

<b>STUDENT NAME:</b>			
<b>SUBJECT TEACHER:</b>		<b>TUTOR GROUP:</b>	

## Year 12 Trial Exam



# SOFTWARE DEVELOPMENT



## Written examination

2022 - A Spirited Tomorrow

Reading time: (120 minutes)

Writing time: (15 minutes)

**September 2022**

## 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	14	14	60
			Total 100

### INSTRUCTIONS TO STUDENTS

Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.

- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- No calculator is allowed in this examination.

### Materials supplied

- Additional space is available at the end of the book if you need extra paper to complete an answer.

### Instructions

- Write your **student name, tutor group & subject teacher's name** in the space provided above on this page.
- All written responses must be in English.

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

**SECTION A – Multiple Choice Questions**

Please write the letter corresponding to the correct or best answers in the table below.

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

**Question 1**

Julie notices that workers at the office are finding it difficult to complete purchase orders. She proposes that, a more streamlined process for purchase orders should be developed by providing a software solution. Ruby decides to investigate this idea and wants to prepare some information for management.

What technique or report should Julie use to illustrate what is required for the software to her manager?

- a) Presenting a journal of observations
- b) Writing an email of complaint to her manager about the staff
- c) Completing a software requirements specification report
- d) Presenting a log of worker's use of the network

**Question 2**

Which of the following factors will have an impact on the development of Julie's software solution non-functional requirements?

- a) Staff experience of computers
- b) Time restrictions
- c) Finances
- d) The scope of the programming language

**Question 3**

Purchasing orders are made many times throughout the day resulting in 1000's of weekly documents stored in order they are created. Which is the best algorithm to search for a particular order?

- a) Binary Search
- b) Quick Search
- c) Selection Search
- d) manual Search

**Question 4**

Julie is a programmer who has decided to build the software solution to assist staff in the purchase order process. She needs to store data to indicate that a purchase order has been paid or not paid. The most appropriate data type to store this data is

- a) string
- b) integer
- c) boolean
- d) floating point

**Question 5**

Julie is keen to investigate the issues the staff are experiencing with the current system. She is not sure what questions to ask so the best method of collecting authentic data is to

- a) interview the manager
- b) invite the staff into focus group discussions
- c) survey all the staff in the company
- d) observe the manager

**Question 6**

The staff at Julie's company are aging and find learning new skills on digital technology confronting. This is an example of

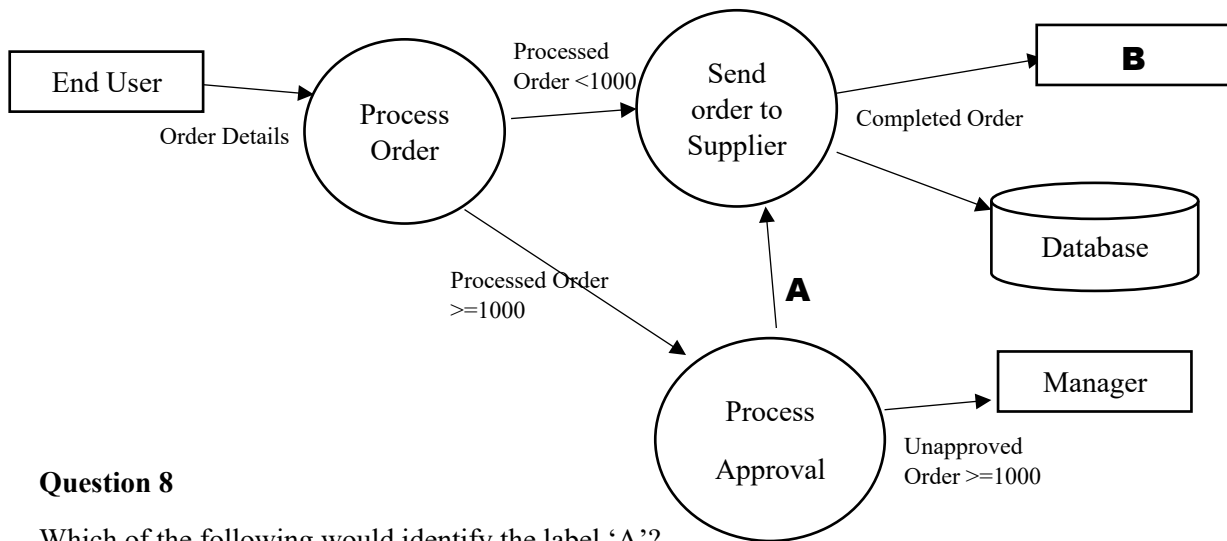
- a) a usability constraint
- b) an economic constraint
- c) a technical constraint
- d) a non-functional requirement

