Surname: Name: ID:

ADMINISTRACIÓ DE SISTEMES OPERATIUS Final Exam, January 9th 2015

Exam needs to be done without external assistance

Answer into the reserved space

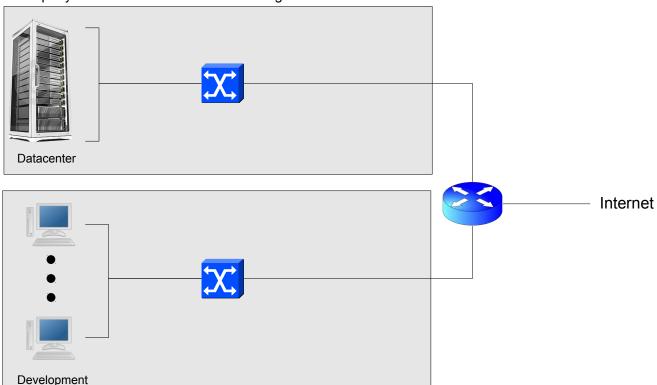
Clearly state SURNAME and NAME

It is mandatory to clearly explain the taken decisions when answering

Duration: 2 hours (It is not possible to leave before 30 minutes)

Question 1 – Network (4 Points)

A company has a network as shown in the figure:



The company has two main divisions:

- Development department, consisting of 15 PC.
- A Datacenter, having 80 Servers.

We also know that the company developns molecule simulators, for which it uses the company's datacenter (40 servers).

We also know that through a web server, the company allows to external agents, connected from the outside, perform simulations. These simulations are performed using 38 of the available servers. The remaining 2 are used to host the rest of the services:

DNS - VPN
 Web - SSH
 NFS (centralized for all the users) - Intranet

GIT

	re have the following reserved IP range 147.45.23.0/24. Dels anteriors serveis indica quins posaries públics i quins no. Justifica la resposta	(0.5 Points)
	ssign which IP addresses need to be assigned to all machines in this network. Elnswer.	aborate your (0.75 Points)
	Detail to which servers would you install each service, you must be coherent with nswers.	the previous (0.75 Points)
u.		
4. H	low would you offer a secure network from the outside in this situation?.	(0.75 Points)

Question 2 – Monitoring (3 Points)

We have a server in charge of the management in a car build chain. This server has a total amount of 10 sensors validating that the different components are corrects. They also control that no problem is found in

the build chain. If a problem is detected the system must react very quickly stopping the component building, raise an alarm and sending a message to the operator.

In order to operate, the server has a service named i_sensor in charge of obtaining the information from the sensors in real time. The $i_watcher$ is the process raising the alarm, while the stopping of the build chain is done through $i_controller$.

In a particular moment there is an alarm, the administrator checks the status of the system and observes the following top:

```
top - 17:54:50 up 4 days, 19:01, 2 users, load average: 7.44, 4.46, 3.18
Threads: 311 total, 10 running, 301 sleeping,
                                                 0 stopped,
%Cpu0 : 61.0 us, 4.5 sy, 0.0 ni, 34.1 id, 0.0 wa, 0.0 hi,
                                                                0.3 si, 0.0 st
%Cpu1 : 72.6 us,
                   3.9 sy, 0.0 ni, 0.0 id, 23.5 wa,
                                                       0.0 hi,
                                                                0.0 \, \mathrm{si},
%Cpu2 : 69.5 us, 5.2 sy, 0.0 ni, 9.4 id, 15.9 wa,
                                                       0.0 hi,
                                                                0.0 si, 0.0 st
%Cpu3 : 53.9 us, 4.9 sy, 0.0 ni, 41.2 id, 0.0 wa,
                                                       0.0 hi,
                                                                0.0 \, \mathrm{si}
                                                                         0.0 st
           2071636 total, 1951220 used,
                                           120416 free,
                                                          174900 buffers
KiB Mem:
KiB Swap:
                                 0 used,
                                                0 free. 1231204 cached Mem
                 0 total,
                          VIRT
                                  RFS
                                         SHR S %CPU %MEM
                                                             TIME+ COMMAND
  PID USER
                PR
                   NT
6736 sens-user 20
                     0
                         27352
                               18468
                                        6752 R 51.1 0.9
                                                           0:01.93 i_sensor
                                        6752 R 43.3 0.0
                                                           0:03.60 i sensor
6664 sens-user 20
                     0
                         21329
                                15678
 6753 sens-user 20
                         23868
                                14608
                                        6732 R 26.1
                                                     0.7
                                                           0:00.87 i sensor
                     0
2711 root
                                17264
                                        3208 R 21.5
                                                           0:09.38 i controller
                20 - 20
                         83024
                                                     0.8
6766 sens-user 20
                                        6652 R 18.2
                                                           0:00.56 i sensor
                         23636
                               13504
                                                     0.7
                                        6524 R 15.3
                                                           0:00.47 i sensor
6775 sens-user 20
                         23504
                               13188
                                                     0.6
 6782 sens-user 20
                         20864
                                 7404
                                        4012 R 2.6
                                                     0.4
                                                           0:00.08 i sensor
6785 watcher
                     0
                          8868
                                 5272
                                        1216 R 1.0
                                                     0.3
                                                           0:00.03 i watcher
    9 root
                20
                     0
                                    0
                                           0 S
                                                0.3
                                                     0.0
                                                           1:06.49 rcu preempt
                             0
   37 root
                20
                     0
                             0
                                    0
                                           0 S 0.3
                                                     0.0
                                                           0:14.17 kswapd0
   60 root
                                                           2:04.96 mmcqd/0
                20
                     0
                             0
                                    0
                                           0 S 0.3
                                                     0.0
 1456 mysql
                20
                     0
                        325380 158648
                                        5256 S
                                                0.3 7.7
                                                           0:12.03 mysqld
18048 mysql
                20
                        325380 158648
                                        5256 S 0.3 7.7
                                                           1:14.83 mysqld
```

