NTConcepts

CASE STUDY: GOOGLE'S CLOUD-BASED MAP ENGINE

By Rod Erickson, GISP, NT Concepts

A GIS requires the following components: hardware, software, databases, and people. A GIS server facilitates the storing and sharing of geospatial information such as imagery and vector data. Maintaining and scaling a GIS server can be challenging. In today's economy state and local governments and non-governmental organizations struggle with shrinking public budgets and fewer resources available to support a GIS; while concurrently incurring a greater demand from an increased number of users requesting map data and imagery as a web-based service. Google's Map Engine eliminates multiple layers of infrastructure and allows GIS data provider's to focus on data without maintaining hardware, software, or databases.

Google Map Engine is a cloud-based Software-as-a-Service (SaaS); it eliminates the need for highly trained information technology staff to administer and maintain a GIS server. As a result, users of Map Engine such as United States Forest Service (USFS) and the Department of Defense can focus on their missions and support their users without the concerns, costs and overhead of maintaining a traditional GIS. Map Engine enables organizations to pool resources and collaborate, which facilitates data sharing and reduces duplication of data hosted on multiple servers.

Google Map Engine's SaaS interface and approach is based on the successful, intuitive Google Applications model for services such as Gmail and Documents already familiar to many users. Many consumers of geospatial data and imagery take advantage of products like Google Earth, and as professionals we may encounter the need to leverage a common and reliable geospatial base map as a resource. As of October of 2011, over one billion users have downloaded Google Earth. Regardless of user type, affiliation or service needs, we all consume Google Earth from the same single web-based resource.

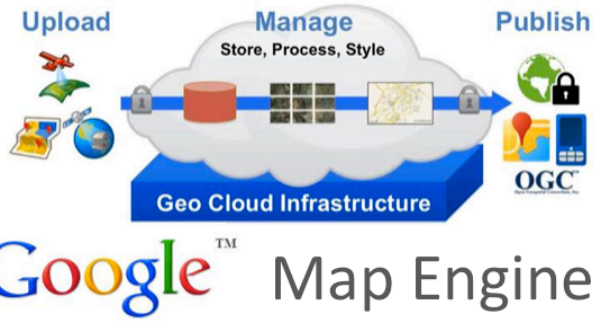
Google Earth is good for the average consumer but government agencies often require a secure, closed web-based resource for storing and sharing GIS data. In the San Francisco Bay Area, there are nine counties and at least 20 jurisdictions that are responsible for storing and sharing GIS data. The USFS National Interagency Fire Center (NIFC) supports wild land fire response and mitigation. NIFC must be able to rapidly store and share hundreds of layers of imagery and map data with federal, state, and local governments during a wild land fire event. In the past, NIFC and the USFS maintained geospatial data and imagery on multiple servers across several organizations; when a fire began data and cost sharing challenges made it difficult to respond to the event in a timely and effective manner. Over the last year, NIFC developed a Fire Enterprise Geospatial Portal (Fire EGP) that leverages Map Engine in order to pool resources, eliminate redundancies, and more effectively and efficiently serve the growing demand for geospatial data from multiple collaborators and responders.

The challenges that Map Engine and Fire EGP has addressed are as follows:

CHALLENGE	MAP ENGINE AND FIRE EGP
Costs associated with processing, updating, inventorying and managing geospatial data and imagery.	Pool funding to pay for the service.
Costs associated with staffing segregated agencies.	Map Engine and Fire EGP do not require database and server administrators.
Costs associated with software.	Eliminate the requirement for multiple GIS and imagery software and server licenses; cloud based resource is an economy of scale.
Rapidly share wild land fire response data to many users, organizations and agencies.	SaaS works in near real time. Powerful, private cloud has more processing power and storage than individually hosted GIS environments. Consolidate a loose and ad-hoc network of GIS servers and data sources into a single, collaborative data-sharing environment that supports multiple GIS user environments via interoperable services.

Google's scalability, reliable infrastructure, and an economy of scale are advantageous for NIFC during peak wild land fire season. It enables the end-users to focus on their objectives without the need for specific skills in server administration or managing expensive middleware products. As a result, NIFC Fire EGP users store and share data it during an event and make it immediately available for all to use.

Users upload, manage, stylize, and publish vector and imagery data as maps that can be exported as Open Geospatial Consortium (OGC) compliant Web Map Services (WMS). Maps can also be published in 2D for Google Maps, or in 3D for Google Earth. Using a robust "management portal" and "dashboard," Map Engine administrators manage the public's access to published maps and data.



Sharing Infrastructure Costs

One of the great advantages of cloud computing is the ability to pool resources. In this context, pooled resources are less about sharing CPUs and servers and more about collaboration and cost sharing. Cost sharing introduces economies of scale that multiple organizations such as NIFC find beneficial. Some of the costs associated with Map Engine include line items for storage capacity and page view allocations; Google also allows large volume discounts.

Eliminate Redundancies

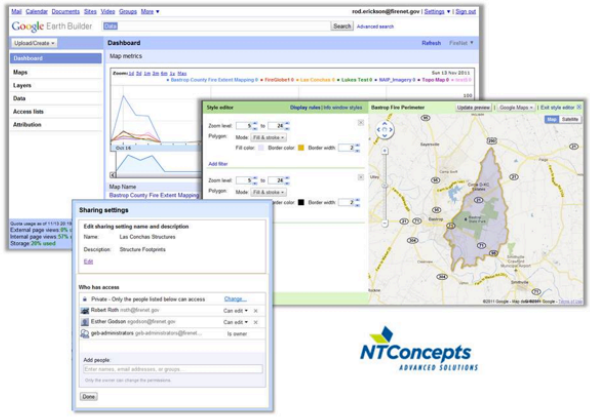
In the Bay Area, a large number of inter-reliant regional and local agencies represent an opportunity to serve out data once and share it across borders. NIFC uses tiled imagery from products such as orthophotography quadrangles and the USDA National Aerial Imagery Program (NAIP). Using Map Engine, these tiles can be processed, stored and served once without redundancy.

Effectively and Efficiently Serve Geospatial Data

Typically, geospatial data services represent the largest data storage and bandwidth footprint in a government's IT infrastructure. NIFC has found that all stakeholders are able to collaborate on this platform without taxing their own IT infrastructure and bandwidth. With Map Engine, a data steward's only concern is storage allocation and page views; in order to scale both can be incrementally increased. As with most cloud-based offerings, there is no lengthy process or paperwork required to scale services. This capability frees organizations such as NIFC from the time and resource intensive process they would normally become hindered with when trying to rapidly upload and serve geospatial imagery and data during an event.

Conclusion

The Map Engine solution by Google is an innovative approach to storing and sharing geospatial data. Using this alternative to a traditional GIS solution, data managers and stewards such as NIFC reduce time and budgets required to serve geospatial data, imagery and a common base map. Expensive middleware and complex administration processes are replaced by a simple, intuitive Google Applications interface. It is time to stop serving the same pixels and vectors over and over again. Serve once and share many, many times.



About the Author

Rod Erickson is a graduate of the University of Alabama Geography/Planning program and a certified GIS Professional (GISP) with Next Tier Concepts. His experience spans over 15 years working with state, local, federal, DoD and Intelligence Community customers providing geospatial integration and management support. At Next Tier Concepts, his focus is on processing, exploiting and disseminating geospatial data and services using cloud based services and mobile platforms.

Next Tier Concepts, Inc.
1945 Old Gallows Road, Vienna, VA 22182
ntconcepts.com | sales@ntconcepts.com