SOFTWARE DEVELOPMENT

UNIT 4 OUTCOME 1



PURPOSE DESIGNED SOLUTIONS

REVISION NOTES

**Unit 4 Outcome 1**

Apply stages of the problem-solving methodology to produce a solution for use on a mobile device, which takes into account technical and legal requirements.

**Key Knowledge**

**1.** Stages of the **problem-solving methodology**

**2.** Types and characteristics of **mobile computing devices**, including PDAs, mobile phones, laptops, gaming consoles

**3.** Procedures and techniques for **handling and managing files**, including security, archiving, backing up and disposing of files

**4.** **Methods of organising files** to suit particular software needs, including serial access and random access

**5.** Ways in which file size, storage medium and organisation of files affect **access of data**

**6.** Characteristics of efficient and effective **user interfaces**

**7. Factors affecting solution design**, including user interface, user needs, processing efficiency, development time, technical specifications of mobile devices

**8. Naming conventions** for solution elements

**9.** Methods and techniques of **expressing software designs**

**10.** Forms and uses of **data structures** to organise and manipulate data, including two-dimensional arrays, stacks and queues

**11. Syntax** of a programming language

**12.** **Validation techniques**, including existence checking, range checking and type checking

**13.** **Techniques for searching**, including binary search, and **techniques for sorting**, including bubble sort and quick sort

**14.** Techniques for **checking that coded solutions meet design** specifications, including construction of test data

**15.** Purposes and characteristics of **internal documentation**

**16.** Forms and types of **user documentation**, including printed, online Internet site (forms) and quick start guide, tutorial, content sensitive help and manual (types)

**17.** Applications and purposes of **utilities** in a programming environment

**18. Legal obligations** of programmers

**19. Security measures** designed to protect the integrity and security of data and information

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| **1.** Stages of the **problem-solving methodology** |

**1. List** the four activities involved in the ‘Development’ stage of the PSM

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**2. Describe** what occurs in the ‘Manipulation’ stage

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**3. Explain** how ‘Validation’ differs from ‘Testing’

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**4. Explain** what occurs during the ‘Documentation’ Activity

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**5. Explain** in which activity ‘internal documentation’ is created

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| **2.** Types and characteristics of **mobile computing devices**, including PDAs, mobile phones, laptops, gaming consoles |

**1. Complete** the table below giving a description of each device:

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| **Device** | **Description** |
| Personal Digital  Assistant |  |
| Mobile Phone |  |
| Laptop |  |
| Gaming Consoles |  |

**2. Discuss** the differences between a PDA and a Mobile Phone

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**3. Explain** an advantage of a Laptop over a Mobile Phone

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**4. Outline** an advantage of a Mobile Phone over a Laptop

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| **3.** Procedures and techniques for **handling and managing files**, including security, archiving, backing up and disposing of files |

**1. Besides** usernames and passwords, **discuss** two security measures that can be used to protect files

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**2. Explain** how ‘Archiving’ differs from ‘Backing-Up’ files

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**4. Outline** a strategy that organisations could follow to dispose of files securely

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**5. Complete** the table below indicating the file management activity being describe:

Archiving Backing-up Disposal Security

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| **Procedure** | **Activity** |
| Karen prints off all records at the end of the financial year, deletes all files and keeps the hard copies in a filing cabinet |  |
| Jessica moves files to the recycle bin, empties the bin then runs a utility program that erases the files from the HDD |  |
| Lauren uses a RAID system to store a file on multiple hard drives |  |
| At the start of every day Charlie copies all her school work from her laptop to a USB and leaves the USB at home in her room |  |

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| **4.** **Methods of organising files** to suit particular software needs, including serial access and random access |

**1. Describe** the term ‘Serial Access’

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**2. Describe** the term ‘Random Access’

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**3. Explain** what each record in a ‘Random File’ has in common

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**4. Outline** one advantage of ‘Random’ over ‘Serial’

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**5. Outline** one advantage of ‘Serial’ over ‘Random’

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| **5.** Ways in which file size, storage medium and organisation of files affect **access of data** |

David has created a program that will be accessed frequently throughout the day by around 100 staff. When deciding where to locate the database files he has to choose between a portable hard drive, magnetic tape and a solid state drive.

