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| `Assessment Title | Assignment – Online Enrolment System |

## Competency Details

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| Unit code/s and title/s | ICTSAD508 - Develop technical requirements for business solutions  ICTPRG536 Design application architecture |
| Qualification code/s and title/s | ICT50120 Diploma of Information Technology (Advanced Programming) |
| Business unit/Work group | Business and Arts/ IT Studies |

## Instructions

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| Method/s of assessment | Product – Assignment |
| Overview of assessment | This is a written and practical hands-on assessment that will require you to interpret a Requirements specification in the role of an analyst/designer and produce a set of UML models that will meet the required specifications and an updated Software Architecture Document to document your solution.  The Main Requirements has sections A-N, some of which must be completed individually and some in a team. The individual/team sections will be clearly labelled. |
| Task/s to be assessed | You will be assessed on the successful completion the requirements defined in Parts A-N as follows:  Part A – Stakeholder Identification/Communication Plan (Done in a Team)  Part B - Determine/Design the Business Model and Architecture (Done in a Team) Part C - Create the user experience model for above Use Cases (Done by Individual)Part D – Design and Implementation Mechanisms (Done by Individual)Section E– Identify Design Elements and interconnecting Components (Done by Individual)Part F –Model the use case realization (Done by Individual)Part G – Class Design (Done by Individual)Part H – Database Design (Done by Individual) Part I – Non-Functional Requirements (Done in a Team)  Part J – Deployment (Done in a Team)  Part K – Analyse and document the Impact of the new system (Done in a Team)  Part L – Work Breakdown Structure (WBS) (Done in a Team)  Part M – Verification/Validation and Signoff (Done by Individual)  Part N – Post Project Analysis (Done in a Team) |
| Time allowed | Refer to your schedule for submission dates |
| Location of assessment | Assessment can be completed anywhere with access to the resources required. (See Resources Required section below) |
| Decision making rules | To receive a satisfactory outcome for this assessment you must complete all parts according to the assessment specification |
| Assessment conditions | This assessment must be undertaken in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.  This is unsupervised assessment, and you may access any required resources.  This is not group work and must be completed as an individual |
| Resources required | To complete this assessment, you will require the following:   * Access to Learn with Internet access * Learn resources * Word processing software such as Microsoft Word. * StarUML version 3.0 or 5.0 * StarUML will be installed on the classroom Windows based machines in class. You can use a Mac if you prefer but these are not provided in the classrooms * Access to [IT Works Organizational Policies and Legislative Requirements](https://tafesaedu.sharepoint.com/:w:/s/TG-ITStudies-5WORK/Ec4myYEureZDkhPGmsnt9RsBbhMFUr-pgHgJBQlgLZWT7Q?e=Jx9jRo) |
| Result notification and reassessment information | You will be provided feedback and the result for your assignment on TAFESA Learn. You will be and given the chance to resubmit with required corrections only once.  Refer to the TAFE SA assessment policy for more information <https://www.tafesa.edu.au/apply-enrol/before-starting/student-policies/assessment> |

**ONLINE COURSE REGISTRATION SYSTEM**

**Main Requirements**

**IT Works** has hired you in the capacity of a Systems Analyst Designer to work in a team of other analyst that will be involved in the development of a UML Design Specification for their client TafeSA.

The application under consideration is an online web-based Course Enrolment Management system - based on a set of specification found in the Appendix below.

Some preliminary Requirements analysis work has been already done and the following analysis artefacts have been completed:

1. TafeSA Online Enrolment System - Requirements Specification
2. A Use Case Model/ Use Case Report
3. Glossary
4. Supplementary Specifications
5. Star UML Template

You can reference to the above documents in Project Documents folder

Your team lead has allocated to you the following Use Cases:

* *View Report card*
* *Select Courses to Teach*
* *Register for Courses*

For the above Use Cases, you are expected to analyse/review the Analysis stage artefacts documented in the provided Software Architecture document and produce the following UML models/documents as part of the business process model - detailed in the sections below. The models/documentation you produce form the basis for establishing and documenting the systems Technical Specifications and Architectural Requirements. Use the Star UML Template provided to create your models and the provided Software Architecture template to record your documentation.

