B

Guidance for Students

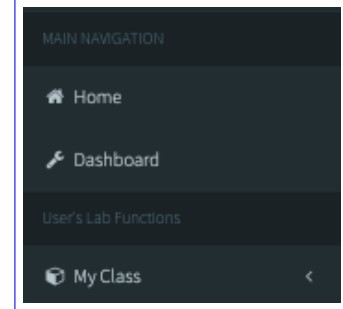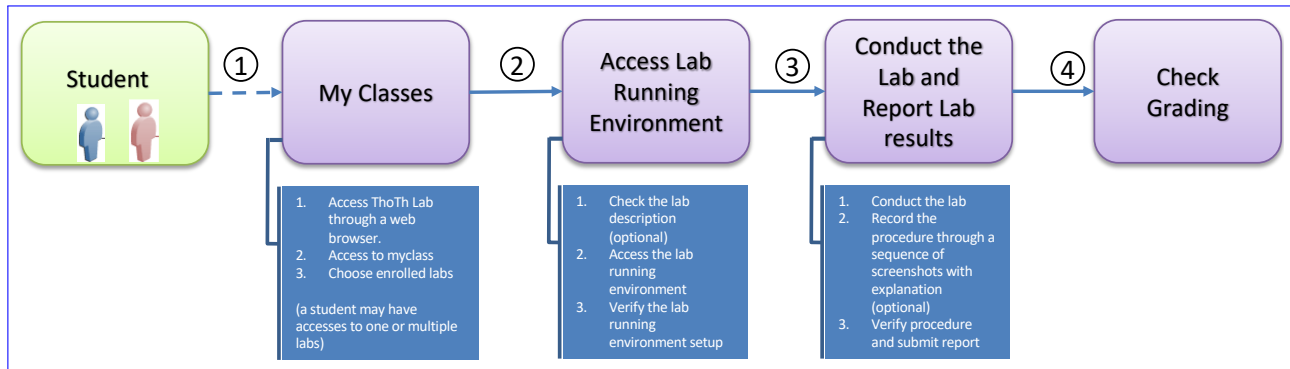**CONTENTS**

Student's functions and roadmap

The default registration role is normal user (or student). You will see a list of "Normal user (student) functions" on the left navigation bar shown in Figure B.2.

    To illustrate how a student uses ThoTh lab, in Figure B.3, we present a roadmap for student to follow. Particularly, the roadmap is built based on the main student's functions. In the roadmap, it includes four main steps. The first step is to login the ThoTh Lab and access to *My Classes*, from which a student can access to the hands-on lab running environment assigned to him/her. The second step is to access lab running environment including access the lab description, and running environments including one or multiple VMs and their interconnections. The third step is to conduct the lab and submit reports. Finally, a student can access to its lab grades.
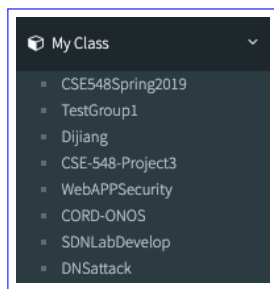

Figure B.2
ThoTh Lab normal user (student) functions.

Figure B.3
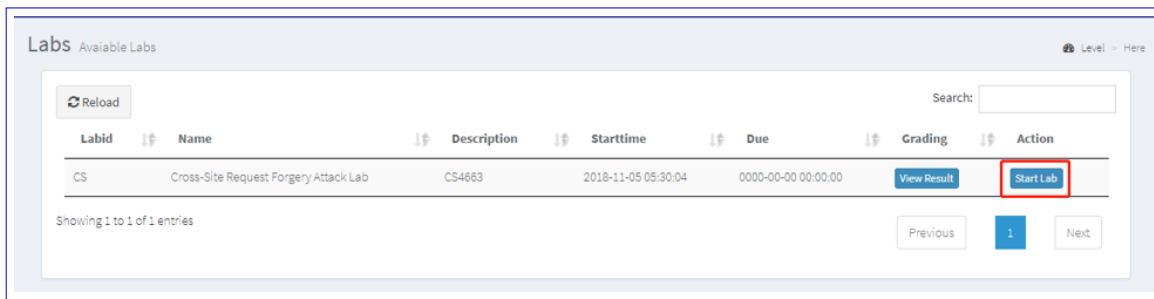Roadmap for instructors.

