SUPERVISOR TO ATTACH
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Write your **student number** in the boxes above. **Letter**

Applied Computing: Software Development

Question and Answer Book

VCE Examination – Thursday 13 November 2025

- Reading time is **15 minutes**: 3.00 pm to 3.15 pm
- Writing time is **2 hours**: 3.15 pm to 5.15 pm

Approved materials

- one scientific calculator

Materials supplied

- Question and Answer Book of 32 pages
- Detachable Insert containing a case study for Section C in the centrefold
- Multiple-Choice Answer Sheet

Instructions

- Follow the instructions on your Multiple-Choice Answer Sheet.
- At the end of the examination, place your Multiple-Choice Answer Sheet inside the front cover of this book.

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

Contents

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Section A (20 questions, 20 marks) 2–10

Section B (5 questions, 20 marks) 11–15

Section C (13 questions, 60 marks) 16–30

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

VICTORIA State Government

Section A – Multiple-choice questions

Instructions for Section A

- Answer **all** questions in pencil on your Multiple-Choice Answer Sheet.
- 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

Consider the following visual representation of a data structure that stores a series of numbers as floating point values.

0	1	2	3	4
1.2	5.0	4.1	2.6	3.9

The data structure represented above is

A. a record.

B. an XML file.

C. a one-dimensional array.

D. a two-dimensional array.

Question 2

'street_number' is an example of a variable using which naming convention?

A. Hungarian notation

B. snake casing

C. camel casing

D. snail casing

Question 3

Ana Lucia is learning how to code and writes a short program. When she tries to run the program, the compiler shows an error message, indicating a syntax error. Ana Lucia has most likely

A. attempted to divide a number by zero.

B. used a variable that has not been defined.

C. missed a required symbol within an instruction.

D. executed a loop condition that causes the program to run indefinitely.

Use the following information to answer Questions 4 and 5.

The following pseudocode is used to calculate a cash bonus for referring new customers.

```
1  IF referrals <= 10 THEN
2       RETURN referrals * 500
3  ELSEIF referrals > 10 AND referrals <= 30 THEN
4       RETURN 5000 + (referrals - 10) * 600
5  ELSEIF referrals > 30 THEN
6       RETURN 15000 + (referrals - 30) * 700
7  ENDIF
```

Question 4

The control structure being used in the pseudocode segment above is

A. repetition.

B. selection.

C. property.

D. method.

Question 5

The cash bonus calculation should work so that:

- fewer than 10 referrals results in a cash bonus of $500 per referral
- between 10 and 30 referrals results in a cash bonus of $5000, plus $600 for every referral after the 10th
- more than 30 referrals results in a cash bonus of $15 000, plus $700 for every referral after the 30th.

Which one of the following statements is correct?

A. 9 referrals will result in a higher cash bonus than 10 referrals.

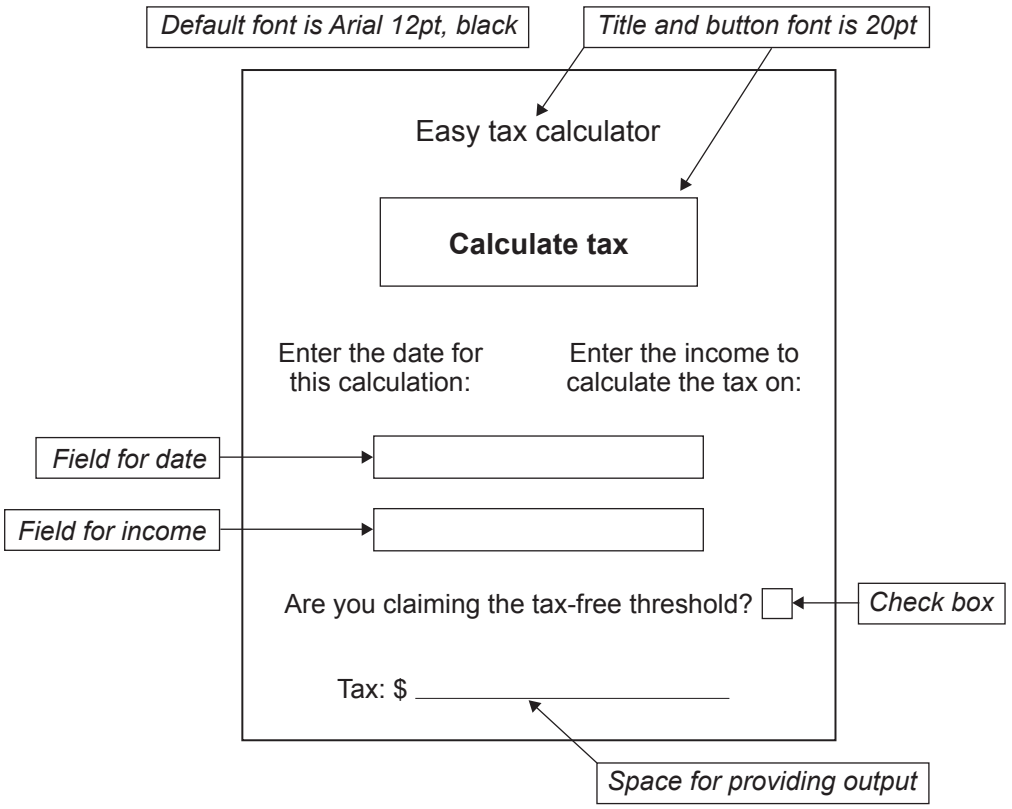
B. 10 referrals will result in a higher cash bonus than 11 referrals.

C. 29 referrals will result in a higher cash bonus than 31 referrals.

D. 31 referrals will result in a higher cash bonus than 29 referrals.

Use the following information to answer Questions 6 and 7.

