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2

COMMON ASSESSMENT TASK

Level 2 Digital Technologies and Hangarau Matihiko, 2019

91898 Demonstrate understanding of a computer science concept

Credits: Three

Achievement Criteria		
Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of a computer science concept.	Demonstrate in-depth understanding of a computer science concept.	Demonstrate comprehensive understanding of a computer science concept.

Type your School Code and 9-digit National Student Number (NSN) into the header at the top of this page. (If your NSN has 10 digits, omit the leading zero.)

Answer all parts of the assessment task in this document.

Your answer should be presented in 12pt Arial font, within the expanding text boxes, and may only include information you produce during this examination session.

You should aim to write between **800–1500 words** in total.

Save your finished work as a PDF file with the file name used in the header at the top of this page ("SchoolCode-YourNSN-91898.pdf").

By saving your work at the end of the examination, you are declaring that this work is your own. NZQA may sample your work to ensure that this is the case.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

**Achievement
03**



INSTRUCTIONS

Read all parts of the assessment task before you begin.

Select ONE of the following computer science concepts:

- computer security
- encryption
- error control
- complexity and tractability
- artificial intelligence.

Type your chosen computer science concept in the space below:

Error control

Begin your answers on page 3.



ASSESSMENT TASK

- (a) Briefly explain your chosen computer science concept.

Error control is used to track and validate data and make sure said data is in the correct place and the data itself is correct. This is vital because incorrect data in the wrong place and cause multiple issues for anybody from you to a business to even the government and therefore error control is used to make sure this said incorrect data either gets replaced or fixed to the correct data and that the incorrect data doesn't cause an issue in the first place. Error control is also used to make sure the said data never becomes incorrect in the first place so that way when the correct data is needed it isn't invalid.



(b) Choose ONE of the following three options to answer.

EITHER: OPTION ONE

Give details of how your chosen computer science concept is used in current digital technologies.

One-way Error control is currently being used in digital technologies is through a feature called a barcode. A barcode is a string of digits which have digitally been assigned to a product for quick ease, purchase or stock check etc. What the barcode allows is essentially a replacement for memory, it allows store employees to check stock on an item and if that item is purchased then it has also its assigned price, solving any possible human factor-based complications from happening

OR: OPTION TWO

Give details of how your chosen computer science concept is implemented in current digital technologies.

OR: OPTION THREE

Give details of how your chosen computer science concept occurs in current digital technologies.

(c) **Opportunities** include providing a solution, improving functionality and solving a known issue / risk.

Answer ONE of the following two options:

EITHER: OPTION ONE

How **is** your chosen computer science concept **currently** applied to address an opportunity?

Error control is also applied to address opportunities through barcodes. For example, someone may want to buy an item however they're not quite sure how much the item costs, barcode checkers may be supplied around the room, or an employee can scan the item which would be able to check and show its current price solving the issue. Another example is if someone does purchase an item however said item is incorrectly scanned and comes up as a different product (E.g. a can of coke to a can of beer) it can cause multiple issues such as price changes, legality and customer dissatisfaction. Therefore, the cashier is able to check the barcode to see if 1) when the digits are solved (Multiply every second number by three, add up all the digits) and they get a result of e.g. 117 and 2) if the check digit is 3 (The check digit is the final digit and should round the total digit to the closest ten (in this case 120)) the barcode is correct and should be working correctly and therefore a store issue, or if the check digit is anything other than 3 (leading to not a multiple of ten) then the barcode is incorrect and faulty and not a store issue, and at the end of it be able to supply the customer with the correct product they intended to buy.

OR: OPTION TWO

How **could** your chosen computer science concept **be** applied to address an opportunity?

(d) **Mechanisms**

Select TWO of the following seven mechanisms:

- techniques
- algorithms
- principles
- protocols
- systems
- procedures
- processes.

(i) Type ONE of your two selected mechanisms in the space below:

Algorithms

Explain how this mechanism relates to your chosen computer science concept.

Algorithms are essential to error control because that's what they're based upon. An example of algorithms can be seen in essentially any form of error control and logically makes sense, e.g. if all data is correct, access = granted, if data incorrect, access = denied. An example of algorithms again can be found in barcodes, a barcode is generated based upon an algorithm, that algorithm is, 1) a 10-digit string. 2) Multiply every second digit by 3. 3) Add all the digits up and get a result. 4) create an 11th digit which when added to the result makes the result a multiple of ten. Error control is then controlled through that because if the check digit doesn't make the result a multiple of ten then that means incorrect data has been given or assigned etc.

