# Visualization Walls Using Commodity Clusters: Rocks Viz Roll

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# Introduction

- In 2004, 58% of the Top500 fastest supercomputers in the world were commodity clusters (From RocksClusters.org)... Why?

1) Cost less than custom architecture

2) Allow more organizations to enter HPC

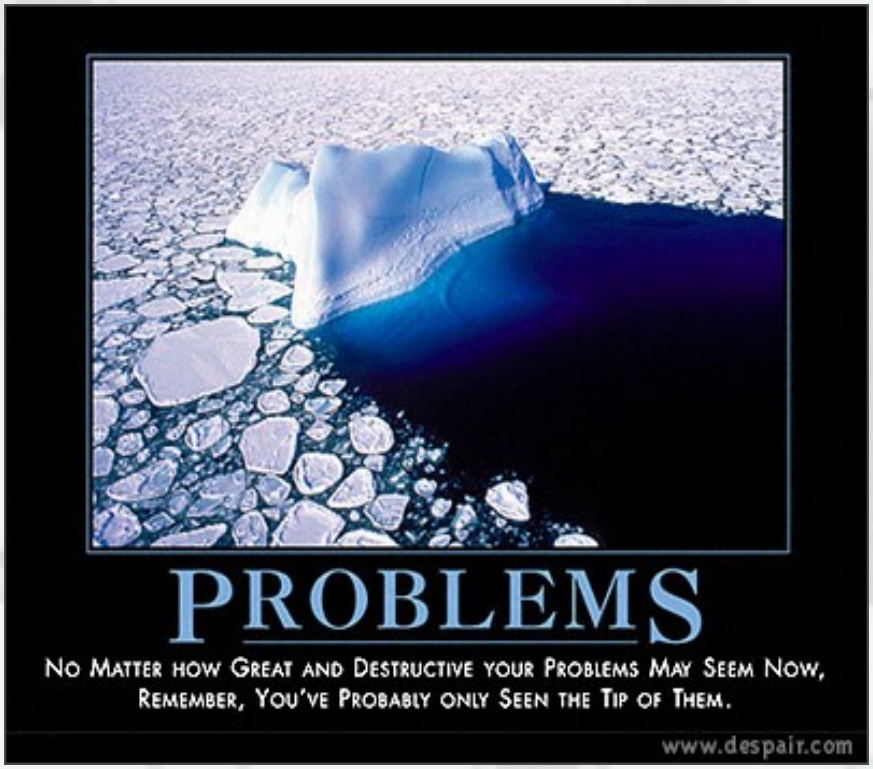
- Growth in HPC increases data set size and quantity = Rise in visualization demand

  *Solution*: Fusion of commodity clusters and high-resolution data visualization

# Related Works

- LionEyes Display wall
  - 12 projectors
  - 12 dual Xeons w/ NVIDIA Quadro 900 XGL (render)
  - 2 Xeons w/ NVIDIA Quadro 900 XGL (application)
  - Resolution: 4096x2304
- Hyperwall-2 (NAS Advanced Supercomputing)
  - 128 LCD screens
  - 128 GPUS
  - 1,024 cores
  - 74 teraflops

