

Archival, Retrieval and Display of NetCDF Products

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Abstract – The objective of this paper is to build a system for archiving NetCDF (Network Common Data Form) images. This paper addresses a way to search, view and download the images in NetCDF format. The main objective of this paper is to provide products in NetCDF format to the users along with their metadata with selection and download option based on user request. Archival NetCDF files and their metadata into directories and database followed by retrieval, display and download of products in NetCDF format is another objective.

Keywords – NetCDF, Archival, Retrieval, Dataset, Metadata, Remote Sensing Application.

I. INTRODUCTION

A National Remote Sensing Center, is responsible for reception, processing and dissemination of data received from Remote Sensing satellites. Each station carries out the responsibilities of data reception and pre-processing.

The Centre [6] is answerable for remote sensing satellite data attainment and dispensation, data broadcasting, aerial remote sensing and conclusion support for disaster management. The Centre is also engaged in executing application projects of remote areas depending on the user's request.

Aerial surveys and expand the large scale mapping services [7] and digital data services to the national segment are handled by the centre. It provides geospatial solutions [7] to different user agencies. Its promotional activities related to remote sensing applications at regional and national level extending services to set up ground stations and processing facilities. It also provides the scheduling service to all ground stations through web based downlink service.

II. PROPOSED SCHEME

We propose that the raw data received from the satellites is taken care by the DPS (Data Processing System) which generates products in NetCDF format. These products along with their metadata are stored in SAN.

Archival of the products is carried on where NetCDF files are populated into directories and metadata into the database. Retrieval of the products is based on user request and products are visualized in the browser. This system consists of a web application providing user registration, login, selection of products based on dates and finally download feature.

The main objective of this paper is to provide products in NetCDF format to the users along with their metadata with selection and download option based on user request. Archival NetCDF files and their metadata into directories and database followed by retrieval, display and download of products in NetCDF format is another objective.

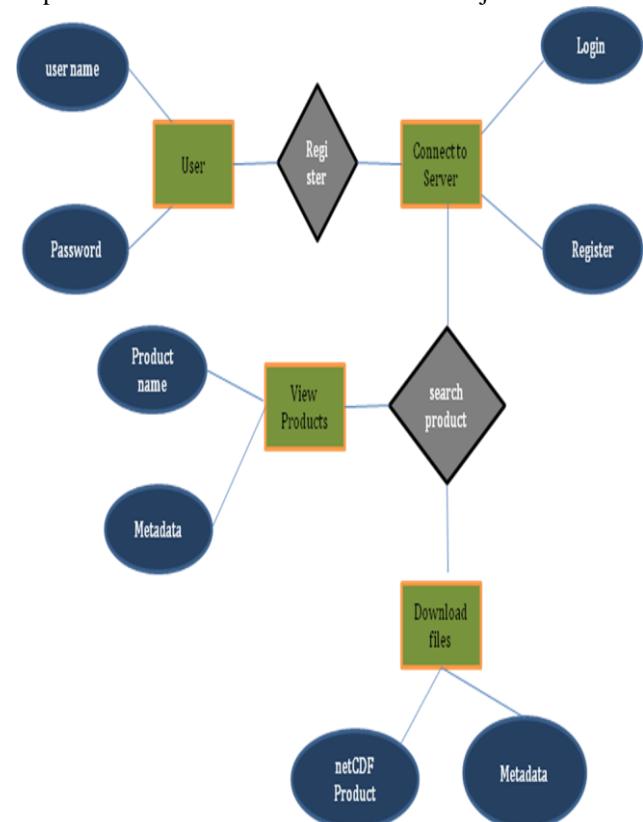


Fig.1. ARDN Basic Design Model

III. SYSTEM ANALYSIS

NetCDF (network Common Data Form) is an interface for array-oriented data access and a library that provides an implementation of the interface. The NetCDF library also defines a machine-independent format for representing scientific data. Together, the interface, library, and format support the creation, access, and sharing of scientific data.

To provide the data services, tools, and cyber infrastructure leadership that advance Earth system science, enhance educational opportunities, and broaden participation.

