

VCE[®] Applied Computing: Software Development

Unit 3 & 4 Practice written examination

FOR ADJUSTED STUDY DESIGN (2020 ONLY)

Reading time: 15 minutes

Writing time: 2 hours

QUESTION AND ANSWER BOOK

Structure of book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	20	20	20
B	4	4	20
C	13	13	60
			TOTAL 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.

Materials supplied

- Question and answer book of 23 pages.
- Detachable insert on page 22.
- Answer sheet for multiple choice questions.

Instructions

- Remove the insert containing the case study during reading time.
- Write your **name** on the space provided above on this page **and** on the answer sheet for multiple-choice questions.
- All written responses must be in English.

At the end of the examination

- Place the answer sheet for multiple-choice questions inside the front cover of this book.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION A – Multiple-choice questions**Instructions for Section A**

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is correct or that **best answers** the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Question 1

A program stores the following data in memory:

“Johan”, “Symonds”, 25, 3.24, FALSE

The most appropriate data structure to store it is

- A. a one-dimensional array.
- B. an associative array.
- C. a record.
- D. a string.

Question 2

Daniel created a new screen for an existing application. Which of the following would allow him to evaluate his solution?

- A. Prevent users from entering incorrect data in the new screen.
- B. Reviewing the documentation of the old system.
- C. Checking the error logs of the new solution.
- D. Entering dummy data into a new screen.

Question 3

Kerri wrote the following statement: All calculations must be 100% correct. This is an example of

- A. a constraint.
- B. an evaluation criterion.
- C. a functional requirement.
- D. an element outside the scope of the project.

Question 4

Which of the following statements is correct regarding Use Case Diagrams?

- A. Actors always initiate Use Cases.
- B. An Actor must always be a person.
- C. An “extends” Use Case must always be performed when the base case is.
- D. An “includes” Use Case must always be performed when the base case is.

Question 5

Which of the following statements best describes a Waterfall development model?

- A. Each stage must be fully completed before continuing to the next stage.
- B. Each stage can only be revisited after evaluation is complete.
- C. Each stage can be revisited once the next stage is complete.
- D. A Gantt chart cannot be used to display a Waterfall model.

Question 6

Which of the following statements is true regarding the critical path?

- A. Any task whose delay will delay the following task is on the critical path.
- B. Any task whose delay will delay the overall project is on the critical path.
- C. Only tasks with dependencies can be on the critical path.
- D. All tasks in a project are on the critical path.

Question 7

The purpose of a Use Case Diagram is to show the relationship between

- A. different users.
- B. users and data.
- C. data and system processes.
- D. users and system processes.

Question 8

A developer has been asked to complete a Software Requirements Specification for a new mobile banking application. Which of these should be included in the SRS?

- A. Evaluation criteria for the new system.
- B. Non-functional requirements for the new system.
- C. Documentation about how to use the new system.
- D. Tests that should be carried out on the new system.

Question 9

Many businesses provide a safe and secure way for more people to access work network systems from home. This secure connection is called

- A. a virtual private network.
- B. a peer-to-peer network.
- C. the internet.
- D. an intranet.

Question 10

Simone is writing a software solution that summarises the daily sales for a food truck store. She must read through the sales file one line at a time. The most appropriate control structure for this process would be

- A. an iteration.
- B. a statement.
- C. a selection.
- D. an array.

Use the following information to answer Questions 11 and 12

The pseudocode below will take elements from two arrays and then output a result into a third array.

Begin

arOne ← [5, 7, 3, 8, 2]

arTwo ← [3, 5, 7, 8, 8]

arResult ← []

For counter ← 0 **To** len(arOne)

If arOne[counter] > arTwo[counter] **Then**

 arResult[counter] ← arOne[counter] - arTwo[counter]

Else

 arResult[counter] ← arTwo[counter] - arOne[counter]

EndIf

EndFor

End

Question 11

Which array has the correct values after the pseudocode has been executed?

- A. Array = [8, 12, 10, 16, 10]
- B. Array = [2, 2, -4, 0, -6]
- C. Array = [2, 2, 4, 0, 6]
- D. Array = [5, 7, 7, 8, 8]

Question 12

Which of the following functions could be a replacement for the selection control structure in the pseudocode?

