

Streaming the Sky: Data Interfaces with Gadgets

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Data Explosion in Astronomy

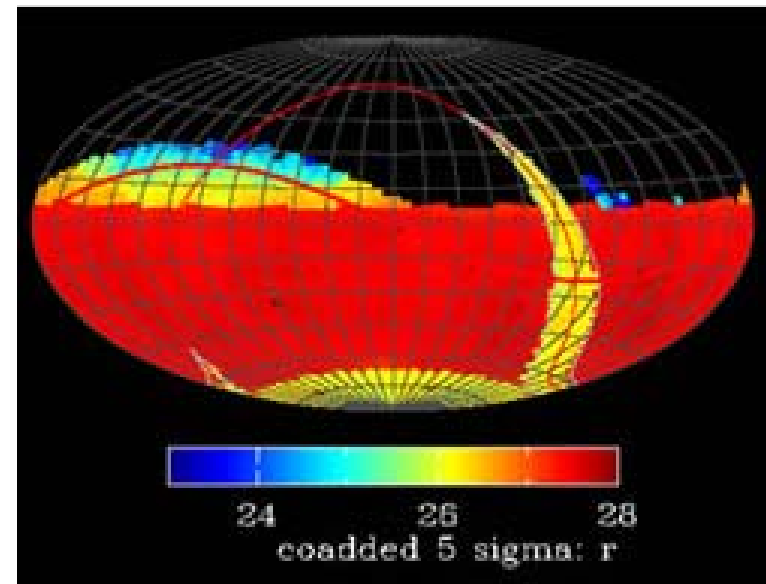
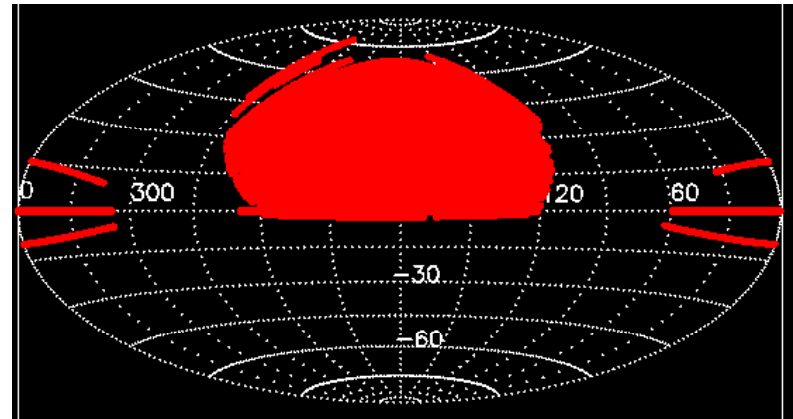
- 1000 fold increase over next 10 years.

- SDSS

- 80 TB images over 10 years
- 4 TB catalogs
- Mostly single observations

- LSST

- 40 TB per night
- 10^9 sources per night
- 6PB images over first yr
- 1PB catalogs over first yr



Data Explosion in Astronomy

- Traditional methods will no longer work.

- Can no longer download data
 - Asynchronous interaction
 - Analysis on small subsections and grown to data
 - Grid/HPC/Cloud interfaces
- Data are more dynamic
 - Data are updated on minute timescales
 - 1-100K alerts per night
 - Entire data stacks re-reduced on a scheduled basis
- Highest precision of all time.



One new way...

- **Making data interface as dynamic as the data.**

- Allow users to customize data views
- Make it easy to share views
- Facilitate personalization of interface



- **Gadgets...**

- Many containers
- Flexible
- Easy to program
- Highly customizable
- Atomic
- Naturally reside on the web
 - Shareable
- This mechanism has already shown to be highly effective:
 - NYT, NASA, NASDAQ, NOAA, Yahoo, Facebook



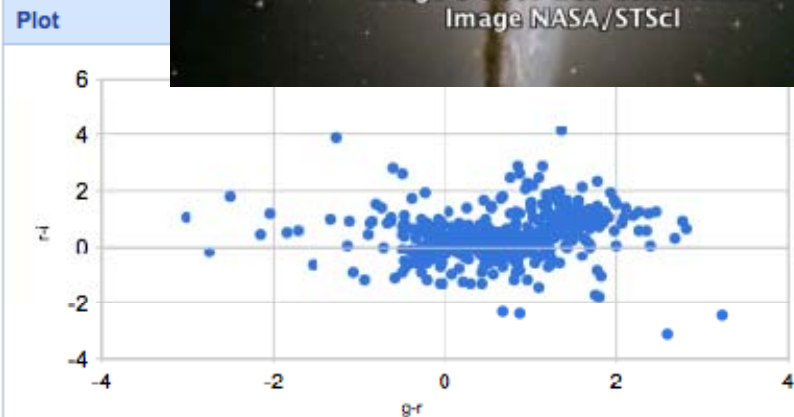
Development

- **Framework**

- iGoogle
- Google Gadgets API
- Google Visualization API
- Python server for communication