1. Do you think that the stopping has been justified, or rather it is an error in the system: (0.75 Point)

 Define each of the fields concerning the system memory indicating in which status is the machine at this moment. (1 Point)

3.	State the implications of the above top regarding the fact that two CPU have a relativ time.	ely high wait 0.75 Points)
4.	Which characteristic have the processes using 0% of memory?	(0.5 Points)

Question 3 – Other (3 Points)

We have the following state of /shared in our system:

```
drwxr-xr-x 4 rserral rserral 4096 Jun 2 11:29 .
drwxr-xr-x 13 rserral rserral 4096 Jun 2 16:51 ...
drwxr-xr-x 2 aso
                     rserral 4096 Jun 2 22:39 dir1
drwxr-xr-- 2 rserral aso
                             4096 Jun 2 15:03 dir2
./dir1:
drwxr-xr-- 2 rserral aso
                            4096 Jun 2 15:03 .
drwxr-xr-x 4 rserral rserral 4096 Jun 2 11:29 ...
-rw----- 1 aso
                              13 Jun 2 15:03 fitxer11
                    aso
-rw-r---- 1 root rserral 213 Jun 2 15:03 fitxer14
./dir2:
drwxr-xr-x 2 aso
                    rserral 4096 Jun 2 22:39 .
drwxr-xr-x 4 rserral rserral 4096 Jun 2 11:29 ...
                              16 Jun 2 22:39 fitxer21 -> ../dir1/fitxer11
lrwxrwxrwx 1 rserral rserral
-rw-r---- 1 root
                           32413 Jun 2 15:03 fitxer22
                    root
```

We know that a user, unless differently stated, only belongs to th grup with his own name. We also know that aso is the only user with privileges to run sudo.

Answer the following questions independently (action happening in a question do not affect the rest).

1. What happens when we run:

```
aso:/shared$ mv dir2/fitxer22 dir1/ (0.25 Points)
```

2. Now we try to:

```
rserral:/shared$ rm dir2/fitxer21 (0.25 Points)
```

3. Given the output of:

```
rserral:/shared$ cat dir1/fitxer14
dir1/fitxer11
```

What happens if we run:

	aso:/shared\$ cat dir1/fitxer14 sudo xargs rm	(0.75 Points)
4.	<pre>And: rserral:/shared\$ cat dir1/fitxer14 > dir1/fitxer11</pre>	(0.25 Points)
5.	Now we run: rserral:/shared\$ sudo mkdir dir3	(0.25 Points)
6.	The user rserral wants to create a file called /home/rserral/free.txt every has to contain the size of the directory /home/rserral. Indicate which command executed and which changes to the system are required to do so.	
7.	The administrator realizes that the user rserral made the changes detailed in question and decides that this user should not be able to run this kind of tasks. How these changes using a single command?	