Linux Games

INTRODUCTION

Hello. My name is Andrew Howlett. I've been using Linux since 1997. In 2000 I cutover to Linux for all my projects, except I dual-booted Windows to play games. I like to play computer games. About a year ago I stopped dual booting. Now I play computer games under Linux. The games I play can be divided into four groups: Free Games, native linux commercial games, Windows Emulated games, and Win4Lin enabled games. This presentation will demonstrate games from each of these four groups.

Platform

Before I get started, a little bit about my setup so you can relate this to whatever you are running. This is a P3 900 MHz machine. It has a Crystal Sound 4600 sound card and a GEForce MX440Video Card. The video card has two outputs: one to my monitor and a second to the TV – the screens are exactly the same, NVidia calls it "TwinView". I am using the proprietary accelerated NVidia drivers. Because of the TV, I have reduced video resolution to 800x600.

On the software side, this computer runs Red Hat Linux 8 with the K Desktop Environment and XFree86 4.2.0. It has wine version 20030318, winex 3.0, and win4lin version 5.

FREE GAMES

Linux is a Free OS so it makes sense to start with some free games. When I say Free, I mean it in the Free Software Foundation sense: free to use, modify and distribute. There are hundreds of free software games, so I will demo five games which recently made the happypenguin.org "best 25 games" list, then two others.

FreeCiv

FreeCiv made the best 25 list and happens to be my favourite linux game. It is also an excellent example of a Free game in that it works in 18 different architecture/OS combinations. FreeCiv is a clone of Microprose Civilization 2. Like many Free games, it uses a client/ server architecture. First you start a server. The server runs in text mode. You define the game properties on the server,

Figure 1: FreeCiv

such as the number of players and the size of the map, then you start the game. Once the game is running clients may join the game. Clients connect to the game using TCP/IP, so it is very easy to play multi-player games over the Internet. Like many Free games, clients are available for many platforms, including Windows, Amiga and Macintosh. So there are lots of players out there. If you don't want to play against other humans, then Freeciv includes some nasty AIs.

BZFlag

BZFlag is a tank combat game along the same lines as the old BattleZone game. Like FreeCiv, BZFlag uses a client/ server architecture over TCP/IP networks. Unlike FreeCiv, the game contains no AIs – you must play this game against other humans (? entities ?) over the Internet. The BZFlag shell includes an easy to use utility which will seek out game servers. Like FreeCiv, there are many variables that the server operator may define prior to the game, so each BZFlag server has a different feel. Below is a screenshot from a game using laser beams and reflecting shots. The game can be played as a plain old shoot 'em up, or can be played as capture the flag (thus the word "flag" in the game's name). For more information visit bzflag.org

Figure 2: BZFlag

NetHack: Falcon's Eye

Nethack is a classic Unix game. But Nethack Falcon's Eye updates the old game with a graphical front end. The Falcon's Eye home page says that you have to compile from source for linux, but if you check the links page you will find sources of deb and rpm files. So install from rpm or deb and use the command "nethack" to start the game. You get to customize your character slightly, then it's slash, hack and explore.
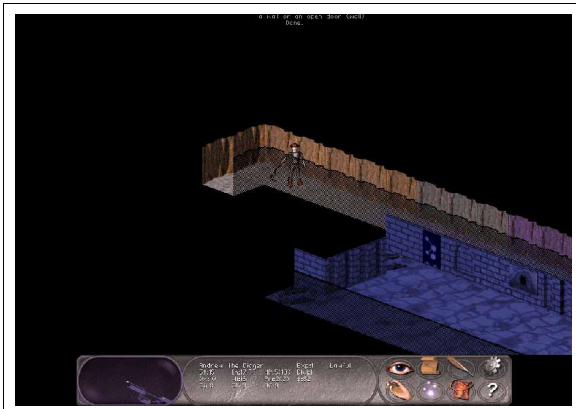
For more information visit
http://www.hut.fi/~jtpelto2/nethack.html

Figure 3: Nethack Falcon's Eye

Frozen Bubble

Frozen Bubble was voted the #1 Free game in the recent Happy Penguin poll. Plus it's written in Perl, which is pretty cool. The homepage is frozen-bubble.org, and you can find links to download sites. A word of warning – you will also need perl-SDL.