NetCDF is an abstraction that supports a view of data as a collection of self-describing, portable objects that can be accessed through a simple interface. Even though we don't know how the data is stored, the array values [2] may be accessed openly by the users. Along with the data, information like what units are used may also be stored.

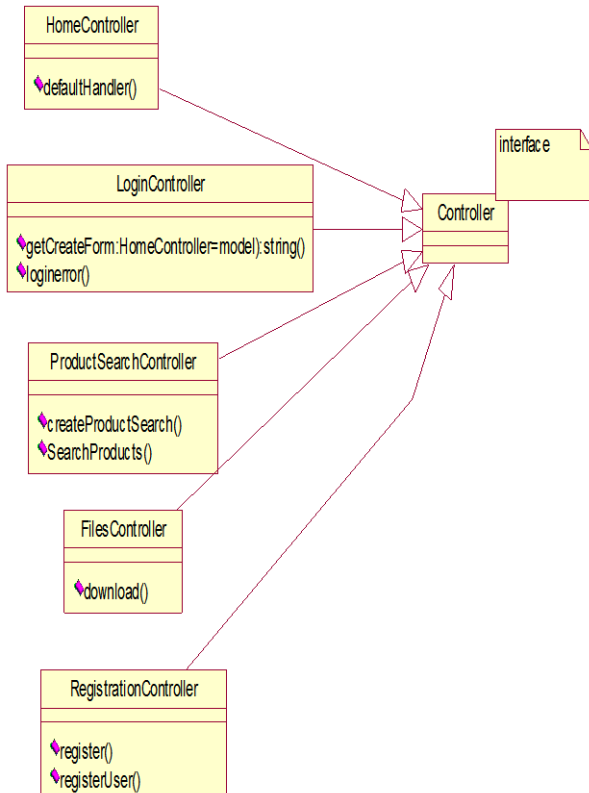


Fig.2. ARDN Class Diagram

Generic utilities and application programs [1] that are defined by users can access NetCDF datasets and download, convert, merge, analyze, or display concerned fields of the data. The development [2] of those applications improves the accessibility of data and improved re-usability of software for data management which is stored in the form of arrays, analysis, and display. The NetCDF software [4] implements an abstract data type, in which all operations are used to access and manipulate data in a NetCDF dataset and it uses only the set of functions provided by the interface. The illustration [3] of the data is concealed from applications that use the interface, so that how the data are stored could be changed from one application to another without affecting existing programs. The physical representation of NetCDF data is designed to be independent of the computer on which the data were written.

The classic NetCDF data model [11] consists of different sets of variables, dimensions, and attributes. This opinion about data was the foundation for the [12] very first NetCDF release, and is still the core of all NetCDF files.

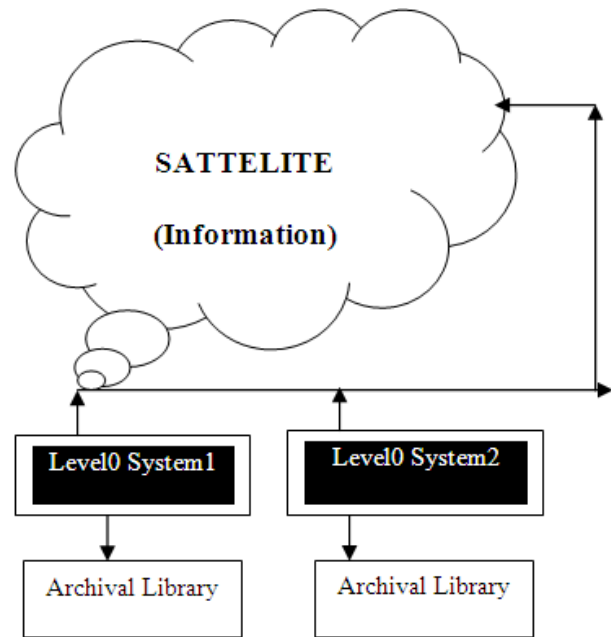


Fig.3. ARDN System Model

3.1 Variables

These are N – dimensional arrays of data, which may be of any data type among char, byte, int, short, float, double.

