

**ANTHONY MENASSE  
RISING SUN  
PICTURES**



# **CONTROLLED CHAOS:**

**LINUX IN THE VISUAL  
EFFECTS INDUSTRY**



**ANDRÉ PANG  
RISING SUN  
RESEARCH**

Questions halfway through talk, and at the end.





**MOVIES, MOVIES, MOVIES...**

Australian VFX House (with Animal Logic, Digital Pictures), S-M size  
Specialise in movies  
Some of the works we've done are...



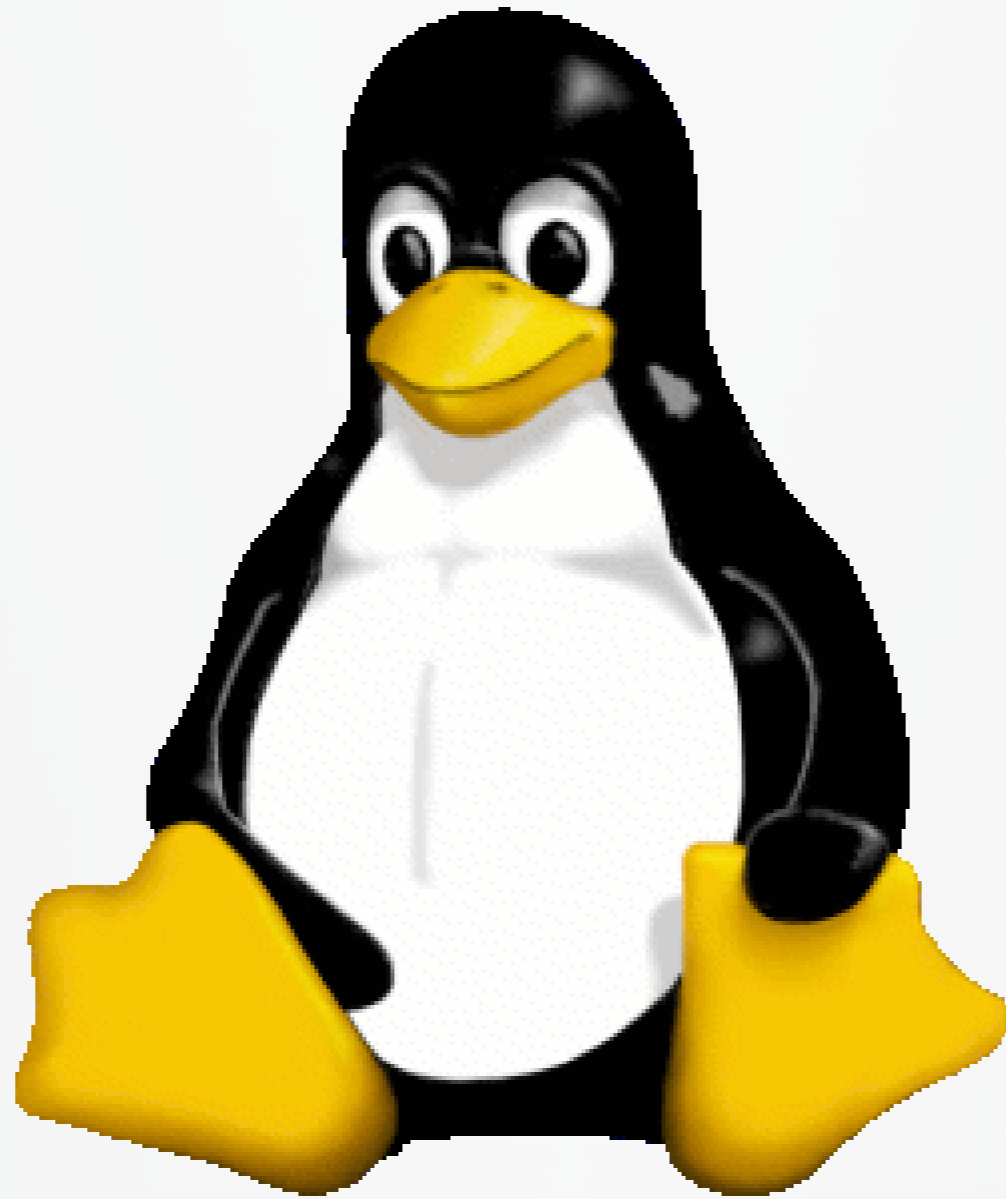


**MOVIES, MOVIES, MOVIES...**



MOVIES, MOVIES, MOVIES...







