**HSC SDD - Assessment Task 1**

**QUESTION SHEET**

# QUESTION 1 (45 marks) MARKS

out of 45

**The Scenario**

St Shaby’s, a primary school located on the sunny Central Coast, currently has a system like most schools where students pay at the library (fines and photocopying), canteen, clothing store, excursions and so on with cash or cheque.

You have been employed to update their system using the latest technology so that students or their parents can preload a student card with money and use that to pay for items such as those described above.

**Note: Appropriate credit must be given to sources of information. Plagiarism is not acceptable and will result in loss of marks**

1. Cash based systems have multiple disadvantages as well as some advantages. Using this scenario, **describe** disadvantages and advantages of using a cash based system.

4 Marks

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| Disadvantages are…   * Cash based systems heavily rely on the cashier to be able to correctly sort money in a timely and orderly manner. Human error could cause a mess as the cashier has to sort through the money again. * Cash based systems have a finite amount of change that can be returned to the customer. If the cashier does not have enough money, a cheque must be written, taking up unnecessary time and effort. * Employees cannot always be trusted and may attempt to steal some money for themselves. When business statements expose this discrepancy, every employee becomes a suspect and ultimately trust is lost, possibly slowing down business. |
| Advantages are…   * Cash based systems allow for access to physical money in the here and now rather than over credit systems which charge the cardholder interest for payments. This not only benefits access from the business side, but customers may also be able to utilise the cash somewhere else where only cash accepted. * Where credit card systems can go down, cash will never, due to its physical nature. * Cash is on-site and will not be affected by any issues with a bank. |

1. St. Shaby’s have decided to migrate to a computer based payment method. The Principal needs to choose the hardware that would be appropriate in order to run the proposed software.   
     
   Select **appropriate hardware** devices that will be needed and **explain** why each item is necessary and suited to the school.

4 Marks

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| **Hardware Device** | **Justification** |
| Computer | In order for there to be a computer based payment system, a computer will have to handle the storing and processing of the data. The computer will also be the basis in which the software is run on. |
| Monitor | In order for the computer system to be used, a device to display visuals is required in order to interact with the system. |
| Mouse/Pointer device | A pointer device such as a mouse is required to physically interact with buttons and hyperlinks on the system. A keyboard-only based system would be a step backwards and would feel sluggish and could be frustrating to navigate. |
| Keyboard | A device that can input useful information such as a keyboard is required in order to make entries to the system. It would be impossible (or at the very least, frustratingly difficult) to enter details in any fields. |
| Mainframe (possibly) | If there is a large amount of data that needs to be stored at high speeds, the school may want to store their data on a mainframe which not only has more storage and is faster, but it’s also safer as data is stored off-site (usually). |
| Card reader | In order for cards to actually be used, the school would need to install card readers that can interact with the cards and make transactions. |

**(Number of rows is not indicative of the number required - complete as required or add extra rows for additional hardware devices by clicking "TAB" key from the last field on bottom right, or Right-Click>Insert Row Below)**

1. Regardless of your recommendation, St. Shaby’s decides to use a system very similar to the Opal Card System used on the Sydney Transport Network (STN).

The principal asks you to reverse engineer the software that runs this system and adapt it to St. Shaby’s particular needs.

**Explain** what reverse engineering of software entails and **discuss** the legal ramifications of using this approach.

4 Marks

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| Reverse Engineering entails….  As the name suggests, reverse engineering is the taking of a piece of software and breaking it down into its source code. This source code can then be used as a foundation or a guide to building a new system. In this case, the Opal system would be reverse engineered so that the card reading technology, the sending and receiving of information and payments, etc. technology would be available already and would simply require some changes and then the rest of the system could be built around it. However, reverse engineering does result in some legal issues. |
| Legal Ramifications are …  As the source code used in the Opal system is not open source, the source code itself must be heavily modified beyond recognition in order to prevent any sort of legal ramifications. Failure to do so can result in some serious breaches of copyright. When a system like this is reverse engineered, it is expected that it is for nonprofit and/or educational purposes.  Companies are constantly looking for ways to get money, and taking copyright infringers to court is easy money to them. If the defendant is found to be in breach of copyright laws and any other acts protecting digital intellectual property, lots of money could be lost. |

1. After a warning letter from STN (who have eyes everywhere), the principal decides that it is best for you to create the software from **scratch**.

She wants it ready for start of Term 1, next school year, but doesn’t really know exactly how it should look.

**Describe** and **justify** which **method** of **software development** you are going to take that you assess to be the most suitable for this project.

Hint. You could use a table to compare your chosen method with others available, and explain why they are not appropriate.

5 Marks

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| The best software development method for this system is the agile approach. As the term is fast approaching, there’s little time to go for a structured approach. Right now the team needs to develop a working system that solves the problem, is implemented, and ready to go for use. Although the system may be basic in the early stages, at least it’ll be working in time. The system can easily be further improved over time as the main system is already in place. If there are any changes needed to be made during the development of the system as has already happened many times, the agile approach will allow for such changes to be made without redeveloping the system, which would cost quite a bit of money. Such ease is something the structured approach would not be able to handle and would require a complete restart of the project, wasting time and money. |

1. After you take your final proposal to the school, St Shaby’s decides to go with your application.

With regard to issues associated with the impact of software, **describe** how this software application will **impact** on the **school community**. Be specific about all the different stakeholders in school that may be affected.