All documentation produced must adhered to the Documentation Procedures and Standard define in section 2.2 of the [IT Works Organizational Policies and Legislative Requirements](https://tafesaedu.sharepoint.com/:w:/s/TG-ITStudies-5WORK/Ec4myYEureZDkhPGmsnt9RsBbhMFUr-pgHgJBQlgLZWT7Q?e=Jx9jRo)

**NOTE:** Please refer to the [IT Works Organizational Policies and Legislative Requirements](https://tafesaedu.sharepoint.com/:w:/s/TG-ITStudies-5WORK/Ec4myYEureZDkhPGmsnt9RsBbhMFUr-pgHgJBQlgLZWT7Q?e=Jx9jRo) document as a guide when identifying, formulating and applying the Organizational policies, standards and procedures during the Project development lifecycle.

On completion above one or more iterations of the Part(s) of the project you will meet with the project lead who will test/verify/validate your solution and provide you with feedback to complete the next iteration. On final completion of all parts the project lead will signoff confirming that requirements were met. The signoff will be included in the appropriate section of the Software Architecture document.  Meetings can be face-to-face or be facilitated using online video conferencing or any other digital medium/tools (See Part M)

**Deliverables**

**Part A – Stakeholder Identification/Communication Plan (Done in a Team)**

Identify and document a list of at least 4 stakeholders of the system and explain what industrial recommended communication strategies (Digital or otherwise) would be suitable to liase with them. Document this using the template provided in the Software Architecture Document.

*On completion of the above, the team lead will review your models to verify and validate them for correctness and its impact on the systems architectural requirements*

**Part B - Determine/Design the Business Model and Architecture (Done in a Team)**

The lead architect has called you into a meeting to discuss and determine the client’s business model from a list of potential alternatives before any concrete decision could be made on preliminary Architecture of the system.  The meeting will comprise of members of the team and the project as the major stakeholder.

During this meeting you will required to discuss the items below and document the outcomes as guided

Given the requirements specification and other ancillary documents you are required to:

1. document and describe the system Business Model and its impact on the choice of Architecture.
2. Explain the Object-Oriented Design/Programming principles have influenced the systems architecture, with emphasis on the MVC pattern
3. Document above in the Software Architecture Document (approx. 200 words), under the proper heading.

**Part C - Create the user experience model for above Use Cases (Done by Individual)**

Using the Use Case Flow of Events document that is found in the ASDA Assignment folder as a guide:

1. Model the participating screens and Forms.

For each screen identify:

* the dynamic content
* user supplied content and
* user actions

2.Model the screen flows

Close registration

3. Model a complete navigation map for identified Screens

*On completion of the above, the team lead will review your models to verify and validate them for correctness and its impact on the systems architectural requirements*

**Part D – Design and Implementation Mechanisms (Done by Individual)**

Make use of the Analysis Mechanism previously identified and the Supplementary Requirements that have been documented in the appropriate section of the software architecture document. Keep in mind the prevailing corporate strategies and Organization Procedures and Standards (2.1.5) regarding the reuse of existing Assets available internally and externally that may influence the selection of the Implementation mechanisms, and if so, explain how in the Justification column

1. Identify and document at least 2 examples for all of the required Design Mechanisms and Implementation Mechanisms in the provided Software Architecture document in the appropriate section
2. Given that there would be several changes to requirements during the development process, document the impact of these changes (in the Justification column) on the selected Implementation (a maximum of 50 words)

*On completion of the above, the team lead will review your models to verify and validate them for correctness*.

**Part E– Identify Design Elements (Layers, Subsystems, and Interfaces) and interconnecting System Components (Done by Individual)**

1. Identify and model the Business, Presentation and Common logical layers and layering considerations based on the Separation of Concerns (SoC) patterns and practices. The layers will be included in your UML model under the Design package. Include two other layers for Login and External Legacy components.
2. Identify and model the Design layers Enterprise System Components and their interfaces and methods
3. Identify and model the Design and Presentation layers Enterprise System Components and their attributes and methods (responsibilities) , based on best practices/patterns for developing Enterprise Applications
4. Identify and model the elements (including their attribute and methods) to be included in the Common layer. The elements should be reusable across both layers

*On completion of the above, the team lead will review your models to verify and validate them for correctness.*

