GFXBench 3.0 User’s Guide

Table of Contents

Introduction to GFXBench 3.0 3
What is GFXBench 3.0? 3
Platform compatibility 3
New User Interface 3
Tabs 3
Home screen 3
Results and Compare 3
Info 5
Settings 5
Technical Specification: Engine and Test Features 6
High-level Test Overview 6
Manhattan 6
Manhattan Engine Features 6
T-Rex 9
Low-level Test Overview 10
Alpha Blending 10
ALU 10
Fill 10
Driver Overhead 10
Special Test Overview 10
Battery 10
Render Quality 11
About Us 11

Copyright 2013, Kishonti Ltd.

Introduction to GFXBench 3.0

What is GFXBench 3.0?

GFXBench 3.0 is a unified 3D graphics performance benchmark suite for OpenGL ES 2.x, 3.x and DirectX 11 (feature level 10/11) compliant desktop, mobile and embedded environments and devices. It is also the first comprehensive cross-platform OpenGL ES 3 benchmark designed for measuring graphics performance, render quality and power consumption in a single, easy-to-use application.

Platform compatibility

GFXBench has been successfully tested on different operating systems including iOS (iPhone / iPad), Android, OS X, Linux, Win32, Windows 8, Windows RT and Windows Phone 8.

The free community version currently supports iOS and Android – support for OS X, Windows 8, Windows RT, and Windows Phone 8 is coming soon.

The engine supports multiple OpenGL implementations, like the desktop OpenGL (using GLEW), native OpenGL ES 2.0 and ES 3.0, and emulators on the PC. GFXBench supports DirectX 11 (feature level 9_3/10/11).

New User Interface

A new, unified, user-friendly UI is introduced in both the community and corporate versions of GFXBench 3.0. (This UI is also used in all Kishonti benchmarks.) The new advanced mode offers the possibility to select individual tests. As the result database is downloaded, its entries are comparable to other devices within the app. Other features include: duel compare mode between two devices and detailed system information about the device. Multiple languages are supported, and new localized versions are getting added with each update.

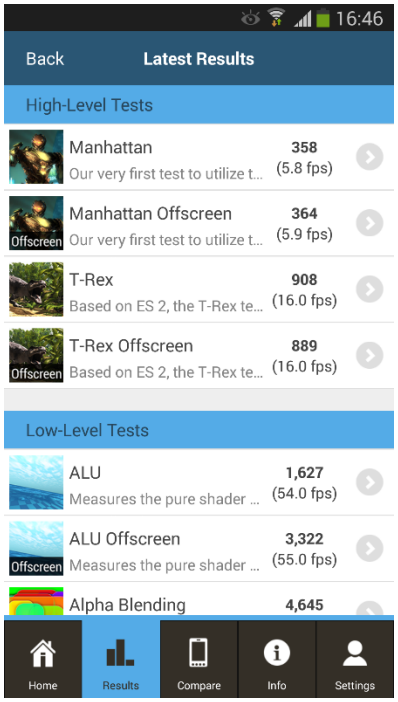
Tabs

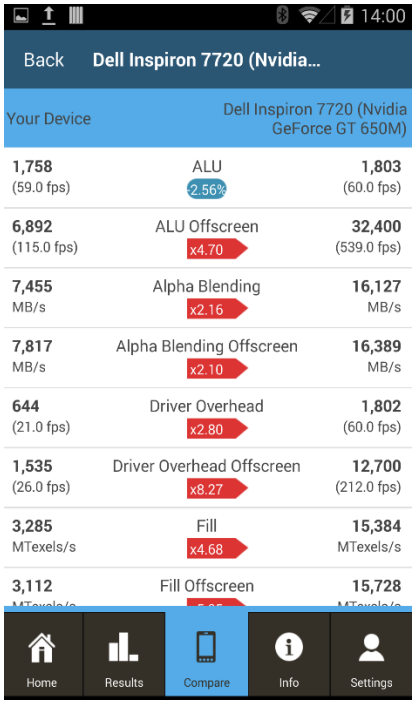
Home screen Press "Start all" to start all tests, press "Test select" to select individual tests! You can start tests in groups, too (High-Level/Low-level tests/Special tests). Please note that selecting the Battery test will unselect all other tests: this test can only be started in itself and it is not included when selecting all tests.

