University of the People

Instructions for using the Virtual Computing Lab

Version 2.1
Overview

The virtual computing lab is designed to provide students who do not have dedicated computers with the various software tools and development environments that are required to complete the labs, projects, and development assignments that are a part of the computer science curriculum.

The virtual computing lab is a cloud computing service. Using VDI (virtual desktop infrastructure) technology that is hosted on cloud computing infrastructure, the solution executes a computer desktop on a remote computer that can be accessed from most internet browsers. The solution has been tested using the Microsoft Windows Internet Explorer, Google Chrome, Mozilla Firefox, and Opera.

Students who use the virtual computing lab will be given a URL or web address and login credentials. The login credentials will typically be the same credentials that are used to log into the University of the People Moodle course room system.

After logging in the student will see in their browser what appears to be a ‘desktop’ of a computer. The desktop has icons of programs on it. Essentially what the student is seeing is a virtual computer that is running in the cloud computing infrastructure and the desktop of that computer is presented back to the student in the browser.

The virtual desktop works pretty much the same way as the desktop on your computer. If you double click an icon the associated application will be executed. There is a start menu in the lower left corner of the desktop that functions the same way as the windows start menu icon. Clicking on this start menu will cause the menu listing all of the applications to appear.

The desktop of the virtual computing lab is a Linux desktop. The system is actually running a special version of the Ubuntu Linux operating system and a special version of an Ubuntu desktop. As such all of the applications are Linux based.

Accessing the Virtual Computing Lab

The virtual computing lab can be accessed by clicking on the link for the virtual computing lab in your Moodle course room under the course resources section.

You can also copy and paste the following URL into your browser.

http://uopeoplelab.org

This URL will access the login page for the virtual computing lab. One point that you should remember is that you will typically want to maximize your browsers size before logging in. When you log in the size of the browser window will become the size of the desktop for the virtual computing lab. You will find it easier to use the system when the desktop is as large as your display.
Another point to remember is that the virtual computing lab is implemented as a Java applet that runs in your browser. The first time that you access the lab from a particular computer, it will download and cache the applet in your browser's cache. This means that your browser must be able to accept such downloads (this is almost always the case) and it also means that you will need to be patient as it can take a few minutes to download the applet the first time it is accessed. Each subsequent access will be much faster as long as the applet is not cleared from the cache.

When the applet has installed and started your screen will look like the following:

![Virtual Computing Lab Screen](image)

**Logging Into the Virtual Computing Lab**

When you have successfully accessed the virtual computing lab, you will be presented with a login screen. You must enter your username and password. The username will be your surname and the password is your student ID. When you login using the portal method, your first name will appear at the top of the screen. Please keep in mind that all logins are case sensitive so you must make sure that you are using an uppercase ‘S’ at the beginning of your student id.

If you do not have an assigned account or cannot remember the password you can still use the virtual computer lab by using one of the guest accounts. There are currently a number of guest accounts. The following usernames and passwords can be used to login to the system.

<table>
<thead>
<tr>
<th>Username</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
You are welcome to use the guest accounts but you must remember that other students can use them as well so I would recommend that you move your personal files off of the server when you are done to make sure that they are not deleted or corrupted by another user. You can always contact me to get a personal account assigned.

The virtual computing lab is currently offered as a Pilot program. As such it is NOT maintained or supported by the University of the People student services. All questions or issues with the system must be directed towards the instructor.

When you have successfully entered your credentials to log in, a screen indicating that your desktop is loading will appear.

**Understanding the Advanced Options**

You may have noticed something on the login screen called advanced options. If you click on this control, the following screen will appear.
There are several options that you can change here but you should NOT change any of them at this time except the session mode option.

The session mode can be either desktop which is the default or portal. The portal mode presents the applications available in the virtual computing lab in a different way. Using portal each application will start in its own browser window. **If you are using the virtual lab from a slower internet connection, you should change the session mode to the portal setting.** The portal setting will provide much better performance. If you have a fast network connection and you would like to have the experience of working in the virtual lab as if it were your local desktop then you can select desktop mode. This selection can be changed each time you log into the system, so you can try both modes to see which one suits you better.

If you select desktop as the mode you will be able to make a further selection to go into ‘fullscreen’ mode. This is a nice feature but does not work well on some displays with high resolution so you might have to reduce the resolution of your display to make use of this. What fullscreen does is it will make the content within the browser occupy the entire screen. This will give the experience of the virtual lab desktop being the desktop of your local computer. Again, this is something that you can test to determine if it will work well for you.