Mac





**HOW DOES  
THIS MAGIC  
HAPPEN?**

- 1. TOOLS &  
INFRASTRUCTURE**
- 2. ARTISTS**

First, need tools: hardware, software, infrastructure.  
Second, need people who can use those tools: artists.  
HP4: 15 employees, 9 months, 50 shots. 90 staff total.





## THE PROBLEM

One frame from a movie is...





## THE PROBLEM

Work in OpenEXR, render to Cineon 2K





## THE PROBLEM

Clients want DPX, + use half/quarter-size proxies





## THE PROBLEM

Multiple copies for A/B comparison + experiments + extra 3D data (shadow maps).  
End: 7 minutes.



# REQUIREMENTS



Hand over to Anthony. Need I/O. Lots of it.

# REQUIREMENTS

- YOUR I/O SUBSYSTEM HAS TO TRANSFER...
  - 25 FRAMES PER SECOND
  - 12MB PER FRAME
  - 300MB PER SECOND
- YOUR AVERAGE DESKTOP PC CAN'T DO THIS



# REQUIREMENTS

- **SOLUTION:**

1. \$10000-\$15000K

2. ... OR ROLL YOUR OWN.

Build special box that plays only 2K files: lots of RAM + RAID0. (Cheaper than \$10k!).  
FrameCycler: RAM-based playback, closed source, problems scrubbing. Replaced with in-house tool (RIP).

# REQUIREMENTS



Solved I/O problem, but now a bigger problem...



# REQUIREMENTS

- **FILE SERVERS: 300MB PER SECOND OF FRAME DATA, RUNNING OVER NETWORK**
- **... WITH ~3GB STORAGE SPACE REQUIRED PER FRAME**
- **... MULTIPLIED BY EACH ARTIST'S WORKSTATION**
- **RENDERFARM TRAFFIC**
  - **CPU LIMITED, BUT ALSO NETWORK-LIMITED**

Need to store OpenEXR, Cineon 2K, DPX, proxies, 3D shadow maps, different versions. In total, RSP has 15TB of disks.

# REQUIREMENTS

- GIGABIT ETHERNET (BONDED) CAN'T COPE
- UNLESS YOU CHANGE YOUR WORKFLOW...
  - PULL WORKING SET TO LOCAL DISK; PUT IT ON FILESERVER WHEN YOU'RE FINISHED
  - USE PROXY IMAGES: HALF-SIZE OR QUARTER-SIZE
- TALKED TO PERFORMANCE CONSULTANTS

If you're dumb about network traffic, your network won't cope.  
If you're smart about network traffic, network's no longer too much of a problem, disk I/O becomes the problem. Performance consultants useful for identifying bottlenecks + problems.



# REQUIREMENTS

- ARTISTS' LINUX WORKSTATIONS
  - PCs, BUT HIGH-PERFORMANCE PCs
  - NEED TO BE RESPONSIVE
  - LATEST KERNEL IN FEDORA IS OK, BUT USED TO HAVE PERFORMANCE PROBLEMS (SCHEDULER, MAYBE?)
    - DIRECT INTERACTION WITH KERNEL FOLKS IS GREAT (HI CON KOLIVAS!)

Summary: need tuning and careful consideration to run properly. But no overtuning, waste of time.

# REQUIREMENTS



What other requirements do we have? The tools...  
Necessary: closed source programs + proprietary hardware  
Note: Massive, complex pieces of software!

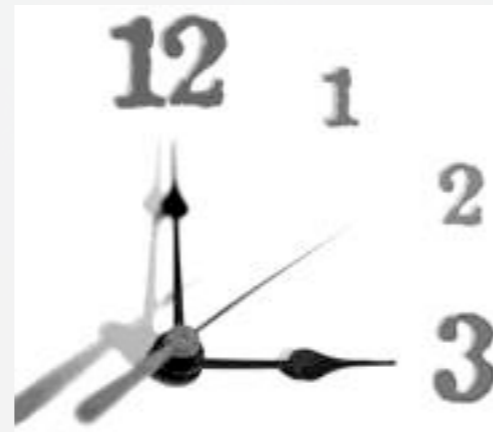
# REQUIREMENTS

- **ADDS CONSTRAINTS, CAUSES PROBLEMS:**
  - **IN THEORY: REQUIRE APPROVED DISTRIBUTIONS  
IN PRACTICE: HAHAHA, ERR, NO**
  - **NEWER KERNEL REQUIRED  
UPGRADE NVIDIA DRIVERS  
SHAKE NO LONGER WORKS PROPERLY**
  - **XSI: VERY STABLE ON WINDOWS, NOT SO ON LINUX  
MAYA: CAUSES CRASHES WITH KDE'S KLIPPER**
  - **GRETAG USB COLOUR PROBE: PROBLEMS WITH  
HOTPLUG**

