



CUAHSI
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HIS document 1

Getting Started with the HIS
Server
(version 1.0)

An introduction to HIS server components and documentation

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Distribution

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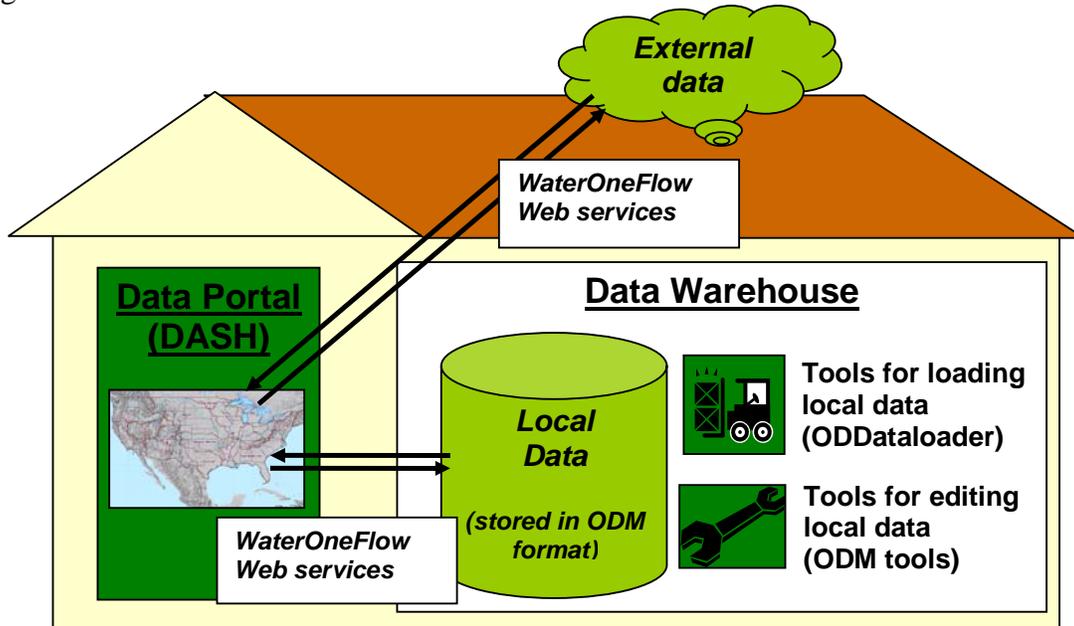
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1.0 Introduction

The HIS Server machine you have received is designed with two goals in mind:

1. To act as a warehouse for storing and organizing environmental data in a format that is recognized by the scientific community
2. To act as a portal for sharing your environmental data with the scientific community and accessing data that have been published by other community members

Communication between portal and warehouse functionalities is achieved through web services. Management of data is achieved through custom database tools. A conceptual diagram of HIS server is shown below.



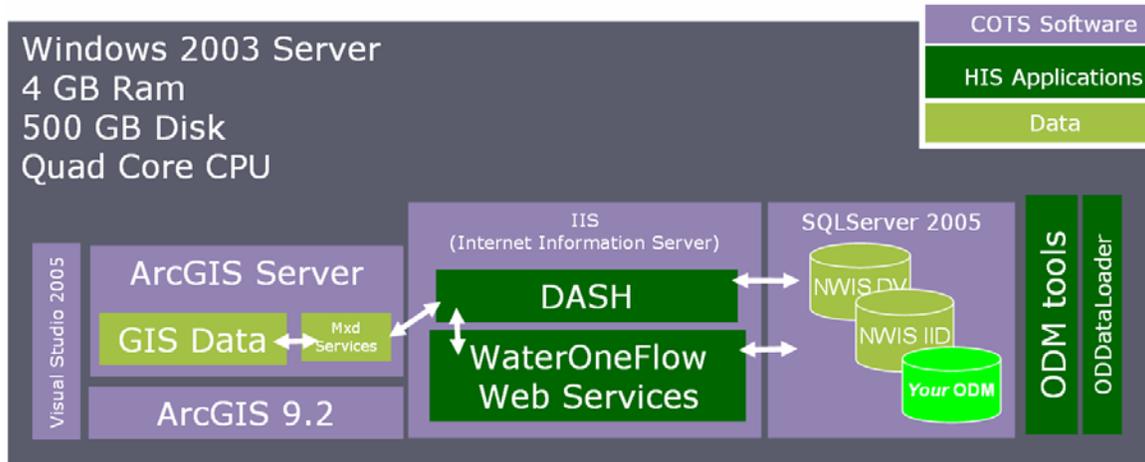
The HIS server machine has been pre-loaded with commercial-off-the-shelf (COTS) software, custom tools and data to support the goals stated above. This document introduces the components of HIS Server, and provides link to documentation about each component.