Consider the mock-up of an online tax calculator shown below.



Question 6

Based on the mock-up provided, the user experience (UX) characteristic that could be improved the most is

A. contrast.

B. portability.

C. affordance.

D. authentication.

Question 7

Which one of the following input-process-output (IPO) charts best reflects the processing of the online tax calculator?

A.

Input	Process	Output
date income	look up tax rate calculate tax	tax

B.

Input	Process	Output
calculate tax date income tax-free threshold	look up tax rate subtract tax-free threshold amount from income	tax

C.

Input	Process	Output
date income tax-free threshold	look up tax rate subtract tax-free threshold amount from income calculate tax	tax

D.

Input	Process	Output
date income tax-free threshold	look up tax rate if tax-free threshold claimed, subtract tax-free threshold amount from income calculate tax	tax

Question 8

Penny is working on a mobile application and needs to ensure it performs well on devices with limited processing power.

Which of the following factors is most relevant to this constraint?

A. the project's budget for marketing

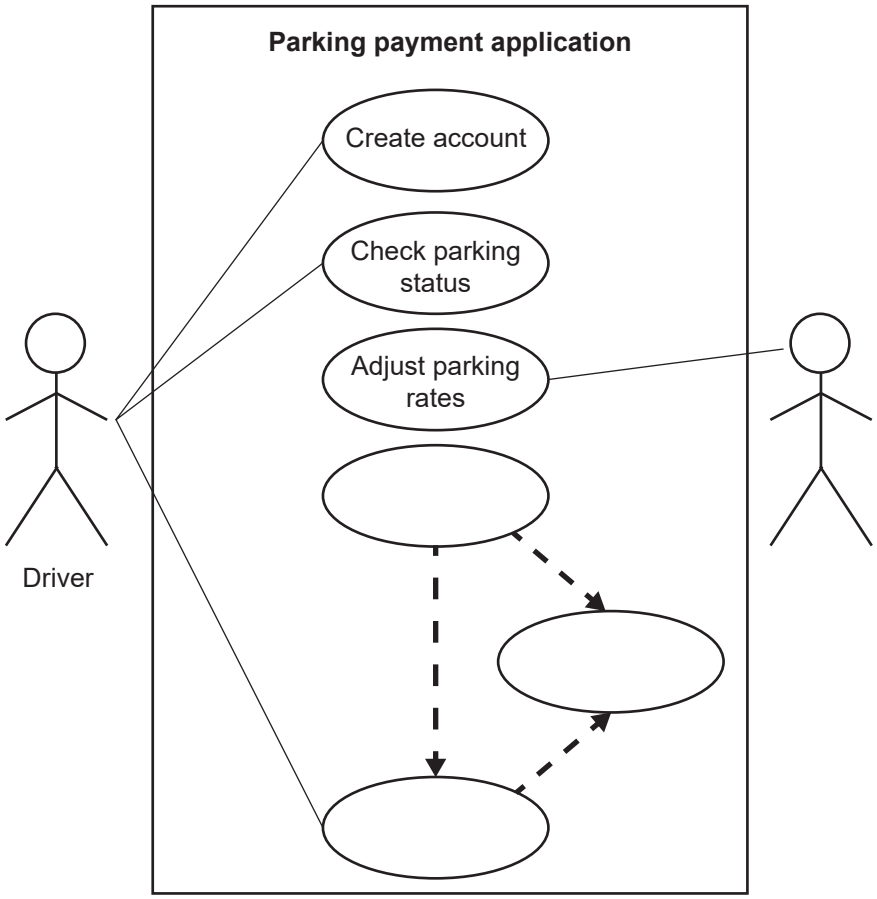
B. the hardware capabilities of target devices

C. user feedback about the mobile application's user interface

D. compliance with industry frameworks, such as the *Information Security Manual*

Use the following information to answer Questions 9 and 10.

An incomplete use case diagram of a vehicle parking payment application is shown below.



Drivers access the application via their mobile phones. When logged into their accounts, they can:

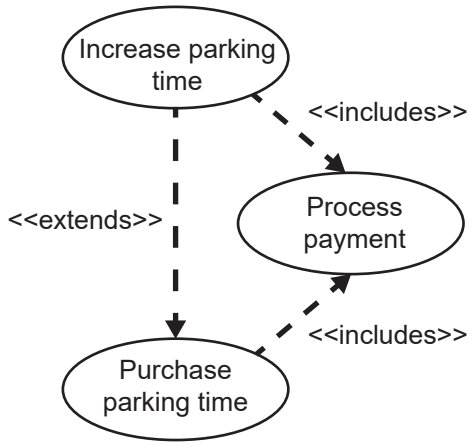
- check their vehicle's parking status
- purchase parking time
- increase their parking time if necessary.

Payment for parking time is handled within the application when drivers purchase or increase parking time. Parking officers at the local council office can use their laptops to adjust parking rates within the application.

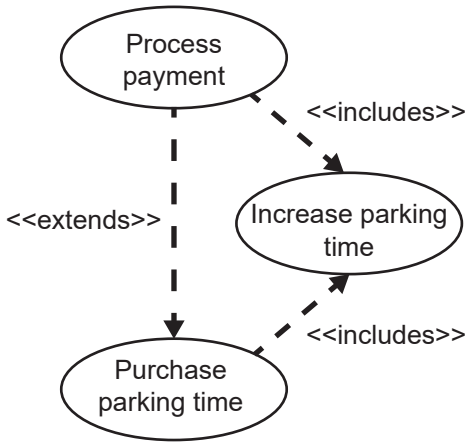
Question 9

Which one of the following represents the missing use cases and relationships in the diagram?

