The task is to create a customized iso for Ubuntu, which contains some labs and their dependencies pre-installed in the iso. So that once the user installs this iso on his/her machine, he/she can run all the Virtual Labs in offline mode.

Requirements :-

To accomplish this task, following are the requirements:
(i) A machine with 32-bit Ubuntu installed on it. (32-bit is required as some labs have jar files which work on a 32-bit machine)
(ii) Ubuntu Customization Kit installed on the machine.
(iii) Unetbootin installed on the machine.
(iv) Internet connection to download and install the softwares

Ubuntu Customization Kit is the software which provides an interface after extracting the base iso, to install any software and add or delete files from the iso. Unetbootin is used to make a bootable pen-drive/usb stick from the iso.

Technical Issues :-

Few of the labs have some .exe executables which requires a Windows platform to run those softwares. So we need to install wine on our iso, which has some dependencies on few libraries. Further, we need to check the dependencies of each lab and install the particular software required or a plugin required to run that lab.

Computer Organization (IIT Kgp) Lab has the dependency on a 32-bit Linux, so we will make a 32-bit iso.

Labspec needs to be updated with the client side requirements, as at times it is difficult to figure out the client side requirements. And we may require it for similar work in future.

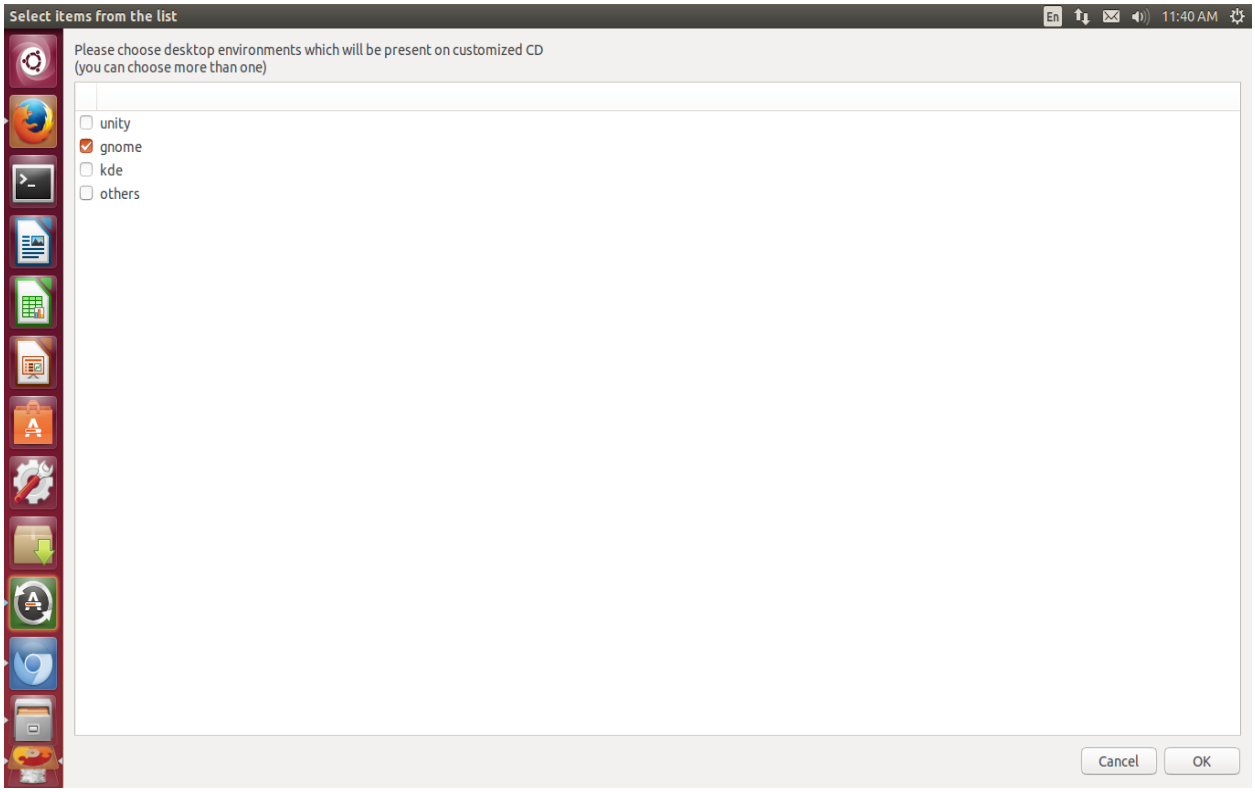
All the external links, in all the labs are to be condensed or removed, as the lab will work in offline mode. Few code changes are required to redirect the home page to index.html rather than pointing to vlab.co.in.

