



# *Tux with Shades*

## *Linux in Hollywood*



FOSDEM  
Brussels  
February 23th, 2008

Gabrielle Pantera  
Robin Rowe



Beverly Hills Sculpture  
"Sisyphus"



DreamWorks Transformer  
"Optimus Prime"

[www.LinuxMovies.org](http://www.LinuxMovies.org)  
[www.CinePaint.org](http://www.CinePaint.org)

1 of 40



## *A Short Time Ago, in a Galaxy Not Far Away...*



In August 1991 Linus Torvalds posts on USENIX:

**I'm doing a (free)  
operating system (just a  
hobby, won't be big and  
professional like gnu) for  
386 (486) AT clones.**

2 of 40



## *By 2001 Linux is # 1*

- Dominates feature animation and visual effects
- All big studios rely on Linux
- Better, faster, cheaper
- Millions of lines of IRIX code ported
- The first film produced on Linux won eleven academy awards including Best Picture*
  - The year was 1998*
  - Can you name the movie?*

3 of 40



## *Digital Domain*



*Titanic*

First Linux Renderfarm...on DEC Alpha...

4 of 40



## *DreamWorks SKG*



Linux on artist desktops...  
...team of 100 Linux developers

5 of 40



## *Industrial Light & Magic*



*Star Wars Episode II*  
Conversion to Linux *during* production...

6 of 40



## Pixar



### *Finding Nemo*

George Lucas pays for divorce, introduces Steve Jobs to Linux...

7 of 40



## Disney

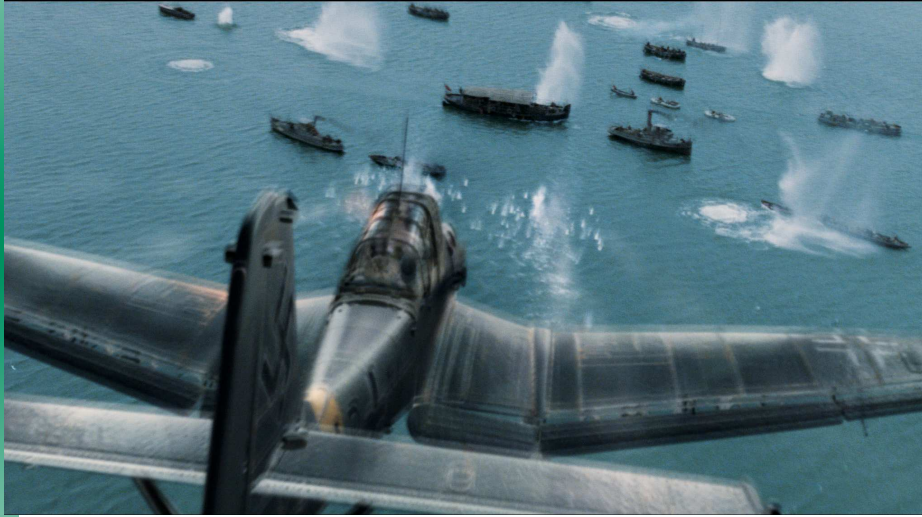


Disney the last of the majors to convert to Linux...

8 of 40



## *Double Negative*



*Captain Corelli's Mandolin*

Maya Stuka and Pixar RenderMan with deliberate motion blur...

9 of 40



## *Flash Film Works*



*Collateral Damage*

Only one helicopter here is real...which one?

10 of 40



## *Hammerhead*



### *Blue Crush*

Ok, the girls are real, but some waves aren't...

11 of 40



## *Rhythm & Hues*



### *Scooby-Doo*

CinePaint for retouching...

