

Operating Systems

Continuous Assessment 1

Name: Ennio da Silva Vitor

Date: 21/10/2016

Module Title:	Operating Systems
Assignment Type:	Practical
Project Title:	Install Server Operating System and RAID Fault Tolerance
Project Date:	October 2016
Assignment Compiler:	Mr. Michael Weiss
Weighting:	20% of Continuous Assessment Total
Due Date:	Saturday 22 nd October 2016

This assessment is a practical hands-on assignment. The student will install a Server Operating System into a virtual machine using the Server ISO disk image. You will install the Enterprise Version of the Server OS. Once the OS is installed the student is to rename their server. Next the student will set up three types of Redundant Array of Independent Disks (RAID). Finally, the student will research questions relating to RAID and Fault Tolerance. Submit work to Moodle as PDF file.

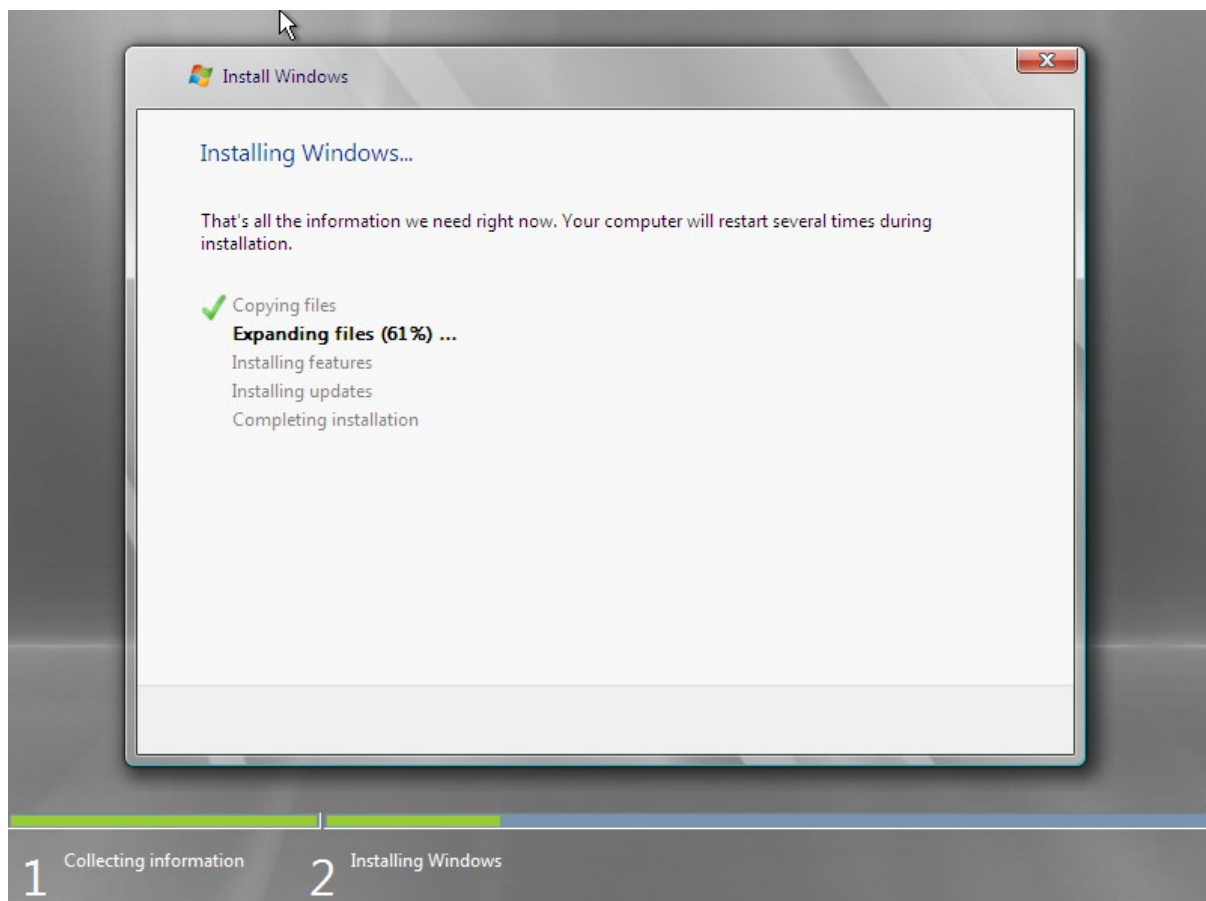
You will provide screen captures as evidence of completion of each Operating System task.