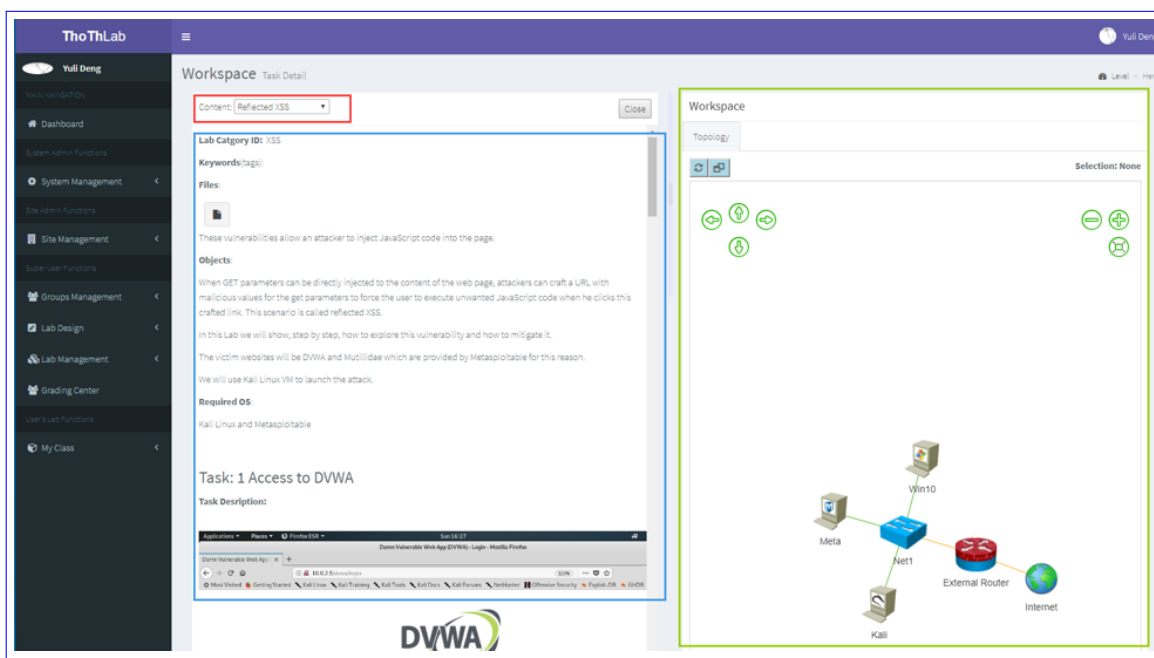## Access to My Class

Figure B.4
Access to labs.

To access your first lab, login to `https://www.thothlab.com/`. As a student, you can access any of your enrolled lab environments. On the home page, as shown in Figure B.5, click on *My Class* in the menu on the left-side of the ThoTh Lab web portal. Then, a drop-down list classes will present. Click on the lab you want to access, and a table will show what labs that the student can access, as shown in Figure B.5. Then, click on *Start Lab* button on the right side of the lab table to access.