12 of 40



## *Sony Pictures Imageworks*



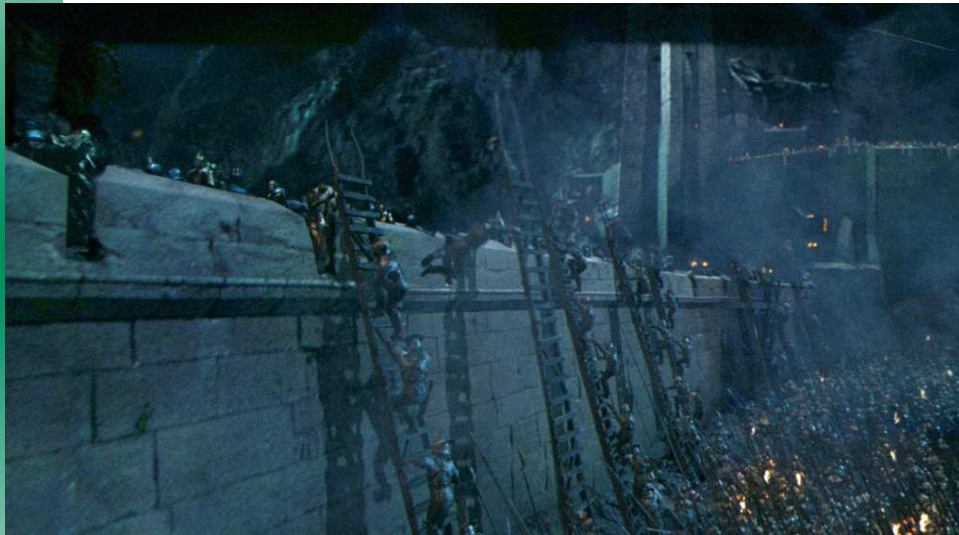
### *The Matrix: Revolutions*

*The Matrix* used so many post-production facilities...  
ESC is the last major Windows post house...

13 of 40



## *Weta Digital*



### *Lord of the Rings: The Two Towers*

Digital extras get autonomous ant-like intelligence...

14 of 40



# South Park



Mac Desktops with Linux Renderfarm...  
...most TV production not big, not Linux

15 of 40



# Tippett Studio

The screenshot shows a Linux desktop with several windows open. The primary window is a video editor displaying a scene from 'The Spiderwick Chronicles' with a boy and a pig-like creature. Overlaid windows include:

- Info window:** Displays technical details for the video file, such as 'Image: 2048 x 1536 x 3 (aspect 1.316)', 'Sample: 2038, 1546 (size 121)', and 'Linear float: 0.0792 0.0409 0.0340 0.0000'.
- Color correction window:** Shows a graph for applying levels to all frames, with a 'Zoom help' button and a 'Levels' section showing values from 0.000 to 1.000.
- Audio window:** Displays an audio waveform for 'audio slip: 0 frames'.

*The Spiderwick Chronicles*  
Team of eight Linux developers...

16 of 40





## Linux Movies

- Dantes Peak [2/7/97] D2
  - Titanic [12/19/97] D2
  - What Dreams May Come [1998] D2
  - Armageddon [1998] D2
  - Ed TV [1999] D2
  - Lake Placid [1999] D2
  - Fight Club [1999] D2
  - Supernova [2000] D2
  - Stuart Little [12/17/99] R&H
  - Little Nicky [11/10/00] R&H
  - Grinch [11/17/00] R&H, D2
  - Sixth Day [11/17/00] R&H
  - Rules of Engagement [2000] D2
  - X-Men [2000] D2
  - Red Planet [2000] D2
  - O Brother Where Art Thou [2000] D2
  - Enemy at the Gates [3/16/01] Double Negative
  - Cats & Dogs [4/4/01] R&H
  - Shrek [5/16/01] Dreamworks
  - Fast & the Furious [6/22/01] Hammerhead
  - Dr. Dolittle 2 [6/22/01] R&H
  - Final Fantasy [7/11/01] Square (ceased operations)
  - Planet of the Apes [7/27/01] R&H
  - Captain Corelli's Mandolin [9/17/01] Double Negative
  - Harry Potter [11/16/01] R&H
  - Lord of the Rings 1 [12/19/01] Weta
  - Stormrider [Disney Theme Park Productions/2001] D2
  - A Beautiful Mind [2001] D2
  - Vanilla Sky [2001] D2
  - Lord of the Rings [2001] D2
  - Collateral Damage [2/8/02] Flash Film Works
  - Blade II [3/22/02] Tippett
  - Death to Smoochy [3/29/02] Flash Film Works
  - Star Wars Episode II [5/16/02] ILM
  - Spirit of Cimarron [5/24/02] Dreamworks
  - Scooby-Doo [6/14/01] Rhythm & Hues
  - Haunted Lighthouse (IMAX) [summer 2002 Busch Gardens] Island Fever
  - XXX [8/9/2002] D2
  - Pluto Nash [8/16/02] Flash Film Works
  - Blue Crush [8/16/02] Hammerhead
  - Below [Q3 02] Double Negative
  - Santa Clause 2 [11/1/02] Tippett
  - Star Trek Nemesis [12/13/02] D2
  - Lord of the Rings 2 [12/25/02] Weta (New Zealand)
  - We Were Soldiers Once [2002] D2
  - Time Machine [2002] D2
  - Jungle Book 2 [2003] Disney
  - Matrix 2 [2003] Tippett
  - 2 Fast, 2 Furious [2003] Hammerhead
  - Finding Nemo [2003] Pixar
- Practically all later major movies are Linux movies