TASK A: Install Server Operating System

Using virtualization software, install a Server Operating System:

Screen capture #1: Operating System during installation phase (0 to 10 points)

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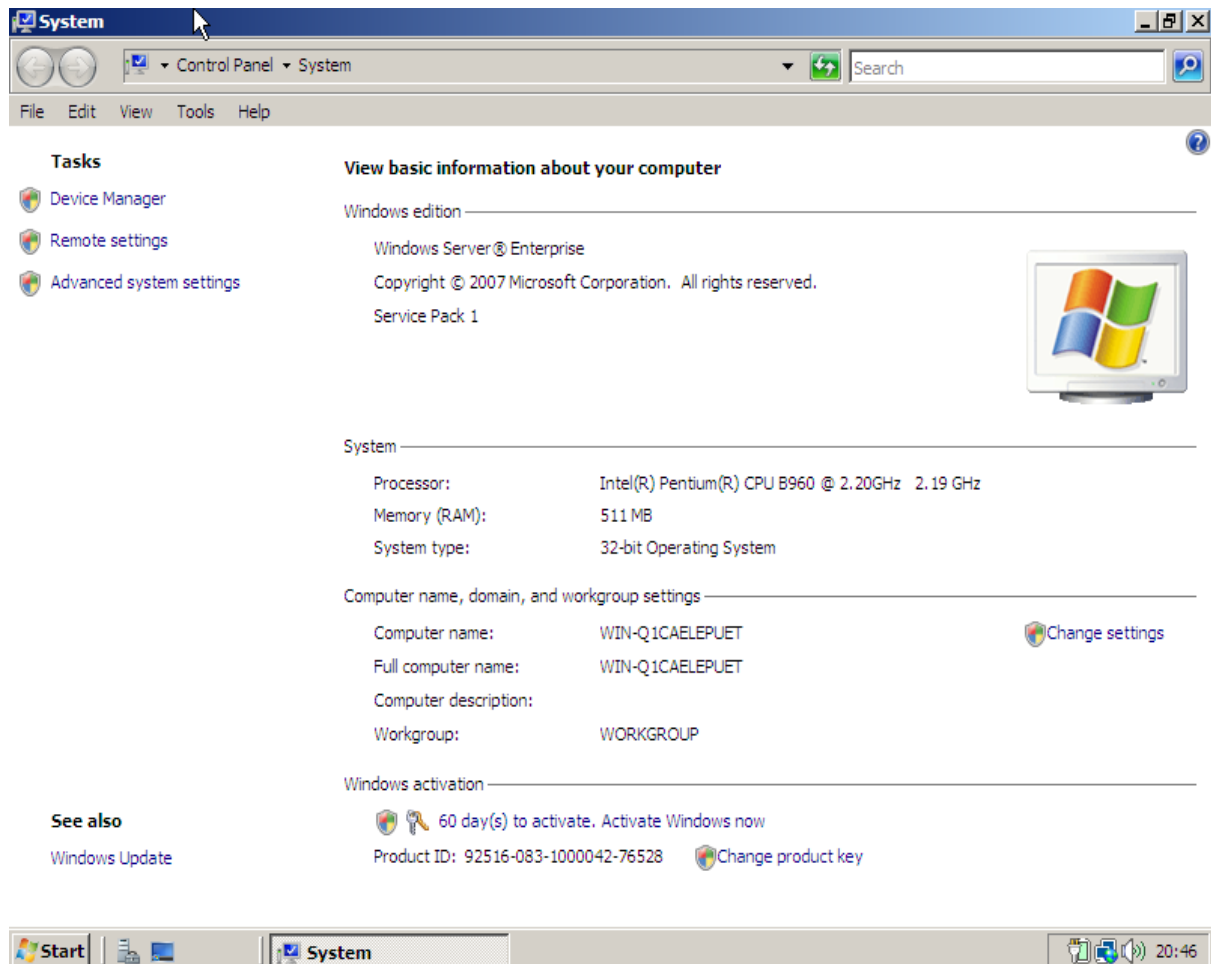


