STUDENT

S-0003-ZKB

TENTAMEN

240605 DT149G Sundsvall

Kurskod	--
Bedömningsform	--
Starttid	05.06.2024 08:00
Sluttid	05.06.2024 13:00
Bedömningsfrist	--
PDF skapad	28.11.2024 10:44
Skapad av	Liselott Engelbrekts

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Instructions

Carefully read the questions before you start answering them. Note the time limit of the exam and plan your answers accordingly. Only answer the question. The questions are not sorted by difficulty. Clearly show which answer you are giving your solution to. Always motivate your answers and show your calculations.

If you want to attach something handwritten as a supplement to your answers, it is possible to write it on a special scanning paper. There is a unique seven-digit code under each question, it should be noted in the upper left corner of the pass-scan paper. Each number must also fill in the corresponding circle below the code. Use blue, black ink pen or pencil. There is scratch paper in the hall if needed.

- **Time** 5 hours.
- **Exam Aids** Dictionary, Pen and Paper
- **Maximum points** 30
- **Questions** 10

Preliminary grades

The following grading criteria applies:

E ≥ 30%, D ≥ 45%, C ≥ 60%, B ≥ 75%, A ≥ 90%.

Scoring will be based on level of depth shown in your answer. **To pass this exam you must have shown proficient knowledge in all the intended learning outcomes (ILO) covered in this exam.**
Each questions ILO affiliation is shown as (ILO: #). The grade limit given is preliminary per ILO. Final grade is set based on your performance on each individual ILO.

Covered ILO

This exam covers the following Intended Learning Outcomes (ILO)

- ILO: 1 – Administer and modify a UNIX-like system and its services
- ILO: 2 – Identify, implement and motivate choice of services
- ILO: 3 – Describe how the upstart process works in a UNIX-like system

Contact Information

For questions regarding the exam
Lennart Franked
lennart.franked@miun.se
Phone: 010 142 8683

Nayeb Maleki
nayeb.maleki@miun.se
Phone: 010 142 8853

For problems with Inspera, contact

inspera@miun.se
or call service center at 010-142 80 00

1 (ILO: 1) What information can you get from the following:

```
brw−rw−−−−   1   root   disk   8,   0   okt 12 08:18   sda
crw−rw−rw−   1   root   tty   5,   0   okt 12 08:08   tty
```

What type of files are shown? What is the difference between them?

Skriv in ditt svar här

b rw- rw- --- 1 root disk 8, 0 okt 12 08:18 sda

"b" means that this is a block device file.
The first rw- means that the owner has read and write privileges, but no execution rights.
The second rw- means that groups have read and write privileges, but no execution rights.
The remaining --- means that other users have no rights to the file.

"1" indicates that there is one hard link referring to this file.
"root disk" means that the file is located on the root disk.
"okt 12 08:18" is the date and time of when the file was last modified
"sda" is the name of the hard disk device or partition

c rw- rw- rw- 1 root tty 5, 0 okt 12 08:08 tty

"c" means that this is a character device file.
For this file, the owner, the group, and others have read and write privileges, but no execution rights.
This file has "1" hard link referring to it.
It was last modified okt 12 08:08

Both block and character device files communicate with hardware components and peripheral devices, such as graphics cards, keyboard, mouse, etc. The difference between character device files and block device files is that the character device file have an unbuffered, direct communication with the device, whereas the block device file has a buffered communication, meaning that it stores log data in a local buffer which makes the communication much more streamlined, and the performance and speed is improved.

Ord: 249

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

7 3 5 1 8 7 0

2 (ILO: 1) I want to run a process every Wednesday at 3 am all year around.
Give a UNIX-way solution for this to happen. Explain how your solution works.

Skriv in ditt svar här

For this task, we can use the `crontab` function:

0 3 * * 4 <process_name>

This will make sure that the process is executed every Wednesday at 03:00 AM

first column: minute, which will be 0
second column: the hour which will be 3
third column: day in month; Wednesday of every month
fourth column: month in year; because every month will have wednesdays
fifth column: day of the week, which is in the range 1-7, where 1 and 7 is sunday. This means that 4 will be wednesday.

