



COMP280: Specialisms in Creative Computing

9: Optimisation Process

Learning outcomes

- ▶ **Explain** the optimisation process
- ▶ **Explain** how a profiler is used
- ▶ **Understand** some of the key tools used for optimisation

Intro

Programmers waste enormous amounts of time thinking about or worrying about, the speed of noncritical parts of their programs, and these attempts at efficiency have a strong negative impact when debugging and maintenance are considered. We should forget about small efficiencies, say about 97% of the time: premature optimisation is the root of all evil. Yet we should not pass up our opportunities in that critical 3%. –Donald Knuth

Optimisation Process

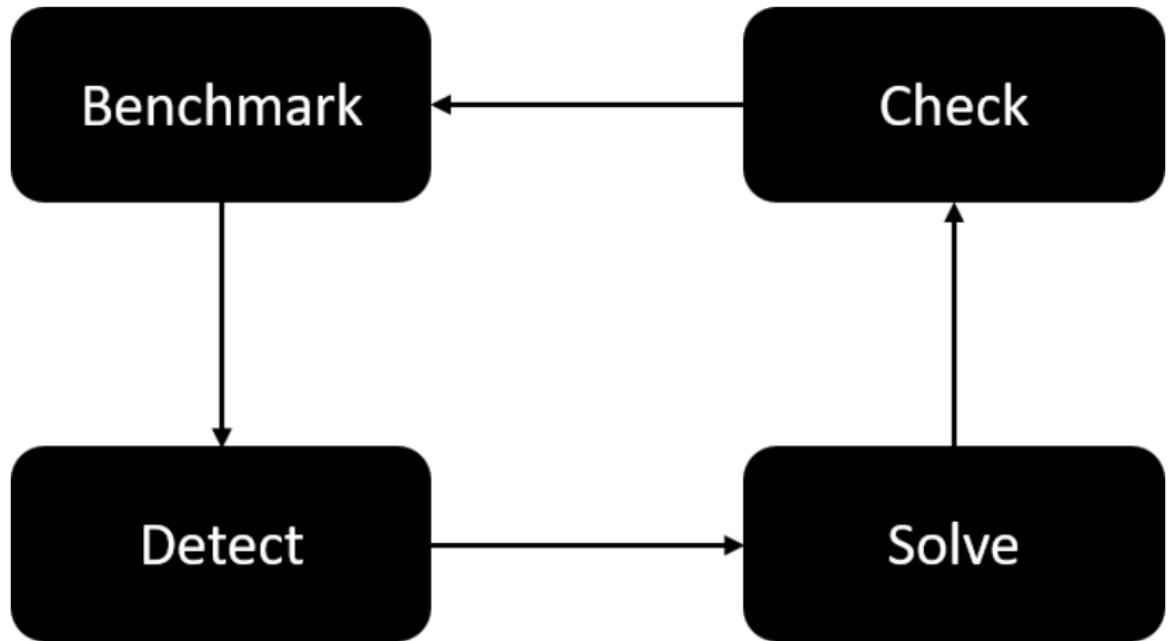
Understand

- ▶ A few things to note when optimising
 - ▶ Limitations of the target hardware
 - ▶ Understand how the CPU/GPU works
 - ▶ Understand how your chosen engine works
 - ▶ Understand how your chosen language compiles
- ▶ For these workshops we are going to focus on a couple of these

Optimisation Process

- ▶ Think of the quote in the intro, you should not worry about premature optimisation
- ▶ Get your core systems working and start optimising
- ▶ Make it a habit and part of your development process, not just when performance becomes a problem
- ▶ Every programmer in the team should optimise