Frozen bubble reminds me a little bit of tetris. It can be played in two-player mode.
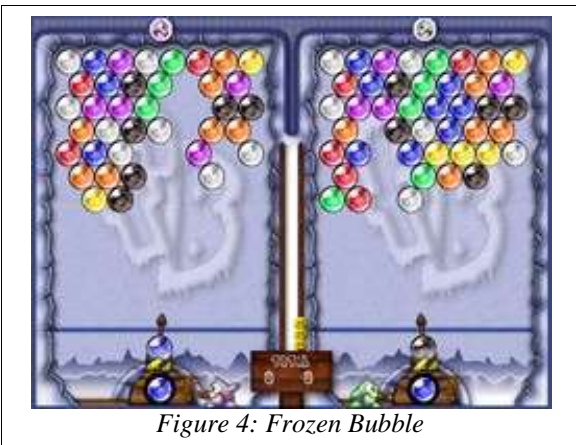

Figure 4: Frozen Bubble

FlightGear

Flight Gear is a Free flight simulator. I have no idea how to use a flight simulator – I can start the application, but I can't demo it. The website is flightgear.org and they provide debian binaries (rpms are available elsewhere on

Figure 5: Flight Gear

the Net – do a google search).It's a big download (38 MB), but if you are interested in this sort of thing, then you should try FlightGear.

TuxRacer

TuxRacer is not Free Software, but it is Open Source ... at least, I will demo version 0.61 which is Open Source. The current version, 1.1, is commercial closed source at the moment, but the creator says that he will eventually open its source. Despite the licensing, version 0.61 is free as in free beer, and if you share a computer with kids then TuxRacer is a must have. For some reason, a penguin belly surfing down a hill at 100 km/h really appeals to kids. Plus, tuxracer works great with a joystick. You can get downloads at rpmfind.net or your favourite debian server. If you really like version 0.61, then the commercial version 1.1 includes more courses and is available at tuxracer.com for $15 US.

Figure 6: Tuxracer

TuxTyping

Tux Typing is part of the tux4kids.org project. It is a Free typing tutor aimed at the 5-15 age bracket. It features pumping music and bright graphics guaranteed to give an adult a severe migraine, but kids seem to like it.

One peculiarity I've noticed: the game installed to `/usr/local/tuxtype` on my machine, and it must be run from that directory. If it is launched from another directory it will be unable to find its files.
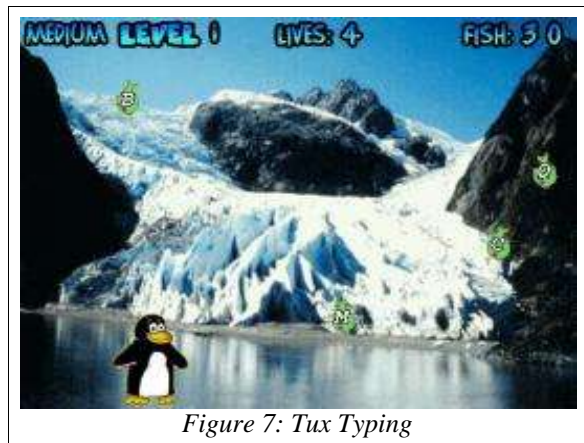

Figure 7: Tux Typing

LINUX COMMERCIAL GAMES

There are some linux clients available for commercial games. You won't find the linux versions at CompuCenter or Electronic Boutique. The Happypenguin.org forums and the linux games faq (http://icculus.org/lgfaq/) are good places to look for clues.