- A. `arResult[counter] ← modulus(arOne[counter], arTwo[counter])`
- B. `arResult[counter] ← maximum(arOne[counter], arTwo[counter])`
- C. `arResult[counter] ← difference(arOne[counter], arTwo[counter])`
- D. `arResult[counter] ← absoluteDiff(arOne[counter], arTwo[counter])`

Question 13

Which of the following functions would return the result 8?

- | | |
|---|---|
| <p>A. Begin</p> <p style="padding-left: 40px;"><code>a ← 4</code></p> <p style="padding-left: 40px;">For <code>i ← 1 To 4</code></p> <p style="padding-left: 80px;"><code>a ← a + i</code></p> <p style="padding-left: 40px;">EndFor</p> <p style="padding-left: 40px;"><code>DISPLAY a</code></p> <p>End</p> | <p>B. Begin</p> <p style="padding-left: 40px;"><code>a ← 4</code></p> <p style="padding-left: 40px;">Repeat</p> <p style="padding-left: 80px;"><code>a ← a + 1</code></p> <p style="padding-left: 40px;">Until <code>a > 8</code></p> <p style="padding-left: 40px;"><code>DISPLAY a</code></p> <p>End</p> |
| <p>C. Begin</p> <p style="padding-left: 40px;"><code>a ← 4</code></p> <p style="padding-left: 40px;">While <code>a < 8</code></p> <p style="padding-left: 80px;"><code>a ← a + 1</code></p> <p style="padding-left: 40px;">EndWhile</p> <p style="padding-left: 40px;"><code>DISPLAY a</code></p> <p>End</p> | <p>D. Begin</p> <p style="padding-left: 40px;"><code>a ← 4</code></p> <p style="padding-left: 40px;"><code>b ← a</code></p> <p style="padding-left: 40px;"><code>c ← a + b</code></p> <p style="padding-left: 40px;"><code>DISPLAY a</code></p> <p>End</p> |

Question 14

John received an email that appeared to be from his bank, asking him to log in to his account and confirm his contact details. He clicked a link and it took him to a website that appeared to be his bank's website where he logged in and completed the requested task. It turned out that John was a victim of

- A. a spam attack.
- B. a phishing attack.
- C. an SQL injection attack.
- D. a cross-site scripting attack.

Question 15

Kenly is checking the sources used for data in a report produced by one of her team members. Which characteristic of data integrity is she concerned about?

- A. Accuracy.
- B. Correctness.
- C. Authenticity.
- D. Reasonableness.

Question 16

Katie, Kamal and Po have been asked to present an idea for a new software solution. They begin by using a large piece of paper and write down as many ideas as they can think of. This is an example of

- A. convergent thinking.
- B. divergent thinking.
- C. design principles.
- D. systems thinking.

Question 17

Julie has updated the terms and conditions document for her organisation's website. The previous file was called "termsandcond_2019_12.docx". When she saved the file this time, she called it "termsandcond_2020_03.docx". Julie is using a different file name because

- A. she is making a backup of the old file.
- B. she is implementing version control.
- C. she did not make any changes.
- D. she has a new computer.

Question 18

To be eligible to attempt a driver's licence test in Victoria, as well as being at least 18 years old, learners must complete at least 120 hours of documented driving practice, including at least 20 hours of driving at night. Which of the following statements would test for these conditions correctly?

- A. `age >= 18 and (hours >= 120 or nightHours >= 20)`
- B. `(age >= 18 and nightHours >= 20) or hours >= 120`
- C. `age >= 18 and hours >= 120 and nightHours >= 20`
- D. `age >= 18 or (hours >= 120 and nightHours >= 20)`

Question 19

The Australian Privacy Principles are guidelines that form part of which legislation?

- A. Privacy and Data Protection Act 2014.
- B. Privacy Act 1988.
- C. Copyright Act 1968.
- D. Health Records Act 2001.

Question 20

Which organisations are governed by the *Privacy and Data Protection Act 2014*?

- A. All Australian companies whose annual turnover exceeds \$3 million.
- B. Victorian Government departments, their agencies and contractors.
- C. Anyone who values privacy of information.
- D. Companies who opt into the Act.

SECTION B – Short-answer questions**Instructions for Section B**

Answer **all** questions in the spaces provided.

Question 1 (2 marks)

With reference to object-oriented programming, compare the terms function and method.

Question 2 (4 marks)

Amir is helping his father with a problem on his computer. He discovers that his father's computer has not had the operating system updated for over two years. When Amir asked his father why, his father said it takes too long each time and he does not see the point as his computer was working just fine.