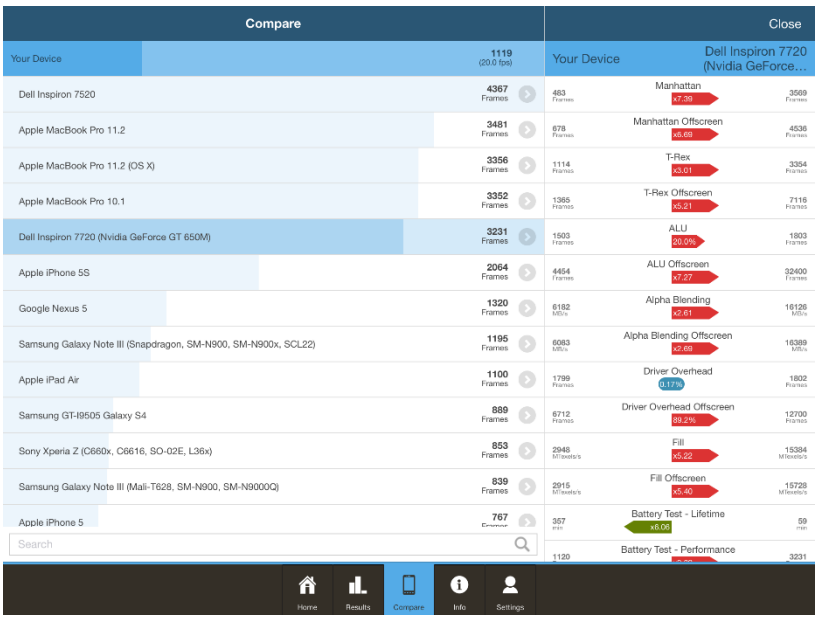
Results and Compare You can see scores for each tests that were run. By tapping on "More" in the upper right corner you will see your results history. Tapping at the test name or its logo gives a description of the test. Tapping at the arrow next to the scores will let you compare your specific test result to all devices in our database. Tapping at the arrow next to a device will open the "device duel" mode that lists all scores of your device and compares it to the selected device.

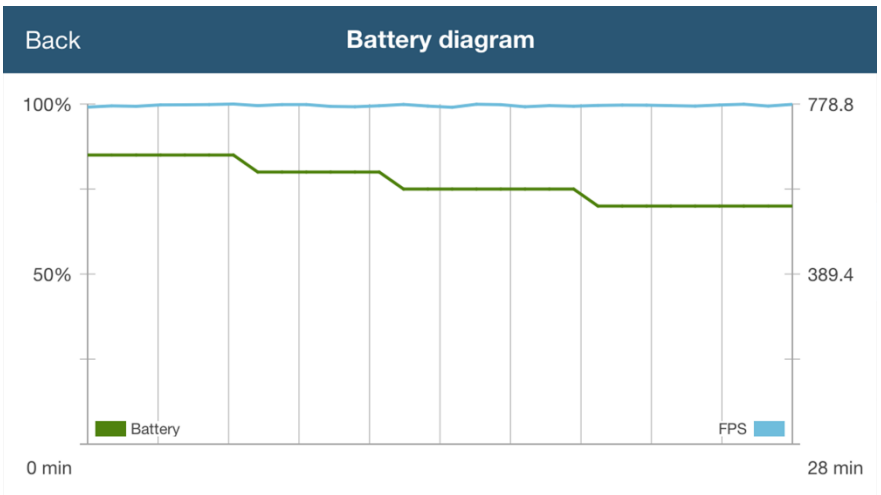
Copyright 2013, Kishonti Ltd.