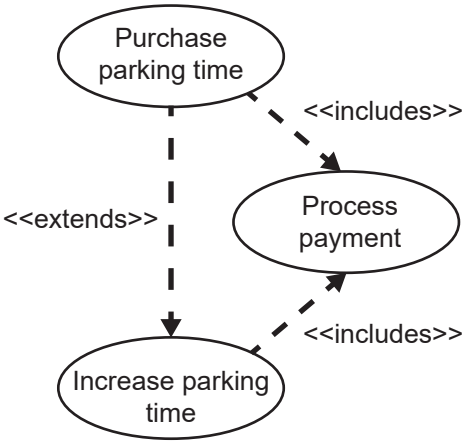
A.



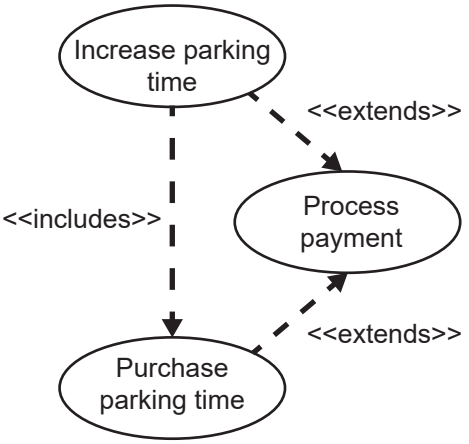
B.



C.



D.



Question 10

The unlabelled actor represents

A. a mobile phone.

B. a parking officer.

C. the local council office.

D. the parking payment application.

Question 11

Juliet is designing a class for a bank application. To prevent external access, she wants to ensure that the variable 'accountBalance' can only be accessed and modified by methods inside the Account class. Which access modifier should Juliet use for 'accountBalance'?

A. public

B. default

C. private

D. protected

Question 12

Richard is debugging an application. When he runs the application, he notices that the code is not performing calculations correctly. Richard decides to comment out some of the code within the application.

One of the benefits of this approach is that

A. the commented-out code is removed and can never be used again.

B. the application will run faster because the errors have been removed.

C. all errors in the code will be fixed and no further investigation will be needed.

D. he can review and adjust the code as needed and continue to debug the application.

Question 13

A project manager reviews her project schedule and realises that a task on the critical path is running behind by two days.

What is the most effective way for her to record and address this delay?

A. Provide additional resources to the project.

B. Shorten a non-critical task in the project by two days.

C. Remove non-critical tasks from the project to compensate for the delay.

D. Adjust the timeframe for the delayed task and reschedule dependent tasks accordingly.

Question 14

A project to create an enterprise software platform has repeatedly added new features at the client's request, leading to scope creep.

Without adjustments to the project plan, what is the most likely long-term impact on the project?

A. The original objectives of the project may not be achieved as resources are diverted to the new features.

B. Added features will lead to better stakeholder satisfaction even if the project is delayed.

C. The project will exceed its budget and timeline but achieve a higher-quality outcome.

D. The team will complete the project as planned but with reduced motivation.

Question 15

A bicycle shop has contracted a web developer to produce software for the buying and selling of bicycles.

Within the code of the solution, there is:

- a constant called 'GST' with a value of 0.1 (as in 10% tax)
- a global variable called 'markup' with a value of 1 (as in 100% markup)
- a local variable called 'price', which refers to the purchase price of the bicycle.

Given the information above, which one of the following statements is **incorrect**?

A. To change the value of 'GST', the code would need to be changed.

B. The global variable 'markup' can be called from anywhere in the code.

C. The local variable 'price' can only be called from within a selection control structure.

D. The value of 'markup' could change based on the line of code that is currently being executed.

Question 16

One example of an insider threat to an organisation and its development environment is that

A. a developer modifies the configuration of the development environment, which allows the application's code and data to become publicly accessible.

B. an international group of malicious individuals repeatedly send phishing emails to employees, and a receptionist clicks a link within the email.

C. anti-malware scanning tools detect and block suspicious scripts uploaded by external consultants.

D. an electrical fire caused by a hardware fault damages the organisation's network infrastructure.

Question 17

A company is using software on a single device in the reception area to manage a log of all visitors. The log will store sensitive information about each visitor, such as their face, their name and the times of their visits.

A visitor types in their name, selects who they are visiting, includes relevant licence ID numbers and has their photo taken. The visitor's photo and details will then be printed on a sticker for them to wear during their visit.

Which one of the following statements highlights the most important security control for the data stored by the application?

A. The data stored by the application should be encrypted.

B. The data should be backed up to the cloud so it can be restored in the event of data loss.

C. Each visitor should be required to set up multi-factor authentication on their phone to verify their identity.

D. Complex passwords should have a minimum length of 12 characters, be based on non-dictionary words and include a mixture of upper case, lower case and symbol characters.

Question 18

Desmond works for the Victorian Government, which is updating the security of a third-party application that stores the contact details of approved contractors. The *Copyright Act 1968* (Cwlth) would be breached if Desmond

A. applied an official patch.

B. accidentally deleted some of the data during the update process.

C. backed up the data to an insecure file server before applying the update.

D. edited the code directly without obtaining permission from the code's author.

Question 19

Which one of the following is a strategy listed in the Essential Eight?

A. prevent scope creep

B. perform regular backups

C. develop evaluation criteria

D. include detailed internal documentation

Question 20

A software development organisation uses artificial intelligence (AI) to write the initial code of all new software packages it develops. This is an ethical issue because

A. the code written might not be efficient.

B. any use of AI to write code is unethical.

C. the organisation might be too reliant on AI.

D. the AI might not put meaningful comments in the code it writes.

End of Section A

Section B – Short-answer questions

Instructions

- Answer **all** questions in the spaces provided.
- Write your responses in English.

