DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY
COURSEWORK ASSESSMENT DESCRIPTION 2022/2023

UNIVERSITY OF HULL

MODULE DETAILS:

Module Number:	600099	Trimester:	2
Module Title:	Computer Systems Infrastructure and Management		
Lecturer:	Dr. Ahmed Moustafa		

COURSEWORK DETAILS:

Assessment Number:	1	of	2		
Title of Assessment:					
Format:	Report				
Method of Working:	Individual				
Workload Guidance:	Typically, you should expect to spend between	40	and	80	hours on this assessment
Length of Submission:	This assessment should be **no** more than: *(over length submissions **may have only** parts of the work marked as per University policy)*	2000 **words** *(excluding diagrams, appendices, references, code)*			

PUBLICATION:

Date of issue:	Wednesday 22nd Feb 2023

SUBMISSION:

ONE copy of this assessment should be handed in via:	Canvas		If Other (state method)	
Time and date for submission:	**Time**	2pm	**Date**	Thursday 4th May2023
If **multiple hand–ins** please provide details:				
Will submission be scanned via TurnitinUK?	Yes	For Turnitin, these should be one of the allowed types e.g. Word, RT, PDF, PPT, XLS etc. Specify any particular requirements in the submission details on TurnItIn. Unless specified: students MUST NOT submit ZIP or other archive formats unless specified. Students can **ONLY** submit **ONE** file and must ensure they upload the correct file. Normally only the LAST submission will be considered – the last submission is late it should incur a late penalty.		

The assessment must be submitted **no later** than the time and date shown above, unless an extension has been authorized.

MARKING:

Marking will be by:	Student Name

ASSESSMENT:

The assessment is marked out of:	100	and is worth	50	% of the module marks
N.B If multiple hand-ins please indicate the marks and % apportioned to each stage above (i.e. Stage 1 – 50, Stage 2 – 50). It is these marks that will be presented to the exam board.				

ASSESSMENT STRATEGY AND LEARNING OUTCOMES:

The overall assessment strategy is designed to evaluate the student's achievement of the module learning outcomes, and is subdivided as follows:

LO/ Competency	Learning Outcome/Competency	Method of Assessment *{e.g. report, demo}*
LO1	Critically evaluate the delivery of services to support core business objectives and comply with legislative requirements	Report
LO2	Explain the techniques used in the secure and reliable management of information	Report

Assessment Criteria	Contributes to Learning Outcome	Mark
An Assessment Critiera Grid is inserted below.		

FEEDBACK

Feedback will be given via:	Canvas	Feedback will be given via:	Canvas
Exemption (staff to explain why)			
Feedback should be provided no later than 4 'teaching weeks' after the submission date.			

You are advised to read the **NOTES** regarding late penalties, over-length assignments, academic misconduct and quality assurance in your student handbook, which is available on Canvas.

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Computer Systems Infrastructure and Management (600099)

ACW (100% of Module)

Virtual Machine Configuration and Networking Infrastructure

Deliverables:

Virtual Machine Practical Report: (PDF)	Thursday 4th May by 2 pm	50%
Networking Infrastructure Report: (PDF)	Thursday 4th May by 2 pm	50%

Assignment

The assignment is split into two deliverables, the Virtual Machine Configuration practical, and the Networking Infrastructure theoretical exercise. Both of these submissions are reports, with their own set limits and restrictions. Please read the below sub-sections carefully. Both items are to be submitted to their separate and appropriate sections under Canvas by the deadline provided.

Virtual Machine Configuration

A leading Japanese Biotech company has recently acquired some virtual machine resources to begin deployment of their research data management system and to additionally facilitate in-house research and development.

You have been given a freshly created Virtual Machine which will need configuring appropriately. Your role as administrator for this company is to configure these systems and maintain them.

Task:

1. Secure, with justification, the root user account
2. Setup administrative users for yourself and another one for the module leader (Ahmd Moustafa)
3. Set-up and correctly configure the SSH server, taking into account all user account requirements.
4. Create accounts where needed for the following persons:
    a. Katsuhide Fujita - Head of R&D
    b. Naoko Yamaguchi - Lead Scientist
    c. Kai Yoshino- Is an intern (Kun) with the company and is being closely supervised by Naoko. He will require access to materials which Naoko will place in a folder in /srv/ for him to access as part of his training.
    d. Shota Suzuki – Media Manager, requiring access to /srv/http to see, and put any promotional material. Shota is not familiar withCLI, and only requires SFTP access infrequently.
    e. Daiki Setoguchi & Makoto Hagiwara – Company research engineers who need access to dedicated project materials for on-going development. These also reside in /srv/.
    f. Yuya Kondo - Quality Manager responsible for verifying that developed work conforms to company standards and works appropriately.
5. Store, and secure access to, a research project data directory (under /srv/) for research engineers to have access to. Research engineers should have full access to the research projects' folders; however, the quality managers should not be able to change the research data, only check the experimentation data for compliance and whether they follow the quality guidelines. Senior members of the company such as the Lead Scientist and the Head of R&D should be able to oversee any company research project/asset. On occasion they will contribute to research projects developed by Daiki and Makoto.
6. Critical reflection section: reflecting on the process of learning these tools, and of configuring the VM to this specification. This can include challenges faced (such as error messages) and how you solved them, as well as personal reflections on the process as a whole.
7. Installation of a docker containerisation environment, with containers spun up for mysql and a phpmyadmin interface. You may additionally install portainer to assist with this if desired. All senior staff members (leads / heads) should have administrative access to manage these containers, as well as database user created

for Naoko which she will log in to through PhpMyAdmin. The database should not be exposed to the outside world, and connections between phpmyadmin and mysql should be handled via a separate subnetwork.