**Question 7**

After producing an SRS and using a variety of idea generating tools, Julie need to design the solution. Which of the following is a design tool?

- a) use case diagram
- b) mind map
- c) data dictionary
- d) gantt chart

Julie has developed a diagram as part of her analysis below. Consider this diagram in answering the following questions.



### Question 8

Which of the following would identify the label 'A'?

- a) processed order
- b) approved order
- c) completed order
- d) transferred order

### Question 9

Which of the following would identify the label 'B'?

- a) Staff member
- b) Email
- c) Supplier
- d) Stored document

### Question 10

Which of the following identifies an Entity?

- a) Process Order
- b) Manager
- c) Order details
- d) Database

**Question 11**

Julia has decided to use terms, icons and images that relate to the manual processes in her software solution. These design factors incorporate

- a) interoperability
- b) affordance
- c) security
- d) reliability

**Question 12**

At Julia's workplace, purchase orders are archived once the financial year is over in July. This means Purchase Orders from the previous year

- a) cannot be recovered
- b) cannot be accessed by the system, but imported from the archived
- c) can only be access by year old back ups
- d) are still in the system

**Question 13**

Each Purchase Order is a PDF file that has an average file size of 500 KB. If the data connection between the LAN and the router is 2000 Kb per second, it will take

- a) 2.8 seconds
- b) 2.0 seconds
- c) 0.8 seconds
- d) 1.8 seconds

**Question 14**

Julia uses code to determine unique purchase order numbers for order. The code collects the date, time, name code of the supplier and the name code of the staff member. For example: Sarah develops a purchase order on the 12 August 22 at 3.10pm for Core Electronics. This produces an order number: 12822310COESAR.

The best data structure that could handle this process would be

- a) Record
- b) 2D Array
- c) 1D Array
- d) Hash table

```
1 Begin
2   Value1 ← 10
3   Value2 ← 2
4   While (Value2 <Value1) Do
5       Value3 ← Value1 + Value2
6       Value2 ← Value2 + (Value3 / 2)
7       Print Value2
8 End
```

**Question 15**

What is the output of the code above?

- a) 10, 2, 12
- b) 12, 8, 20
- c) 8, 17
- d) 8, 12

**Question 16**

Julia's workplace is implementing a change over from desktop computers connected by ethernet to the LAN to laptops that will connect via wireless connections. Which of the following protocols does WiFi use?

- a) CSMA/CD
- b) Request to send/Clear to Send
- c) TCP/IP
- d) HTTP

**Question 17**

Julia has decided to use an Agile development model to produce the required software. Which of the following best describes the model?

- a) Julia will deliver the solution in increments to the client for feedback until it is complete.
- b) Julia will deliver prototypes to the client for risk assessment until complete.
- c) Julia will follow the Gantt Chart instructions until the solution is complete.
- d) Julia will follow the Problem Solving Methodology until the solution is complete.

**Question 18**

Julia is concerned that purchase order documents have payment details. Which of the following would keep the documents safe while in transit attached to an email?

- a) a firewall
- b) encryption
- c) a locked door on the office
- d) staff password access

**Question 19**

Which of the following would be a suitable criterion for evaluating the effectiveness of a software solution?

