Remote Rendering Using Commodity-Based Clusters

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Commodity Clusters for Virtual Reality

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Motivations

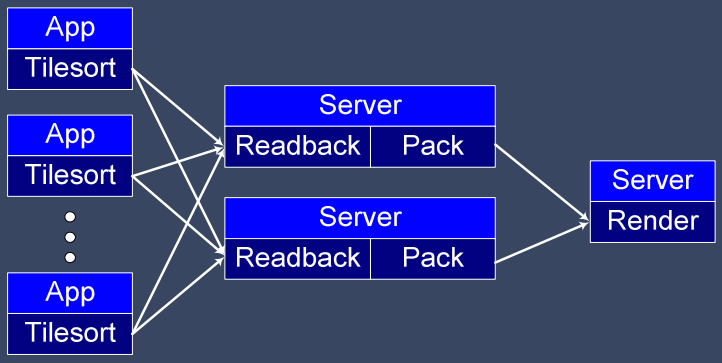
Removing the tight coupling of graphics hardware and display

Accessing the power of a cluster from the desktop or a handheld device

Graphics as a Remote Service

Brief Chromium Background

Replaces system's OpenGL driver
Manipulates streams of graphics commands
Can define a DAG for data distribution



Remote Rendering Sub-systems

Event Distribution
System and Application Interface
Data Compression
Adaptable Graphics System
Resource Sharing and Allocation
New Display Paradigms

Event Distribution

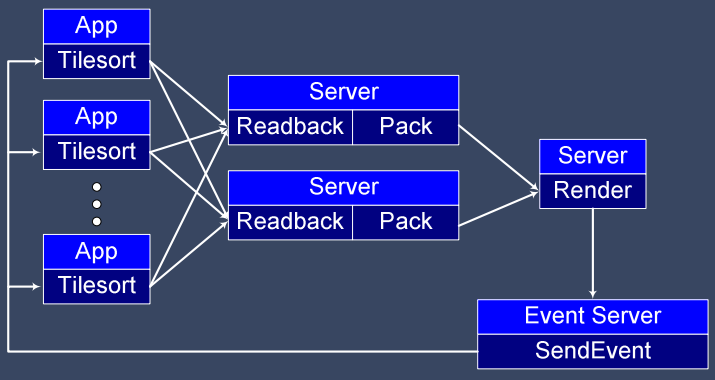
Alpha version released with latest version of Chromium

API for distributing events, not strictly associated with any toolkit

Allows for flexible application development

Event Distribution

Event generation can be completely removed from the rendering context



System and Application Interface

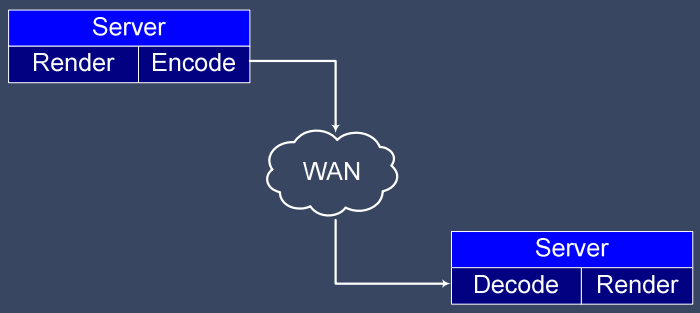
Simplest interface would be a web page

Specialized applications will most likely require custom GUIs

- Would act as an interface to both the cluster and the application
- Easier to integrate with the event distribution libraries

Data Compression

Encode/Decode SPU would reduce amount of data flow

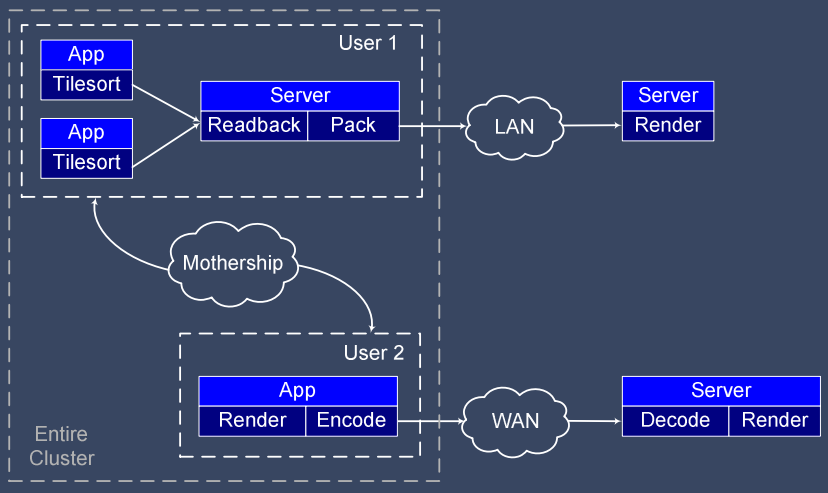


Adaptable Graphics

Should be able to adapt to situations to improve performance
- Based on available bandwidth, network latencies, frame rate

Uses compression and resource allocation to adapt

Resource Sharing and Allocation



New Display Paradigms

Displays as ultra-thin clients

- Capable of receiving compressed imagery or graphics commands and sending back events
- Require little processing power
- Allows for portable display walls
  - e.g. billboards

Applications

Can render to devices like head mounted displays and immersive environments

Large scale applications (e.g. Scientific Visualization) benefit from not requiring the user to go “down the hall”

Schools could be outfitted with a cluster available to all classrooms

Conclusion

- Allows for more accessible visualization needs
- Removes the need for clusters dedicated to certain applications
- Clusters become more usable