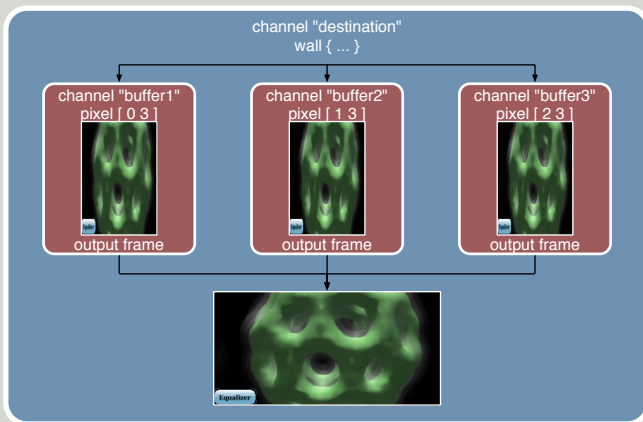


Screen-space decomposition applied to polygonal rendering using four GPU's



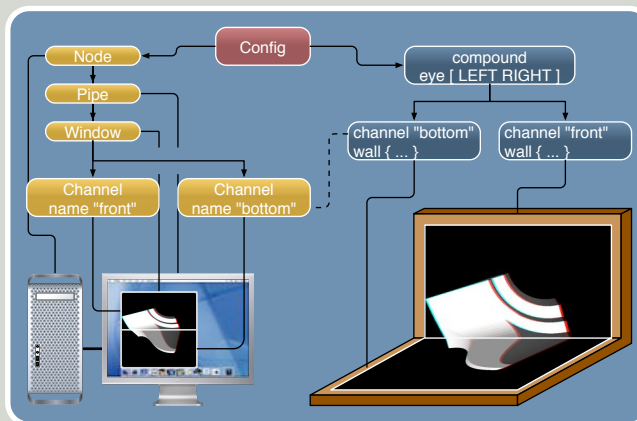
Pixel decomposition applied to volume rendering

## Scalability

Equalizer implements a wide range of algorithms to parallelize the rendering of large data sets. Multiple graphic cards, processors and computers can be combined to render a single view. Equalizer distributes the rendering task across the available resources (decomposition) and assembles the results on the final view (recomposition).

For the task decomposition, Equalizer supports sort-first (2D), sort-last (DB), Pixel and stereo (Eye) compounds. Time-multiplex (DPlex) is planned.

Equalizer supports virtually any parallel compositing algorithm, for example binary swap or direct send for sort-last rendering, and tile gathering for sort-first rendering.



Example configuration for a TAN Holobench™ using stereo rendering

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Equalizer is a product of Eyescale Software GmbH.

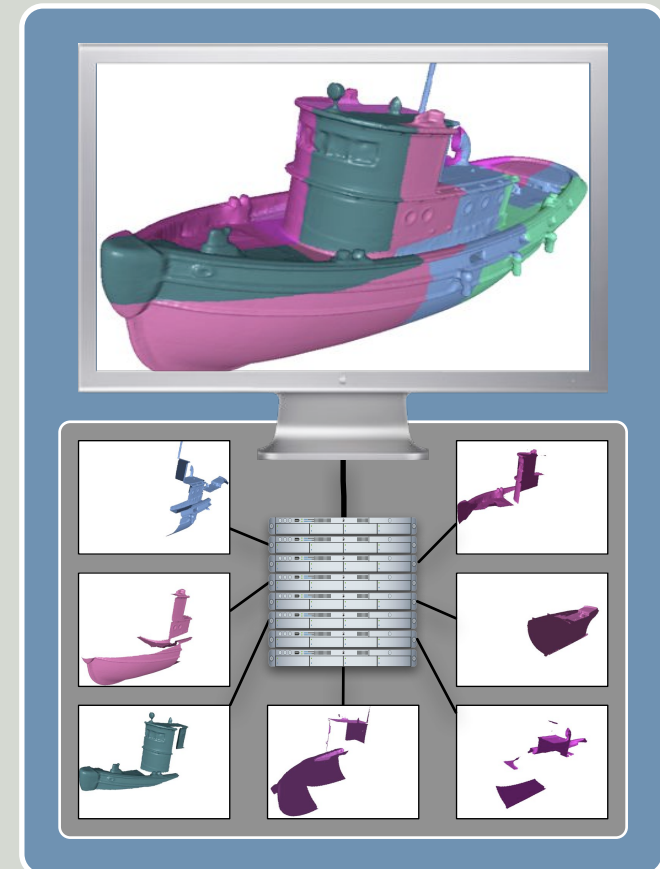
## Contributors:



Sun Mar 23 2008  
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# Equalizer

## Parallel Rendering



Equalizer is an open source programming interface and resource management system for *parallel, scalable* OpenGL® applications. An Equalizer application can run unmodified on any visualization system, from a singlepipe workstation to large scale graphics clusters and multi-GPU workstations. The foundation of Equalizer is a *minimally invasive* programming interface which addresses the problems common to any multipipe application.