15:44
GFXBench
Version 3.0.0
Start all
Test select
Home
Results
Compare
Info
Settings


16:46
Back
Latest Results
High-Level Tests
Manhattan
Our very first test to utilize t...
358
(5.8 fps)
Manhattan Offscreen
Offscreen
Our very first test to utilize t...
364
(5.9 fps)
T-Rex
Based on ES 2, the T-Rex te...
908
(16.0 fps)
T-Rex Offscreen
Offscreen
Based on ES 2, the T-Rex te...
889
(16.0 fps)
Low-Level Tests
ALU
Measures the pure shader ...
1,627
(54.0 fps)
ALU Offscreen
Offscreen
Measures the pure shader ...
3,322
(55.0 fps)
Alpha Blending
4,645
Home
Results
Compare
Info
Settings

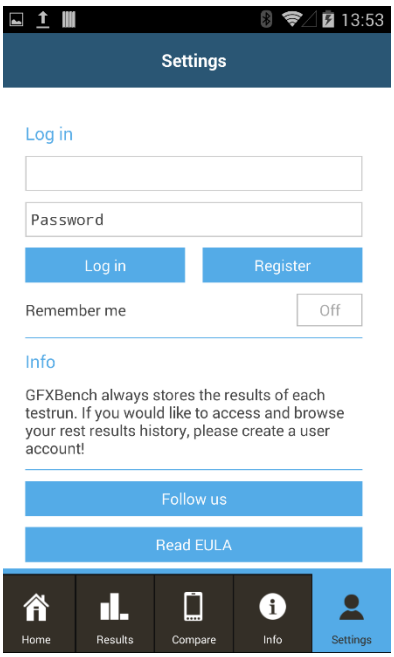

14:00
Back
Dell Inspiron 7720 (Nvidia...
Your Device
Dell Inspiron 7720 (Nvidia GeForce GT 650M)
1,758 (59.0 fps)
ALU
-2.56%
1,803 (60.0 fps)
6,892 (115.0 fps)
ALU Offscreen
x4.70
32,400 (539.0 fps)
7,455 MB/s
Alpha Blending
x2.16
16,127 MB/s
7,817 MB/s
Alpha Blending Offscreen
x2.10
16,389 MB/s
644 (21.0 fps)
Driver Overhead
x2.80
1,802 (60.0 fps)
1,535 (26.0 fps)
Driver Overhead Offscreen
x8.27
12,700 (212.0 fps)
3,285 MTexels/s
Fill
x4.68
15,384 MTexels/s
3,112
Fill Offscreen
15,728
Home
Results
Compare
Info
Settings


Compare
Close
Your Device
1119
(20.0 fps)
Dell Inspiron 7520
4367 Frames
Apple MacBook Pro 11.2
3481 Frames
Apple MacBook Pro 11.2 (OS X)
3356 Frames
Apple MacBook Pro 10.1
3352 Frames
Dell Inspiron 7720 (Nvidia GeForce GT 650M)
3231 Frames
Apple iPhone 5S
2064 Frames
Google Nexus 5
1320 Frames
Samsung Galaxy Note III (Snapdragon, SM-N900, SM-N900x, SCL22)
1195 Frames
Apple iPad Air
1100 Frames
Samsung GT-I9505 Galaxy S4
889 Frames
Sony Xperia Z (C660x, C6616, SO-02E, L36x)
853 Frames
Samsung Galaxy Note III (Mali-T628, SM-N900, SM-N9000Q)
839 Frames
Apple iPhone 5
767
Search
Your Device
Dell Inspiron 7720 (Nvidia GeForce...
Manhattan
x7.39
Manhattan Offscreen
x8.69
T-Rex
x3.01
T-Rex Offscreen
x5.21
ALU
20.0%
ALU Offscreen
x7.27
Alpha Blending
x2.61
Alpha Blending Offscreen
x2.69
Driver Overhead
0.17%
Driver Overhead Offscreen
89.2%
Fill
x5.22
Fill Offscreen
x5.40
Battery Test - Lifetime
x6.06
Battery Test - Performance
Home
Results
Compare
Info
Settings


Back
Battery diagram
100%
50%
0 min
778.8
389.4
28 min
Battery
FPS

Info Detailed information on your device. The 3D API information can be opened by tapping next to the arrow at the 3D API row.

