Time Series Analyst

UtahState UNIVERSITY

USGS NWIS Time Series Analyst

Developed by:

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Purpose and Function

The NWIS Time Series Analyst application, developed at Utah State University, was designed to provide users with plotting and export functionality for data at any United States Geological Survey (USGS) monitoring station in the United States. It implements the NWIS Web Services (http://water.sdsc.edu/wateroneflow/) designed and developed as part of the CUAHSI HIS project to provide access to the USGS data contained within the National Water Information System (NWIS).

The Time Series Analyst is an example of an application built by one of the CUAHSI Hydrologic Information System (HIS) partner Universities by implementing technology created by the HIS project.
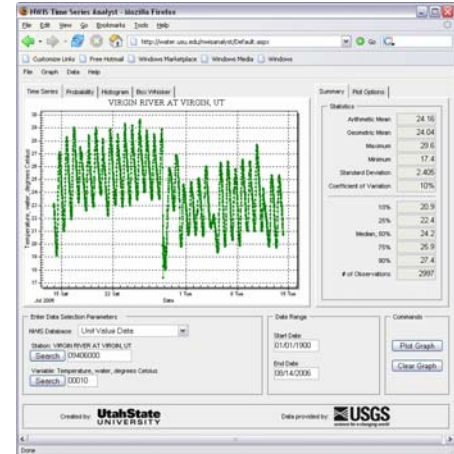
Operating the Time Series Analyst

The USGS NWIS Time Series Analyst can be operated using any Internet browser by connecting to the following URL: http://water.usu.edu/nwisanalyst/

For more details about how to use the Time Series Analyst, please view the tutorial.

Required Operating System and Client Software

An Internet browser is the only client software required to operate the core functionality of the Time Series Analyst. Users do not have to download or install any special software. Time series data downloads are formatted as Microsoft Excel files, and so Excel is required to read the data files exported from the Time Series Analyst. The Time Series Analyst has been tested on Windows operating systems using Internet Explorer and Mozilla Firefox browsers.

Technical Specifications

The Time Series Analyst server side application was developed using Microsoft ASP .Net technology with the Microsoft Visual Studio .Net 2003 development environment. It is running on a Microsoft Windows 2003 server and requires Microsoft IIS and the Microsoft .Net Framework to be installed on the server. The data plots are generated using a 3rd party plotting control called ProEssentials that has been developed by Gigasoft (http://www.gigasoft.com).

Information Flow

The Time Series Analyst can be used through an Internet browser at any location with access to the internet. The Time Series Analyst server side application is implemented on a Windows server at Utah State University. It implements the NWIS Web Services developed by the CUAHSI HIS project to access the USGS streamflow and water quality data stored in the USGS NWIS system. The NWIS web services are implemented on a server at the San Diego Supercomputer Center (SDSC).

Requests for data are made by users through an Internet browser and are interpreted by the Time Series Analyst server side application at USU. The Time Series Analyst server side application then sends requests to the NWIS Web Services at SDSC. These services interpret request from the Time Series Analyst server side application, retrieve the requested data from the NWIS system, parse the data text files returned from NWIS, and then return the data to the Time Series Analyst server side application where it is used to generate plots, descriptive statistics, and data export files. The following figures illustrate this process.
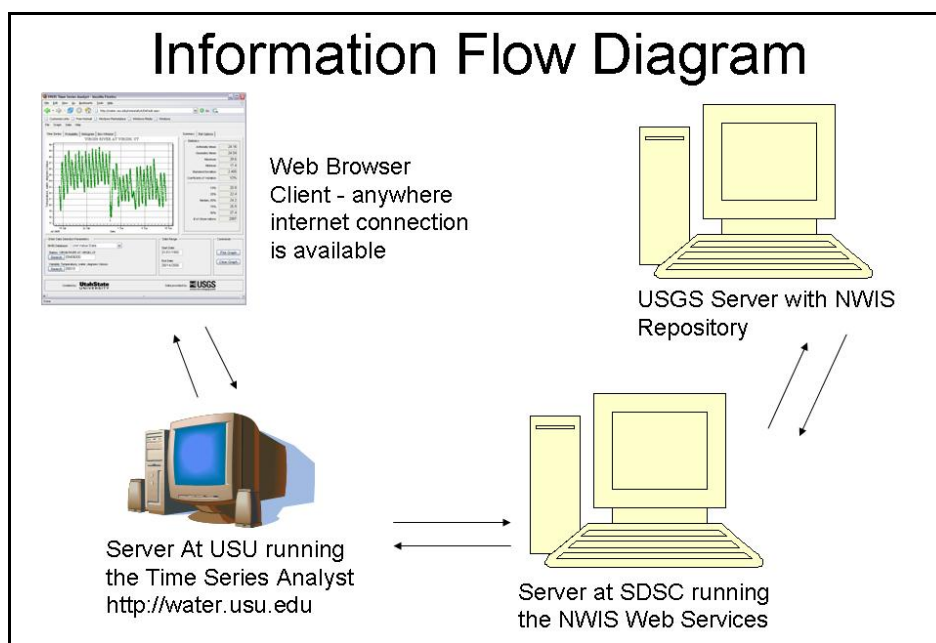