17 of 40



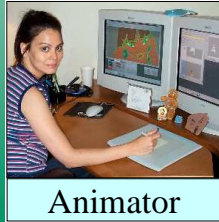
## How Did Linux Do It?

- Speed/Cost Rules Hollywood
- Intel x86 Chips Surpass RISC
- Windows isn't UNIX, coming from IRIX
- Games Accelerate PC Graphics (NVIDIA)
- SGI, HP, IBM and Dell smooth transition
- Top Movie Applications on Linux
  - Alias Maya, SoftImage|XSI, Houdini
  - Pixar RenderMan
  - Apple Shake...later discontinued

18 of 40



# The Studio Pipeline



Animator

2k Film Scanner



Retouching



Compositor




Render

Lots of Perl and Python glue...

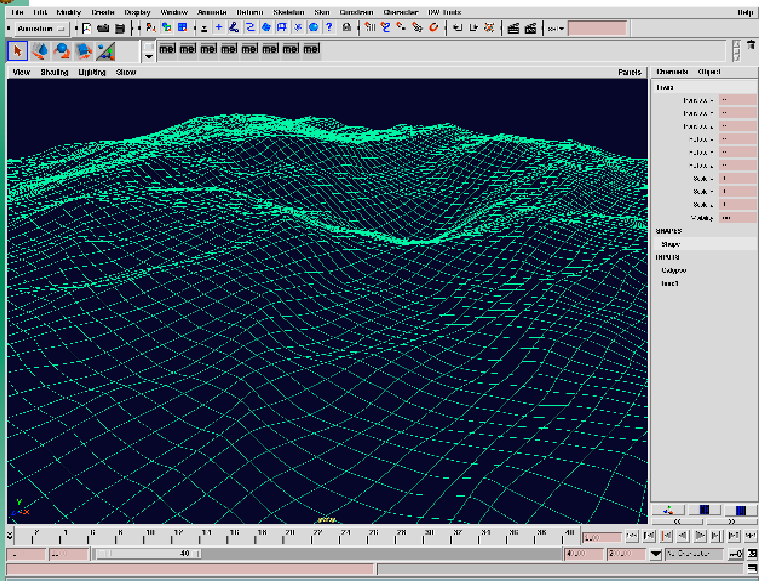


# Alias Maya





# DreamWorks Maya Plug-in



The screenshot shows the Maya 2005 interface with a wireframe landscape model rendered in green. The interface includes a menu bar, a toolbar, a viewport with a wireframe grid, and a right-side panel with various tool options. The bottom status bar shows the current scene name as 'maya.prim.001'.

