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

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

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## 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

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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

NWS issues warning → Event occurs → SPoRT provides imagery via WMS → NWS uses imagery through DAT during storm survey → Surveys Improve

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

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Super Typhoon Haiyan

ASTER imagery provided via the web interface for Super Typhoon Haiyan
Future Work

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

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NASA ROSES Applied Science Disasters