3.2 Dimensions

These will describe the axes of data arrays and have name and length. An unlimited dimension has a length which may expand at any time. NetCDF files consist of atmost one unlimited dimension.

3.3 Attributes

These are either scalar values or one dimensional array values, which can be associated with a file or a file. Although there is no enforced limit, the user is expected to keep attributes small.

IV. SYSTEM DESIGN

The system is responsible to archive the data from the satellite, to store the raw data in data processing system, to autopopulate metadata into local database and NetCDF files into respective directories, to provide user registration to login to the website, to provide user authentication, product search and selection based on user request and lastly providing the download feature for the user.

4.1. Archival

Satellites capture the images and send them across to NRSC as raw data, which is stored in level 0 system. Then generation of NetCDF products and metadata information will be auto populated into the local DB. NetCDF files are moved to respective directories.

4.2. Login

User has to register to login into the website. With authentication the user is provided with a username and password. User can now login into the website successfully.

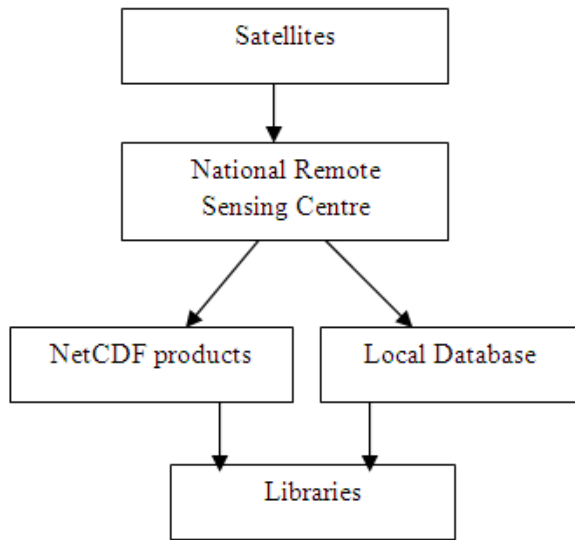


Fig.4. Proposed Design Architecture

4.3. Retrieval

Retrieval of products is carried out based on user search. Day based Query is allowed to search the desired products by the user based on date.

4.4. Download

User can select the desired products, and can download.