Few html pages were made, for example the landing page i.e. index.html, and few discipline wise pages.

Steps Involved :-

1. Download the base image, eg. ubuntu-13.10-desktop-amd64.iso
2. Start ubuntu customization kit.
3. Choose the language as ‘en’ for English

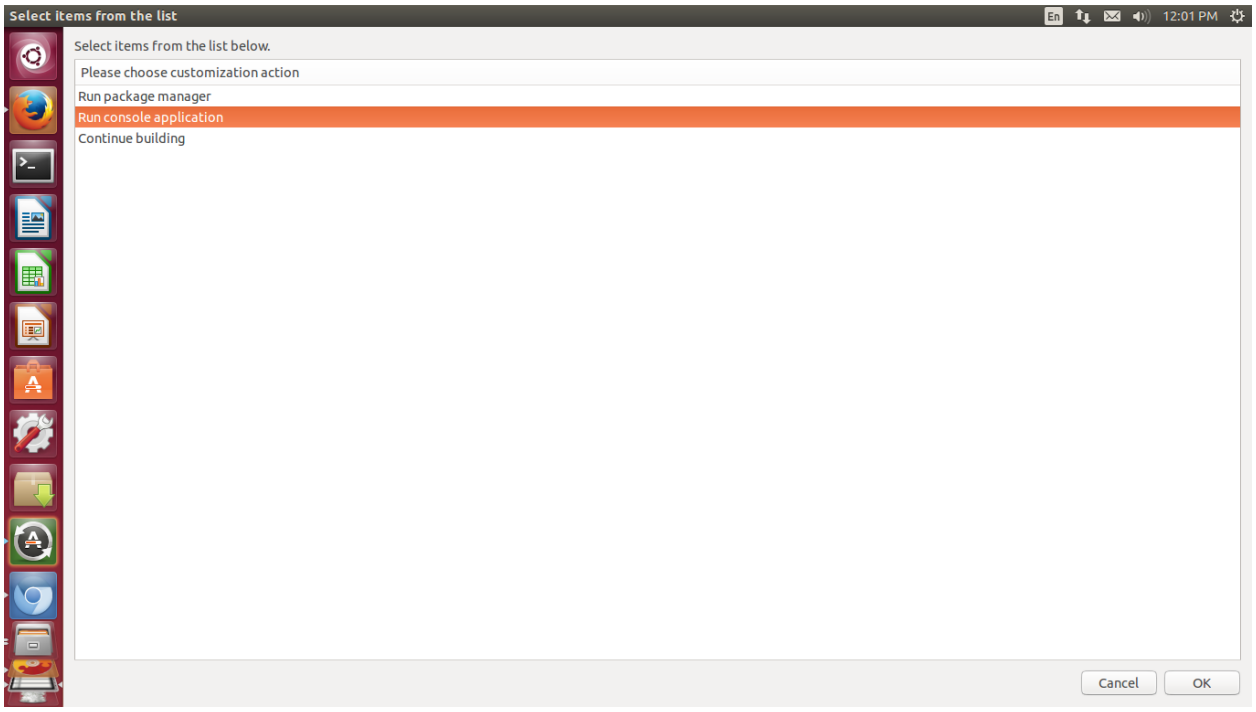
4. After that, choose desktop environment as gnome.