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Screen Capture #2: *Windows System Properties* showing OS fully installed (0 to 10 points)

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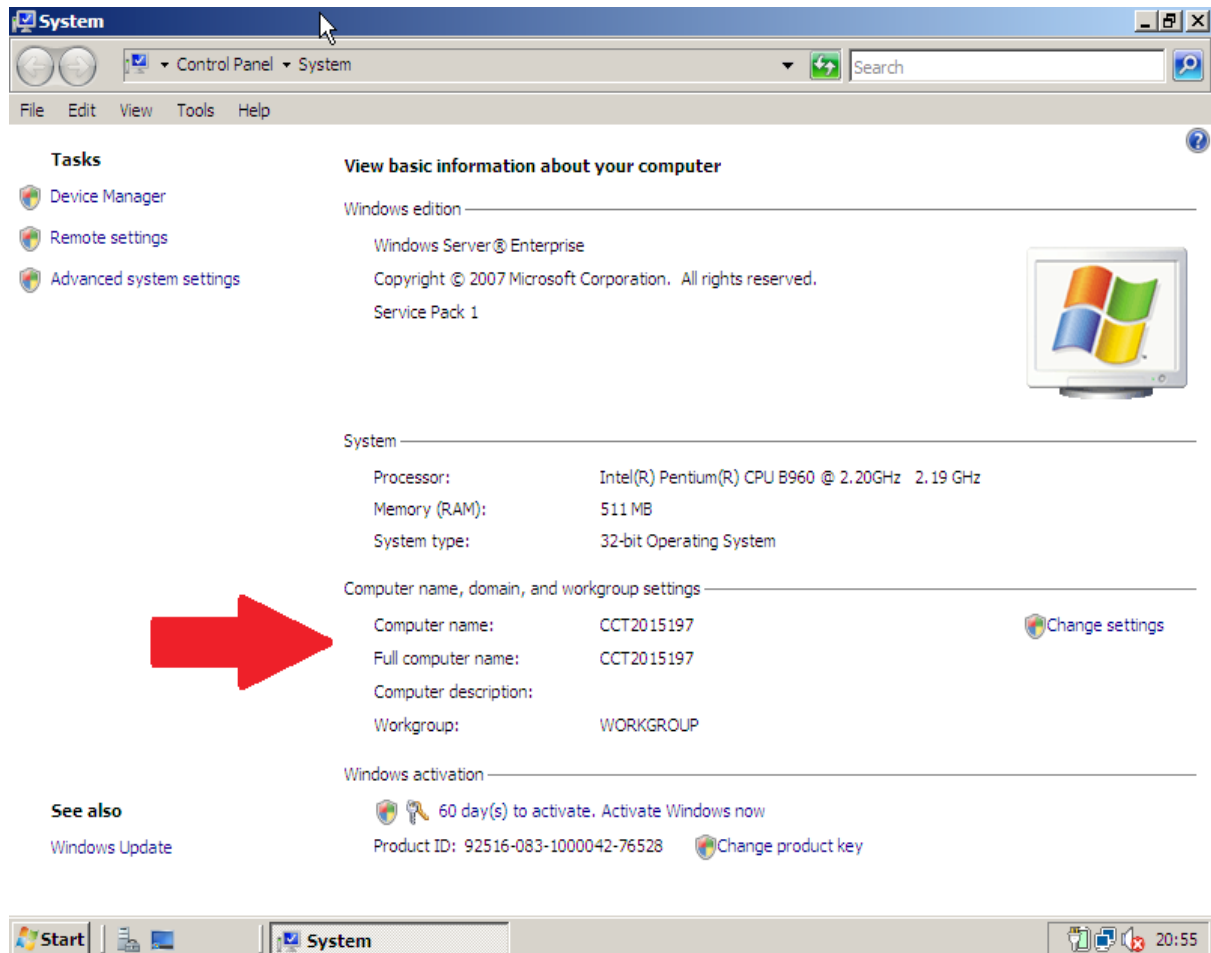
TASK B: Renaming

The Server follow the following format: CCT followed by your student number.