    After clicking on the *Start Lab*, you will be redirected to the lab workspace as shown in Figure B.6. On the left side of the page is lab description box (in a *blue frame*). You may also click on the drop-down menu on the top in the *red frame* to navigate between lab contents. On the right side of the page in the *green frame* is the virtual lab running environment (or workspace), from which you can access VMs to run your project. The lab content window can be closed (resumed) to allow larger view of workspace.
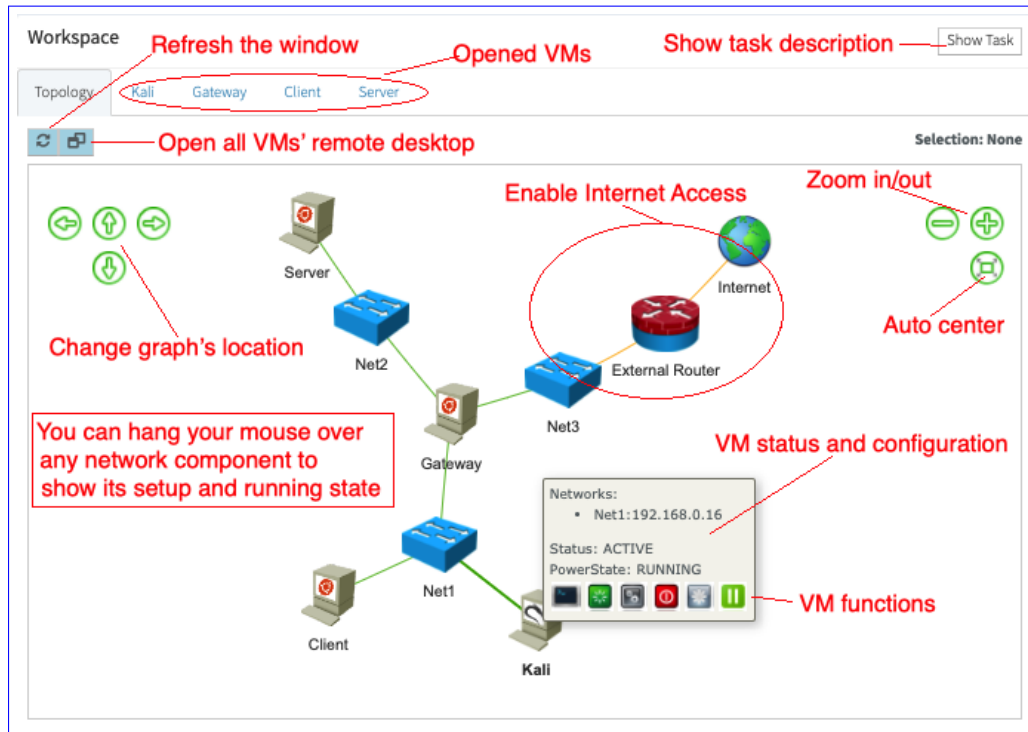
Figure B.5
Lab access for students.

Figure B.6
Lab Environments for students.

In the lab running environment window as shown in Figure B.7, the workspace shows a topology of your virtual lab running environment, in which the example includes internet, an external router (i.e., a virtual router), a local network, and a VM. The basic networking components and units in the lab environment include:

- *Virtual Machines (VMs)*: accessible and configurable. Student will conduct their labs mainly on provided VMs. ThoTh lab provide a set of VMs with different OSes and configuration setup.

- *Virtual Switch (VS)*: non-accessible and non-configurable. A VS is used for layer-2 access. Attaching VMs on the same VS allows them to see each other at the layer 2.

- *Virtual Router (VR)*: non-accessible and non-configurable. A VR is a *switch* enable the lab network to access to the external Internet.

- *Software Router (SR)*: accessible and configurable. An SR is implemented by software running on VMs. You can treat it as a common VM with installed routing software.

Figure B.7
An example of Lab environment setup in workspace.

- *Internet*: non-accessible and non-configurable. The Internet represent the external networking access. It should work with VR together to enable the external network access.

    You may use mouse to interactive with the graphic interface. Hang your mouse over the Router will show its IP address, while hang your mouse over the net will show the local network configuration, which shows 192.168.0.0/24 as in the example. Hanging your mouse over the Virtual Machine, it will show the IP address of the VM, the status of the VM (On, Off, Suspend, Error, etc.), and also a list of action that you can perform on the given VM. The available actions include:

- *Get Console*: It will open the remote desktop of the VM in a new tab.

- *Restart*: It will restart the VM (the system will delay 60 seconds before the restart action.)

- *Rebuild*: It will restore the VM to its original status from the beginning of the lab, i.e., the system will rebuild the VM from its OS image. Note that by doing rebuild, you will lose all data and modifications that you have done on the VM. Be cautious to take this action since you **Do NOT** need to do this unless the VM is corrupted. It may take more than 30 minutes to rebuild depending on available system resource. Please consult to your system admin before doing this action.

- *Shutdown*: VM will shut down. After shutdown, the VM's states will be lost.

- *Suspend*: VM will be suspended. For suspension, the VM's states will be maintained and it will release the system resource. Thus, if a user does not use the system for longer time, it is better to put the VM in the suspension state to release resource for other users.