Question 1 (5 marks)

Sayid is managing the development of a new software solution. The project involves the following tasks:

- conducting research into desirable application features (1 week)
- determining the functional requirements of the software solution (1 week)
- designing the user interfaces (2 weeks)
- developing the software solution (4 weeks)
- alpha testing (2 weeks)
- beta testing (1 week)
- preparing the software solution for release (1 week).

Sayid is preparing a Gantt chart to represent these tasks. He has identified the following dependencies:

- Functional requirements and user interface design must be completed before development begins.
- Beta testing can only occur once alpha testing has been completed.
- The software solution can be released once adjustments following beta testing have been completed.

a. Describe how tasks are sequenced in a Gantt chart. 1 mark

b. Aside from project completion, identify one potential milestone in the project and explain its significance in monitoring progress. 2 marks

Milestone

Explanation

Question 1 continues on the next page.

c. Describe how a Gantt chart can be used to monitor and document the progress of Sayid's software development project. 2 marks

Question 2 (2 marks)

A software development organisation is working with a major sporting brand on a project that will potentially see millions of dollars in sales generated annually. The organisation has employed several new software developers and has noticed that secure development practices are not being followed.

Describe a strategy that the organisation could use to improve the security of software development practices.

Question 3 (4 marks)

Frank is in the process of applying updates to the software that runs the day-to-day operations of their business. The business is running a combined development, testing and production environment. The software that runs the day-to-day operations of the business is still being used while it is being updated.

Identify and explain two risks associated with proceeding with the update.

Risk 1

Risk 2

Question 4 (4 marks)

The table below describes errors that might occur while developing a solution.

For each error description, select the relevant type of error from the following list and write it in the box beside the description.

- logic
- overflow
- index out of range
- type mismatch
- divide by zero

Type of error	Description
	There is not enough memory available for the application, leading it to stop working and crash.
	An application attempts to store text-based data within an array of integers.
	When a condition is tested, the user receives unexpected outputs.
	A counter used with an array has been erroneously incremented and moved past the last item in the array.

Question 5 (5 marks)

A game is being developed that involves three players.

The rules are as follows:

- Each player uses a symbol: C, M or X.
- Players take turns to enter their symbol in an empty position on a 5×5 grid.
- The first player to get three of their symbols in a row (horizontally, vertically or diagonally) wins.

Part of an in-progress game is shown in the grid below.

	0	**1**	**2**	**3**	**4**
0		X			
1		X	M		
2	X	C	C	M	
3					
4					

a. From the following list, circle the data structure that is **best** suited to storing the information described. 1 mark

one-dimensional array two-dimensional array record

b. Identify the data type that would be best used to store the symbols that the players use, and provide **one** reason why it is the best choice. 2 marks

_____

_____

_____

c. The game is to be played online. When a player makes a move, the coordinates of the move and the player's symbol are sent to the other players to update their displays. It is possible that future updates to the game could require more information to be sent.

Describe **two** benefits of using XML to send information on a player's move. 2 marks

End of Section B

Section C – Case study

Instructions

- Please remove the Insert from the centre of this book.
- Use the case study provided in the Insert to answer the questions in this section. Answers must apply to the case study.
- Answer **all** questions in the spaces provided.
- Write your responses in English.

Question 1 (3 marks)

Jin has the job of collating all the spreadsheets that are sent in from each agency. It takes Jin 1–2 hours per agency to manually collate the spreadsheets, which is time-consuming.

State **three** reasons why the head office may wish to undertake a software development project.

Question 2 (4 marks)

Justify why it would be better for the company to develop the web-based application in-house, rather than use an external development team.

Question 3 (4 marks)

To create the software requirements specification, Jack and Claire need to gather data on how each real estate agency currently collects, inputs and sends data to the head office. They will also need a detailed understanding of the requirements of the new web-based application.