**Using the Desktop**

When you have successfully logged in (and you have selected desktop mode) the desktop will appear. The icons on the desktop will change depending upon which courses you are enrolled in. Some icons will be common for all users as all users will have access to the OpenOffice tools. Other icons will be specific for particular courses. The following shows the desktop that is displayed for students enrolled in CS1101.
You will notice that there are icons for a variety of applications on the desktop that you can use to complete your assignments. This desktop is for students enrolled in CS1101 so the most important icon is the IDLE icon which starts up their IDLE development environment and provides access to the Python interpreter.

The following is a quick review of some of the applications on the desktop:

**Thundar File Manager** – This application is similar to the Microsoft File Explorer. It allows the user to access the files and directories in the user’s desktop.

**OpenOffice Calc** – This application is similar to Microsoft Excel and provides an Excel compatible spreadsheet.

**OpenOffice Math** – This application is similar to Microsoft Equation. It will enable users to create math formulas that can be embedded in documents using OpenOffice writer.

**OpenOffice Impress** – This application is similar to Microsoft Powerpoint. It will enable the user to create Microsoft Powerpoint compatible presentations.

**OpenOffice Draw** – This application will enable the user to create pictures. This application contains the symbols necessary to create flowcharts so this tool can be used to create flowcharts.

**OpenOffice Writer** – This application is similar to Microsoft word and can create word compatible documents.

**OpenOffice Base** – This application is similar to Microsoft Access and can be used to create Access compatible databases.

**UoPeople** – This icon will start the Firefox web browser and open the University of the People website.

**UoPeople Moodle Course room** – This icon will start the Firefox web browser and open the University of the People Moodle course room.

**Terminal** – The terminal application will open a terminal which provides access to the Linux command line. Students who have an understanding of Linux or Unix can use this to navigate their system.

**Mousepad** – This application provides a simple editor that is similar to Microsoft notepad.

**Dia** – This application is used to create diagrams and in particular flowchart, UML, and entity relationship diagrams. If you use this application to create diagrams, you should use the ‘export’ feature to export your diagram to a common format such as .jpeg because this format can be uploaded to Moodle and your peers will be able to display your diagram.

**Firefox Web Browser** – This is the browser application that is available in the virtual computing lab.
Keep in mind that the applications that appear on the desktop in desktop mode are the SAME applications that are available in portal mode.

**Using Portal Mode**

When you have successfully logged in (and you have selected portal mode) the portal display will appear. In portal mode, you will see a file manager displayed by default in the main part of the screen and all of the applications that you have access to will appear in a menu on the left side of the screen. Clicking on any of the icons in the menu will start the corresponding application. The portal mode will have the same applications as desktop mode, they are just presented differently and because on the active application will be interacting with the virtual lab server at any time, the performance from a network perspective is substantially better.

**File Manager Display**

When logging in using portal mode, most of the display is occupied by the file manager view. In the figure above we can see the portal display screen and much of the screen is occupied by the file manager which is on the right side. The file manager will provide a simple view of the file structures that you have access to. To help you get acquainted with the different areas of the portal display, the following diagram numbers each section and provides a description of its function.
1. Section 1 is the menu of applications. This section contains icons and descriptions of each application that you have access to. Different UoPeople courses have different requirements in terms of the applications or features that you will need access to so the icons listed will change. Applications are associated with a group for each course. When you register for a course, your username will be associated with the ‘group’ for that course and the group will provide you with access to the the applications required for the course and the shared directory for the course.

2. Section 2 is the folders control. In this section there is a drop down menu that will enable you to select any of the folders that you have access to. Each student will always have access to a folder called uopeople which contains files that are common to all uopeople courses. This folder is associated with the uopeople group as well. The uopeople group provides applications such as the OpenOffice applications, Adobe Reader, Terminal, File Manager, FireFox and the UoPeople Shortcuts because these are common to all courses. Each user account will have a Desktop directory and a Documents directory which are found under the dropdown menu item ‘Profile’. The desktop directory is only used for Desktop mode. The Documents directory is where you MUST save all of the files that YOU create. Again ONLY save your files in the Documents directory. You will see additional directories depending upon which courses you are registered for. Currently we are only supporting cs1101 but will include more courses in the future. These shared course directories contain files and applications that are required for the course.

3. Is a file details screen. When a particular file or directory has been selected in section 4, the details of the item appear in section 3. In addition to details such as file type, size, and
modification date, the valid actions or applications that you can use on the file are listed as well. For example, if you click on a pdf file, section 3 will list actions such as ‘download’ which will allow you to download the file to your local computer and ‘adobe reader’ which will use the adobe reader application to open and display the pdf file. These options change to match the appropriate options for the type of file.

Section 4 lists the files and directories that exist in the directory that has been selected in section 2.

**Understanding the shared folders**

When you use the Thundar file manager to view your files and directories or in the file manager that appears when logging in via portal mode, you will notice that you will have at least 3 directories that are created automatically. For example students who are enrolled in CS1101 will have the following three directories:

**cs1101** - Each course that a student is enrolled in will have a course common directory. You should not create any files in this directory. This directory will contain any files, scripts, or data that might be required for a particular course. Each course directory is accessible by each student that is enrolled in the course.

