**DEVELOPMENT PROJECT**

assessment instrument

**APPLY PRINCIPLES OF CREATING COMPUTER SOFTWARE BY DEVELOPING A COMPLETE PROGRAMME TO MEET GIVEN BUSINESS SPECIFICATIONS**

**US ID:** 115392 **NQF LEVEL:** 5 **CREDITS:** 12 **NOTIONAL HOURS:** 120

**DEMONSTRATE AN UNDERSTANDING OF ESTIMATING A UNIT OF WORK AND THE IMPLICATIONS OF LATE DELIVERY**

**US ID:** 114059 **NQF LEVEL:** 5 **CREDITS:** 5 **NOTIONAL HOURS:** 50

**APPLY PRINCIPLES OF DESIGNING COMPUTER SYSTEM INPUTS AND OUTPUTS**

**US ID:** 115365 **NQF LEVEL:** 5 **CREDITS:** 7 **NOTIONAL HOURS:** 70

**APPLY ADVANCED HTML AND ASSOCIATED TECHNIQUES TO BUILD A WEBSITE FOR BUSINESS APPLICATIONS**

**US ID:** 115368 **NQF LEVEL:** 5 **CREDITS:** 12 **NOTIONAL HOURS:** 120

**TEST A COMPUTER PROGRAM AGAINST A GIVEN SPECIFICATION**

**US ID:** 115384 **NQF LEVEL:** 5 **CREDITS:** 6 **NOTIONAL HOURS:** 60

**PRODUCE COMPUTER PROGRAM DOCUMENTATION TO AGREED STANDARDS**

**US ID:** 115388 **NQF LEVEL:** 5 **CREDITS:** 3 **NOTIONAL HOURS:** 30

SECTION A: FORMATIVE ASSESSMENT

*Answer the following questions;*

**Module 1 Formative Assessment (Unit Standard 115392)**

**Apply principles of creating computer software by developing a complete programme to meet given business specifications**

**Question 1 (5)**

Write a program to converts temperature from Fahrenheit to degrees in Celsius.    
Test Data  
Input a degree in Fahrenheit: 212  
Expected Output :  
212.0 degree Fahrenheit is equal to 100.0 in Celsius

*Please paste your code and a unit test of the calculation function here:*

|  |
| --- |
| public class FormativeAssessment  {  public static void Main(string[] args)  {  var formativeAssessment = new FormativeAssessment();  formativeAssessment.Question1();  }  public void Question1()  {  Console.WriteLine("Input a degree in Fahrenheit:");  var input = Console.ReadLine();  try  {  var output = ConvertFahrenheitToCelsius(int.Parse(input));  Console.WriteLine($"{input} degree Fahrenheit is equal to {output} in Celsius.");  }  catch (Exception)  {  Console.WriteLine("Invalid Input.\n");  Question1();  }  }  public int ConvertFahrenheitToCelsius(int fahrenheit)  {  var celsiusConversionCalculation = (fahrenheit - 32) \* 5 / 9;  return celsiusConversionCalculation;  }  } |
| [TestFixture]  public class FormativeAssessmentTests  {  public FormativeAssessment FormativeAssessment()  {  return new FormativeAssessment();  }    [Test]  public void ConvertTemperature\_GivenFahrenheit\_ReturnCelsius()  {  //Arrange  const int input = 212;  const int expectedOutput = 100;  //Act  var output = FormativeAssessment().ConvertFahrenheitToCelsius(input);  //Assert  Assert.AreEqual(expectedOutput, output);  }  } |

**Question 2 (5)**

Write a program that reads a number in inches and converts it to meters.    
Note: One inch is 0.0254 meter.  
Test Data  
Input a value for inch: 1000  
Expected Output:   
1000.0 inch is 25.4 meters

*Please paste your code and a unit test of the calculation function here:*

|  |
| --- |
| public class FormativeAssessment  {  public static void Main(string[] args)  {  var formativeAssessment = new FormativeAssessment();  formativeAssessment.Question2();  }  public void Question2()  {  Console.WriteLine("Input a value for inch:");  var inchInput = Console.ReadLine();  try  {  var meter= ConvertInchesToMeters(double.Parse(inchInput));  Console.WriteLine($"{inchInput} inch is {meter} meters ");  }  catch (Exception)  {  Console.WriteLine("Invalid Input.\n");  Question2();  }  }  public double ConvertInchesToMeters(double inches)  {  const double conversionBase = 0.0254;  var inchesToMetersCalculation = inches \* conversionBase;  return inchesToMetersCalculation;  }  } |
| [TestFixture]  public class FormativeAssessmentTests  {  public FormativeAssessment FormativeAssessment()  {  return new FormativeAssessment();  }  [Test]  public void ConvertMeasurement\_GivenInch\_ReturnMeter()  {  //Arrange  const double input = 1000;  const double expectedOutput = 25.4;  //Act  var output = FormativeAssessment().ConvertInchesToMeters(input);  //Assert  Assert.AreEqual(expectedOutput, output);  }  } |

**Question 3 (4)**

Write a program that prints the current time in GMT.

Test Data  
Input the time zone offset to GMT  
Expected Output:   
Current time is 23:40:24

*Please paste your code here:*

|  |
| --- |
| public class FormativeAssessment  {  public static void Main(string[] args)  {  var formativeAssessment = new FormativeAssessment();  formativeAssessment.Question3();  }  public void Question3()  {  var currentTime = DateTime.UtcNow.ToLongTimeString();  Console.WriteLine(currentTime);  }  } |

**Question 4 (7)**

Write a program to takes the user input for a distance (in meters) and the time was taken (as three numbers: hours, minutes, seconds), and display the speed, in meters per second, kilometres per hour and miles per hour (hint: 1 mile = 1609 meters).

Test Data  
Input distance in meters: 2500   
Input hour: 5   
Input minutes: 56  
Input seconds: 23  
Expected Output:   
Your speed in meters/second is 0.11691531   
Your speed in km/h is 0.42089513   
Your speed in miles/h is 0.26158804

*Please paste your code and a unit test of the calculation function here:*

|  |
| --- |
| public class FormativeAssessment  {  public static void Main(string[] args)  {  var formativeAssessment = new FormativeAssessment();  formativeAssessment.Question4();  }  public void Question4()  {  try  {  Console.WriteLine("Input distance in meters:");  var meters = float.Parse(Console.ReadLine());  Console.WriteLine("\nInput hour:");  var hour = float.Parse(Console.ReadLine());  Console.WriteLine("\nInput minutes:");  var minutes = float.Parse(Console.ReadLine());  Console.WriteLine("\nInput seconds:");  var seconds = float.Parse(Console.ReadLine());  var metersPerSecond = CalculateMetersPerSecond(meters, hour, minutes, seconds);  var kilometersPerHour = CalculateKilometersPerHour(meters, hour, minutes, seconds);  var milesPerHour = CalculateMilesPerHour(meters, hour, minutes, seconds);  Console.WriteLine($"\nYour speed in meters/second is: {metersPerSecond}");  Console.WriteLine($"Your speed in km/h is: {kilometersPerHour}");  Console.WriteLine($"Your speed in miles/h is: {milesPerHour}");  }  catch (Exception)  {  Console.WriteLine("Invalid input supplied for one of the options, please retry.\n");  Question4();  }  }  public float CalculateMetersPerSecond(float meters, float hour, float minutes, float seconds)  {  var timeSeconds = (hour \* 3600) + (minutes \* 60) + seconds;  var metersPerSecond = meters / timeSeconds;  return metersPerSecond;  }  public float CalculateKilometersPerHour(float meters, float hour, float minutes, float seconds)  {  var timeSeconds = (hour \* 3600) + (minutes \* 60) + seconds;  var kilometersPerHour = (meters / 1000.0f) / (timeSeconds / 3600.0f);  return kilometersPerHour;  }  public float CalculateMilesPerHour(float meters, float hour, float minutes, float seconds)  {  var timeSeconds = (hour \* 3600) + (minutes \* 60) + seconds;  var kilometersPerHour = (meters / 1000.0f) / (timeSeconds / 3600.0f);  var milesPerHour = kilometersPerHour / 1.609f;  return milesPerHour;  }  } |
| [TestFixture]  public class FormativeAssessmentTests  {  public FormativeAssessment FormativeAssessment()  {  return new FormativeAssessment();  }  private const float Meters = 2500;  private const float Hour = 5;  private const float Minutes = 56;  private const float Seconds = 23;  [Test]  public void CalculateDistance\_GivenMetersHoursMinutesSeconds\_ReturnMetersPerSecond()  {  //Arrange  const float expectedOutput = 0.11691531f;  //Act  var output = FormativeAssessment().CalculateMetersPerSecond(Meters, Hour, Minutes, Seconds);  //Assert  Assert.AreEqual(expectedOutput, output);  }  [Test]  public void CalculateDistance\_GivenMetersHoursMinutesSeconds\_ReturnKilometersPerHour()  {  //Arrange  const float expectedOutput = 0.42089513f;  //Act  var output = FormativeAssessment().CalculateKilometersPerHour(Meters, Hour, Minutes, Seconds);  //Assert  Assert.AreEqual(expectedOutput, output);  }  [Test]  public void CalculateDistance\_GivenMetersHoursMinutesSeconds\_ReturnMilesPerHour()  {  //Arrange  const float expectedOutput = 0.26158804f;  //Act  var output = FormativeAssessment().CalculateMilesPerHour(Meters, Hour, Minutes, Seconds);  //Assert  Assert.AreEqual(expectedOutput, output);  }  } |