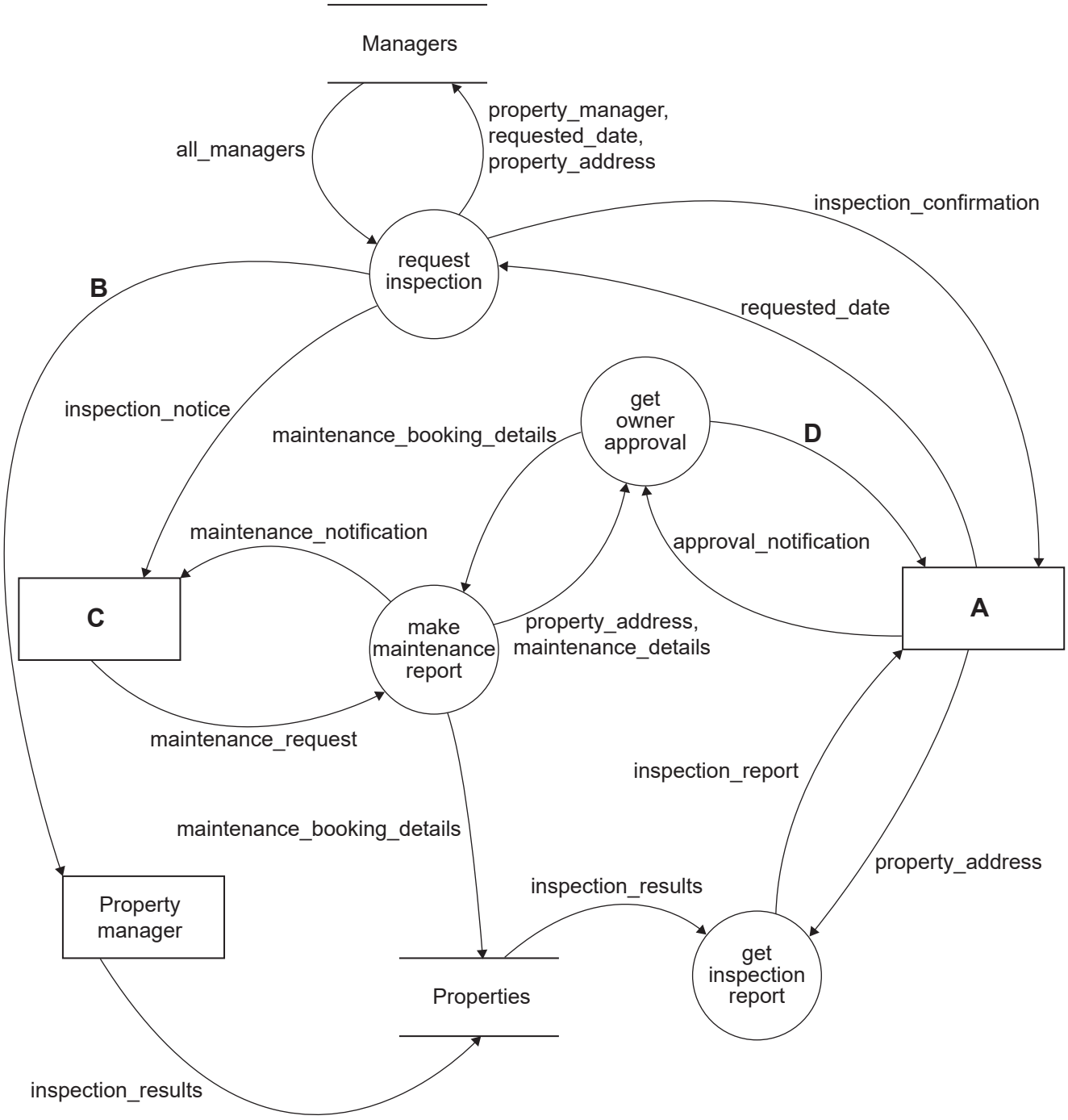
For each of the stakeholders listed below, state which method of data collection should be used and provide **one** reason why this method is the most appropriate.

Property managers at every agency

Leadership team members

Question 4 (6 marks)

Kate has created a Level 1 data flow diagram (DFD) of the system based on the context diagram (Figure 1 in the Insert for Section C) provided to her by Jack and Claire.



a. Using the information provided in the context diagram (Figure 1 in the Insert for Section C), write in the spaces below the labels for A, B, C and D in the Level 1 DFD. 4 marks

A _____

B _____

C _____

D _____

b. There is an error in the DFD Kate created.

Identify and explain the error. 2 marks

_____

_____

_____

Question 5 (3 marks)

Kate has worked with Jack and Claire to also develop a set of statements that will be relevant to the web-based application's development, based on conversations with a range of stakeholders. Kate, Jack and Claire know that they must now classify some statements before adding them to the software requirements specification, and they decide upon the following key.

1. functional requirement
2. non-functional requirement

Classify each of the statements in the table below by writing the activity number from the key above in the spaces provided.

Statement	Activity number
The software solution does not need to run on Apple devices.	
Financial reports can be generated for up to 10 years of data.	
Tenants are able to lodge maintenance requests.	

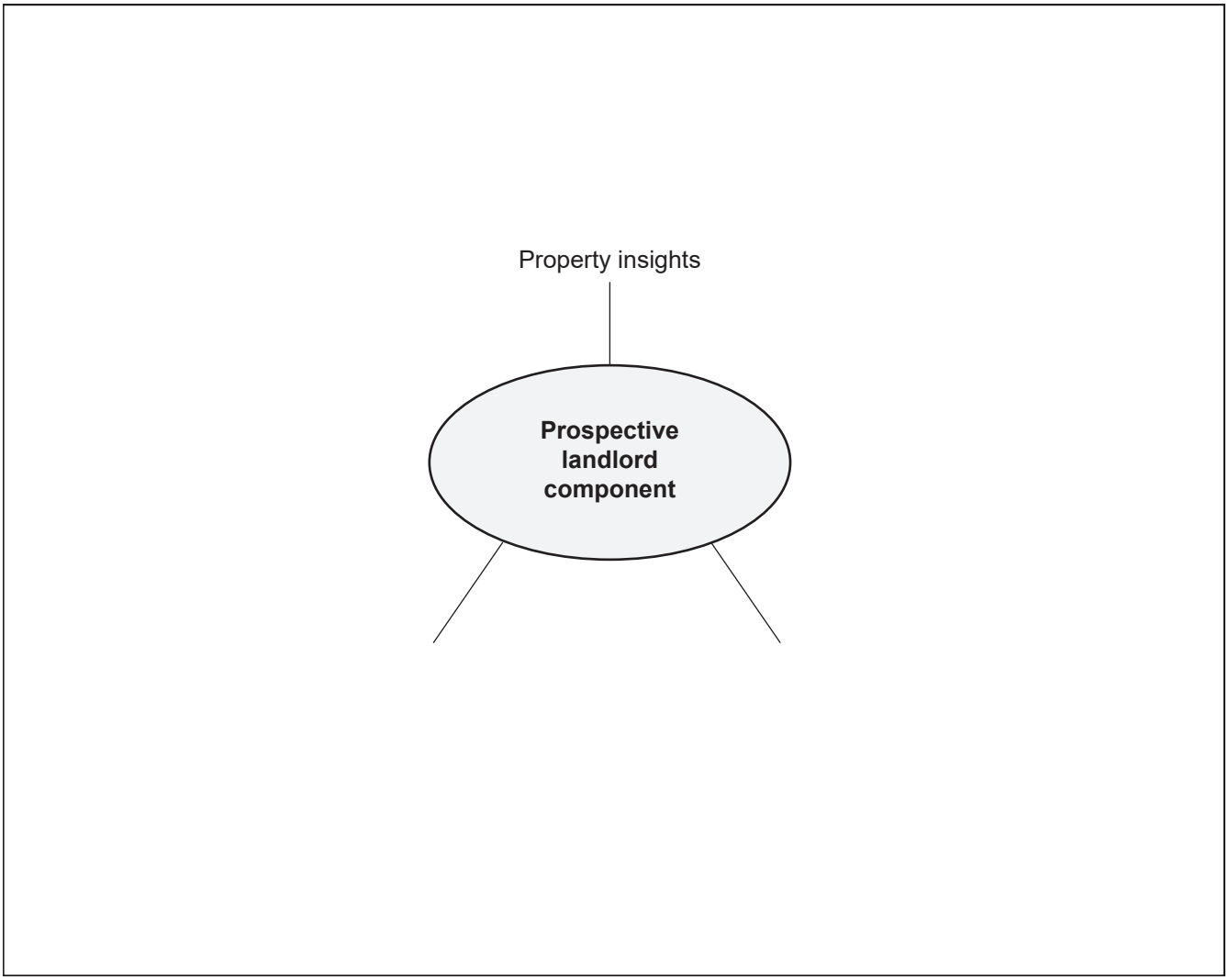
Question 6 (4 marks)