Calypso Water Plug-in

21 of 40



# ILM Cari and SoftImage

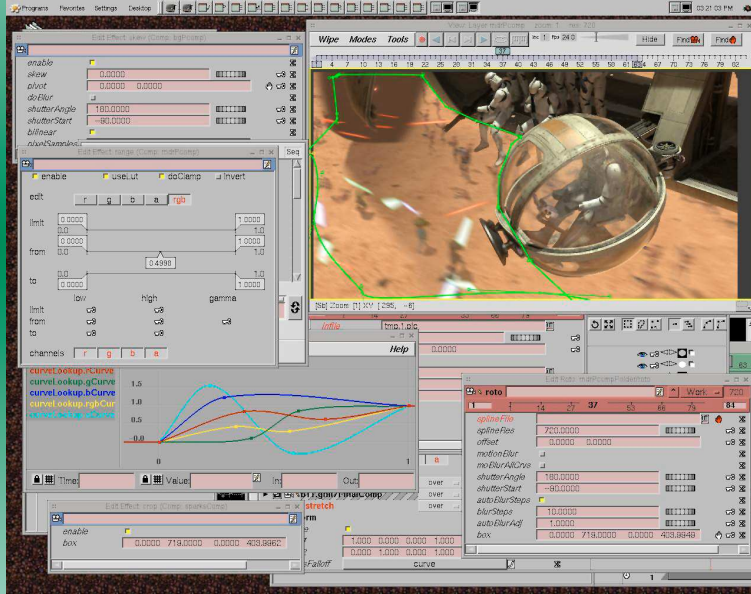


The screenshot displays the SoftImage 7.0 interface with a 3D model of Yoda's head. The interface is complex, featuring a left-hand 'Groups' panel with a hierarchical tree of objects, a central viewport showing the model, and several floating control panels. One panel shows 'Eye Editor' with sliders for 'horizontal', 'vertical', 'convergence', and 'camber'. Another panel shows 'Motion Editor' with a graph of 'EB\_I\_ANGRY' over time. The bottom status bar shows the current time as 00:35 PM on Fri, Apr 20.