Quake 3 Arena

Happypenguin voted Quake 3 Arena as the best Commerical Game. This choice might seem a little strange since the game is more than three years old. But even though Quake 3 Arena was released three years agao, the Q3 game engine powers lots of recent titles, such as Medal of Honour Allied Assault which is a very popular new game from Activision. I happen to have a copy of Quake 3 Arena, purchased from Loki Entertainment Software before they went out of business.
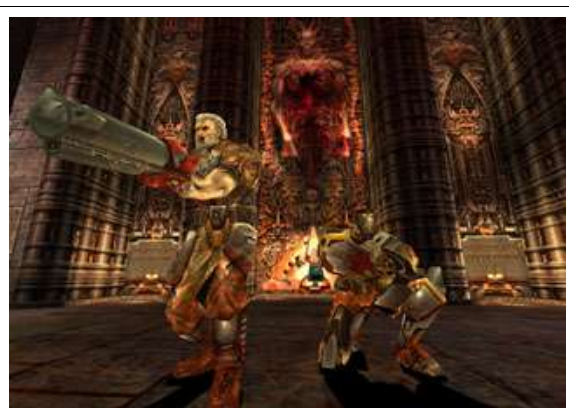

Figure 8: Quake 3 Arena

Loki Entertainment Software

Loki was a short lived software company which ported popular commercial games to linux. Unfortunately, not enough people bought the linux versions (freely distributing the linux binaries to add to Windows versions might have been part of the problem). But some of their games are still around. Here is a copy of SimCity 3000. I won't demo it, because SimCity gives me a headache. Loki also ported the following games to Linux:

- Postal Plus
- Rune: Halls of Valhalla
- Tribes 2
- Sid Meyer's Alpha Centauri
- Heavy Metal: F.A.K.K.2
- MindRover
- Rune
- Kohan: Immortal Sovereigns

- Deus Ex
- Soldier of Fortune
- Unreal Tournament
- Descent 3
- Civilization: Call to Power
- Heavy Gear 2
- SimCity 3000 Unlimited
- Eric's Ultimate Solitaire
- Heretic 2
- Heroes of Might and Magic III
- Myth 2: Soulblighter
- Railroad Tycoon II

Demos of most of these games can be downloaded from the net, or you can order the full demo CD from xplinux.biz for $3.

Other Commercial Games with Linux Binaries

These games are also known to have linux binaries:

- Return to Castle Wolfenstein
- SiN
- Warcraft (i.e. the FreeCraft engine)
- America's Army

WINDOWS EMULATION

Because most game (and other software) companies distribute Microsoft Windows versions of their product, but not Linux versions, there is a lot of interest in creating an emulator which will Windows games on Linux platforms. There are several such projects. The foremost Free Software windows emulation project is the WINE project. (Strictly speaking, Wine is not an emulator, but we will leave that as a topic of debate for Computer Scientists.)

The WINE Project

Here is how the Wine Project describes itself:

Wine is an implementation of the Windows Win32 and Win16 APIs on top of X and Unix. Think of Wine as a Windows compatibility layer. Wine provides both a development toolkit (Winelib) for porting Windows sources to Unix and a program loader, allowing many unmodified Windows 3.x/95/98/ME/NT/W2K/XP binaries to run under Intel Unixes. Wine works on most popular Intel Unixes, including Linux, FreeBSD, and Solaris.

Wine does not require Microsoft Windows, as it is a completely alternative implementation consisting of 100% Microsoft-free code, but it can optionally use native system DLLs if they are available. Wine comes

---

Linux Joystick Support

You might have noticed me using a joystick during my demonstration. Linux supports many types of joysticks (I am using a Microsoft Sidewinder). The linux kernel has joystick/gamepad modules, and some games, like tuxracer, automatically use the joystick. But other games, like Quake3, don't recognize the linux joystick system. Fortunately there is an incredibly simple and elegant little hack called "kbstick" put together by David Fulgham. This neato little program reads the linux joystick device and uses thebuiltin XWindows function XTestFakeKeyEvent to translate each joystick event into a keyboard event. So if you press left on the joystick, kbstick will generate a keypad left arrow keypress. Most games let you customize the keyboard commands, so you can quickly instruct Quake or any other game to respond to these keyboard inputs. You can find kbstick at http://www.ditch.org/kbstick/.

with complete sources, documentation and examples and is freely redistributable. (The licensing terms are the GNU Lesser General Public License.)