- *Pause*: VM will be paused. The pause action will not release system resource for the VM, it simply halts the VM, and the VM can be quickly wake up from the pause state.

Access to Lab Running Environment
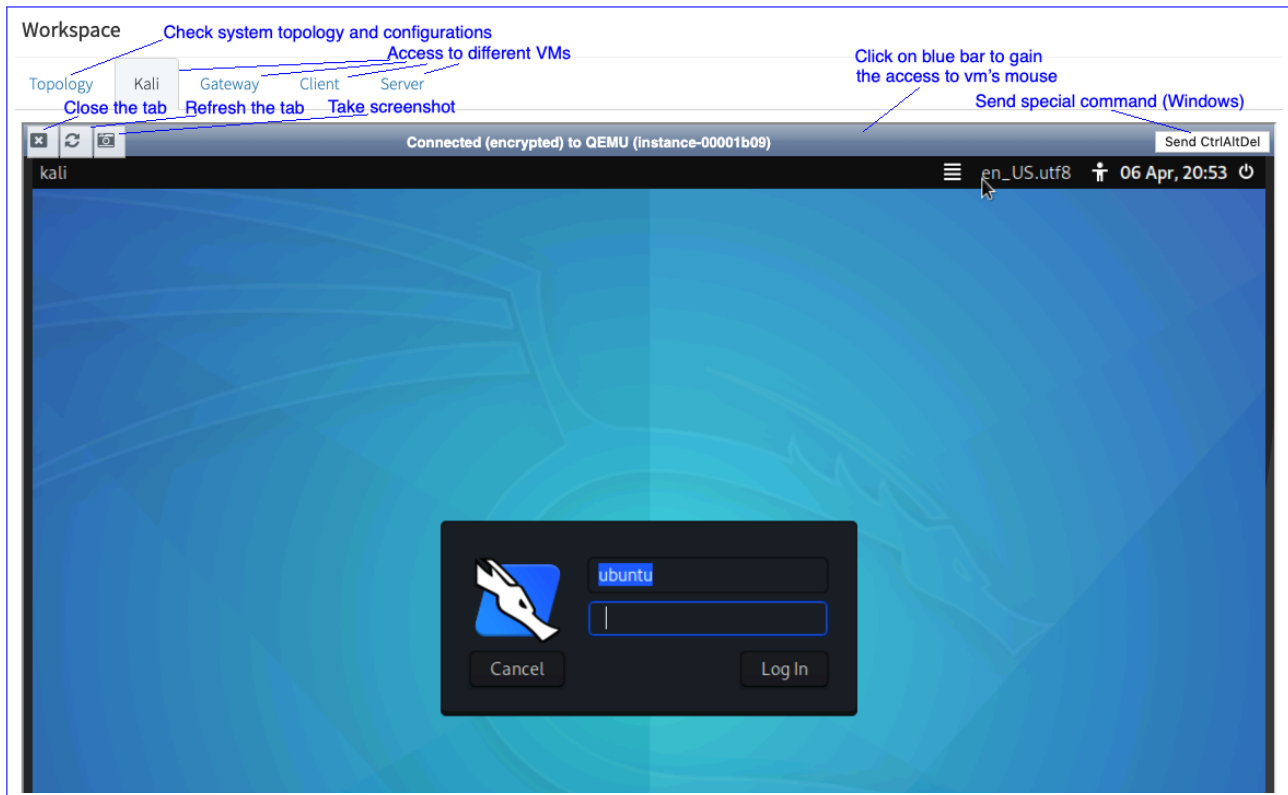
Figure B.8
Access to VM's remote desktop.

For convenience, on the left upper corner of the workspace window, there is an icon ⊡ . You can click on it to open all the VMs' remote console at the same time. Each console is presented as a tab in the workspace. Then, you can click on a tab to access to its remote desktop. An example is shown in Figure B.8.

Once the remote desktop of a VM is opened in the workspace, you can click on the top *Blue Bar* to allow the remote desktop to *grab* your mouse device. Otherwise, the mouse will only work on your local computer and will not act in the remote desktop. Then, you can switch between VMs to work on different remote desktops of given VMs.

Note that students are sharing the access to VMs if they are assigned as a multi-member team project. We must note that, if there is no server-based VM is used, for group-based team project and multiple students sharing the same setup, only one student can work on the dedicated VM.