# Two Problems

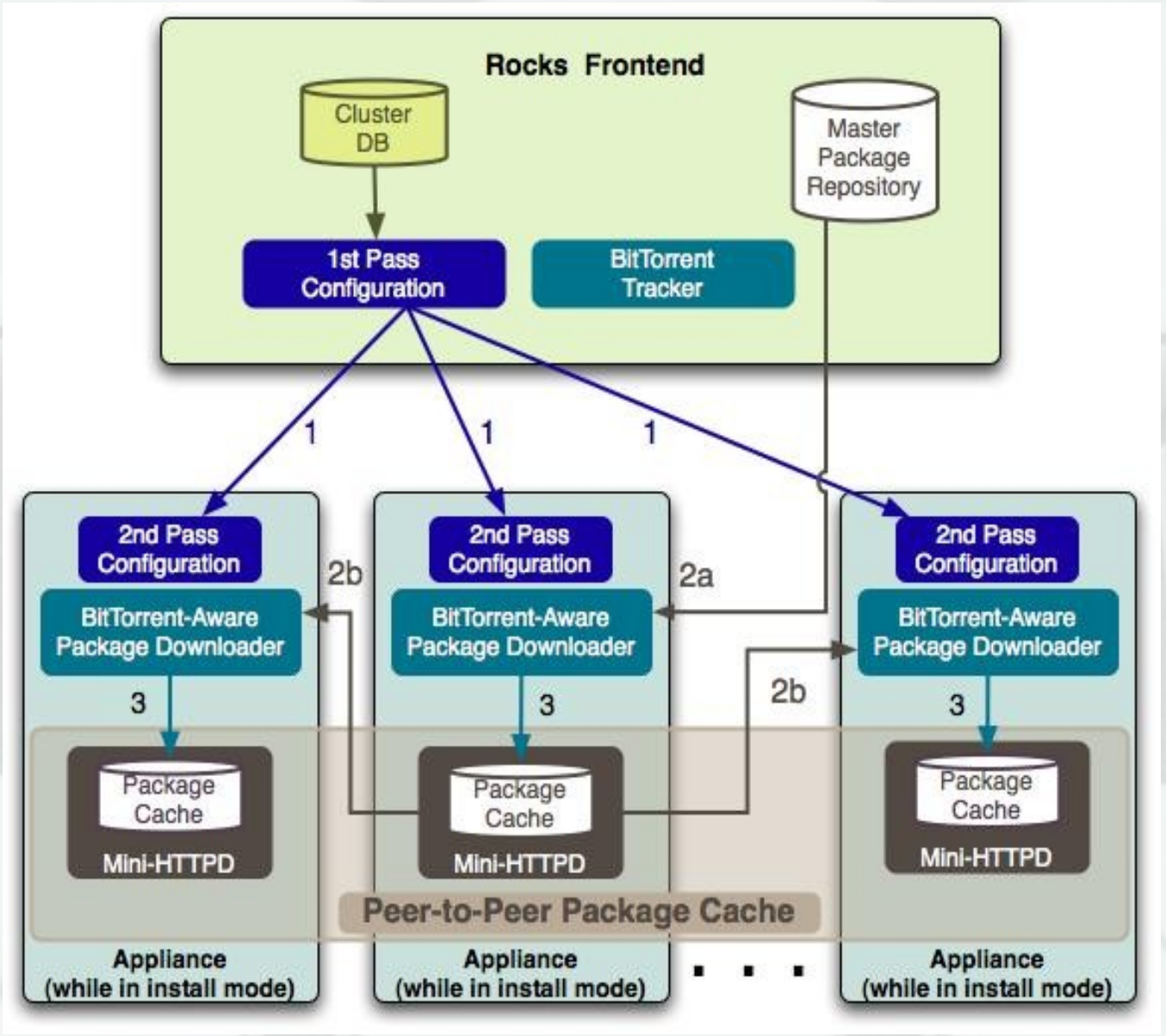



- Commodity clusters require computer scientists to rethink:

