



Oregon's Imagery Portal

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Geospatial Solutions

To facilitate the distribution of statewide imagery datasets, Oregon State University teamed up with a GIS developer to create an imagery distribution and provisioning Web portal.

For the past ten years, many people throughout the Oregon GIS community have relied on imagery datasets for their mapping needs. However, securing statewide imagery coverage at any reasonable resolution has required the time-consuming chore of moving the dataset around via CD/DVD, portable hard disks, or FTP sites. With imagery needs growing exponentially, distributing datasets via these methods has proven to be cumbersome.

What has been needed is a more efficient distribution mechanism, whereby users can acquire digital datasets via a Web-based library/portal system. Such systems have been used for years to deliver Landsat 7 satellite imagery to federal members of the Multi-Resolution Land Characteristics Consortium (<http://www.mrlc.gov>).

After the acquisition of statewide half-meter and one-meter imagery products from the National Agriculture Imagery Program in 2005 (<http://Sounhein and Plank, 2006http://eirs.geospatial-online.com/gsseirs/article/articleDetail.jsp?id=375177>), the imagery and dataset were being disseminated manually -- a highly inefficient scenario. Understanding these limitations, and also needing a method for distributing historical and future datasets, in late 2006 the Oregon Orthoimagery Framework Implementation Team was contracted with Oregon State University (OSU) to create an imagery distribution and provisioning Web portal that could be integrated with OSU's Oregon Explorer natural resources digital library portal.

Picturing the Portal

The primary goal of this new portal would be to provide datasets to federal, state, and local agencies, as well as higher education institutions, by allowing users to select an area of interest and then extract/download the data (in the appropriate format and projection) to the user's site. Eventually, the site would be made available to the general public.

The portal could also serve as a tool for ingesting and storing imagery files via a library, as well as providing a service to those clients using applications that can access imagery via a Web map service (WMS), such as ESRI's ArcGIS, Google Earth, and many others. OSU contracted with a GIS software development firm that specialized in image processing to build the requested imagery portal, and work began in early 2007.

System Components

The heart of the portal is a Web server, which allows for the storage of terabytes of data that can be shared with Web clients. The portal also comprises a Web-based image integration framework, which provides the user interface framework; an engine to extract image subsets; an image catalog component, which loads metadata into a database; and a desktop application for image processing.

The vector overlays are provided by an ArcIMS service, as are the "Find a Place" searches, with the exception of the address search, which is provided by a geocoder. The Overview window is provided by a WMS service using the server-based Web-publishing product via a WMS connector.

The user interface manages the services independently (asynchronously), so that data is displayed as soon as it is available -- it is not necessary to wait for all the services to respond before starting to see the results. This is useful when there are multiple services that have different response times. It also means that if one service is down, the rest of the portal still functions.

From Selection to Delivery

Image provisioning features. A key component of the provisioning feature of the portal is the option to define a clip region over the image mosaic, and have this section of the image "cut out" and packaged for download. The user performs spatial discovery operations on the imagery using a combination of search operations via the Find a Place panel, and then performing manual positioning using the pan, zoom, and zoom box tools. Once a view of the imagery is identified, the user has the choice of extracting an image component based on the bounding box of the viewing window, or drawing a clip region with the mouse to define the bounding box for the extraction.

Processing options and output. To make image downloads as efficient as possible, a number of processing options have been provided to tailor the imagery extracts to users' needs. This includes selection of the format; the current choices are ECW, JPEG 2000, GeoTIFF, and JPEG. The user can specify the desired image quality (where supported by the format), which in turn determines the compression level for the output file. The user can also select the projection for the output image from a list of ten different projection options. By adjusting the rows and columns desired for the image extracted, the user controls the resolution of the resulting image file. These processing options ensure that once the data is received, it can immediately be employed in the user's application.

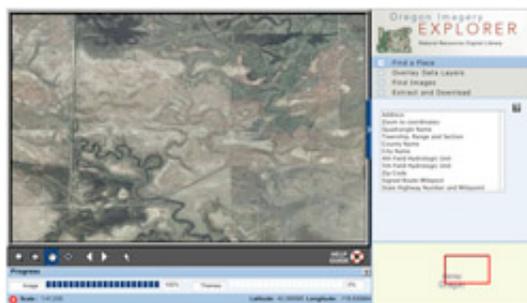
Preview of selections. Prior to submitting the extraction order, the user is presented with a form detailing the key elements of the order. This includes the image name and the processing options, including the format and projection selected. Since image extractions can be large, the user is provided with an estimate of the final output file size and a guide to the download time for a range of connection speeds.

Processing and delivery of imagery. When imagery is loaded, an XML file containing Federal Geographic Data Committee (FGDC) standard metadata must also accompany it. This metadata is captured for each image and stored in the metadata database. Some of the metadata fields may be used to search for images to display. The metadata is also packaged with images that are extracted and downloaded.