Myst

To get an idea of how Wine works, lets try installing a Windows game using Wine. Before we go any farther I should let you know that I am extraordinarily cheap and buy all my games from the bargain bins. So I won't be demonstrating the latest, greatest (most expensive) games. To start, we will install an old game named "Myst" that I picked up at Staples for $7.99.

First, of course, put the Myst CD in the drive and mount it. Then run the setup program using the command

```
$ wine /mnt/cdrom/SETUP.EXE
```

You will likely get an error because you don't have permissions for the directories that wine has been configured to use. So change to superuser and try again:

```
# wine /mnt/cdrom/SETUP.EXE
```

You will experience a Myst installation, just as you would on a Windows computer. Next, try the game. We installed the game to C:\Program Files\Myst\myst.exe, so the command to execute the game is:

```
# wine "C:\Program Files\Myst\Myst.exe"
```

Notice that wine understands both Unix and Windows file naming conventions. The Myst game runs, as it would on Windows.

Full Screen or XWindow?

The `~/.wine/config` file controls the emulator's behaviour. You can control

The Desktop line controls whether the game will run as fullscreen, or whether it will appear in an X Window. The line is in the [x11drv] section and looks like:

```
"Desktop" = "640x480"
```

By specifying a Desktop size you can force the Windows program to run in an XWindow of corresponding size. Since many old Windows games have a resolution of only 640x480 or 800x600 pixels, you can easily play the game in a window.

Windows Version

You can also change the Windows version which Wine emulates. Simply edit the [Version] section of the config file. The format is very easy to understand:

```
[Version]
; Windows version to imitate (win95,win98,winme,nt351,nt40,win2k,
winxp,win20,win30,win31)
"Windows" = "win98"
; DOS version to imitate
;"DOS" = "6.22"
```

Application Database

Myst works using wine. Many applications work on linux using wine. But some require special settings in the config file or registry. Other games just don't work under wine. The wine application database is a repository of knowledge regarding which applications work with wine (and how to make them work) and which don't. The application database can be found at: http://appdb.winehq.com/appbrowse.php

TRANSGAMING WINEX

Wine has some problems. For one, I don't like installing and running windows apps as root (and yes, apps running under wine can execute unix commands, so it is possible to embed unix malware in a windows executable). Wine has had problems with DirectX support. Wine has problems running programs that use CD hardware copy protection. And wine is a very broad project, which doesn't focus on a specific genre of software, such as games.

Transgaming is a Canadian company which specializes in a version of Wine intended for use with games. Their version of wine is called WineX. WineX is subscription software, meaning that you must become a member of Transgaming's service to download the software. A membership costs $5US per month and the minimum membership term is 3 months.

WineX installs as an rpm or deb package. You use it exactly as you would use wine, but instead of wine, the command is "winex3".

Star Trek Voyager Elite Force

For instance, to install Star Trek Voyager Elite Force using WineX, insert and mount the CD, then use the command

```
$winex3 /mnt/cdrom/Setup.exe
```

to launch the installer. The stvef installer will launch, and you may use it to install the game. It will even create desktop icons for you. You can run the installer as a normal user - winex will create a Transgaming_Drive/ directory in the user's home directory, which contains the windows C: drive.

