

NSDSS Build-Install Notes

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1. About This Document

This chapter provides a general overview of this document and contains the following major sub-sections:

- Document Purpose
- Document Audience
- Using this Document
- References

2. Document Purpose

This document serves as the Reference guide for the NSDSS Web Services Prototype. It explains how to operate and use the NSDSS Web Services (NSDSS WS) after it has been installed and pre-configured. In particular, the document focuses on how to access NSDSS Web Services and perform tasks such as:

- Data Permissions
- Operations and Maintenance
- Exception Handling

In summary, this document is intended to serve the following purposes:

- Give you a general overview of the NSDSS Web Services.
- Explain how to operate and administer NSDSS WS.

3. Document Audience

3.1. Pre-Requisites

The following knowledge, skills, and experience are recommended before reading this document:

- Working knowledge of the installation facility's network topology and the interconnections between the facility's components and target client network topology.
- Working knowledge of how to perform administration on Windows Server 2008.
- Working knowledge of how to perform administration on IIS.
- Basic proficiency in using one of the following web browsers:
 - Microsoft® Windows® Internet Explorer® 7 (or up)
 - Mozilla Firefox™ 2.0 (or up)
- Additional packages may be listed in the Overview section.

3.2. Out-of-Scope Content

The following topics are not covered by this document but may be available in other referenced documents (see references):

- Functional specifications
- Application programming interface (API) descriptions
- Any other out-of-scope content is not covered by any part of the NSDSS documentation suite.

4. Using This Document

4.1. Document Structure

This document is divided into the following chapters:

4.2. Typographical Conventions

The following sections describe the typographical conventions used in this document.

4.2.1. Formatting Styles

Formatting Description	Element or Information Type	Examples
Arial	Field names (Includes drop-down lists, check boxes, radial buttons, and other lists and selections)	
	API method or operation names	
ARIAL SMALL CAPS	Keystrokes	
<i>Calibri Bold Italics</i>	References to other documents or source material	
	Screen, window, pop-up, and tab	

	names. (First letter capitalized)	
<u>Calibri Bold + Italics + Underline, Blue</u>	Cross-references (links) to other headings or sections in this document	
<i>Calibri Italics</i>	Emphasis to a block of text	
Courier New	Code samples (Such as scripts, file formats, XML data, and so on)	
	Directory paths	
	Filenames	
Courier New Bold < <i>Courier New Bold Italics</i> >	Input (text) that the user must enter (Variables are expressed in italics surrounded by angle brackets <>)	

4.2.2. Special Icons

The following special icons are used in this document to alert the reader to important pieces of information:

Icon	Description
	<p>Note: Extra or supplementary information that needs to be emphasized to the reader. Can provide further context, instructions, or understanding.</p>
	<p>Tip: Useful tips or pointers that can help the reader while they are using the product or this document.</p>
	Reference
	<p>Warning: Alerts the reader to a potential action, practice, or situation that can result in major damage to data or the system. Damage is permanent and irreversible. Results may be contrary to what is expected or intended.</p>

Description

4.3. References

The latest versions of the following documents should be used in conjunction with this NSDSS WS Reference guide. They provide other useful, supplementary information about the product.

Reference	Description
<i>NSDSS Database Guide</i>	Documentation for the database models used for the implementation of NSDSS Web Services (ODM documentation not included)
<i>NSDSS Interface Specifications</i>	Specification documentation for the NSDSS Web Services APIs
<i>Getting Started With ODM</i>	Obtainable from CUAHSI and included in release package (file <code>GettingStartedWithODM.pdf</code>)
<i>ODM Web Service 1.0 install package</i>	Obtainable from CUAHSI and included in release package (file

	GenericWSSetup_20090115.zip)
<i>ODM Web Service 1.1 install package</i>	Obtainable from CUAHSI and included in release package (file GenericODWS-1-1_Release.zip)
<i>ODM Blank SQL Server Schema</i>	Obtainable from CUAHSI and included in release package (file ODM1.1BlankSQLServerSchema.zip)
<i>ODM 1.1 Schema Diagram</i>	Obtainable from CUAHSI and included in release package (file ODM1_1SchemaDiagram_md.jpg)
<i>HIS document 4 Configuring web services for an observations database (version 1.0)</i>	Obtainable from CUAHSI and included in release package (file HISDoc4_ConfigureWebServices.pdf)
<i>ODM 1.1 Design Specifications</i>	Obtainable from CUAHSI and included in release package (file ODM1.1DesignSpecifications.pdf)