**Question 5 (3)**

Write a C# program to print 'Hello' on screen and then print your name on a separate line.    
Expected Output:   
Hello   
Alexandra Abramov

*Please paste your code here:*

|  |
| --- |
| public class FormativeAssessment  {  public static void Main(string[] args)  {  var formativeAssessment = new FormativeAssessment();  formativeAssessment.Question5();  }  public void Question5()  {  Console.WriteLine("Hello");  Console.WriteLine("Sahil Muniram");  }  } |

**Question 6 (6)**

Write a program to print the sum (addition), multiply, subtract, divide and remainder of two numbers.    
Test Data:   
Input first number: 125  
Input second number: 24

Expected Output:   
125 + 24 = 149  
125 - 24 = 101  
125 x 24 = 3000  
125 / 24 = 5  
125 % 24 = 5

*Please paste your code and one unit test per calculation function here:*

|  |
| --- |
| public class FormativeAssessment  {  public static void Main(string[] args)  {  var formativeAssessment = new FormativeAssessment();  formativeAssessment.Question6();  }  public void Question6()  {  try  {  Console.WriteLine("Input first number:");  var num1 = int.Parse(Console.ReadLine());  Console.WriteLine("\nInput second number:");  var num2 = int.Parse(Console.ReadLine());  Console.WriteLine($"\n{num1} + {num2} = {Add(num1, num2)}");  Console.WriteLine($"{num1} - {num2} = {Subtract(num1, num2)}");  Console.WriteLine($"{num1} x {num2} = {Multiply(num1, num2)}");  Console.WriteLine($"{num1} / {num2} = {Divide(num1, num2)}");  Console.WriteLine($"{num1} % {num2} = {Remainder(num1, num2)}");  }  catch (Exception)  {  Console.WriteLine("Invalid input, please try again.\n");  Question6();  }  }  public int Add(int num1, int num2)  {  return num1 + num2;  }  public int Multiply(int num1, int num2)  {  return num1 \* num2;  }  public int Subtract(int num1, int num2)  {  return num1 - num2;  }  public int Divide(int num1, int num2)  {  return num1 / num2;  }  public int Remainder(int num1, int num2)  {  return num1 % num2;  }  } |
| [TestFixture]  public class FormativeAssessmentTests  {  public FormativeAssessment FormativeAssessment()  {  return new FormativeAssessment();  }  [Test]  public void Calculate\_Given2Numbers\_ReturnAddition()  {  //Arrange  const int num1 = 125;  const int num2 = 24;  const int expectedOutput = 149;  //Act  var output = FormativeAssessment().Add(num1, num2);  //Assert  Assert.AreEqual(expectedOutput, output);  }  [Test]  public void Calculate\_Given2Numbers\_ReturnSubtraction()  {  //Arrange  const int num1 = 125;  const int num2 = 24;  const int expectedOutput = 101;  //Act  var output = FormativeAssessment().Subtract(num1, num2);  //Assert  Assert.AreEqual(expectedOutput, output);  }  [Test]  public void Calculate\_Given2Numbers\_ReturnMultiplication()  {  //Arrange  const int num1 = 125;  const int num2 = 24;  const int expectedOutput = 3000;  //Act  var output = FormativeAssessment().Multiply(num1, num2);  //Assert  Assert.AreEqual(expectedOutput, output);  }  [Test]  public void Calculate\_Given2Numbers\_ReturnDivision()  {  //Arrange  const int num1 = 125;  const int num2 = 24;  const int expectedOutput = 5;  //Act  var output = FormativeAssessment().Divide(num1, num2);  //Assert  Assert.AreEqual(expectedOutput, output);  }  [Test]  public void Calculate\_Given2Numbers\_ReturnRemainder()  {  //Arrange  const int num1 = 125;  const int num2 = 24;  const int expectedOutput = 5;  //Act  var output = FormativeAssessment().Remainder(num1, num2);  //Assert  Assert.AreEqual(expectedOutput, output);  }  } |

**Module 2 Formative Assessment (Unit Standard 114059)**

Demonstrate an understanding of estimating a unit of work and the implications of late delivery

**Question 1 (SO 1, AC 1)**

Define cost/benefit analysis (2)

**Answer**:

Cost Benefit Analysis (CBA) is a technique that encompasses an approach or process that is used for the comparison of financial costs associated with a project with its associated benefits. Cost Benefit Analysis uses a basis of common metrics which are used for the calculation of the net costs and benefits associated with a project and thus derived from these calculations are the estimations of strengths and weaknesses which are identified with possible alternatives available for achieving the project with plausible approaches in terms of associated financial and beneficial factors.

**Question 2 (SO 1, AC 2)**

Identify and explain the different components of a cost benefit analysis (8)

**Answer**:

The following is a list and explanation of the different components associated with the cost benefit analysis technique:

* **General description of the project**: This component of the CBA includes the context of the project in terms of explanatory details related to the relevant environment of the project that is to have analysis undergone to determine factors such as objectives, various assumptions and decisions to be made.
* **Identification of benefits and costs**: This component of the CBA includes the identification of associated costs and benefits of a project with regard to all alternative options that have been identified. The identification of benefits and costs can be further broken down into the following:
  + **Cost Factors**: The identification of costs factors for a project will include all associated costs that must cover the cost of the entire project with regard to listed alternatives available which have been identified as being possible feasible options to pursue in the project that is to be undertaken, this includes cost factors such as:
    - Activities and Resources.
    - Cost Categories.
    - Personnel Costs.
    - Direct and Indirect Costs.
    - Depreciation.
    - Annual Costs.
  + **Benefit Factors**: The identification of benefit factors for a project will include factors related to the benefits that each identified alternative option that can be used to undertake the project provides, the benefit factors include items such as services, capabilities and qualities that each alternative option provides. The estimation of benefits involves the identification of benefits related to the various parties involved in the project which includes the customer and service provider. After the benefit factors have been identified they need to have established performance factors that must be measured against the project to determine the feasibility, reasonability and value that each benefit holds.
* **Scheduling benefits and costs**: This component of the CBA includes the identification of the values and costs associated with each of the identified alternative options for the project. This includes the process of taking the benefit of each alternative option as well as the costs associated with it and formulating the cost for specified time periods from the start of the initial decision stages. After the costs and benefits for the specified time periods have been worked out in terms of estimations then they can be converted into a common unit of measurement which can be used to efficiently compare the different alternative options.
* **Comparison of alternatives**: This component of the CBA includes the comparison of the alternative options or solutions that could be used to undertake the project. The comparison process can take the form of tables and graphs which are all used as part of the decision-making process of choosing the best alternative options. The end result of this component boils down to determining the best possible solution that provides the lowest cost with the most benefits.
* **Sensitivity Analysis**: This component of the CBA basically includes a process of defining how sensitive the results obtained from the comparison phase are to changes. The sensitivity analysis process includes an analysis phase which is used to determine how reliable the results obtained from the CBA are as this helps in predicting the outcome of a variable if it is exposed to different factors that differ from key predictions hence this further helps in determining if there is any uncertainty in the identified variables of the cost benefit analysis.

**Question 3 (SO 4, AC 2)**

Explain the implications of late delivery on time and cost of a project (6)

**Answer**:

The implications that late delivery has on time and cost of a project has a direct economic impact on the delivery mechanisms planned and put into place for the project. Thus, the consequences relate to the direct implications that project owners and service providers/contractors have to face which is a direct correlation of time and cost and thus can be factored into time and cost overruns.

Time overruns relate to the inability of a service provider or contractor to carry out and deliver project requirements with regard to deadline specifications and thus as a result the entire project becomes setback with project milestones being pushed out.

Cost overruns relate to when a project exceeds the designated financial threshold for what was initially budgeted and as a result the there is a need for excess funding required for the completion of the project.