As Kai has just started, Naoko does not yet have any materials tosend him; however, she still requires a place to put these when ready.

Kai has been told he should normally use private keys; however, he asks if he can login with password only from the following host on the local network: (150.237.92.8); Everywhere else he has private keys to login.

First Steps

Follow the vSphere access instructions, including VPN access.

Each VM has internet connection for downloading any packages you may need. Each of your VMs is also in a subnetwork, therefore enabling communication between your colleagues for testing purposes. Note: Any abuse of this will be dealt with severely.

You should request a reset of your Virtual Machine when you are ready to attempt this assignment task, as it will require documenting your progression. See the "What if things go wrong / needs resetting" section below for details on resetting back to the template.

What if things go wrong / needs resetting?

It is possible for you to misconfigure your machine which will result in your being locked out. In some cases, even using the vSphere login web console might not be possible. If you have fully locked yourself out, and a snapshot isn't available to roll-back to, then you may request your VM be reset back to the template by opening a Virtual Machine ticket on support.hull.ac.uk putting "For the attention of Andrew Hancock" at the top.
Please ensure you include your 6-digit ADIR number so your response can be dealt with promptly.

This WILL wipe your VM back to the original workshop starting point, and will require you to reinstall many packages which you may be familiar with from workshops.

Also note, it may take time for these to be reset depending on the current workload of ICTD, therefore consider this a warning against last minute VM configurations close to the deadline.

Deliverable

A PDF report (Minimum 4 pages; Maximum 8 pages) detailing the steps from the initial machine given to you, towards the goal of configuring to the above specification. You should provide clear and justified rationale for decisions made.
You should include steps taken to verify that changes implemented are working as intended. You may utilise additional software which is required to be installed via pacman; however, these must be justified and fit-for-purpose.

Cover page, table of contents page, appendices, and references sections do not count towards the page limit.

Note: Your VM will NOT be inspected for being awarded marks. Therefore you should ensure that your documented progress sufficiently shows the steps taken. It is expected that when performing configuration steps that these are done optimally and with consideration of security of the system such as proper root and non-root administrative account use

600099 Computer Systems Infrastructure and Management - CRG

ACW - Virtual Machine Configuration and Networking Infrastructure

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Learning Outcome	Criterion	Pass	2:2	2:1	1st	Upper 1st
[LO1] Critically evaluate the delivery of services to support core business objectives and comply with legislative requirements. [LO2] Explain the techniques used in the secure and reliable management of information.	Virtual Machine Configuration based upon provided specification (50%)	VM is minimally configured. SSH is configured minimally to allow remote access for a non-root user. An administrative user is created. File/Folder permissions, if attempted, are erroneous. Report covers major aspects of configuring the VM, but may be missing critical reflection. No Docker installation attempted.	In addition to previous. Remote connections using private keys may be erroneous in places. Administrative users are in-place. Some of the non-administrator users are attempted. Testing is limited in scope, and may be missing in others. File/Folder permissions are attempted, with some error. Docker installation completed, but configuration is missing.	In addition to previous. VM Configuration is mostly complete, some errors may exist, or some constraints unmet. Testing of configuration is mostly correct and complete. Critical reflection is present, and appropriate. File/Folder permissions are correct and appropriate. Docker installation and management is presented but may not fully realise the configuration task required.	In addition to previous. Report is well-written and structured; showing strong evidencing of process. Report critically evaluates alternative approaches with respect to the specification. Testing of each configuration is thorough, and well-documented. Critical reflection is thoughtful and covers thoroughly the process of undertaking the assignment. File/Folder permissions are correct, appropriate, and well-justified. Docker installation and management is presented and complete	In addition to previous. The specification is expertly broken down into its requirements, and implemented with careful thought and strong rationale. Testing of each configuration is thorough, and well-documented. Making use of advanced approaches. Docker installation and management is presented and complete with high-level of detail surrounding containerisation concepts.

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[LO2] Explain the techniques used in the secure and reliable management of information. [LO3] Discuss and critically evaluate the process of installing and configuring core business services in authentic scenarios.	Network Infrastructure report for a University library network.(50%)	A basic topology is presented, but may be missing certain elements. An approximate cost breakdown is provided, but may be lacking justification for choices. No server storage considerations provided.	In addition to previous. A suitable Network topology is outlined, but may contain errors, or not meet all requirements. An approximate cost breakdown is provided with some justification. Storage server requirements are considered, but may be erroneous and/or incomplete.	In addition to previous. A suitable Network topology is outlined, enabling separation between floors, withshared space access to both. Placement of equipment, and routing of cabling is considerate of the building layout. Storage server requirements are analysed, with a proposed solution which addresses some of the functional requirements. An appropriate cost breakdown is provided, withgoodjustification.	In addition to previous. Report is well-written and structured; breaking down provided floor plans into their requirements with strong evidencing and justification. Some alternatives to the proposed solution are presented with justification, which meet the requirements. The cost breakdown is comprehensive for well-chosen equipment based on the identified requirements. Equipment choice takes into consideration future-proofing for the University environment, and is of enterprise standard. Storage server requirements are analysed, with a proposed solution which addresses all of the functional requirements.	In addition to previous. Report considers a wide range of technical solutions, critically evaluating them and presenting them. Cost breakdown is thorough, with consideration for vendor, including warranties and additional support mechanisms.
Weighting	All criteria are weighted as shown by the percentages indicated in the relevant criterion box.					