**1. Recommend** to David which storage medium would be most appropriate. **Justify** your answer

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Garry’s Graphics have offices located in both Melbourne and Perth. They store all the data as a serial file on a server in the Melbourne office. Each record in the file is around 200 MB and a file consists of around 100 records. A virtual private network (VPN) set up connecting the two offices.

**2. Outline** problems that Garry’s Graphics might face when accessing the data

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Phil wants to download a 500 MB movie. His maximum internet download speed is 4 Mbps

**3. Calculate** how long it will take to download the movie

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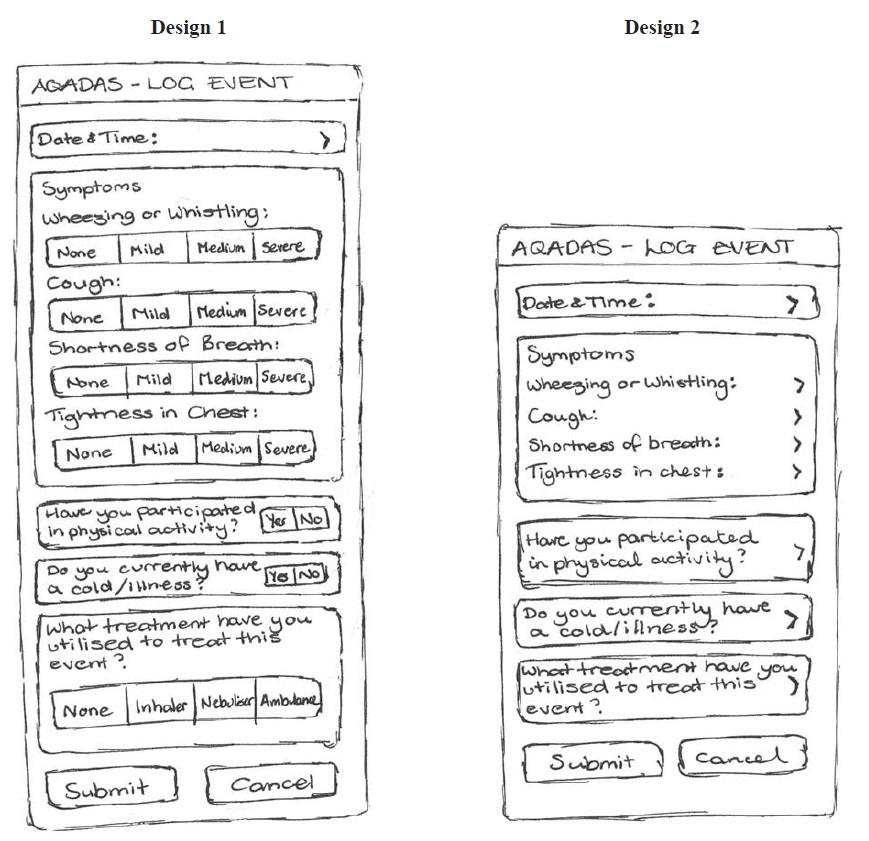
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| **6.** Characteristics of efficient and effective **user interfaces** |

**1. Explain** how the use of ‘White Space’ help with the effectiveness of a user interface

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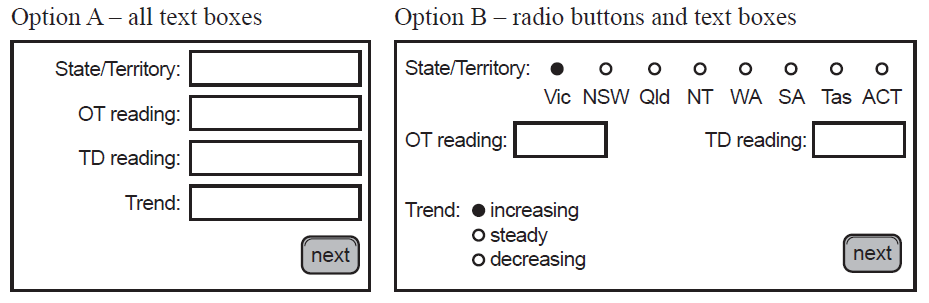
Above are two designs for a mobile phone App

**2. Discuss** the advantage of each design

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**3. Identify** which design is more effective and **identify** which design is more efficient. **Justify** your answers

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| **7. Factors affecting solution design**, including user interface, user needs, processing efficiency, development time, technical specifications of mobile devices |

Ben is developing an application to be used on an IPhone 5.

