# Digital Solutions 2019 v1.2

## Unit 2 assessment instrument

### Project - digital solution

#### Unit objectives

This assessment instrument is used to determine student achievement of the following Unit objectives:

1. recognise and describe programming elements, data and useability principles, and data management processes

2. symbolise and explain information, ideas and data flow relationships within and between systems related to programming problems

3. analyse problems and information related to the selected technology context

4. determine solution requirements and prescribed and self-determined criteria of a programming problem

5. synthesise information and ideas to determine possible digital solutions

6. generate user interface and programmed components of the prototype digital solution

7. evaluate impacts, components and solutions against criteria to make refinements and justified recommendations

8. make decisions about and use mode-appropriate features, language and conventions for particular purposes and contexts.

*The assessment objectives used in the ISMG below have been contextualised to reflect these unit objectives.*

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| **Subject** | Digital Solutions | | |
| **Technique** | Project – digital solution | | |
| **Unit** | Unit 2: Application and data solutions | | |
| **Topics** | Topic 1: Data-driven problems and solution requirements  Topic 2: Data and programming techniques  Topic 3: Prototype data solutions | | |
| **Conditions** | | | |
| **Duration** | Up to 8 weeks | | |
| **Mode** | Multimodal | **Length** | * 8-10 A3 pages * 2-4 minute demonstration of the functionality of the user interface and coded components of the digital solution by video recording * 4-6 A4 pages of code with annotations |
| **Individual / group** | Individual | **Other** | * The reference list is not included in the page count. * Schools implement authentication strategies that reflect QCAA guidelines. |
| **Resources available** | * Computers * Internet * Stimulus (technical proposal) | | |
| **Context** | | | |
| Web-based information systems deliver real-time data services for concurrent users irrespective of device or location. Given the proliferation of these services, consideration must be given to issues such as device and data independence, as well as ensuring the security, integrity and ethical use of data, and enabling a high speed, efficient, accurate and cost-effective service.  You are required to build a proof of concept information system, accessible via a web interface, that will manage a hierarchy of tasks for the client described in the stimulus. | | | |
| **Task** | | | |
| You must document the problem-solving process used to develop and generate the user interface, data storage and transaction requirements, as well as the programmed components of a prototype for a new information system web application. The new application must address the requirements of the scenario in the stimulus provided. Demonstrate the functionality of the components of the prototype information system web application in a video recording. | | | |
| **To complete this task, you must:** | | | |
| * **recognise and describe**   + programmed and user-interface components   + useability principles, including accessibility, effectiveness, safety, utility and learnability * **symbolise**   + the user and developer problem using mind maps and one or more of constructed sketches, annotated diagrams, images or screenshots   + algorithms communicated in pseudocode that demonstrate knowledge and understanding of programming features   + interrelationships between user experiences and data in the prototype web application * **explain**   + internal and external data components and data structures using appropriate symbols, code, data samples and screenshots from the prototype web application with annotations   + the prototype web application from a user-experience perspective communicated by way of a collection of annotated images of the user-interface components   + how programming elements and user-interface components connect, communicated in an annotated diagram   + the functionality, useability and efficiency of the coded components communicated through code comments and annotations on the 4–6 A4 pages * **analyse** the prototype web application problem and information to **identify**   + data inputs   + data and programmed components and their relationships to the structure of the prototype web application   + the prototype web application’s potential personal, social and economic impacts * **determine**   + solution requirements that include     - essential elements and features of the user interface based on useability principles     - data structures and linkage to interface and code   + prescribed and self-determined criteria * **synthesise** ideas and information about solutions for   + user interfaces   + data and programmed components of the prototype web application, e.g. annotated diagrams identifying and describing proposed components of the prototype web application   + data repositories   + programming to generate a prototype web application * **generate**   + sample code for the digital prototype on the 4–6 A4 pages, demonstrating     - selection     - iteration     - user input     - data output   + a prototype web application by combining the user interface, data and coded components * **evaluate** against criteria   + personal, social and economic impacts supported by a collection of data samples or representations   + accuracy and efficiency of the coded components supported by a collection of annotated code segments in tables, diagrams and written paragraphs identifying errors and actions to make refinements   + the prototype web application from a user-experience perspective supported by a collection of annotated images of the user-interface components * **make** refinements and justified recommendations for current and future improvements. | | | |
| **Stimulus** | | | |
| See Stimulus material at end of document | | | |
| **Checkpoints** | | | |
| □ Term 3 Week 5: Submit exploration of solutions, identification of algorithms, user interface sketches and data flow diagram | | | |
| □ Term 3 Week 8: Complete draft submission | | | |
| □ Term 3 Week 10: Final submission | | | |

