Laboratory for Advanced Visualization & Applications
University of Hawaiʻi at Mānoa
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Electronic Visualization Laboratory
University of Illinois at Chicago
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Arthur Nishimoto, Krishna Bharadwaj,
Jillian Aurisano, Andrew Burks
Funding

- Began with NSF ITR (OptIPuter) grant in 2002.
- Supported with NSF STCI grant 2009-2013.
- New support with NSF SI2-SSI grant 2013-2018.
- Academy for Creative Media, University of Hawaii system
What is SAGE2?
Scalable Amplified Group Environment

- Middleware to access, display, and share high-resolution digital media on one or more scalable resolution tiled-display walls
- Uses web technologies (rewrite of SAGE: Scalable Adaptive Graphics Environment)
- Push laptop screens or digital media onto a wall
- Multi-user interaction

SAGE BOF 2016

www.sagecommons.org
SAGE2 User Community 2016
67 Sites: 35 International + 32 National
# SAGE2 User Community 2016

67 Sites: 35 International + 32 National

<table>
<thead>
<tr>
<th>AUSTRALIA</th>
<th>CANADA</th>
<th>UNITED STATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMIT, (VX)Lab</td>
<td>Ciena Research Labs</td>
<td>Jackson State University, ECE</td>
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<tr>
<td>University of the Sunshine Coast (3)</td>
<td>Simon Fraser University, IRMACS</td>
<td>NASA Marshall Space Flight Center, SPoRT</td>
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<td>University Southern Queensland</td>
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<td>Northwestern University, iCAIR</td>
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<tr>
<td>BRAZIL</td>
<td>CZECH REPUBLIC</td>
<td>Stanford University, HIVE</td>
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<td>Bahia School Medicine &amp; Public Health</td>
<td>CESNET &amp; Czech Technical Univ, SAGElab</td>
<td>Univ of California, San Diego, Calit2-QI, VROOM</td>
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<td>Catholic University of Salvador (UCSal)</td>
<td>CESNET, Mobile SAGE</td>
<td>Univ of Hawaii’i at Hilo, ‘Imiloa Astronomy</td>
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<tr>
<td>Federal University Paraiba, LAViD</td>
<td>Masaryk University, Cyber Exercise &amp; Research Platform Project</td>
<td>Univ of Hawaii’i at Hilo, Computer Science</td>
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<td></td>
<td>Univ of Hawaii’I Mānoa, HIGP</td>
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<td>Masaryk Univ., Lab Adv. Networking Tech (2)</td>
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<td>University of Campinas, Cinema</td>
<td>University of Sao Paulo, LARC</td>
<td>Univ of Hawaii’I at Mānoa, LAVA (3)</td>
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<td>University of Sao Paulo, LASSU (2)</td>
<td>Univ of Hawaii’I at West Oahu, Academy for Creative Media</td>
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<tr>
<td>SOUTH AFRICA</td>
<td>UNITED KINGDOM</td>
<td>Univ of Illinois at Chicago, ACM/LUG Student Chapters</td>
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<tr>
<td>University of Cape Town, Informatics and Visualisation Laboratory</td>
<td>Imperial College London, Data Science Institute</td>
<td>Univ of Illinois at Chicago, Communications</td>
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<tr>
<td>NEW ZEALAND</td>
<td>UNITED STATES</td>
<td>Univ of Illinois at Chicago, EVL (5)</td>
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<td>REANNZ</td>
<td></td>
<td>Univ of Illinois at Chicago, Eng Maker Space</td>
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<tr>
<td>JAPAN</td>
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<td>NTT Network Innovation Labs, Yokosuka</td>
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<td>Univ of Illinois at Urbana-Champaign, NCSA</td>
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<tr>
<td>Osaka Univ., Cyber Media Center</td>
<td></td>
<td>Univ of Maryland, Baltimore County, π² Immersive Hybrid Reality Lab</td>
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<td>KOREA</td>
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<td>Gwangju Institute of Science &amp; Tech.</td>
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<td>• National Center for High-performance Computing</td>
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<td>NETHERLANDS</td>
<td></td>
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<tr>
<td>Air France-KLM, CIO Group Tech Office</td>
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<td>• Adler Planetarium</td>
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<td>SURFsara, Sci Vis Group, Collaboratorium</td>
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<td>• Argonne National Laboratory, ALCF</td>
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<td>• Catherine Cook School</td>
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<td>SOUTH AFRICA</td>
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<td>• Digital Manufacturing and Design Innovation Institute (DMDII)</td>
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<td>• University Urbino and ETH Zürich</td>
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<td>ITALY and SWITZERLAND</td>
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BRAZIL, Catholic University of Salvador (UCSal)

CANADA, Ciena Research Labs

JAPAN, Osaka University, Cyber Media Center

NETHERLANDS, Air France-KLM, CIO Group Tech Office

SOUTH AFRICA, Univ. Cape Town, Informatics and Visualisation Laboratory

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USA, Adler Planetarium

USA, Argonne National Lab, ALCF

USA, Stanford University, HIVE

USA, University of Hawai‘i at Hilo, ʻImiloa Astronomy

USA, University of Hawai‘i at Mānoa, Information Technology Center

USA, University of Maryland, Baltimore County, π² Immersive Hybrid Reality Lab
SAGE2 Global Community 2015-16

- sagecommons.org
- ~ 4,000 page views per month
- 7,000 users
- USA, Russia, Brazil, China, Australia, Japan, Canada, Czech, ...
SAGE2 User Community 2016

