

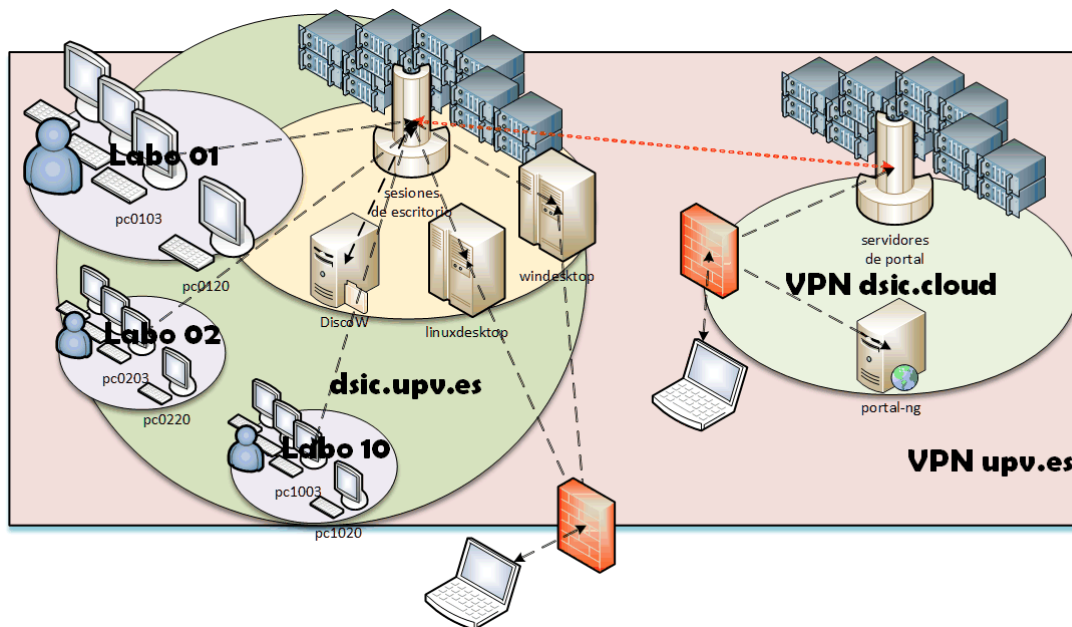
TSR LABS

2020/21 COURSE

TSR'S LAB ENVIRONMENT

This document extends the contents of "**DSIC's Lab environment**" document, giving specific details on how to carry out TSR's lab work within the DSIC lab environment.

We should point out the important role that virtualized environments play on how to carry out the lab assignments, and how those environments can be accessed remotely.



Before current pandemic restrictions, the standard way to access computing resources involved physically interacting with the computers available in the lab rooms. This is no longer possible. Fortunately, it was, and, thus it is still, entirely possible to access the needed computing resources remotely.

We need to distinguish two different kinds of virtualized computing resources: linuxdesktop¹ sessions and virtual machines. The requirements for the environments derive from the goals of TSR's lab sessions, namely: **"To develop a distributed service built out of components (applications) developed on top of NodeJS, that communicate with each other using ZeroMQ, and deploy it using Docker containers"**.

linuxdesktop is a shared environment, which makes it impossible for two users to allocate the same resource for their exclusive use. This is the case of network ports, needed to establish

¹ En adelante, todo lo referente a linuxdesktop es aplicable también a windesktop

communications among components. Additionally, it is not really possible for each student to manage an independent Docker image store for deploying a service within the linuxdesktop environment.

Thus, the only realistic way to carry out the lab exercises is by using virtual machines providing an isolated and individually managed environment for each lab team/individual. Thus, most of the lab activities for TSR will need to be carried out within a virtual machine, being the exception that they can be carried out within a linuxdesktop.