Information flow of the Time Series Analyst.

Time Series Analyst users interact with the application through a web browser. Requests for data from the user are passed to the server at USU – these requests include the station, variable, and date range to be returned, as well as the output options including plot type, plot options, and data export options. The Time Series Analyst server side application returns summary statistics, plot images, and data export files to the user's Internet browser based on the request that it has received.
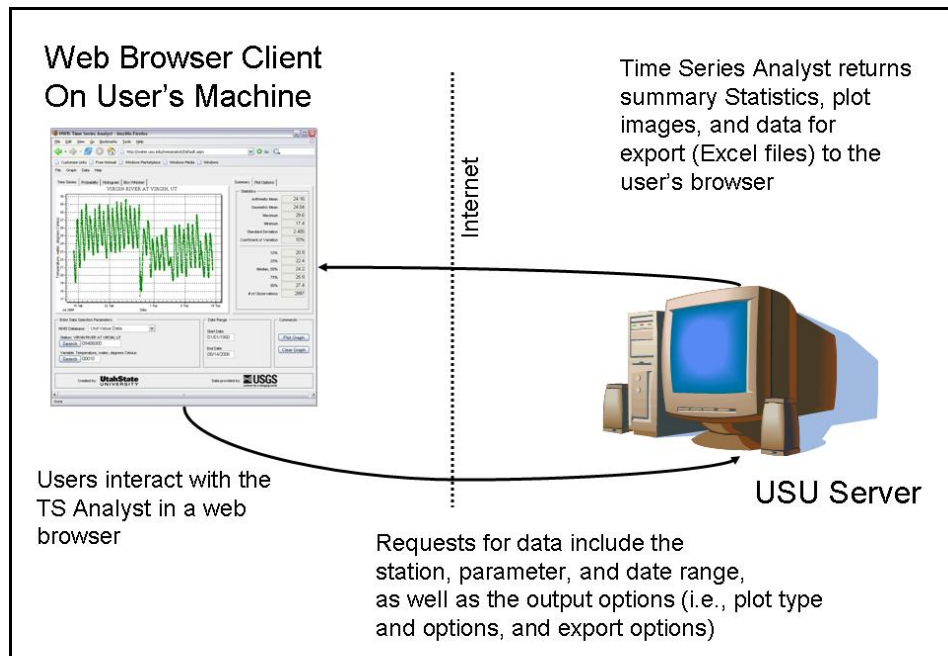

Interaction between the Internet browser client and the USU server running the Time Series Analyst server side application.