- a) The solution processes output correctly
- b) The solution processes data timely for the work flow
- c) The solution is portable across devices
- d) The solution is efficiently designed

**Question 20**

When testing data type validation, the test data must include:

- a) letters, number and symbols
- b) values only
- c) any data and missing data
- d) only correct data

**SECTION B – Short Answer Questions**

Answer all the questions in the spaces provided

**Question 1**

Below is table of sample data that will be processed by Brian's salary software. He needs to create a data dictionary to list the variables and data types he will use in his code.

<b>StaffID</b>	<b>Given Name</b>	<b>Family Name</b>	<b>Annual Salary</b>	<b>Superannuation</b>
234983	William	O'Brien	87,000	Rest Super
093545	Cynthia	Jackson	198,010	Government Super

a) Identify two naming conventions Brian should use in his data dictionary.

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2 Marks

c) Complete the table below to create Brian's Design tool.

Variable	Data Type	Size	Description

4 Marks



**Question 2**

Brian is developing his Salary Software and was told to develop an algorithm before starting to code due to the complexity. The code needs to calculate the monthly salaries for each worker, deducting tax at 30% if over \$100,000 or 22% between \$50,000 – \$99,999. Any salaries below \$50,000 attract 18% tax rates. Superannuation is calculated as 9% of the monthly payment. Once the amount is calculated, a payslip needs to be created with the staff identification details, the gross pay and the net pay (gross minus the tax). It needs to include the superannuation amount to be contributed to their account.

a) Below is the start of Brian's algorithm in pseudocode. Please complete the pseudocode to produce the payslip. 5 Marks

Begin

Input intStaffid

Input strGivenName

Input strFamilyName

Input fptAnnualSalary

fptMonthlyPayment = fptAnnualSalary /12

IF fptAnnualSalary > 100,000) THEN

---

---

---

---

---

Print intStaffid

Print strGivenName

Print strFamilyName

Print fptAnnualSalary

Print fptMonthlyPayment

Print fptMonthlyPaymentNET

Print fptSuper

End

**Question 3**

Name three distinctions between a procedure and a function.

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3 Marks

**Question 4**

Brian has been asked to conduct usability testing on his salary software.

a) State the purpose of usability testing.

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3 Marks

b) Identify three strategies that could be employed in usability testing.

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3 Marks

**SECTION C – Case Study Questions**

Please remove the insert during reading time. Use the Case Study provided on the last page to answer the questions in this section. Answer ALL the questions in the spaces provided.

**Question 1**

a) Identify a goal of the TeachNShare system.

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1 Marks

b) Identify an objective of the TeachNShare system.

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1 Marks

**Question 2**

a) Julia is using a Spiral development model to further develop the system. She made a basic email list when she was a student and has decided to further develop it for TeachNShare.

Justify why Julia has elected a Spiral development model rather than a waterfall model for the development of the system.

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4 Marks

**Question 3**

a) Sid wants to develop a Gantt Chart, but Julia says she knows what she is doing. Explain why Sid would want to use a Gantt Chart.

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2 Marks

b) Sid has talked to Julia about what needs to be completed before the TeachNShare system can go live online, ready for teacher sign ups. They want the system ready in two months at the beginning of February at the start of the school year. There is an excerpt of the Gantt Chart below, use this to answer the following questions.

Task Number	Task	Duration	Dependencies	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
1	Data Collection	1									
2	SRS	1	1								
3	Design Folio	1	2								
4	Prototype 1	1	3								
5	Risk Management	2 days	4								
6	Prototype 2	1	5								
7	Risk Management	2 days	6								
8	System Online		7								
9	Usability Testing	3 days									
10	Evaluation Report	1									

Complete the Gantt Chart above based on the durations and dependencies provided.

5 Marks

**Question 4**

a) Sid has prepared the SRS (Software Requirements Specifications) for TeachNShare. Outline the purpose of an SRS.

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2 Marks

b) Identify ONE Functional Requirement the TeachNShare system SRS would need to include.

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1 Marks

c) Identify TWO Non-Functional Requirements the TeachNShare system SRS would need to include.

