

IMAT3904 Report Template

Please write in the boxes below. Expand the boxes as you need to, however this report should not exceed 2 pages.

Name:	George Hanks	P Number:	P17173176
Github Username:	geohan98	Github Repo URI:	https://github.com/IMAT3904/cw-geohan98

Please summarise the functionality of your game engine (bullet points are fine):

- Console Logging
- Time Keeping
- Event Handling
- Event Dispatching
- Window System
- Input Polling
- GPU Buffer Abstraction
- Texture Abstraction
- Shader Abstraction
- Basic 3D Rendering
- Basic 2D Rendering / Basic Text Rendering
- 3D Camera
- 2D Camera
- Layers
- Composable Game Objects
- Components
- Model Loading
- JSON Level Loading

What testing have you performed and what testing strategy was used?

Black Box Testing – Throughout the project I would perform very loose black box testing to verify that new functionality was working as intended, however as there was no detailed specification for much of the functionality it was difficult to design test cases, so most of the time these were not recorded. Examples of black box testing would be when abstraction of the buffers and OpenGL objects occurred, they should output the same result after the abstraction.

Unit Testing – I have written unit tests for some parts of the project, they can be used to verify parts of the code work as intended very quickly. However, I did not find them very useful when debugging, as it was usually very apparent when something was wrong and where the program was going wrong.

Profiling – I did limited profiling to see the difference from the debug version of the project and the release version. I would compare the differences between the frame rates of the two versions.

How have you approached your time management for this piece of work?

Time management has always been difficult for me, especially when there is a large amount of work to do, for this project I would try and fit the work in by doing small amounts every day, rather than long session on a couple days a week. This worked around my other university work and personal commitments. However, I still struggled to keep up with the weekly work, so towards the end of the project I did have to put in extra hours in order to complete sections of the project.

What have you learned from whilst building your game engine?

Engine Architecture – Before this project I had limited knowledge on how game engines were designed and how all the systems interacted with each other. I now have a better knowledge on how a game engine can be built, but I feel I still have much to learn with respect to common practices in software engineering.

OpenGL – I have learnt a great deal about building an OpenGL render in this project, I feel that I could independently build a basic rendering system for another project with the knowledge I have gained. I would like to learn more advanced techniques with OpenGL such as batch rendering and deferred rendering.

Premake – I had never used a build system before this project, so when I learnt about premake it really changed how I could work, it was now easier to switch between workstations and continue my work, without the need to upgrade solutions or projects in visual studio, I now try to use a build system for any new projects I have on GitHub.

If you were to undertake this piece of work again what would you do differently?

Time Management – My time management for this project could have been better, if I had paced myself better, I think I would have been able to complete more work to a higher standard. I wasted time early on which impacted the back half of the project.

Asking Questions – Whilst I now know how to build a simple game engine, I do not know why we have done things in this way, or why doing this way is better than other solutions. I think I should have asked my tutor more questions about the structure of the game engine, and why we are choosing to do things that way.

GitHub Commits – I made frequent use of github during the project however it wasn't very consistent, some weeks I would not commit at or and other I would commit multiple times. I also think I should have put more effort into the commit messages, as I was working on my own this did not affect me, but if I was in a group this could cause confusion amongst my co-workers.

3D Camera Input Testing

Test	Expected Result	Actual Result	Comments if Necessary
Movement	<ul style="list-style-type: none"> Key Press Should Move Camera in the appropriate Direction Move Direction should be relative to the camera rotation Move Speed Should be constant Move Speed should be the same in every direction 'W' Should move forward 'S' Should move backward 'A' Should move left 'D' Should move right 'Space' Should move upward 'Left Shift' Should move down 	<ul style="list-style-type: none"> All works as intended 	<ul style="list-style-type: none"> Needed to rotate the direction vectors by the view matrix of the camera for the move direction to be relative
Rotation	<ul style="list-style-type: none"> Key Press Should rotate the camera in the appropriate direction Angle of rotation should be relative to the current rotation Rotation Speed Should be constant Rotation Speed Should be the same in every direction 'Left Arrow' should rotate negative on the yaw axis 'Right Arrow' should rotate positive on the yaw axis 'Up Arrow' Should rotate positive on the pitch axis 'Down Arrow' Should rotate negative on the pitch axis 'Q' Should rotate negative on the roll axis 'E' Should rotate positive the roll axis 	<ul style="list-style-type: none"> All Works as intended except issue with the axis of rotation. When rotation on the roll axis it is not local to the camera current location. The rotation also does not feel correct overall, however cannot prove this. 	<ul style="list-style-type: none"> Unable to Fix Camera Rotation Issue, rotation is still of axis when camera is not in the default rotation.
Reset	<ul style="list-style-type: none"> 'R' Should Reset the camera to a set position and rotation This should happen on the key being released 	<ul style="list-style-type: none"> All works as intended 	

Basic 3D Renderer

Test	Expected Result	Actual Result	Comments if Necessary
Submit	<ul style="list-style-type: none"> Vertex Data and Shader for a cube is submitted to the render A Static Cube Should be Draw in the Centre of the Camera View 	<ul style="list-style-type: none"> All works as intended 	
Clear Render Command	<ul style="list-style-type: none"> Previous Colour & Depth Buffer Should clear on Command Action 	<ul style="list-style-type: none"> All works as intended 	<ul style="list-style-type: none"> Affects All Layers
Fill Render Mode Command	<ul style="list-style-type: none"> On Command Action Rendering Should Use fill rendering mode 	<ul style="list-style-type: none"> All works as intended 	<ul style="list-style-type: none"> Affects All Layers
Line Render Mode Command	<ul style="list-style-type: none"> On Command Action Rendering Should Use line rendering mode 	<ul style="list-style-type: none"> All works as intended 	<ul style="list-style-type: none"> Affects All Layers