• From November 2015
  – v1.0.0-Koolau: 1,949 binary downloads
  – Not counting sources download
• 36 registered developers
  – [https://bitbucket.org/sage2/sage2](https://bitbucket.org/sage2/sage2)
  – + 12 outside ‘followers’
• 238 forum members
  – [https://groups.google.com/forum/#!forum/sage2](https://groups.google.com/forum/#!forum/sage2)
  – ~ 50 posts per month (up to 120 last September)
Use Cases
Distributed Data Visualization Class

- Class between ‘Imiloa Astronomy Center at University of Hawai‘i at Hilo and LAVA at University of Hawai‘i at Mānoa
- Faculty from Marine Science, Computer Science, and Art and Creative Media
Kamehameha School:
Native Hawaiian pre-college school
NASA-funded SIMPLE Project
Sub-ice Investigation of Marine and Planetary-analog Ecosystems

SIMPLE is a collaboration of Georgia Tech, University of Illinois at Chicago, Louisiana State University, University of Texas, Stone Aerospace, Moss Landing Marine Laboratory and the University of Nebraska, Lincoln. http://schmidt.eas.gatech.edu/simple/
NetSage

http://www.netsage.global

https://youtu.be/Bip-5t-KSLU

SAGE BOF 2016

www.sagecommons.org
CESNET
Sketchfab Model Viewer and Gigapixel Viewer

Jiri Kubista
Sven Ubik

Deep Viewer + Leap Motion Controller

Sketchfab Viewer

SAGE BOF 2016
Emperor at UCSD/Calit2

Yoshiki Vazquez-Baeza

• Emperor is an interactive tool for the analysis, visualization and understanding of high throughput microbiology datasets.

• With SAGE2 we can collaboratively interrogate, and interact with the complexity characteristic of modern microbiome studies.

• Emperor used to visualize beta-diversity plots that succinctly summarize the community structure present in samples collected for microbiome studies.
SC16 Ciena/Northwestern/EVL Demo
Demo Prototyped at GLIF 2016, Miami, in September

- A remote SAGE2 server is set up at University of Illinois at Chicago (UIC)
- A SAGE2 display monitor is set up at SC16
- A SAGE2 browser is used to access and display Ciena’s Blue Planet web-based network monitoring charts from a server at Northwestern University, video streams from UIC, and PDFs and videos from a local laptop.

Visit Ciena Booth # 2523
What’s New
Electron technology

- Framework to build cross platform desktop apps with web technologies, using JavaScript, HTML, and CSS
- Combining Chromium and Node.js into a single runtime and apps can be packaged for Mac, Windows, and Linux
- Uses the rendering library from Chromium
- maintained by GitHub, open source
Electron capabilities

- **Webview**
  - Can create independent web windows easily
  - Views can be controlled by parent process

- **Independent of Chrome installation**
  - Packaged in the SAGE2 installer
  - No need for Chrome on the display machines

- **Easier to control**
  - Window position and size
  - Security
What the Transition to Electron Enabled
App Store

• Place for developers to share applications
• apps.sagecommons.org
• Login with Google
  – Open to all
• Zip and drag-drop
  – Manage your apps
• Monetization ?

SAGE BOF 2016
App Store

- Easy to use for end-users
- Search box
  - Keywords
  - Tutorials / Samples
- Click to download
  - Get a zip file
- Drop the zip onto your UI
- Application installed and usable immediately
Screen Partition

- Move and resize groups of applications, like giant poster boards
Extended Launcher

- Windows binary helper
  - To help with initial setup and editing of configuration
  - Starts Electron for display client and audio manager
Application Interface

• UI right-click context menu
  – app interaction without starting the pointer

• Basic key controls
  – Arrows for PDF
  – ‘p’ play movie

• Download the content directly from the wall
Automatic UI Scaling

• Resizing of the UI widgets based on screen size, resolution and user distance
  – Basic
    • Screen diagonal distance, aspect ratio, and resolution
  – Advanced
    • Screen width/height, border thickness, and resolution

• Leverages screen size and resolution to optimize UI space and readability relative to typical user distance from screen
Mouse/Keyboard events

- SAGE2 pointer to mouse event conversion
- Reduce requirement of converting webpage to SAGE2 app
  - Use existing event handlers
- Automatic translation from SAGE2 to the web browser
- Works well for D3.js
New Applications

- CSV viewer
- ChemViewer
- PDF viewer
- Doodle and quick notes
• Installation
• SAGE2 UI walkthrough
• SAGE2 API
• Screencast and how-to videos
  – Youtube channel
  – https://www.youtube.com/channel/UCQs-iwHHGqg3xNHR6dDDi3A/
Upgrade

• Download and unpack
  – how to upgrade
    • V1.0 to V2.0
    • copy the SSL/HTTPS keys
  – Windows non-cluster
    • Defaults to Electron for display
    • Chrome: legacy mode (without webview)
  – Linux & Mac
    • Instructions
    • Docker image
Beta Features

• Movie player
  – Synchronized group of movies

• Services
  – Image processing
    • Pyramidal processing and hosting
  – Video processing
    • MP4: 4K, HD, 720p

• Container
  – Docker
  – SAGE2 server on demand

• Jupyter integration
• ParaSAGE
• Linked visualizations
Future

• Inter-application communication
  – Group behavior
    • Play/pause several movies
  – Inter application messaging
    • Shared variables
  – Parent-child relationship
    • Hierarchy and multiple views

• SDN communication
  – Discovery, allocation, reservation of network resources for collaboration

• Portable sessions
  – Sharing sessions between sites
  – Uploadable to the app store
From the community

• Share your application via the app store
• Share your use cases and lessons learned
• Share pictures of your SAGE2 displays
Come see Wrigley on Showfloor

NCSA Booth 2501
2 x 65” 4K OLED Displays

Also at the Ciena booth and on SCInet displays
Ciena booth: blueplanet
Network monitoring

SCInet Analytics displays