The Time Series Analyst server side application sends requests to the NWIS web services at SDSC using the SOAP protocol. SOAP is a simple XML based protocol that allows applications to exchange information over HTTP. The requests to the NWIS web services include the station, variable, date range, etc. as parameters. In general, the NWIS web services return variables that contain strings or arrays that hold the data that has been requested by the Time Series Analyst server side application.
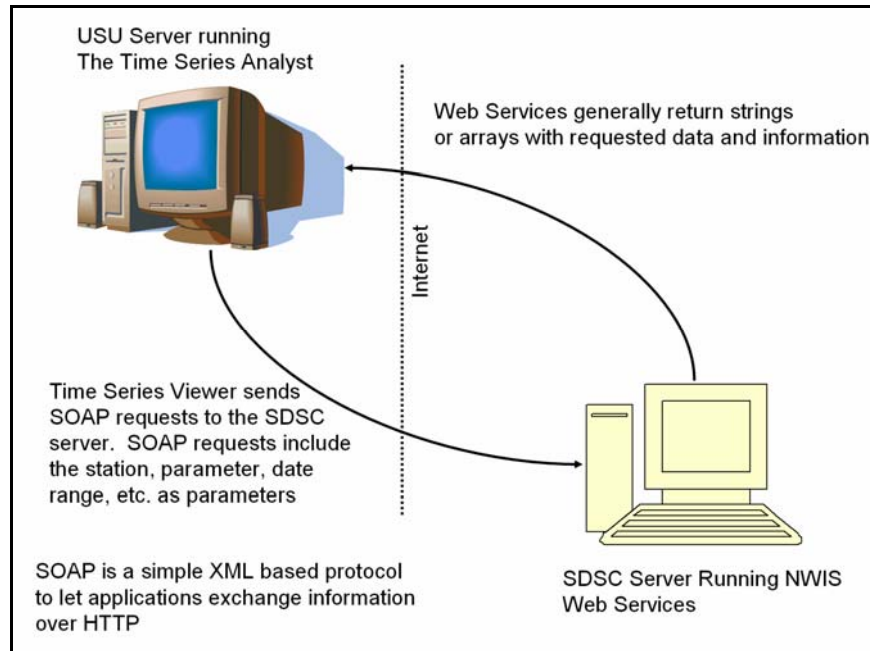
Interaction between the Time Series Analyst server side application and the NWIS web services implemented at SDSC.

Based on the requests received from the Time Series Analyst server side application, the NWIS web services request data from the USGS NWIS system. The NWIS system returns standard NWIS text files to the NWIS web services, which then parse the text files and format the information to be returned to the Time Series Analyst server side application at USU.
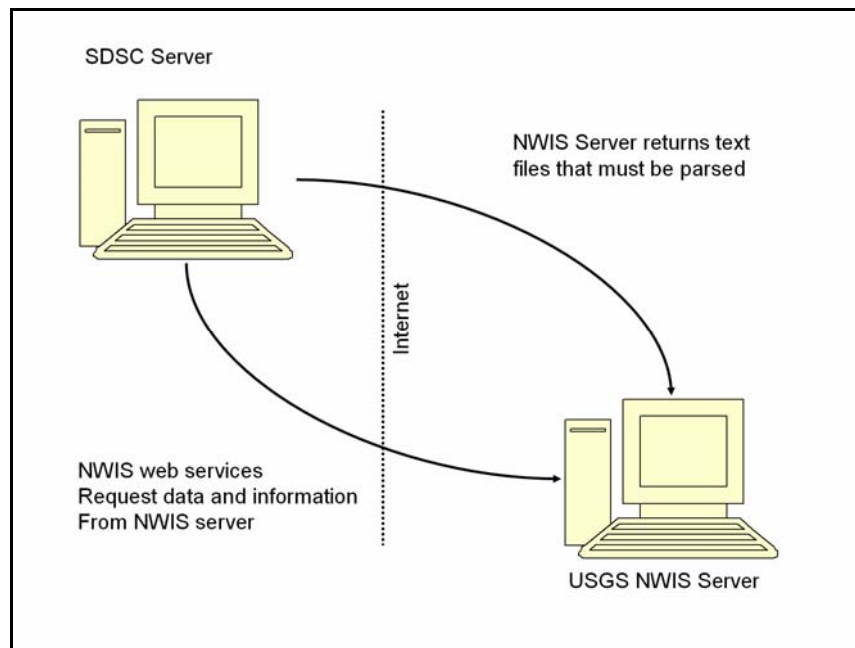
Interaction between the NWIS Web Services at SDSC and the USGS NWIS system.