5. Then select the base image, which you downloaded in step one.
6. Choose ‘yes’ for the option Do you want to customize the CD manually during building (using packages).
7. Select ‘yes’ on the next window. Do you want to delete all windows related files from the CD
8. Select ‘yes’ on the next window. Do you want to generate a hybrid image(ISO/USB)
9. Your new iso image will be created in
   ~/tmp/remaster-new-files/livecd.iso
   Click OK to start the process.
10. The terminal will ask for the password.

The files will be extracted from the base image, and it will mount the image. This step will take some time.

11. Once it extracts all the files, following window pops up, select the option “Run console application”.



13. The new terminal will open up, write
apt-get install vim firefox aptitude
The above will install all the basic software required to complete the installation.

14. Steps involved in installing Wine
(i) First we need to add this ppa repository, with following
add-apt-repository ppa:ubuntu-wine/ppa
apt-get update

(ii) Then we need to update the sources.list file in /etc/apt/sources.list, such that we can download and install few softwares which have their dependencies on some libraries which are not generally provided from regular ubuntu repositories. So add the following repositories to the sources.list file

- deb http://archive.ubuntu.com/ubuntu quantal main restricted multiverse universe
- deb http://archive.ubuntu.com/ubuntu quantal-updates main restricted multiverse universe
- deb http://archive.canonical.com/ubuntu quantal partner
- deb http://extras.ubuntu.com/ubuntu quantal main

(iii) After updating the sources.list file, we can easily install wine using the following command.
apt-get update
apt-get install wine

15. Apart from wine, we also need ngspice, flashplugin-installer, stellarium
So install those using the following command
apt-get install ngspice stellarium flashplugin-installer openjdk-7-jdk openjdk-7-jre icedtea-plugin

16. Next we need to ensure that our flash plugin is working. So also download the file
install_flash_player_11_linux.x86.tar.gz
from official adobe's website or from any site hosting it. Then extract the files from above .gz file. So from the directory where 'libflashplayer.so' file is located, copy it to ~/tmp/remaster-root/usr/lib/mozilla/plugins/

17. As one of the lab requires xampp, so we need to install xampp in our iso. So download the file xampp-linux-1.7.7.tar.gz
Then run the following command from where you have downloaded this file.
tar -xvzf xampp-linux-1.7.7.tar.gz -C ~/tmp/remaster-root/opt/

18. Now for the flash to work in xampp we need to add the following to /opt/lampp/etc/httpd.conf
AddType application/x-java-jnlp-file .jnlp
AddType application/x-java-archive .jar
AddType application/x-java-archive-diff .jardiff

This is to be added where all the other AddType commands are placed.

19. After this we need to copy our labs to /opt/lampp/htdocs, and change the owner and permissions. For example

```
sudo cp -R cse01/ ~/tmp/remaster-root/opt/lampp/htdocs
chmod -R 775 cse01/
```

