

Geekbench 4 Compute Workloads

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Introduction

This document outlines the Compute workloads included in Geekbench 4.

Platform Support

| Platform | Minimum Version | Comment |
|----------|-----------------|---------|
| Android | 5.0 | |
| iOS | 9.0 | |
| Linux | 14.04 LTS | |
| OS X | 10.11 | |
| Windows | 7 | |

API Support

| Platform | Version | Comment |
|--------------|------------|---|
| CUDA | CUDA 7.5 | Device must support compute capability 1.1 or later |
| OpenCL | OpenCL 1.1 | |
| RenderScript | N/A | |

Runtime

Geekbench 4 groups the Compute workloads into one section.

Scores

Geekbench 4 provides one score for the Compute workloads. The score is the geometric mean of the scores of the individual Compute workloads.

Compute Workloads

Sobel

The Sobel operator is used in image processing and computer vision for finding edges in images.

The Sobel workload converts an RGB image to greyscale and computes the Sobel operator for the greyscale image. The operator uses two integer convolutions (one for horizontal edges, one for vertical edges) to compute the final image.

Histogram Equalization

Histogram Equalization is a method used to enhance contrast by adjusting image intensities.



FFT

FFT (Fast Fourier Transform) decomposes an input signal into a linear combination of a basis of trigonometric polynomials. FFT is a core algorithm in many signal-processing applications.

The FFT workload executes an FFT on a 32MB input buffer operating in 16KB chunks. This is similar to how FFT is used to perform frequency analysis in an audio processing application.

The Compute and CPU implementations of the FFT workload produce comparable output.

Gaussian Blur

Gaussian Blur blurs an image using a Gaussian spatial filter. Gaussian Blurs are widely used in software, both in operating systems to provide interface effects, and in image editing software to reduce detail and noise in an image. Gaussian Blurs are also used in computer vision applications to enhance image structures at different scales.

The Gaussian Blur workload blurs an image using a Gaussian spatial filter. While the Gaussian Blur implementation supports an arbitrary sigma, the workload uses a fixed sigma of 1.0f. This sigma translate into a filter diameter of 9 pixels.

The Compute and CPU implementations of the Gaussian Blur workload produce comparable output.

Face Detection

Implementation of face detection using the algorithm presented in “Rapid Object Detection using a Boosted Cascade of Simple Features” (2001) by Viola and Jones.

RAW Processing

Processes the raw data from a digital camera sensor into an RGB image. RAW Processing has several steps: debayering, denoising, colour correction, gamma correction, sharpen, and quantization. Depth of Field

Computes a lens blur “depth of field” image given two images — a depth image and a colour image — by applying a blur to each pixel of the colour image that is proportional to the distance of the pixel from the focal point (as determined by the depth image).

Particle Physics

Similar to the N-Body CPU workload, but the Compute workload includes elastic collision of the particles and ignores other particle-particle forces.