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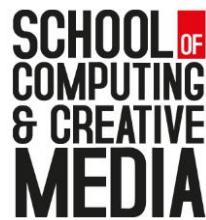
Bachelor of Game Development (Hons)

# Game Engine Architecture and Design

## XBGT3124N

Prepared by Mohamad Faris Zakwan  
Semester September 2024

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# ASSIGNMENT 3

Course Title : Game Engine Architecture & Design  
Course Code : XBGT3124  
Course Lecturer : Mohamad Faris Zakwan  
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## BRIEF

### ⚠ Important ⚠

This course's assignments are continuous in nature.  
Use your Assignment 2 project as the base for Assignment 3.

Continue from your Assignment 2 project.

You are to:

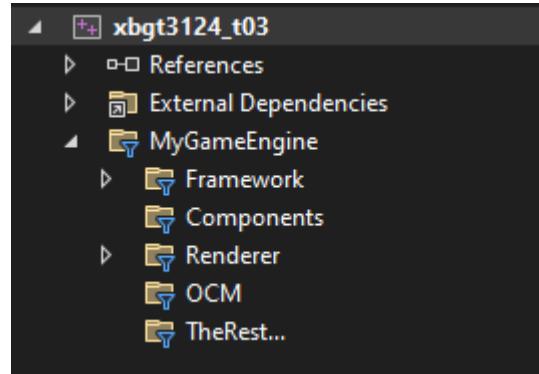
1. Structure your project accordingly.
2. Add 5 core components (one of it must be **SpriteRenderer**), to your game engine.
3. Write API documentation and user manual, **in HTML format**, generated with Doxygen.
4. Provide a simple GAME showcase demonstrating your game engine in action.

# REQUIREMENTS

## Project Structure & Namespacing (4%)

### Project Structure (2%)

Organize your project code files according to their usage. For example:



**Organize your game showcase code files as well!**

### Namespacing (2%)

Ensure ALL game engine related files are namespaced with your own game engine name.

Non-game engine files ARE TO USE a different namespace, e.g. `namespace ShowcaseA3`

**YOU ARE NOT ALLOWED TO USE  
MyGameEngine  
as your namespace, as that label is used in tutorials.**

## Core Components (16%)

Core components are inherited from `BaseComponent`. They are **GENERIC** components that are **USEFUL** in game creation. You are to implement `SpriteRenderer`, and up to 4 other custom components.

### SpriteRenderer Component (4%)

Add `SpriteRenderer` component. Sprites are required to render as alpha blended (Transparent).

The `SpriteRenderer` component needs to have these features:

1. Have colour tinting and opacity. (the default is white colour with opacity of 1.0)
  - a. `setColour(r,g,b)` and `setColour(vec3)`
  - b. `setOpacity(a)`
2. Able to set custom sprite size. (the default is the loaded texture size)
  - a. `setSize(w,h)` and `setSize(vec2)`
3. Able to set Sprite pivot (the default is x:0.5, y:0.5)
  - a. `setPivot(x,y)` and `setPivot(vec2)`
4. Use transformation values from `Transform` component.

Use Unity's `Sprite` system as reference.

### Custom Core Components (3% / 6% each, 12% maximum)

Design and implement additional core components (up to 4) that game engine users can use in their game development. Non-exhaustive examples:

- `AnimatedSpriteRenderer`
- `NineSliceSpriteRenderer`
- `LabelRenderer`
- `Button`
- `Toggle`
- `ProgressBar`
- **Collision\***
- **AudioSource\***

**Collision** and  **AudioSource** are worth 6% each, as they require modification to the game engine itself, and inclusion of third-party libraries. You may use:

- `Box2D` (for Collision)
- `IrrKlang` (for Audio)
- `SoLoud` (for Audio)

NO assistance provided if you choose to implement **Collision** or  **AudioSource**. Refer to their respective documentation on guidance.

## **Documentation (15%)**

You are to provide game engine documentation and manual, **in HTML**, generated using Doxygen.

**OTHER FORMS OF DOCUMENTATION ARE INVALID.**

**You will get 0% on Documentation for non-compliance.**

### **About (3%)**

The main page of the documentation (accessed via index.html) MUST contain:

- Name
- Student ID
- Semester (MONTH YEAR – See assignment brief cover page)
- About the Project
- Libraries Used

In **About the Project**, you may follow the template below:

AABB is a XYZ game engine written in XYZ language. It supports .....

In **Libraries Used**, list ALL third-party libraries that are used in the project, and its purpose.