For example if your student number is 2014953 the server should be named CCT2014953

Screen capture #3: Renaming the Server (Name changed as specified) (0 to 10 points)

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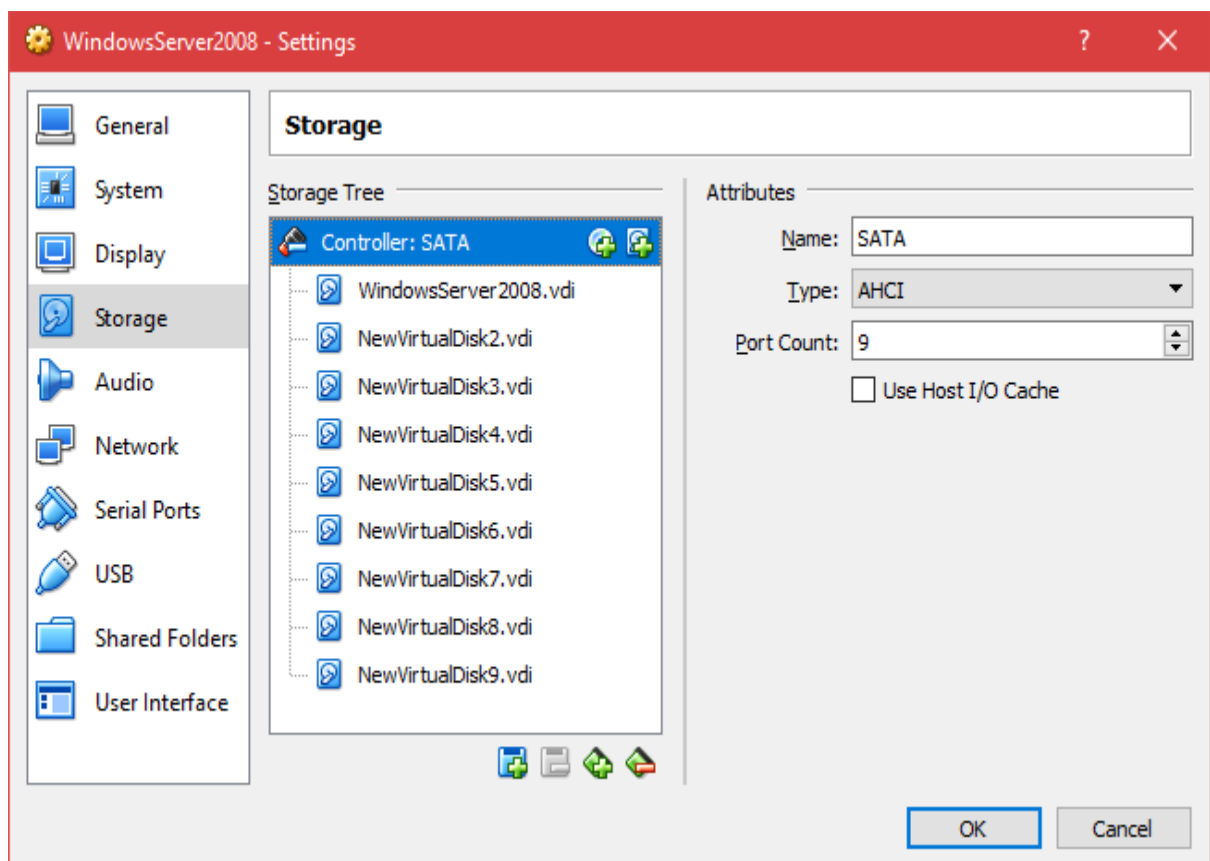
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TASK C: Setting up RAID (0 to 11 points)

Show the use of the *VM settings interface* for adding 8 virtual hard disk drives for the RAID configurations (show that you have added 8 additional hard drives... there should now be 9 of the virtual hard disk drives showing)