Conceptual diagram of a HIS server

2.0 System Overview

At the heart of the system is your observations data. The ODM (Observations Data Model) is the data model used to store these observations into a SQL Server database. Each “Network” will have its own ODM database and GIS data layer, where a network is defined as a set of sites with observations of variables that logically belong in the same database. As an example, all of the US Geological Survey’s gages measuring real-time stream flow are grouped into a single observations network. The way in which you group your own observations data into one or more networks depends on the nature of your data and how you choose to organize it.

Once your data are loaded into an ODM database, the data are exposed to clients via the WaterOneFlow web services and the DASH web application. The DASH application is an ArcGIS Server web application which uses a map interface to allow clients to graphically select the sites from which they can get observation data values.

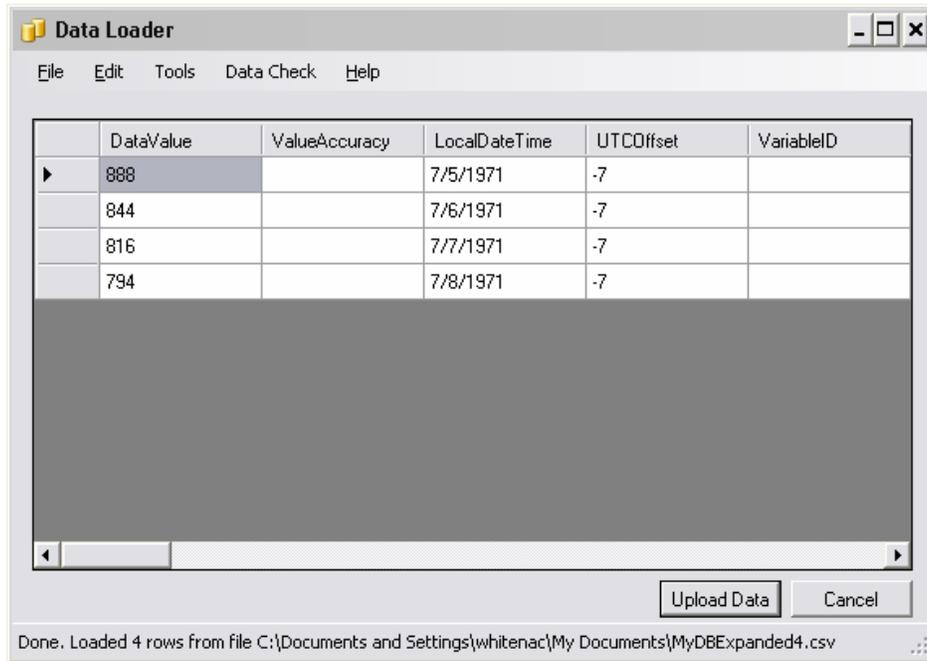


The following sections introduce HIS Server components for loading and publishing data.

3.0 ODDataLoader

<http://river.sdsc.edu/wiki/DataLoader.ashx>

The ODDataloader is a custom tool to assist you in loading your data into the ODM. The tool is targeted towards users who are new to SQL Server, and presents a simpler interface than traditional database import methods such as SSIS (SQL Server Integration Services). The ODDataLoader is designed to load data from a text file or Excel spreadsheet, and automatically populates missing database fields if necessary, in order to comply with constraints which help insure the integrity of the ODM database.



4.0 ODM Tools

<http://water.usu.edu/cuahsi/odm/>

The ODM Tools is an application which allows you to analyze and edit your observations data. This application provides a quick way to:

- Check to see if data were loaded into your ODM database correctly.
- Plot time series.
- Edit individual time series records.

The screenshot shows the ODM Tools application window. The interface includes a menu bar (File, Edit, Tools, Help) and three tabs: Query, Visualize, and Edit. The Query tab is active, displaying several query options:

- Query by Site:** A list of sites with a scroll bar, including "10010400 - EAST FK BEAR RIVER NR EVANSTON, WYOMING" and "10010500 - HILLIARD-E FK CANAL NR ST LINE NR EVANSTON, WYO".
- Query by Variable:** A list of variables with a scroll bar, including "00010 - Temperature, water" and "00020 - Temperature, air".
- Query by Source:** Fields for Organization, Source Description, and Multiple Entries (AND/OR).
- Other Query Options:** Checkboxes for General Category (Hydrology, Water Quality), Value Type (Derived Value, Field Observation, Sample), Sample Medium (Surface Water), Data Type (Average, Sporadic), Quality Control Level (0-4), and Method.
- # of Observations:** A numeric field with a dropdown arrow.
- Time Period:** Fields for from and to dates, both set to 7/25/2007.