1) System Management
2) Programming Methodology

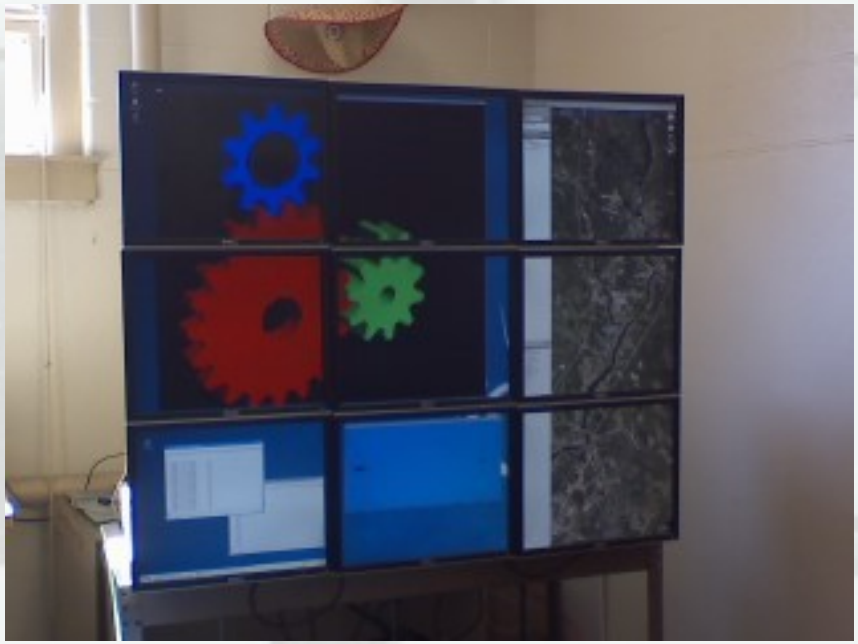
# Rocks Clusters

- SQL Database & Master Repository
- Back-end nodes connect via PXE or CD
- Red Hat Kickstart
- Package downloading via torrent
- New nodes exchange packages without front-end
- Cluster DB used for propagating configuration changes

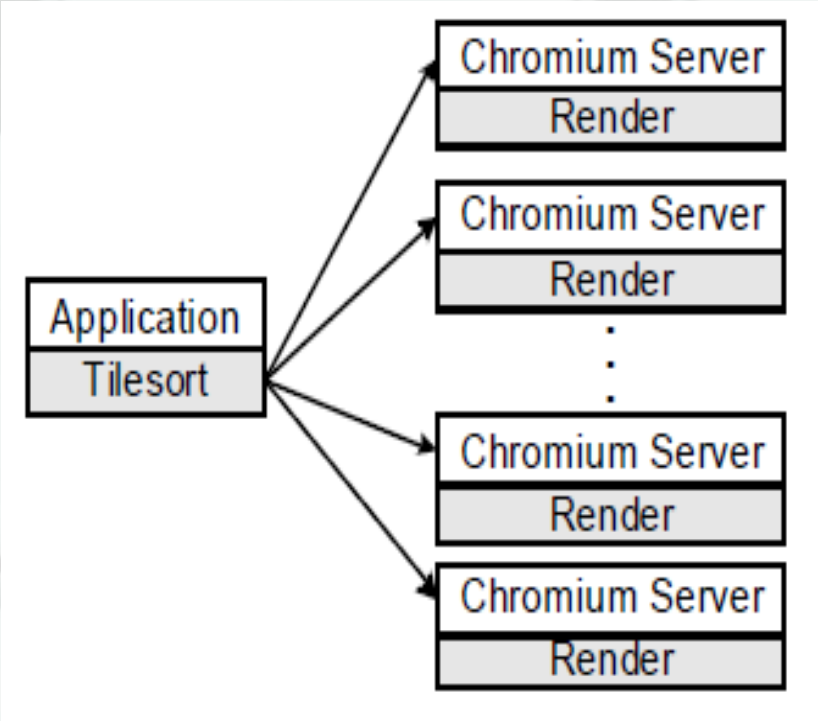

Rocks Frontend
Cluster DB
Master Package Repository
1st Pass Configuration
BitTorrent Tracker
1
1
1
2nd Pass Configuration
BitTorrent-Aware Package Downloader
3
Package Cache
Mini-HTTPD
2b
2a
2b
Peer-to-Peer Package Cache
Appliance (while in install mode)
Appliance (while in install mode)
Appliance (while in install mode)

# DMX & Xinerama

- DMX (Xdmx) = multiple displays from multiple machines
- Xinerama = multiple displays unified as single screen