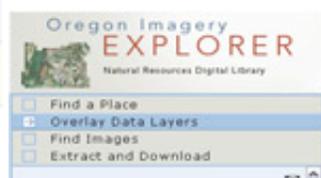
The provisioning system includes a queuing system, which manages all simultaneous orders from users. To ensure rapid response, the system maintains two separate queues: a priority queue for smaller jobs and a batch queue for larger extractions. Once the order is submitted to the image extraction engine, it is placed in the correct queue depending on its size.

All requested jobs smaller than 100 megabytes (the size limit is configurable by the administrator) are placed into a priority queue, which can be monitored directly via a Web page. Typically, a job will be processed in less than one minute, and the user will be presented with a download link to a ZIP file containing the image, and an appropriate FGDC metadata file in both XML and HTML formats. Jobs in excess of the cutoff limits must be confirmed from an e-mail link, which is sent to the user's designated email address. Once confirmed, these jobs are entered into the batch queue, and once the extraction job is completed the user is e-mailed a download link to the ZIP file to access the extracted files.

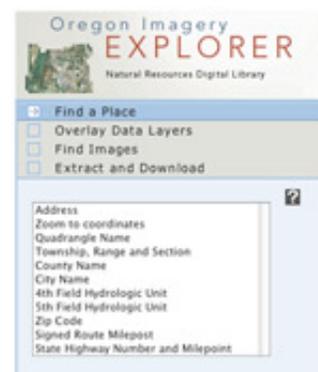
User Interfaces

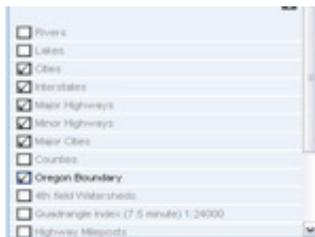


Upon entering the site, users will find a Table of Contents where they can utilize the following interfaces: Find a Place, Overlay Data Layers, Find Images, and Extract and Download.



Also





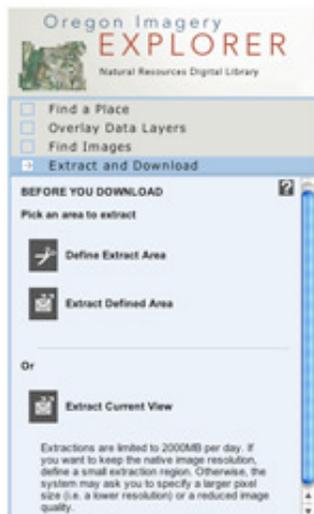
Overlay Data Layers

included is an overview map to track the user's current location in the state.

Find a Place



Find Images



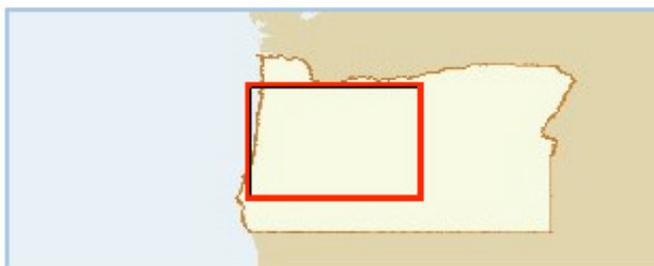
Extract and Download

Access Options

Desktop applications. One of the ways to get imagery is to use the portal to extract and download an area of interest. However, it is also possible to directly access imagery from the server using the WMS protocol, the Enhanced Compression Wavelet Protocol (ECWP), or both.

The WMS protocol is natively supported in a wide range of desktop applications, such as ArcGIS, MapInfo, and Google Earth. ECWP is also supported via plugins

in a wide range of desktop applications including ArcGIS, MapInfo, ER Mapper, and others. ECWP provides streaming imagery, which results in a faster, smoother user experience.



Overview Map

Existing Web sites. Members of the Oregon GIS community who already have existing interactive mapping Web sites and want to take advantage of the statewide imagery served by the image Web server that is at the heart of the Oregon Imagery Explorer can do so. Direct ECWP support is also available in ArcIMS clients via an Active X plugin, and in Arc Designer Web sites using an integration tool called I - Wizard. With the addition of an ImageX or WMS image layer, these Web sites can use IWS-served imagery without the need for an additional plugin.

A Change for the Better

Users now have many choices for accessing data via the Oregon Imagery Explorer. The results and the benefits of the portal are very beneficial for the GIS community. Users are no longer burdened with storing or maintaining duplicate datasets throughout the community. Furthermore, the user no longer needs to worry about the processing capabilities and image manipulation times that are typically encountered. The Oregon GIS community's overall response has been positive.

Manufacturers

ER Mapper (<http://www.ermapper.com>), which has since been purchased by Leica Geosystems), built the Oregon Imagery Explorer, using its Image Web Server as the foundation. ESRI's (<http://www.esri.com>) ArcIMS and WMS Connector provide the vector overlays, Find a Place search function, and Overview window. Google's (<http://www.google.com>) Geocoder performs the portal's address search.