Submit Lab Reports

Students can choose the VM to work on specified tasks. As shown in Figure B.9, on the left side, it presents the lab tasks. For each task, it may be configured for task report submission, which is shown in-line ⊞Open Task Submission. Clicking on it, you can use screenshot function to record your lab progress and outcomes.
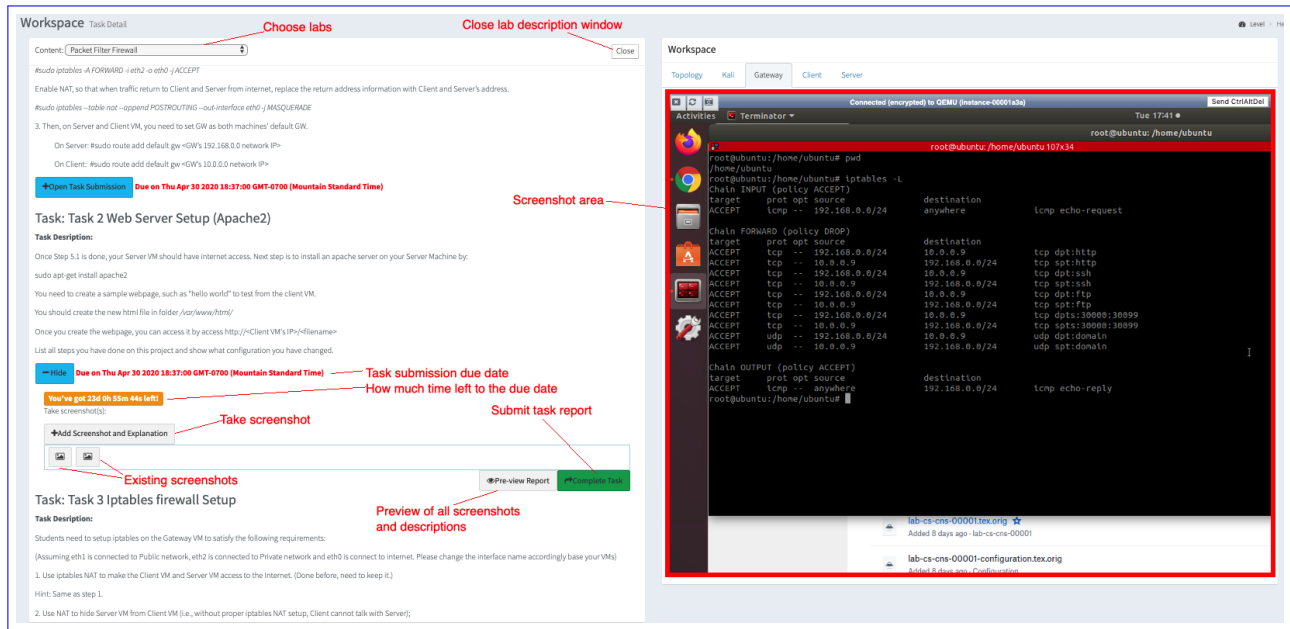
Figure B.9
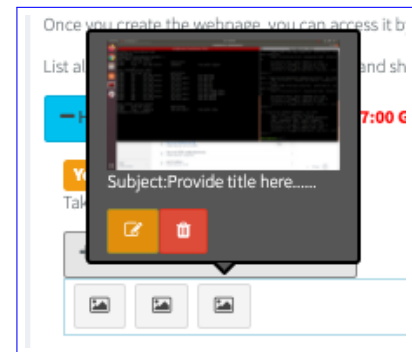Student lab running environment and lab report submission.

In Figure B.9, the main functions and features are noted by *red text and links*, in which most of them are straightforward without needing in-depth explanation. The screenshot area is in the bold and red frame on the right-side of workspace window. We must note that a screenshot must only be taken by clicking on the *Add Screenshot and Explanation* button to prevent students from uploading screenshots from external resources. This will guarantee the submitted work is done in the provided lab running environment.