(ii) Type your OTHER selected mechanism in the space below:

Processes

Explain how this second mechanism relates to your chosen computer science concept.

Processes relate to error control because they're what are able to solve errors. When an error is identified it will go through a process of examination essentially to identify how the error has occurred, and how the data its supplied is incorrect. Once done the said data or error will go through a process to be fixed and properly display or distribute the correct data.

- (e) Explain in depth the impact that ONE or TWO of the following factors has on your chosen computer science concept.

Ethical issues:

One thing Error control can combat ethically is something such as credit card details being stolen. Error control on a credit card works where you need first, the physical details of your card such as 1) CC number 2) Name and CC expiration date and 3) the 3-digit security code on the back of the card. Without these the CC can't be accessed however, if they are stolen and someone has access with you knowing you can call the bank and cancel the card allowing no further purchases to be made. However, if someone illegally uses your CC without you knowing, when an odd or large purchase is made the bank will contact you and ask for confirmation that this purchase was yours, this way if it wasn't the card can be charged back and your money will be returned to you.

Social impact:

A social impact of error control is that of safety and security. Error control is meant to make us secure as a) it should solve anyone attempting to steal data, money or account details etc. from you. B) help you get the correct data you need or grant you access to the correct accounts and if you can't get access to said data or accounts, help you regain access to them.

Sustainability:

Human factors:

Human errors occur all the time and will continue to do so and that's why error control is also able to control human errors and fix them. One example is that of a social media account and its password. A password will restrict the account and must be supplied first before access is granted so if someone tries to gain access to your account or you mistakenly enter the wrong password access to the account will not be granted. If it was just a human error however it will allow you to try re-enter the password until either a) the correct password is entered or b) access to the account is temporarily disabled. Furthermore, if the account owner has simply forgotten the password, a human error, an option to reset the password to something completely new is available as long as email validation assigned to the account is granted from the email itself.

Future proofing:

- (f) Comprehensively explain the key problems or issues related to your chosen computer science concept.
This can include showing links between and expanding on your answers to parts (a)–(e).

Error control is essential in every day life. Error control needs to be apart of every day life because without it, data which is required for things such as peoples personal accounts, businesses and corporations and even the government would be incorrect and could lead to severe issues and drawbacks with extreme consequences.

One extreme example of error control not being present is when NASA created a multi-million-dollar satellite originally meant to reach mars and scan the planet for any signs of water however, the district of NASA which made all of the calculations to get the satellite close enough to mars without entering the atmosphere and burning up used the metric system and the other district which launched the satellite used the imperial system. Because of the huge difference in the systems the satellite ended up entering the atmosphere and burning, destroying it and wasting millions of dollars.

Another generic example can be that a business which relies on the correct data for their products or stock has been getting incorrect values which may make them charge their customers for way too much or way to less which either can make a reputation for the business and almost kill it if not dealt with.

Error control not being present can also cause issues for the government. For example, once a consensus is completed and the estimated population is tallied, the government is able to see how much tax is being paid per person or vacant homes are in the country etc. and if the tally doesn't make logical sense, the consensus may have incorrect data and a redo is required.

Essentially, Error control is required because without it, it can lead to unforeseeable consequences which may not be present before errors occur.

Achievement Exemplar 2019

Subject	Digital Technologies		Standard	91898	Overall grade	03
Q	Grade	Annotation				
		<p>The candidate showed limited understanding of error control. When explaining the concept, they were not clear about what occurred after an error was detected. When explaining where barcodes were used, a short summary of the benefit of barcodes was given, but there was little / no discussion of error control. When explaining opportunities, most of the answer instead explains the techniques involved, which is repeated when explaining algorithms. The algorithms answer provided a sufficient answer at the Achieved level. There was no need to provide a worked example. The processes answer was limited and was marginally acceptable. The answers to the parts of the assessment task related to impact were largely off topic and confused. When answering the key problems question, the candidate again provided some off topic and unrelated answers. Overall there was sufficient evidence for a pass at Achieved level.</p>				