Describe two advantages to applying software updates that will help Amir explain to his father why applying software updates regularly to his computer is a good idea.

Question 3 (5 marks)

The school canteen has a new student card system that allows students to pay for food and drinks using credits on their card. Parents can add credits to their child's card using a web payment form. When the student goes to pay, the system looks up their card number in an array of Student objects and returns the current number of credits. If the number of credits is enough, payment is accepted and deducted from the total credits and the updated credit total is stored in the file. If there are not enough credits, an error is returned. Student credits are stored as part of an object called "Student". The object description is below:

Object: Student**Properties**

Name	Type	Description
id	int	Unique Id of student
surname	string	Student surname
firstname	string	Student first name
cardNumber	int	Unique card number
curCredits	float	Current number of credits available

Methods

Name	Parameters	Description
load()	cardNumber - int	Load data from file. Return FALSE if failed
update()		Save data back to file.

Complete the pseudocode below to describe this process.

Begin

{Check Card Credits}

Input cardNumber, purchaseAmount

 studCard ← new Student()

If (studCard.load(cardNumber) <> FALSE) **Then**

Else

 OUTPUT "Card not found"

EndIf

End

Question 4 (9 marks)

Taj runs a successful software development firm in Victoria. He employs 5 full time programmers and 3 help desk support staff as well as an office administrator. They have several clients in Victoria, including medical centres and one local council. Last year was very successful and for the first time his company had an annual turnover of over \$3 million.

Recently, one of their customers complained that their data now included customer and product records that do not belong to them. When Taj reviewed the complaint, he discovered that some records from one customer's data had somehow ended up in another customer's database system. Further investigation found that this occurred during a recent software update to both sites.

- a. Taj knows that these clients are now using the latest version of his software as he uses a version control system. Describe one purpose of version control. 1 mark

- b. Taj knows it would be quite easy to just go and delete the records that were accidentally added and not tell the other client about the problem. However, he has decided to speak to both customers about the situation. Discuss two possible consequences of Taj's decision to speak to his customers. 4 marks

- c. Recommend two strategies Taj can employ to help reduce the chance of this error occurring again.

4 marks

SECTION C – Case study**Instructions for Section C**

Answer **all** questions in the spaces provided. Remove the case study insert and read **all** the information provided before you answer these questions. Answers must apply to the case study.

Question 1 (1 mark)

Identify **one** organisational goal for Tommy and Tamara's Tomatoes.

Question 2 (1 mark)

Identify **one** system objective for the Greenhouse Control System.

Question 3 (4 marks)

Before beginning any design or development work, Tommy and Tamara read through all of the information provided by the manufacturer of MyWeatherStation and the controller units for the windows, fan and watering systems.

- a.** What data collection technique have Tommy and Tamara used to gather this information?

1 mark

- b.** Identify and justify another data collection technique that Tommy and Tamara could use to help determine the features and limitations of a system like the one they want.

3 marks

Question 4 (4 marks)

- a.** Identify one functional requirement from the case study. 1 mark

- b.** Identify one constraint from the case study and describe the impact the constraint would have on the project. 3 marks

Question 5 (9 marks)

Tamara is going to write the software that controls all of the systems, while Tommy installs all of the watering, pumps and other equipment required. As they can only work on the project on weekends, Tamara thought it best to create a project plan for them to follow.

- a.** List four components of a project plan. 4 marks

- b.** Tamara can begin writing the code but will not be able to do any testing until Tommy has completed the installation of the control units.

What is the name given to a task that must wait for another task to complete before it can begin?

1 mark

- c.** Finishing the coding is an important point in the project. In project management what is a significant point in a project called?

1 mark

- d.** If Tommy were to take longer than expected to install the control systems, it would delay the whole project because there is no slack time for that task. What is slack time?

