

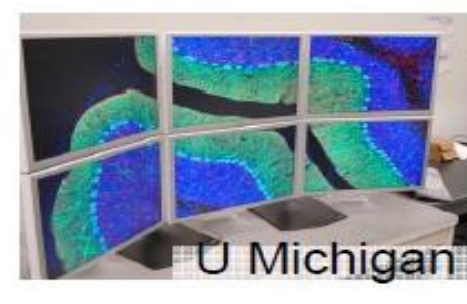
OptIPortal and OptIPortable Anatomy 101

MSI-CIEC OptIPortable Workshop
CALIT2/UCSD
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Dr. Gregory Hidley, Technical Director
California Institute for Telecommunications and
InformationTechnology, UCSD

OptiPortals – Many Flavors

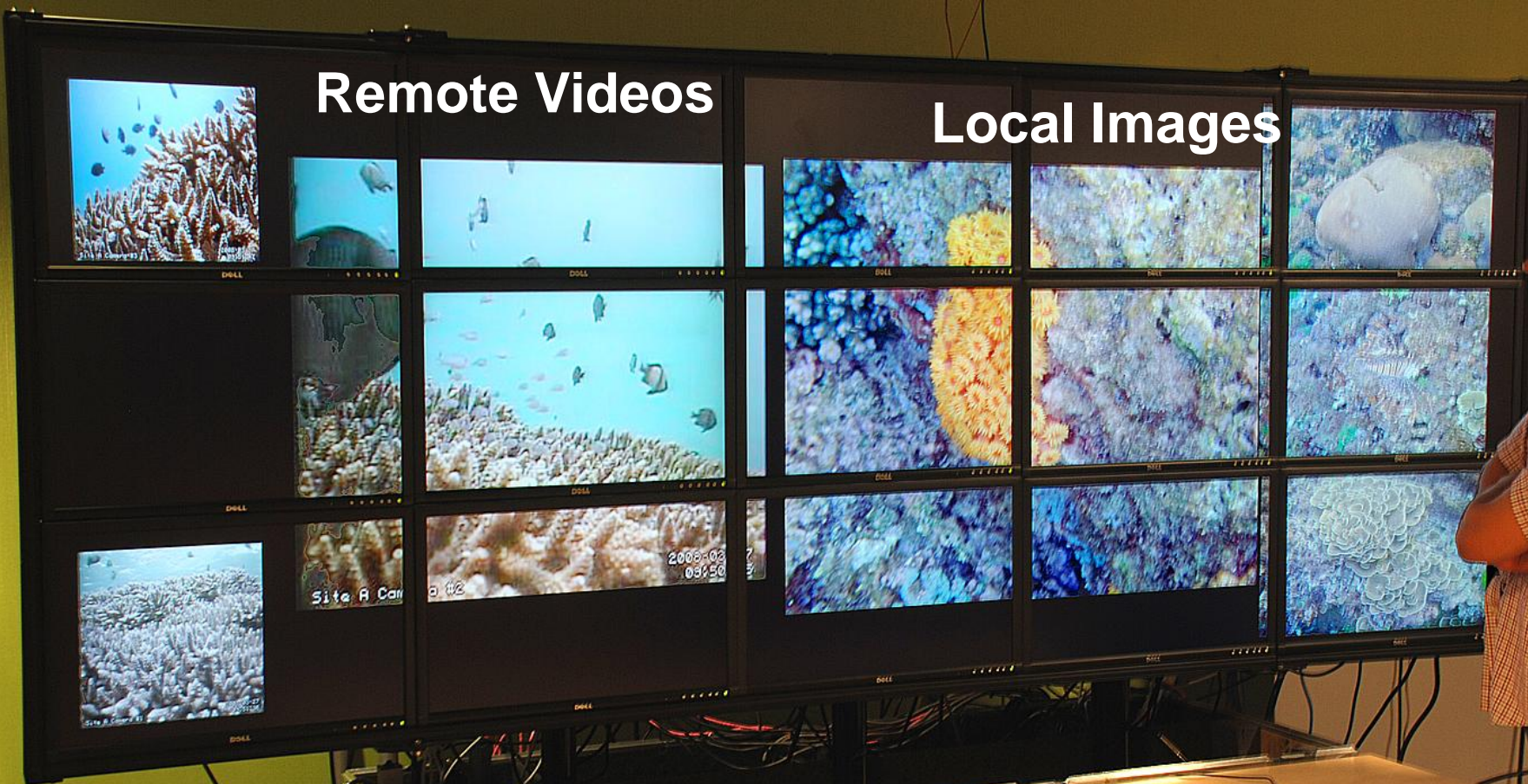
This Fusion of Advanced Visualization, Networking, Storage & Sensors has created a New Generation of Applications, Requirements & Communities of Users & Collaborating Researchers



