

Enrollment Information	
#Students Enrolled	: 2
#Students Enrolled in CS101	: 1
#VMs Created for CS101	: 1
#Students Enrolled in CS102	: 1
#VMs Created for CS102	: 1

At administrator homepage you will get information about the system i.e number of courses, templates uploaded to the system, enrollment information for each the course. There are three tabs on administrator's homepage. In system status all the important messages like registering a course, creating a VM, starting a VM etc will be displayed. In the third tab "Delete Course", administrator can delete a course. After end of each semester s/he will need to delete the VMs for all the courses. There are more tabs on the left side. Lets look important ones.

## 1.3 Adding a template

The screenshot displays the 'vLab:Managing and Provisioning VMs for Labs' web interface. On the left is a vertical sidebar with navigation links: Home, Add Template (highlighted in orange), Update Information, Add-Admin, Sheepdog Cluster, CourseInfo, Dashboard, About, and a Logout button. The main content area has a blue header with the title and a green sub-header 'Welcome Admin!'. Below this, the 'Add Template' form is visible, featuring fields for Template Name (with a 'Browse...' button and 'No file selected.' status), Select OS (a dropdown menu), User Name (pre-filled with 'root'), and Password (masked with dots). At the bottom of the form are two buttons: 'Add New Template' and 'Information'. The background of the main area is a light green gradient.

Administrator has to upload the template(s) to be used by the instructor in registered courses. From here we are just inserting the information to the system and not actually uploading the template file. Because template file are large files and uploading such large files is not feasible. Information about creation and upload of template files can be checked by clicking on information button. In select OS we have to select which OS is installed on template file and username & password is for the user account in template file.

## 1.4 Update Administrator Information

The screenshot displays the 'vLab:Managing and Provisioning VMs for Labs' web interface. On the left is a sidebar menu with the following items: Home, Add Template, Update Information (highlighted in orange), Add-Admin, Sheepdog Cluster, CourseInfo, Dashboard, About, and a Logout button. The main content area has a blue header with the title 'vLab:Managing and Provisioning VMs for Labs' and a green 'Welcome Admin!' message. Below the header, the 'Update Information' form is visible, containing fields for Username (admin), Name (root), Password (masked with dots), and Email-ID (admin@example.com). A 'Update Admin Information' button is located at the bottom of the form. The background of the main area is a light green gradient.

Administrator can update information related to him/her. He/She can update his Name, Password and, Email-Id. The updated information will be mailed to him/her.

## 1.5 Adding New Administrator

vLab:Managing and Provisioning VMs for Labs

Welcome Anbil

Home

Add Template

Update Information

Add-Admin

Sheepdog Cluster

CourseInfo

Dashboard

About

Logout

Username

Username

Name

root

Password

\*\*\*\*\*

Password Strength:

Confirm Password

Password

Result

Email

Email-Id

Level

admin

Enter Code

68584

Image Result:

register

Any user with administrator rights can add a new administrator to the system. Administrator doesn't have right to add new student or instructor. This right is reserved by the institute and only a new administrator can be added by an administrator.

## 1.6 Adding Information about Cluster Nodes

Home

Add Template

Update Information

Add-Admin

Shexlog Cluster

CourseInfo

Dashboard

About

Logout

vLab:Managing and Provisioning VMs for Labs

Welcome Admin

Add Nodes to Cluster

Cluster Information

Cluster Status

\*You can change the configuration at any time. Only the nodes given here, will be used to run VM.

Number of Nodes:

IP of Nodes:

IP-Address1,IP-Address2

Add Nodes to Cluster

NODE :10.129.26.8

Hostname

: ankit-lappi

Hypervisor

: QEMU 2.0.0

Max VCPU(s) per VM

: 16

CPU(s)

: 4

CPU frequency

: 2690

Architecture

: x86\_64

Memory

: 5977276

Total Number of VM(s)

: 7

Running VM(s)

: 0

Stopped VM(s)

: 7

NODE :10.129.26.104

Hostname

: pc2

Hypervisor

: QEMU 2.0.0

Max VCPU(s) per VM

: 16

CPU(s)