### **Manual (6%)**

Mandatory to provide manual pages for:

- How to create custom components.
- How to create scenes.
  - Creating custom scene.
  - Adding custom scenes to the application.
  - Loading custom scenes.

### **Script Reference (6%)**

Provide documentation to ALL your game engine code header files. All public and protected class members (class, function, variables) require at least one sentence explaining what it is/does.

## **Game Showcase (15%)**

The game showcase MUST demonstrate ALL your game engine capabilities.

The showcase MUST have:

1. Splash Scene with custom logo.
2. At least one scene showcasing game engine components in action.

### **What to showcase?**

You can create a simple, hyper casual game. The game MUST have a winning and/or losing states.

Hyper casual game examples:

- Knife Hit (Search online)
- Pick a Lock (Search online)
- Chrome Dino Game (The game you can play on Google Chrome when you are offline)
- Quiz Game

#### **NOTE**

Display game information within the window itself rather than the console!

For example, "How to Play" is shown in the game itself rather than printed to the console.

# SUBMISSION REQUIREMENTS

**⚠️ Do not include the highlighted folders in your submission! ⚠️**

By default, .vs folder is hidden in Windows Explorer. Enable Hidden items to see it.

Name	Date modified	Type	Size
📁 .vs	11/3/2024 10:29 AM	File folder	
📁 assets	22/1/2024 6:39 AM	File folder	
📁 build	11/3/2024 11:11 AM	File folder	
📁 src	11/3/2024 4:09 PM	File folder	
📁 temp	11/3/2024 12:36 PM	File folder	
uproject_solution.sln	26/2/2024 9:20 AM	Visual Studio Solu...	2 KB

Delete the highlighted folders before zipping

**Zip Filename Format:** *StudentID\_XBGT3124\_A3*

e.g., 0120123\_XBGT3124\_A3.zip

Your zip file MUST contain:

1. project/ folder (**REMEMBER TO DELETE THE HIGHLIGHTED FOLDERS!**)
2. deps/ folder
3. documentation/ folder

**Each student is given access to an individual OneDrive folder for assignment submissions.**

- Only the student and lecturer-in-charge will be able to access the contents inside the folder.
- The same folder is used for all coursework submissions.

**Penalty applies:**

- **If you submit past the deadline: -50% of marks per day late.**
- **If you update your submission past the deadline without receiving permission from the lecturer beforehand.**

# ASSESSMENT CRITERIA

Coursework marks allocated for this assignment is **50%**, of which:

- |                                   |       |
|-----------------------------------|-------|
| • Project Structure & Namespacing | : 4%  |
| • 5 Core Components               | : 16% |
| • Documentation                   | : 15% |
| • Ultimate Showcase               | : 15% |

**No submission or non-working submission is assessed as 0% of the allocated marks.**

**DUE DATE: 15 DECEMBER 2024, 11:59:59PM**

# ASSESSMENT RUBRIC

CRITERIA	MARKS				
Project (4)	-	-	-	2      1      0	
<b>Project Structure (2)</b>				<p>All code files are separated into two categories:</p> <ul style="list-style-type: none"> <li>• Game Engine</li> <li>• Showcase</li> </ul> <p>Subcategories are made for each category for better organization.</p>	
<b>Namespacing (2)</b>				<p>All game engine related code files are namespaced.</p> <p>Some game engine related code files are namespaced.</p>	
<b>Component (16)</b>	-	4	3	2      1	
<b>SpriteRenderer (4)</b>		<p>Supports four (4) of the following:</p> <ul style="list-style-type: none"> <li>• Colour tinting.</li> <li>• Custom sizing.</li> <li>• Custom pivot.</li> <li>• Use proper transform values.</li> </ul>	<p>Supports three (3) of the following:</p> <ul style="list-style-type: none"> <li>• Colour tinting.</li> <li>• Custom sizing.</li> <li>• Custom pivot.</li> <li>• Use proper transform values.</li> </ul>	<p>Supports two (2) of the following:</p> <ul style="list-style-type: none"> <li>• Colour tinting.</li> <li>• Custom sizing.</li> <li>• Custom pivot.</li> <li>• Use proper transform values.</li> </ul>	<p>Supports one (1) of the following:</p> <ul style="list-style-type: none"> <li>• Colour tinting.</li> <li>• Custom sizing.</li> <li>• Custom pivot.</li> <li>• Use proper transform values.</li> </ul>
<b>Custom Component 1 (3 or 6)</b>			Implemented custom component:	Implemented custom component:	Implemented custom component:
<b>Custom Component 2 (3 or 6)</b>			<ul style="list-style-type: none"> <li>• Offers extensive customization options.</li> <li>• Is working correctly.</li> <li>• Is easy to use.</li> </ul>	<ul style="list-style-type: none"> <li>• Offers sizeable customization options.</li> <li>• Is working correctly.</li> </ul>	<ul style="list-style-type: none"> <li>• Offers limited customization options.</li> <li>• Is buggy or incomplete.</li> </ul>
<b>Custom Component 3 (3)</b>			<b>Notes:</b>		
<b>Custom Component 4 (3)</b>			<ol style="list-style-type: none"> <li>1. Components that require game engine modification, such as Collision and AudioSource, provide double the marks (6 each instead of 3 each).</li> <li>2. You may obtain up to 12% total for Custom Component. This means at minimum you need to implement 2, at most 4, custom components.</li> </ol>		