1st Generation OptIPortable From Taiwan's Kenting Reef to a Calit2's OptIPortal

Remote Videos

Local Images



March 26, 2008

2nd Generation OptiPortables



OptIPortal [able] Equation

- **OptIPortable =**
 - Custom Framing +
 - Displays +
 - Computer[s] +
 - Network[s] +
 - Software +
 - Configuration
- **Collaboration = OptIPortable +**
 - Network connectivity and bandwidth +
 - Videoconferencing equipment +/-or
 - Streaming media server
 - Personal device integration (laptops, tablets, ipads, phones ...)
 - Remotely controllable instruments (optional)

OptIPortal [able] Equation: Framing

- **OptIPortals use custom 80/20 framing as specified on our wiki**
- **OptIPortables use custom rolling case with integrated 80/20 framing**
- **Two options possible**
 - **Build OptIPortal from parts**
 - **Build OptIPortable from custom case kit**
 - **Murray Consulting provides the prebuilt framing and case**
- **Prebuilt kit framing includes**
 - **Framing, powered gas strut, and roller case preintegrated**
 - **Requires minor frame assembly (measured in hours)**
 - **Supports NEC 46 inch and 55 inch of displays today**
 - **46 inch framing system is ~\$5,522 (55 inch is ~\$6,322)**

A 2x2 OptiPortable kit ready to ship



OptIPortable Framing Kit



Production Line Assembly



Unpacking an OptIPortable



Unpacking an OptIPortable



4x2 46" Display OptiPortable (162"x46" 5280x1440 "seamless")



OptiPortal [able] Equation: Displays

- Technology Display choices today include size, LCD/Plasma, 2D, or 3D
- LCD displays in desktop sizes (24 to 30 inch – Dell or Apple)
 - Have lowest cost per megapixel (\$240-\$350 per MP)
 - Have long lives (at least 3 years operating 7/24)
 - Are fairly well color matched
 - Have Bezels that visually interfere with images spanning displays
- Larger Bezel-less LCDs (46 to 55 inches – Nec X461UN or X551UN)
 - Are larger and heavier (100lbs or more)
 - Somewhat easier to build into larger OptiPortables
 - Have no bezels to interfere with images spanning displays
 - Are somewhat lower resolution
 - Are more costly per pixel (~\$3,000 per MP for 55 inch display)
- Plasma or LCD TVs (many choices)
 - Are larger and heavier, (100 lbs or more)
 - Have very thick bezels, thus producing large mullions
 - Are lower resolution (typically 1366 × 768)
 - Cost about \$500-1,500 per MP

OptIPortal [able] Equation: Computer[s]

- Generally use high end consumer gaming computers
- Most recently Dell Alienware Area-51 systems
 - Multicore Intel CPU based
 - 12GB or more memory
 - SATA III or SSD drives
- High end graphics board pairs (drives 2 displays each)
 - GeForce GTX 560 or
 - GeForce GTX 580
- Network Interfaces
 - Dual GigE
 - 10GigE (Myricom 10G-PCIE-8B-S+E NIC) optional
- Misc peripherals
 - Keyboard, mouse, local (touch?) display
 - Audio control (simple USB or better)

OptiPortal [able] Equation: Networks

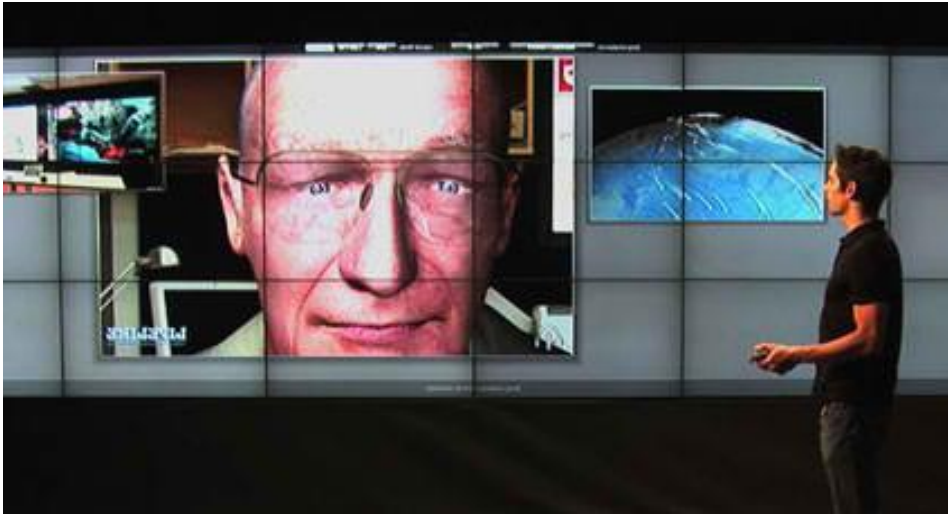
- **OptiPortables usually use dual networks**
 - **Internal (private) network connects computers to each other**
 - Uses Private non-routable IP address
 - Usually GigE
 - Usually uses small commodity switch (e.g. Netgear GS108)
 - Could use 10GigE as needed (as number of displays per node increase)
 - Requires significantly more expensive nics and switch[es]
 - We use Myricom 10G-PCIE-8B-S+E NICs at \$450 each
 - **External (public) network connects computer to Campus net or Internet**
 - Uses Public routable IP addresses
 - Usually GigE
 - Usually uses commodity switch with 1-2 10GigE uplinks to area router
- **A 2x2 OptiPortable with single computer does not require dual networks**
 - **Can use single GigE NIC with public routable address**