**UoPeople** – The UoPeople directory is a common directory for all students who have access to the Virtual Computing Lab. You should not create any files in this directory. This directory will contain common files such as the UoPeople logo that is used on the desktop and scripts that are used by the virtual computing lab.

**Documents** – The documents folder is your directory. All of the files that you create, assignments that you are working on, and data that you require should be saved in the Documents directory. Files that you might need that are in the course directory (such as cs1101 above) should be copied into your Documents directory. The documents directory will be persistent between courses. As long as your account persists in the virtual computing lab this directory will not change and will be available. You are allowed to create sub-directories in your Documents directory and it would be recommended that you create sub-directories for each course that you enroll in that requires the use of the virtual computing lab.

**Important Best Practices**

The following are tips that will help you make effective use of the virtual computing lab.

1. In desktop mode, selecting apps from the start menu is easier than double clicking on the desktop
2. Keep as few applications running on your computer as possible to improve performance
3. **ALWAYS** remember to log out of your virtual computing lab session. This can be accomplished either from the start menu or by clicking the icon in the lower right hand corner of the desktop when in desktop mode or by clicking the logout icon in the upper right corner when in portal
mode. If you do not log out of your session, you might not be able to log back into the system until the timeout on your session has expired and the system cleans up your desktop. This is VERY IMPORTANT

4. Many of the applications have configurable options that will allow you to change the font or font size of text. If you are having difficulty reading or working with an application you might want to change the font to something that you are more comfortable with. The following are a couple of applications that you may want to adjust the size of the fonts:
   a. IDLE /Python – Under options and configure IDLE you can change the font
   b. Terminal – Under view, select the zoom in option to make the font larger
   c. Thundar File Manager – Under view, select the zoom in option to make the font larger
   d. Mousepad – Under options, select font to change the font

**Moving files and data into and out of the Virtual Computing Lab Environment**

Files such as scripts, documents, diagrams, and other data that are created in the virtual lab environment will often need to be moved out of the environment and vice versa data, files, or other items may need to be moved to the virtual lab environment. In the current version of the virtual lab environment this can be accomplished in two ways.

When operating in Desktop mode, you can use the Thundar File Manager to move files between your local computer and the virtual lab environment. You will notice that the disk drives, desktop, and documents folders form your local computer will appear as folders in the Thundar File Manager as shown in the following picture.
The virtual lab environment cross mounts directories between your local computer and the virtual lab environment to allow you to copy files from one environment to another. This same capability will map printer from your local computer to the virtual lab environment and you can use the local media capabilities of your computer (such as sound) from within the virtual lab environment. For example if you were to log into the virtual lab environment and play a video clip on YouTube, you would hear the sound on your local computer.

A similar capability is available when using the file manager in portal mode because the file manager will have the ability to both upload and download files which will enable you to move your personal files, programs, or other materials from the virtual computing lab to your local computer and vice versa. For those students who are using shared computers, you can use this to move your work into the virtual computing environment and leave it there where it is accessible regardless of what computer you are using.

In addition to the capabilities to move files between the local computer and the virtual lab environment that are built into the environment, the following tools can also be used to move files and data between environments.

Moodle
Files that need to be uploaded as assignments to the University of the People Moodle course room must be uploaded by logging into Moodle from within the virtual computing lab. You can get access to the Moodle site using the Moodle icon which is on the desktop in the virtual computing lab.

From within Moodle, if you select to upload a file, you will be able to upload files from your desktop in the virtual computing lab environment.

**Email**

Another method of moving files either into the virtual computing lab environment or out of it is through the use of email. Any email account that is accessible from a web browser can be accessed from within the virtual computing lab by using the Firefox browser. You can log into your email from within the virtual computing lab environment and upload files to your email (send the file to yourself) or download them from your email (save files that are attached to a message in your inbox).

**Dropbox**

Another method to manage files is to sign up for a free account at Dropbox. You can sign up for a free Dropbox account at [http://www.dropbox.com/](http://www.dropbox.com/) Dropbox provides a cloud storage solution where you can keep your files in the cloud. A free account provides 2 gigabytes of storage that you can use to store files that you would like to move into (or out of) the virtual computing lab environment. To use dropbox you will need to have a valid account on a computer, but once your account has been created, you can upload, store, and download files using your web browser. I have used this method of moving files very successfully to and from the virtual computing lab.