Cost overruns have a direct implication of time, if a project requires more funding for completion due to unexpected costs or poor financial planning then a project becomes setback as financials needs to be secured and approved in order to proceed and this process might take some time. Likewise, time overruns can have a direct implication on the overall cost of a project cause if a service provider or contractor is unable to deliver project deliverables on time then a project is pushed back and as a result may required additional funding for the completion.

Both time and cost can be major impediments on a project and have many implications directly and indirectly, hence if a project enters the stages where it has hit cost and or time overruns then someone has to be held responsible which is usually the projects service provider or contractor who has the bare the loss and expenses endured due to the project service provider or contractor poorly planning and estimating the outcomes and deliverables of the project.

**Module 3 Formative Assessment (Unit Standard 115365)**

**Apply the principles of designing computer system inputs and outputs**

**Question 1 (SO 1, AC 1)**

1. Explain the principles of computer input and output design. (6)

**Answer:**

The principles of computer input and output design can be used to effectively guide the design process and as such revolves around many considerable factors which can be incorporated and used. The principles that can be used for designing computer inputs and outputs are listed and described below:

* **User Involvement**: A major principle that has a large benefit to the process of input and output design is user involvement. This principle allows for continuous interaction of users in the design phase of inputs and outputs and allow for good understanding and communication to be established between the designer and the user when delivering designs based on user specifications. User involvement allows for many benefits to be achieved such as an increase in user satisfaction, enhanced productivity and granular level acceptance and rejection of input and output designs.
* **User First, Computers Last**: This principle revolves around the design factors that focus on the relevant choices of choosing beneficial designs that focus primarily on the user and not factors that focus on choices such as easy design for code implementation by programmers. The principle and overall concept of user first and computers last ensure that user benefits from the design choices of inputs and outputs made so that their interaction with the interfaces developed creates a good overall experience with minimal performance factors and compromises being made.
* **Minimize Human Efforts**: The principle of minimizing human efforts focuses around the concepts of Human Computer Interaction (HCI) and User Experience (UX) which in its core revolve around ensuring that uses are able to have a pleasant experience when interacting with the interface of a system. Factors that revolve around the application of this principle include items such as: reducing the number of keystrokes required by a user wherever possible, avoiding manual data entry and populate data automatically if possible to prevent data errors and user frustrations in capturing unnecessary data.
* **Remember Human Limitations**: The principle of remembering human limitations revolve around the concept that humans make mistakes and are thus prone to errors hence necessary preliminary checks and validations should be put into place to ensure that when errors are made they can be corrected or brought to a user’s attention so that they are aware of the mistake or error. Other factors of human limitations include not overwhelming uses with too much of information on a screen as there is only so much information a user can take in at a given time, avoidance of carrying over information to multiple screens as users should not be required to remember details due to factors such as short-term memory.
* **Convention Standardization**: The principle of convention standardization focuses and keeping the standards and ways that users are accustomed to, such as for example if there is a particular way that a business or organisation performs a certain function such as searching by pressing a certain shortcut key then its best practice to keep that standard when designing a system as this prevents users from having to remember different ways to perform something than what they are usually accustomed to.
* **Cultural Bias**: The principle of cultural bias focuses on the need that the design of inputs and outputs should be consistent and aligned with the expectations of humans. This includes factors such as considering the representation of data in terms of how it is displayed on an interface such as data flowing from left to right and then form top to bottom and how certain things are displayed such as for example error messages where common terms that are identifiable should be used instead of personal preferences as this needs to focus on the larger group of users and their particular environment of use.

1. Identify the types of inputs and outputs. (6)

**Answer**:

**Inputs**:

* Keyboards.
* Mouse.
* Scanners.
* GPS sensors.
* Telephone.
* Letter.
* Forms.
* Diskette.

**Outputs**:

* Screens.
* Printers.
* Speakers/headphones.
* Plotters.
* Magnetic media.

**Question 2 (SO 1, AC 2)**

Distinguish between the appearance and underlying structure and process in computer input and output designs. (8)

**Answer**:

Inputs and outputs can be defined as a collective term which represents the communication and processes of how data is initially obtained in the form of some input such as text from a keyboard which is then typically processed by a computer where the result of that processing is then showcased as a form of output which can be displayed to some sort of an output mechanism or further used for processing.

The following is a distinguishable list of factors for the appearance of underlying structures and processes in computer input and output designs and is based on input processes and structures and output processes and structures as 2 main categories:

**Input Processes and Structures:**

* **Aggregation**: Some forms of input can be supplied in continuous streams such as a GPS sensor which can be used for real time location tracking of something like a vehicle that has a tracker device installed on it, hence a GPS tracker will provide a lot of data in the form on inputs to a computer program and some of this data may be duplicates due a vehicle that maybe in a stationary position for a long period of time, hence aggregation can be used to obtain a reading from the GPS sensor at specific time intervals which will allow for the input data to be compiled better for processing and more meaningful outputs being obtained from the aggregated inputs.
* **Conversion**: Inputs can be provided in many different forms and as a result the input maybe unrecognisable by a system which means that the input that has been supplied becomes unusable, hence data needs to undergo the process of conversion where the supplied input data is converted or rather translated from one format to another so that it can be recognised by the system or computer program so that it can be further processed. Conversion also has a major factor in the internal representation of inputs, for example a user can provide an input in the form of voice which needs to be converted into a text-based transcript to be used for further processing and possibly being displayed back to the user on a screen hence some inputs needs to be converted into an internal representation for a format that is based on and required by the needs of a system.
* **Validation**: When input is provided from a user it needs to be validated to ensure that the data it contains is valid in the sense that it meets the specifications or requirements as defined and expected from the input being supplied, an example if a user supplies an alphabetic based input and a numeric based input is expected then this difference would need to be distinguished and validated to ensure that the input is not further processed as a system may not be able to cater for it during the processing of that input, hence validation is used to ensure that the correct types of data are supplied via input mediums before it can be formatted and processed any further.

**Output Processes and Structures**:

* **Accessibility**: When output is supplied after a form of processing that has taken place considerations need to be given to the expected end user of the output. If the output is intended for another system or program then the output needs to be machine readable so that the system or computer program can accept the output being supplied to it, likewise if the output is intended for a human audience then factors of accessibility for the output needs to be considered for the overall benefits of humans and this may include factors such as using screen readers and appropriate fonts especially for users who are visually impaired.
* **Format**: Data that is stored can take the form of many different formats such as binary hence when data is retrieved from memory and processed to be supplied as an output it needs to be formatted so that it is readable and meaningful for the desired output mechanism and audience that it is intended for such as humans or other computers systems. A typical example of data that needs to be formatted is one where numbers are stored in memory in a binary based format, this binary based format is unreadable to humans as they do not understand it hence the binary data representing the numbers will need to be formatted to represent a more readable version of the binary data that humans understand before it can be outputted.
* **Encoding**: When output is intended for another system then it must undergo the process of data transmission where the data will be sent via different communication mediums to reach its end point being another device/system/program, though in order for output data to be successfully transmitted it needs to be encoded so that it can be accepted by the its destination end point. Hence encoding ensures that the output is in the correct and required format and type that is expected so that it can be successfully accepted by an endpoint for further processing or being outputted by that end point device/system/program. Once an output has being successfully transmitted and accepted by its endpoint then it can be decoded where the necessary information or data can be extracted and used for further processing or being outputted to an output device or mechanism, an example of encoding would be the transferring of a file in an HTML file format to a web server so that it can be rendered to a browser that has requested the file.

**Question 3 (SO1, AC 3)**

Explain the purpose of user involvement in creating input and output designs. (4)

**Answer**:

One of the basic principles of good design revolve around the need of user involvement. When creating input and out designs the continuous involvement of users can provide greater insight and meaningfulness into the design process in the various phases of designing inputs and outputs and are a direct relation to some of the following factors listed and described below:

* **Acceptance/ Rejection of a System**: When a user is continuously and directly involved in the design process of inputs and outputs they will be able to determine if the designs meet their required specifications and as such have the ability to effectively communicate this to designers during early or initial design stages of a system. If designs of inputs and outputs are not clearly communicated and showcased or demonstrated to the user early and on a regular basis then this can cause major impediments to the overall design phase of a project, cause if designs are showed to a user where most or majority of the system has been designed in terms of inputs and outputs and the user does not approve of the designs that have been made then they can reject the system which will lead to the process of redesigning which is a direct impact on factors such as delivery times and efforts put into the project. If a user is continuously involved in the designing of inputs and outputs then they can clearly communicate the specifications of what is to be achieved at a more modular level in which they can accept or reject designs that form part of the whole system. Hence instead of having all or most of the input and output designs of a system rejected at once, it can be avoided by having continuous user involvement and engagement, which can ensure that modular pieces of input and output designs when available can be showcased to the user and these can then be accepted or rejected and if rejected then the designer will be able to effectively focus on making amendments on that rejected component and be able to re-showcase it again to the user based on further obtained feedback and clarification.
* **Understanding Between User and Designer**: When a designer designs inputs and outputs they need to meet the expectations of the user, if there is no thorough communication and proper understanding of the expectations then impediments can arise as the designer would mostly be working against requirements that have been defined by the user and this may not be clearly defined or there could be a misunderstanding from the designer’s side. When a user is involved in the initial design phases of inputs and outputs then communication is carried out on a regular basis between the user and designer which allows for the designer to gain a more in-depth understanding of the requirements that is expected to be produced and as such, good clear communication and understanding overall leads to other additional factors such as better clarity and directions, better trust and commitments between the user and designer and the mitigation of any possible issues or conflicts that may arise due to a lack of understanding and communication.
* **Cost and Time**: Any project has financial and time constraints and as such these factors need to be strictly adhered to as going over budget and not meeting deadlines on time usually leads to a failed project or losses being made. Constant user involvement can radically have an impact on both cost and time factors cause when a user is constantly involved then good clear communication is established which leads to clear and specific understandings of specifications that are expected to be achieved and as such with constant user involvement the designs of inputs and outputs can be made more quickly and achieved in a timely manner in which the design specification will be more accurately achieved due to the user being involved in the design process. When a project involving the designing of a system goes according to cost and time then this will increase overall customer satisfaction and ensure critical success of a project especially in the initial design phases.

**Question 4 (SO 1, AC 4)**

Compare online computer functions with manual and offline data entry. (5)

**Answer**:

The following is a comparison of computer-based functions with regard to manual and offline data entry and is based on the following criteria:

* **Online Media**: Media in basic form is a representation of some sort of information that is communicated by some platform such as a news articles for example. Online media in terms of offline input offers a relatively simple approach in its creation, physical representations such as writing out articles and scripts or drawing sketches can be used as manual methods of data capture and input to create the basis of the media. In the context of online input, computer functions with utility applications with document and image processing capabilities can be used for the date capturing and creation of online media content. Offline modes of creating media pose some disadvantages such as if mistakes are made they are hard to rectify since they are physical such as written down or drawn where as in an online mode mistakes can be easily rectified with computer-based functions. Also, sometimes there needs to be various versions of media created such as a prototype or temporary version that needs to be decided on before a final version is created hence offline modes usually result in multiple copies of media being written or drawn where as in an online mode duplication with modifications can easily be made with computer-based functions.

When it comes to data entry manual offline means are simpler and more relatable to most users but online computer functions offer the ease and efficiency of doing it especially if media that has been created needs to be distributed as offline created media needs to be replicated and uploaded manually to be online whereas media created online can be easily distributed.

* **Document Readers**: With document readers offering numerous advantages that are based on online computer functions that can be available in email applications, document editors or PDF viewers for example, not many users may not be accustomed to using a document reader and may resort to more manual means of data capture such as writing.

Users in general are accustomed to the process of writing which in essence is a form of manual offline data entry, writing can be used to fill in forms and documents which then can be later processed where the contents of the form or document can be captured onto a computer system where it can be available to be viewed on a document reader.

When documents are written by a user, the style and way a user may have written may pose a problem such as the written contents being misinterpreted or misunderstood entirely due to writing styles such as cursive writing, or the text been too small to make out and understand hence document readers eliminate such issues by allowing for specific fonts to be used for text inputs and the availability of features such as being able to zoom into text that may be too small to view for some users who may be visually impaired.

With online computer functions, document readers allow for advance features to be used such as audio-based outputs to be carried out.

* **Source Documents**: The use of source documents is typically used for the capturing of data for record purposes such as recording clinical trials that have passed and failed for a given month.

In a manual and offline approach, a source document taking a clinical trial for example can typically take the form of manual capture where data is manually written down in a ledger for recording purposes. Hence this source document would need to be further compiled manually for sensible information to be gathered form all of the clinical trials captured to determine the overall pass and failure rates of all trails.

In the context of an online computer function source documents can be done electronically on a computerised device where the contents can be captured digitally, easily stored and retrieved and can be compiled by an online computer function where meaningful data analytics can be obtained. Manual capture can relate to longer times to compile sensible information from data stored in source documents even though it might be easier to manually record something but for the ease of storage and quick access online computer functions definitely conquer over offline methods as advantages such as easy storage and retrieval and quick data operations to present meaningful information in real time can all easily be achieved even though there might be some user training required on how to go about using electronic based source documents.

* **Conversion Media**: The concept of conversion media can be quite generic but in one or many forms it can represent the types or processes that different forms of media can go through to be represented or interacted with.

With regard to manual offline data entry when data is captured in some form such as being written down or drawn on a piece of paper or recorded on a tape recorder for examples, these types of manual offline data capture can only be represented in their initial form of capture and cannot possibly be enhanced or modified further due to the limitations imposed by manual means.

When online computer functions are used to create, capture or modify media that has been manually created, the media can go through a process of being converted into a more applicable formats so that it can be used and be available more easily, examples include images being scanned so that they can be available electronically, audio recoding uploaded so that they can be enhanced and converted into better formats for benefits such as better audio quality, etc.

Conversion media helps with the process of allowing media to be changed from one form to another, in an online computer environment conversion of media may take a while to be performed and thus there is usually a waiting period for its availability where in an offline environment where the media was initially created it can be available immediately to be viewed or interacted with. There may be instances where media in some form needs to be converted into different formats for archiving or distribution purposes and thus the process of media conversion needs to be carried out, this may involve complicated processes to be carried out by specialised software application and possibly even trained skilled users who know how to perform the conversion.

**Question 5 (SO 1, AC 5)**

Compare graphical input and output functions with text-based input and output functions. (4)

**Answer**:

The following is a comparison of input and output functions with text-based input and output functions and are based on the following criteria:

* **User Types**: Input and output functions can be both performed in different ways in a graphical and text-based environment but as such each environment differs based on the users experience in each environment as users can typically be categorised into novice, experienced and professional users and depending on each category of user the different types of environments can make a big difference for input and output functions.

A graphical user interface-based environment offers a very interactable environment for inputs and allows for outputs to be easily formatted and displayed to the user. GUI based environments allow for an easier understanding of how to use an interface especially for novice users but for more experienced or professional users they might not find GUI based environments suitable for their need and purpose.

Text based inputs and outputs compared to GUI based inputs and outputs are more focused on experienced and professional users as these types of environments are quite specific in their use and usually require an in-depth understanding on how to use and operate command line terminals to interact with a system or application but the benefits of using such an environment can be rewarding as experienced or professional users may find it more appropriate when perform input based functions and expecting certain output functions.

* **Response Times**: The time it takes for any computer or application environment to load and show inputs and display outputs can make a big difference in a user’s overall experience.

GUI based environments usually have much longer load times compared to text-based environments and this is due to the fact that interfaces require more resources such as memory and CPU processing in order to be rendered to a user, the more complex or populated an interface is the more resources it requires to be rendered. When it comes to input and output functions response times can differ depending on the system or application, when inputs functions are performed they need to be processed and the interface of the GUI environment needs to be updated as a result of an output function which can have long response times

Text based environments which are usually accessed by a command terminal of some sort are quick and efficient in repose times as command terminals do not require lots of resources such as memory and additional processing to be rendered as command terminals are not graphical based environments and usually form part of a Command Line Interface (CLI) which allows for fast data transfers to be processed from inputs and quick outputs to be displayed due to minimal resource requirements needed to produce the CLI environment. Also, text-based environments that use CLI’s allow for the user of commands which act as shortcuts in being able to perform some sort of operation quickly with minimal input which allows for quick overall response times when performing certain tasks.

* **Icons**: When it comes to communicating or enhancing the environment a user interacts with then the use of icons make a large difference.

In GUI based environments icons can be used to gain many advantages compared to text-based environments. Such advantages revolving around the purpose and use if icons which include items such as an enhanced experience as icons are able to gage the interests of users as icons can be used as a visual communication mechanism as sometimes images have more meanings than words, icons can also be used as interactive placeholders such as for example a home icon can be used to indicate to the user that clicking on the icon will take them back to the home screen of a system or application and as such this represents types of interactions for inputs and outputs that can occur via the use of icons.

Unfortunately, text-based environments cannot benefit from the use of icons as such an environment only support texts for input and output functions hence in terms of a visually engaging and interactable environments, text-based environments such as CLI’s fall short in this category and aspect in general overall.

* **Menus**: In general context and definition a menu is a facility that contains a list of commands or options that can be accessed and used in a computer system or application.

In a GUI based environment menus can be used as facilities that can be interacted with by clicking on or selecting various options available in a displayed menu context, these options allow for quick and easy access of options, additional utilities or commands that can assist a user and require minimal effort to interact with in terms of input and usually results in quick outputs depending on the nature of the menu item or facility being interacted with.