*Continued next page...*

CRITERIA	MARKS						
	6	5	4	3	2	1	0
<b>About (3)</b>				Contains student name, ID, and semester.	Contains student name, ID, and semester.	Contains student name, ID, and semester.	
<b>Manual (6)</b>	The user manual is complete and well written.  All steps on creating custom objects are explained in a clear and concise manner.	The user manual is complete but very lengthy.  Some of the steps on creating custom objects have explanations.		The user manual is very bare.  Steps on creating custom objects have very little to no explanation.			
<b>Script Reference (6)</b>	All public and protected functions, properties, and variables are documented.  Documentations provide useful information in a clear and concise manner.	Most public and protected functions, properties, and variables are documented.	Half of the public and protected functions, properties and variables are documented.  Documentations provide useful information in an elaborate manner.	Half of the public and protected functions, properties and variables are documented.  Documentations provide minimum useful information.	Very few public and protected functions, properties and variables are documented.  Documentations do not provide useful information.	Very few public and protected functions, properties and variables are documented.	One of the following: <ul style="list-style-type: none"><li>• No submission.</li><li>• Does not meet minimum requirements.</li></ul>
<b>Showcase (15)</b>	-	-	3	2	1		
<b>Stability (3)</b>			The showcase is free of bugs, errors, and crashes. <ul style="list-style-type: none"><li>• Your output needs to run without any issue from start to end to qualify for this.</li></ul>	The showcase has some bugs or errors, but crash-free.  Examples: <ul style="list-style-type: none"><li>• Error: File missing.</li><li>• Bug: Something not behaving properly or incomplete.</li></ul>	The showcase works but may crash. <ul style="list-style-type: none"><li>• You will get this mark if any crash occurs.</li></ul>		
<b>Showcase Info (2)</b>				All information pertaining the showcase is shown within the game window itself and not using the console.	Some information pertaining the showcase is shown in the console instead of within the game window.		

<b>Showcase Content (10)</b>	<b>10</b>	<b>8</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>0</b>
A complete, playable game with custom splash screen, main menu, game, credits, and game over screens.  All scenes have complete visuals.	A complete, playable game with custom splash screen, main menu, game, credits, and game over screens.  Very few scenes look barebone/incomplete.	A complete, playable game with custom splash screen, main menu, game, and game over screens.  Some scenes look barebone/incomplete.	A playable game with main menu, game, and game over screen.  Scenes look barebone/incomplete.	A barebones game.	One of the following: <ul style="list-style-type: none"><li>• No submission.</li><li>• Does not meet minimum requirements.</li></ul>	
<b>PENALTIES</b>			<b>Documentation</b>	<b>Namespace</b>	<b>Code Quality</b>	<b>Late</b>
<b>Infractions</b>			Using anything other than Doxygen for documentation. (-15)  Including LaTeX documentation. (-2)	Using MyGameEngine namespace for the game engine namespace. (-2)	Unused codes are commented out instead of removed. (-1 each, max -5)  <b>NON-TEMPLATE</b> function definitions in header file (-1 each, max -3)	-20% assessed marks per day late.  How days are counted: $x = \text{hours late}$ $\text{Days} = \text{ceil}(x / 24)$  e.g. 5 minutes late: $x = 5/60 = 0.0833$ $\text{Days} = \text{ceil}(0.0833/24)$ = $\text{ceil}(0.003472)$ = 1 day  27 hours late: $x = 27$ $\text{Days} = \text{ceil}(27/24)$ = $\text{ceil}(1.125)$ = 2 days