RedHat 9. XSI: Small issue, but interesting interaction. Very short shpiel on cineSpace/colour calibration. Didn't know a thing about Hotplug, but now we do. Was problem with PCI IDs. Developers of colour software also must use closed APIs...



# REQUIREMENTS



# REQUIREMENTS

The following internal patch fixes the issue:

[[source:/trunk/config/systemFiles/treeRoot/etc/hotplug/usb/gretagmacbeth.usermap.patch#latest](#)]

The agent script gretag provides sets very restrictive permissions.

For now we fix this via a patch to their agent script:

[[source:/trunk/config/systemFiles/treeRoot/etc/hotplug/usb/gretagmacbeth.patch#latest](#)]

Unfort. i was still unable to get udev to apply a rule for this device. Im not sure why this is and it may be a general udev issue. However the above patches allow access for users to the probe

## Conclusion

The interim solution is to mount the usbfs using more open permissions. The better solution will occur in the next release of the image when we will configure usbfs support into the kernel

For both cases the patches described need to be applied to the hotplug config files provided by gretag in their libi1C rpm (version 3.2.1)

Kludges vs proper fixes. Often, problems will happen again when we fix them, i.e. we don't fix it properly. (Oh no!) As long as you document this, it's OK. Remember, time! Deadlines! VFX artists!

# TICKETS

FOR USERS' PROBLEMS

CLOSED WHEN THE  
USERS' PROBLEM  
IS FIXED

REQUEST TRACKER  
+ INTERNAL CHANGES  
+ THIRD-PARTY PLUGINS

# BUGS

FOR OUR PROBLEMS  
(PROJECTS)

CLOSED WHEN WE  
FIX THE ROOT CAUSE  
OF THE PROBLEM

TRAC

0. Two kinds of tech support systems. e.g.: Gamin using 100% CPU
1. Enable users to track their progress (empowerment), enable us to track our progress



# REQUIREMENTS

- METRICS...  
ON AVERAGE: 20 TICKETS PER DAY  
RIGHT NOW: 50 TICKETS PER DAY (DEADLINES)  
WHAT'S OUR RUN RATE?
- IT'S ALL ABOUT ATTITUDE!
  - TECH SUPPORT? OR INTERNAL SOLUTIONS PROVIDER?
  - FIXING THINGS VS MAKING US MORE PRODUCTIVE

Many tickets get turned into projects, which are long term fixes.  
Metrics measurement is important (for both management and us!)  
VFX artists, business group etc. are internal customers.

**QUESTIONS?**

Should be at 37 minutes. Andre back in.

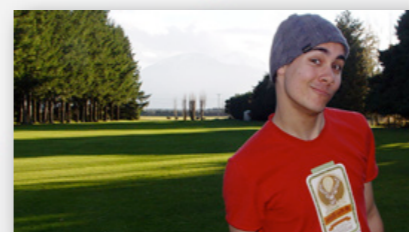
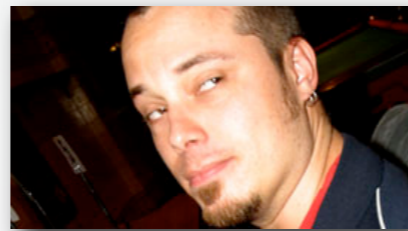
# REQUIREMENTS

- **RENDERFARM**
  - **SUN GRIDENGINE (OPEN-SOURCE) + CRAPLOADS OF INTERNAL SCRIPTS**
  - **PYTHON**
    - **... AND (T)CSH (HISTORICAL, OV COURSE)**
    - **WITH PYTHON SCRIPTS THAT WRITE (T)CSH SCRIPTS**
  - **EXAMPLE: ADDING DOUBLE-SLOT TASKS**

Gridengine: Built on UNIX principles. Distributed, super-lpr. Queueing system with error codes. (Think print job: success, fatal error, error but try again) etc. Renderfarm system about as ad-hoc as lpr, but worse. Few formal frameworks! Adding double-slot tasks (dual proc, hyperthreading, dual core): 5 seconds to turn on, 1 week to benchmark (with setup of harness). Found optimal was to turn on for 40% of the machines capable, due to extra network load + I/O load on local disks. But why 1 week to test? Because...