5 Marks

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| The project will require lots of teamwork and likely a large number of people working on the system at once. Systems engineers may have to frequent the school in order to install new technology as the development continues. Some students may be, understandably, uncomfortable with strangers roaming the school grounds.  As the project is being fast tracked through the agile development approach, money will have to be invested at an increased rate. Although this money is more likely to result in a functional and more change-flexible system than one created with the structured approach, financial managers may be concerned about investing large sums of money quickly into a product that has had less planning than one that would be created through the structured approach, which would have money trickled into it over its development life cycle (even though all of that money could be lost if change is needed!).  The IT department would have to be ready to constantly update their systems to keep up with the development of the new system. This could require some extra training and the IT department would have to be able to integrate the new system.  Parents may not trust the new system as it is in an early stage of development. They may fear that any money added to the student cards would be lost in the event of any system failure which could be common in this scenario. This could result in the development team being unsure of what to change if there is no feedback being provided as the system isn’t even being used.  There may be worry about the security of the new system. New systems such as this may not have the expected amount of security due to its early stages of development. This may throw some people off and will result in the system being underused. |

1. After meeting with the Principal to show your progress, she mentions that the data that the system will use will need to be **stored ‘in the clouds’.**  
   Discuss what additional **concerns** storing the data in this way will have upon you, **as** the **developer**.

2 Marks

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| In order for a cloud-based storage to be trusted, it would need to be secure. If there was ever a breach, the developer would be blamed and further action could be taken. During a breach, personal information including credit card information could be stolen and used with malicious intent.  Storing data off-site would require a trustworthy storage facility with a good reputation and a good record for security. An untrustworthy facility could steal information or information could simply be lost due to ignorance, faulty hardware, bad management, etc.  Data transmission must be quick and secure. A system like this will be real-time and require a low-latency connection. Data must also not be able to be intercepted before it reaches its destination. Good encryption should suffice. |

1. As you are not particularly strong in Cloud-Based programming, this latest adaptation by the principal has thrown you into panic mode as you are no longer sure you can deliver what is required.   
     
   **Describe** what you are going to do given this latest turn of events, remembering that the client is ‘always right.’

3 Marks

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| As the client wants a cloud-based system, they will get a cloud-based system. This would require the hiring of an engineer who specialises in cloud-based programming. There will need to be teamwork and communication in order to efficiently create and output a system that is capable of all of the functionalities that the client desires. Outsourcing will require more money. The financial managers would need to approve such a payment, but they will need to if the principal wants their system up and running when they want it to be. |

1. What **licensing arrangements** are you going to set up with the school for the software that you have created.

2 Marks

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| The system is not for redistribution or for resale. The system should not be reverse engineered by any third party without knowledge as the system is unique. |

1. Due to the nature of the software you have created, other schools become interested in your program.   
   **Describe** the **advertising** methodology that you would use to make other schools aware of your product.

2 Marks

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| One of the best ways to advertise the new system is on the front page of the school website. It would detail all of the fancy new things that the system brings with it and the developer(s) behind the system. This would provide exposure and allow for the other schools to make direct contact with the development team.  Schools are constantly mentioned in the newspaper. This would be a great place for an article about the new system. It would grasp the attention of people as it is something rarely seen. |

1. The principal wants you to address the P and F association to describe the new system and what procedures need to be followed, with particular emphasis of the advantages of the system.

**Create a Presentation which you could use to address the P and F.**

**(Consider Target Audience and Objective of Presentation to decide level of content and choice of words)**

4 Marks

***Embed a link to your online presentation here (e.g Google Slides - ensure you share your document to allow "anyone with link" to VIEW …***

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1. **Describe** and **justify** the **method** of **implementation** that you are going to use in the installation of the new system. You could use a comparison / contrast table.

2 Marks

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| As the old system cannot be scrapped while the new one is being developed and installed, the parallel method of implementation is suggested. The old system can live alongside the current system until the new system is able to take over completely. The new system running alongside the old system will give customers the chance to test out the new system while still being able to use the old system if they really want to. |

1. **Construct** a data entry screen that you envisage would be used by canteen staff or librarians when using the system you create.

* Allow transaction to be complete on ONE screen
* Limit data entry input error AND
* Follow good design principles
* Describe and justify the screen being included , and
* ANNOTATE the drawing to identify the key features/design principles followed

**(Hint: Use a online drawing tool, such as Draw.IO or Pencil Perfect etc to create a drawing or hand-draw and scan image, then export as a image file and embed below on a new page  
Make sure it is easily visible)**

4 Marks

What is this screen? and what is it doing?

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| The screen provides an area to sign into the student’s school account. From there a payment area will appear where the parent can provide their card details to top-up the student’s card. There is also the ability to make transactions in advance to make life easier. |

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| **Screen Design:** |

1. Thinking ahead, identify/plan additional program features which you would consider most appropriate for this system, which you could implement in the next version of the system.

4 Marks

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| Version 2.0 could include….  A digital version of the school card available alongside the physical card. As most students have a mobile device with NFC functionality, they would not have to carry an extra card around. They could simply tap their phone once they’ve added the card to their digital wallet and pay that way.  If comfortable, students could provide a biometric imprint of sort, perhaps a fingerprint. Instead of using any sort of card system, the student could be identified with a read of their fingerprint. This system would live alongside the card system as some students may not be comfortable with this.  An automatic top-up system for the student would eliminate the need for constant recharges to the card online. |

Bibliography:

Wikibooks. (2019). Retrieved from: <https://en.wikibooks.org/wiki/Reverse_Engineering/Legal_Aspects>