With careful attention to detail, it is still possible to carry out the lab work for the first two labs, either within the linuxdesktop environment. Another viable alternative would let you use your own computing means. Details on this alternatives can be found in the appendix "**Alternatives not using the portal**"

1 HOW TO ACCESS THE PORTAL. RECOMMENDATIONS

1. **On-site:** at DSIC lab room numbers 0 to 9. Not possible due to public health restrictions. One could choose to boot either Windows or Linux. Booting into the LINUX environment would be equivalent to working directly within the linuxdesktop environment, with access to the network and the portal VMs.
2. **Through the UPVNET network environment.** It is possible to log into the linuxdesktop environment through a remote terminal session. Once within one of those sessions it is possible to Access the VM portal.
3. **Remoto fuera de la UPV.** Two alternatives: (A) Through a VPN to the UPVNET network. Then proceed as in point 2 above. (B) Directly accessing another direct VPN into a Portal network, in which case it is not necessary to start a linuxdesktop session first.

Remote sessions to linuxdesktop through a GUI interface have a higher overhead than establishing a direct TTY/Console remote connection, as they make sense really only in scenario 1 above.

Thus, the simpler and most efficient way to connect to your virtual machine is to employ method 3-B above: directly connect to your VM by previously joining the Portal VPN.

The previous document ("**DSIC's lab environment**") contains all information you need to follow this recommended approach. Note that you can follow this approach whether you are on campus or at a remote location.

2 SOFTWARE ARTIFACTS USED

1. Software common for all the labs:
 - Linux distribution: Ubuntu 20.04.1
 - NodeJS: 12.X
 - Npm: 6.X
 - Some programmers text editor (we recommend *Visual Studio Code* within the Programación menu)

```

worcli.js - user - VisualStudio Code
Archivo Editar Selección Ver Ir Ejecutar Terminal Ayuda
EXPLORADOR Bienvenido JS worcli.js x
EDITORES ABIERTOS
USER
ESQUEMA
JS worcli.js > ...
1 // worcli
2 // invoked with "node worcli bk1URL bk2URL delay class"
3 // all 5 parameters are mandatory
4 var zmq = require('zeromq')
5 , rw = zmq.socket('req')
6 , rc = zmq.socket('req')
7
8 var args = process.argv.slice(2)
9 if (args.length < 4) {
10   console.log ("Usage: node worcli bk1URL bk2URL transfer_delay class")
11   console.log ("Redirects bk1's class requests to bk2 broker, increasing del
12   process.exit(-1)
13 }
  
```

2. For labs 2 and 3:
 - ZeroMQ: 5.X
3. Only for lab 3:
 - Docker: 19.03.X
 - Docker-compose: 1.26.X

In addition, you will need to use utilities to move files between your development computer and the VM (e.g., scp)

To interact with this environment, you should manage three sets of credentials/users:

Caso	Nombre/clave
Credentials for linuxdesktop	your_login/your_password
Credentials to configure the connection to the portal VPN	your_login/your_password
Credentials for https://portal-ng.dsic.cloud	your_login/your_password
Credentials for remote desktop or ssh access to the VM (on <code>tsr-millogin-2021.dsic.cloud</code>), as a standard user (non-admin) .	user/resu
Credentials to Access the VM as an administrator.	root/GalYMatias