Optimisation Cycle 1

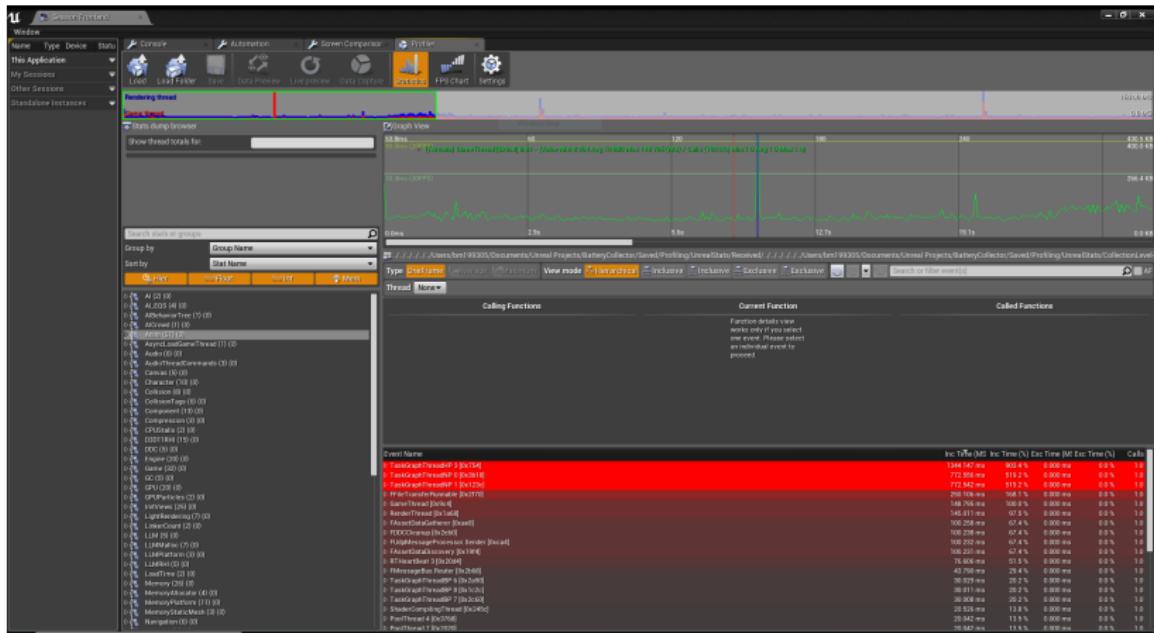


Optimisation Cycle 2

- ▶ If you look at the previous slide, these steps feel like an **experiment**
- ▶ We just don't try to optimise **without** data
- ▶ We always **profile** and find out the bottle necks and hotspots
- ▶ We then make changes to our code base or content
- ▶ Then we return to start of the process using our benchmark as a comparison

Profiler

UE4



Unity



Profiler

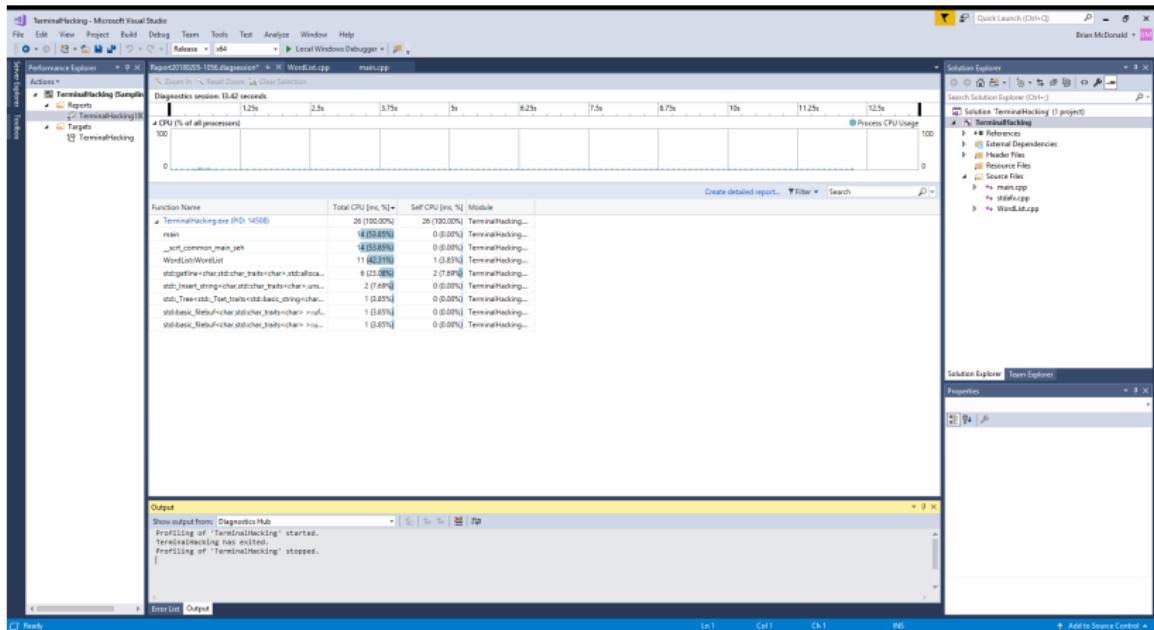
- ▶ You have already met the profilers for UE4 and Unity
- ▶ They have some commonalities
 - ▶ Visualise Performance via graphs
 - ▶ Performance measures (calls, time, frame time etc)
 - ▶ Code call graphs, usually linked to the visuals and perf measures
- ▶ This is the main tool you have to measure performance in your game