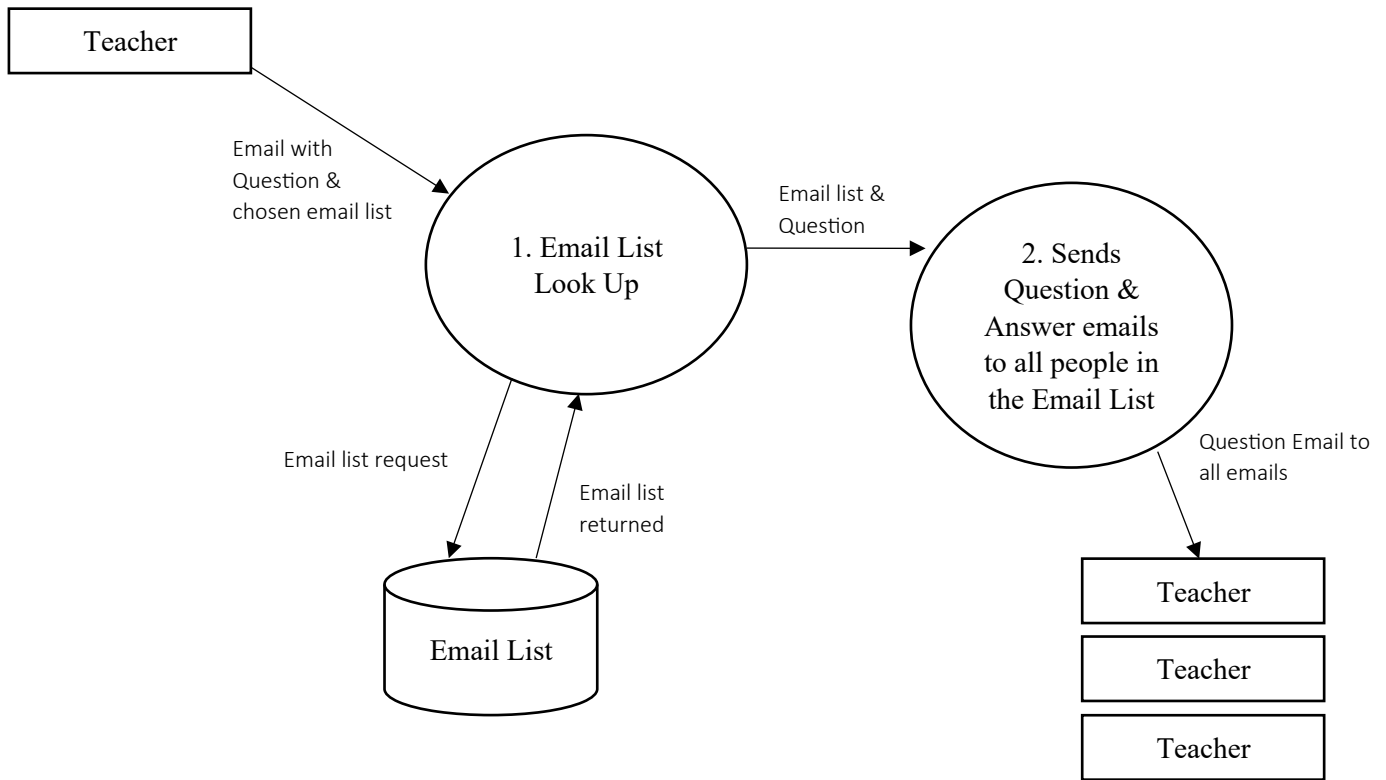
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2 Marks

**Question 5**

Sid prepared the Data Flow Diagram below.



Identify the components in the DFD above.

a) Storage \_\_\_\_\_

b) Entity \_\_\_\_\_

c) Data Flow \_\_\_\_\_

d) Process \_\_\_\_\_

4 Marks

**Question 6**

Sid has designed two interfaces for the Sign Up page on the TeachNShare website shown below.

**Design 1**

**Design 2**

Select the most appropriate design for the Website email list sign up page. Justify your selection.

Design Selection:

Justification:

3 Marks

**Question 7**

Julia is concerned that allowing sign ups on the website might risk the authenticity of the system by allowing non-teachers to access the lists. Julia is going to limit sign ups to people who have emails containing "...edu.au".

a) This is an example of:

1 Marks

b) What other risk is the website prone to without security?