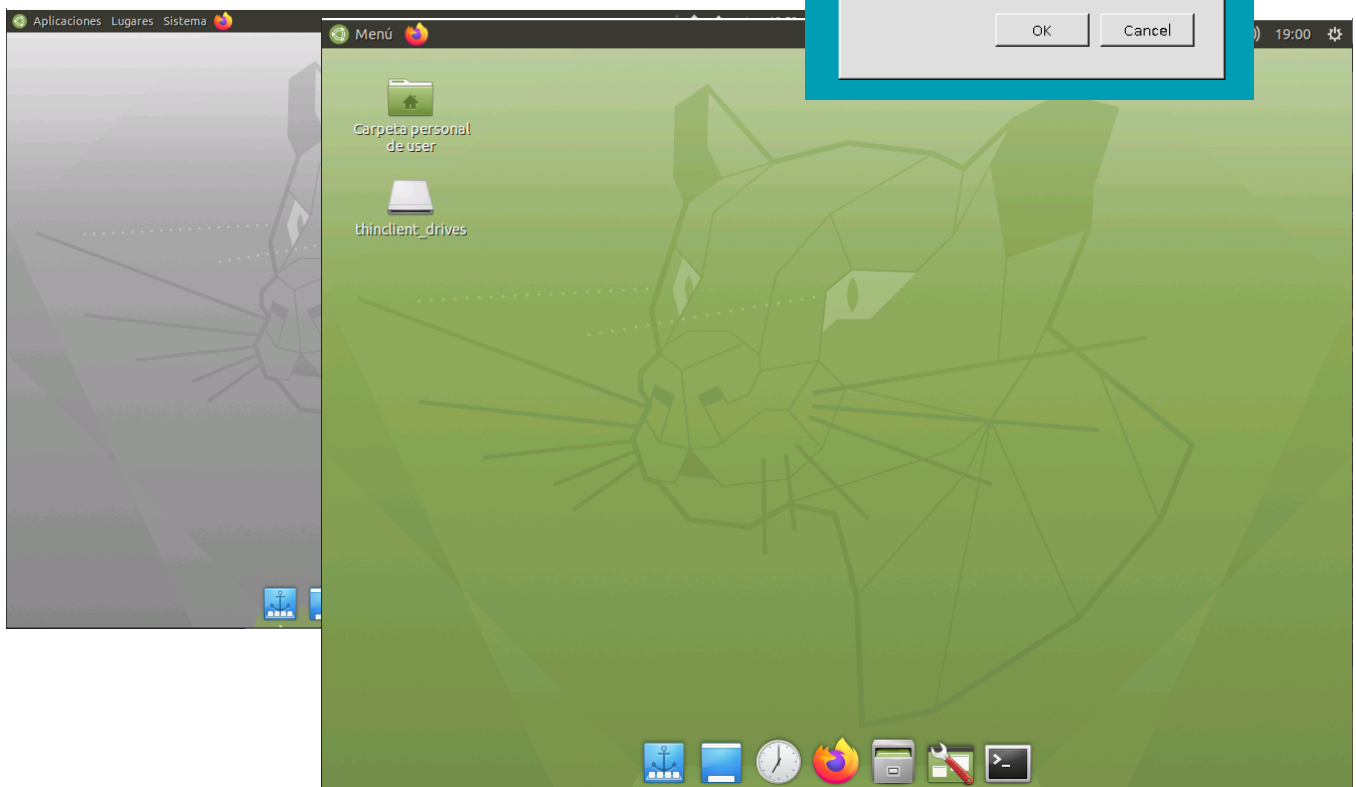
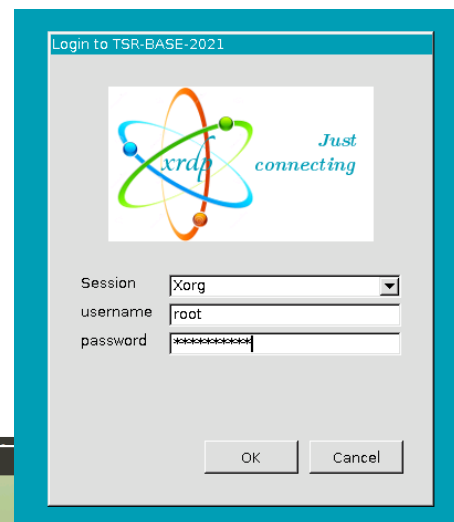
3 A TYPICAL WORK SESSION

The following steps are quite typical of a work sesión in this environment.

