Imagination Technologies, Ltd. Linux Driver README
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INTRODUCTION
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The Imagination Technologies Linux Driver kit provides 2D and 3D acceleration for PowerVR KYRO family of graphics chips running in 16 and 32 bpp depths. The drivers are based on the standard DRI mechanism shipped with XFree86 > 4.0.

This is the README for driver version 2.01.21-7.

The license for installation and use of this software is found in:

    Red Hat: /usr/share/doc/powervr-2.00.20/LICENSE.TXT

    SuSE: /usr/share/doc/packages/powervr/LICENSE.TXT

    Mandrake: /usr/share/doc/powervr-2.00.20/LICENSE.TXT

    Other distributions: /usr/share/doc/powervr/LICENSE.TXT

INSTALLATION INSTRUCTIONS
=========================

Installation instructions depend upon your Linux configuration.
Choose the appropriate section from the list below:

    * SuSE, Red Hat, or Mandrake running the vendor supplied kernel

    * rpm based system with a custom kernel

    * non-rpm based system

SuSE, Red Hat or Mandrake with vendor kernels

Download the package appropriate for your system (see list below).
For all distributions, first quit the X server and return to the
console before installing. Run the command indicated below as root:

SuSE

```
rpm -Uvh powervr-2.01.21-7.suse82.i586.rpm
```

Note: Depending on how SuSE was installed the rpm may indicate that a required package is missing (xf86_glx). This package should be installed and the PowerVR package should then install cleanly. See this document for more information:

http://sdb.suse.de/en/sdb/html/xf86glx_int.html

Red Hat

For i386 class Intel Machines (Uni processor only)

```
rpm -Uvh powerv-2.01.21-7.rh90.i386.rpm
```

For i686 class Intel Machines (Uni processor only)

```
rpm -Uvh powervr-2.01.21-7.rh90.i686.rpm
```

For AMD Athlon Machines (Uni processor only)

```
rpm -Uvh powervr-2.01.21-7.rh90.athlon.rpm
```

Mandrake

Mandrake 9.0:

```
rpm -Uvh powervr-2.01.21-7.mdk90.i586.rpm
```

In all systems above, to complete the installation for the first time, the X server must be configured as described in the "XFree86 Configuration" section.

Rpm based system with custom kernel

Requirements: linux kernel 2.4.x or >= 2.5.8, source in /usr/src/linux.

Download powervr-2.01.21-7.src.rpm. Run the following as root:

```
rpm --rebuild powervr-2.01.21-7.src.rpm
```

If running Red Hat 8.0 (or another distribution with a newer version of rpm), the command is "rpmbuild" instead of "rpm".

Look for a line near the end of the output which says where the resulting rpm is being placed. This line will read something like this:

Wrote: /usr/src/redhat/RPMS/i386/powervr-2.01.21-7.i386.rpm

Run "rpm -Uvh" on the indicated file. For this example, the command would be:

rpm -Uvh /usr/src/redhat/RPMS/i386/powervr-2.01.21-7.i386.rpm

To complete the installation for the first time the X server must be configured, described in the "XFree86 Configuration" section.

Non-rpm based system

Requirements: linux kernel 2.4.x or >= 2.5.8, source in /usr/src/linux.

Download powervr-2.01.21-7.tgz. Run the following commands as root:

```
tar zxvf powervr-2.01.21-7.tgz
cd powervr-2.01.21-7
make install
```

Slackware distribution note: if you are using the original kernel and kernel source that were installed, check if the source is configured the same as the kernel you are running. In particular a SMP mismatch will cause the resulting powervr kernel module to fail to depmod/insmod with kernel_flag undefined.

To complete the installation for the first time the X server must now be configured, described in the "XFree86 Configuration" section.

XFREE86 CONFIGURATION

The KYRO driver is installed, unless another video card has be installed in the interim.
Follow the appropriate instructions below, depending on yor Linux configuration:

* SuSE
* Red Hat & Mandrake

SuSE

The SaX2 utility on SuSE can be used to easily set up the X configuration.

SuSE 8.0:

1) Run "sax2 -b /var/opt/sax/profile/kyro -m 0=powervr"

2) SaX2 will ask if you want to enable 3D. Answer "yes".

3) SaX2 will then show its configuration panel. Select "Change configuration" to setup the mouse, keyboard, and desktop. Make sure the color depth is set to 16bit or 24bit.

4) After pressing finish to exit SaX2, run the command "switch2xf86_glx" from a command prompt as root. This changes some symlinks on the system so that OpenGL is not hardcoded to Mesa.

5) Restart X.