5. Overview

NSDSS is a prototype collection of web services, databases, and OS features configured in a way to meet the prerequisites necessary for the functionality of the NSDSS Prototype GUI produced by Atkins North America, Inc for the NSDSS grant in concert with University of Alaska Fairbanks (UAF) and the Texas A&M University (TAMU) for the U.S. Department of Energy (DoE). As a prototype, the deployment is largely a set of manual processes and not a production model.

This guide serves as documentation for the build processes required to compile and publish the various web services in the NSDSS prototype and the current state of the NSDSS server components deployed in the VMWare prototype server at UAF's facility on the host `nsdss.ine.uaf.edu`. In some places, the guide will refer to existing 3rd party documentation of install processes and components and is not intended to supplant that existing documentation. The reader should expect that some additional reading and research will be required in order to understand the construction/deployment of the prototype server.

The prototype makes extensive use of CUAHSI's ODM services, both client-side and server-side. It is strongly recommended that the reader familiarize themselves with the following technology before planning activities around the information in this guide. These components are listed as follows:

-
1. CUAHSI's ODM Version 1.1 (NOTE: later/earlier versions will not work as their designs are radically different in operation. The ODM 1.1 release components are provided in the NSDSS release packages as a convenience.)
 2. NetCDF Version 3 (NOTE: later/earlier version will not work as their designs are also radically different. The specific dll version for the NetCDF reader described⁷ in the Implementation Guide must be used in compilation unless code is ported to the new library.)
 3. Visual Studio 2008
 4. Windows Server 2008 R2 (standard edition, x64)
 5. IIS (Internet Information Server) 7 [Operations Guide: <http://technet.microsoft.com/library/cc732976.aspx>]
 6. SQL Server 2008 [Guides: <http://technet.microsoft.com/en-us/sqlserver/bb671410.aspx>]
 7. Log4net 1.2.10 (not necessary, but helpful) [<http://logging.apache.org/log4net/>]
 8. LDAP, and specifically Microsoft's ADAM/ADLDS [<http://technet.microsoft.com/en-us/library/cc754361%28WS.10%29.aspx>]

