**HND Assignment Brief (RQF)**

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| **Qualification** | BTEC Level 5 HND Diploma in Computing | | |
| **Unit No. and Title** | Unit 20 - Advanced Programming | | |
| **Assignment No./ Title** | Assignment 2 - Implementing and evaluating design patterns | | |
| **Learning Aim(s)** | LO3, LO4 | | |
| **Assessor** | Vernon Righelato | | |
| **Issue Date** | 21/04/2020 | **Submission Date** | 19/05/2020 |

**Plagiarism**

Plagiarism is a particular form of cheating. Plagiarism must be avoided at all costs and students who break the rules, however innocently, may be penalised. It is your responsibility to ensure that you understand correct referencing practices. As a university level student, you are expected to use appropriate references throughout and keep carefully detailed notes of all your sources of materials for material you have used in your work, including any material downloaded from the Internet. Please consult the relevant unit lecturer or your course tutor if you need any further advice.

**Student Declaration**

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| **Student declaration**  I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.  Student signature: Aaron Date: 1/05/2020 |

**Learning Outcomes and Assessment Criteria**

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|  | Grading Criteria | Met | Grading Criteria | Met | Grading Criteria | Met |
| **LO3** | P3 |  | M3 |  | D3 |  |
| **LO4** | P4 |  | M4 |  | D4 |  |

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| **Assessor Feedback:**  \*Please note that constructive and useful feedback should allow students to understand:   1. Strengths of performance 2. Limitations of performance 3. Any improvements needed in future assessments   Feedback should be against the learning outcomes and assessment criteria to help students understand how these inform the process of judging the overall grade.  Feedback should give full guidance to the students on how they have met the learning outcomes and assessment criteria. | | | | |
| **Grade:** | **Assessor Signature:** | | | **Date:** |
| **Resubmission Feedback:** | | | | |
| **Grade:** | **Assessor Signature:** | | **Date:** | |

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| **Submission Format** | |
| Task 1/2:   * A Visual studio project with all necessary files contained in a .zip archive   Task 3/4:   * A word processed document in google doc format | |
| **Unit Learning Outcomes** | |
| **LO3**  Implement code applying design patterns  **LO4**  Investigate scenarios with respect to design patterns | |
| **Assignment Brief and Guidance** | |
| You have recently joined a software development company in a junior position and your first project was to help improve the documentation of their in-house software libraries following the resignation of a previous employee.  As a result of the weak documentation it has been very difficult for the company to utilise their code in multiple projects and maintenance has been slow.  On your previous project you were tasked with documenting existing code due to some poor and missing documentation on existing projects.  The team also has a number of planned projects which were documented but never implemented due to staffing issues.  You have been asked to address this issue by implementing the outstanding projects and evaluating the use of object oriented design patterns within them. | |

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| **Task 1:**  The first unimplemented project is a contract with a local car rental company called CRC who have requested a mock up for an application which will act as their in house sales system.  The mock up you will be working on will be a command line application to begin with and simply needs to simulate the process of recording a rental of multiple vehicles. The rental agreement will need to accommodate multiple customer names (so the system will need to be able to add a number of customers on a single rental agreement).  The program you are writing will need to achieve the following:   1. Allow the user to add new customer information for multiple customers on a rental agreement. 2. Allow the user to add multiple vehicles to the rental agreement. 3. Allow the user to print out the full rental agreement containing all customers details on the agreement and all information about the vehicles they have rented.   The program should approximate the menu designs and operation outlined in [appendix A](https://drive.google.com/file/d/1dvVmCb7pGVVK8dGUQ2qECUqRmkJrfZGP/view?usp=sharing) and closely follow the design specified in the UML diagram in [appendix B](https://drive.google.com/file/d/1ZW0lhwPVfcgKaFIveADruWjE-N32Q0ar/view?usp=sharing). |

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| **Task 2:**   1. The client at CRC has requested you add a feature to the mock up which will allow them to tag all registered customers on the system with an appropriate message when recalls are made on their vehicles. Using the UML diagram provided in [appendix C](https://drive.google.com/file/d/1L4WawSKBJyTQ2Zo2MB12X9_Vnxfb9-Ai/view?usp=sharing) modify your program to simulate this using an implementation of the observer pattern. |

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| **Task 3:**   1. Write an evaluation of the use of the observer pattern for the purpose used in task 2 above. Your evaluation should include comparisons with any other design patterns you can identify as useful in the implementation of the project in task 2. |

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| **Task 4: (A1)**   1. Write a short document which identifies a suitable design pattern for the scenarios below. In each case you will need to provide justifications (with sources) for why the pattern you have chosen is most appropriate for the given scenario. Critically evaluate the sources you have found regarding the design patterns and their uses.   **Scenario 1:**  Your company has previously developed a mobile application for a transport company. The application provides the ability to purchase tickets but currently only gives static train information. You have been asked to recommend a suitable approach to implement an information system which will provide updates for all users of the app as they are made.  **Scenario 2:**  Your software development company has taken on the conversion of a popular bullet hell shooter video game from the 1998 [The Touhou Project 4: Lotus Land Story](https://www.youtube.com/watch?v=A4gETEv9o2s) . The original title designed for the PC98 is to be converted to the Android platform and will be required to run on low end systems. You have been asked to suggest suitable approaches to implement the enemy and bullet creation and efficiency.  **Scenario 3:**  Your software development company has been contracted by a large printer development company to develop the print spooler software. You have been asked to recommend a suitable approach to implement the software for use on networks. |

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| **Learning Outcomes and Assessment Criteria** | | | |
| **Learning Outcome** | **Pass** | **Merit** | **Distinction** |
| **LO3**  **Implement code applying design patterns** | P3  Build an application derived from UML class diagrams. | M3  Develop code that implements a design pattern for a given purpose. | D3  Evaluate the use of design patterns for the given purpose specified in M3. |
| **LO4**  **Investigate scenarios with respect to design patterns** | P4  Discuss a range of design patterns with relevant examples of creational, structural and behavioural pattern types. | M4  Reconcile the most appropriate design pattern from a range with a series of given scenarios. | D4  Critically evaluate a range of design patterns against the range of given scenarios with justification of your choices. |