# REQUIREMENTS



Generally high stress level. Tight delivery times. Working with crazy Hollywood folks. Work hard, party hard. At same time, need to always improve process to make us better than the overseas VFX houses! What do users think of Linux? Should be at 42 minutes.

# OUR USERS VS LINUX

- IMPRESSED BY STABILITY
- ARE NOT STUPID (IN THE GEEK SENSE):
  - 80% PROFICIENT AT WRITING SIMPLE SHELL SCRIPTS  
50% WRITE COMPLEX SHELL SCRIPTS / PYTHON  
3D ARTISTS ARE VERY GOOD C++ CODERS  
SOME GERMANS START GENTOO FLAMEWAR
- WISH MORE GUI FRONT-ENDS WERE AVAILABLE
- GNOME (FAST/STABLE) || KDE (CUSTOMISABLE)
- USER-RUN WIKI AS AD-HOC KNOWLEDGE BASE

Hand over to Anthony. Stability: apps may crash, Linux doesn't. Still not away from a 'magic reboot' culture, though. Shell scripts: Empowerment through automation of process. Argument setting program, vs deep directory changer. Need more RAD tools for writing GUIs. (See Cocoa-Python on Mac.). Offer both GNOME and KDE, e.g. Maya crashing, try GNOME.

# OUR USERS VS LINUX

- **TEACHING RESPONSIBILITY**
  - **NETWORK AND DISK IS A SHARED RESOURCE**
  - **WHAT YOU DO CAN GREATLY IMPACT OTHERS!**

In paper yesterday: five Rs (reading, riting, rithmetic, respect, responsibility). No needless renders, no excess Shake nodes, no 10MB attachments \* 100 people (you get flamed!). Different from corporate behaviour.



# **USER EMPOWERMENT**



# OUR ENVIRONMENT

AUTOMATED INSTALLATION TOOLS...

err, i know we should...

First question you guys will ask us... Generally roll out new builds after entire jobs are finished (6-12 months). Push out small ad-hoc changes. Currently quite manual, but size of network forcing us to look at automated tools (isconf, radmind, rsync, etc)



# OUR ENVIRONMENT

- ALL PRODUCTION APPLICATIONS SERVED FROM CENTRAL FILESERVER
- EXTRA NETWORK I/O, BUT EASIER TO MAINTAIN
- CONSISTENT, POWERFUL DIRECTORY STRUCTURE
- DEALING WITH A MYRIAD OF APPLICATIONS:
  - 'NEEDS' SYSTEM:  
tcsh% need shake  
tcsh% need hp4

Distributed package management system would make things easier, but we'll discuss that later. Abuse the filesystem as a organisation tool. Programs need a properly setup environment: e.g. LD\_LIBRARY\_PATH to point to differing versions of C/threading/whatever libraries. Artists need specific customisations to their programs, we do that for them. e.g. run with specific set of plugins, use different versions of plugins (including in-house plugins). Customise delivery resolution, aspect ratios (HP4), etc. And now for something different...



Hand back to Andre.

Beautiful, elegant, evolving systems, what we do in the future (zen moment). How awesome is that photo? (52 minutes)



# THE BIG PICTURE

- MORE AUTOMATION (DUH)
- VERSION CONTROL FOR SOURCE BUILDS
  - DISTRIBUTED REVISION CONTROL SYSTEMS VS PACKAGE MANAGEMENT
- BETTER COLLABORATION (WITH OURSELVES AND OTHERS)
  - ... OPEN-SOURCING SOME TOOLS. WE THANK THE COMMUNITY, AND WANT TO GIVE BACK!

Replace documentation with automation.

Managing local patches to upstream programs (cinePaint), versioning config files, installation of programs. Maybe maybe similar to Canonical's Launchpad project?

