

Integrated open-source geophysical code framework: II. Web processing and software distribution

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A web service model for data manipulation, analysis, and modeling was implemented, based on a generalized data processing system called SIA. The service is not limited to any specific data type or operation and allows the user to combine ~190 tools of the existing package, with new codes easily includable. Although initially started as a replacement to a commercial reflection seismic processing system, the system has now grown into a generalized code design framework and has been applied in several areas of geophysics, such as reflection/refraction and earthquake seismology, potential fields, and visualization. The system is already fully developed and includes a Graphical User Interface, parallel processing capabilities, on-line documentation, on-line software distribution service and automatic code updates.

The processing service (<http://seisweb.usask.ca/SIA/ps.php>) allows remote execution of complex processing flows completely designed and controlled by remote clients who are presented with mirror images of the server processing environment. A characteristic feature of the model is its decentralization, with all the servers and clients running identical copies of SIA software. Clients are also able to post their processing flows at the web server, thereby building a knowledge base of processing expertise shared by the community. Flows in this knowledge base are currently represented by a hierarchy of automatically-generated interactive web forms. These flows can be accessed and the resulting data retrieved by either using a web browser or through API calls from within the clients' applications. Server administrator is thus relieved of the need for development of any content-specific data access mechanisms or codes.

Currently, the processing service is utilized to maintain a library of processing examples (<http://seisweb.usask.ca/temp/examples>) including a number of useful web tools (such as UTM coordinate transformations, calculation of travel times of seismic waves in a global Earth model, and generation of GMT color palettes). Examples of important potential applications of this web service model include building intelligent data queries, processing, and modeling of global seismological data.

In addition to the processing service, a companion code distribution and automatic update service (<http://seisweb.usask.ca/SIA/cs.php>) was also designed. The service utilizes the SIA system maintenance utilities to synchronize its source code with multiple (user-selectable) software repositories. The program performs automatic checking for the available updates, downloads them from the web, and installs them from source code. Notably, any SIA distribution (used for data processing or code development) on a system providing Apache web services would automatically become a code distribution server.