OptIPortal [able] Equation: Software

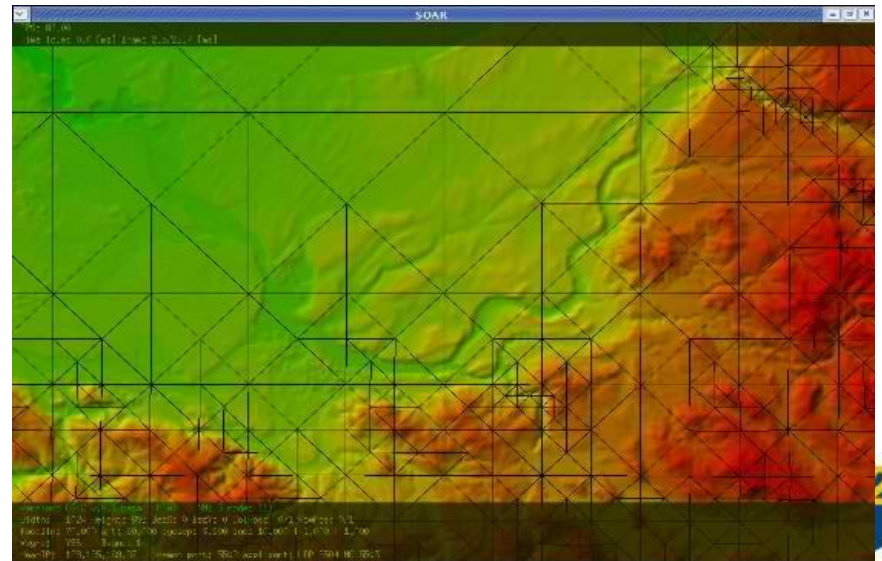
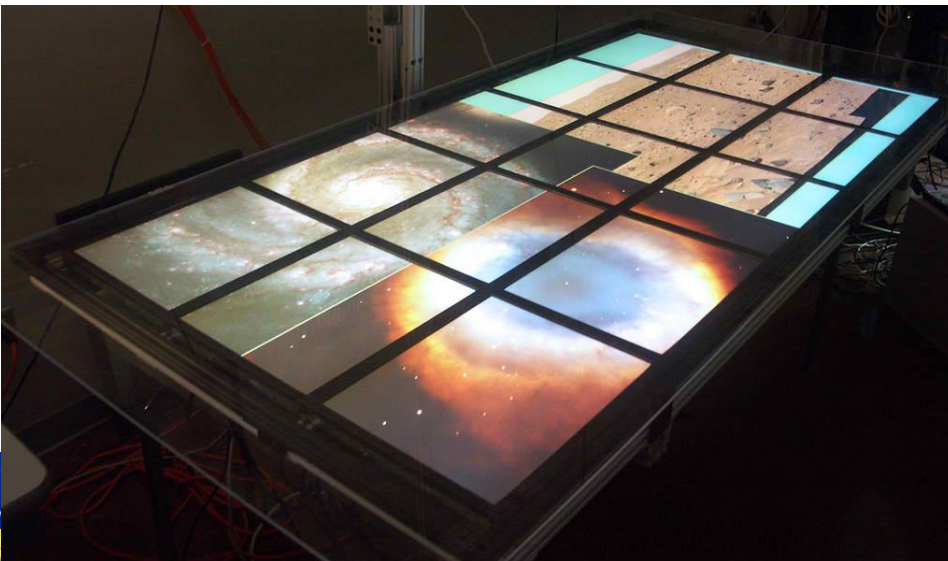
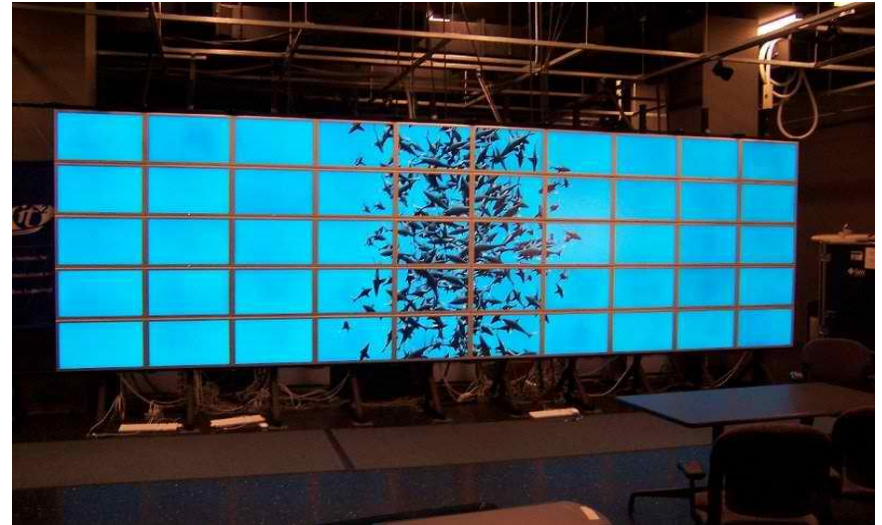
- **Operating System – Linux Based**
 - Manual install of Linux (Centos, OpenSUSE, Ubuntu, Scientific Linux 6*...)
 - ROCKs based automated install (cluster middleware)
 - Other automated install mechanisms are available
- **Middleware – SAGE and/or CGLX**
 - **CGLX – Image/display management platform**
 - An OpenGL-based graphics framework for the development of high performance visualization applications.
 - CGLX allows OpenGL programs to scale imagery across tiled displays and leverage available resources to maximize performance and resolution.
 - **SAGE – Multi-tasking OS for tiled display systems**
 - Open-source cross-platform streaming framework for tiled display systems
 - Enables access, sharing and displaying of data among users/sites
 - Supports laptop based control and drag and drop to display wall
 - Enables rich user interactions via keyboards, mice, joysticks, trackballs, touch screens, magnetic trackers, Nintendo Wiimote and Microsoft Kinect.
 - Supports multiple applications simultaneously