Better collaboration: internal wiki, shouldn't have to solve the same problem twice (e.g. Nvidia vs Shake conflicts)



# THE BIG PICTURE

- **3 KEY POINTS:**

- 1. FIX THINGS ONCE: DISCOVER THE ROOT OF PROBLEMS. IT MAKES YOUR JOB MORE INTERESTING AND SATISFYING.**
- 2. EDUCATE AND EMPOWER USERS.**
- 3. BE HUMAN: BE FLEXIBLE, ENABLE ARTISTS TO BE THEIR MOST CREATIVE, FOSTER MUTUAL RESPECT.**

But ultimately, when you do your job right, the really big point is...







Composition by Jiho from MacDesktops.com



People remember





Having an impact





On people



# X-MEN

[www.x-men-the-movie.com](http://www.x-men-the-movie.com)

7.14.00

Height: 6'2"

Weight: 150 lbs

Eyes: Blue-gray

Hair: White

**Other distinguishing features:** Magneto has been literally rejuvenated by Alpha the Ultimate Mutant, so that despite his much greater chronological age, he appears still to be a relatively young man. Strength level: Magneto can use his magnetic powers to increase his physical strength up through Class 100 (the ability to lift over 100 tons).

**Known superhuman powers:** Magneto has the mutant ability to control magnetism and other related electromagnetic forces. He also possesses minor psychic abilities, such as the ability to create a psychic shield against psionic attack.

**Costume specifications:** Made of flexible metal bonded on the molecular level, provides protection against projectiles, energy weapons, and concussive force; helmet also provides protection from psionic attack.

MAGNETO







But there's also gems





We are lucky



# TRANSFORMERS™



Linux should be proud to be part of it





How many of these movies do you love?









In a noisy bar in avalon I tried to call you  
but on a midnight watch I realized why twice you ran away

it turned my lights on brighter  
I was counting through the night ride

I was on the road to austin  
met a man on the highway  
he sold me junk and conversation  
he was wise and dirty and the whole

slipped into a deep sleep  
I said "darkness into darkness  
all the carnage of my journeys  
makes it harder to be living"

he said, "it's a long road  
to be forgiven"

you understand now why you came this way  
'cause the truth you might be running from is so strong

But it's as clear as the promise  
the promise of the coming day

I went looking for a car  
found myself beneath the stars  
I went looking for a girl  
found a man and his world  
I went looking for a car  
found myself beneath the stars  
I went looking for a girl  
found a man and his world

so we cheated and we lied and we tested  
and we never failed to fall  
it's the easiest thing to do

you will survive being bested  
somebody fine will come along  
make me forget about loving you

big-big-truck.com/bebop





A SCI FI ORIGINAL SERIES  
EVERY SCI FI FRIDAY AT 10/9C  
[SCIFI.COM/BATTLESTAR](http://SCIFI.COM/BATTLESTAR)

Sci Fi

Watch the credits next time!





BATMAN BEGINS.  
JUNE 16

TM & © DC COMICS  
©2005 WARNER BROS. ENTERTAINMENT INC.





# Harry Potter



[www.desktopextreme.com](http://www.desktopextreme.com)

by 33ma13.de.vu





KEYWORD: LORD OF THE RINGS WWW.LORDOFTHERINGS.NET

© MMIII NEW LINE PRODUCTIONS, INC. THE LORD OF THE RINGS, AND THE NAMES OF THE CHARACTERS, EVENTS, ITEMS, AND PLACES THEREIN, ARE TRADEMARKS OF THE SAUL ZAENTZ COMPANY D/B/A TOLKIEN ENTERPRISES UNDER LICENSE TO NEW LINE PRODUCTIONS, INC. ALL RIGHTS RESERVED.

# THE LORD OF THE RINGS

THE RETURN OF THE KING

THE JOURNEY ENDS DECEMBER 17<sup>TH</sup>





Bring Anthony up. VFX is a great industry, but with plenty of problems to be solved. Linux has contributed a great deal to solving those problems.

# QUESTIONS?



[WWW.RSP.COM.AU](http://WWW.RSP.COM.AU)

[WWW.RISINGSUNRESEARCH.COM](http://WWW.RISINGSUNRESEARCH.COM)



# THANK YOU!

The logo features a large, light gray circle with a subtle drop shadow. A horizontal line passes through the center of this circle. The text 'risingsun' is written in a teal color, with a small teal dot to its left. Below 'risingsun', the word '[PICTURES]' is written in a smaller, gray, all-caps font.

● risingsun  
[PICTURES]

[WWW.RSP.COM.AU](http://WWW.RSP.COM.AU)

[WWW.RISINGSUNRESEARCH.COM](http://WWW.RISINGSUNRESEARCH.COM)