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Architecture and Usability Aspects of Environmental Data Portals

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Web / Data Portal Architecture

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Definitions

Web Portal
A web site that acts as a starting point or gateway to Internet content, services, and information. Portals expose this information via a consistent set of visual elements and organizational constructs that improve the user experience and may relate, unify, or otherwise enhance the content.

Data Portal
A web site that acts as a starting point or gateway to Internet content, web/data services, and related information. Portals expose this information via a consistent set of visual elements and organizational constructs that improve the user experience and relate, unify, and otherwise enhance the content. Data portals focus on providing centralized, robust access to specific data and supported manipulations.
Web Portal Characteristics

- Content
  - Dynamic
  - Static
- Unification / consolidation
- Automation
- Secure exposure
- Data services
  - Selection
  - Manipulation
  - Transformation
  - Acquisition
General Architecture

**Clients**
- Public Users
- Collaborators
- Applications

**Web / Data Portal**
- Static Content
- Dynamic Content
- Educational Materials
- Software Frameworks
- Documentation
- Data Services

**Data Sources**
- Remote Sources
  - WRCC
  - Public Stores
  - Data Loggers
  - Web Services
  - Cameras
  - Satellites

- Local Database
Architecture Tiers

- **Client**
  - Consumes or accesses information
- **Web / Data Portal**
  - Provides access to information
  - Provides various features
- **Data Sources (back-end)**
  - Persistent storage
  - Includes various sources
General Client Data Access

[Diagram showing the flow of data from Clients (Public Users, Collaborators, Applications) through the Web/Data Portal (Data Services: Other, NetCDF, MVC, Excel, CSV, REST, SOAP) to Data Sources (Local Database, Remote Sources: WRCC, Public Stores, Data Loggers, Web Services, Cameras, Satellites), with Request/Query and Formatted Data paths.]
General Data Acquisition

Data Sources
- Remote Sources
  - WRCC
  - Public Stores
  - Data Loggers
  - Web Services
  - Cameras
  - Satellites

Local Database

Request / Query
- Scheduler
- HTML
- SOAP
- Campbell Logger
- HDF5
- NetCDF
- Other

Response / Data
- Importer
- Standardized Data
- Data Validator & Analyzer
- Data Services

Verified Data

Web / Data Portal
Logical Components

- Scheduler
- Data services
  - Importer
  - Exporter
  - Validation
  - Manager
- Data stores
  - Database
  - Service
  - File
Logical Server Architecture

Web server

LAN connection

Database Failover Cluster

Database engine

Failover connection

iSCSI connection

Storage server
Physical Implementation

- Plan for redundancy
  - Failover clusters
- Optimize hardware utilization
  - Virtualization
- Ease upgrades
  - Virtualization resource allocation
  - Easy transfer to new hardware
- Fast recovery
  - Restoration of virtual machines
- Isolation of components
Physical Server Architecture

Failover Cluster

- Web server
- Database server
- Process server
- Source control server
- Database server
- File server

iSCSI connections

Storage server
Software Selection

Database
  - Microsoft SQL 2008 Enterprise Edition

Web development
  - ASP.NET 3.5 or above

Operating systems
  - Windows Server 2008
    - Datacenter Edition
    - Web Server
    - Enterprise