22 of 40



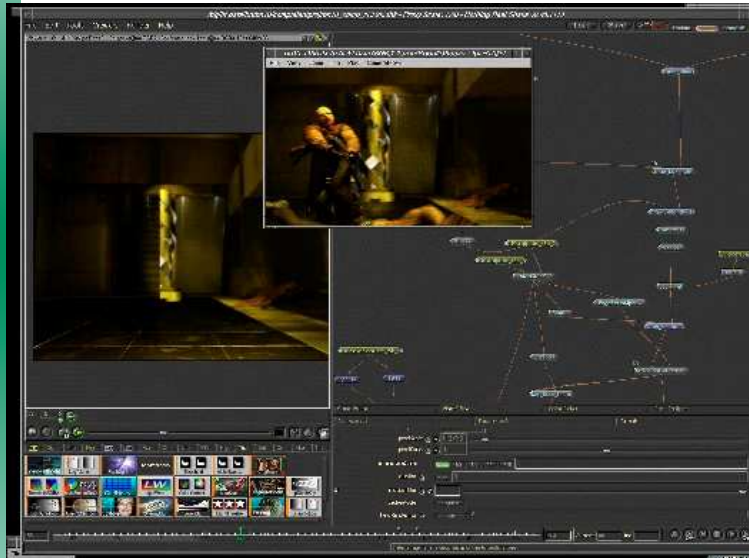
# ILM CompTime



23 of 40



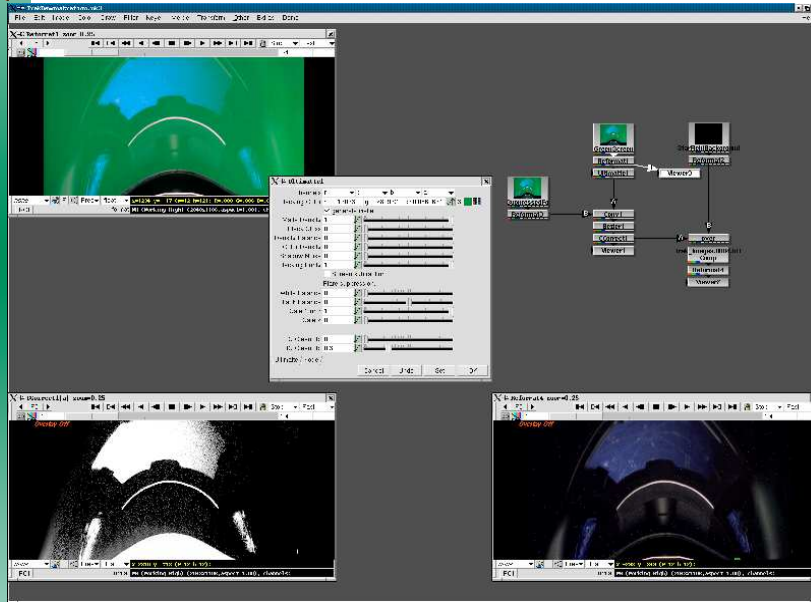
# Apple Shake



24 of 40



# Digital Domain NUKE



25 of 40



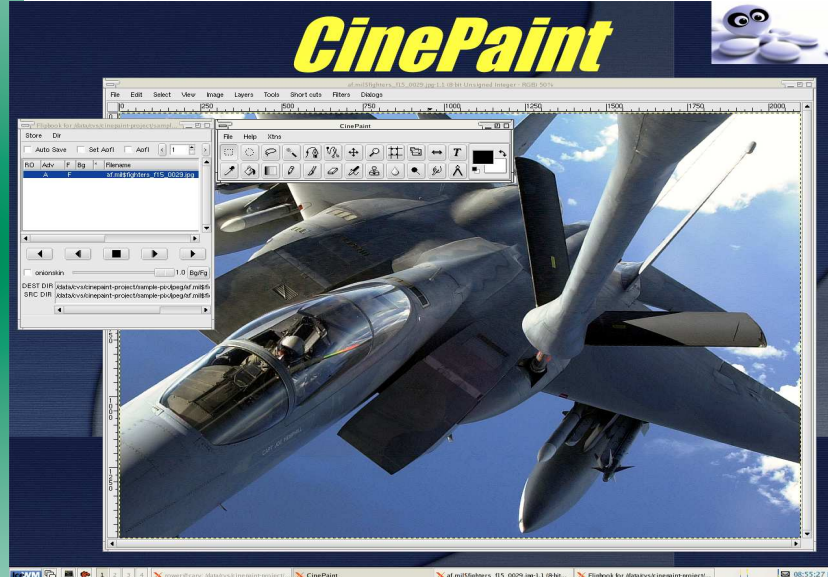
# Commercial Linux Tools

- ATI graphics drivers and GPU
- Baselight - grading and finishing
- Boujou - matchmove
- Conform - editing system
- DaVinci Revival - color correction
- Deadline - render queue
- Flint - visual effects
- FrameCycler - playback
- Gelato - renderer
- Houdini - animation
- Maya - animation
- Massive - crowd simulation
- Mental Ray - renderer
- Mokey - stabilization
- Monet - motion tracking
- NUKE - compositing
- NVIDIA - graphics drivers/GPU
- Photogenics - HDR painting
- Piranha - editing system
- Platform LSF - render queue
- qube! - render queue
- RaveHD - DDR playback
- RealFlow - water modeling
- RealSoft - 3D modeling
- RenderMan - renderer
- Rush - render queue
- RushPlay - digital dailies
- SoftImage - animation
- Smoke - editing system
- SpeedGrade - color correction
- SteadyMove - stabilization
- US Animation - cel

26 of 40



## CinePaint



27 of 40



## CinePaint Deep Paint

- CinePaint is not GIMP and not GEGL
- Branched from GIMP... a long time ago in 1998
- Looks like GIMP, but engine different
- Opens high fidelity image files
  - DPX, 16-bit TIFF, and OpenEXR
- Different purpose, different architecture
- Deep paint retouching tool for image sequences
- Used for feature films
- Used for pro photography
- Supports 8-bit, 16-bit and 32-bit color channels
- Supports HDR and CMS
- Opens conventional formats like JPEG and PNG, too

