REPORTS OF THE EVALUATION TEAM

iADAMA – Australia

CLIDATA – Czech Republic

CLISYS – France

JCDMS – Jordan

CLIWARE – Russian Federation

SDCLIM – Tunisia

CLIMSOFT – Zimbabwe

iADAMA

Australia

Overview

The Australian system, iADAM (International ADAM), is not yet ready for evaluation. It is being designed as a modification of the ADAM system used by the Australian Meteorological Service. It is built on an ORACLE RDBMS and can operate as a client-server system or can be operated as a web-based application. When iADAM reaches the stage of development that warrants evaluation, the reviewers urge the developers to resubmit the system for a full evaluation.

Contact :

Mr Kai (Kelvin) Wong
Bureau of Meteorology
150 Lonsdale Street
MELBOURNE, Vic 3001
Australia
Tel: *(+61-3) 96694227*
Fax: *(+61-3) 96621223*
E-Mail: *k.wong@bom.gov.au*

CLIDATA

Ver 21.16.13

Czech Republic

Overview

The system submitted for review, CLIDATA version 21.16.13, is a professionally designed and implemented system for management of climate data. It is scalable for use in all sizes of climate data organizations and will handle most any data reporting need. The system is tightly integrated around the ORACLE RDBMS and associated management and data discovery tools. This integration of ORACLE tools at all levels of data management, reporting, system administration, and data key-entry provides a comprehensive system presented within a consistent user-interface environment.

The system is highly configurable and provides multi-language support and flexible specification of quality control procedures. Both of these features are implemented as look-up tables stored with the ORACLE RDBMS. Documentation is well-written and is provided in an on-line system.

The metadata system, used to store information about station characteristics is a comprehensive and well-designed system. It tracks historical changes over time and includes the ability to link multiple graphical images to textual metadata.

Data reporting and product generation is performed using the ORACLE Discoverer software package. Using this system, reports are defined by the user and can be saved as stored procedures for later use. Stored procedures can also be used to generate derived variables from observed data for such things as potential evapotranspiration and complex water vapor variables. Graphical weather symbols can be tied to data objects, such as observed weather, and displayed in tabular data outputs.

The system generates derived values, such as monthly summaries from daily data, using stored procedures executed at pre-defined (configurable) intervals. The interval is chosen to maximize the timeliness of changes to the summaries imposed by the underlying observed data considering the performance characteristics of the chosen hardware platform and system usage characteristics.

In summary, the CLIDATA system is an extremely well-developed system that could be employed at any location to manage its climate data archives. The review team is unanimous in offering its evaluation that his system has the capabilities of a full-featured climate database management and reporting system.

Strengths

- Uses ORACLE RDBMS for data management offering industry-standard tools and management facilities.
- Extensive use of ORACLE Discoverer to produce specialized data reports.
- Partnership with a private-sector software firm to develop the system has resulted in a professionally designed and implemented system.
- Several countries have already begun to use the system in an operational environment (Macedonia, Ghana, Lithuania, Latvia, Czech Republic)
- Organized training sessions have already been conducted to address the needs of users and system administrators. Developers have made impressive strides in developing an infrastructure for user training and support.
- Multi-language support can be provided for all languages supported by ORACLE. User prompts and error messages are stored in the ORACLE database as translation table entries.

- Remote management of database administration and problem resolution is possible.
- Data quality control procedures can be defined and managed by the end user providing limitless possibilities to improve data quality.

Weaknesses

- Initial and recurring costs associated with ORACLE RDBMS and product production tools can be high. Costs are dependent on ability to negotiate favorable rates with ORACLE.
- Products are generated using ORACLE Discoverer. The system would benefit by the development of pre-defined products integrated directly into the package.
- The use of data quality flags is adequate for most installations but could be expanded to handle more complex data quality reporting needs. An example of this deficiency is the inability to distinguish missing data observations from observed data that was, simply, not entered into the system.
- Use of stored summary information derived from underlying observed data increases performance but may result in erroneous summary information if summary reports are generated when the underlying data have changed and scheduled updates to the summary information have not been executed.