Sun is working on the part of the web-based application that property managers will use to help attract new property owners to the company for rental management. The property managers want property insights, compliance information and the user interface to be key considerations in this part of the solution.

The following ideas were also raised.

- clear and intuitive
- comparable rental properties
- contract management
- payment and maintenance portals
- matches the company's branding
- tenant interest and demographics

Using the key considerations and ideas raised above, complete the mind map below by labelling the branches and adding sub-branches. One branch has been provided.



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Examination continues on the next page.

Question 7 (8 marks)

John and Sun are preparing to design the objects required within the web-based application. They plan to have a user class, along with subclasses for each user group, as shown in the outline of the User class and its potential subclasses (Figure 2 in the Insert for Section C).

John's and Sun's teams have now designed the RentalProperty object that will be used within the application using an object description.

A	RentalProperty
Properties/ attributes	propertyID (string) ownerID (string) tenantID (string) agentID (string) propertyType (string) address (string()) numBedrooms (integer) numBathrooms (integer) size (integer) **C** **D** availableFrom (date) notes (string) maintenanceReqs (MaintenanceReq()) inspectionSch (Inspection())
B	getPropertyDetails() isAvailable() updateRentAmount(newRentAmount) updateMaintenanceRequest(MaintenanceReq) scheduleInspection(Inspection) assignTenant(tenantID, leaseStartDate)

Do not write in this area.

a. Describe **one** benefit of inheritance in this context and provide an example with reference to the case study. 2 marks

b. Identify the name of each section of the object description, labelled A and B on page 22. 2 marks

A	**B**

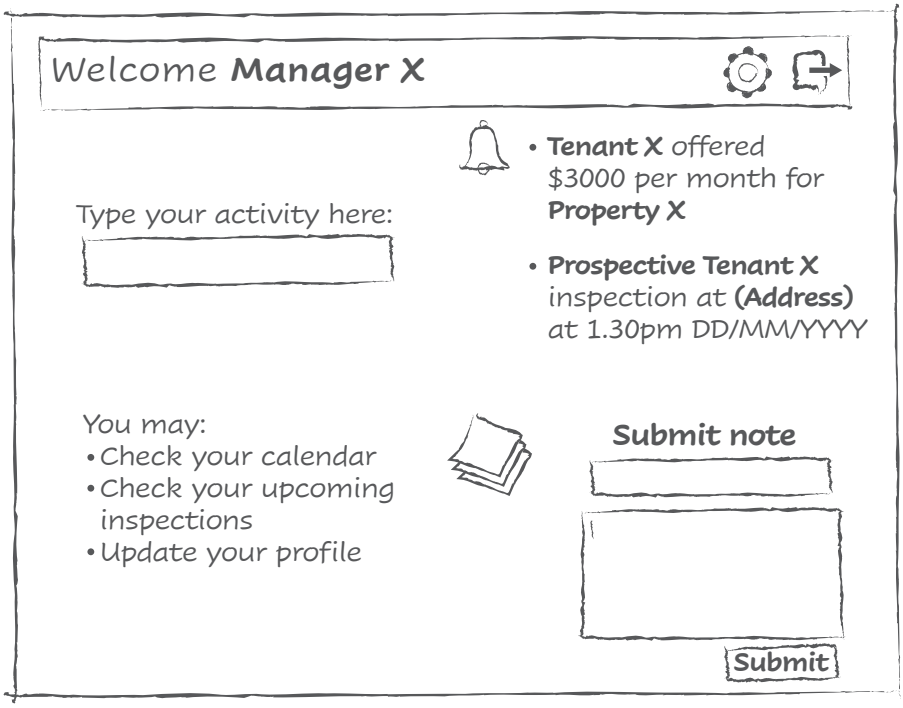
c. Using the information provided in the case study, complete the object description by identifying the missing properties/attributes and their respective data type, labelled C and D on page 22. 4 marks

