Web 2.0, Cloud Computing, and Earthquake Forecasting

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We discuss the impact of Web 2.0 and Cloud Computing on geo-sciences and on e-Science generally. Social networks, user driven content, "start page" portals, gadgets/widgets, mash-ups, REST-style web services, RSS/Atom feeds, JSON, and AJAX have transformed Web computing and have challenged our assumptions about how Web applications should be designed and built and who should build them. Similarly, cloud computing (powered by multicore computers and virtualization) introduces several important parallel programming models relevant to data-mining.

Web 2.0 provides a comprehensive network programming environment that compares well to the standardized Web Services architecture used by QuakeSim and other science portals. Inevitably, these new techniques will have an impact on e-Science, both in the way data and information (such as earthquake forecasts) are delivered and shared and the way that scientists interact with each other. One of the interesting side-effects of Web 2.0 is the "do it yourself" trend in Web computing, which can be viewed as a reaction against the excessively complicated "enterprise" development models used by Grids and Web Services.

Cloud computing (such as Amazon's EC2 and S3 online services, the Google App Engine, and Microsoft's SkyDrive) outsources basic computing infrastructure such as storage, computing, and hosting. The interiors of such systems are interesting and make use of virtual machine technologies, but such details are not exposed to the user. This technology movement is closely related to the advent of multicore, which are well matched to virtualization technologies such as VMWare, Xen, and OpenVZ. Programming models for clouds such as MapReduce-based Hadoop and Dryad are suitable for large scale clustering, dimensional reduction, and other data-mining techniques.

We discuss these trends as well as academic efforts aimed at scientific computing requirements. In particular, we discuss the proposed "QuakeSpace" Web 2.0 and Cloud system that was an outcome of the 2008 ACES Meeting and its potential for sharing data, applications, and information through social networks.