**Troubleshooting Common Problems**

The virtual computing lab is designed to operate in a typical windows environment so the vast majority Windows XP, Windows 7, and Windows Vista implementations with Internet Explorer used as the web browser will work without any issues. It is a REQUIREMENT to have Java installed on your machine and to have the browser plug in for java installed. In many cases java is installed on Windows and Linux systems by default. If java is NOT installed on your windows system, you can install it by pointing your browser to [www.java.com](http://www.java.com) clicking on the ‘free java download’ button and following the instructions. Although the most common problem to using the virtual computing lab, there are some other common situations and conditions that might prevent the virtual computing lab from working including the following:

**Firewall Setup**

The virtual computing lab uses the RDP or remote desktop protocol. Each of the ports defined in the following chart are used and must be allowed to pass through your local firewall. Most of these ports are typically open in all situations (ports 22 and 80 for example). The standard port for RDP, which is used by Microsoft is also typically open in most firewalls. The final two ports that are used are 1111 and 1112.
If you are having problems getting the virtual computing lab to work AND you have a firewall this could be your problem.

A firewall that is preventing the Virtual Computing Lab from functioning may be on your computer if the windows firewall is enabled or any of the optional Linux firewalls are enabled, or the firewall may be device in the network. Many of the routers that are used for DSL or Cable internet service have such firewall capabilities. If your router device has a firewall that is blocking these ports, follow the instructions of the manufacturer of the device to open access to these ports.

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>SSH</td>
</tr>
<tr>
<td>3389</td>
<td>RDP</td>
</tr>
<tr>
<td>80</td>
<td>HTTP</td>
</tr>
<tr>
<td>1111-1112</td>
<td>Ulteo Protocol</td>
</tr>
</tbody>
</table>

**Java Plug In**

The virtual computing lab uses a java applet that executes within your internet browser. The current version of the Virtual Computing Lab has been tested with a number of internet browsers including Windows Internet Explorer, Opera, Google Chrome, and Firefox.

The browser used must support running java applets and will typically require a ‘plug in’ for the java runtime. By default browsers installed in the Windows operating system typically have the Java plug in installed by default, it is possible that the plug in has been removed or disabled. If you are getting an error at the login screen that indicates no java or a java timeout then the problem may be that the plug in either does not exist or has been disabled. Please contact the instructor for more details on how to resolve this problem. In windows based computers this can often be resolved by installing java by pointing your browser to [www.java.com](http://www.java.com) and clicking on the ‘free java download’ button and following the instructions. By default this installation process will install the correct version of java and will configure the browser plug in as well.

**Linux Java Issues**

Following the acquisition of Sun by Oracle and change in the Oracle policies with respect to Java which is intellectual property that is now owned by Oracle many Linux distributions including Ubuntu and Ubuntu variants, RedHat, SuSe, Fedora, and other variants of Linux no longer package java in the Linux distribution by default. Most Linux distributions attempt to avoid software that is not OpenSource or does not subscribe to GNU licensing. The Java runtime environment from Sun/Oracle is not opensource and is proprietary to Sun/Oracle.

What many Linux distributions are instead installing by default is a copy of the OpenJDK which is an open source version of Java. This is coupled with something called IcedTea which is the browser plug in for the OpenJDK Java runtime.
IcedTea is not compatible, at this time, with the java applets used by the virtual computing lab and you will see an error at the login screen in the browser when you attempt to access the virtual computing lab from a Linux computer that has the OpenJDK java runtime and the IcedTea plugin.

The only known resolution for Linux computers at this time is to uninstall OpenJDK and IcedTea and install the Sun Java SE runtime environment and its related browser plugin.

This is typically a pretty easy thing to do, but will unfortunately require that you have system administrator access to the computer that you are using.

The following tools can be used (based upon the distribution of Linux) to uninstall the OpenJDK and install the Java SE runtime.

Ubuntu – Software Center

Windows Java Issues

The installation of a Java runtime environment (JRE) in a Windows based system is often the typical or default situation. Many websites require the use of Java based code so you will normally find that the java runtime environment is installed.

If you find that the java runtime environment is NOT installed on your system and you are using one of the windows operating systems including Windows XP, Windows Vista, or Windows 7, installing the Java JRE is pretty simple. From the system navigate to the following URL:

http://java.com/

When this page appears, click on the “Free Java Download” button. The appropriate version of java for your system should be selected by default, and a page displayed which features a button with the following caption “Agree and Start Free Download”.

By clicking on this button the installation process will be started. You might see a prompt asking you to confirm the download. You should select ‘run’ at this point which will both download and then execute the installation process.

When the installation program has downloaded a dialogue will be displayed to lead you through the installation process. You might be prompted to install the ‘ask.com’ toolbar. I would recommend that you do not install the toolbar which you can do by ensuring that the checkbox is NOT selected.

As part of the installation process, the java browser plug in will be installed and configured along with the JRE. After the installation has completed close all of your browser windows and restart the browser and the virtual lab environment should work.