# Chromium

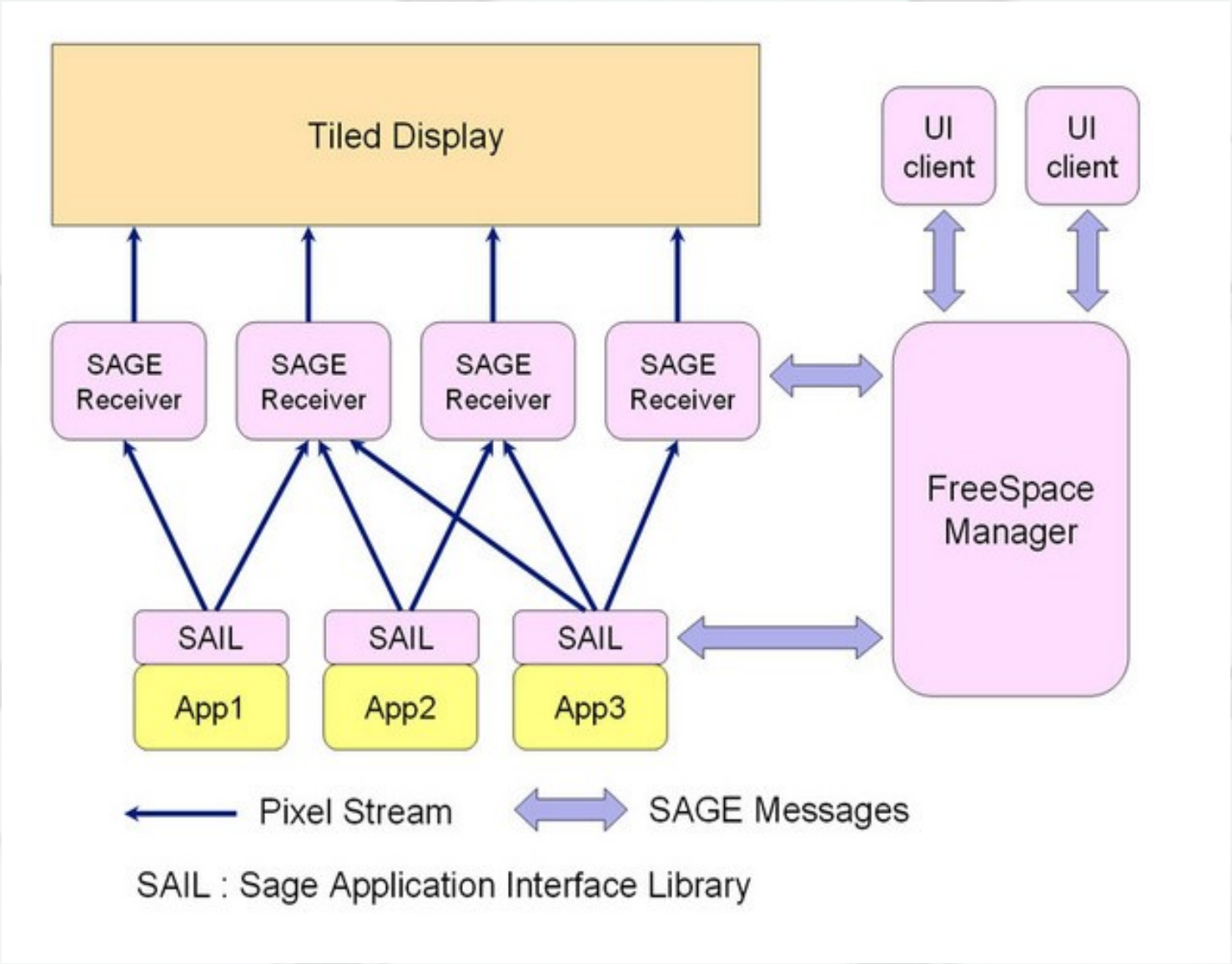



- Manipulates OpenGL for graphics cluster
- Stream Processing Unit (SPU)
- *Mothership*
- *Tilesort* SPU
- *Render* SPU

# SAGE

- Stream graphics from rendering cluster
- Collaborative environment
- Components:

1) Free Space Manager
2) SAGE Application Interface Library (SAIL)
3) SAGE Receiver
4) User Interface (UI)


Tiled Display
UI client
UI client
SAGE Receiver
SAGE Receiver
SAGE Receiver
SAGE Receiver
FreeSpace Manager
SAIL
SAIL
SAIL
App1
App2
App3
Pixel Stream
SAGE Messages
SAIL : Sage Application Interface Library

# Results

- Rocks 4.2.1 – issues
- Rocks 5.0
- Dual Pentium 3s w/ 3x Geforce4 MX 4000s 128MB (3 nodes)
- Core 2 Quads w/ nVidia 8600GT Dual-DVI cards 256MB (2 nodes)

# Acknowledgment

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# References


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# Questions?