The STVEF install happens to take a long time, so I have already installed it. In this case I had some trouble launching stvef. I found that I had to change directories to the stvef directory, then use the command:

```
$ winex3 stvoy.exe
```

You will notice that the sound is a bit garbled. During startup, winex produces console messages complaining about the sound driver. Transgaming has a game database at their website (transgaming.com). The entry for STVEF
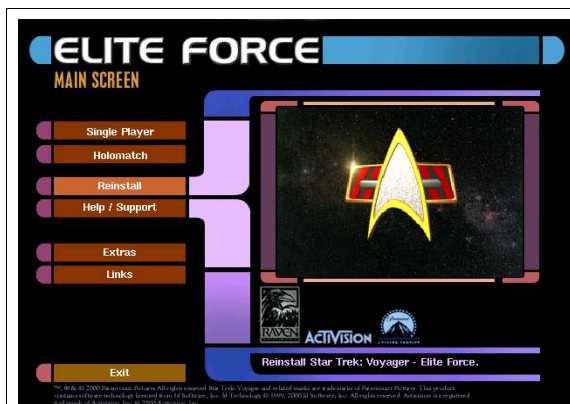

Figure 9: STVEF Installer

suggests that sound is a common problem. Otherwise, however, the game runs fine. And like wine, you can control the fullscreen/xwindow behaviour by modifying the config file, which is stored at `~/.transgaming/config`. The config file looks exactly the same as a wine config file.

Caesar III

Here's another example of a game that works under WineX: Caesar III. This is a paricle based simulator game, along the same lines as SimCity, but with an Ancient Rome flavour. Notice when I run the game that the pointer doesn't work properly – the buttons gain focus when the pointer is about 100 pixels beneath them. This is a common problem with WineX enabled games. It has something to do about the XWindow having different dimensions than the Windows game. We can edit the config file to fix the problem, or we can change the dimensions of the game. This gives rise to an interesting problem. The game starts in 640x480, but then later allows resolution up to 1024x768. But the Desktop size is fixed. So either we accept the mouse problems at the beginning of the game and use the larger desktop later, or we accept a small desktop for the entire game. You might also notice minor sound problems.

Master Of Orion 2

Master of Orion 2 underlines the fact that you should always try both wine and winex before giving up on a game. For many months I tried to run MOO2 using winex. Winex would install the game but couldn't play it - “Unhandled Exception”. Then one day I decided to try wine and it worked well first time.

Starfleet Command II

Starfleet Command is my favourite PC game. It is a computer implementation of an old board game named Starfleet Battles. Starfleet Command does not work under linux, but according to the Transgaming games database, some people have played Starfleet Command II (SFC2) with winex.I have been able to install SFC2 with winex, but when I run it the introduction movies play then winex exits. But I can run the `SFC2Setup.exe` utility with winex.

The funny thing is, the game runs using wine, but only if I use the `sfc2setup.exe` program to set the graphics to 800x600. But wine won't run the `sfc2setup.exe` program – I have to use winex to do that. So I need winex to install the game, but I have to run the game with wine. This goes one lesson further that MOO2 – always test installation with winex and run the game with winex, and vice versa.

Spiderman: The Movie

Spiderman works in Linux using WineX, but there are several challenges. The first challenge is that SpiderMan comes on two CD's. So you insert and mount the first CD, start the installation, and ten minutes later it asks for the second CD. Problem is, you can't unmount the first CD. This is a common problem with multi-CD games. Fortunately, the installation program just copies files from the CD, so you can exit the installation and copy the files

Figure 10: Spiderman The Movie

manually. The second problem comes when you try to launch the game. The game uses a hardware CD protection scheme which winex does not recognize, so even though you have the CD in the drive, the game won't start. In this case, the solution is to download and install a no-cd crack from the Internet. This will expose your system to malware, but at least you are only running winex from a user account. And, finally, you can play the game.

Star Fleet Command III

Star Fleet Command III is the latest version of Starfleet Command. It doesn't work under wine or winex (yet). But the movies run, and they provide an interesting comparison between wine and winex. The movies run smooth as silk in winex3, but are choppy in wine. And this demo will show you two different failure modes.