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| **Criterion** | **Marks allocated** | **Result** |
| **Retrieving and comprehending**  Assessment objectives 1, 2 | 8 |  |
| **Analysing**  Assessment objectives 3, 4 | 8 |  |
| **Synthesising and evaluating**  Assessment objectives 5, 6, 7 | 10 |  |
| **Communicating**  Assessment objective 8 | 4 |  |
| **Total** | 30 |  |
| **Authentication strategies** | | |
| * Students will provide documentation of their progress at indicated checkpoints. | | |
| * Students must acknowledge all sources. | | |
| * Students must submit a declaration of authenticity. | | |
| * The teacher will collect copies of the student response and monitor at key junctures. | | |
| * The teacher will conduct interviews or consultations with each student as they develop the response. | | |
| **Scaffolding** | | |
| Your response must include:   * A3 pages that   + demonstrate all phases of the problem-solving process   + communicate knowledge and understanding by way of annotated sketches, diagrams, images or screenshots * a video   + in mp4 file format   + no larger than 200 MB   + demonstrating the functionality of the user interface, data and coded components of the prototype digital solution * A4 pages of code with annotations explaining analysis, synthesis and evaluation decisions related to the code element or problem * referencing of sources following the school’s referencing style * written and visual features, as well as grammatically accurate language conventions, to communicate your decision-making * headings that organise and communicate the iterative phases of the problem-solving process in Digital Solutions. | | |

