University of Huddersfield
School of Computing and Engineering
Department of Informatics
Assignment Specification

Module Title	**Game Engine Architecture**
Code	**CIT2213**
Assignment Title	**Portfolio submission 2**
Weighting	**60%**
Module Tutor	**Dr. Minsi Chen**

Assignment aims

This assignment aims to give you an opportunity to demonstrate the following learning outcomes (see the module specification for further details)

- Learning outcome (1)
    - Explain approaches to the design and implementation of non-graphics game engines and game engine components using industry standard programming languages and tools
- Learning outcome (2)
    - Evaluate the use of industry standard game middleware for implementing the non-graphics aspect of computer games.
- Learning outcome (3)
    - Employ industry standard tools and techniques to design and implement non-graphics game engine components and tools, illustrated by a working game utilizing those components
- Learning outcome (4)
    - Produce clear documentation, and explain choices made between competing approaches to design and implementation of the non-graphics aspects of a game engine

Problem statement and Brief

A game development project is often a process beyond simply making a fun and enjoyable game. In many cases, the development of each game often pushes the boundary of various technologies. Programmers are often challenged to create novel mechanics and techniques within the constraints of existing tools and engines.

For this assignment, you are required to create a game/level demonstrating advanced programming techniques, practices and related topics. Your work is constrained by the following requirements:

- You are **NOT** allowed to use a commercially available game engine. Instead, you will be provided with an open-source rendering engine on top which you will build your own custom technology
- You are encouraged to use external libraries to support your development requirements, e.g. a physics engine
- Your solution should conform to a sound software engineering principle, e.g. extensibility, maintainability and efficiency

You must discuss and justify the choice of solution in the technical report. For the requirements of the technical report, please refer to the Deliverable and Submission Process section.

There is no stipulation on the type of game you can produce for this assignment. Although, your work should focus on demonstrating technical aspects of game production.
Some example areas include:
- Game AI
    - Intelligent path-planning in a dynamic game world
    - Squad behaviour
    - Strategy planning in games
- Game Physics
    - Environmental physics in game
    - Physics driven character controls
    - Destructible physical environment
- Game Content/Resource Management
    - Adaptive objective system
    - Procedurally generated content
- Networking and multiplayer systems

You should develop your game idea and discuss it with your tutor by the end of **Week 03** of the term.

Formative Checkpoints

There are two formative checkpoints where you will discuss the progress of your work with your tutor.
- **Checkpoint 1 - Week 3:** At this checkpoint, you should have developed your initial idea and work plan.
- **Checkpoint 2 - Week 7**: At this checkpoint, you should already have a concrete design and specification of your work. You should be familiar with the core of your chosen tools and how to apply them to your work.
- **Checkpoint 2 – Week 12**: At this checkpoint, your work ideally should be in a completed state, i.e. they should be fully functional but perhaps require more refinement.

Please note, you must still take part in this formative checkpoint even if you think you are behind your work. You will receive appropriate guidance from your tutor.

Deliverables and Submission Process:

The deadline for submitting your work is **23:59 Friday 03/05/2019**. You will submit the following TWO deliverables for this assignment:

- **Game**: A self-contained ZIP (no RAR, 7z, etc) file packaging your entire game project. **Please note, your submitted project must build and run on the machines in SJ05/04**. It is recommended that you check this on a regular basis.

- **Technical Report:** in PDF format, read on to see the requirements for the report

The ZIP file containing your game project must be named using the format "*STUDENTID_assignment2.zip*". Substitute *STUDENTID* with your own student number.

The Technical Report must be named using the format "STUDENTID_TechReport.pdf". The requirement for your technical report is as the followings:

- World limit: 1000 with the usual 10% plus/minus word count
- Your report should at least contain the following sections:
  - *Introduction*: Provide background information of your project to the readers including a brief rationale on the importance of your chosen technical focus

  - *Methods*: Discuss and explain the techniques including programming, the choice of tools and algorithms used to realise your project

  - *Results and Evaluation:* Present the evidence of your work and provide a meaningful evaluation in both qualitative and quantitative manners

  - *Discussions:* Objectively discuss the strengths and weaknesses of your work

  - *Future Work:* Proposed any future work you want to carry out to further develop your project

- This is a technical report so the style of writing should appropriately formal and academic.
- Facts, statements and claims must be appropriately attributed by using references and timely citations. You are free to choose a citation style as long as one is consistently applied across the report.

Instructions for handing your work in are available on Brightspace

Level of Collaboration

This is an individual assignment, collaboration is NOT permitted

Assessment criteria
This assignment is worth 60% of the total for this year.