Screen capture #4: Installing the 8 virtual hard drives as specified above

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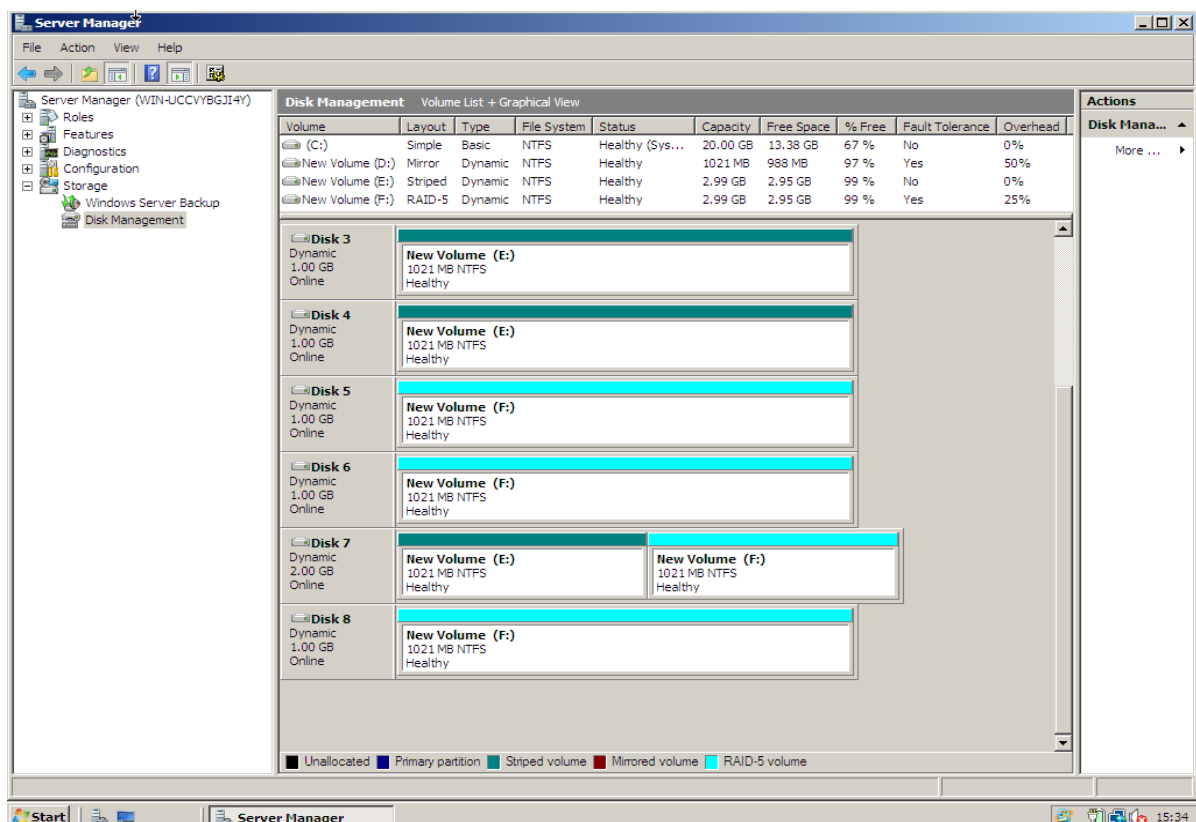
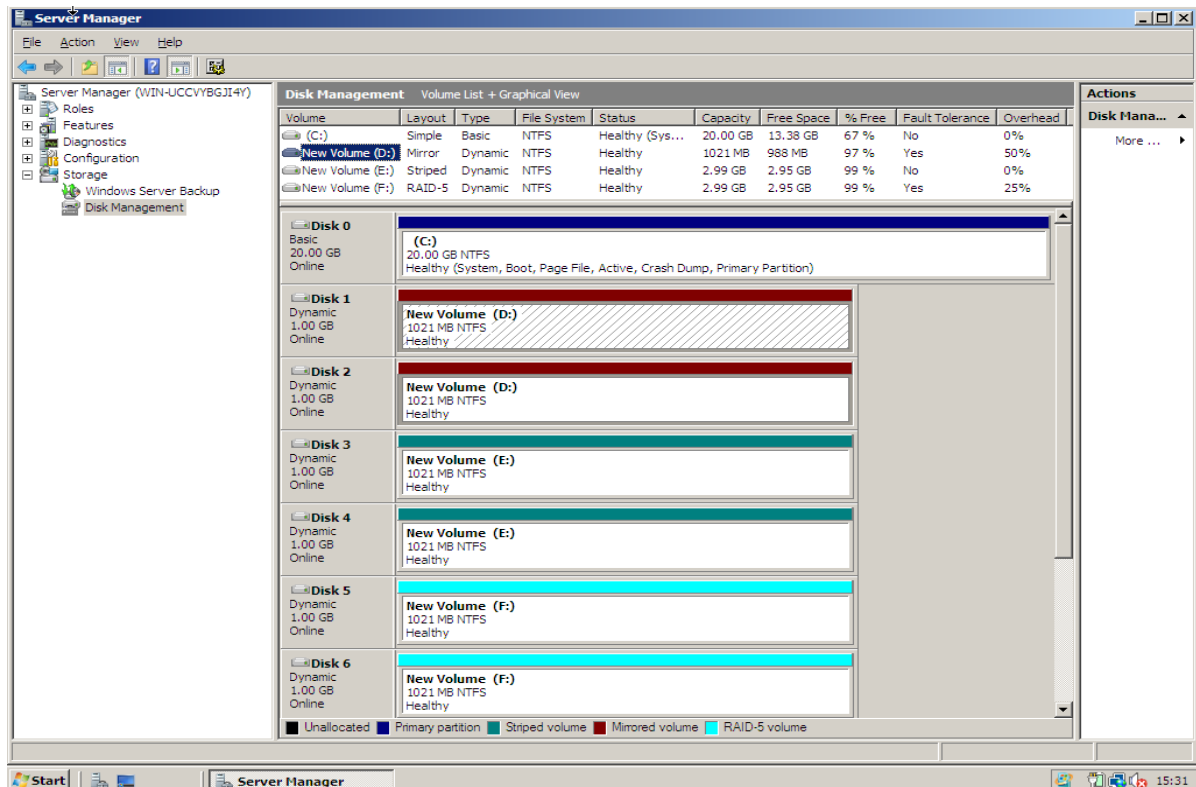
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TASK D: Configuring RAID (0 to 24 points)