**Part F –Model the use case realization (Done by Individual)**

1. Realize each use case using the Use Case Report (supplied as resources) as a guide to understanding each Use Case flow of events using the identified Design Classes. This will be modelled as a Sequence diagram for the Business and Presentation tiers (Basic Flow)
2. For each Use Case create a View OF Participating Classes (VOPC) to include the relevant classes required to realize each Use Case

*On completion of the above, the team lead will review your models to verify and validate them for correctness.*

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**Part G – Class Design (Done by Individual)**

Re-examine the classes/relationships you produced in your VOPC in section D – and add, delete and/or modify your classes to reflect the following considerations: Update the Design classes in your UML Model accordingly.

1. Identify if any of your classes require state management and add relevant attributes/methods/responsibilities.
2. Can you leverage the benefits of Generalization and other Design Patterns?
3. Determine any system-wide cross-cutting concerns and its impact on your Design classes

**NOTE:** *For example, logging, security and data transfer are the concerns which are needed in almost every module of an application, hence they are cross-cutting concerns*

1. Identify and model class interconnections through relationships

*On completion of the above, the team lead will review your Class models to verify and validate them for correctness.*

**Part H – Database Design (Done by Individual)**

1.   Map the Entity classes to tables in the database (ORM Mapping)

2.   Produce an ER model using the principles of Normalization (up to 3rd Normal

       Form) / Database Design

3. Document the above in the appropriate section of the Software Architecture document.

*On completion of the above, the team lead will review your models to verify and validate them for correctness.*

**Part I – Non-Functional Requirements (Done in a Team)**

Use the supplementary specifications (Non-functional Requirements) table in Section I the Software Architecture Document to document the systems Supplementary specifications. The decisions made here will impact on the architectural requirements of the system

1. Against each of these requirements, document how you have catered for them in your final design models using the Implementation column in the table
2. Where relevant, document how each specification will be measured and benchmarked. You can make reasonable assumptions about the benchmarks values, for example, under Performance you can assume that pages will have to load between 2-5 seconds.

*On completion of the above, the team lead will review your models to verify and validate them for correctness.*

**Part J – Deployment (Done in a Team)**

1. Document the Hardware, Software required to deploy test and run the application in both testing and production environments. Use the table in Section J of the System Architecture Document template provided.
2. Model the required Hardware components (client and required server) nodes (at least one node per component) that are required for this system, using the appropriate UML model in your Star UML Template

*On completion of the above, the team lead will review your models to verify and validate them for correctness.*

**Part K – Analyse and document the Impact changes re the new system (Done in a Team)**

The project manager has tasked you to document the impact the new system will have on the currently existing processes and will get a signoff form the key stakeholders identified earlier.

Meet with your project team to discuss the items listed below. Once the team has reached agreement, use the appropriate section in the Software Architecture Document to record the following, using the Use Case report as a guide:

1. What existing processes in the current system will be impacted by the new system (Identify at least five of them)
2. Identify and explain 3 reasons the new system will add value to the exiting business.
3. Identify any training gaps of relevant stakeholder and use this information to document the training needs of the system users/personnel to match the required skills to use the new system. Record this in the Software Architecture Document under the relevant section.

*On completion of the above, the team lead will review your models to verify and validate them for correctness.*

**Part L – Work Breakdown Structure (WBS) /Gantt Chart (Done in a Team)**

To complete the project, you will require additional resource roles such as system architects, analyst/designers, testers, database designers and documentation specialist. You can make your own assumptions as to the number of personnel , the cost of the resource and type of roles you will need. You must include at least 5 different types of roles..