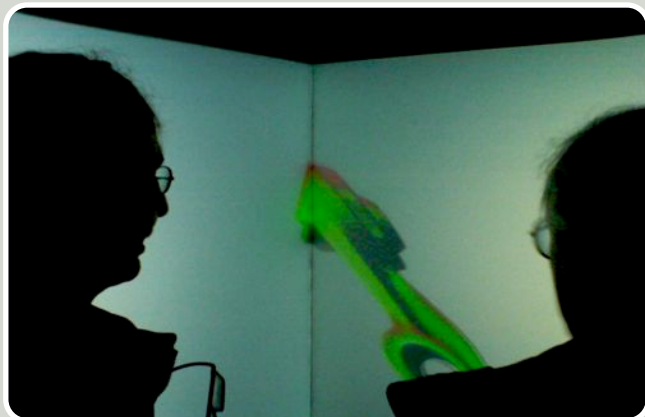
A display wall running an Equalizer-based terrain rendering application

## Parallel Programming Interface

Equalizer uses a *minimally invasive* programming interface. Most of the application is unmodified, only the rendering is separated and plugged into the Equalizer framework. Common graphic entities are abstracted by C++ classes, for example:

- **Node** - a single computer in the cluster
- **Pipe** - a graphics card and rendering thread
- **Window** - an OpenGL drawable
- **Channel** - a viewport within a window

The developer amends these entities by implementing application-specific *task methods*. Equalizer facilitates application porting by providing a default implementation for each task, which implements the typical use case.



A virtual reality installation using passive stereo and head tracking

## Major Features

**Runtime Configurability:** An Equalizer application can run on any configuration, from laptops to large scale visualization clusters, without recompilation. The runtime configuration is externalized from the application, and configured flexible at runtime.

**Runtime Scalability:** An Equalizer application can use multiple CPU's, GPU's and computers to scale the rendering performance of a single view.

**Distributed Execution:** Equalizer applications can be written to support cluster-based execution. The task of distributing the application data is facilitated by support for versioned, distributed objects.

**Support for Immersive Environments:** Equalizer supports both active and passive stereo rendering, as well as head tracking, which is required for immersive Virtual Reality installations.

## Use Cases

The Equalizer framework abstracts the runtime configuration from the application code. This allows an application to be deployed in many different ways without any modification, for example:

**Display Walls** are one of the common uses for visualization clusters today. Typically one instance of the application's rendering code is executed locally on a node for each display.

**Virtual Reality Installations** use passive or active stereo rendering with head tracking, both supported by Equalizer.

**Scalable Rendering** parallelizes the rendering of a single view across multiple graphic cards, processors and potentially computers to render more data faster.

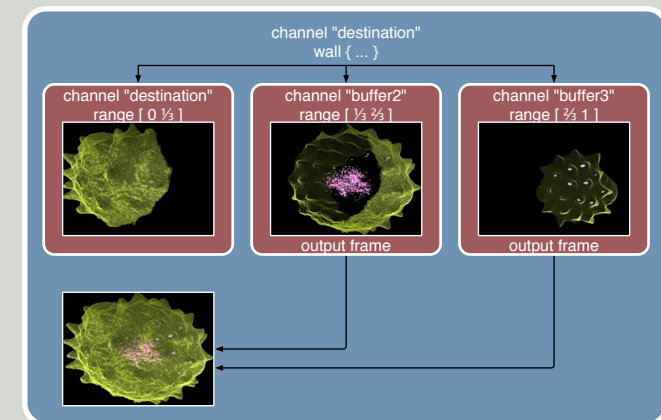
**Multi-GPU Workstations** are an affordable way to scale the rendering performance and display size. Equalizer applications can exploit multiple processors and graphic cards by running multiple rendering threads.

## Major Benefits

**Parallel Rendering Know-How:** Equalizer contains 10+ years of experience in parallel and scalable rendering, easily integrated in your application.

**Fast Path for Scalable OpenGL Applications:** Equalizer provides the natural parallel execution model to exploit the parallelism of multi-core, multi-GPU workstations and graphic clusters.

**Feature-Rich Framework:** Equalizer contains state-of-the-art scalable rendering algorithms, and its open development model ensures constant improvement. The configurability allows to deploy Equalizer applications in many, often unforeseen environments.



Database decomposition applied to volume rendering using three graphics cards

## Compatibility

**OS Support:** Linux, Windows XP and Mac OS X

**Interconnects:** Ethernet, InfiniBand

**Portable:** 32 and 64 bit, little- and big-endian

**Minimally invasive:** easy porting

**Clusters and Multi-GPU workstations**

**LGPL license:** commercial and open source use

**Open standard** for parallel rendering