Administration Requirements and System Costs

Single User

Software

- Oracle Personnel Edition
- Oracle Discoverer

Hardware (Minimum)

- Pentium III or equivalent processor with a minimum of 128 MB of RAM with a backup device

Management

- Provided appropriate extent management, backup and recovery procedures are well defined and automated where possible the system could be managed without any special database skills.
- A daily cold backup would be the preferred method of management.

Re-occurring Costs

- Software licensing Oracle Personnel Edition
- Software Licensing Oracle Discoverer
- 10% of one person for backup, recovery and extent management
- Backup Media

Two Tier Configuration (Server with multiple Clients)

Software

- Oracle 8i Standard Edition
- Oracle Discoverer

Hardware (Minimum)

Server

- Pentium III or equivalent processor with a minimum of 256 MB of RAM with a backup device
- Network card

Clients

- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

- The network administrator could also manage the database without the need for specialised database skills provided the extent management, backup and recovery procedures are well defined and documented.
- A daily cold backup would be the preferred method of management provided 24-hour access is not required.

Re-occurring Costs

- Software licensing Oracle Standard Edition (Number of licenses user or concurrent)
- Software Licensing Oracle Discoverer
- 25% of one person for backup, recovery, extent management, user security, network administration
- Backup media

Distributed Network (Multiple Locations)

Software

- Oracle 8i Enterprise Edition
- Oracle Discoverer

Hardware (Minimum)

Servers

- Depends on the network distribution architecture.

Clients

- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

- Requires a fulltime database administrator and a full time network administrator

Recurring Costs

Would depend on the network distribution architecture. However the following would need to be considered

- Software licensing Oracle Enterprise Edition

- Software licensing Oracle Discoverer (Czech Federation Only)
- 2 full time people for network and database administration
- Backup media

Contact :

Dr Radim Tolasz
Czech Hydrometeorological Institute
K Myslivne 3
70800 OSTRAVA
Czech Republic
Tel: (+420-69) 6900270
Fax: (+420-69) 6910289
E-Mail: tolasz@chmi.cz

C L I S Y S

Ver 1.1

France

Overview

The French system, CLISYS v 1.1, was presented as a preliminary version that is still not ready for operational release. However, it was sufficiently developed to demonstrate that it is a capable system that is a viable choice to be considered as a climate database management system.

The CLISYS package was built using a design philosophy that differed from many of the other systems evaluated. It is being built using, primarily, open source software packages with the goal of building a robust, yet affordable, CDBMS. The modules consist of the following major components: Linux operating system, Oracle RDBMS, ZOPE application server, and python scripting language capability. In addition, the full range of Linux/UNIX utilities and open source support software is utilized to perform task scheduling, text processing, and generation of graphical images. The only component that is currently not taking advantage of open source software is the RDBMS. Plans are underway to test and evaluate use of the PostgreSQL RDBMS as an alternative to ORACLE.

The system includes data entry, data retrieval, reporting, quality control, and metadata sub-systems integrated into a comprehensive CDBMS. An interesting feature is the design of a stand-alone data entry module that allows for off-line data entry without requiring a direct connection to the database. Another strength of the system is the ability to define data tables dynamically to accommodate new climate data attributes.

The user interface allows for fairly intuitive entry of data extraction and reporting functions but appeared incomplete at the time of the evaluation. It appeared that certain user and administrative functions required the user to leave the CLYSYS interface to perform needed functions. This aspect was confusing to the evaluation team and resulted in an unfavorable impression of system capabilities. Since this system was submitted as a ‘work in progress’, these issues may be addressed in future versions of the system and corrected before it is released for operational use.

Strengths

- Use of open-source software components will reduce the costs associated with software licensing.
- The system provides context sensitive help for many basic system functions.
- The data entry module is a stand-alone process that produces a separate data import file. This capability is beneficial to organizations that want to isolate the data entry process from data usage or that want to employ a large number of data entry personnel to enter extensive non-digital data into the system.
- Dynamic entity definition within RDBMS data tables.