28 of 40



## *CinePaint for Feature Films*

- Used in many feature films, such as *The Last Samurai* where it was used to add flying arrows
- Motion picture frame-by-frame retouching
- Flipbook for movie playback of image sequences in RAM
- Dirt removal
- Wire rig removal
- Render repair
- Paint background plates
- Paint 3D model textures

29 of 40



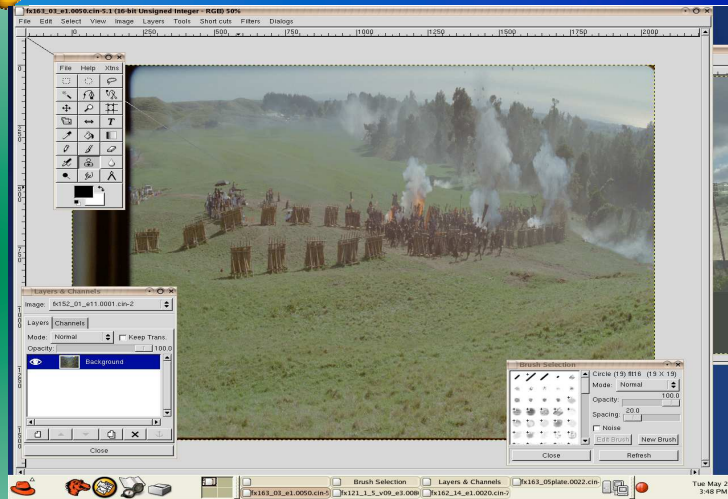
## *CinePaint for Pro Photography*

- 16-bit TIFF
- Can import bracketed HDR exposures
- GutenPrint gallery-quality 16-bit per channel color printing
- CinePaint's high dynamic range is crucial with B&W still photography because images only have a single channel

30 of 40



# The Last Samurai

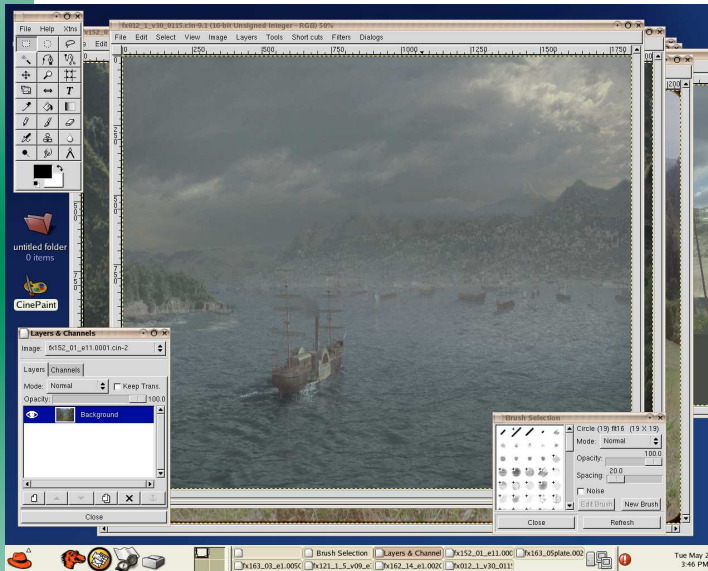


Flash Film Works won a Visual Effects Society Award this year for Best Supporting Effects for work on *THE LAST SAMURAI*. They used CinePaint to add the flying arrows. No real arrows were shot in filming. In this shot the film crew visible under umbrella toward left of screen is being removed.