1 Marks

**Question 8**

The email server stores all the emails under different lists. These lists need to be accessed once an email addresses the list to add all the email addresses to the forward process. There are roughly 300,000 teachers in Australia so, it must be capable of managing that many emails in each list.

a) Julia needs to store the data for the email lists on a server. When a teacher selects one or more emails lists, their email is added to those lists. What file type would best store this data so all listed emails will get each email submission? Justify your answer.

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3 Marks

b) Each list is related to a subject and a year level. So for example: English is taught from Year 1 to Year 12. Some subjects are adjusted or replaced over the years such as Year 12 Information Technology was changed to Year 12 Data Analytics. There are 90 subjects in Year 12 alone in Victoria. Each senior Secondary subject is different between Australian States. This means they will have hundreds of potential lists that teachers can join. Which algorithm studied would best allow the Email server to find the correct list? Justify your answer.

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3 Marks

**Question 9**

Sid and Julia discussed data redundancy where schools have signed up all their teachers but some are not active on the lists taking up storage space. Julia wants to be able to run a sorting algorithm to see who has not used the service in the last six months. Once a list of emails is identified as non-participants, they can be sent an email asking if they wish to continue to use the service or if they need assistance in how to use the service.

- a) Julia is considering Selection Sort or Quick Sort. Which of these two would be the best algorithm given the nature of the problem.

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1 mark

- b) Justify your answer for the previous question.

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1 mark

- c) Describe how Selection Sort and Quick Sort function and how they are different.

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4 marks

### Question 10

Julia is testing her binary search algorithm to find a teacher's login ID. She is using the sample data below.

1992	2638	2741	3182	3422	3522	5298	7192	7399	782 1	8102	892 2	9127
------	------	------	------	------	------	------	------	------	----------	------	----------	------

The system is searching for login ID 2638

- a) Identify which ID will be found in the first iteration of the search.

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1 mark

- b) Identify which ID will be found in the second iteration of the search.

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1 mark

- c) Identify which ID will be found in the third iteration of the search.

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1 mark



**Question 11**

The pseudocode below checks authentication on sign up for a new teacher.

```

1. Begin
2.   Read email
3.   If email contains "*.edu.au" Then
4.     2FACode ← RandomInteger (6)
5.     SendEmail(AuthenticationCode, email)
6.     Read ReturnedCode
7.     If ReturnedCode == 2FACode Then
8.       ValidMember ← FALSE
9.     Else
10.      CreateRecord(email)
11.    End If
12.  Else
13.    ValidMember ← FALSE
14.  End IF
15. End

```

a) Complete the Test Table below using both valid and invalid test data.

Test	Returned Code	Expected Result	Actual Result
m.brown@gmail.com	True	ValidMember ← FALSE	ValidMember ← FALSE
	False		
	True		
	False		

3 mark

b) Identify the where the pseudocode contains an error.

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1 mark

c) Rewrite the code to correct the error.

---

1 mark

d) What type of data structure is 'RandomInteger'?

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1 mark

**Question 12**

Sid is looking for ways that marketing could bring in extra revenue and is considering data mining for key terms in online discussions to find participating teachers who may be a target customer for a wide range of online teaching resources. Sid is considering allowing commercial organisations access to the emails of teachers who may be discussing related terms to commercial products. For example: If an email discussion contains queries about geometry resources, the teachers involved would be targeted via email to buy geometry teaching resources by external commercial organisations.

- a) Identify the relevant legislation that applies to the use of data for these purposes.

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1 mark

- b) Describe how this type of data use is a breach of the legislation identified in part a.

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2 marks

Sid was approached by a school principal who wanted access to all the email lists his teacher were actively using, so he could monitor their interactions to see who in his staff were experiencing issues and needing help. Sid suggested that it could be a feature that TeachNShare could offer schools. Julia was concerned that there would be an ethical issue with adding that feature.

- c) Outline one ethical concern regarding Sid's suggestion for the principal monitoring feature.