Weaknesses

- Use of the PostgreSQL RDBMS, ZOPE application server, Python scripting language, and Linux operating system may provide a challenge to the developers to keep these

open source systems working together within CLISYS. As each component evolves independently, version control becomes critical and CLISYS installation and administration documentation must explicitly specify the required version for each system component.

- Security issues may also become a problem if security weaknesses in the open source packages are fixed with version releases that 'break' functionality with other open source packages.
- The reviewers noted that the user interface was not developed consistently and required the user to leave the CLISYS system to perform tasks that should have been available with the CLISYS interface.
- While the ZOPE application server provides powerful functionality for the system, its management and the addition of new applications can be difficult for an end-user. Furthermore, the ZOPE model has undergone radical changes in design philosophy that have made it difficult to implement version changes that remain compatible with all versions of Python.

Administration Requirements and System Costs

The system has been designed to operate in a three-tier configuration. (Database server, Application server, and Web server.)
This summary of management assumes the system is using an Oracle database as shown during the testing.

Three-tier Configuration

Software

- Oracle 8i Standard Edition
- Zope (freeware application server)
- Web browser

Hardware

- This type of architecture could reside on one server or a separate server for each component. For a single server operation the following would be the minimum requirements

Server

- Pentium III or equivalent processor with a minimum of 256 MB of RAM with a backup device
- Network card

Client

- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

Management of this type of system requires knowledge in four separate components:

- Server Operating System
- Database Administration
- Application Server
- Web Server

Re-occurring Costs

- Software licensing Oracle Standard Edition
- Backup media
- 50% of one person Database administration, and 50% of one person for the web and application server management.

Contact:

Mr Denis Stuber
Météo France
42, avenue Gustave Coriolis
31057 TOULOUSE Cedex 1
France
Tel: *(+33-5) 61078337*
Fax: *(+33-5) 61078309*
E-Mail: *denis.stuber@meteo.fr*

Mrs Valérie Schneider
Météo France
42, avenue Gustave Coriolis
31057 TOULOUSE Cedex 1
France
Tel: *(+33-5) 61078191*
Fax: *(+33-5) 61078109*
E-Mail: *valerie.schneider@meteo.fr*

J C D M S

Ver 1.1

Jordan

Overview

The system submitted for review by the Jordanian developers is Version 1.1 of the Jordan Climate Data Management System (JCDMS v.1.1).The system includes a fully documented installation guide and partially documented versions of a User's Guide, System Administrator's Guide, and Database Model and System Design Concepts. The system is fully functional but is subject to modification and enhancements in future versions.

This system was designed, specifically, to manage data collected from the system of climate data stations in Jordan. Data tables and attribute definitions are tailored, solely, to these observations that includes, primarily, 3-hourly synoptic observations. Addition of different observation types and reporting intervals would require modification to the data system which is based on an ORACLE RDBMS.

The system performs its intended design functions capably. It has been designed as a replacement system for CLICOM and generally follows the look and feel aspects of CLICOM. Key entry capabilities are competent and include rudimentary quality control features. It will import data from CLICOM if the data are exported in the ASCII format. It does not support import of CLICOM dbm files. CLICOM metadata can also be imported but the system does not utilize all of the metadata attributes as they were not seen as pertinent to Jordanian metadata requirements.

Application of this system to meet the requirements of users that currently use CLICOM, or desire the full capabilities of the CLICOM model, will require modification of the data tables to handle additional data types and reporting intervals. The developers have indicated a willingness to modify the system but funding would need to be obtained

Strengths

- Uses Oracle RDBMS for data management offering industry-standard tools and management facilities.
- Organization of system procedures similar to CLICOM that makes it easy to transition from CLICOM to JCDMS

Weaknesses

- Data model is tied closely to Jordanian data needs. Member having different data storage needs may be required to modify the system's data model.
- Support for Member has not been determined and will depend on available funding.