31 of 40



# The Last Samurai



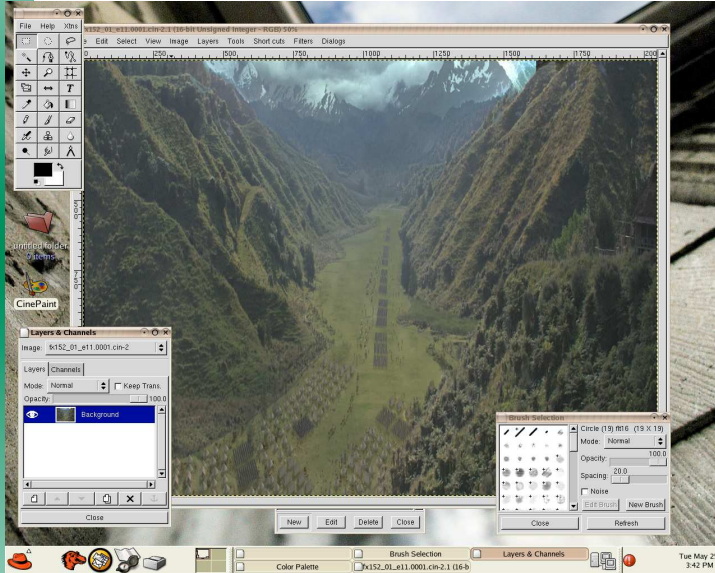
CinePaint Retouching Animation Render

32 of 40





# The Last Samurai

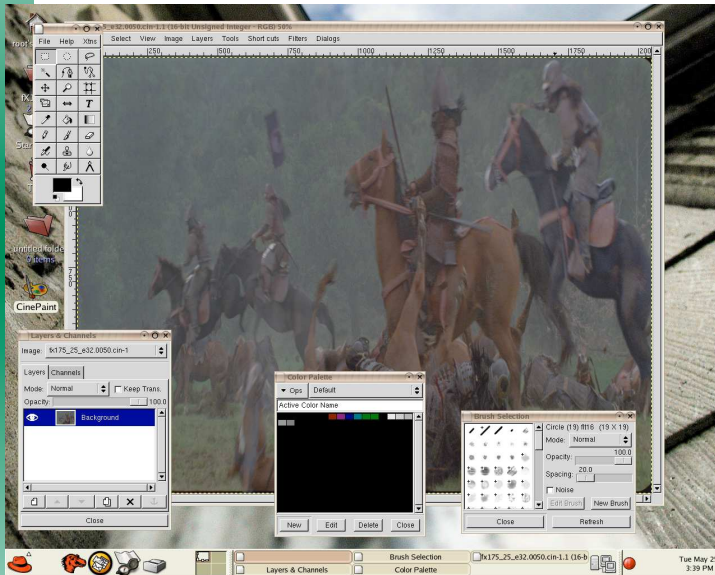


CinePaint Dust-busting

33 of 40



# The Last Samurai

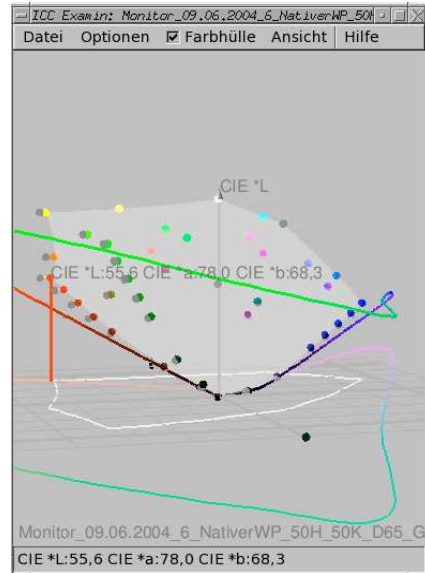
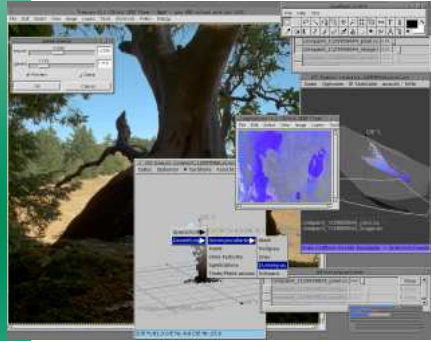