	Property/attribute name	**Property/attribute data type**
C		
D		

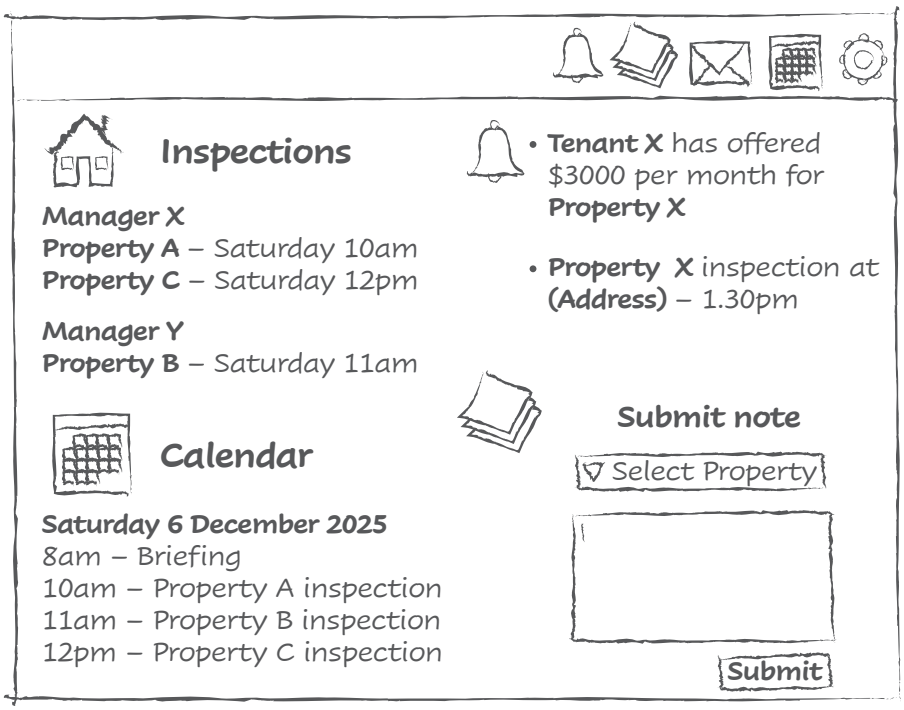
Question 8 (4 marks)

Sun and Nadia present two sketches for the property manager dashboard to the company's leadership team. These designs are shown below.

Sketch 1



Sketch 2



Do not write in this area.

For each sketch, justify which characteristic of user experience is better demonstrated compared to the other sketch.

Sketch 1

Sketch 2

Question 9 (3 marks)

Explain how user-centred design could be used to ensure that the web-based application is efficient and effective.

Question 10 (5 marks)

John wants to ensure that the development environment is protected from a range of threats. He has proposed implementing the following security controls as a minimum:

- robust identity and access management
- version control.

a. Explain how each security control would protect the software development practices or the data to be stored within the application. 4 marks

Security control	Explanation
Robust identity and access management	
Version control	

b. State a threat modelling principle that could be used to support the protection of the software development practices after security requirements have been defined. 1 mark

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Examination continues on the next page.

Question 11 (9 marks)

When a tenant submits a rental application, the leadership team wants the solution to validate the information provided against some key requirements to help with the application review process.

Ben has been asked to demonstrate that the solution can support this request by focusing on two key requirements.

- The **applicant's age** is at least 18 years old.
- The **monthly income** is at least **three times** the rental price per month.

He uses the following pseudocode to demonstrate feasibility.

```
1    BEGIN
2        IF age is not blank THEN
3            IF age < 18 THEN
4                DISPLAY "Must be 18 or over to apply."
5                RETURN False
6            ELSEIF monthly_income < (rental_price * 3) THEN
7                DISPLAY "Monthly income too low."
8                RETURN False
9            ELSE
10               DISPLAY "Application is valid."
11               RETURN True
12           ENDIF
13       ENDIF
14   END
```

a. Identify the validation technique that has been used on line 2 of the pseudocode. 1 mark

b. Identify a validation technique that should be added to the pseudocode and explain why it is necessary. 2 marks

Do not write in this area.

c. Using the information provided on page 28, complete the test table below to represent the required tests based on the pseudocode written by Ben.

For the purpose of the testing, you can assume that the rental_price is $2000 per month and that all other required values have been entered. 6 marks

Test	Age	Monthly income	Expected output displayed	Actual output returned
1	18	2000	`Monthly income too low.`	`Monthly income too low.`
2				
3				
4				

Question 12 (4 marks)

With alpha testing completed and identified issues resolved, Ben is now ready to commence beta testing.

a. State which user group should be selected to participate in beta testing a function that retrieves an inspection report. 1 mark

b. Describe a beta testing strategy that could be implemented, with reference to the user group identified in **part a**. 3 marks

Question 13 (3 marks)

The design stage ran over the allocated time. The following is an excerpt from the project log.

……

08/09/2025 – Nadia J.

Design of the user interface has taken a week longer than expected.

09/09/2025 – Nadia J.

Design of the interface and feedback now finalised.

14/09/2025 – Sun K.

Object descriptions tracking as expected.

17/09/2025 – Sun K.
Object descriptions completed ahead of time.

……

Using the information provided above, describe one potential issue that might arise due to the way the changes to the project plan were being recorded. Recommend two ways that the recording of the project's progress could be improved.

Issue _____

_____

Recommendation 1 _____

_____

Recommendation 2 _____

_____

End of examination questions

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Applied Computing: Software Development

Insert for Section C

Please remove from the centre of this book during reading time.

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY
VICTORIA State Government

Case study

A real estate company that operates 60 agencies across Australia offers a range of rental property management services.

The real estate agencies within the company vary in their approach to managing rental applications. In the larger agencies, property managers and administrative staff either use dedicated applications or rely on reports generated from a software package, while the smaller agencies still use spreadsheets to manage and share their data.

Agents handle emails with tenants and property owners, copying details into property records. Financial tasks, such as rent collection and payments to property owners, are managed by a separate application. Every three months, all agencies are expected to send financial summaries and tenancy information to the company's finance team based at its head office. The collection and collation processes are time-consuming and sometimes lead to mistakes being made.