A screenshot example is given in the Figure B.11. Students need to provide a title and explanation for each screenshot to illustrate the lab progress and outcomes. Students can also retake the screenshot and edit description by hanging mouse over the screenshot icon in the screenshot queued area shown in Figure B.10 and click on the editing. A new screen shot window will be presented and you can retake the screenshot by click on the *re-take Screenshot* button and update the description, which is shown in Figure B.12.

Figure B.10
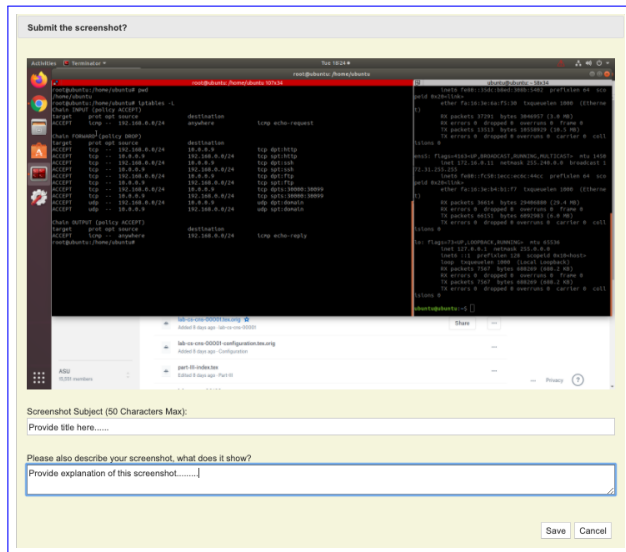Edit existing screenshots.

Students can review all their captured screenshots and descriptions by click on the *Pre-view Report* button. Once the report is finalized, students can click on the green *Complete Task* button to submit the report for a task. Once submitted, students cannot modify the submitted report.

Another important feature that students need to pay attention is the due date. It counts down to the due date time. Once the due is reached, students cannot take screenshots and submit the report.
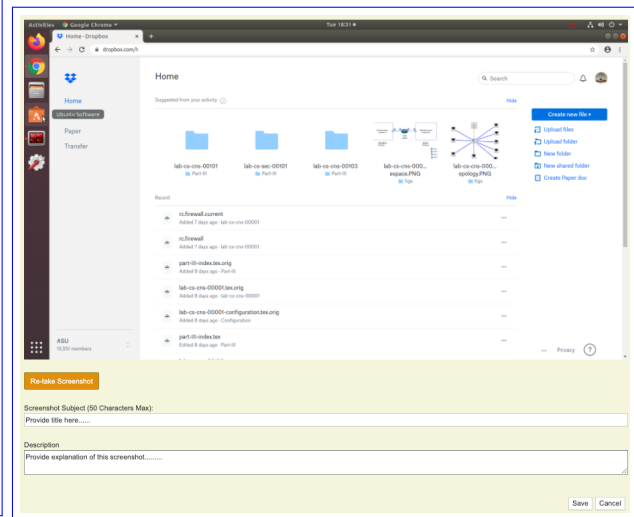
In addition to taking screenshots and provide explanations, ThoTh Lab also provides upload a word or PDF report file from students' computers or submit a pure text description (normally short). The features are standardized and easy to follow.
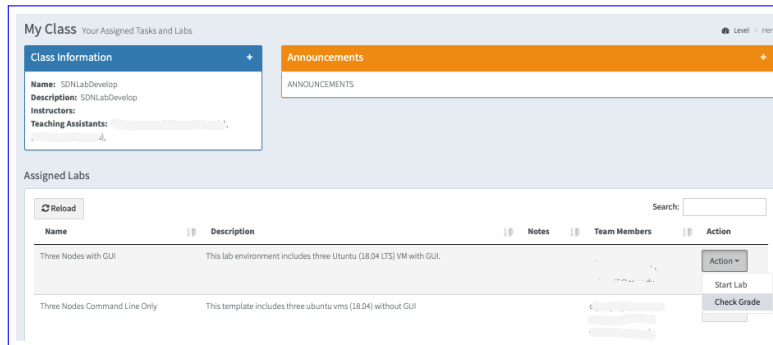
Figure B.11
Screenshot example.

Figure B.12
Retake screenshots.

Check Grading

Finally, grade checking is very simple. Students can go to the lab list and click on *Action → Check Grade* to access the grade.

Figure B.13
Check grade.