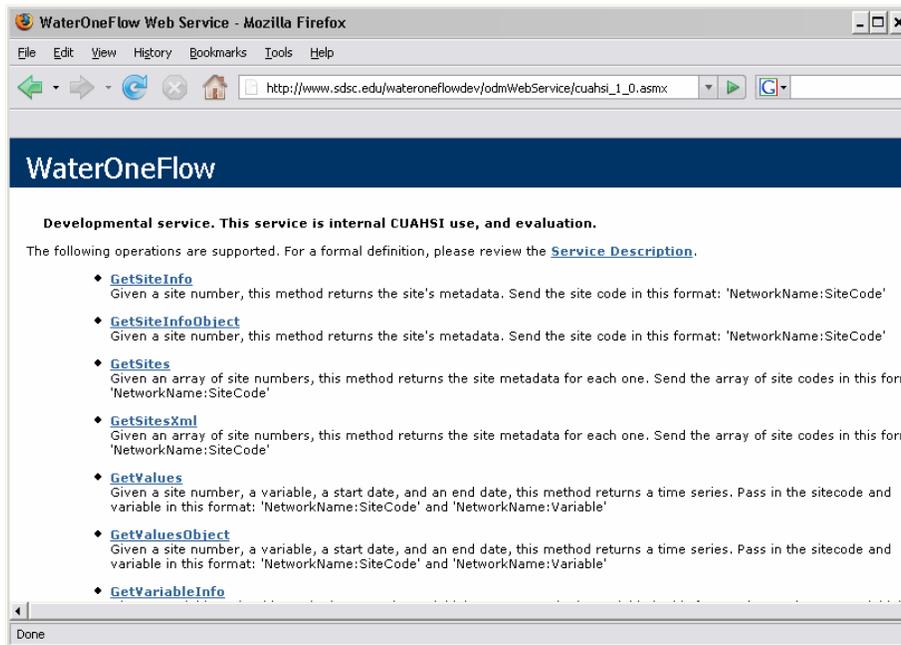
At the bottom, there is a table with columns: Site, Variable, Variable Units, General Category, Value Type, Sample Medium, Data Type, Quality Control Level, Method Description, # of Observations, and Date. Below the table are buttons for "Export Checked Metadata", "Export Checked Data", and "Query".

5.0 WaterOneFlow Web Services

http://river.sdsc.edu/wiki/GenericODWS_User_Guide.ashx

Each ODM database will be exposed as a .Net web service within IIS (Internet Information Services). The web service belongs to a family of CUAHSI web services called WaterOneFlow, which follow the waterML schema for exchanging hydrologic data. The key web methods accessed by other applications are `getSiteInfo()`, `getVariableInfo()` and `getValues()`. These methods are the means by which applications extract data from your ODM database.

While a user can browse to the location of your web service using an Internet browser and see a web page such as the one below, the web service is designed to be accessed with programming code rather than a graphical user interface (GUI). The next section introduces a web-based GUI for retrieving data.



6.0 DASH (Data Access System for Hydrology)

<http://river.sdsc.edu/wiki/dash.ashx>

The DASH application is an ArcGIS Server web application which uses a map interface to allow clients to graphically select the sites from which they can get observation data values. This is the interface your clients will use. It connects to WaterOneFlow web services, the ODM databases, and of course the ArcGIS Server Map services.

When the user navigates to your DASH web page, they will see an interactive map in which they can zoom and pan to locate an area of interest. They can then click on individual sites to see what data are available for each site, or they can search for a particular variable measured at sites within the map.



7.0 About Your Machine

7.1 Machine Inventory

The HIS Server has three disks, which are mirrored for redundancy.

C:\ drive is used for the operating system and COTS product installations only.

O:\ drive is used for data only.

P:\ drive is used for HIS application code and other miscellaneous data.