The company's leadership decides that it is time to move its rental property management services to a web-based application. Kate is in charge of organising a team to explore the development of a new web-based application to bring together all these functions (rental applications, maintenance requests, communications, inspection notices and financial reports) into one easy-to-use platform. By combining these tasks, the company hopes to improve communication, reduce manual work and prevent errors.

The project team

Kate, as project lead, has selected her team as follows:

- Jack and Claire are business analysts, who will work with Kate to understand what the company and its staff need in the new platform.
- Jin is a financial analyst at head office and is responsible for the regular collection and collation of the data from each of the agencies.
- Sun and Nadia are two of the graphic/web designers at the company and will focus on the design of the solution.
- John is the development lead and will work with other members of the team to design and develop the solution.
- Ben, one of the senior developers, will work with John.

Kate's role is to:

- ensure that the project stays on track
- work with each of the team members to ensure that the solution meets the company's needs.

Analysing solution requirements

After collecting a range of data about the company's needs, Jack and Claire create the context diagram shown in Figure 1.

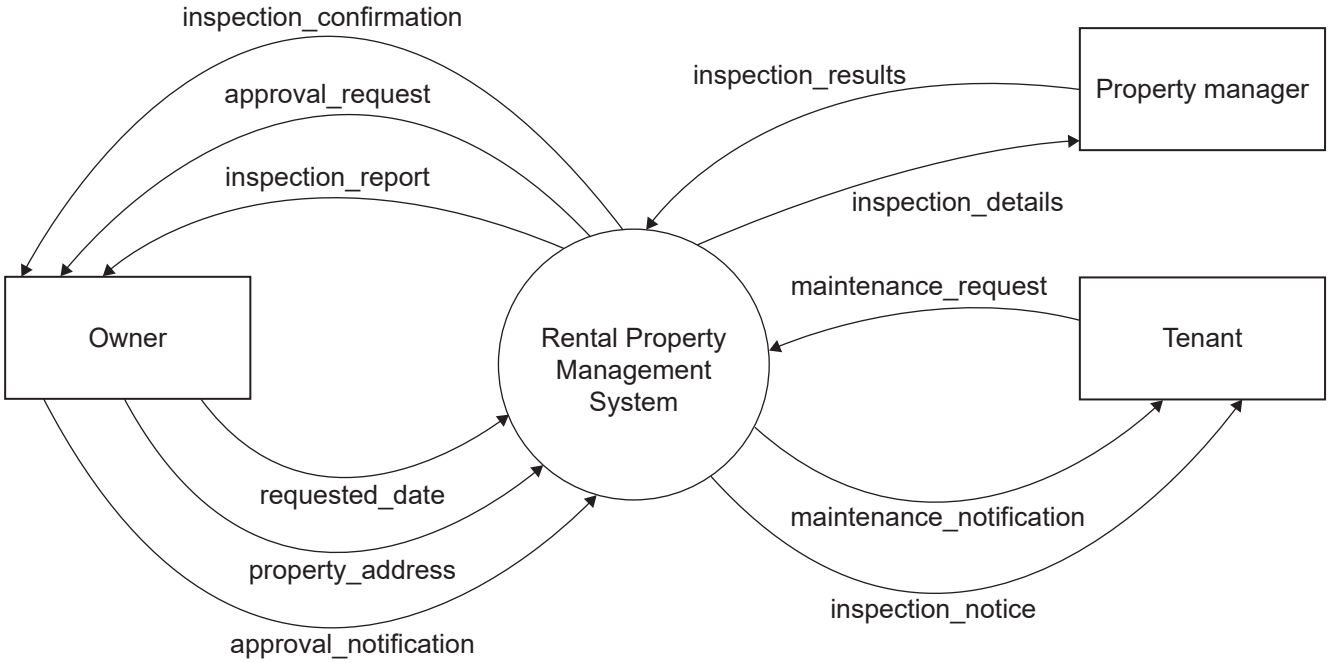

Figure 1: Context diagram

Case study continues on the next page.

Generating designs

One of Kate's hopes for the project is to design and develop the new solution with the users front of mind, to ensure usability for all user groups.

Sun and Nadia lead the ideation and design processes that will determine the look and feel of the solution. The company's leadership team emphasises the need to ensure that the solution and its interfaces are clear, attractive and accessible.

Sun and Nadia work with John and his team to develop designs related to the functionality and data requirements of the solution. Together, they will generate detailed designs using design tools such as object descriptions, pseudocode and data dictionaries.

Users within the system will be classified as property owners, property managers, head office staff or tenants. Ben has suggested that while a user class will be necessary within the platform, a subclass should be established for each of the identified user groups via inheritance (Figure 2). Sun is not sure about Ben's suggestion.

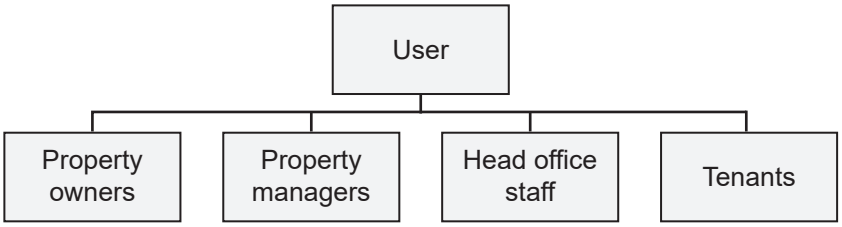

Figure 2: Outline of the User class and its potential subclasses

The team will also design a RentalProperty object to be used within the application. When property managers register a property, they collect information such as:

- property details: type, number of bedrooms and bathrooms, size, rent amount (per month)
- address: street number, street name, city, state, postcode
- availability: when the property will be ready to rent
- additional notes: general comments about the property.

The leadership team also wants to store extra details, such as the property's occupancy status (true or false), maintenance requests and inspection schedules.

End of Insert