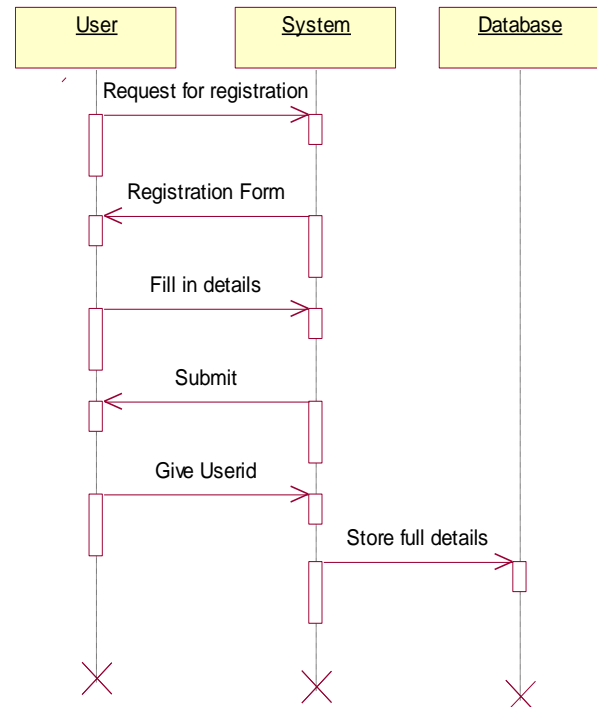


Fig.5. ARDN Sequence Diagram

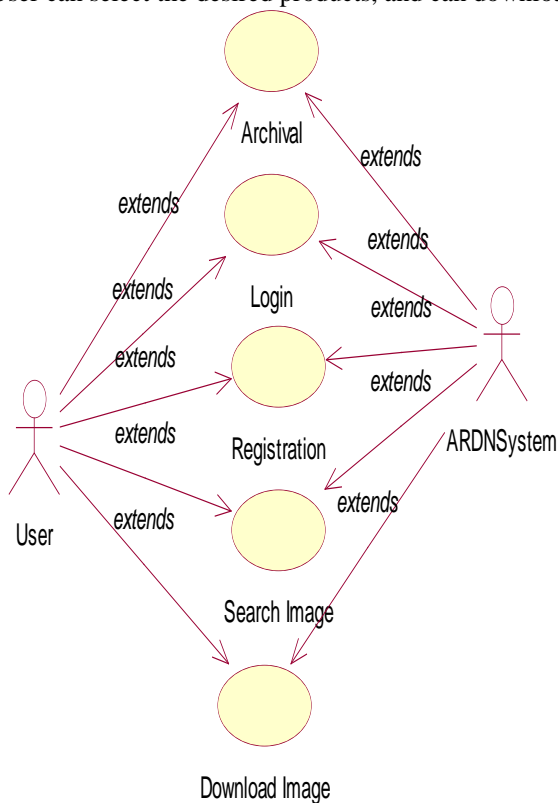


Fig.5. ARDN Usecase Diagram

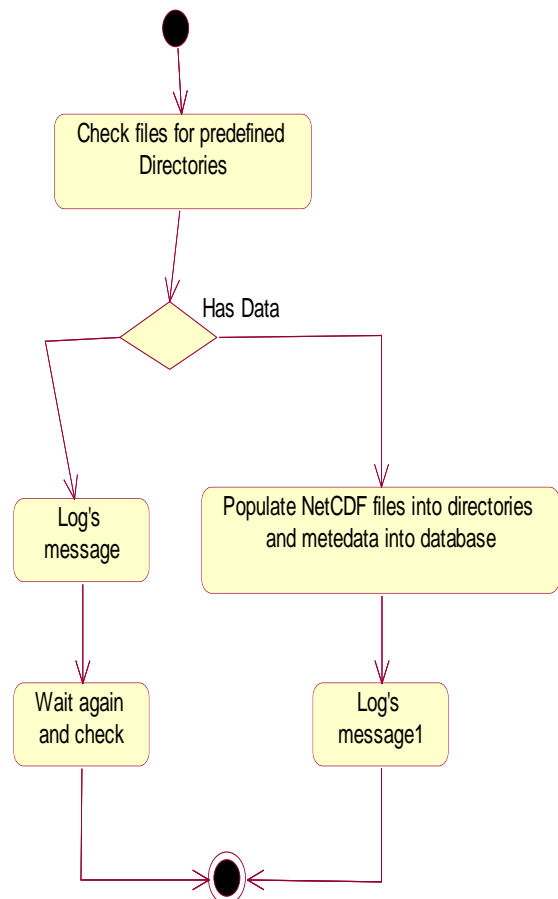


Fig.7. ARDN Activity Diagram

V. RESULTS & DISCUSSION

5.1 Login Page

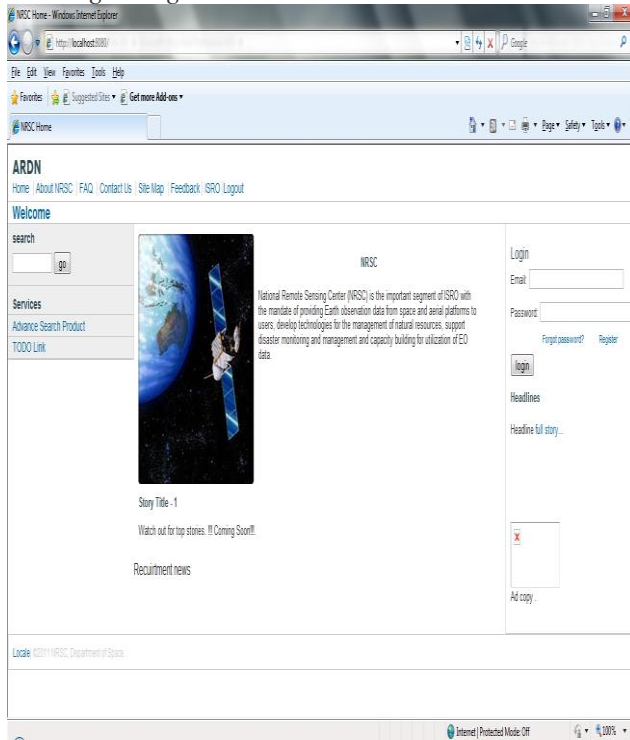


Fig.10. Login Page

5.2 Search Page

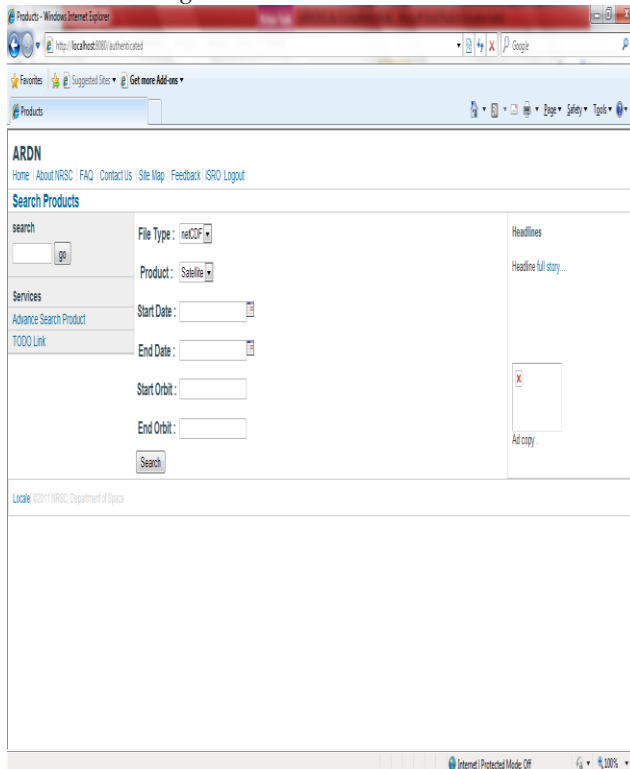


Fig.10. ARDN Search Page

5.3 List of Products

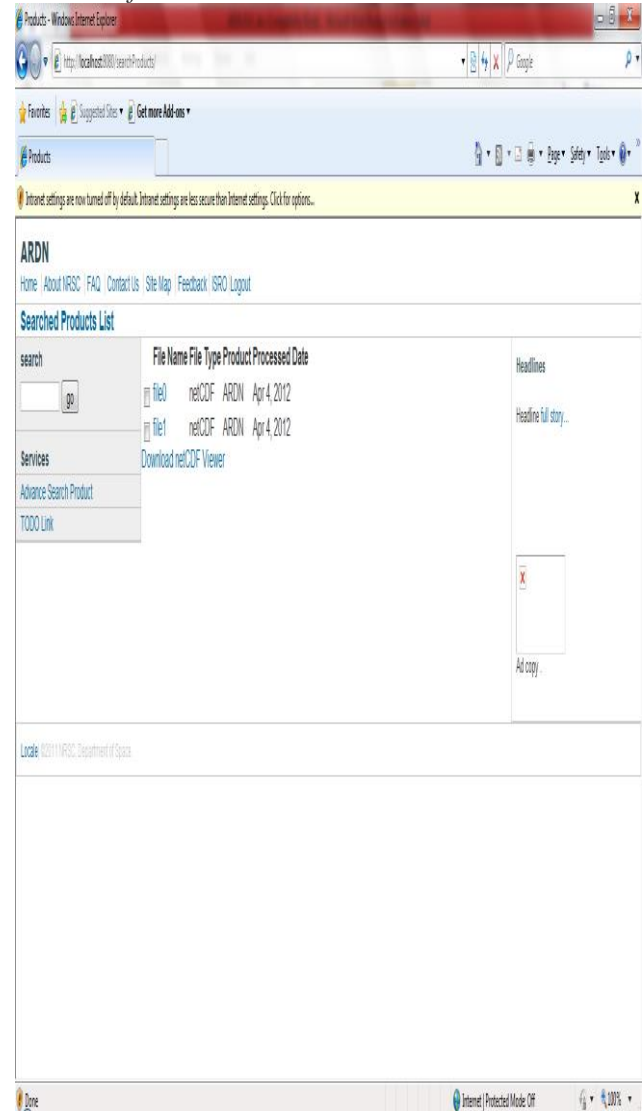


Fig.11. ARDN List of products

5.4 Download Product

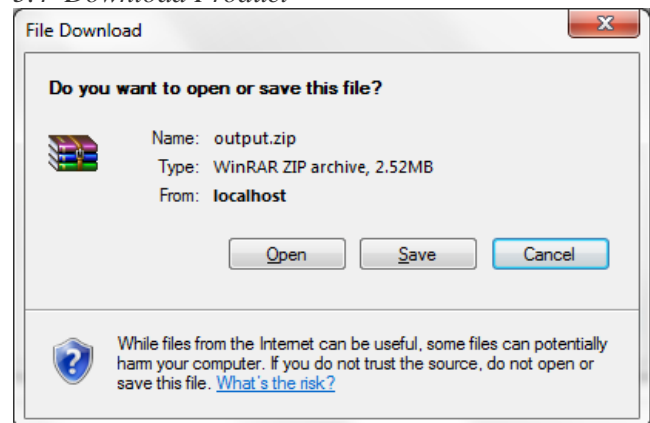


Fig.12. ARDN Download Product1