Settings You can login and find contact information (tapping at Follow us) and the EULA here. You can set if you want to download the database at every startup. Some features listed here are only available in the corporate version. Please see our licensing terms on the website.



Technical Specification: Engine and Test Features

Each test is able to run in onscreen and offscreen mode (if supported by hardware). The resolution of the onscreen target is the native display resolution of the device. Offscreen mode's default resolution is 1080p (1920 x 1080) on every platform. To see how your device performs at its native resolution, run the Onscreen test. To compare your scores to other devices, use the Offscreen version.

High-level Test Overview

GFXBench 3.0 merges OpenGL ES 2 and ES 3 tests into a single application that will run on both ES 3 and ES 2 devices. (On ES 2 devices the ES 3 test called Manhattan is disabled).

For compatibility reasons, the T-Rex high-level OpenGL ES 2 test from GFXBench 2.7 is also included.

Manhattan

This high level test a new addition to GFXBench 3, and uses OpenGL ES 3 features. The test takes place in a city environment at nighttime, and uses many lights to illuminate its contents.

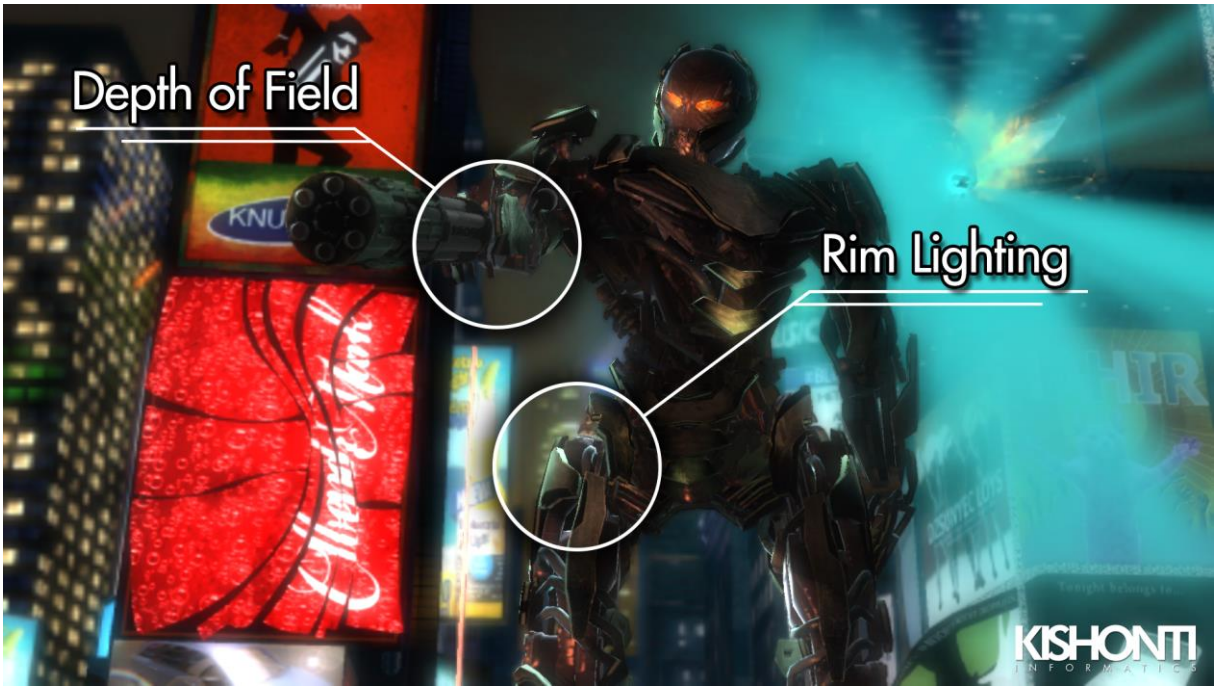
Manhattan Engine Features

1. The graphics pipeline is based on deferred shading
    1. Multi-render target (MRT) is used for the geometry pass
       The g-buffer layout is:
       Four color attachments as RGBA888 texture
       (albedo, normals, reflected color, material parameters)
       Depth attachment as 24 bit depth component texture
    2. In the lighting pass: diffuse and specular lighting calculation for 60+ lights.
       Depth shadow map can be used with certain light sources

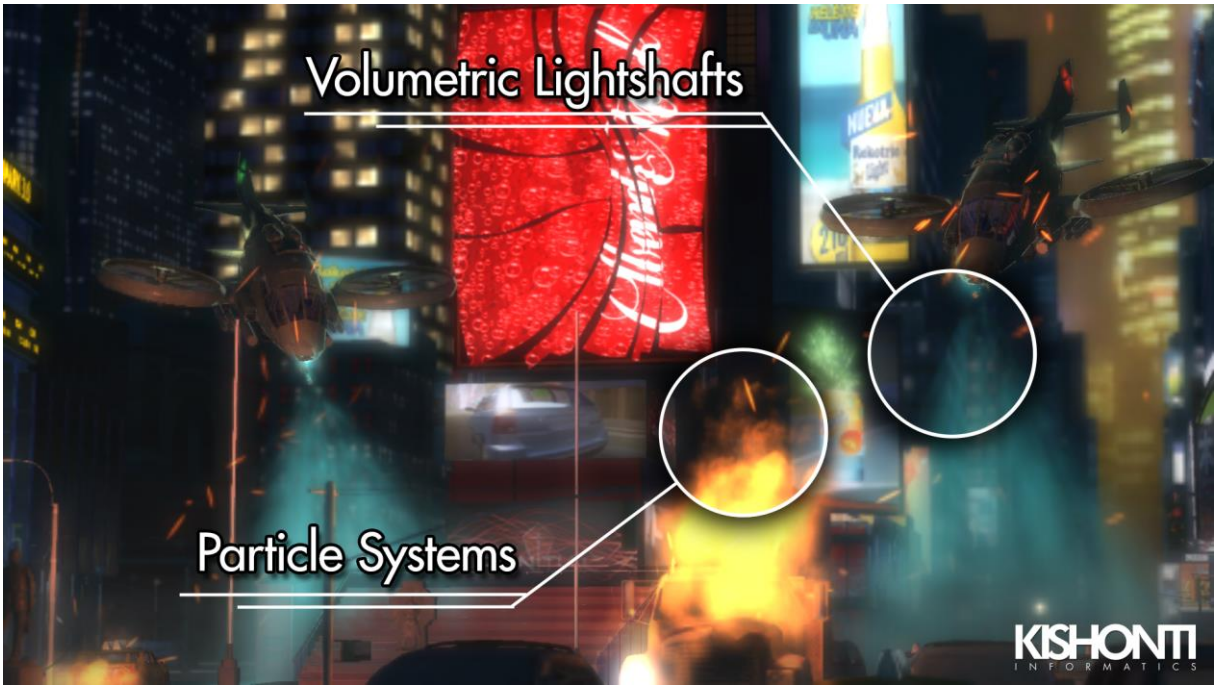
3. Static cubemap reflection and emission is applied in the final pass
4. Triplanar mapping and array texture used for the robot's cloaking effect, with tiling texture animation

2. Instanced mesh rendering with geometry LODs, and optimized vertex / index ordering
3. Post-process effects:
    1. Bloom (with bright-pass filter)
    2. Depth of field

Copyright 2013, Kishonti Ltd.