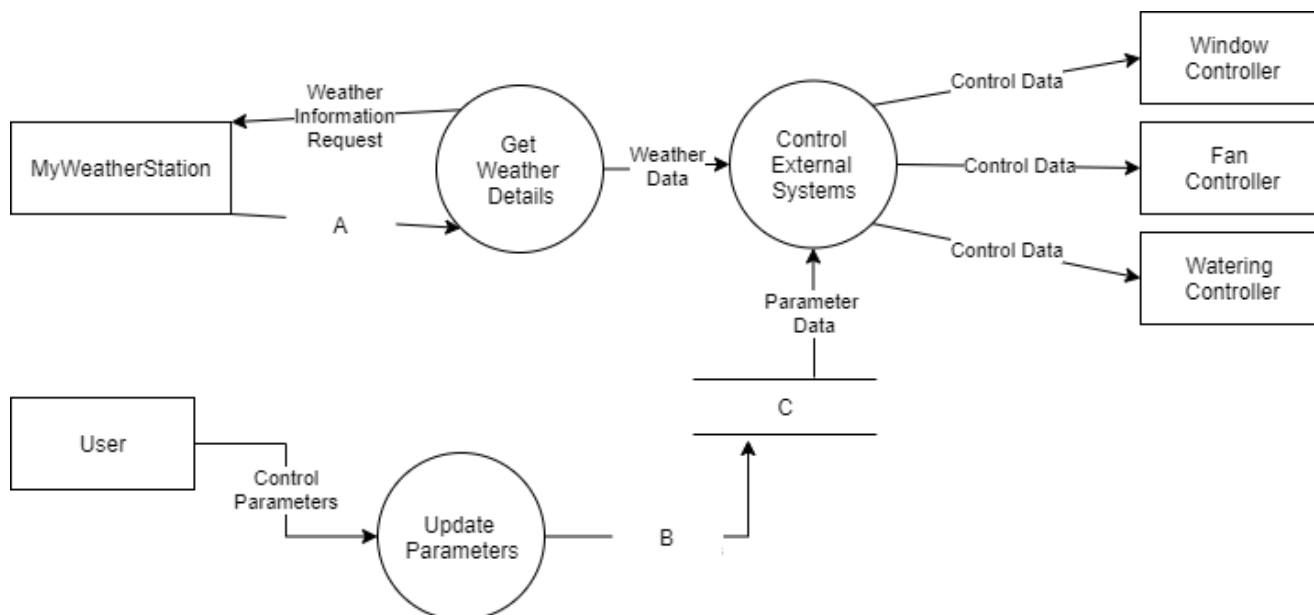
1 mark

- e.** Tommy's installation task lies on the critical path of the project. Explain what it means for a task to be on the critical path.

2 marks

Question 6 (7 marks)

To help her further understand the requirements, Tamara drew the following diagram.



- a. What is the name given to the diagram above? 1 mark

- b. From the diagram, provide an appropriate label for the components marked A, B and C. 3 marks

A _____

B _____

C _____

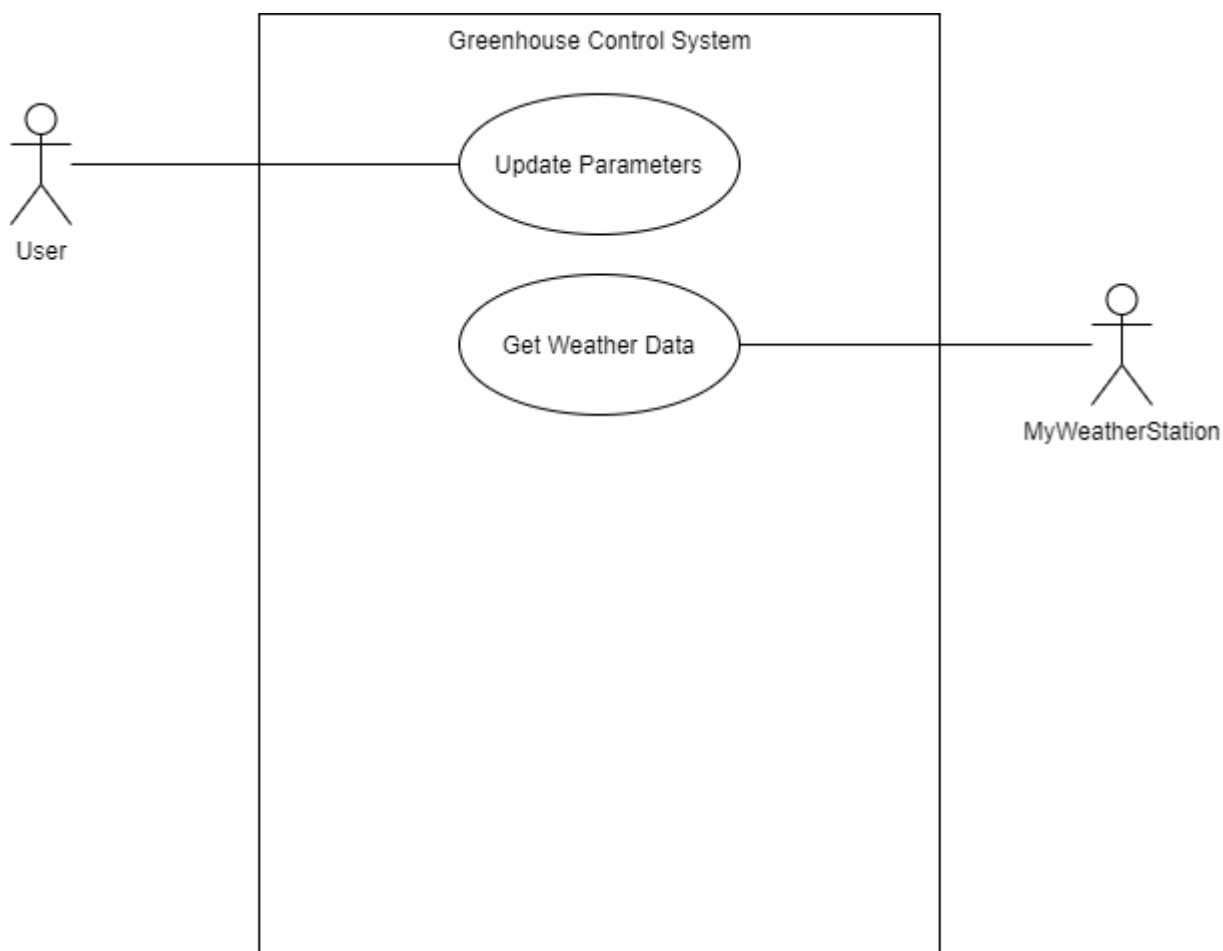
- c. Identify the element type of the following components in the diagram. 3 marks