**1. Discuss** the factors that will affect Ben’s design

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**2. Explain** how a solutions designed for a touch screen device will differ from that of a traditional keyboard & mouse device

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Karen has been told that she needs to design a solution in a hurry. She has been told to fully design the user interface but don’t overly worry about if the algorithms are prefect at this stage.

**3. Discuss** when it would be appropriate to design a solution like this

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Jade is developing a solution for Hanson’s Truck Group, that will used by drivers as they are delivering goods

**4. Explain** how the need of the users may affect the design of the solution

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| **8. Naming conventions** for solution elements |

Lauren is developing a data dictionary and object descriptions for a software development project. Part of the dictionary is shown below:

**Data Dictionary**

|  |  |  |
| --- | --- | --- |
| strSurname | String | Contains the name of the each customer’s surname |

**Object Descriptions**

|  |  |  |
| --- | --- | --- |
| frmMain | Form | Form that will open on start-up |

**1. Identify** three conventions that have been followed in the above naming convention

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**2. Discuss** how the above naming convention will assist in the ‘development’ of the solution

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**3. Discuss** how the above naming convention will assist in the ‘maintenance’ of the solution

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**4. Explain** how the use of ‘CamelCase’ might assist the project

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| **9.** Methods and techniques of **expressing software designs** |

**1. Explain** how ‘pseudocode’ and ‘algorithms’ are related

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**2. Identify** the output of the following algorithm if the value 2 was input into variable A

**Begin**

Input A

While A < 10

A = A \* 2

End While

Display A

**End**

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Robert needs to write an algorithm that will allow him to input two numbers. A loop will begin if the first number is larger than the 2nd number. The first number will have 2 added to it, the 2nd number is doubled. After the loop is completed the 2 two numbers will be displayed – with the larger number displayed first.

**3. Create**, using pseudocode, the algorithm required

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| **10.** Forms and uses of **data structures** to organise and manipulate data, including two-dimensional arrays, stacks and queues |

**1. Label** each diagram showing the data structure represented

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**2. Explain** when using a ‘Two-dimension array’ is suitable

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Karen is creating an App for a restaurant to manage bookings. When a customer makes a booking they are added to the waiting list. After they have finished their meals the waiter will remove them from the list.

**3. Identify** the most appropriate data structure to use for the App. **Justify** your answer

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Billy is creating a program that will allow the user to undo the last action they performed

**4. Identify** the most appropriate data structure to use for the undo function. **Explain** why this data structure is appropriate

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| **11. Syntax** of a programming language |

**1. Define** the term ‘Syntax’

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**2. Explain** how the pseudocode of a solution differs from the syntax

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**3. Explain** what is meant by a ‘Syntax Error’

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**4. Discuss** two ways a syntax error in a program can be identified

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**5. Explain** how a ‘syntax error’ differs from a ‘logic error’

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| **12.** **Validation techniques**, including existence checking, range checking and type checking |

**1. Explain** the term ‘validation’

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**2. Complete** the table below by identifying the most appropriate validation check to use:

|  |  |
| --- | --- |
| **Scenario** | **Validation Technique** |
| Sophie is creating a program where the mobile phone number of a customer is required |  |
| Jack is writing an error handling function that needs the input to be entered to be a string |  |
| Olivia needs a program that needs the users to enter an amount greater than $1.00 |  |
| Geoff is creating a solution that will read in a User ID then check to see if the ID matches an ID already in the solution database |  |
| Louise has written code that will enforce the user to enter 2 decimal places when entering currency values |  |
| SuperApps has created an App where the user can only select a value from the existing drop down list given |  |

**3. Explain** how validation can occur either through the user interface or in the code of a program. **Give** examples to illustrate your answer

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| **13.** **Techniques for searching**, including binary search, and **techniques for sorting**, including bubble sort and quick sort |

Peter wants to perform a binary search on file containing the details of products. He plans to search for a product using the product name.