: 4

CPU frequency

: 1998

Architecture

: x86\_64

Memory

: 2038684

Total Number of VM(s)

: 2

Running VM(s)

: 0

Stopped VM(s)

: 2

NODE :10.129.28.250

Hostname

: pc1

Hypervisor

: QEMU 1.7.91

Max VCPU(s) per VM

: 16

CPU(s)

: 4

CPU frequency

: 800

Architecture

: x86\_64

Memory

: 7826964

Total Number of VM(s)

: 2

Running VM(s)

: 0

Stopped VM(s)

: 2

Here we can add information about the nodes in the cluster. It is not about the cluster management. Only the information is added at this place. Cluster is formed and managed by starting of the system. Once IP address of the nodes are added to the system, we can see information about the nodes in the cluster like how much CPU, Memory and other information about the nodes.

8



## 1.7 Cluster Status

The screenshot displays the vLab: Managing and Provisioning VMs for Labs interface. The top navigation bar is blue with the title "vLab: Managing and Provisioning VMs for Labs" and a "Welcome Admin" message. Below the navigation bar, there are three tabs: "Add Nodes to Cluster", "Cluster Information", and "Cluster Status". The "Cluster Status" tab is currently selected. On the left side, there is a sidebar with a list of navigation links: "Home", "Add Template", "Update Information", "Add-Admin", "Sheepdog Cluster" (highlighted in orange), "CourseInfo", "Dashboard", "About", and "Logout". The main content area is green and contains a list of links for cluster management: "Cluster Node Information", "Disk Image Information", "Cluster Information", "Add disk to sheepdog cluster(vdi,snapshot or incremental disk)", "Start sheep on each node", "Configure Sheepdog zookeeper", and "Cluster with local driver & Commands". Below these links is a table showing the status of disk images in the sheepdog cluster.

Name	Id	Size	Used	Shared	Creation time	VDI id	Copies	Tag	
s ServerTemplate.qcow2	1	10 GB	2.2 GB	0.0 MB	2015-06-24 14:31	9c44fe	3		CS101
s ServerTemplate.qcow2	2	10 GB	0.0 MB	2.2 GB	2015-06-24 14:40	9c44ff	3		CS102
ServerTemplate.qcow2	0	10 GB	0.0 MB	2.2 GB	2015-06-29 13:56	9c4500	3		
c 133050024CS101	0	10 GB	148 MB	2.0 GB	2015-06-24 14:59	a4621f	3		
c 133050024CS102	0	10 GB	96 MB	2.1 GB	2015-06-29 13:57	a463d2	3		

At this place, the administrator can get information about the actual cluster. Whether it's working fine or not. In this figure we can see many links like, cluster node information, Disk image information, etc. The screenshot is about disk images present in the sheepdog cluster. Other information related to cluster formation is also added here.

## 1.8 Information about Courses & VMs

vLab:Managing and Provisioning VMs for Labs  
Welcome Admin

**Registered Courses**

Course-id	Instructor
CS101	Sushmita Bhattacharya
CS102	Sushmita Bhattacharya

**Course-Wise Enrollment List**

Select CourseID ▾ List-of-Students

**Course-Wise VM Created**

Select CourseID ▾ List-of-VMs

133050024CS101

**Course-Wise Pending VMs**

Select CourseID ▾ List-of-VMs

Logout

Here the administrator can get all the information about the courses. How many courses has been register, who registered which course, how many students are enrolled in each courses, and how many VMs are created for each course etc.