Monopoly

This is one of those games that kids get free with their box of Sugar Lumps breakfast cereal. I've tested three of these games with wine and winex – Monopoly, Candyland and Clue. None of them worked. But what I want to show here is the debugmsg commandline option. If a game doesn't work under wine (or winex) it may be informative to turn on the debug message. You can turn on all debug messages using the command

```
$ winex3 –debugmsg +all Monopoly.exe
```

You may notice that wine generates a huge number of debug messages. In fact, if you were to redirect these messages to a file, as you probably would if you were debugging an applications, then you might exceed your disk quota. So wine debug messages are grouped into categories called channels and you can turn each channel on or off individually. Here is a list of the wine debug channels:

all	accel	advapi	animate	aspi
atom	avifile	bitblt	bitmap	caret
cdrom	class	clipboard	clipping	combo
comboex	comm	commctrl	commdlg	console
crtdll	cursor	datetime	dc	ddeml
ddraw	debug	debugstr	delayhlp	dialog
dinput	dll	dosfs	dosmem	dplay
driver	dsound	edit	elfdll	enhmetafile
event	exec	file	fixup	font

gdi	global	graphics	header	heap
hook	hotkey	icmp	icon	imagehlp
imagelist	imm	int	int10	int16
int17	int19	int21	int31	io
ipaddress	joystick	key	keyboard	loaddll
ldt	listbox	listview	local	mci
mcianim	mciavi	mcicda	mcimidi	mciwave
mdi	menu	message	metafile	midi
mmaux	mmio	mmsys	mmtime	module
monthcal	mpr	msacm	msg	msvideo
nativefont	nonclient	ntdll	odbc	ole
opengl	pager	palette	pidl	print
process	profile	progress	prop	propsheet
psapi	psdrv	ras	rebar	reg
region	relay	resource	richedit	scroll
segment	seh	selector	sendmsg	server
setupapi	setupx	shell	snoop	sound
static	statusbar	storage	stress	string
syscolor	system	tab	tape	tapi
task	text	thread	thunk	timer
toolbar	toolhelp	tooltips	trackbar	treeview
ttydrv	tweak	typelib	updown	ver
virtual	vxd	wave	win	win16drv
win32	winedbg	wing	wininet	winsock
winspool	wnet	x11		

Furthermore, each channel has four classes of mesaage. The classes are trace, fixme, warn and error. And you can specify which class of message you want for each channel.

For instance, if you want to receive all classes of debug messages about the joystick channel, you could use the command:

```
$ winex3 -debugmsg +joystick Monopoly.exe
```

If you want to receive all debug messages except win16drv and tooltips, then you could use the command

```
$ winex3 -debugmsg +all,-win16drv,-tooltips Monopoly.exe
```

If you want to receive only err class messages, then you could use the command

```
$ winex3 -debugmsg err+all Monopoly.exe
```

WIN4LIN

As I showed with the last few examples, wine does not work with some games. Win4lin is a different approach to Windows emulation. Wine tries to replace Microsoft's Windows OS, but Win4lin makes Windows work within Linux. To use Win4Lin you need a copy of Win4Lin, which costs $79 from Netraverse.com, and a legal copy of Microsoft Windows 95, 98, or ME. You start the win4lin installer, then it asks you for the Microsoft Windows CD. Then you see what appears to be a normal installation of Windows. But when the installation is finished, instead of booting Windows, you reboot linux. Then you can use the **win** command under X to start a Microsoft Windows session (or **fwin** to start Windows from a virtual text terminal). Win4Lin creates virtual display, input, and networking devices, so the copy of Windows operates as though it were working on a dedicated machine. But you see it in an X Window, with the window decorations from
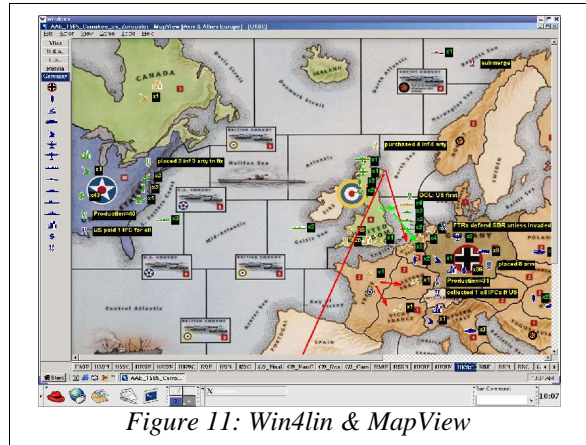

Figure 11: Win4lin & MapView

your installation of KDE, Gnome or whatever you happen to use as a window manager.