1. We open a VPN² tunnel to portal-ng from our workstation.
2. We Access portal-ng (<https://portal-ng.dsic.cloud>) using a browser, providing our DSIC credentials for authentication. After login, the browser shows us the state of our VMs, allowing us to interact with them. Assuming, for example, that the id we have been assigned is **milogin**, then the FQDN for our VM will be:

tsr-milogin-2021.dsic.cloud

3. If the VM is not running, we start it, and wait till its status shows it is running.
4. The web interface will show us extra information when we click on the name of our VM. Underneath that name we can find the link "Descarga archivo RDP" (tr: "download RDP file"), clicking on it will start a remote desktop connection with the VM.
5. We can login into the VM through the remote desktop connection client interface, and establish a sesión with said VM.
 - Best practice is to login as a normal (non-admin) user. (user, the desktop's background is Green). Best practice when we need to use elevated (privileged) operations is to run them using sudo instead of login in as root.



² You will need to configure it the first time around

6. Any further activities we carry out will be part of the work sesión proper, and will happen within the M. We can send/receive files, edit programs, and run them/test them.
7. When done, if you are not going to use the VM for a while, you should turn it off to avoid wasting its resources. If you foreseen continuing work son after, simply closing your sesión is enough for a quick later login.

APPENDIX: TWO ALTERNATIVES TO USING THE VMS

These alternatives are presented not as substitutes for using the VM, but as conveniences if momentary circumstances make it difficult/impossible to actually connect to it.

We present two alternatives: Working with a VM running on our desktop, or carry out part of the lab activities within linuxdesktop taking some precautions.

3.1 VM on your desktop.

If the connectivity you have for remote Access to the UPV network is bad, the experience you should expect out of connecting to the remote VM will be quite unpleasant, probably bordering the unusable.

You are still expected to fully understand, how to interact with your portal VM, however, for those bad connectivity cases, you can use a compatible virtual machine image we have created for the VirtualBox³ hypervisor. You can use this image to create a VM on your own desktop (VirtualBox can run on Windows, Mac, LINUX), which will work similarly to the VMs of the portal.

Keep in mind that the VM environment will consume a non-negligible amount of resources from your Desktop environment, thus, this approach should probably not be used with old/underpowered systems. If you opt to use this approach, it is your responsibility to install VirtualBox and setup and maintain the VM.

³ <http://www.virtualbox.org>, versión 6.1.14



When the VM in that environment boots, the system auto-logs in user user presenting the desktop shown in the above image. We have tried to reproduce exactly the configuration of the portal VM, so everything should work the same

The image, in format OVA, is available at TERENA⁴, using the following url: <https://filesender.rediris.es/?s=download&token=0c7f6111-4bdf-e152-b001-8d89570557bb>. The current version weights 5.7GBs and expires december 10.

3.2 linuxdesktop for labs 1 and 2

If using **linuxdesktop for labs 1 and 2** you need to take care to avoid using the same ports other users may be using. To achieve this goal, we should reinterpret the port numbers that you see in the lab exercise handouts.

We have reserved the port range 50000 to 59999 (5 is fixed) on linuxdesktop for TSR labs. Given that no exercise requires more than 10 ports at the same time (we can represent them as a digit, from 0 to 9), we have 3 digits remaining to distinguish one student from another. We suggest taking the last 3 digits of your ID card to identify yourself on those “free” three digits of the port number.

- Thus, a student with ID Card number 29332481 can use ports 54810 to 54819, with a good chance that no one else will also try to use them.
- If an exercise asks you to use ports 8000, 8001 and 8002, you should reinterpret those ports as 54810 (instead of 8000), 54811 (instead of 8001) and 54812 (instead of 8002).

These are the main differences between linuxdesktop and the portal VMs

⁴ A public european organization the UPV is part of.

- Differences: user credentials⁵. Docker (lab 3) is only available on the VMs.
- Similarities: Same Linux distribution (Ubuntu 20.04), same window manager (MATE), same software dependencies for TSR (Visual Studio Code with extensions, NodeJS v12, ZeroMQ v5)

4 REFERENCES

- Student manual for PORTAL-NG (http://www.dsic.upv.es/docs/infraestructura/portal-ng/manual_portal2_usuario_v8.pdf)

⁵ Al final del apartado 2 hay una tabla que resume esas informaciones