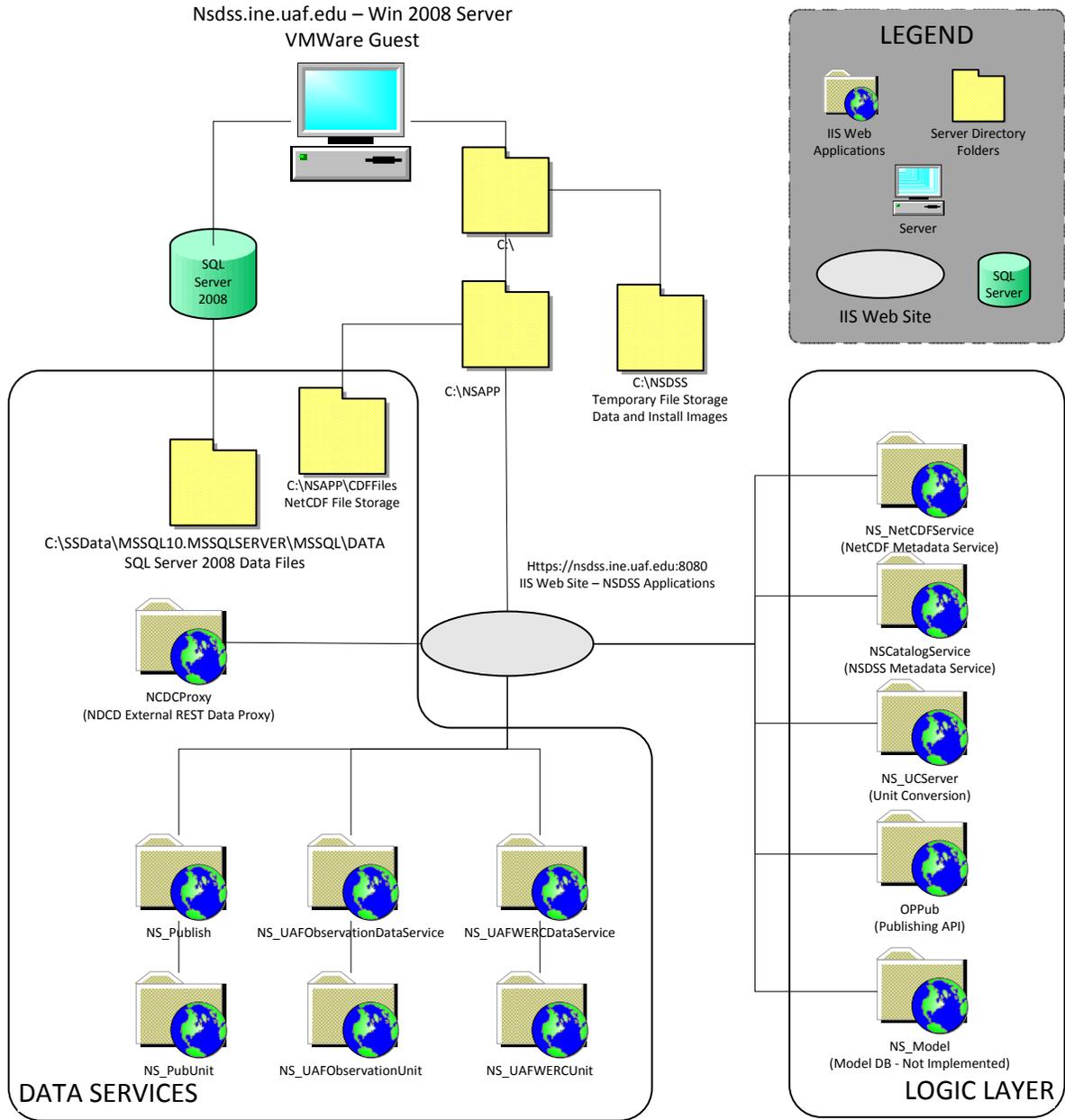


Figure 1. NSDSS Logical View

6. Source Code Build

6.1. Build Configuration Notes

NSDSS Web Services are primarily written in Microsoft Visual Basic and are compiled (built) into Web Services output folders. The projects/solutions are then published to a temporary

directory on the builder's development machine where they are then zipped and then moved to the server (Ex: C:\NSDSS) for deployment. Some manual customization of the web.config file is done at the server (documented per the Implementation Guide) before the application can be put into run state using the IIS Manager.

It is strongly recommended that if a build environment is contemplated that upon extraction of the source code that source code tree be placed under a source control system before anything is modified in the tree. Microsoft Visual Studio, being a highly automated development system, may attempt to modify the code tree even upon loading of a project and multiple restore points will be highly useful while building.

Several of the projects rely on utilities libraries (in the NSDSS Utilities subdirectory) which should not be moved from their location in the tree without significant forethought. Logging, error reporting, and authentication projects provide common libraries to several of the web services. The components of the build tree can be looked at as one of several classes of code:

- 3rd party libraries – libraries not part of the NSDSS source tree used to support specific functionalities:
 - Netcdf.dll – NetCDF reader library
 - Log4net.dll – supports advanced logging for some of the Web services
- Common libraries – Libraries intended to be used by one or more services.

NSDSS Utilities – consisting of:

- ErrHandler
 - Logging
 - Authentication
- Web services – projects which are intended to be deployed as complete web services into IIS.
 - Test jigs/samples – projects intended to act as test platforms for various functions of the system.

6.2. Extract

Extraction of the build package should be straightforward. Choose an empty directory in which to place the source tree and unzip the contents of the build package into that directory. Again, it is strongly recommended that that source tree be placed in source control. Implementing source control is beyond the scope of this document. For reference, Collabnet Edge Subversion was used for the development of the NSDSS prototype code. This subversion version was used specifically because Visual Studio 2008 source control system integration was available for this package.

6.3. Compile

Each relevant directory should have a solution and/or VB project file. These files should be necessary and sufficient to produce a build directory for deployment. Common libraries (the NSDSS Utilities) should be compiled first (ErrHandler, Logging, and Authentication) by using the NSDSS Utilities solution file. Once the NSDSS Utilities are built, Web services projects should be directly buildable using Visual Studio's build directive. Test jigs/sample projects can be built but are not necessary for deployment

6.4. Publish

Microsoft VS's publish directive is probably the easiest way to create a build state. It is currently configured in the model to publish to a directory. It is suggested that the builder report that directory to accommodate the builder's file system, that it be a blank directory, and that it be clearly labeled as a temporary publishing directory.