# Stimulus

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| --- | --- |
| **Identification** | |
| **Your role** | For this project, you assume the simulated roles of an information systems analyst, designer and developer (including UX designer and developer). |
| **Client** | Local Freight Services (LFS) |
| **Solution required** | A *prototype* of an information system to manage LFS operations as described below, with accessible web-based front and back end conforming to strict usability standards. |
| **Local Freight Services Operations** | LFS provide a local delivery service. They have one large warehouse where they operate their entire delivery service from, which is located on the main street of town. Customers bring their articles of postage to the LFS customer service outlet at the front of the warehouse, where a customer service attendant receives the article and tenders the delivery fee. Within 24 hours the article is processed and dispatched by the Delivery Dispatch Manager to a Courier for delivery.  LFS are hoping their new web-based system, powered by a back-end relational information system, will enable:   * customers to track their deliveries in real-time * deliveries to be prioritised and run more efficiently (meaning shorter delivery times from acceptance to completion) * the process in-between acceptance and delivery will be more streamlined and (hopefully) mistakes will be decreased by LFS employees * the system will be accessible by all, as well as being quicker to perform business operations (such as calculating delivery costs) |
| **Assumptions** | For this project, you can assume that the regions NORTH, WEST, EAST and SOUTH are decided and assigned by trained LFS counter service attendants to requested delivery articles. You are not required to code the decision making behind what addresses lay within NORTH, WEST, EAST and SOUTH. |
| **Business Needs** | * Meet the needs of their user base * Enforce their business logic * Ensure data integrity * Perform due diligence by meeting considered social and ethical expectations in all its practises, such as ensuring safety of its employees by multiple checks of the dangerous goods disclaimer |
| **Potential *interactions* with the web-based information system** | |  |  | | --- | --- | |  | **Where**: LFS local outlet – customer service reception  **Who**: LFS counter service attendants  **Tasks**:   * Calculate and accept payment for postage * Accept goods and check dangerous goods disclaimer signed * Tag articles as either NORTH, EAST, WEST or SOUTH based on their destination address | |  | **Where**: remote customer access (online)  **Who**: customer  **Tasks:**   * Check status of her unique delivery, including other relevant details (such as description, weight or cost) * *Optional: see location of delivery (live) via a map service provider* | |  | **Where**: LFS local outlet – warehouse storage and dispatch  **Who**: Delivery Dispatch Manager  **Tasks:**   * Check the dangerous goods disclaimer is signed before assigning to delivery courier, and if it isn’t, notify customer to attend for required signature before processing * Creates delivery lists according to delivery region –NORTH, EAST, WEST or SOUTH * Prioritizes and dispatches regional lists of articles to courier drivers, and marks associated deliveries as DELIVERING | |  | **Where**: on the road during a live delivery  **Who:** Courier  **Tasks**:   * Look up exact destination address of delivery * Mark a delivery as COMPLETED when delivery has been completed | |
| **Specifications** | |
| **Data** | Article data:   * Sender and receiver names and addresses * Description of contents * Weight (KG rounded to 1 decimal place e.g. 5.7KG) * Dangerous goods declaration signed? Y / N * Article tagged upon reception with either NORTH, SOUTH, EAST or WEST depending on its destination   Delivery data:   * Who is delivering the article (i.e. the courier’s name) * Dates and times for:   + Initial acceptance of article at processing outlet   + Completion of service (i.e. successful delivery of article) * Current status: REQUESTED, DELIVERING, COMPLETED   + REQUESTED: accepted a non-dangerous article at an outlet   + DELIVERING: the article has been picked up by a courier, and is on the way to its destination (live in-transit)   + COMPLETED: the article has reached its destination and the service has been marked as complete and finished * *Optional: current location of article (live GPS co-ordinates)*   Courier data:   * Contact name of delivery driver * Contact data (such as mobile phones or emails) to reach driver |
| **Code** | An algorithm adapted and modified from the algorithm below to perform the following business logic:  For the Customer:  Calculate total cost based on:   |  |  | | --- | --- | | **Article size** | **Price per kilogram** | | <= 9.9 KG | 50c | | 10.0 KG to 24.9 KG | $1.00 | | 25.0 KG to 49.9 KG | $2.00 |  * Any article 50.0 KG or over will not accepted * Any article without dangerous goods declaration signed will not be delivered   For the Delivery Dispatch Manager:  *Task A: organise delivery lists*  For all articles with REQUESTED delivery status AND dangerous goods declaration is signed:  For all articles that have an initial acceptance date time within past 24 hours:  Create 4 delivery lists of NORTH, SOUTH, EAST and WEST articles  For all articles missing dangerous goods declaration:  Notify customer of missing dangerous goods signature to attend outlet for required signature  Reassign a new initial acceptance date / time stamp upon signing of declaration  *Task B: assign deliveries to couriers*  Work out the size of the 4 delivery lists (NORTH, SOUTH, EAST and WEST), with the size being the number of items in each list  Send out the longest list FIRST (as it will take the longest to deliver) and mark those items as DELIVERING  Work through each of the remaining lists in order of decreasing size. |
| **Interface** | * Responsive template provided (**lfs.zip**) – this is a skeletal responsive framework, with CSS styling for common HTML elements. The actual UX design for this application is left as a job for the developer. * Modifications to the template are welcome provided:   + Intuitiveness (e.g. breadcrumb navigation) and accessibility (e.g. tooltips, alt text, contrasting colours) are guiding principles.   + Modifications conform to the W3 standards. A good benchmarking tool for this is the Queensland Government Consistent User Experience Standard, available here: <https://www.forgov.qld.gov.au/cue> |

# Instrument-specific marking guide

Criterion: Retrieving and comprehending

### Assessment objectives

1. recognise and describe programming elements, data and useability principles, and data management processes

2. symbolise and explain information, ideas and data flow relationships within and between systems related to programming problems

|  |  |
| --- | --- |
| **The student work has the following characteristics:** | **Marks** |
| * accurate and discriminating recognition and discerning description of relevant programming elements, data and useability principles, and data management processes * adept symbolisation and discerning explanation of information, ideas, and data flow relationships within and between systems related to programming problems | 7-8 |
| * accurate recognition and effective description of relevant programming elements, data and useability principles, and data management processes * methodical symbolisation and effective explanation of information, ideas, and data flow relationships within and between systems related to programming problems | 5-6 |
| * appropriate recognition and description of some programming elements, data and useability principles, and data management processes * competent symbolisation and appropriate explanation of information, ideas, and data flow relationships within and between systems related to programming problems | 3-4 |
| * variable recognition and superficial description of programming elements, data and useability principles, and data management processes * variable symbolisation and superficial explanation of information, ideas, and data flow relationships within and between systems related to programming problems | 1-2 |
| * does not satisfy any of the descriptors above. | 0 |

Criterion: Analysing

### Assessment objectives

1. analyse problems and information related to the selected technology context

2. determine solution requirements and prescribed and self-determined criteria of a programming problem