SAGE and CGLX

SAGE



CGLX



OptiPortal [able] Equation: Video Conferencing + Streaming Media Equipment

– VTC Equipment

- Use off the shelf H323 and HD systems (we use LifeSize 200 systems)
- Simplest configuration displays on adjacent large screen TV
- Integrated streaming into the OptiPortable is also possible
 - Using a dedicated streaming server computer (below)
 - Using SAGE or CGLX specific applications

– Streaming Media Server

- Add custom server to stream various media using
- DecLink or similar capture card
- USB sound card or Mac mini for audio
- Advanced multi-channel audio support (optional)
- Speakers (JBL C2PS pair or custom system for advanced audio)
- Wacom touch display
- Capture camera

OptIPortal [able] Equation: Device Interfacing

- Applications supporting personal device display
 - **SAGE, using VNC and SAGE pointer application**
 - Uses a VNC client on the wall side
 - Requires VNC server on the device side (TightVNC for PCs, Mac native Screen Sharing)
 - SAGE pointer software allows
 - Use of laptop mouse to control SAGE display window system
 - Sharing of desktop[s] on the SAGE display
 - Drag and Drop multimedia files from computer or browser
 - Use of wired or wireless (wifi) connection
 - **CGLX, using streaming capture computer**
 - Connect to capture device via dvi, hdmi or VGA cable
 - Capture signal streamed to wall
 - Number of sessions dependent on number of capture servers

OptIPortal References

- Main OptIPortable build wiki : <http://wiki.optiputer.net/optiportal>
- CGLX Info and download: <http://vis.ucsd.edu/~cglx/>
- SAGE info and download: <http://www.sagecommons.org/>
SAGE Pointer download:
http://www.sagecommons.org/index.php?option=com_content&view=article&id=113
- ROCKs Documentation: <http://www.rocksclusters.org/wordpress/>
- MSI-CIEC Portal - <http://www.msi-ciec.us/>
- Mail Lists
 - OptIPortals – <https://groups.google.com/a/eng.ucsd.edu/group/calit2-optiportal/topics>
 - ROCKS - <https://lists.sdsc.edu/mailman/listinfo/npaci-rocks-discussion>
 - SAGE - http://www.sagecommons.org/index.php?option=com_ccboard