In a text-based environment such as a CLI a menu can be present but in a much different form compared to a GUI based environment. Menus in text-based environments require much more input than that of a GUI based environment as GUI based environments only require inputs that involve the user selecting/interacting the appropriate menu options they would like to open or execute where as in a CLI environment menus require users to physically type in menu option numbers for example to access the particular menu item which may also require additional inputs thereafter for possible further interactions.

Menus in both GUI and text-based environments can both be used as navigation tools to get to certain parts of a system or application representing both input and output functions, GUI environments would offer a more interactive menu with better laid out options where as a text-based environment will offer a more descriptive based menu where physical typing of items such as menu numbers or references will be required for the navigation to take place.

**Module 4 Formative Assessment (Unit Standard 115368)**

**Apply advanced HTML and associated techniques to build a web site for business applications**

**Question 1 (SO 1, AC 1, 2)**

1. Identify advanced HTML features. (4)

**Answer**:

The following are some of the advance features available in HTML:

* + Frames.
  + Forms.
  + Controls.
  + Scripting.

1. Describe the use of the features that you identified above. (8)

**Answer**:

The following is a description of the listed advanced features of HTML:

* + **Frames**: The use of frames allow for the organizing and formatting of how content is displayed on a web page that is rendered to a browser. Frames allow for multiple sections to be created and used within a single webpage, this allows for the separation of being able to display different content that needs to be isolated from other webpage elements. Frames provide the advantage of allowing content to be loaded independently in a webpage as well as allowing for customised layouts in terms of width, height and even custom styling to be implemented.
  + **Forms**: A form represents a section of an HTML document that is generally is used for the capturing of data via different input controls. Once data has been captured on a form it can be submitted to server for further processing which is referred to as server-side processing. Forms can have various different input controls that can be easily customised and used for the capturing of information.
  + **Controls**: A control is an element that is used on a form for the capturing of user input, controls can represent a wide collection of input mechanisms such as for example: textboxes, checkboxes, drop down list selectors and radio buttons. Controls are given names which are either defaulted or user defined, these names are used to uniquely identify a control on a web page and allows for these controls to be easily accessed by programming languages for further processing or the extraction of data being held by the control.
  + **Scripting**: Scripts are programs that can be embedded into an HTML document to provide client-side functionality which is functionality that can be executed on a browser on a local machine/computer instead of a server. Scripts allows for developers and creators to extend the basis of HTML documents by adding in additional functionalities that can bring about enhanced mechanisms and features in an HMTL document that is rendered on a browser. The functionalities that are defined within scripts do not rely on a post back to occur to a server for server-side processing to occur hence this brings about increase response times and efficiencies in executable functionality that can be carried out with the use of scripting languages such as JavaScript.

**Question 2 (SO 1, AC 4)**

Explain the use of Dynamic HTML and XML. (8)

**Answer**:

**Dynamic HTML**

Dynamic Hypertext Markup Language represents a combination and collection of different technologies which are all used together for the creation of interactive and animated web content.

Dynamic HTML allows for more control over HTML elements to be established and as a result this allows for more easy integration and incorporation of different technologies such as client-side scripting with JavaScript and usages of style sheet languages like CSS for customized presentation layers.

Dynamic HTML allows for many great features and functionalities to be carried out, some of these feature and functionalities include items such as:

* Allowing for dynamic renditioned changes to a web page without the need of having to post back to a server for any changes to occur.
* Customised animations in the form of text and images.
* Ability to refresh portions or segments of a webpage instead of the entire webpage.
* Custom real time validation for input controls that does not require any server-side processing.

**XML**

Extensible Markup Language is a markup language that is based on a set of rules that is used for encoding documents in a format that is easily understandable by humans while also being machine readable. XML is a meta language that offers a text-based format encompassed in a tagging system similar to HTML which allows developers to create their own customised formatted structure for storing data, this customised format forms part of self-defined or self-describing data.

XML has core uses which primarily focuses on data transmission, interpretation and storage with easily customisable, extendable and standardised ways of reading and storing data as XML based files can easily be transmitted between different applications or services for data exchanges to occur quickly and efficiently as well as allow for other types of uses and functionalities to be carried out quickly and efficiently such as search based functionalities for data/information stored in XML files.

**Question 3 (SO 1, AC 5, 6)**

1. Identify and describe Dynamic HTML concepts. (8)

**Answer**:

The following is a list and description of dynamic HTML concepts:

* **Object Orientated View of Page Elements**: The elements on a web page such as headings, paragraphs, textboxes images and lists can all be viewed as objects of a web page and as such these objects can be given attributes and properties which help define them and their purposes. The attributes and properties that can be given to objects include items such as names for uniquely identifying the objects, font styles, text colours, alignment and positions, visibility and many more various other attributes and properties. An object orientated view of page elements allows for customised and greater control of how elements are used, an example: elements can be controlled with programming languages in conjunction with functions such as events which can be based off interactions made by users such as mouse clicks which can allow specific elements to be enabled or made visible and others to be disabled and made non-visible.
* **Style Sheets and Layering**: A style sheet serves the purpose of allowing for the separation of the visual layout of a web page which is commonly known as the presentation layer from the rest of the content and structure of the web page. Style sheets help define the design characteristics and properties for user interface elements and components such as layouts, font sizes and styles, colour themes and pallets, sizes of text for titles, headings and paragraphs, etc., hence style sheets help with defining consistent visuals of content throughout multiple webpages of a website or web system. With the use of dynamic HTML style sheets can be created using CSS (Cascading Style Sheets) which allow for the creation of linked style sheets which can be referenced and used throughout a website or web system. Style sheets also allow for layering to applied to a website or web system where alternative style sheets can be used to change the appearance of content by creating overlays over the existing content and as such layers can be used in many different ways such as actions from user interactions and timed presentations for example.
* **Programming That Addresses Page Elements**: With dynamic HTML providing concepts such as object orientated views of page elements this provides a major advantage and use for both front end and back programming as functions can be created and tailored around the use and need of defined page elements. With the ability to give page elements properties such as names it allows for the creation of access mechanisms to allow for the easy identification and retrival of the contents such as input data that a page element may hold using a programming language such as JavaScript, by being able to access page elements additional functionality can be carried out such as preformatting or validation on data that is being held on the page element before further processing can be carried out. Programming that addresses page elements as a dynamic HTML concept allows for many uses and advantages such as being able to control page elements via events such as button click events from user interactions where the use of style sheets can be incorporated for different layout effects which can all be controlled and easily implemented with programming languages, other uses include the incorporation of modular structures for programs and better data modelling with incorporation of design elements
* **Dynamic Fonts**: These represent custom font files which contain custom properties for items such as font styles, sizes and colours. Hence dynamic fonts represent a feature which allows for custom font files to be contained as part of a webpage in which the font file is downloaded with the web page when the web page is accessed and thus results in the customised font properties being applied and used instead of defaulted browser fonts.

1. Identify and describe XML concepts. (6)

**Answer**:

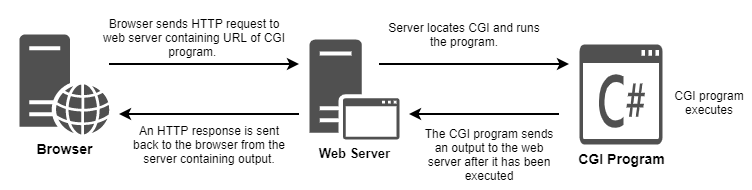
The following is a list and description of XML concepts:

* **Elements**: XML elements can be described as the building blocks of XML documents or files as elements can represent containers which can hold contents such as other elements, text, attributes and other types of objects such as media. The structure of an element consists of a name that defines the element which consists of a start and corresponding closing tag, the content that falls in-between an element can be attributes which are defined in a similar way as elements.
* **Tags**: The structure and scope of XML documents are defined using tags which are similar to HTML tags, tags usually have a start and corresponding closing tag which makes up a set. Tags in XML documents are used to uniquely create the customised and formatted structures that XML allows for with consideration to simple rules such as case sensitivity when defining elements and attributes using tags and the order of correspondence of opening and closing tags.
* **Attributes**: XML attributes are used to provide information about XML elements. Attributes consist of names which are used to identify the attribute that is part of an element and values that the attribute holds which usually relates to information of some sort that is stored by the attribute hence attributes form a name value pair construct which are used to define the properties of elements.