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| **The student work has the following characteristics:** | **Marks** |
| * insightful analysis of the problem and relevant contextual information to identify the essential elements and features of user interface, data and programmed components and their relationships to the structure of the low-fidelity prototype digital solution * astute determination of the user interface, data, programmed and solution requirements of the digital solution and essential prescribed and self-determined criteria. | 7-8 |
| * considered analysis of the problem and relevant contextual information to identify the relevant elements and features of user interface, data and programmed components and their relationships to the structure of the low-fidelity prototype digital solution * logical determination of the user interface, data, programmed and solution requirements of the digital solution and effective prescribed and self-determined criteria. | 5-6 |
| * appropriate analysis of the problem and contextual information to identify some elements and features of user interface, data and programmed components and their relationships to the structure of the low-fidelity prototype digital solution * reasonable determination of the user interface, data, programmed and solution requirements of the digital solution and some prescribed and self-determined criteria. | 3-4 |
| * superficial analysis of the problem or partial information to identify aspects of elements or features of the low-fidelity prototype digital solution * vague determination of some solution requirements of the digital solution and some criteria. | 1-2 |
| * does not satisfy any of the descriptors above. | 0 |

Criterion: Synthesising and evaluating

### Assessment objectives

1. synthesise information and ideas to determine possible digital solutions

2. generate user interface and programmed components of the prototype digital solution

3. evaluate impacts, components and solutions against criteria to make refinements and justified recommendations

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| **The student work has the following characteristics:** | **Marks** |
| * coherent and logical synthesis of relevant information and ideas to determine data elements, user interface and programmed components for a digital solution * purposeful generation of efficient user interface and programmed components of the digital solution * critical evaluation of impacts, user experience and coded components and the digital solution against essential prescribed and self-determined criteria to make discerning refinements and astute recommendations justified by data. | 9-10 |
| * logical synthesis of relevant information and ideas to determine data elements, user interface and programmed components for a digital solution * effective generation of user interface and programmed components of the digital solution * reasoned evaluation of impacts, user experience and coded components and the digital solution against effective prescribed and self-determined criteria to make effective refinements and considered recommendations justified by data. | 7-8 |
| * simple synthesis of information and ideas to determine data elements, user interface and programmed components for a digital solution * adequate generation of user interface and programmed components of the digital solution * feasible evaluation of impacts, user experience and coded components and the digital solution against some prescribed and self-determined criteria to make adequate refinements and fundamental recommendations justified by data. | 5-6 |
| * rudimentary synthesis of partial information or ideas to determine data elements, user interface or programmed components * partial generation of user interface and programmed components of the digital solution * superficial evaluation of impacts, user experience components or the solution against some criteria. | 3-4 |
| * unclear combination of information, ideas or solution components * identification of a change to an idea or a solution. | 1-2 |
| * does not satisfy any of the descriptors above. | 0 |

Criterion: Communicating

### Assessment objectives

1. make decisions about and use mode-appropriate features, language and conventions for particular purposes and contexts

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| **The student work has the following characteristics:** | **Marks** |
| * discerning decision-making about, and fluent use of   + written and visual features to communicate about a solution   + language for a technical audience   + grammatically accurate language structures   + referencing and project conventions. | 3-4 |
| * variable decision-making about, and inconsistent use of   + written and visual features   + suitable language   + grammar and language structures   + referencing or project conventions. | 1-2 |
| * does not satisfy any of the descriptors above. | 0 |

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| **Marks** | **LOA** |
| **30** | **A+** |
| **29** |
| **28** | **A** |
| **27** |
| **26** | **A-** |
| **25** |
| **24** | **B+** |
| **23** |
| **22** | **B** |
| **21** |
| **20** | **B-** |
| **19** |
| **18** | **C+** |
| **17** |
| **16** | **C** |
| **15** |
| **14** | **C-** |
| **13** |

ISMG to LOA  
Note: Your grade will be awarded holistically. The “marks-to-grade” ratios shown below are a guide, and not to be taken as a determinant of final award:

|  |  |
| --- | --- |
| **Marks** | **LOA** |
| **12** | **D+** |
| **11** |
| **10** | **D** |
| **9** |
| **8** | **D-** |
| **7** |
| **6** | **E+** |
| **5** |
| **4** | **E** |
| **3** |
| **2** | **E-** |
| **1** |