Problems and Troubleshooting

Quake3 explicitly tries to open the shared library "libGL.so". This may not exist on SuSE systems or may be a symbolic link to the Mesa3D software rendering library, which will result in very slow rendering. The solution is to execute Quake3 the first time with the command:

```
quake3 +set r_gldriver /usr/lib/libGL.so.1
```

This setting is then saved in:

```
~/.q3a/baseq3/q3config.cfg
```

and from next time on Quake3 can simply be executed with "quake3".

SuSE 8.2

For SuSE 8.2 and above follow the instructions below rather than the ones from the general SuSE category.

1) /etc/X11/XF86Config file needs to be manually changed:

a) First you must determine the busID of your KYRO card, this is done by the command:

```
/sbin/lspci | grep VGA | grep SGS
```

This should result in an output of the form:

XX:YY.Z VGA compatible controller: SGS Thomson Microelectronics: Unknown device 0010 (rev BB)

where
XX:YY.Z is the bus ID of the device
BB is the type of KYRO 01 = KYRO-I, 07 = KYRO-II

b) Edit the XF86 config file (/etc/X11/XF86Config) to modify the line:

BusID "PCI:1:0:0"
to be
BusID "PCI:XX:YY:Z"

c) identify Section "Device" and change Driver to be "powervr"

2) Run the command "switch2xf86_glx" from a command prompt as root. This changes some symlinks on the system so that OpenGL is not hardcoded to Mesa.

3) Restart X.

Problems and Troubleshooting

Quake3 explicitly tries to open the shared library "libGL.so". This may not exist on SuSE systems or may be a symbolic link to the Mesa3D software rendering library, which will result in very slow rendering. The solution is to execute Quake3 the first time with the command:

quake3 +set r_gldriver /usr/lib/libGL.so.1

This setting is then saved in:

~/.q3a/baseq3/q3config.cfg

and from next time on Quake3 can simply be executed with "quake3".

Red Hat & Mandrake

Red Hat and Mandrake (unlike SuSE) do not provide tools to easily automate XF86 configuration, as the standard tools provided only recognize devices of which XF86 itself is aware of, and KYRO is not among these.

If your configuration is simple, i.e. standard type of mouse, keyboard and only one graphics card it is recommended, unless you are expert at XF86 configuration, that you base your config file on the supplied sample and modify as per the following guidelines.

1) First you must determine the busID of your KYRO card, this is done by the command:

Red Hat:
/sbin/lspci | grep VGA | grep SGS

Mandrake:
/usr/bin/lspci | grep VGA | grep SGS

This should result in an output of the form:

XX:YY.Z VGA compatible controller: SGS Thomson Microelectronics:
Unknown device 0010 (rev BB)

where
XX:YY.Z is the bus ID of the device
BB is the type of KYRO 01 = KYRO-I, 07 = KYRO-II

2) Now copy the sample XF86 config file (/etc/X11/XF86KyroSampleConfig) to /etc/X11/XF86Config-4. If there is an existing XF86Config-4 file rename to something safe first.

3) Edit the XF86 config file (/etc/X11/XF86Config-4) to modify the line:

BusID "PCI:1:0:0"
to be
BusID "PCI:XX:YY:Z"

Notice that XX, YY are returned as hex while XF86Config-4 must have decimal values.

4) Again in the XF86 config file uncomment the mouse appropriate section for your mouse, either PS/2 intellimouse or 2 button PS/2 mouse. The country code of your keyboard can also be edited at this time, it is immediately above the mouse sections.

5) Uncomment the appropriate font server section (located at the top of the file immediately after the serverlayout section).

6) Check that there is a symlink from /etc/X11/X to /usr/X11R6/bin/XFree86 (there may already be a symlink from /etc/X11/X, this should be removed) i.e

```
if [ -e /etc/X11/X ]; then rm -f /etc/X11/X; fi;
ln -s /usr/X11R6/bin/XFree86 /etc/X11/X
```

Note: On some systems the link to X may be somewhere else, to /usr/X11R6/bin/X for instance, but otherwise the procedure is the same. The path variable for the X startup process should be examined to see where the link to X may be.

7) Run startx

Problems and Troubleshooting

The above (1-6) is aimed at simple standard configs. If you have a more complex setup or less common input devices a suggested approach is to replace the KYRO with a card which XF86 knows of, and generate a XF86Config file using a standard tool. Once generated the section relating to the temporary video card is removed and replaced with the appropriate lines from the sample config file. Additionally ensure that the "Module" section contains the lines:

```
        Load "GLcore"
        Load "dri"
        Load "glx"

     and that the following section is included
        Section "DRI"
            Mode 0666
        EndSection
```

Configuration Options

A list of possible configuration options.
These should be left as defaults unless you are experiencing problems.