## 1.9 Start & Stop VMs

vLab:Managing and Provisioning VMs for Labs  
Welcome: Ankit

<div style="background-color: #003366; color: white; padding: 2px; text-align: center;">Home</div> <div style="background-color: #003366; color: white; padding: 2px; text-align: center;">Add Template</div> <div style="background-color: #003366; color: white; padding: 2px; text-align: center;">Update Information</div> <div style="background-color: #003366; color: white; padding: 2px; text-align: center;">Add-Admin</div> <div style="background-color: #003366; color: white; padding: 2px; text-align: center;">Sheepdog Cluster</div> <div style="background-color: #003366; color: white; padding: 2px; text-align: center;">CourseInfo</div> <div style="background-color: #FF6600; color: white; padding: 2px; text-align: center;">Dashboard</div> <div style="background-color: #003366; color: white; padding: 2px; text-align: center;">About</div> <div style="background-color: #FF0000; color: white; padding: 2px; text-align: center; margin-top: 5px;">Logout</div>	<div style="background-color: #003366; color: white; padding: 2px;">Server Information</div> <div style="background-color: #003366; color: white; padding: 2px;"> <b>Hostname</b> : ankit-lappi  <b>Hypervisor</b> : QEMU 2.0.0  <b>Max VCPU(s) per VM</b> : 16  <b>CPU(s)</b> : 4  <b>Architecture</b> : x86_64  <b>Total Memory</b> : 5.70 GB  <b>Free Memory</b> : 2.17 GB  <b>Total Disk Space</b> : 452.05 GB  <b>Free Disk Space</b> : 218.27 GB </div> <div style="background-color: #003366; color: white; padding: 2px; margin-top: 5px;">Virtual Machines</div> <div style="background-color: #003366; color: white; padding: 2px;"> <b>Total Number of VM(s)</b> : 7  <b>Running VM(s)</b> : 0  <b>Stopped VM(s)</b> : 7 </div>	<div style="background-color: #003366; color: white; padding: 2px; text-align: right;">Filter By: Select Type <span style="border: 1px solid black; padding: 0 5px;">▼</span> OR Select a Course</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">VM Name</th> <th style="width: 10%;">Screenshot</th> <th style="width: 40%;">VM Info</th> <th style="width: 30%;">Start/Shutdown VM</th> </tr> </thead> <tbody> <tr> <td>133050024CS101</td> <td style="text-align: center;"><div style="background-color: #ccc; border: 1px solid #000; padding: 5px; width: 30px; margin: 0 auto;">VM</div></td> <td>Max memory: 1048576 KB Used Memory: 1048576 KB State: Shutdown CPU(s): 1</td> <td style="text-align: center;"> <div style="background-color: #00FF00; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">⏻</div> <div style="background-color: #FF0000; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">⏻</div> </td> </tr> <tr> <td>VM1</td> <td style="text-align: center;"><div style="background-color: #ccc; border: 1px solid #000; padding: 5px; width: 30px; margin: 0 auto;">VM</div></td> <td>Max memory: 1048576 KB Used Memory: 1048576 KB State: Shutdown CPU(s): 1</td> <td style="text-align: center;"> <div style="background-color: #00FF00; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">⏻</div> <div style="background-color: #FF0000; 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VM Name	Screenshot	VM Info	Start/Shutdown VM																															
133050024CS101	<div style="background-color: #ccc; border: 1px solid #000; padding: 5px; width: 30px; margin: 0 auto;">VM</div>	Max memory: 1048576 KB Used Memory: 1048576 KB State: Shutdown CPU(s): 1	<div style="background-color: #00FF00; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">⏻</div> <div style="background-color: #FF0000; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">⏻</div>																															
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In dashboard we can get the information about the underlying system. Number of CPU, disk space, memory etc. And on the right all the VMs in the systems are listed and we can filter these based on running VMs, shutdown VMs, VMs related to a particular course. Administrator can start and stop the VM at anytime by pressing green or red button respectively.

## 2 Instructor

### 2.1 Adding a course

The screenshot shows the vLab:Managing and Provisioning VMs for Labs interface. The top header is dark blue with the text "vLab:Managing and Provisioning VMs for Labs" and a green welcome message "Welcome Sudhita Bhattacharya". On the left is a vertical sidebar with a dark blue background containing links: Home, Add Course (highlighted in orange), Add Students, Select Template, Dashboard, About, and a red Logout button. The main content area has a light blue header with the text "Add a new course". Below this, there is a form with a label "CourseId:" followed by a text input field containing "CS102" and a placeholder "ex:-CS101". To the right of the input field are two buttons: "Add Course" and "Instructions". The main content area below the header is a large green rectangle.