Screen capture #5: Screen shot of Disk Manager which shows (1) RAID 1 (Disk Mirror) fully set up on two disks (2) RAID 0 set up on 3 disks and (3) RAID 5 array (Disk Striping with Parity) fully set up on 4 disks (you may need more than one screen capture).

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TASK E: Research topics on RAID and Fault Tolerance

For maximum credit provide examples and cite all of your reference sources.

Conduct research and explain (in your own words) the following topics:

Topic 1: (0 to 10 points) How does Software RAID differ from Hardware RAID?

Software RAID is the program built into the operational system that provides limited options to create arrays that will connect multiple hard drives, it offers a basic solution to create a simple, spanned, striped, mirrored or RAID-5 volumes on a set of hard drives. According to the Microsoft windows documentation this is not the best way to have gain of performance or data protection, but it does have a good solution for basic users that cant afford the cost to have a hardware RAID. Also the software side have the user's CPU as the only option to work with. The result is a loss of the CPU's performance. Other problem found into the Software RAID is that the system have more chances to fail.

The Hardware RAID by the other hand are much more powerful and because it comes with integrated CPU and integrated disk cache it gives a lot of performance compared to the Software RAID, it mean that all the process are done on the side of the user's CPU.

Now a day we can find many different companies offering different solutions of hardware ut the basic solutions of those are hot-swap, hot-spare, more levels of RAID, to cover the needs of bigger users such as large companies that can not hold there tasks using only the software RAID.

References:

Microsoft (2016). chapter 19: Implementing Disk Management. Available at:
<https://msdn.microsoft.com/en-us/library/dd163556.aspx> [Accessed on 20th October 2016]

Data on Storage (2016). Storage Spaces. Available at:
<http://www.dataonstorage.com/technology/102-hardware-raid-vs-software-raid.html> [Accessed on 20th October 2016]

Topic 2: (0 to 10 points) How does RAID 10 differ from RAID 0+1?

The RAID 10 is the some of the RAID 1 (mirror) + the RAID 0 (stripe). This method needs at least 4 hard drives to work with, and the size of the disk will be the some of the RAID 0.

this method have fault tolerance and the system will not stop if one of the disks fail.

The performance is improved because the data will be redden from multiple disks. But the process to write the data into the disk is quite slow, once the method have to make sure the data is written on all disks.

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The RAID 0+1 is the opposite of the RAID 10. the data is first striped then this method will collect the actual stripe and mirroring it. The total size of the disk will be the same of the mirror process, this method also does not have fault tolerance, so in case of any of the disks fail, the system will not work, but by a other hand the performance will be improved. This method needs at least 4 hard drive disks to work.