- **POC gadgets**

- Imagery viewer
 - Sky in Google Earth Plugin
 - Sky in Google Maps
- Sky Above
- Go to Position
- Object Lookup
- Scatter Plot



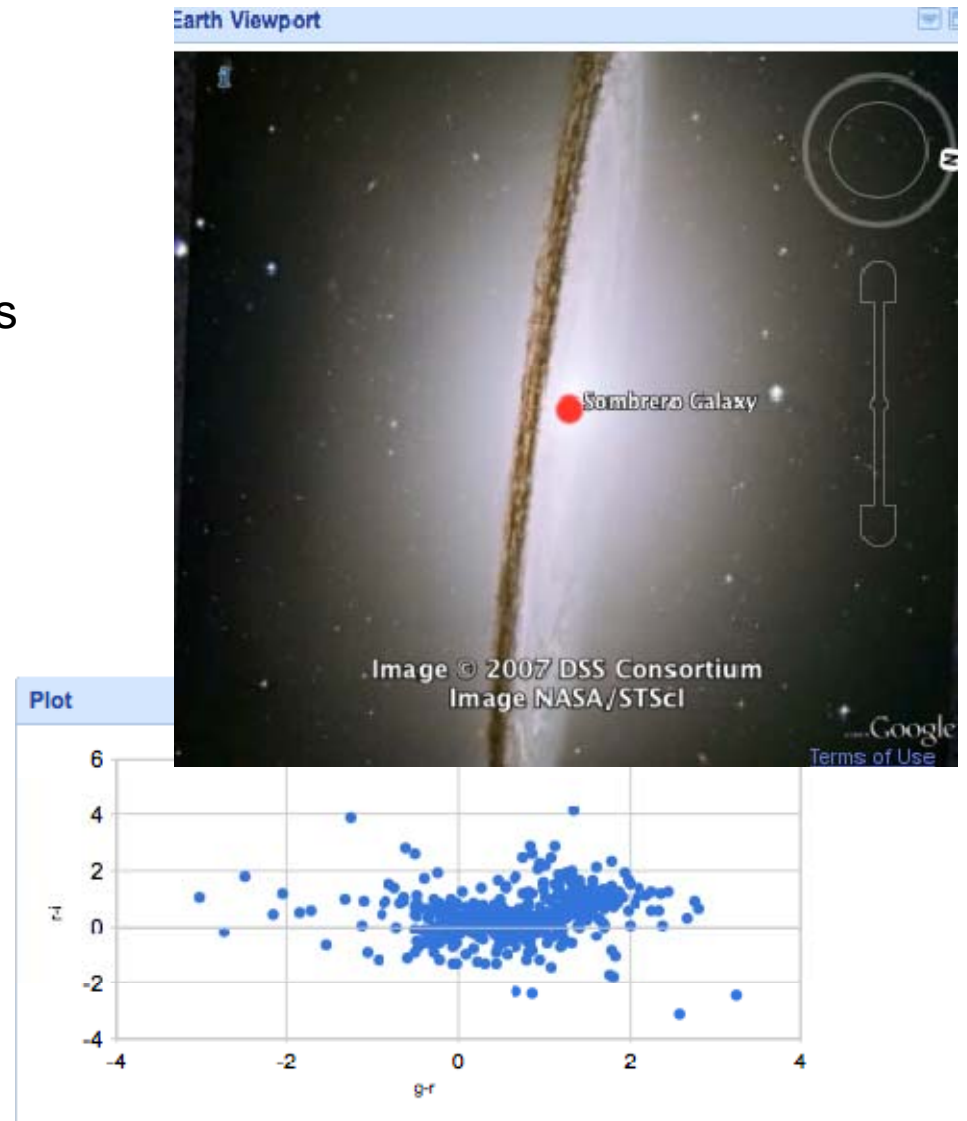
Lessons Learned

• Pros

- Shallow learning curve
 - HTML, JavaScript, XML
- Many JavaScript libs
- Rapid integration of web services (NED, SIMBAD, Address resolution)
- Easy interaction with VO protocols through GET messages
- Framework handles adding, deleting and moving gadgets

• Cons

- Inter-Gadget communication is difficult
- iGoogle container not as flexible as desired
- Tied to features in the libraries
- Some features not fully cross platform





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Future

• Expansion of gadgets

- Further catalog query capability
 - Cone search
 - TAP
 - SQL
 - SAMP
- Improvement of visualization tools
- Data manipulation
- Conversion tools
- Observing tools
- Proposal tools
- Multi-wavelength views
- Spectroscopy

• Improved communication

- Comet, AJAX, WebSockets
- Preserve state/transaction information
- Security
- Collaborative tools

• Advanced analysis

- Density estimators
- Tree building
- Outliers
- Connection to the cloud