

OpenGL ES 2.0 Emulator Release Note

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Abstract

This document contains notes relating to the 1.2.0 release of the OpenGL ES 2.0 Emulator.

Release Information

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- An explanation with as much information as you can provide. Include symptoms if appropriate.

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- The document number.
- The page number(s) to which your comments refer.
- A concise explanation of your comments.

General suggestion for additions and improvements are also welcome.

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1 PREFACE

This document contains general release information about the OpenGL ES 2.0 Emulator 1.2.0 EAC deliverables and covers the following topics:

- Deliverables summary.
- Details of external tools required.
- Build instructions.
- Changes and fixes in this release.
- Known issues.
- Details of testing prior to release.

2 PRODUCT DELIVERABLES

2.1 Parts

2.1.1 Windows

The OpenGL ES 2.0 Emulator for Windows is made available via a Microsoft Installer Package,

```
OpenGL_ES_2_0_Emulator_vm.vn.vp.vr_Win32.msi
```

Where `vm` is the major version number, `vn` is the minor version number, `vp` is a patch level and `vr` is the build number of the package.

2.1.2 Linux

The OpenGL ES 2.0 Emulator for Linux is made available via a gzipped tar archive,

```
OpenGL_ES_2_0_Emulator_vm.vn.vp.vr_Linux.tar.gz
```

Where `vm` is the major version number, `vn` is the minor version number, `vp` is a patch level and `vr` is the build number of the package.

3 DOCUMENTATION

Additional documentation for the OpenGL ES 2.0 Emulator is available from <http://www.malideveloper.com/>. This documentation comprises:

3.1 OpenGL ES 2.0 Emulator Errata

This document describes the errata discovered in the implementation of the OpenGL ES 2.0 Emulator, categorised by level of severity. Each description includes:

- a description of where the implementation deviates from the specification,
- the conditions under which erroneous behaviour occurs,
- the implications of the erratum with respect to typical applications,
- the application and limitations of a work-around where possible,
- the status of corrective action.

3.2 OpenGL ES 2.0 Emulator User Guide

The integration guide provides user information for OpenGL ES 2.0 Emulator. It describes how to install and operate the emulator software.

3.3 Release Note

This document contains general release information about the OpenGL ES 2.0 Emulator product.

4 REFERENCE PLATFORM

ARM Limited recommends the use of the same platform that was used to develop and test the OpenGL ES 2.0 Emulator. This section lists the additional hardware and software that is required.

In general, the OpenGL ES 2.0 Emulator requires a desktop computer with an OpenGL 2.x capable graphics card. ARM recommends that you upgrade to the latest drivers from your graphics card vendor. Additionally, for Linux platforms, the graphics card and drivers must support GLX 1.4.

On platforms without hardware support for OpenGL 2.x, it may be possible to use the Mesa software OpenGL implementation as an alternative. For more information on this, see section 7.

4.1 The reference platform

The reference platform for the OpenGL ES 2.0 Emulator is an x86 PC running Microsoft Windows XP SP3 or Ubuntu 10.04 LTS, with an NVIDIA GeForce 210 graphics card using driver version 197.45 (Windows) and 195.36.15 (Linux).

4.2 Installing the system on the reference platform

To install the system on the reference platform, the following are required:

- For Windows, an up to date version of Windows Installer is needed. This should be kept up-to-date by your operating system and separate installation is highly unlikely to be necessary.
- For Linux, a version of GNU tar 1.13 or greater is required.

5 INSTALLATION

5.1 Installation Procedure

On Windows, installation is achieved via the Windows Installer mechanism. Run the installer package and follow the on-screen instructions. On Linux, installation is performed via extracting the gzipped tarball to a location on disk.

For complete installation information on both platforms, consult the OpenGL ES 2.0 Emulator User Guide.

5.2 Directory Structure

By default, the OpenGL ES 2.0 Emulator will install the following files:

- OpenGL ES 2.0 Emulator libraries
- Example application
- Development libraries and header files.

For a complete list of the installed components, consult the OpenGL ES 2.0 Emulator User Guide.

6 BUILDING APPLICATIONS TO USE THE EMULATOR

6.1 Required Tools

To build applications that use the OpenGL ES 2.0 Emulator, you will need:

- Microsoft Visual Studio 2005 or higher (Windows only)
- GCC version 4.1.3 and GNU make version 3.80 or later (Linux only)

For information about building applications on your platform (including building the example application), consult the OpenGL ES 2.0 Emulator User Guide.