References:

Intel (2016). RAID 0,1, 5, 10, Matrix RAID, RAID-Ready for Intel Rapid Storage Technology. Available at: <http://www.intel.com/content/www/us/en/support/boards-and-kits/000005867.html#raid10> [Accessed on 20th October 2016]

Tech Target (2016). RAID (redundant array of independent disks). Available at: <http://searchstorage.techtarget.com/definition/RAID> [Accessed on 20th October 2016]

Wikipedia (2016). Nested RAID levels. Available at: https://en.wikipedia.org/wiki/Nested_RAID_levels#RAID_10_.28RAID_1.2B0.29 [Accessed on 20th October 2016]

Go Linux Hub (2016). RAID levels 0, 1, 2, 3, 4, 5, 6, 0+1, 1+0 features explained in detail. Available at: <http://www.golinuxhub.com/2014/04/raid-levels-0-1-2-3-4-5-6-01-10.html> [Accessed on 20th October 2016]

Topic 3: (0 to 15 points) Explain what 'fault tolerance is' and give 4 examples of fault tolerance that would be found at a network Data Centre:

Fault tolerance is the method that covers any possible fault that a system could have. The fault can occur on the software, hardware or human side if the system have a good fault tolerance, the network Data Centre will not stop working, or it will be unavailable just for few minutes, depending on how the system have been set up.

Hot swapping, data corruption, software error, human mistakes, are examples of fault tolerance that would be found at a network Data Centre.

Hot swapping: occur when one or a set of hardware fail and then the failed equipment have to be changed.

Data corruption: as the data centre works with written, read, storage and processing of data, into any where in the process can occur a error that could generate a corrupted data. On this case the the final user that can be from bough sides client or administrator will not be able to visualize the data.

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Software error: In a software error the data centre can be offline or even worse the data could be deleted. Anyway among many problems that could occur in this situation the main problem is that it would take time to reestablish all the system.

Human mistakes: A Data Centre can be designed from a simple project to a large, complex and expensive project. To guaranty that the result is a healthy system, many steps of best practice have to be considered in order to prevent any potential issues, for example: a bad project could result in overheating of the system that could shut down the hole data centre.

References:

IBM (2016). High availability Vs fault tolerance. Available at:
https://www.ibm.com/support/knowledgecenter/SSPHQG_6.1.0/com.ibm.hacmp.concepts/ha_concepts_fault.htm [Accessed on 20th October 2016]

IEEE (2013). Fault-tolerance characteristics of data center network topologies using fault regions
<https://www.computer.org/csdl/proceedings/dsn/2013/6471/00/06575321.pdf> [Accessed on 20th October 2016]

Linux Academy (2016). What is fault tolerance. Available at:
<https://linuxacademy.com/blog/cloud/what-is-fault-tolerance/> [Accessed on 20th October 2016]

Computer World (2016). Software error complicates Amazon's data center recovery. Available at:
<http://www.computerworld.com/article/2509099/cloud-computing/software-error-complicates-amazon-s-data-center-recovery.html> [Accessed on 20th October 2016]

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Candidate Name: Ennio da Silva Vitor	CCT Student Number: 2015197
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TASK A: Install Server Operating System

#1: Operating System during installation phase (0 to 10 points) _____

#2: Operating System fully installed showing System Properties (0 to 10 points) _____

TASK B: Renaming the Server

#3: Server correctly renamed (0 to 10 points) _____

TASK C: Setting up and configuring Fault Tolerance using RAID

#4: 5 Virtual Hard Disk Drives added correctly (0 to 10 points) _____

#5: Screen shot of Disk Manager showing RAID 0, R1 and R5 fully set up (0 to 20 points) _____

TASK D: Explain RAID 1 and Fault tolerance

#6: Topic 1: How does Software RAID differ from Hardware RAID? (0 to 10 points) _____

#7: Topic 2: RAID 1: How does RAID 10 differ from RAID 0+1? (0 to 10 points) _____

#8: Topic 3: Explain what 'fault tolerance is' and give 4 examples of fault tolerance that would be found at a network Data Centre: (0 to 10 points) _____

Total Grade Achieved: _____

I hereby declare that all of the work shown here is my own work

Student's Name: Ennio da Silva Vitor