From Climsoft version 3 to a Free and Open Source Climate Data Management System

Climsoft is a software suite for storing climatic data in a secure and flexible manner and for extracting useful information from the data. Climsoft is a free open-source software, licensed under GPL3. It is widely used by the National Meteorological and Hydrological Services of developing countries.

Challenges with the previous versions

The installation of previous versions of Climsoft was not easy to many Climsoft users due to indirect connection to the database, many Climsoft users experienced difficulties in setting up the connection to the MySQL back-end through ODBC. Previous versions of Climsoft were using MS Access to manage data stored in MySQL back-end database as well as user access control; the security features in MS Access were not very stringent. Users could easily gain access to the database through the back door, and there were issues that often developed with the security management system of MS Access that resulted in some users failing to log into the Climsoft system even with the correct username and password. The quality of graphical output (graphs, charts, plots etc...) and facility to manage paper archive were among the challenge in previous versions.

Solution

Climsoft version 4 brings the solutions to the issues of installation and system security since the installation of Climsoft V4 is now much easier largely because it has removed dependency to Microsoft Access by providing direct connection to the database, security is now managed efficiently at database level. User access privileges are now configured and controlled to the finest detail.

Management of images of paper records (paper archives) in support of Data Rescue was made possible in Climsoft version 4 (Images of paper records can be stored and retrieved on the fly to facilitate immediate checking of key in data against the handwritten observation paper records).

Capabilities of Climsoft Version 4 Climate Data Management System (CDMS) that make it suitable for use in many National Meteorological and Hydrological Services (NMHS) are:

1. Sustainability
Climsoft is a free climate Data Management System (CDMS) built on the freely available open source tools such as Visual Studio, MySQL/MARIADB making it less costly to implement and maintain. After the initial training, users are able to continuously support Climsoft operations on their own;

2. Scalability
Climsoft can be implemented in a standalone computer at the observatory as well as in the server at the centralized database at the NMHS headquarters. It therefore allows connectivity between the observatories and the remote database server thereby facilitating data digitization right from the source. It works very well in a multi-user environment allowing many users to access the centralized climate database concurrently for different operations;

3. User Management, Operations Monitoring and Quality of Data
Secure security access levels is guaranteed. It is easy to monitor data entered by different users, set a target for users to achieve and evaluate user work performance through Climsoft. It has got an elaborate key entry and post Key entry Quality Control (QC) functions;

4. Ingestion of data from Automatic Weather Station (AWS)
Climsoft automatically ingests data from Automatic Weather Stations (AWSs) on real time basis thereby making those observations to be available for weather forecasting purposes;

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5. Data files Import and Export
Data files of different formats can be easily imported into Climsoft. It can exports data in formats ready for use by many climate applications that include RCLIMDEX, CPT, GEOCLIM, INSTAT, R-INSTAT, ENACTS, etc.;

6. Message Encoding and Forwarding to Global Telecommunication System (GTS)
Climsoft encodes observations into weather messages according the WMO standards of Table Driven Code Forms (TDCF). It is capable of forwarding those encoded messages to the WMO GTS network;

7. Management of images of paper records (paper archives) in support of Data Rescue (DARE)
Images of paper records can be stores and retrieved on the fly to facilitate immediate checking of key in data against the handwritten observation paper records;

8. Climate Products
Climsoft produces the standard WMO climate products from the archived and quality controlled data. The data inventory function is good and advanced (Ability to inventory available and missing data in both spreadsheet and graphical format);

9. Linkage with R – Instat, Climate Data Analysis Tool
Climsoft interrogate very well with R - Instat to produce variety of climate summaries and reports (including wind rose, time series plots, trend analysis graphs, calculations of the start/ends of rain, length of the season, spell length (dry/wet), Data Inventory graphs, spatial distribution maps, Examine trend and quantify the evidence of climate change (global warming), rainfall variability.etc.);

10. Technical Support and Software Maintenance
It is very easy and cheaper to get technical support, software maintenance and training.

What is the future of Climsoft?

At the WMO Commission for Climatology meeting in May 2018, WMO decided to implement a strategy for development of a free open-source Climate Data Management System and inviting Members of WMO to participate. This "OpenCDMS" is expected to bring together the best techniques from existing CDMS, including Climsoft, MCH (strong in Hydrology) and CliDE (used in Pacific Countries). Being fully open-source software means that the tools and techniques used for quality control and data assurance are open to peer-reviewed scientific study. This will lead to better and more consistent climate data globally.

The Climsoft Steering Committee and the developers are fully committed, and expect that at some point in the future Climsoft will be replaced by OpenCDMS, with many more users and developers. However, it is important that the NMHSs of developing countries are fully involved in the development process so their requirements are fully integrated.

Useful links:
- Climsoft GitHub page;
- Map of Climsoft version 4 current status of rolling out in Countries;
- Software and Documentation on Climsoft;
- Climsoft Five (5) year development roadmap;
- Software and Documentation on R-Insat, Climate data Analysis Tool;
- Guide on WMO Climate Data Management System Specifications.