**Question 4 (SO 2, AC 1, 2)**

1. Explain the usage of CGI. Use a diagram to illustrate. (8)

**Answer**:



The Common Gateway Interface (CGI) essentially allows for web servers and server-side programs to be able to interact with each other in the form of obtained responses being passed through a web server and thus acts as a form of middleware. Thus, one of the main usages of CGI is to allow for requests to be sent to web servers to allow for the execution of independent application programs which execute and return back a response to the webserver, this usage allows dynamic pages to be rendered to a browser based on responses retuned from the CGI program through the web server and allows for easy integration to work across multiple platforms and web servers.

As seen in the image above, the process of how CGI is used and carried out is demonstrated and the follows the following processes and steps:

* A request action is made to a web server from a browser containing a website or web system, the request action response is typically based of some sort of event or action such as a button being clicked to submit a form and its contents. The browser sends an HTTP post request to a web server which contains URL information for the location of a CGI program that needs to be executed.
* The web server receives the request being posted to it from the browser and then processes it and tries to locate the designated CGI file with the supplied directory information from the provided URL. Once the CGI file has been located it is then executed.
* When the CGI program is executed it then returns an output of the result of its execution back to the web server.
* The webserver then returns an HTTP response back to the browser with the contents of the output obtained from the CGI program with any optional information such as header information which can be used to identify the output being sent.
* When the browser receives the response, it handles the response and displays an appropriate output to the user.

1. Describe the types of services provided by a database backed website. (6)

**Answer**:

Database backed websites which are commonly known as database driven websites offer many different services that can be advantageous in the contexts of its overall use. A database backed website is a good representation of a dynamic website in which the contents of webpages on a database driven website are loaded by being obtained from a database, this means that every time a webpage is loaded data is retrieved from a database and loaded onto the webpage.

Hence some of the beneficial services and uses that a database backed website provides include items such as:

* The ability to easily update information for a website as most of the data is stored on a database which means only the data on the database needs to be changed or modified instead of any markup on the websites actual source files which means that new or updated information will automatically be rendered to a website once changed on the database without the need for any human intervention on the websites markup files.
* Backend programming or commonly known as server-side programming is used to establish connection to the database to retrieve the required information needed to be displayed on a webpage and as a result offers a central point and bases of maintained code instead of having to update multiple html source files across the entire website which also results in the benefit of not having any advanced HTML knowledge or expertise to perform updates on HTML based files.
* Large amounts of data can be retrieved, inserted and updated all in real time with quick turnarounds for reflections on websites and usually does not require the need for new files to be published to a server for updates or new content to be reflected.

Database backed websites can take many different forms, some examples of common database driven websites include the following:

* E-Commerce Platforms: These types of websites make great used of database backed services as these types of platforms represent businesses on an electronic platform via a medium of a website which needs to cater for large amounts of data such as product listings and catalogues which needs to be continuously updated as well as cater for the addition of new product items and catalogues. A database backed website provides e-commerce platform with many benefits and services such as being able to easily and efficiently update and add new items to the platform via a database.
* Content Management Systems (CMS): These types of systems make good use of the services and benefits that are offered by database backed websites as CMS’s are typically used to manage the content of a website and with the use of a database driven CMS’s content can be easily managed in terms of being modified and added without the need of having the necessary expertise or specialization in programming to manage the content via a CMS’s.
* Blogs: A blog needs to hold a lot of information such as online community forums and thus a database driven website offers the necessary services and facilities to effectively manage the large amounts of data that needs to be stored and retrieved in real time.

**Module 5 Formative Assessment (Unit Standard 115384)**

**Test a computer program against a given specification**

**Question 1 (SO 1, AC 4)**

1. Define the term computer program testing. (2)

**Answer**:

Computer program testing is a process that is used for the verification and evaluation of a system for the purpose of determining if the system meets certain specified requirements in terms of its functionality. Computer program testing can further be expanded into the purpose of being able to identify potential errors, issues and bugs of a system and being able to determine how well a system can work with various internal and external variable factors being introduced. There are different types of computer programming testing that can be carried out such as manual and automation testing.

1. Explain the reasons why a developer must follow standards and procedures specified in the test plan for testing and retesting. (4)

**Answer**:

The reasons why a developer must follow the standards and procedures that are specified in a test plan that is used for testing and retesting is because a test plan is an essential document that contains and defines items such as: the scope of the test plan, applicable approaches, resources and the schedule that is used for the outlining of all test activities. Hence by following the outlined standards and procedures that are specified in a test plan then various factors can be strictly adhered to and followed, such factors include:

* Identifying the correct test items and test cases.
* Identifying the correct features to be tested.
* The process of testing the identified tasks.
* Team assignments of who will be doing what tasks.
* Identification of possible risks and listings of contingency plans.

Hence test plans create a road map that allows for proper guidance in the process of testing and retesting which allows developers to follow the defined and outlined standards and procedures to ensure correctness in the objectives of testing test cases with regard to test inputs, execution conditions and expected test results as this all determines the overall success of incorporating the necessary mechanisms of a test plan.

**Question 2 (SO 2, AC 1)**

List records that a developer must create to capture results from a testing computer program. (4)

**Answer**:

The following are some of the records that a developer must create in order to capture the results from testing a computer program:

* Test plan.
* Test design specification.
* Test case specification / Test procedure specification.
* Test log / Test recording / Test reporting.

**Question 3 (SO 3, AC 1)**

Explain what a developer must check when reviewing the testing process for a computer program. (4)

**Answer**:

A developer should check multiple items when reviewing the testing process for a computer program so that potential issues can be identified early and handled correctly and improvements can be made to the computer program as well as the testing process, some of the items that a developer much check when reviewing the testing process include:

* **Test deliverables**: A developer should focus on checking test deliverables of a computer program as test deliverables are the various artefacts which are the various forms of documentations that are given to stakeholders such as test plans, test strategies and test cases that will be used during the testing process. Hence test deliverables outline the expectations of the testing process and give detail and insight into what is involved in the entire testing process and thus it is important for a developer to check all test deliverables when they are reviewing the testing process for a computer program to ensure that the deliverables are still being adhered to and meet as expected and defined.
* **Review of the test incident report**:The test incident report allows for a listing of all encountered situations where the program did not behave as expected or did not produce an expected output hence these items along with many other incident types are logged in an incident report which allows for the reporting, tracking and managing of incidents that have occurred during different testing runs or phases. Hence it important for a developer to check and review the items on an incident report when reviewing the testing process for a computer program as it will allow for the identification and management of defects.
* **Pass and fail criteria’s**: The use of pass and fail criteria’s help in determining if test cases have passes or failed in the various test phases or test runs in which they were tested. Developers therefor should check the pass and fail criteria’s especially for failing or unsuccessful types of tests when reviewing the testing process for a computer program as this will provide additional and in-depth insight in the form of key performance indicators of the success rates of the different types of test being conducted and their test cases.
* **Contingencies**: A developer must always check if there are any contingencies in place when reviewing the testing process for a computer program as contingencies are used as an alternative course of action to respond to something that did not work out as expected hence in the case of a computer program undergoing a testing process this can include many factors where contingencies can be used and incorporated to mitigate an identified risk and use alternative measures to achieve the desired result of what was required, thus contingencies are important factors that need to be checked and taken into account by a developer during a review of the testing process as this can be crucial information in making any future based decisions and understanding the current contexts of why contingencies had to be implemented.
* **QA approval**: It is important that a computer program gets approved by a quality assurance team and as a result it is important that a developer checks that a computer program meets all specified requirements during the testing process before it is handed over for acceptance testing to a quality assurance team. A QA team will perform acceptance tests on the computer program in an effort to determine how the program would perform and behave in a real production environment while also ensuring that the program meets the client’s specifications and overall requirements hence it is important for a developer to ensure that all test deliverables are covered thoroughly and all expectations and specifications that have been outlined have been met.

**Module 6 Formative Assessment (Unit Standard 115388)**

**Produce documentation for a computer program to agreed standards**

**Question 1 (SO 1, AC 1)**

Identify and describe the key elements that must be covered in the design of a computer program document. (8)

**Answer**:

The following is a list and description of key elements that must be covered in the designing of a computer program document:

* **Style**: The element of style is something that is unique in different organisations as different organisations each have their own unique way of writing program documents. The style element can have many different attributes which can be incorporated into the writing of documents, different attributes include items such as: the use of active tenses instead of passive ones, not using long sentences that cover several points and instead using short sentences that cover singular points and the use grammatically correct constructs and correct spelling. The style element can ensure that document writing standards and quality and upheld and are consistent throughout a document.
* **Structure**: The element of structure is used for the organising of material which make up a document, this includes items such as organising the documentation content into chapters, sections and subsections. Organisations usually have a predefined structure that they follow when creating documentation as structure plays an important role in the overall readability and usability of a document as documentation that is structured correctly makes it easier to find information.
* **Content**: The element of content is specific to an organisation as organisations define what type of content is to be included into documents that are being created. The types of content that can be included in a document vary largely but there are guidelines that can be used to help dictate the writing of content that is governed by an organisation’s rules and procedures, some of the guidelines include items such as: Including only relevant information and details, using short sentences to convey points and the use of clear and direct titles so that related content can be clarified more easily.
* **Format**: The element of format helps define the arrangement of content in a document so that the content is appropriately laid out. The process of document formatting ensures that a document is presentable and follows a particular structure and style for the content that the document holds. A typical design document for example can have the following headings for sections of a document: statement of goals, functionality, user interface, milestones and conclusion - these headings help format the document into sections of appropriateness so that each section holds the desired related content of the document.