Note: The Emulator libraries have been built for 32-bit systems. To build OpenGL ES applications using 64-bit systems, you would have to pass an appropriate flag to the compiler (Eg., For gcc you could use flag `-m32`)

7 MESA SOFTWARE OPENGL IMPLEMENTATION

This section details how to use Mesa with the OpenGL ES 2.0 Emulator in cases where hardware support of OpenGL 2.x is unavailable. The instructions below assume a Linux environment. For other environments, consult the Mesa documentation.

Mesa (<http://www.mesa3d.org/>) is an open-source, cross-platform software implementation of OpenGL. In cases where there is no available OpenGL 2.x hardware support, Mesa can be used as an alternative. The OpenGL ES 2.0 Emulator has been tested with version 7.7.1 of Mesa.

7.1 Building Mesa

After downloading Mesa, run

```
./configure --with-driver=xlib  
make
```

which will create the shared library `libGL.so.1` in the `lib/gallium` subdirectory.

7.2 Building Applications to Use Mesa

When building OpenGL ES 2.0 applications, link against `libGLESv2.so`, `libEGL.so` and `libGL.so.1`. You may need to export `LD_LIBRARY_PATH` to point to the locations of the libraries.

8 KHRONOS CONFORMANCE

The OpenGL ES 2.0 Emulator has been verified for conformance to the OpenGL ES 2.0 specification via the OpenGL ES 2.0 Emulator Conformance Test Suite, published by the Khronos Group (<http://www.khronos.org/>).

8.1 Conformance Test Results

The Khronos Conformance Test Suite was run on the platforms described in section 4.1. The results are as follows:

Platform	Driver Version	Test Result
Windows XP SP3, NVIDIA GeForce 210	197.45	All tests pass
Ubuntu 10.04 LTS, NVIDIA GeForce 210	195.36.15	All tests pass
Ubuntu 10.04 LTS, NVIDIA GeForce 8600 GT	195.36.24	All tests pass
Ubuntu 10.04 LTS, NVIDIA GeForce 9500 GT	195.36.24	All tests pass

Note: The conformance tests were run after the installation of the Mali GPU Offline Shader Compiler, which is required to ensure conformant behavior. The Mali GPU Offline Shader Compiler is available from <http://www.malideveloper.com/>.

8.2 OpenGL Driver Workarounds

A number of workarounds are present in the OpenGL ES 2.0 Emulator to compensate for issues in some OpenGL drivers that would otherwise prevent the conformance tests from passing. A partial list of workarounds is presented below:

Workaround	Platforms
<code>glFramebufferRenderbuffer</code> with attachment <code>GL_STENCIL_ATTACHMENT</code> is unsupported	All platforms.
<code>glTexImage2D</code> with type as <code>GL_UNSIGNED_SHORT_5_5_5_1</code> is unsupported	All platforms
<code>glRenderbufferStorage</code> with internal format as <code>GL_RGB5_A1</code> is not supported	Windows and Linux reference platforms.

9 CHANGES IN FUNCTIONALITY FROM PREVIOUS RELEASES

9.1 Changes from version 1.1.0

- Pixmap Surfaces are now supported by the EGL Library in Linux.
- eglCopyBuffers is now supported by the EGL Library in Linux
- Validated conformance to the OpenGL ES 2.0 specification via the Khronos Conformance Test Suite.

10 KNOWN ISSUES AND LIMITATIONS

10.1 Known Issues

The known issues affecting the OpenGL ES 2.0 Emulator are documented in the OpenGL ES 2.0 Emulator Errata document, available from <http://www.malideveloper.com>.

Any issues found subsequent to this release of the OpenGL ES 2.0 Emulator will be documented in new versions of the errata document.

10.2 Support

Please contact support@arm.com regarding any issues with the installation and content of this release.

It should be noted that Support of the product will only be provided by ARM if such support is covered by a current contract with the recipient.

11 APPENDIX A: GLEE LIBRARY LICENCE

The OpenGL ES 2.0 Emulator, Windows version, makes use of GLEE. The notice below is reproduced in accordance with the redistribution conditions of GLEE in binary form.

GLee
GL Easy Extension Library
Version 5.21

By Ben Woodhouse
<http://elf-stone.com>

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