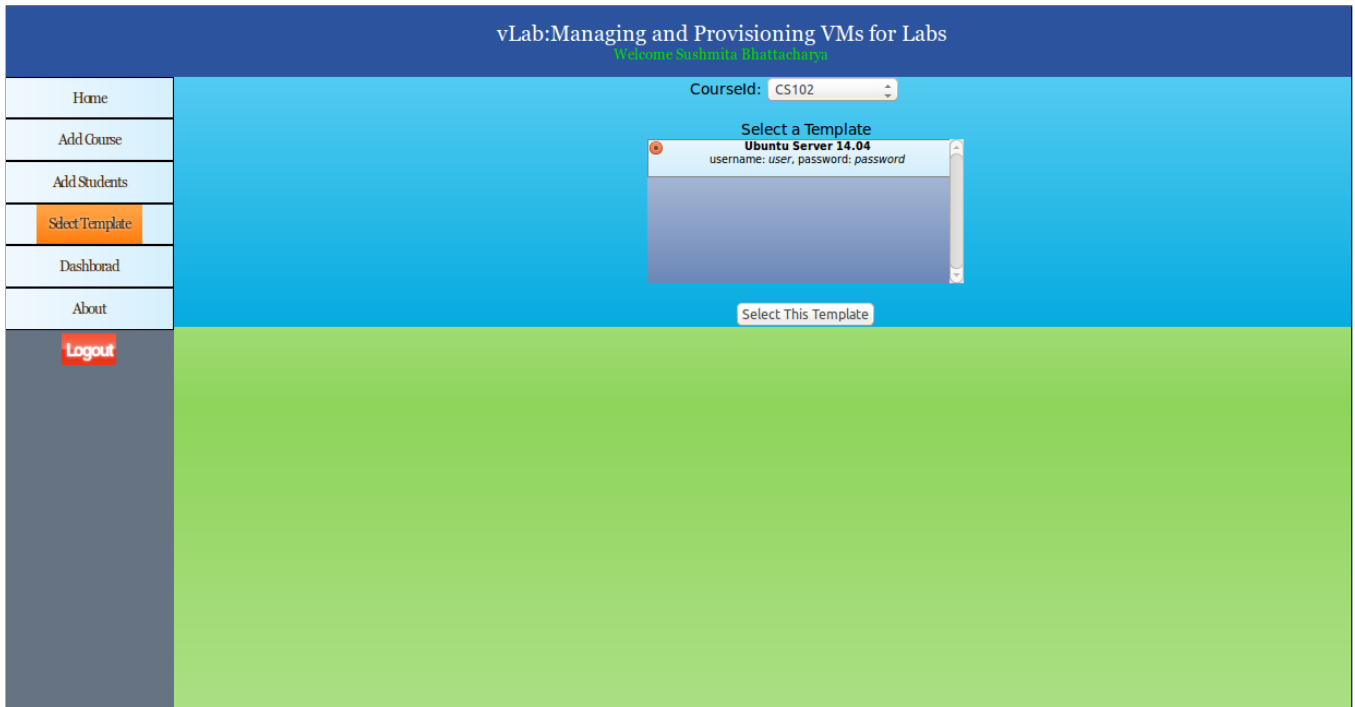
Simply give the name CourseId of the course, say CS101 for basic programming course for undergrads. After clicking Add Course, you will be transferred to next page where you are suppose to give the list of students to be enrolled in this course.

## 2.2 Adding students to a course

The screenshot shows a web application titled "vLab:Managing and Provisioning VMs for Labs" with a user greeting "Welcome Sushmita Bhattacharya". On the left is a sidebar menu with options: Home, Add Course, Add Students (highlighted in orange), Select Template (highlighted in yellow), Dashboard, About, and a Logout button. The main content area has a light blue header with a "CourseId:" dropdown menu set to "CS101". Below this is a file upload section with the text "Choose a file to upload:", a "Browse..." button, the status "No file selected.", and an "Upload File" button. A message states "CSV file should contain records in this format" followed by a sample CSV snippet: "Rollno", "Rollno1", "etc.". The bottom half of the page is a large green rectangular area.