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3 marks

**Question 13**

Julia has employed a security expert to ensure the TeachNShare system data is secure. She has just developed the mobile phone app to allow access to the email discussions teachers have signed up for.

- a) Describe one security vulnerability the app could experience.

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1 mark

- b) Describe a security measure that could be put in place to minimise that risk identified in part a.

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1 mark

**Question 14**

Julia has suggested TeachNShare develop a risk management plan that includes strategies to minimise security vulnerabilities.

Recommend two key risk management strategies as part of a risk management plan and outline how each strategy would minimise security vulnerabilities.

Risk management strategy 1

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2 marks

Risk strategy 2

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2 marks

END OF QUESTION & ANSWER BOOK

**INSERT for Section C – Case Study**

Remove from the booklet during reading time.

**TeachNShare – a new online teaching resource.**

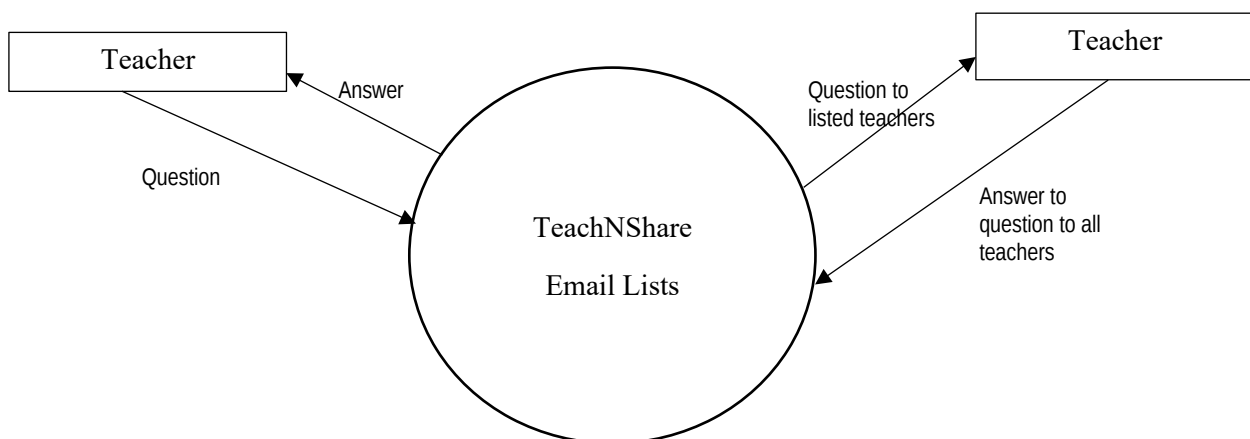
Sid and Julia are starting a new business that allows teachers from all over Australia to share teaching and learning resources via email lists. They had been trying to get a teacher-focused social media app up and running, but found that teachers do not usually have access to their mobile phones while at school and their laptops are restricted from access to social media sites, so they decided to connect teachers via direct email. Sid and Julia are both teachers and know how difficult it is when you are new to teaching and need help from other teachers.

Sid and Julia's business is called TeachNShare. It runs on a web and email server. Teachers can sign up to an email list on their website. There are email lists for all subjects and all year levels. An example use of the service might be where a new teacher needs help writing an assignment question, so she posts her question to the Year 9 English email list as an email. All the other teachers who have signed up to the Year 9 English email list will get the email and respond if they have an answer. Everyone on the list will see the exchange and benefit from the conversation while allowing anyone to add any information to the discussion. Each posting is a new email to all listed teachers.

To make the business cover the costs of running the servers, they have developed an eCommerce back-end to the website for sign up and payment. To encourage all government schools to sign up there is a flat fee of \$49.50 for remote or country schools and \$109.99 for town or metropolitan schools. The fee includes all the teachers at that school for a year. Non-government schools are charged a higher flat fee of \$159.99 per annum. If teachers cannot convince their school to sign up, they can sign up as individuals at \$19.99 per year.

It is important that only educators can access the email lists and exchanges on the list remain teaching related to ensure that those signed up are not spammed.

Sid has created a Context Diagram (below).



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