The first question I get asked is usually, "if you are using a real copy of Windows why not just give it its own partition and set up a dual boot environment?" Here's the first reason. I need a volunteer who has a stopwatch function on his watch. When I say "start" start timing. When I say "stop", stop timing. Start. I just executed the win command. One, two, three, four, five, six, seven, eight, nine, ten, stop. We just booted Windows ME in ten seconds. Now I can shut down Windows the usual way from the Start menu, or I can just click the windows close button. And I can start Windows again in just ten seconds. I'll demonstrate some of the other reasons for using Win4Lin by explaining to you why I bought it.

MapView

I play a game called Axis and Allies. It's a board game, but good players are hard to find, so I belong to a Internet A&A club and we play game by email. We use a program called MapView to draw our moves and we mail the save files back and forth. MapView is a Microsoft Windows program. It does not work with wine.

I could dual boot Windows to use MapView, but my email client works under linux and I need the browser to roll dice. When playing as allies, every turn requires three emails, so I had to reboot my computer five or six times to play one turn as allies. One of the members of our LUG demonstrated Win4Lin and a few days later I had MapView running under Linux using Win4Lin. Here's MapView running in a Microsoft Windows Window within an X Window.

Now I'm going to exit the MapView application. Notice that the window is still there. This is a MapView bug – it takes a long time to shut down the application. But who cares? We can just shut down Windows, restart, and ten seconds later we have a fresh desktop.

Starship Exeter

Starship Exeter isn't a game, it's a Star Trek episode (http://homepage.mac.com/starshipexeter/). I'm going to use it for a quick demonstration of Media Player under win4lin. First, here is what it looks like using mplayer. Now here is what it looks like using Media Player. Movement is a little

bit choppy, and you can see some graphic-block artifacts, but I was surprised that it ran at all.

Arthur's Adventures With D.W.

My wife upgraded her computer to Windows XP. My wife shares her computer with my six year old daughter who owns a pile of "edutainment" software. But a lot of it won't work with Windows XP. So I wondered – will it work with Win4Lin.

The answer is yes, but first I'm going to shut down X. My daughter prefers to play her games in full screen mode. So this time we start win4lin using the `fwin` command from a virtual terminal. Win4lin lauches an xserver and customizes it to display the windows desktop. If you didn't already know win4lin was running, you might not even notice.

One of the ways you might notice is loading and ejecting CDs. I have found that the only reliable way to load, mount and eject CDs is by using a virtual terminal, then switching back to the X terminal. So we load and mount Arthur, then switch back to Windows, and run the game.

Barbie as Rapunzel

Win4Lin version 4 didn't support DirectX. DirectX has many components such as DirectDraw (2d drawing), Direct3d, DirectSound, DirectPlay, and so on. The new Win4Lin version 5 supports some DirectDraw. Maybe you play Diablo and you are more interested in Direct3D. But DirectDraw support means that win4lin can run the six

year old girl Killer App – Barbie as Rapunzel. It also demonstrates some neato features such as desktop resizing and movies. Here's a quick look at the game running under win4lin in fullscreen mode.

CONCLUDING MATERIAL

Linux Gamers FAQ

The linux gamers FAQ has more details than I was able to talk about tonight. You can find the lgfaq here: http://icculus.org/lgfaq/. You might be especially interested in the Linux Games List, which is here: http://icculus.org/lgfaq/gamelist.php.

Summary

The point of this presentation was just to show some games running under Linux. I'm not trying to prove a thesis. But I think that I have proven that a good variety of professional quality Free games exist; that many Windows games will run under Linux, but many others won't. So before buying a game we should do a google search for Free alternatives and it might be a good idea to check the Linux Games List, the Wine application database and Transgaming's game database.

Happy gaming!

Andrew Howlett
June 2003.