**1. Explain** what needs to done before Peter can perform the search

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**2. Outline** the process of how a binary search works

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**3. Explain** why a ‘Quick Sort’ is preferred to a ‘Bubble Sort’ when dealing with large data files

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**4. Outline** two reasons why a programmer may still prefer to use a ‘Bubble Sort’

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| **14.** Techniques for **checking that coded solutions meet design** specifications, including construction of test data |

Jason is design a program that will check if each pie cooked in the bakery is at least 500 grams. He has created the following algorithm that will be used to perform the calculation:

Begin

Read Weight

If Weight > 500 Then

Return Acceptable

Else

Return Unacceptable

End If

End

**1. Complete** the table below showing both the expected and actual results

|  |  |  |
| --- | --- | --- |
| **Test Data** | **Expected Result** | **Actual Result** |
| 499 |  |  |
| 500 |  |  |
| 501 |  |  |

Lucy is developing a program for a medical centre. When patients visit a doctor they are billed on the time they stay with the doctor. Visits 15 minutes or under are consider short consultations and visits over 15 minutes are considered long consolations. Lucy has developed the following pseudocode:

Begin

Read First Pateint Record

For Visit = 1 to NumofPatients

DeadlineTime = StartTime + 15

If DeadlineTime <> - 1 Then

If CurrentTime > DeadlineTime Then

Consulatation = Long

Else

Consultation = Short

End If

End If

Read Next Patient Record

End Loop

End

**2. Complete** the test table including test data and the reason why the test data was selected

|  |  |
| --- | --- |
| **Test Data** | **Reason** |
|  |  |
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| **15.** Purposes and characteristics of **internal documentation** |

**1. Explain** the purpose of ‘Internal Documentation’

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**2. Discuss** the effect internal documentation has on processing time

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**3. Discuss** when internal documentation should be used in the code

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**4. Explain** how ‘Internal Documentation’ differs from ‘User Documentation’

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**5. Identify** which of the lines of code below are internal documentation

1. ‘\*Developed by the Hound Dog Group 2013

2. Dim A as Integer

3. ‘\*Calculate if students passes or fails

4. If A > 49 Then

5. Result = Pass

6. Else

7. Result = Fail

8. End If

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| **16.** Forms and types of **user documentation**, including printed, online Internet site (forms) and quick start guide, tutorial, content sensitive help and manual (types) |

**1. List** two advantages of printed documentation over online documentation

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**2. List** two advantages of online documentation over printed documentation

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**3. Complete** the following table describing the following user documentation

|  |  |
| --- | --- |
| **User Documentation** | **Description** |
| Quick Start Guide |  |
| Tutorial |  |
| Content Sensitive Help |  |
| User Manual |  |

**4. Explain** how a Tutorial differs from Content Sensitive Help

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| **17.** Applications and purposes of **utilities** in a programming environment |

**1. Define** the term ‘Integrated Development Environment (IDE)’

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**2. Explain** how a ‘compiler’ differs from an ‘IDE’

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**3. Explain** what is meant by ‘Utilities in a Programming Environment’. **Give** examples to illustrate your answer

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**4. Identify** if ‘Utilities’ help with the efficiency or effectiveness of developing a solution. **Justify** your answer

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| **18. Legal obligations** of programmers |

**1. Explain** how the Charter of Human Rights & Responsibilities Act (Vic) 2006 may affect software developers?

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**2. Complete** the table below identifying the appropriate law that may be breached:

|  |  |
| --- | --- |
| **Scenario** | **Law** |
| David has decided to use code from another programmer in the solution he is developing |  |
| Mornington Peninsula Council has decided not to use any validation techniques on the Internet form it uses to allow residents to pay their rates online |  |
| Jessica, a student, created a new smart phone App that displayed the address and mobile number of all her class mates |  |
| Bank of Frankston has a function on its customer App that sends data back relating to what other financial applications a customer uses on their smart phone |  |
| Funk nightclub sent SMS messages to members on their VIP list without first getting consent of the members |  |
| Michael, a dentist from Melbourne, has not enable the username and password function for his IPad that he uses to store patient records |  |

**3. Discuss** two areas that are not covered under the Copyright Act

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| **19. Security measures** designed to protect the integrity and security of data and information |

**1. Complete** the table below for each of following security measures:

|  |  |  |
| --- | --- | --- |
| **Measure** | **Description** | **Threat Stoped** |
| Username & Password |  |  |
| Malware Protection |  |  |
| Encryption |  |  |
| Staff  Training |  |  |
| Uninterrupted Power Supply |  |  |
| Back-up  Strategy |  |  |
| Physical  Security |  |  |

**2. Explain** why it is important for an organisation to have both a firewall and anti-virus protection installed to protect data and information

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