Ord: 88

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

1 3 9 5 3 1 4

3 (ILO: 1) What UMASK values must be set to give the following default permission. Show your calculations.

1. 755
2. 500
3. 110

Skriv in ditt svar här

If we have the default permissions 777, and apply these umasks, we get:

777 - 755 = 22
777 - 500 = 277
777 - 110 = 667

read, write and execute privileges are determined using the octadecimal system.

Users	Groups	Others	
rwx	rwx	rwx	
000	000	000	(or any other combination of one's and zero's)

Let's start with the resulting permission 22:
the octadecimal representation of this value is 000 010 010
This means that the owner will have no rights, the group will only have write privileges, and other users will also only have write privileges

The octadecimal representation of 277 is 010 111 111
This means that the owner can only write to the file, but can't read or execute it. Both the group and other users can read, write, and execute the file.

The octadecimal representation of 667 is 110 110 111
This means that the owner and groups have read and write permissions, but no execute permissions. The other users have all permissions; read, write, and execute.

For 22, the owner will have no rights at all, and not the group nor others will even have read permissions. This makes the resulting permissions of 22 highly impractical.

For 277, the owner can only write, which is very restrictive. The group has full privileges, but other users also have full privileges, which can be a security hazard since unauthorized users can do whatever they want with the file.

For 667, the user and groups have read and write permissions, which might be appropriate, but the other users still have all rights which is not a safe thing.

Ord: 271

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

5016530

4 (ILO: 1) What is the difference between loading a driver as a module, and building it directly into the kernel?

Reason between the positive and negative parts of both methods of adding a driver.

Skriv in ditt svar här

The difference between loading a driver as a module and building it directly into the kernel is that if a driver is directly in the kernel, it is integrated into the system, and is automatically loaded together with the kernel, whereas a module driver can be loaded in and out dynamically, as it isn't coupled with the kernel.

The positive aspect of having a built in driver as that it is easy to setup, as no kernel configuration for this will be necessary. It is also more likely that the kernel takes care of compatibility issues for the user.

The negative parts of having a built in driver is that there is more overhead to the kernel, which can increase the size, bootup and loading times of the kernel.

The positive part of having a driver as a module is that it is highly resource-efficient; if the kernel doesn't need it, or if it is only needed at certain times, it can be loaded in and out on demand. This approach is much more modular and can increase the efficiency and speed of the kernel

The negative part of having a driver as module is that it can be cumbersome to do the configuration manually, and there might be more issues relating to compatibility issues, and of course, it could also be tiresome to do manual driver maintenance for this reason.

Ord: 231

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

7 2 6 0 9 6 6

5 (ILO: 2) Name and explain all the resource records needed for properly running a mail server in your domain. Including reducing the risk of someone spoofing your domain.

Skriv in ditt svar här

SSL,
MTX,
Postfix (MTA)
Dovecot (MDA)

I don't know the answer to this question, but here is an explanation of the essential components of an email system:

Mail User Agent (MUA) is the client that the user uses to create, write, read, and send emails. Examples include Outlook, Gmail, OpenOffice etc.

Mail Submission Agent (MSA) takes the outgoing email from the MUA, preprocesses it, and then sends it to the transport system (MTA)

The Mail Transport Agent (MTA) is responsible for routing the email between network nodes and machines, to make sure it ends up at the MDA

The Mail Delivery Agent (MDA) takes the email and stores it in the recipients local message store, where the recipient then can access and read the email.

The Access Agent (AA) is an optional component of the email system, and it is used when and if the email that has been received is not stored in the clients local message store, but it is stored on a remote server. Then they use the access agent which applies a mail transfer communication protocoll such as IMAP or POP3.

Ord: 185

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

5 0 4 0 4 5 6

6 (ILO: 2) Show all the steps necessary to share a folder that a windows computer can access iff they have an account on your system.

Skriv in ditt svar här

If a user has an account on a Unix machine with a file on it that they need, and they are currently on a Windows computer, they can access the file by using Samba, which is a file-sharing protocol that provides the capability to store, send, or retrieve files over a network between operating systems such as Windows and Unix.