CinePaint Retouching

34 of 40



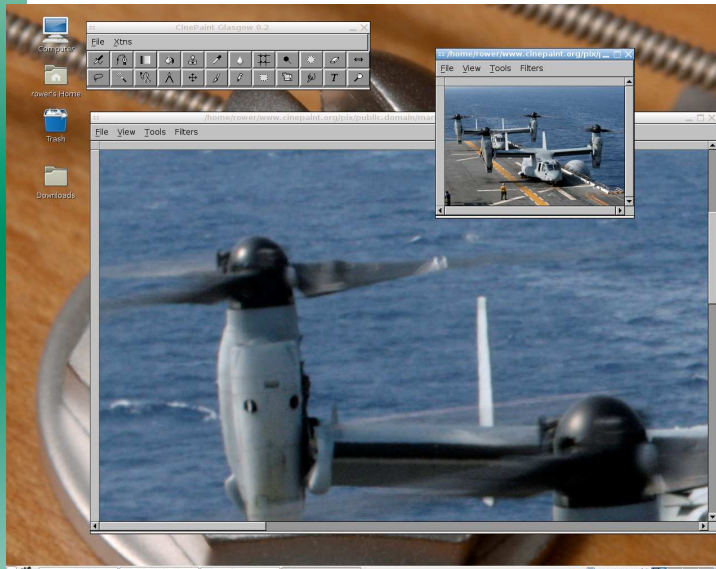
# CinePaint Color Management



35 of 40



# CinePaint Glasgow

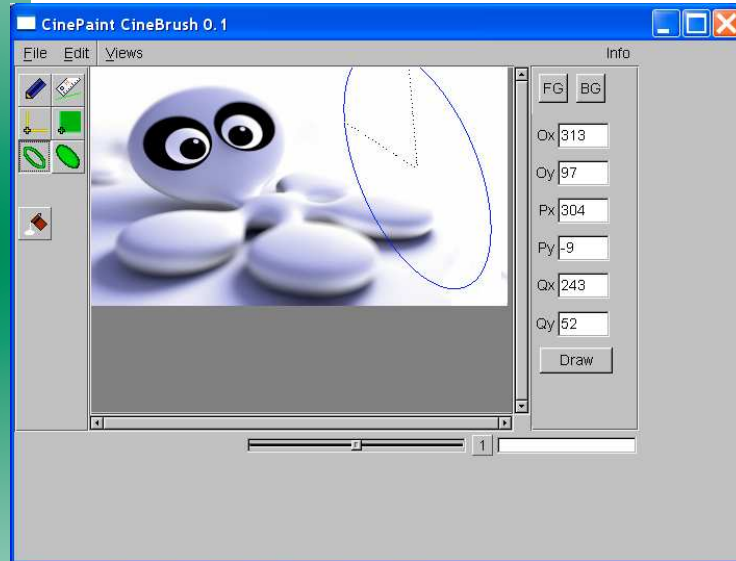


FLTK-based CinePaint prototype developed at University of Glasgow

36 of 40



## CinePaint Cinebrush



Another FLTK-based CinePaint in development

37 of 40



## Open Source Budgets

- Mozilla: \$20M/year
- OpenOffice: \$250k/year
- CinePaint: \$0/year...slows progress
- Studios can't provide R&D budget
- Where will funding come from?

38 of 40



## What's Next?

- Studio Linux is “done”
- Millions of lines of secret studio Linux code
- Dozens of commercial Linux tools
- Open source graphics tools falling behind
- CinePaint is the focal point for OSS

39 of 40



## Thank You!



FOSDEM'08

FREE AND OPEN SOURCE SOFTWARE DEVELOPERS' EUROPEAN MEETING

- FOSDEM
- LinuxCertified.com Linux Laptop
- ASUS Eee



Robin Rowe <[robin.rowe@CinePaint.org](mailto:robin.rowe@CinePaint.org)>  
Gabrielle Pantera

40 of 40