run following from /opt/lampp

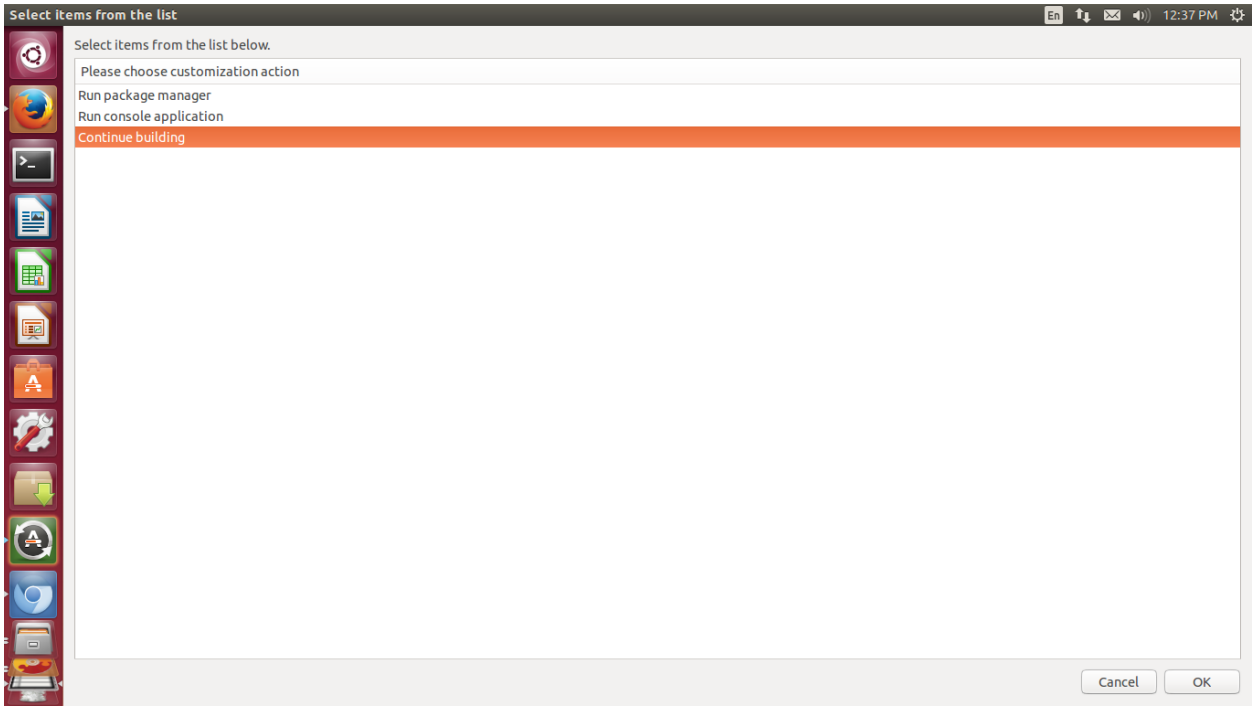
```
chown -R nobody:nogroup htdocs/
```

20. After this as Virtual Microwave Lab, also requires mysql so follow the step from https://github.com/vlead/Manual-OVPL/blob/master/Hosting%20-Virtual-Microwave to create the database and setup the mysql in the iso.

21. You can download the index.html and other html pages required for this iso from https://github.com/dharmeet/customizedISO
and place those under ~/tmp/remaster-root/opt/lampp/htdocs/

22. Add the following command to /etc/rc.local so that it starts xampp whenever the system boots up.
/opt/lampp/lampp start

With the above steps we are done with installation of all the softwares required for the lab, and the deployment of the lab is done. You need to update the source codes of the labs, which have links pointing to the external links. After this exit from this prompt which will again bring you to the following window, select continue building and press OK.



Your livecd.iso is ready in ~/tmp/remaster-new-files

Create Bootable Pendrive from ISO

After making the iso following the above steps, or downloading the iso from a given source, do the following.
To create the bootable pendrive from above iso, insert a 8 GB USB stick and start the unetbootin software. And select your customized image i.e. livecd.iso, rest of the steps are self explanatory.

Challenges faced in creating the ISO

As different labs are created on different platforms with different system requirements, it was difficult to install one software working for all the labs. Especially the requirement to run the .exe files, and the .jnlp files on a 32-bit machine took some extra effort in completing this task.

The Virtual Microwave Lab, runs fine on a older version of xampp, but then we dropped VLSI lab as it required a newer version of mysql.

The labs should be developed such that the end user has to install minimal softwares to run those, but each lab had its own specific requirement on the client side, so this made the task more challenging.

The labspec.json file should be updated with the client side requirements for the lab.