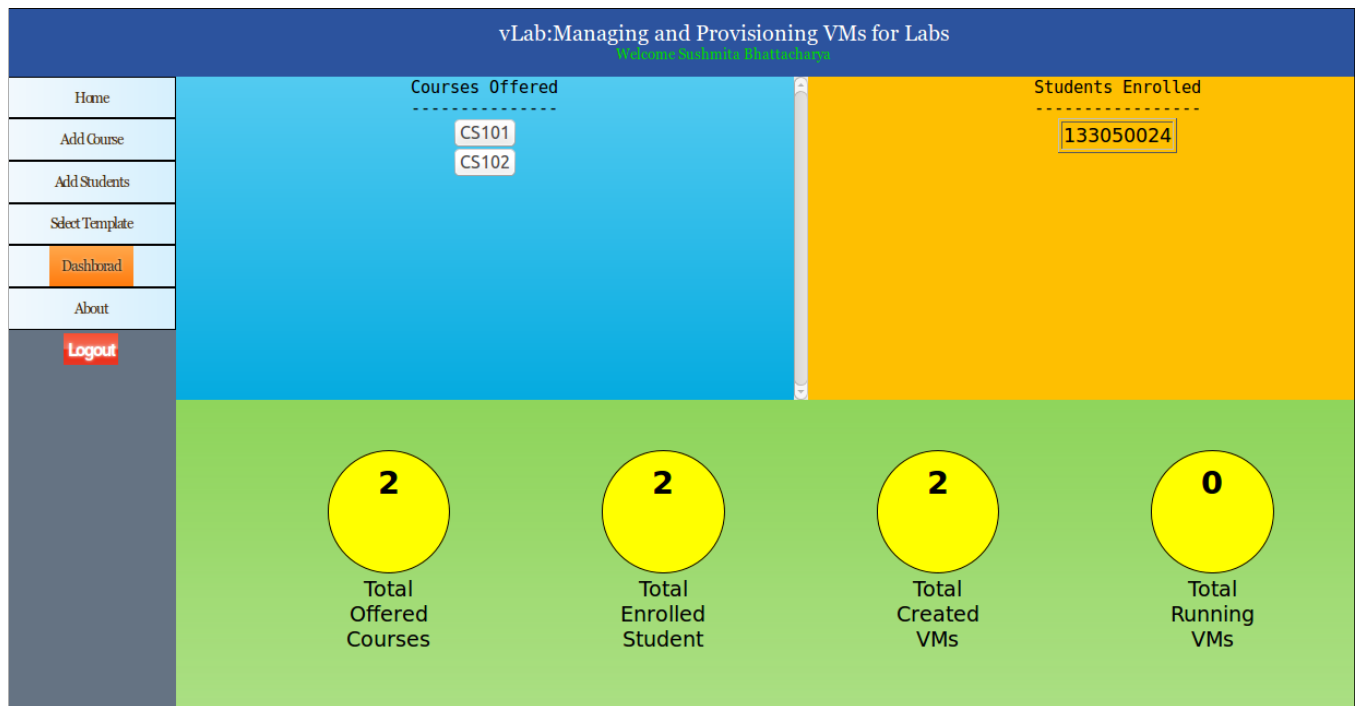
Simply give a csv file containing roll numbers of the students to enroll the students in some course. You can select the course from drop down list in which you want to add the students. If you have already added students in some course then also you can give more roll numbers to add more students to the course. All the courses, registered by you, will be shown in the drop down list and you can only see the courses which are registered by you. No same course can be registered by two instructor at the same time. Till now you registered a course and added students to the course. Now add a template to the course to create VMs for the students.

## 2.3 Choosing a template for a course



All the templates uploaded by the administrator will be shown here with the OS installed in those templates, username and password for that template. Select one of the template from the list and click on "Select This Template". This will create a different directory for your course and copy the template to that directory. Which will be used by other VMs for that course.

## 2.4 Dashboard



Here the instructor can check about all the courses offered by him/her and all the students enrolled to the courses offered by him/her . Beside that he/she can also view information about VMs, how many total VMs are there for all his/her course(s), how many running VMs, etc.