Option "SWCursor" "boolean"
    Enable or disable software rendering of the X cursor.
    Default: off.

Option "HWCursor" "boolean"
    Enable or disable hardware rendering of the X cursor.
    Default: on.

Option "NoAccel" "boolean"
    Enable or disable 2D hardware acceleration.
    Default: off.

Option "PixmapCacheLines" "integer"
    Number of lines in the offscreen pixmap cache used by XAA.
    Default: VirtualY of screen.

VERIFYING YOUR INSTALLATION

To check your installation, run "glxinfo".
The output should contain the lines:

```
        OpenGL vendor string: Imagination Technologies
        OpenGL renderer string: PowerVR KYRO
        OpenGL version string: 1.2.1
```

INSTALLED COMPONENTS

* XFree86 2D driver (/usr/X11R6/lib/modules/drivers/powervr_drv.o)

* XFree86 DRI component (/usr/X11R6/modules/dri/powervr_dri.so)

* kernel DRM module (/lib/modules/`uname -r`/char/drm/powervr.o)

* internal libraries (/usr/lib/lib{PVR2D,PVR2OS,PVRMMAP,SGL2,SGLMID7B}.so)

* library symlink (/usr/X11R6/lib/modules/drivers/libPVR2D.so)

FAQs
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1) Undefined symbol "MTRR_TYPE_WRCOMB" when compiling the drivers.
   This means the kernel you are trying to compile against does not
   have MTRR support. SOLUTION: reconfigure the kernel to support MTRR,
   compile and install it and then compile and install the PowerVR drivers.

2) "can't find powervr module" error reported after running startx
   (XFree86 quits without reaching graphic mode) It is possible the
   kernel module did not load due to undefined symbols. To check this,
   as root try to load manually the module: "modprobe powervr.o".
   If it reports undefined symbols then you have installed a package
   which does not match your distribution/kernel. Download either the
   .tgz or .srpm package and install that.

3) error message regarding missing k_deflt when installing the rpm package
   under SuSE. This means you are either missing the kernel sources alltogether
   or the kernel source package you have installed does not match the
   driver version you are installing.

Note: For further FAQs and help on using PowerVR cards with Linux
try one of the many developer or fan sites e.g. http://www.pvr-net.com

KNOWN ISSUES
============

No multiple video card support. This will be supported in a future
release.

Mode timing (besides vertical refresh) and sync polarity from the
XF86Config mode lines are ignored by the driver. This will be
resolved in a future release.

This driver has not been tested on SMP systems.

Tuxracer commercial version will not run. Issue is being discussed
with tuxracer developers.

If an OpenGL application is forcibly terminated by closing the X
connection then there may be leftovers on the desktop. This appears to
be a problem in the DRI infrastructure the driver is based upon.

Mandrake 9.0 systems with the default kernel might experience random
kernel crashes. This is due to a security patch that Mandrake installs
and interferes with our kernel module. This security patch does not
exist in any other standard kernel version. The solution is either to
recompile the kernel while making sure the GRsecurity is turned off,
install the kernel and then recompile and install the PowerVR drivers,
or install a standard stock kernel (which will not have the patch).

FEEDBACK
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Please report bugs to:

linux_bugs@powervr.com

As these drivers are unsupported drivers we cannot guarantee that
bugs will be fixed, but we will do our best.

When filing a bug report, please include the following information:

Type of KYRO card
Version of PowerVR drivers
Which driver package was used for installation
Processor
Motherboard chipset
Amount of memory
Kernel version
Linux distribution
XFree86 version
Window manager and/or desktop environment
Application (and version) experiencing the problem
Steps to reproduce the problem

For general queries or comments regarding the PowerVR Linux drivers,
write to:

linux@powervr.com

CHANGELOG
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powervr-2.01.21-7

Fixed: startup problem on some system configurations

Added: support for gcc 3.x compilers and kernels compiled with gcc 3.x

powervr-2.00.20-427

Fixed: Xv overlays sometimes vanishing/reappearing after geometry change

Fixed: Unreal Tournament 2003 problems

powervr-2.00.20-369

Added: AGP support

Added: Xv support

Added: DPMS support

powervr-2.00.20-234

Fixed: drivers not working on some system configurations

Fixed: XawTV startup abort

Added: gamma support

Added: .tgz and .src.rpm packages

powervr-2.00.20-180

Initial public beta release