Mandelbrot Set – Part 3  
Numerical Scientific Computing Mini-Project

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**Course:** Numerical Scientific Computing

# Docstrings and Doctests (3 cases), see mandelbrot\_opencl.py

Text

Description automatically generated

A screenshot of a computer

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# OpenCL with defined memory types for all variables

\_\_global memory data type for the input and output data.

\_\_private memory data type for data that is only relevant for workers within the function.

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# Local grid sizes (work group)

All CPU, GPU and integrated GPUs increase in performance as the local size increases.  
The Intel® OpenCL HD Graphics is the integrated GPU and the Intel® OpenCL is the CPU. Here it can be seen that the integrated GPU significantly outperforms the CPU.

A picture containing chart

Description automatically generated

# Global grid size (mandelbrot size)

# Extra features

* Zoom Animation
  + Path to code: “Extra Features/mandelbrot\_iteration\_animation.py”
    - GitHub: <https://github.com/LukasKristensen/Mandelbrot-Python/blob/main/Iterations%20Animation/mandelbrot_iteration_animation.py>
  + Video of output: <https://www.youtube.com/watch?v=L2zKIrriDfI>
* Iteration Animation
  + Path to code: “Extra Features/mandelbrot\_animation.py”
    - GitHub: <https://github.com/LukasKristensen/Mandelbrot-Python/blob/main/Zoom%20Animation/mandelbrot_animation.py>
  + Video of output: <https://www.youtube.com/watch?v=8BjqgaIuses>