4. Particle system – animated particles on GPU (with transform feedback), batched rendering (particles are rendered with single draw call with instancing and as animated sprites using 3D textures)



5. Skeletal animation on the GPU
6. Occlusion query is used to determine light source visibility, triggering additional lens flare rendering
7. Animated volumetric light shafts using ray marching volumetric rendering
8. Video playback with Theora, using asynchronous texture streaming and PBO

Copyright 2013, Kishonti Ltd.

T-Rex

Optimized for 1080p, this high level test from GFXBench 2.7 utilizes an enhanced version of the GFXBench 2.5 engine and uses scenery, which includes highly detailed textures, materials, complex geometry, particles with animated textures, and a post process effect: motion blur. The graphics pipeline also features effects introduced in GFXBench 2.5 Egypt HD, e.g.: planar reflection, specular highlights and soft-shadows.

Copyright 2013, Kishonti Ltd.

Low-level Test Overview

GFXBench 3.0 contains a new set of low-level tests to benchmark the different aspects of device performance.

Alpha Blending

This test measures the device's alpha blended rendering performance by drawing screen-aligned quads with high-resolution uncompressed textures using alpha-blending. The number of primitives is dynamically adjusted to achieve 20 frames per second to maintain responsiveness during the test.

ALU

Complex shaders used in high-end games require a significant amount of compute capability. This test measures the device's compute performance using a single full-screen quad and complex fragment-shader code to render a complex scene featuring animation, procedural textures, normal mapping, reflection and refraction.

Fill

Blending multiple layers of compressed textures is an extremely common use case in casual games. This test measures the device's fill rate by rendering four layers of compressed textures blended in fragment shader.

Driver Overhead

High-end games tend to use a large number of draw calls and state changes to present complex scenes, which can adversely affect CPU performance. This test measures the CPU overhead, rendering a large number of simple objects one-by-one, changing device state for each item.

Special Test Overview

GFXBench 3.0 contains new special tests to measure various other aspects of the device – energy usage, performance stability, and rendering quality.

Battery

This combined test measures the device's battery life and performance stability in a high-end gaming scenario by logging frames-per-second (FPS) while iterating the T-Rex test at least 30 times (or until the battery charge drops significantly enough). The test delivers two scores:

- performance [in frames (and fps)]
    - this shows the slowest iteration's values, so one can judge long-term performance of the device (which might degrade for example due to thermal throttling)
- lifetime [in minutes]
    - this shows the estimated maximum time the test would run

Before starting this test make sure you have your device fully charged and unplugged. Testing takes at least 25 minutes.

Copyright 2013, Kishonti Ltd.

Render Quality

While mobile GPUs provide impressive performance with low power consumption some of them achieve this at the cost of precision resulting in visual artifacts. The render quality test introduced in GFXBench 3.0 measures the visual fidelity provided by the device in a high-end gaming scene, by rendering a single representative image of the test.

The overall score is the peak signal-to-noise ratio (PSNR) based on mean square error (MSE) compared to a pre-rendered reference image. There are also two variants of this test – one forces shaders to run with high precision, while the other does not.

About Us

GFXBench 3.0 is developed by Kishonti Ltd., the leading specialist in graphics and compute benchmarking software technologies since 2003. Our services are used by market-leading hardware designers and manufacturers, software developers, technology journalists and enthusiastic consumers worldwide.

For more details on GFXBench and Kishonti Ltd., please contact us:

Product information: sales@kishonti.net
Support: help@gxbench.com
Web: www.gfxbench.com or www.kishonti.net
Phone: +36-1-3360033
Fax: +36-1-3360034

Copyright 2013, Kishonti Ltd.