Marking Grid

Explain approaches to the design and implementation of non-graphics game engines and game engine components using industry standard programming languages and tools (10 marks)	Evaluate the use of industry standard game middleware for implementing the non-graphics aspects of computer games. (20 marks)	Employ industry standard tools and techniques to design and implement non-graphics game engine components and tools, illustrated by a working game utilizing those components (20 marks)	Produce clear documentation, and explain choices made between competing approaches to design and implementation of the non-graphics aspects of a game engine (10 marks)	Mark band
Excellent explanations, no weaknesses. Significant, very original thinking on the topic.	In addition to the criteria for "89 - 80": Puts forward a convincing original argument to support reasons for final conclusions.	Effectively extends industry standard game engine using standard techniques and with extensive innovative use of appropriate advanced techniques	In addition to the criteria for "89 - 80": Puts forward a convincing original argument to support some choices	**100 – 90**
Excellent explanations, no weaknesses. Some original thinking on the topic.	In addition to the criteria for "79 - 70": Critically reviews all relevant sources/available data to deal effectively with contradictory information when evaluating the options.	Effectively extends industry standard game engine using standard techniques and with some innovative use of appropriate advanced techniques	In addition to the criteria for "79 - 70": Critically reviews relevant sources to when evaluating the options and justifying all choices	**89 – 80**
Excellent explanations, no significant weaknesses.	Uses relevant sources/available data to evaluate the specified technology. Investigates reliability, validity and significance, and demonstrates an ability to investigate contradictory information, identifying reasons	Effectively extends industry standard tools using standard techniques, and appropriate advanced techniques	Documentation is imaginatively presented resulting in clarity of message and information	**79 – 70**

	for contradictions. Clear criteria are applied to demonstrate reasons for final conclusions			
Good explanations Weaknesses in one area compensated by good understanding elsewhere	Uses relevant sources/available data to evaluate the specified technology. Investigates reliability, validity and significance. Clear criteria are applied to demonstrate reasons for final conclusions.	Effectively extends industry standard tools using standard techniques	Documentation is carefully structured with clear message	**69 – 60**
Reasonable explanations; some weaknesses or omissions.	Uses relevant sources/available data to evaluate some aspects of the specified technology. Can evaluate relevance and significance of the sources/data. Conclusions are linked to the evaluation.	Extension of industry standard tools using standard techniques is mostly effective	Documentation included is relevant to topic and has been structured.	**59 – 50**
Reasonable explanations one significant misunderstanding	Presents benefits and disadvantages of some aspects of the specified technology. Some use of sources/data in evaluation but without providing clarity on reason for final conclusions.	Some weaknesses in aspects of the extension of industry standard tools using standard techniques compensated by effective extensions elsewhere	Documentation presented is relevant but lacks structure	**49 – 40**
Poor explanations in most areas OR More than one significant misunderstanding	A limited investigation of the specified technology but some attempt to link evaluation to evidence considered	Some weaknesses in aspects of the extension of industry standard tools using standard techniques	Documentation is structured but there are gaps, or some is not relevant	**39 – 30**

Poor explanations in most areas; some evidence that the topic is misunderstood.	A limited investigation of the specified technology but little attempt to link evaluation to evidence considered	Attempted extension of industry standard tools using standard techniques is only partially complete or done incorrectly	Documentation is incomplete or irrelevant and lacks structure	**29 – 20**
Significant evidence that the topic is misunderstood.	Significant weaknesses in the evaluation.	Attempted extension of industry standard tools using standard techniques is only partially complete and done incorrectly	Documentation is incomplete or irrelevant and it is presented in a disorganised manner	**19 – 10**
Has misunderstood the topic.	Little attempt to present a coherent evaluation.	Little evidence an attempt to extend the industry standard tools	Little evidence of an attempt to document the solution	**9 – 0**

Additional Information for Clarification

- You are reminded that it is your responsibility to read and understand the University regulations regarding assessment. Your attention is directed to the regulations regarding assessment in the Student's Handbook of Regulations (available from the University website), and in particular to its guidance on academic misconduct and plagiarism.
- ***A note on using other people's program code in your work:***
  It is standard practice amongst professional developers to use pre-existing code in their programs. Correctly using such code is an important skill: you will not be marked down for using such code appropriately in your solutions. The need to properly reference such "quotations" is obvious in an academic context; however it is increasingly important in commercial contexts too, due to increased copyright and patent protection of code. This means that any code taken from a text book, or an Internet site, should be surrounded by comments that clearly indicate:
  - Where the quoted code starts and ends.
  - The original source of the quoted code, using the University's standard referencing system.
  - A brief description of any changes, simplifications or improvements you have made to the quoted code.

  Warning: It can sometimes be harder to adapt someone else's code to meet your needs than to code something from scratch. You should also be aware that there are some very bad code samples on the Web. Incorporating bad code in your own work demonstrates a lack of understanding of good coding practice, and is an inappropriate use of pre-existing code. **Take care when "standing on the shoulders of giants" that the giant isn't a dinosaur.**

Hand out date: 14 January 2019   **Hand in date:** 03 May 2018

Study time: 120 hours