6.5. Package

As each project is published (into separate subdirectories) an archival program (such as WinZIP or pkzip) should be used to package that subdirectory into one file. That file should be used as the install image to transfer to the target server. There is an existing SFTP server (based on the freeSSHD utility/service) on the NSDSS server which can accommodate the SFTP transfer.

7. Databases

All databases in the NSDSS Server Prototype run under SQL Server 2008, with the exception of the unit conversion database, which is an XML flat file called 'convunit.xml', and the exception of time series data kept in NetCDF files, which are located inside the folder "C:\NSDSS\CDFFiles".

7.1. Scripts

Debugging scripts used to update and correlate fields as well as pull summary information from various databases can be found in C:\NSDSS\SQLQueries as well as under C:\Users\Administrator\Documents. Several good examples of database manipulation scripts can also be found in C:\Users\Administrator\Documents\SQL Server Management Studio\Projects.

7.2. ODM Model Databases

LittleBear11: An ODM 1.1 Test Server with initial test data. Not currently used, it serves as an example of a properly installed and operational ODM 1.1 Server.

NSODM: An ODM 1.1 Test Server used for early development. (NS_UAFObservationsData service)

OD_NSDDSS: Current primary ODM data source for UAF WERC data. (NS_UAFWERCDATA service)

7.3. NSDSS Custom Databases

More detailed documentation on these databases can be found in the NSDSS Database Guide.

NSCAT – NSDSS Metadata Catalog Database

NCMeta – NSDSS NetCDF Metadata Store

Xqt: Database used to support the Model Database (currently unimplemented, NS_Model service)

ODpub: Modified ODM 1.1 Database for supporting ODM data publishing (NS_Publish service)

8. Install

8.1. Server Preparation

The IIS 7 (Web) server role should be installed. SQL Server 2008 should be installed. The ADAM/ADLDS role should be installed. (Not in the document scope)

8.2. Transfer

Make or use an existing standard folder location for install image archives (the zip files created during the publish step).

8.2.1. Prepare Physical Directory

Make a specific directory for NSDSS web applications (services) to live. Extract separate install images into separate directories using WinZIP or a similar tool

In the NSDSS Server, all NSDSS services run in subdirectories of C:\NSAPP.

In the NSDSS Server, the temporary transfer directory is C:\NSDSS. This directory is also used as a transfer and storage location for several intermediate dataset files, testing and reporting SQL scripts, and ODM install images and documentation. Files with names corresponding to the format *<module>-yyyymmdd<qualifier>.zip* are generally install image generated from a publish run on the build machine for a specific module. The dates correspond to their build dates.

8.2.2. Edit Web.config

Modify configuration files per the Implementation Guide. The base web.config from the build process is usually not fully populated with the appropriate value for the destination server and should be adjusted appropriately for the server environment. See the Implementation Guide for details.

8.3. Install ODM Services

In the “ODM Documentation” section of the build package all files necessary to bring an ODM 1.1 Server including documentation are provided. For each ODM source that is required start with the “GettingStartedWithODM.pdf” documentation. A detailed explanation of how to build ODM databases is beyond the scope of this document.

NOTE: for every new ODM service brought up using the ODM Server model, a proxy Web Service will need to be created to support the time interpolation and unit converter function in the overloaded GetValues call necessary for NSDSS. In order to support this, the deployer will have to create a new application directory, unpack an install image of the NS_ODMService, give the application a unique name (in the NSDSS Server, the original ODM Service usually resides in <data source>Data and the proxy resides in <data source>Unit), and modify the 'NS_ODMService_ndu_WaterOneFlow' application setting in Web.Config to the URL of the .asmx file for the ODM Service for that data source.

8.4. Make IIS Applications

The NSDSS Applications should be deployed in their own Web site, in order to be able to customize the port and addresses on which the applications/services respond on the server. In order to facilitate secure computing it is also recommended that the server have at least one valid SSL certificate installed before NSDSS deployment (in order to support https:// endpoint constructions and provide encryption for the system services calls).