The project manager has requested you submit Work Breakdown Structure (WBS) identifying your project resource personnel, costs, and usage timelines. When working out your estimated project costs, use the following cost measurements that will be included the costing of the project:

1. Actual Costs (AC)
2. Cost Performance Index (CPI)
3. Cost Variance (CV)

You are also required to produce a corresponding Gantt chart based on the WBS data. The WBS/Gantt Chart should be included in the relevant section (a-N) of the Software Architecture Document. The Gantt Chart will be used to drive and monitor the progress of the project and inform the project team of any changes that might be required around project priorities/demands. You can make your own assumptions about the task dependencies

*On completion of the above, the team lead will review your models to verify and validate them for correctness.*

**Part M – Verification/Validation and Signoff (performed individually)**

On completion above one or more iterations of the Part(s) of the project you will meet with the project lead who will test/verify/validate your solution and provide you with feedback to complete the next iteration. On final completion of all parts the project lead will signoff confirming that requirements were met. The signoff will be included in the appropriate section of the Software Architecture document.  Meetings can be face-to-face or be facilitated using online video conferencing or any other digital medium/tools

**Part N – Post Project Analysis (Done in a Team)**

At this point you have completed the Design models/documentation and the project manager has invited you to be part of a discussion about how future such projects could be better implemented by using a different software methodology approach.

In preparing for the discussion, you are required include your finding in section N of the SAD. Your discussion must include the following considerations:

1. A range of at least 3 software development methodologies being used for similar Projects in industry - A table format with the name of the methodology, a brief description, the advantages, and disadvantages would suffice.
2. What would have been the most suitable methodology for this type of application. Explain your choice by describing the software development life cycle in the context of the selected methodology.
3. A list of suggestions of how the Organizations current policies and procedures could be improved. Your suggestion focus on the technical (2 suggestions) and non-technical (2 suggestions) processes , procedures and standards.
4. Analyze the impact of any post project changes on the supply of hardware, software and skilled software engineering personnel and document how the organizations current business supply chain procedures and strategies could be improved to meet these challenges. This will usually take the form of a table as shown with the following columns:

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| --- | --- |
| Risk | Analysis/Improvements/Mitigation Strategies |

**Appendix**

**TafeSA – Online Enrolment System – Problem Statement**

TafeSA is looking at revamping its legacy Student Management System (SMS) and the first phase of the project is to target the Student Enrolment System which is a legacy desktop application developed around outdated technology.

They have requested the development of a new web based on-line student enrolment system to accommodate the growing number of students that enrol both as onshore and offshore through their overseas partner sites. Considerations will have to be made in the design and development of this application to accommodate for globalization, localization cultural specific information and worldwide distribution

The new system will allow students to register for courses and view report cards from personal computers attached to the campus LAN, or from a PC at home or any other PC system that has internet access. The system should also be able to accommodate students enrolling from its overseas partner sites.

Due to a decrease in State government funding, the institute cannot afford to replace the entire system at once. The college will keep the existing student management system (SMS), where all student information is maintained.

This database is a legacy Ingres relational database running on a Unix Server. The institute has invested in an open SQL interface that allows access to this database from Institutes servers. The legacy system performance is rather poor, so the new system must ensure that access to the data on the legacy system occurs in a timely manner. The new system will be able to access student information from the legacy database.

The Registrar's office will continue to maintain student and course information through another system.

Lecturers will be able to access the system to register their interest to teach courses, see their teaching schedules as well as record student grades.

At the beginning of each semester, students may request a course catalogue containing a list of course offerings for the semester. Information about each course, such as lecturer, cost, times, prerequisites, etc will be included to help students make informed decisions.

The new system will allow students to select a maximum of six course offerings for the coming semester. In addition, each student will indicate two alternative choices in case the student cannot be assigned to a primary selection.

Course offerings will have a maximum of twenty students and a minimum of ten students. A course offering with fewer than ten students will be cancelled.

For each semester, there is a period of time that students can change their schedule. Students must be able to access the system during this time to add or drop courses. Once the registration process is completed for a student, the registration system sends information to the billing system, so the student can be billed for the semester. If a course fills up during the actual registration process, the student must be notified of the change before submitting the schedule for processing.

At the end of the semester, the student will be able to access the system to view their electronic academic transcripts. Since student grades are sensitive information, the system must employ extra security measures to prevent unauthorized access.

Lecturers must be able to access the on-line system to register an interest of which courses they would like to teach for that semester, and should select at least six course offerings and two alternatives choices in case the lecturer cannot be allocated their first choice. They will also need to see which students signed up for their course offerings. In addition, the lecturer will be able to record the grades for the students in each class.

The registrar will finalize all lecturer teaching schedules after examining each lecturer’s course offering teaching preferences and be also responsible for creating those semesters course offerings.