MyWeatherStation _____

Get Weather Details _____

C _____

Tamara started drawing a use case diagram as shown below.



Question 7 (5 marks)

Tamara wants to include the controllers for the windows, fan and watering in this diagram.

- a. Justify their inclusion in the use case diagram. 2 marks

- b. On the diagram make the necessary changes to include the **fan controller system**. 3 marks

Question 8 (5 marks)

The MyWeatherStation system is able to monitor a number of variables, but Tommy and Tamara only have some features currently enabled – the sunshine sensor, the rain gauge sensor (both located outside) and the temperature sensor which is set up inside the greenhouse.

Every 10 minutes the controller sends a status request to the weather station and receives a response in XML format. A sample response is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<weather>
  <timestamp>2020-10-01 13:23:10</timestamp>
  <sensor>
    <type>temperature</type>
    <value units="Celsius">22.2</value>
  </sensor>
  <sensor>
    <type>rain</type>
    <value units="mm">0.0</value>
  </sensor>
  <sensor>
    <type>sunshine</type>
    <value units="mins">3</value>
  </sensor>
</weather>
```

- a. What is the name given to the “units” element which provides additional information for the value of each sensor? 1 mark

- b. Explain an advantage for both the manufacturer of the MyWeatherStation system and their customers in using XML to send the sensor data. 4 marks

Question 9 (6 marks)

To control the windows the program needs to call one of two functions “openWindows()” and “closeWindows()”. Similarly, to control the fan, there are two functions “startFan()” and “stopFan()”. Within each function the current status of the window or fan is determined before making any changes. Tommy wants the windows to open when the internal temperature reaches 20°C and the fan to start once it reaches 24°C. When the temperature drops below 24°C the fan should turn off, and once the temperature drops below 20°C the windows should close.

Tamara has written the following pseudocode to operate the windows and fan based on the internal temperature recorded by the weather station sensor:

Begin

```
{control greenhouse temperature}
    Input weatherData

    If weatherData.temperature < 20 Then
        Call closeWindows()
    Else
        Call openWindows()
        If weatherData.temperature > 24 Then
            Call startFan()
        Else
            Call stopFan()
        EndIf
    EndIf
End
```

- a. Select a set of values for temperature to fully test the algorithm and complete the testing table below.

4 marks

temperature	Expected result	Actual result
19	<i>windows closed, fan off</i>	<i>windows closed, fan off</i>

- b. Identify the error in the pseudocode by writing the incorrect line below 1 mark

- c. Re-write the line of code correctly 1 mark

Question 10 (6 marks)

The amount of water the tomatoes need is partly dependent on the number of sunlight hours they receive. Once the number of hours of sunlight is over 5 hours, the tomatoes need an additional 10 minutes of watering for each additional hour of sunlight.

For example, if the previous day had 6 hours of sunlight, they would need an additional 10 minutes of watering. If there was 8 hours of sunlight, they would need an additional 30 minutes of watering.

Each time the MyWeatherStation responds to a data request, it returns the number of minutes of sunshine recorded **since the last request**. Therefore, each time the data is retrieved, the Greenhouse Control System will need to add the number of minutes for the day to a variable to track the total.

Tamara has created a variable called dailySunshineHours. This stores the number of sunshine hours so far on this day.

- a. Complete the following pseudocode by writing the line of code to update the dailySunshineHours variable. 2 marks

Begin

