SOFTWARE DEVELOPMENT

UNIT 3 OUTCOME 2



DESIGN & DEVELOPMENT

REVISION NOTES

**Unit 3 Outcome 2**

On completion of this unit the student should be able to represent a software design and apply a range of functions and techniques using a programming language to develop a prototype solution to meet a specific need

**Key Knowledge**

1. Stages of the **problem-solving methodology (Design, Development)**

2. Characteristics of **data types**: integer, floating point number, Boolean, character, string

3. Types of **data structures**, including one-dimensional arrays, records and files

4. Methods of expressing **software designs** using data dictionaries and data structure diagrams, object descriptions and pseudocode

5. **Formatting and structural characteristics** of efficient and effective input and output

6. **Needs of users** and how these influence the design of solutions

7. **Criteria for evaluating** the efficiency and effectiveness of solutions

8. **Programming language** as a method for developing solutions that meet specific needs

9. **Processing features** of programming languages, including instructions, procedures, methods, functions and control structures

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

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

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

**1. List** the two activities involved in the design stage

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**2. Explain** why it is important to thoroughly complete the design stage

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**3. Discuss** the role of design tools in planning a new solution

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**4. Explain** why criteria to evaluate a project are created before development begins

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| 2. Characteristics of **data types**: integer, floating point number, Boolean, character & string |

**1. Define** the term ‘Data Type’

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**2. Explain** two reasons why it is important to select the correct data type

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**3. Complete** the table below for each data type:

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| --- | --- | --- | --- |
| **Data Type** | **Description** | **Storage Size** | **Example** |
| Integer |  |  |  |
| Floating Point |  |  |  |
| Boolean |  |  |  |
| Character |  |  |  |
| String |  |  |  |

**4.** For each of the following variables **identify** the most appropriate data type

|  |  |
| --- | --- |
| **Variable** | **Data Type** |
| First Name |  |
| Total Price |  |
| Number of Items |  |
| Order Paid? |  |

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| 3. Types of **data structures**, including one-dimensional arrays, records and files |

**1. Define** the term ‘array’

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**2. Explain** how a ‘data structure’ differs from a ‘data type’

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**3. Discuss** how using an array, rather than individual variables, improves both efficiency and effectiveness when programming

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**4. Distinguish** betweena ‘record’ and an ‘array’

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**5. Explain** the purpose of a ‘File’

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| 4. Methods of expressing **software designs** using data dictionaries and data structure diagrams, object descriptions and pseudocode |

**1. Complete** the ‘Data Dictionary’ below:

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| **Variable Name** | **Data Type** | **Size** | **Description** |
| Customer No | Integer | 4 | Unique identifier for each customer |
| HouseNumber |  |  | House Number of Customer |
| StreetName |  |  | Street Name of Customer |
| Paid |  | 1 | Is customer up to date with payments? |

**2. Draw** a ‘Data Structure Diagram’ for the following program

The stock file consists of item name, item price and quantity on hand. The transaction file date of purchase, customer name, Item name and quantity. After each transaction the stock file is then updated

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**3. Write** an ‘Algorithm’ for the following program

When the program begins, the first record is read from the file. If the file is not empty the first record is added to a list box, then the next record is read from the file, until the file is empty

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| 5. Formatting and structural **characteristics** of efficient and effective input and output |

**1. Define** the term ‘Comma Separated Values’ file

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**2. Discuss** if a CSV files assist with efficiency or effectives when inputting or outputting data

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**3. Explain** why a random access file is more efficient than a serial file

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**4. Discuss** why presenting information as $1, 200, 000 is more effective than presenting information as 1200000

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| 6. **Needs of users** and how these influence the design of solutions |

**1. Complete** the table below to describe how the design of a program may be influenced by the needs of each group

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| **User Characteristic** | **Influence on Design** |
| Vision Impaired |  |
| Infant Children |  |
| Teenagers |  |
| IPhone Users |  |
| ESL Students |  |
| Experienced IT Professionals |  |

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| 7. **Criteria for evaluating** the efficiency and effectiveness of solutions |

**1. Explain** how ‘Efficiency’ differs from ‘effectiveness’

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**2. List** three measures of ‘efficiency’

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**3. List** four measures of ‘effectiveness’

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**4. Indicate** whether each of the following criterion is measuring effectiveness or efficiency

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| **Criteria** | **Effectiveness or Efficiency** |
| The program produces accurate reports |  |
| The program will reduce the amount of data the user will be required to enter |  |
| The information will be free of errors |  |
| The new system will process the information faster than the old system |  |
| The new program will require less maintenance |  |
| The system will be easy to use |  |
| The new interface will be easier to understand |  |

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| 8. A **programming language** as a method for developing solutions that meet specific needs |

**1. Explain** the purpose of a ‘Programming Language’

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**2. Discuss** how a ‘Compiled Language’ differs from an ‘Interpreted Language’

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**3. Define** the term ‘object oriented’

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**4. Explain** what the ‘syntax’ of a language is referring too

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| 9. **Processing features** of programming languages including instructions, procedures, methods, functions and control structures |

**1. Define** the term ‘instruction’. **Give** an example to support your answer

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**2. Explain** how a ‘procedure’ differs from a ‘function’

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**3. Define** the term ‘method’. **Give** an example to support your answer

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**4. Write** a brief algorithm to represent each of the three main control structures

**Sequence Conditional Repetition**

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| 10. Purposes and characteristics of **internal documentation** |

**1. Define** the term‘Internal Documentation’

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**2. Discuss** the benefits of including ‘internal documentation’ in a solution

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**3. Explain** the effect that ‘internal documentation’ has on the efficiency of a program

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**4. Discuss** when using ‘internal documentation’ in a program is appropriate

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| 11. Techniques for checking that coded **solutions meet design** specifications, including construction of test data |

**1. Explain** the purpose of ‘Testing’ a solution

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**2. Complete** the following test table for the algorithm shown below, using four values:

Begin

Open Employee File

For I = 1 to End of File

Read Hours Worked From Employee File

If Hours Worked <> 999 Then

If Hours Worked > 40

Display “Overtime”

Else

Display “Normal”

End If

End If

Read Next Record

Next

End

|  |  |  |  |
| --- | --- | --- | --- |
| **Hours Worked** | **Expected Outcome** | **Line of Code** | **Reason** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |