THE UNIVERSITY OF WESTERN AUSTRALIA

DESK No. | | | |

FAMILY NAME: _____

GIVEN NAMES: _____

SIGNATURE: _____

STUDENT NUMBER: | | | | | | | | |

SEMESTER 2, 2021 EXAMINATIONS

CITS5503

Physics, Mathematics & Computing

Cloud Computing

Department of Computer Science & Software Engineering

This paper contains: **4** Pages **(including title page)**

Time Allowed: **2:00** hours

INSTRUCTIONS:

This exam is marked out of 100 points and is worth 50% of the overall unit mark.

- Your name and ID number should be written on the cover page of the answer booklet.
- Please use readable handwriting. What we cannot read we cannot mark.
- Do not use pencil or red pen

THIS IS A CLOSED BOOK EXAMINATION

SUPPLIED STATIONERY	ALLOWABLE ITEMS
1 x Answer booklet 10 pages	No Allowable Items.

PLEASE NOTE

Examination candidates may only bring authorised materials into the examination room. If a supervisor finds, during the examination, that you have unauthorised material, in whatever form, in the vicinity of your desk or on your person, whether in the examination room or the toilets or en route to/from the toilets, the matter will be reported to the head of school and disciplinary action will normally be taken against you. This action may result in your being deprived of any credit for this examination or even, in some cases, for the whole unit. This will apply regardless of whether the material has been used at the time it is found. Therefore, any candidate who has brought any unauthorised material whatsoever into the examination room should declare it to the supervisor immediately. Candidates who are uncertain whether any material is authorised should ask the supervisor for clarification.

Candidates must comply with the Examination Rules of the University and with the directions of supervisors.
No electronic devices are permitted during the examination.
All question papers and answer booklets are the property of the University and remain so at all times.

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1. (20 points)

The creative designers of a marketing and video editing company in Melbourne use a commercial web-based application for converting videos to different formats. In addition, one of the main advantages of this software is the ability to publish those videos in popular social media networks such as YouTube, Instagram, Twitter, etc. This allows the user to convert and edit a video and then publish the same video at the same time to all different social media that the user selects in the software. This is particularly useful for marketing campaigns were usually a video is published in different social media networks. In the past, before using that software they used to spend around 5-10 hours to convert a single video to different formats, resolutions, etc. and upload them to all different social media. Now using this software this process is reduced to only 45mins to 1 hour. Since they started using this software, they have to pay a monthly subscription fee of 25.000 AUD per month or around 300.000 AUD per year regardless of the number of videos they process per year. Despite all the benefits from this software, the CTO of the company believes they should pay a software developer to replicate this web-based software instead of keep paying those high fees. While he knows building software is expensive, he also believes there must be a way of designing this new software to reduce the cost and make it profitable in the long term. You as a Software Developer and Cloud Computing expert are hired for this task.

1.1 **(10 points)** You initially think on using EC2 instances for processing. Briefly explain what other AWS technologies you would use to replicate the web-based software functionalities and what architecture you would use to satisfy the needs of the client using such technologies.

1.2 **(10 points)** The company currently creates on average 50 videos per month and it's not likely to increase the demand of clients for the next couple of years. Take also into account that there are less than 20 people that will be using the system. Discuss how you could change the previous solution using now a full serverless architecture and what benefits and disadvantages would have this new architecture over the previous architecture using EC2 instances.

2. (20 points)

A professor in Computer Science at UWA has data from all labs, mid-term exam and final exam marks for the last two years of every student in csv format. He first noticed that in previous years those students that did very well in the labs and mid-term exam for a particular unit got at least 70% marks in the final exam. This year, the professor only has access to the labs and mid-term exam marks in csv format. However, he thinks he can predict the outcome of the final exam for students before marking the final exam.

2.1 **(10 points)** How would you use AWS technologies to prove (or disprove) his theory and help the professor predicting the marks for the current students this year?

2.2 **(10 points)** What approach would you use to assess the data models and help with the data analysis of the results?

3. (10 points)

A software developer wants to create a Drobox-like application for Photographers where they could seamlessly upload pictures from a local machine to the cloud and synchronise the data across multiple devices (Computer, Mobile Phones, etc.) for authenticated users. For every image uploaded by the users, she wants to save the metadata related to the file. Given the files uploaded by users are very important, she wants to allow restoring such files even if users delete the images on purpose. In addition, the software developer wants to automatically create labels for the uploaded images so they can perform searches of images based on the generated labels.

Describe your approach using AWS technologies to create that application.

4. (20 points)

A MedTech company in Perth has created a novel algorithm for detecting heart diseases from **X-rays *and CT scans (medical images)*** using machine learning and computer vision. The company now wants to commercialise it as a Software-as-a-service (SaaS) product. Initially, this product should allow authorised radiologist working at the Royal Perth Hospital to upload such images. Then, once the algorithm can process the image (it could take a couple of minutes) it should retrieve the prediction. The solution should be scalable so it can be used in other hospitals in the future.

Give 10 recommendations to the company on how they could use AWS to create this platform. **Provide your answer as a list of bullet points.**

5. (20 points)

You are a consultant who has been asked to write a report for a rapidly growing pet food company (PFC), based in Perth who would like to upgrade their systems to cope with the increasing global demand for their products. The company has rented space in a data centre for their systems that are a mix of Windows and Linux Servers, networking and firewall equipment and a range of storage devices (SANs, NAS, disk drives in servers). The company uses a range of software that they have purchased over the years that run on these machines. The functionality covered is everything from finance, sales and manufacturing to online product sales through their website. PFC have received venture capital funding and want to expand into new markets, especially Asia and China in particular. To do this, they will need to be able to use modern systems that scale and operate at global scale.

Provide 5 pros and 5 cons of moving infrastructure from being on-premises to cloud based. Consider this in the context of global expansion and resilience. **Provide your answer as a list of bullet points.**