Profiling Tips

- ▶ Run the profiler on a built version of your game
- ▶ Turn off features of the profiler you don't need

Other Tools

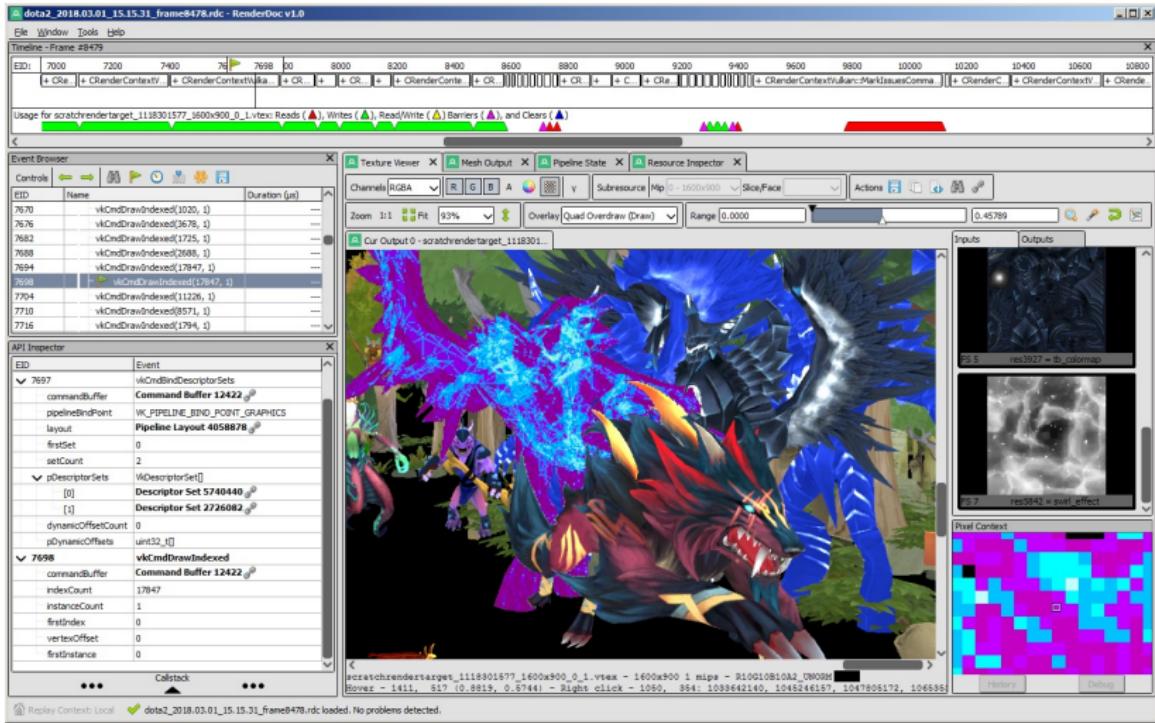
Visual Studio



NVidia Nsight



Render Doc



Worksheet

Optimisation Worksheet

<https://learningspace.falmouth.ac.uk/mod/resource/view.php?id=114234>

Worksheet