The configuration for this is done in the Samba config file, where the administrator can set the network configs, including port number, what protocol to use (IMAP, POP3, etc), what IP-address is incoming or outgoing, where the file is located or should be sent to, etc.

Ord: 106

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

5 6 0 8 7 4 5

7 (ILO: 2) Motivate why it is necessary to reverse the order for the IP-address when setting up reversed DNS. Discuss the scenario where an organisation might not have a full /24 subnet.

Skriv in ditt svar här

It is necessary to reverse the order of the IP-addresses when setting up reversed DNS because of the structured hierarchy of DNS.

Traditional (forward) DNS has the following hierarchy for www.example.com:
root: " "
TLD: com
SLD: example
Sub: www

And reverse DNS has the following hierarchy for an arbitrary IP-address 192.2.1.0 (IPv4):
root: " "
TLD: 0
SLD: 1
Sub: 2
SSub: 192

This means that the IP address will look like this:
0.1.2.192

And then the `in-addr.arpa` will be appended at the end, to represent a unique namespace of reverse DNS domain:

0.1.2.192.in-addr.arpa

The address can then be translated from an IP-address to the corresponding domain name.

Ord: 108

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

3 7 6 5 4 0 6

8 (ILO: 3) I can see something called ”load average” when checking performance and settings in my computer system:

- What’s the use of that information?
- Why is it three values and what’s the meaning of them because they seem to be different?

Skriv in ditt svar här

Load average is a metric which conveys the activity level or load on the computer. That is, the number of processes that are either using the cpu or waiting for cpu time.

The three values represent the load average in the last
1, 5, and 15 minutes. This information gives the administrator a clear picture of the load on the server.

Typically, you want the load average to not exceed the number of cpu cores that are being used. For example, if a server uses 4 cpu cores, then a load average greater than 4 should warrant a discussion on whether or not to upgrade or replace the hardware.

Ord: 109

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

0 2 1 4 4 6 3

9 (ILO: 3) In one of the laboratory assignments in this course, you experimented with different ways of running a script from the terminal.

Compare the different methods, give examples of the syntax used and what it do, and explain when each method is useful, in comparison to the others.

Skriv in ditt svar här

You can run a script by deciding if it should run in the foreground or the background.

To run it in the foreground, you can simply type in the script name such as "script.ssh"
To run it in the background, you can use the ampersand operator, &, so it becomes "script.ssh &"
To resume the process to foreground, you can write the command "script.ssh fg"

Foreground processes are appropriate for user processes that might require more interaction or resources in the short term, while running in the background might be more appropriate for batch jobs; tasks that typically are executed in the kernel space and require a longer time to execute.

Ord: 111

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

3 0 4 2 8 1 4

10 (ILO: 3) Explain the functions and responsibilities of the following components:

- Grub
- Kernel
- Shell
- GUI

Skriv in ditt svar här

Grub (GRand Unified Bootloader) is a program which has the responsibility to load the Kernel into memory, after the BIOS/UEFI has performed power-on self-test (POST). It is a crucial part of the bootstrapping process. It can also be used to support different kernel options, enabling the user to choose which kernel to load into memory at startup.

The Kernel is the operating system for Unix environments. It takes care of all fundamental tasks to make the system operational. This includes memory management (paging, RAM etc), resource distribution between processes, process planning, scheduling, ensuring the interoperability between drivers and hardware, and taking care of many of these tasks in the kernel space, where the user in the user space don't have access.

The shell is an interface between the user and the Kernel. It can be seen as an intermediary layer between the UI (user space) and the Kernel space. The shell offers the user many tools and functions to perform batch jobs, run scripts, download modules or packages, etc. It is great for administration and is a more straightforward, less cluttered interface for computer and kernel operations.

GUI (Graphical User Interface) is the main user interface in the user space. It offers a comprehensive suite of tools and auxiliary views through which the user can navigate to perform their tasks. It is more user-friendly compared to the shell, but might be seen as more bloated. However, it is still highly useful and can also be used for many administrative tasks.

Ord: 250

Besvarad.

Bifoga ritning till ditt svar?
Använd följande kod:

6 1 1 6 9 2 0