**Question 2 (SO 1, AC 2)**

List the program documentation components that the documentation plan must cover. (8)

**Answer**:

The following is a list of some of program documentation components that a documentation plan must cover:

* Design documents.
* Program listings (including annotations).
* Sample input/output.
* User manuals.
* Technical manuals.
* Online help (all components needed as applicable to the type of program being documented).

SECTION B: SUMMATIVE ASSESSMENT

Perform the following activities along with their related tasks.

Each task is specified as a GROUP or INDIVIDUAL activity.

Please follow these guidelines.

As an overview, these are the activities and tasks in this summative assessment:

[Activity 1 – Planning the Project](#_Toc36544647)

[Task 1 (US 115392: SO 1, AC 1, 2, 3, 4) [INDIVIDUAL WORK]](#_Toc36544648)

[Task 2 (US 114059: SO 4, AC 1) [GROUP WORK]](#_Toc36544649)

[Task 3 (US 114059: SO 2, AC 1, 2) [GROUP WORK]](#_Toc36544650)

[Task 4 (US 114059: SO 3, AC 1, 2) [GROUP WORK]](#_Toc36544651)

[Activity 2 – Design the Software](#_Toc36544652)

[Task 1 (US 115392: SO 2, AC 1, 2, 3, 4) [GROUP WORK]](#_Toc36544653)

[Task 2 (US 115365: SO 2, AC 1, 3) [GROUP WORK]](#_Toc36544654)

[Task 3 (US 115365: SO 2, AC 2) [INDIVIDUAL WORK]](#_Toc36544655)

[Activity 3 – Building the Software](#_Toc36544656)

[Task 1 (US 115392: SO 3, AC 1, 2, 3) (US 115365: SO 3, AC 1, 2) [GROUP WORK]](#_Toc36544657)

[Task 2 (US 115365: SO 3, AC 1, 2) [INDIVIDUAL WORK]](#_Toc36544658)

[Task 3 (US 115368: SO 1, AC 3, 7) [INDIVIDUAL WORK]](#_Toc36544659)

[Task 4 (US 115368: SO 2, AC 3, 4) [INDIVIDUAL WORK]](#_Toc36544660)

[Activity 4 – Testing](#_Toc36544661)

[Task 1 (US 115392: SO 4, AC 1, 2) [GROUP WORK]](#_Toc36544662)

[Task 2 (US 115384: SO 1, AC 1, 2, 3, 4) [INDIVIDUAL WORK]](#_Toc36544663)

[Task 3 (US 115384: SO 2, AC 1, 2, 3, 4) (US 115392: SO 4, AC 3) [INDIVIDUAL WORK]](#_Toc36544664)

[Task 4 (US 115384: SO 3, AC 1, 2) [INDIVIDUAL WORK]](#_Toc36544665)

[Activity 5 – Implementation / Installation](#_Toc36544666)

[Task 1 (US 115392: SO 5, AC 1) [INDIVIDUAL WORK]](#_Toc36544667)

[Task 2 (US 115392: SO 5, AC 2) [INDIVIDUAL WORK]](#_Toc36544668)

[Task 3 (US 115392: SO 5, AC 3) [INDIVIDUAL WORK]](#_Toc36544669)

[Activity 6 - Documentation](#_Toc36544670)

[Task 1 (US 115392: SO 6, AC 1, 2, 3, 4) (US 115388: SO 2, AC 1, 2, 3) [GROUP WORK]](#_Toc36544671)

[Task 2 (US 115388: SO 3, AC 1, AC 2) [INDIVIDUAL WORK]](#_Toc36544672)

|  |
| --- |
| **DECLARATION OF GROUP WORK:**  The tasks labelled as GROUP WORK were performed as a group with the following learners:   * Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   Learner Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

## Activity 1 – Planning the Project

### Task 1 (US 115392: SO 1, AC 1, 2, 3, 4) [INDIVIDUAL WORK]

You have been given a software project assignment.

1. Identify and describe the problem that the business is facing. (4)

**Answer**: The following answer is based off the AskAMerch project scenario.

The problem that the business is facing is that the business has a large client base where they serve thousands of clients on a daily basis and don’t have any additional ways to service their clients in order to make their services more valuable such as providing relevant information for the services that they offer or addressing frequently asked questions. Hence a solution is needed to create a system that serves as an online medium is required to cater for the problem that the business is facing so that clients will have the opportunity to have better interactions in obtaining relevant feedback with regard to the services being offered by the business and allow for information to be publicly available for viewing so that commonly asked questions can be easily viewed.

1. Interpret the problem facing the business and create a plan to develop a computer program solution. The plan must;
2. Propose a description of the problems to be solved by the development of the computer program.
3. Integrate the research of problems in terms of data and functions.
4. Include an evaluation of the viability of developing a computer program to solve the problem identified and compares the costs of developing the program with benefits to be obtained from the program *(Use the costing information gathered in Task 4 for this comparison)*
5. Choose the best solution to the problem and document the program features that will contain the capabilities and constraints to meet the defined problem. (16)

**Answer**:

**Program Solution Plan for AskAMerch.**

**Problem Description.**

The business representing the largest network of car mechanics in South Africa serves a client base of over a thousand clients on a daily basis, thus having such as large client base the business has no other mediums of servicing their clients in terms of being interactable and having the ability to provide information or feedback in the form of advice based on car mechanical insights.

Hence the main problem on not having an online medium to serve as an interactable platform for the business, having a software solution in place to cater for this problem will allow for the creating and the establishing of good strong relationships with customers which could potentially lead to repeat business ventures in the future. Therefor the computer program that can be developed can solve the issues and problems of not having an online medium for the business to provide external information and advice services to their clients and the general public who have an interest.

**Integration of Research Problems in Terms of Data and Functions.**

The following is a list per a screen of the system in terms of all of the fields that are produced and their user interface types and descriptions for purposes:

**TODO: REQUIRE SOME DESIGN PLANNING BEOFRE IMPLEMENTING THE FIELD DECLARATIONS.**

|  |  |  |
| --- | --- | --- |
| **Public Dashboard** | | |
| **Field** | **Type** | **Description** |
|  |  |  |
| **Login Screen** | | |
| **Field** | **Type** | **Description** |
| Title | Label | Displays the title of the system |
| Login title | Label | Displays the title of login |
| Email | Text box | Holds the value of the users email address |
| Password | Text box | Holds the value of the user’s password. |

**Evaluation of the Viability of the Computer Program.**

**TODO: REQUIRE COMPLETION OF TASK 4 IN ORDER TO DO EVALUATION.**

**Best Solution with Associated Program Features.**

**TODO**

### Task 2 (US 114059: SO 4, AC 1) [GROUP WORK]

You are required to draw up a Work Breakdown Structure WBS to reduce the element of late work delivery on your project

1. Define the purpose of your Work Breakdown Structure (3)
2. Decompose your project into small manageable components (10)
3. Your WBS must show that the element delivered is often a subset of a bigger deliverable. (3)
4. Explain the reasons behind decomposing your project (4)

### Task 3 (US 114059: SO 2, AC 1, 2) [GROUP WORK]

For your software project assignment you are required to provide a time estimate for the project.

1. Breakdown the components of the project to be run in the logical parts for estimating (use the WBS from Task 2 above)
2. Estimate your time based on the main deliverables and the other components

(Use a pert chart and a WBS to estimate the time to complete the project)

**Note:** Attach all relevant evidence in the POE guide. (15)

### Task 4 (US 114059: SO 3, AC 1, 2) [GROUP WORK]

For your software project assignment you are required to estimate the cost of the project.