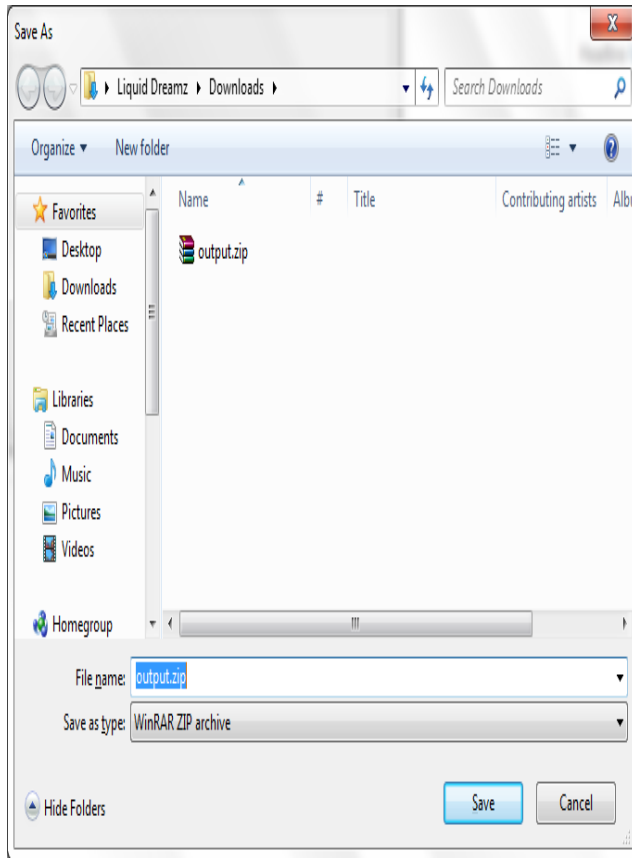


Fig.12. Download product1

VI. CONCLUSION

Developing of this web application consists of registration of users there by allowing viewing and downloading of products free of cost, which are in NetCDF format.

This paper consists of receiving the raw data from the satellite and processing in the data processing system and then archival of the products which are in NetCDF format and metadata.

Retrieval of the NetCDF files from the directories and metadata from the database is carried on. The whole process is done in a well secured manner providing authentication.

FUTURE SCOPE

One challenge in this context is to achieve data confidentiality and scalability simultaneously, which is not provided by current work. Further it may be extended to different sets of variables, dimensions and attributes. Extension of this work is to use pointers to cross sections, nested arrays and multiple dimensions.

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- [4] F90 User guide http://nf.nci.org.au/facilities/software/NETCDF/f90User_guide.book.pdf.pan.txt
- [5] Wisconsin Milwaukee : NETCDF 3 : netcdf - Course <http://www.coursehero.com/file/1724479/netcdf/>
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