## 3 Student

### 3.1 Start/Stop a VM

vLab: Managing and Provisioning VMs for Labs  
Welcome Anshu Taneja

Filter By: Select Type OR Select a CourseID

VM Name	Create VM	VM Info	Start/Shutdown VM
133050024CS101	Create VM	Max memory: 1048576 KB State: Running vCPU(s): 1 OS: Ubuntu Server 14.04	
133050024CS102	Create VM	Max memory: 1048576 KB State: Shutdown vCPU(s): 1 OS: Ubuntu Server 14.04	

Domain started  
Use 'ssh user@192.168.122.4' to access your Virtual Machine  
Default Password for VM was/is "password". Please change your password.  
VM took 25.68 seconds to boot.

Close

All the VMs for you will be listed in VMs tab. If you are login for the first time then click on "Create VM" button. Yeah you can click on Create VM button. After this you VM will be created in the system. On the right most column there are two buttons, green and red. Green is to start the VM and red is to stop the VM. Once you will click on the green button your VM will be started and a messages will appear on the screen that your VM started and do ssh using username@ip-address. It will also show the default password. Beside that it will show the boot time i.e how much time it took to boot your VM.



## 3.2 Student Related Events

vLab:Managing and Provisioning VMs for Labs		
Welcome Ankit Ankit		
Home	Enrollment Status	System Status
VMs	<div>[Mon, 29 Jun 2015 14:00:10 +0530] IP Address: 133050024CS102 IP Address is 192.168.122.4.</div> <div>[Mon, 29 Jun 2015 14:00:10 +0530] BOOT TIME: 133050024CS102 took 14.10 seconds to boot.</div> <div>[Mon, 29 Jun 2015 13:58:27 +0530] IP Address: 133050024CS102 IP Address is 192.168.122.4.</div> <div>[Mon, 29 Jun 2015 13:58:27 +0530] BOOT TIME: 133050024CS102 took 15.10 seconds to boot.</div> <div>[Mon, 29 Jun 2015 13:57:24 +0530] VM CREATE: 133050024 Created VM 133050024CS102</div> <div>[Mon, 29 Jun 2015 01:53:44 +0530] IP Address: 133050024CS101 IP Address is 192.168.122.4.</div> <div>[Mon, 29 Jun 2015 01:53:43 +0530] BOOT TIME: 133050024CS101 took 14.49 seconds to boot.</div> <div>[Mon, 29 Jun 2015 00:02:32 +0530] IP Address: 133050024CS101 IP Address is 192.168.122.4.</div> <div>[Mon, 29 Jun 2015 00:02:32 +0530] BOOT TIME: 133050024CS101 took 14.60 seconds to boot.</div> <div>[Sun, 28 Jun 2015 20:00:47 +0530] IP Address: 133050024CS101 IP Address is 192.168.122.4.</div> <div>[Sun, 28 Jun 2015 20:00:47 +0530] BOOT TIME: 133050024CS101 took 16.43 seconds to boot.</div> <div>[Sun, 28 Jun 2015 19:58:38 +0530] IP Address: 133050024CS101 IP Address is 192.168.122.4.</div> <div>[Sun, 28 Jun 2015 19:58:38 +0530] BOOT TIME: 133050024CS101 took 26.88 seconds to boot.</div> <div>[Wed, 24 Jun 2015 22:06:34 +0530] VM CREATE: 133050024 Created VM 133050024CS101</div> <div>[Wed, 24 Jun 2015 15:49:43 +0530] IP Address: 133050024CS101 IP Address is 192.168.122.4.</div> <div>[Wed, 24 Jun 2015 15:49:43 +0530] BOOT TIME: 133050024CS101 took 14.41 seconds to boot.</div>	
About		
Logout		

Important events related to the student is shown here. like at what time he/she booted which VM, how much time it took to boot that VM and what is/was the IP address of that VM. In fact, similar functionality is also added for each type of user. An instructor can view all the information about all the courses, all the VM in his/her courses, and likewise an administrator can view events about the whole system.