1. Breakdown the main deliverables into logical components for easy estimating (use the WBS from Task 2 above)
2. A list of all the activities (including testing) to be done must be shown with estimated cost

(Direct costs and overhead costs must be included in the estimate for the project)

1. Identify the cost contingencies from the project and provide an estimation of all possible inclusions

**Note:** Attach all relevant evidence in the POE guide. (20)

## Activity 2 – Design the Software

### Task 1 (US 115392: SO 2, AC 1, 2, 3, 4) [GROUP WORK]

Using the plan that you developed in Activity 1 (Task 1) above, you are required to design a computer program. The computer program design must meet the following specifications;

* Incorporate development of appropriate design documents and is desk checked
* Include User Stories for the requirements
* Include program structure components
  + (Either of: structure charts or UML structure notations)
* Include program logical flow components
  + (Whichever are best suited: Activity Diagrams, Decision trees, flowcharts, pseudo code, decision tables, etc.)
* Include data structures and access method components
  + (At least one of: direct access files, indexed files, database tables)

**Note:** As evidence, you must attach your designs in your POE. (20)

**Attached User Stories and Designs:**

### Task 2 (US 115365: SO 2, AC 1, 3) [GROUP WORK]

Design user interface wireframes for the computer program.

* Your wireframes should cover the essential use cases of the computer program
* The design must meet the specification for the function. That is, error avoidance, workplace design, document design, equipment design, dialog design, job design.
* The design must relate to current industry recommended format.
* Attach your wireframes as evidence in your POE (15)

**Attached wireframes:**

### Task 3 (US 115365: SO 2, AC 2) [INDIVIDUAL WORK]

Given the wireframes that were designed as a group in Task 2 above:

1. Explain how the design can be implemented in the client’s computer environment
2. Identify the computer environment considerations that influenced the design
3. Identify some computer environments that the design would not be ideal for (9)

**Answer:**

i)

ii)

iii)

## Activity 3 – Building the Software

### Task 1 (US 115392: SO 3, AC 1, 2, 3) (US 115365: SO 3, AC 1, 2) [GROUP WORK]

You are now required to create a computer program that implements the design. Take note of the following;

* The creation must include coding from design documents.
* Names created in the program must describe the purpose of the items named.
* The creation includes conformance with design documentation.

As evidence, you must provide a link to a zip file shared through any online file sharing service without an expiry date (drop box, google drive, one drive, etc.) (30)

*File sharing URL to project zip file (all code and database scripts/backup):*

…

In order to prove that you have contributed to this aspect of the project the assessor/facilitator will arrange an interview with you (in person or over video conferencing) to ascertain the authenticity of the submission with regard to the following:

|  |
| --- |
| The learner was able to identify, explain and answer questions regarding a section of code that they contributed to the project. |

The assessor/facilitator must complete the attached evaluation checklist.

(The checklist is attached at the end of this Assessment Instrument).

### Task 2 (US 115365: SO 3, AC 1, 2) [INDIVIDUAL WORK]

Examine the computer program that you created to implement the design as compared to your original designs. Describe the differences and similarities between the design and the implementation as they relate to the following:

1. Does the function format correspond to the design?
2. Does the function behaviour correspond to the design? (10)

**Answer:**

i)

ii)

NB. Take screenshots of the implemented designs (screens, database diagrams, etc.) and attach them in your POE below.

*(tip: use “win key” + shift + s to capture the specific section of the screen and then paste it here)*

### Task 3 (US 115368: SO 1, AC 3, 7) [INDIVIDUAL WORK]

Find a section of styled html from your project and its related css (just the selectors that are applicable).

1. *Describe* the styles that have been applied to the html elements in the snippet and how they affect the display of the elements.
2. Include the HTML, CSS and Screenshot of the rendered output for the section of styled html in your POE.

(10)

**Answer:**i)

ii) The snippets and a screenshot are included in the blocks below.

HTML:

CSS:

SCREENSHOT:  
*(tip: use “win key” + shift + s to capture the specific section of the screen and then paste it here)*

### Task 4 (US 115368: SO 2, AC 3, 4) [INDIVIDUAL WORK]

With reference to the computer program that you have created, please answer the following:

1. *Describe* the underlying technologies that link databases and web sites.
2. *Describe* known methods of linking web pages to back-end proprietary applications.

(10)

**Answer:**i)

ii)

## Activity 4 – Testing

Using the computer program that you have developed, you are required to test the computer program.

### Task 1 (US 115392: SO 4, AC 1, 2) [GROUP WORK]

Develop and attach a testing strategy. (6)

(Tip: Follow the guidelines in the US 115392 learner manual for developing your testing strategy.  
Take note of the difference between the test strategy and the test plan, which you will develop next)

### Task 2 (US 115384: SO 1, AC 1, 2, 3, 4) [INDIVIDUAL WORK]

In accordance with your test strategy:

1. Develop and attach a testing plan

* Include your test case specifications
* Include methods of Black Box and White Box Testing

1. Test the application, following the the operational steps identified in the test plan.
2. The testing must use input data as specified in the test plan.
3. The testing outlines the deviations from the test plan with explanations.
4. The testing must follow industry standard operating procedures.
5. Record the testing results as you perform the testing (these will be used for Task 3)

**Note:** Attach your test plan and test case specifications in your POE (20)

### Task 3 (US 115384: SO 2, AC 1, 2, 3, 4) (US 115392: SO 4, AC 3) [INDIVIDUAL WORK]

You are required to record the results of the tests that you conducted in Task 2 above.

1. Attach the test log from your testing of the application
2. Create and attach a test report summarizing the results
3. Create and attach test incident reports for any test failures.
4. Ensure that the records:

* Are provided for all tests executed and that variations from expected test results are given.
* Results are recorded in a manner that they can be reproduced and reviewed

**Note:** Attach your test log, test report, and test incident reports in your POE. (15)

### Task 4 (US 115384: SO 3, AC 1, 2) [INDIVIDUAL WORK]

You are now required to review the testing process against acceptable standards in the organization or industry.

1. Review the testing process and suggest areas of improvements. (10)
2. Explain whether the testing process follows standard procedures and policy. (8)

**Answer:**

i)

ii)

## Activity 5 – Implementation / Installation

You are required to prepare to implement the program in order to meet the needs of the business.

### Task 1 (US 115392: SO 5, AC 1) [INDIVIDUAL WORK]

Explain how you shall check that the implementation complies with user expectations. (6)

**Answer:**

### Task 2 (US 115392: SO 5, AC 2) [INDIVIDUAL WORK]

Develop a training plan for the small business owner and the users of the system. (8)

**Answer:**

### Task 3 (US 115392: SO 5, AC 3) [INDIVIDUAL WORK]

Develop a plan for the installation process of the program. (5)

**Answer:**

## Activity 6 - Documentation

### Task 1 (US 115392: SO 6, AC 1, 2, 3, 4) (US 115388: SO 2, AC 1, 2, 3) [GROUP WORK]

Using the computer program that you have developed, you are required to design, create and attach the following program documents in your POE.

* User Manual
* System Architecture Document
* System Maintenance Guide
* Technical Manual  
  The Technical Manual should include: Program purpose, programming standards, design approach, any other information that would be relevant to a programmer working on the program

Take note of the following when creating the documents;

* The documentation is created according to industry standard design.
* The documentation created is structured sensibly, defining how program specifications have been met.

(20)

### Task 2 (US 115388: SO 3, AC 1, AC 2) [INDIVIDUAL WORK]

You are required to review the program documentation that you have developed in question 1.

1. Review the document design and justify the style, structure, content and format used. (6)
2. Explain whether the documentation created was consistent with the computer program being documented. (6)

|  |  |
| --- | --- |
| **STUDENT NAME:** ……………………………………….  **COMPANY:** …………………………………..  **ID:** …………………………………………….. | **EVALUATION CHECKLIST**  DATE: …………………..  TIME: ………………….. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EVALUATION CRITERIONS** | | **Met Requirements** | **Did Not Meet Requirements** | **COMMENTS OR ACTION REQUIRED** | |
| **ACTIVITY 3 (Task 1) - US 115392: SO 3, AC 1, 2, 3** | | | | | |
| The computer program includes coding from design documents. | |  |  |  | |
| Names created in the program must describe the purpose of the items named. | |  |  |  | |
| The creation includes conformance with design documentation. | |  |  |  | |
| **ACTIVITY 3 (Task 1 & 2) - US 115365: SO 3, AC 1, 2** | | | | | |
| The creation ensures that the function format corresponds to the design. | |  |  |  | |
| The creation ensures that the function behaviour corresponds to the design. | |  |  |  | |
| **AUTHENTICITY** | |  |  |  | |
| The learner was able to identify, explain and answer questions regarding a section of code that they contributed to the project. | |  |  |  | |
| **GENERAL COMMENTS:** | | | | | |
|  | | | | | |
| Date…………………….. | Time started……………….. | | | | Time completed………………. |
| **FACILITATOR / SUPERVISOR NAME**  **………………………………** | **FACILITATOR / SUPERVISOR SIGNATURE**  **…………………………………….** | | | | **ASSESSOR ENDORSEMENT**  **(SIGNATURE)**  **………………………………….** |

**(5 marks per evaluation criterion) TOTAL MARK 30**