UNIGINE HEAVEN BENCHMARK 4.1 (Advanced Edition)

OVERVIEW

Heaven Benchmark is a beautiful GPU benchmark powered by the cutting-edge UNIGINE Engine™. It is a reliable tool that produces unbiased workload to determine the stability of a GPU under extremely stressful conditions, as well as check the cooling system's potential under maximum heat output.

Heaven Benchmark immerses a user into a magical steampunk world of shiny brass, wood and gears. Nested on flying islands, a tiny village with its cozy, sun-heated cobblestone streets, an elaborately crafted dirigible above the expanse of fluffy clouds, and a majestic dragon on the central square gives a true sense of adventure. An interactive experience with fly-by and walk-through modes allows for exploring all corners of this world.

FEATURES

- Extreme hardware stability testing
- Accurate results due to 100% GPU-bound benchmarking
- Benchmarking presets for convenient comparison of results
- Stress testing mode (benchmark looping) [only for Advanced and Pro versions]
- Support for DirectX 9, DirectX 11 and OpenGL 4.0
- Multi-Platform support for Windows, Linux and Mac OS X
- Comprehensive use of hardware tessellation, with adjustable settings
- Dynamic sky with volumetric clouds and tweakable day-night cycle
- Real-time global illumination and screen-space ambient occlusion
- Cinematic and interactive fly/walk-through camera modes
- Support for multi-monitor configurations
- Various stereo 3D modes
- Support for Oculus Rift virtual reality display

- GPU temperature and clock monitoring
- Command line automation support [only for Advanced and Pro versions]
- Reports in CSV format [only for Advanced and Pro versions]
- Support for software rendering mode in DirectX 11 for reference purposes [only for Pro version]
- Support for English, Russian and Chinese languages

SYSTEM REQUIREMENTS

- Hardware:
  - GPU:
    - ATI Radeon HD 4xxx and higher
    - NVIDIA GeForce 8xxx and higher
    - NVIDIA Quadro
    - Intel HD 3000 and higher
  - Video memory: 512 Mb
  - Disk space: 1 Gb
- Operating system:
  - MS Windows XP / Vista / 7 / 8
  - Linux (proprietary video drivers required)
  - Mac OS X 10.8+ (Mountain Lion)

For hardware tessellation, both a video card with DirectX 11 / OpenGL 4.0 support and MS Windows Vista / 7 / 8 or Linux are required.

LAUNCH OPTIONS

In the launcher, it is possible to choose one of the benchmarking presets or specify settings to run Heaven.

- **Language** - use English, Russian or Chinese language for the interface
- **Preset** - benchmarking preset
  - **Custom** - allows for changing launch options
  - **Basic** - provides standard GPU load
  - **Extreme** - provides extremely heavy load for system testing
- **API** - graphics API to be used:
  - DirectX 11
  - DirectX 9 (no tessellation)
  - OpenGL
- **Quality** - quality preset, from Low to Ultra high
- **Tessellation** - tessellation preset:

    - **Disabled** - disable the tessellation
    - **Moderate** - this mode is targeted to provide reasonable performance on a wide range of DX11 hardware
    - **Normal** - default mode available in the benchmark shows optimal quality-to-performance ratio. That's the way to achieve prominent visual difference with hardware tessellation technology
    - **Extreme -** pushes up the tessellation level to the extreme to showcase the capabilities of the top-shelf hardware
- **Stereo 3D** - enables stereo rendering:
    - **Disabled** - no stereo 3D rendering
    - **3D Vision** - NVIDIA 3D Vision stereo. This mode requires 3D Vision-compatible graphics card and monitor, as well as active shutter glasses (or anaglyph ones, depending on the 3D Vision driver settings)
    - **3D Surround** - NVIDIA 3D Surround stereo across three monitors (the same requirements as for NVIDIA 3D Vision apply)
    - **Dual Output** - stereo mode for custom VR/AR output devices that support separate images input, such as 3D video glasses or helmets
    - **Side-by-side** - screen is halved horizontally to render left- and right-eye images
    - **Top-and-bottom** - screen is halved vertically to render left- and right-eye images
    - **Interlaced** - interlaced stereo
    - **Anaglyph** - anaglyph stereo (red-cyan glasses are required)
    - **Oculus** - stereo mode for Oculus Rift virtual reality display
- **Monitors** - render Heaven across multiple monitors
    - **Single** - render on one monitor
    - **Surround 3x1** - span Heaven across three monitors using one window only
    - **Wall Auto** - detect the number of available monitors (works only for identical monitors, with identical resolution)
    - **Wall 2x1** - 2 monitors in a row
    - **Wall 1x2** - 2 monitors in a column
      etc.
    - **Panorama** – panoramic rendering
    - **Fisheye -** stereoscopic fisheye rendering
- **Anti-aliasing** - set the level of hardware anti-aliasing or disable it
- **Full Screen** - full screen mode
- **Resolution** - choose screen resolution or window size from the list
    - **System** - auto-detection of used resolutions
    - **Custom** - set custom width and height to be used

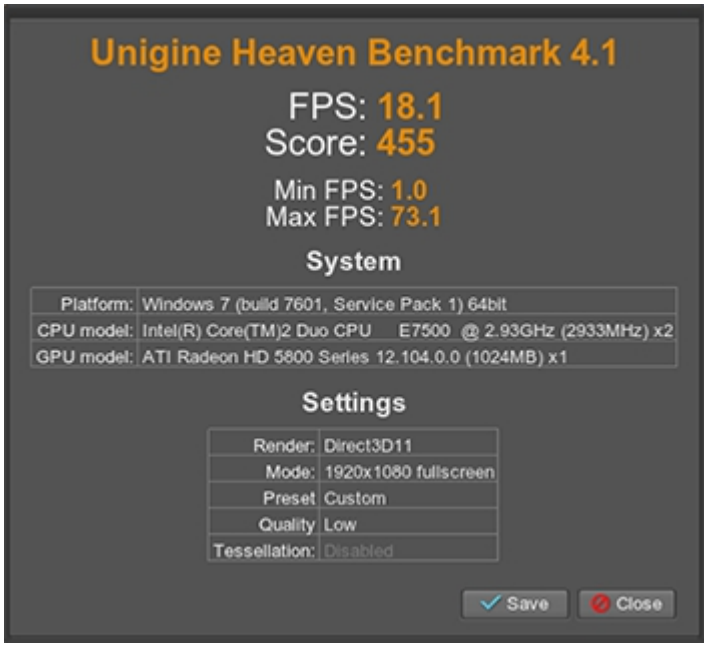
Run button runs Heaven Benchmark application.

BENCHMARK

This option starts benchmarking of the system. During this run, the GPU is stressed to 100% in order to test if it runs reliably under an extremely heavy load.

The following parameters are displayed during benchmarking (you can press Esc to cancel a test run):

- **FPS** - the current, per-frame FPS
- **Time** - duration of benchmarking
- **Frames** count
- **Min FPS** - the minimum FPS since the beginning of benchmarking
- **Max FPS** - the maximum FPS since the beginning of benchmarking
- **Scene** - the number of cinematic scenes shown/left



The results of benchmarking are output onto the screen and can be saved into HTML file. In addition to the above mentioned parameters, they include:

- **FPS –** average FPS during benchmarking
- **Score** – your system score
- **Platform –** system data and version of the UNIGINE Engine powering the benchmark
- **GPU** and **CPU** model data
- **Settings** - graphics settings used to run the benchmark

CAMERA

The Camera mode option allows to view the cinematic scenes or switch to an interactive mode:

- **Cinematic -** cinematic scenes
- **Free** - fly-by mode
- **Walk** - walk-through mode

In the **Cinematic** camera mode, the following hot keys are available:

- **Space bar** — stop/resume scene playback
- **Enter** — skip the scene
- **Backspace** — replay the scene from the start

In interactive camera modes the depth of field effect can be additionally tweaked:

- **Focus** - change the focus point from close-by objects to distant ones
- **Aperture** - change the width of the area in focus

To take a screenshot of the current scene press **F12** button on your keyboard. The **.png* format image will be saved to the following files directories by default:

- For MS Windows XP / Vista / 7 / 8, it is `%userprofile %/Heaven/screenshots`
- For Linux, it is `~/.Heaven/screenshots`
- For OS X 10.8.2+, it is `~/Library/Application Support/Heaven/screenshots`

ENVIRONMENT

The Environment option allows for setting any time from the full day-night cycle. From early dawn to the deep of the starry night, true-to-life atmospheric conditions are simulated.

TESSELLATION

The Tessellation options allow for changing the hardware-accelerated tessellation on thy fly, to see drastically more detailed the scene becomes. Tessellation can be toggled via **Enable** option or **F3** hotkey.

- **Scale** controls the scale of displacement. The higher the Scale, the more raised the details are. Low values result in level surfaces.
- **Factor** controls how finely to tessellate. The higher the Factor, the higher the

number of polygons into which objects are subdivided in real-time.
- **Distance** controls if further objects are less tessellated to save performance. Low values means that only close-by objects are tessellated.

To see how polygons are divided in real-time, the wireframe of objects can be toggled via **F2**.

QUALITY

The Quality option allows for choosing between 4 quality presets when rendering Heaven, from Low to Ultra one. This option effectively scales the rendering performance load.

SOUND

The Sound option toggles the background sound.

AUTOMATION

There is a number of automation Python scripts (*.*py* files) for different scenarios available out of the box (Python 2.7.x is required). These scripts are located in the ***automation*** directory.

Report Files

Report files are generated in CSV format and are compatible with any spreadsheet applications, such as Microsoft Excel or OpenOffice Calc. They are written into the specified file with *.*csv* extension.

Reports are saved into the following directory by default:

- For Windows XP/Vista / 7 / 8, it is `%userprofile%/Heaven/reports`
- For Linux, it is `~/Heaven/reports`
- For OS X 10.8.2+, it is `~/Heaven/reports`

Available Scripts

all_apis.py

Runs the benchmark in different graphics APIs: OpenGL, DirectX 9, DirectX 11.

all_resolutions.py
Runs the benchmark with different screen resolutions. See ***resolutions*** array in the script for the details.

loop_100x.py
Performs a stress-test by running the benchmark in a loop mode. Edit ***iterations_number*** parameter to control the number of loops.

single_run.py
Runs the benchmark a single time.

Customization

To customize any of these scripts, modify ***heaven_automation.run()*** options inside of them.

- **api**: *DX9* (by default)*, DX11, GL*
- **fullscreen**: *0, 1* (by default)
- **aa**: *0* (by default)*, 2, 4, 8*
- **width**: an integer value (in pixels, *1280* by default)
- **height**: an integer value (in pixels, *720* by default)
- **quality**: *LOW, MEDIUM, HIGH, ULTRA* (by default)
- **tessellation**: *DISABLED, MODERATE, NORMAL* (by default), *EXTREME*
- **log**: report file name (can contain subfolders), set to '' to omit
- **log_caption**: comma-separated report file captions
- **log_format**: Report format (by default, it is *$F,$A,$v,$m,$quality,$tessellation,$g, $c*). Available placeholders are:
  - **$F** – average frames per second value
  - **$z** – minimal frames per second value
  - **$x** – maximal frames per second value
  - **$v** – screen resolution
  - **$m** – anti-aliasing mode
  - **$g** – video card info

- **$c** – CPU info
- **$A** – graphics API
- **$S** – score
- **$tessellation** – tessellation mode
- **$quality** – quality preset