```
{update dailySunshineHours}
```

```
    Input weatherData.sunshine, dailySunshineHours
```

End

- b. What data type should the dailySunshineHours variable be? 1 mark

- c. Once the watering time has been calculated each morning, what needs to happen to the `dailySunshineHours` variable? 1 mark

- d. Explain an advantage of storing the value of the `dailySunshineHours` variable to permanent storage each time it is updated. 2 marks

Question 11 (5 marks)

Tamara intends to code one part of the software solution, then implement it. She will then test to see if it works as intended, then move on to the next component. Identify which development model this process is most like and describe two advantages it has over alternative approaches.

Development Model _____

Advantage 1

Advantage 2

Question 12 (4 marks)

The MyWeatherStation controller can operate in two wireless network modes – Bluetooth or Wi-Fi. Tommy and Tamara could use either mode but need to decide which mode they will use. Describe two factors they will need to consider when making their choice.

Question 13 (3 marks)

The MyWeatherStation controller is used by many customers across the country in a range of situations. The owners of MyWeatherStation value the privacy of their customers and their data and have a Privacy Policy that they follow.

List 3 things a privacy policy should state.

END OF QUESTION AND ANSWER BOOK

Insert for Section C – Case study

Please remove from this book during reading time.

Tommy and Tamara’s Tomatoes

Tommy and Tamara have just purchased a greenhouse to grow tomatoes for sale at the local fresh food market. Using a greenhouse allows them to control the amount of water, humidity and temperature to grow the best tomatoes they can, for most of the year.

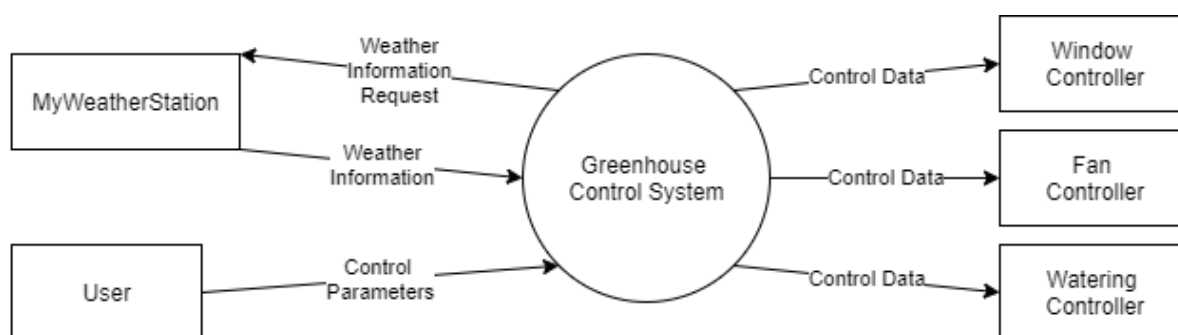
While they love gardening (and tomatoes) they both have other jobs and want to create an automated system to look after the plants’ needs during the day. This will involve an automated watering system and control of the temperature inside the greenhouse.

The temperature is controlled by opening and closing windows at either end of the greenhouse and using a fan on particularly hot days.

Their watering system has two components. Firstly, they have a large water tank that is connected via a pump to a drip watering system at the base of each plant. Secondly, when the tank is low, another pump can pull water into the tank from their large dam.

Tommy and Tamara want to design a system that can control the amount of water and regulate the temperature in the greenhouse for them. They have all the hardware required, including electronic pumps, motors and switches that can be controlled by a computer and a system called MyWeatherStation that can send details of the current weather conditions to other applications.

As part of their analysis, Tamara drew the following context diagram:



END OF CASE STUDY INSERT

VCE Computing: Software Development NAME: _____**Section A: Multiple Choice Answer Sheet**

For each multiple-choice question, shade letter of your choice.

Question				
1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D