Development of Web Mapping Service Capabilities to Support NASA Disasters Applications / App Development

Jason E. Burks¹ and Andrew L. Molthan¹
¹NASA Marshall Space Flight Center / Earth Science Office, Huntsville, Alabama

Kevin M. McGrath²
²Jacobs Technology, Inc. / NASA Short-term Prediction Research and Transition (SPoRT) Center, Huntsville, Alabama

18th IOAS-AOLS Conference
94th AMS Annual Meeting (2014) in Atlanta, GA
Session: “Satellite Data and Technology for Forecasting and Responding to Natural Disasters”

Transitioning unique data and research technologies to operations
Motivation

• Seamless method to deliver earth science data to multiple platforms
  – Scientists:
    • want to deliver data for science and collaboration via:
      – web
      – mobile phones
      – native GIS applications
    • don’t want to spend time developing delivery mechanism for each system
  • Control development and maintenance costs
Transitioning unique data and research technologies to operations

Data Flow

NASA Earth Science Data

Ingest Server

WMS and tile cache

GIS Application

Custom or Future DSS

Web Browser

Smartphones and Tablets

Web Browser
## Server Framework

### Technology Tools:

<table>
<thead>
<tr>
<th>Type</th>
<th>Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Mapping Service</td>
<td>Geoserver</td>
<td>Provides imagery via HTTP</td>
</tr>
<tr>
<td>Tile Cache</td>
<td>GeoWebCache</td>
<td>Caches map slices</td>
</tr>
<tr>
<td>Web Server</td>
<td>Tomcat</td>
<td>Serves HTTP requests</td>
</tr>
<tr>
<td>Database</td>
<td>Postgres/PostGIS</td>
<td>Backend to store layer information</td>
</tr>
<tr>
<td>Application Framework</td>
<td>Spring</td>
<td>Glues together application</td>
</tr>
<tr>
<td>Enterprise Service Bus</td>
<td>Camel</td>
<td>Routes data to be processed</td>
</tr>
</tbody>
</table>

Developed restful services, ingest application, and purging service
Client Framework

• Technology Stack
  – OpenLayers (Javascript Web Mapping)
  – JQuery (JavaScript Framework)
  – JQuery Mobile (Mobile JavaScript Framework)
• Use of JavaScript framework to support iOS, Android and Web clients from common code base
  – Framework supports discovery of data
  – Map interface
  – Animation
  – Flexible enough to be configured for specific use within various applications
Project Enabled Capabilities

• SPoRT
  – Real-time Imagery
  – Damage Assessment Toolkit (NWS)
  – Response to tornadoes in Illinois and Indiana Nov 17, 2013

• SERVIR
  – Hosting cloud fraction product for ISERV targeting
  – Beginning planning for deployment to nodes
  – Assessing additional products to add to system

• Arctic Collaborative Environment (ACE)
  – Demonstration to support ACE
  – Hosting SPoRT real-time imagery
Case Study

- Damage Assessment Toolkit (DAT) SPoRT NASA ROSES Applied Science: Disasters proposal

National Weather Service storm survey process using the DAT and supplemented by SPoRT imagery.

ASTER False color composite, ISERV imagery, and the official NWS storm survey for the Moore, OK tornado.
Data within the Damage Assessment Toolkit

Screenshot of Worldview imagery in the DAT provided by WMS along with SPoRT analysis of the damage

Worldview Image copyright DigitalGlobe, provided through USGS in support of disaster assessment

Transitioning unique data and research technologies to operations
Super Typhoon Haiyan

ASTER imagery provided via the web interface for Super Typhoon Haiyan

Transitioning unique data and research technologies to operations
Future Work

• Continue work extending the framework based on feedback from scientists
• Develop better numerical model handling
• Build in additional scalability (load balancing)
Questions

Funding provided by
Marshal Space Flight Center and
NASA ROSES Applied Science Disasters