NOTE: If modifying a Web Application under the Web Site, it is HIGHLY recommended that the Web Site be put in a STOPPED state during modification.

On the master website on the NSDSS Server, the base directory is set to C:\NSDSS instead of C:\NSAPP. This was done in order to make certain subdirectories accessible during the development of NSDSS but is not necessary; it is still recommended that the applications not be directed out of the staging directory but a separate application directory to prevent confusion on which directories contain running applications.

It is recommended when creating IIS applications for NSDSS that a separate application pool be established for all NSDSS Applications (web services). This application pool must be created with the Classic Managed Pipeline feature running the .NET Framework v2.0. A second application pool may be created to run some of the web services, but it is important to note that the NetCDF service **must be run using the Classic Managed Pipeline** application pool. This is due to the netcdf.dll that is part of this web service – it is a 32-bit dll and will not run under the integrated model under an x64 based server system. Under the advanced settings the “Enable 32-Bit Applications” must be set to true.

The configuration can be inspected on the NSDSS Server – the application pool used is named “Classic .NET AppPool”. A secondary applications pool called “NSDSS Applications” is used for some of the NSDSS Applications that do not require the 32-bit mode and are more flexible in their execution behavior.

Each application, in its basic settings, must have its corresponding Application Pool specified, the location of its runtime image directory (NSDSS Server: specific subdirectory of C:\NSAPP) and its enabled protocols (usually https; http can be additionally specified but is insecure and should only be turned on for testing purposes). The name of the application serves as its virtual subdirectory path under the website.

9. Security Configuration

9.1. Web Service Security – LDAP

An ADAM/AD LDS LDAP database has been installed on the NSDSS Server, by installing the AD LDS server role (see Microsoft’s documentation on install server roles using Server Manager). The contents of the LDAP, running on port 50000, can be inspected using the “ADSI Edit” application and modified as necessary. The system is configured to use the DN base “o=uaf,c=us”.

Note that the current security model requires that three groups exist in the OU=Users container: “Admins”, for users with complete access to the services, “NCUsers” for access to NetCDF data, “ODMUsers” for access to ODM data. Three Roles must exist in the CN-Roles container: “Administrators”, “Readers”, and “Users”.

9.1.1. The Override (Backdoor) Service Password

For the NSDSS prototype GUIs an authtoken is used to override the LDAP security mechanism. For certain calls, an authtoken parameter is requested but is not evaluated (especially with ODM datasets as there was never any security model supported under ODM 1.1). Where an authtoken is evaluated, if the build Resource of a project App_AuthTokens is set to ENABLED, the value of the Resource App_StaticAuthToken will be accepted as a service backdoor and will circumvent the LDAP user/password/token check.

10. Initialize Run State

General steps for bringing up the NSDSS Server Prototype. They should be generally done in this order if the entire system is down:

- Place databases online. Check databases for connectivity using the SQL Server Management Studio.
- Test Databases. (Section 11.1)
- Ensure all Web Service configuration files are supplied with the appropriate SQL Server database connection strings.
- Test Security/LDAP. (Section 11.2)
- Turn on the Applications Web Site using IIS Manager.
- Test Services. (Section 11.3)
- Base NSDSS Web Services should be up and running.

11. Install/Runtime Tests

11.1. Database

Use SQL Server Management studio (locally to the server) to check that the SQL Server is running. Login to each database and run SELECT queries on various tables to confirm the server is returning valid data. If remote access is necessary, check the Windows Firewall with Advanced Security to ensure that the remote system has access to the server at port 1433 (requires Inbound Rule).

11.2. Security/LDAP

Use ADSI Edit to ensure the AD LDS instance is contactable at the correct DN, Port, and server address. (for NSDSS Server, DN is "o=uaf,c=us", port is 50000, server is "nsdss.ine.uaf.edu")

11.3. Services

Test the .asmx URLs for each web service (Example: http://nsdss.ine.uaf.edu:8080/NS_CatalogService/NS_CatalogService.asmx). Extract the WSDL for each service (.asmx URL + "?WSDL"; Example: "http://nsdss.ine.uaf.edu:8080/NS_CatalogService/NS_CatalogService.asmx?WSDL") Use the individual .asmx URLs to test queries to each service.