System Disk	Data Disk	HIS software
Operating System Program Files - SQL Server - IIS - Visual Studio - ArcGIS - ArcGIS Server	GIS Data SQL Data (ODM)	- WaterOneFlow Web Services - DASH - ODM Data Loader - ODM Tools - WSTestPage
C: 50Gb	O: 230Gb	P: 180Gb

7.2 Detailed Inventory

COTS software: (c:\)

Microsoft SQL Server 2005 Standard Edition

Microsoft Visual Studio 2005 Professional

ArcGIS Server Enterprise Advanced

ArcEditor Single Use

Microsoft Internet Information Services (IIS)

Custom Tools: (p:\)

ODDataLoader

- Tool to assist loading your observation data into the ODM

ODM Tools

- Used to analyze and edit ODM data

WaterOneFlow Web Services

Generic ODM Web Service

DASH (Data Access System for Hydrology)

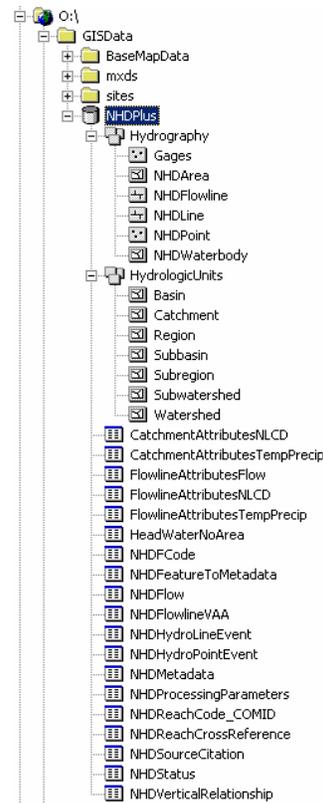
- Main User interface used by clients to retrieve observation data

Data: (o:\)

NHDPlus (GIS data)

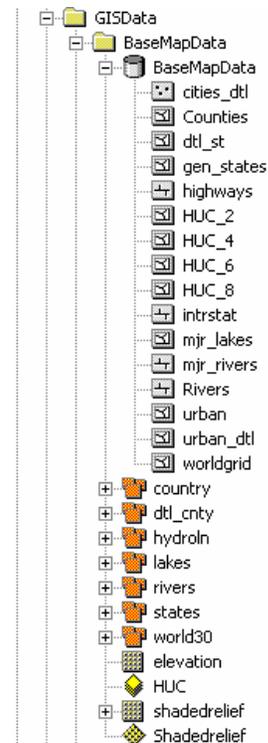
NHDPlus consists of 1:100K National Hydrography Dataset (NHD) data, along with a set of value added attributes to enhance stream network navigation, analysis and display. In addition to the NHDPlus stream network, your HIS Server also contains:

- An elevation-based catchment for each flowline in the stream network
- Catchment characteristics
- Headwater Node Areas
- Cumulative drainage area characteristics
- Flowline min/max elevations and slopes
- Flow volume & velocity estimates for each flowline in the stream network



You also get the following basemap data:

- ESRI “Maps and Data” Layers (GIS Data)
 - US States, Counties, Cities
 - Highways, Major roads
 - Urban Areas
 - Major Lakes and Rivers
 - Shaded Relief Image
 - ... and more
- Hydrologic Unit Code Data 1:250,000 (GIS Data)
 - HUC 2
 - HUC 4
 - HUC 6
 - HUC 8



The following data support query of national datasets and map configuration:

- Sites (GIS Data)
 - NWIS Daily Values sites
 - NWIS IID sites
- NWIS DailyValues Catalog (SQL Database)
 - Does not include data values
- NWIS IID Catalog (SQLDataBase)
 - Does not include data values
- BaseMap.mxd
 - ArcGIS Map Document used to configure the BaseMap Service of the application
- Networks.mxd
 - ArcGIS Map Document used to configure your Observation data networks

7.3 What To Do When the Machine Arrives

The first step is to log in to the machine: The “hisadmin” user has already been created and you should have had a password emailed to you. If you don’t have this password, email twhitenack@sdsc.edu. The “hisadmin” user is a member of the Administrators group, so you will have full privileges on this server.

The next step is getting this machine on your network so your clients can access your data. You may want to talk with your network administrator to help you set this up.

What you specifically want to request is this:

- A public IP address (visible from the internet).
- The firewall must be configured to allow traffic on port 80 (to allow web clients to access the IIS server).
- You’ll also need to have them allow Remote desktop access so support persons can assist in configuring and updating the server. This requires that port 3389 is open.

Next, open and test DASH application: <http://localhost/DASH>

This application has been pre-configured with National-scale observation data. Try zooming in and using the HIS-Identify tool to select a site and see if you can get data. For any problems encountered with this application, email twhitenack@sdsc.edu.

Your system is up and running!

Now you’ll need to add your observations data to the system. To do this:

- [Load your observation data network into a new ODM using the ODM Loader tool](#)
- [Implement the WaterOneFlow Web Services configured to the new network](#)
- [Add the new network to the DASH](#)

That’s it! Now your data are loaded and published, and you are finished with HIS Server installation and configuration.