Administration Requirements and System Costs

Single User

Software

- Oracle Personnel Edition

Hardware (Minimum)

- Pentium III or equivalent processor with a minimum of 128 MB of RAM with a backup device

Management

- Provided appropriate extent management, backup and recovery procedures are well defined and automated where possible the system could be managed without any special database skills.
- A daily cold backup would be the preferred method of management.

Re-occurring Costs

- Software licensing Oracle Personnel Edition
- 10% of one person for backup, recovery and extent management
- Backup Media

Two Tier Configuration (Server with multiple Clients)

Software

- Oracle 8i Standard Edition

Hardware (Minimum)

Server

- Pentium III or equivalent processor with a minimum of 256 MB of RAM with a backup device
- Network card

Clients

- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

- The network administrator could also manage the database without the need for specialised database skills provided the extent management, backup and recovery procedures are well defined and documented.
- A daily cold backup would be the preferred method of management provided 24-hour access is not required.

Re-occurring Costs

- Software licensing Oracle Standard Edition (Number of licenses user or concurrent)
- 25% of one person for backup, recovery, extent management, user security, network administration
- Backup media

Distributed Network (Multiple Locations)

Software

- Oracle 8i Enterprise Edition

Hardware (Minimum)

Servers

- Depends on the network distribution architecture.

Clients

- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

- Requires a fulltime database administrator and a full time network administrator

Re-occurring Costs

Would depend on the network distribution architecture. However the following would need to be considered

- Software licensing Oracle Enterprise Edition
- 2 full time people for network and database administration
- Backup media

Contact :

Mr Khaled Sawafteh
Jordan Meteorological Department
P.O. Box 341011
AMMAN 11134
Jordan
Tel: (+962-6) 4892408
Fax: (+962-6) 4894409
E-Mail: sawafteh789@hotmail.com
meteo@jmd.gov.jo

C L I W A R E

Ver 1.1

Russian Federation

Overview

This system, CliWare v.1.1, is the most technologically advanced of the systems reviewed. It uses a client-server model that can access data locally or over a network connection to a remote database through an http socket. The system communicates with the database using JDBC calls that allow for different database engines to be utilized for the underlying data store. During the evaluation two database engines were utilized including Oracle and SAP DB, an open source database. Other database engines that support JDBC connectivity, such as the open source PostgreSQL RDBMS could also be employed. This flexibility offers an advantage over other systems that rely, solely, on a commercial database system in that licensing fees for database use can be eliminated.

Another feature that merits discussion is the extensive use of XML (eXtensible Markup Language) both to describe the structure and redefinition of the database structure and to pass data to and from the metadata tables and between clients and servers to deliver data and data products. The use of XML tags to describe the passing of data between processes makes the interchange of data to other data centers more easily definable. Since XML is an open standard that is gaining widespread acceptance, this technology promises to be a more readily accepted interchange methodology for the foreseeable future. Indeed, several WMO initiatives are exploring XML as a possible data dissemination and interchange standard. This system is seen as a trend-setter that should be watched as XML DTDs (Document Type Definition) for meteorological data become defined by the meteorological data community.

The system has the capability to easily extract information from the database and could be used to produced a wide variety of products. Performance in extracting data and producing products is very good when extracting data locally or over the network. This system can manage large volumes of data, utilizes internationally recognized standards for metadata and data exchange protocols, and is a technically complex system requiring sufficient staff and expertise to manage.

Strengths

- Can be configured to use any RDBMS that supports JDBC such as ORACLE, PostgreSQL, and SAP DB.. This CDBMS system offers flexibility for using alternate RDBMS systems and could reduce initial and recurring software maintenance costs if open-source RDBMS systems are employed.
- Use of XML for data transfer offers potential to integrate this system with future data definition/exchange standards currently proposed for support by the WMO.
- Support of local and remote data storage, accessible via the Internet, offers flexibility in data management options.

Weaknesses

- Complicated system that may require more expertise in managing the system and understanding the interactions of various technologies.
- Installation of the system may be difficult due to the lack of wrapping the individual system components into a comprehensive installation package.

Administration Requirements and System Costs

The system has been designed to operate in a three-tier configuration. (Database server, Application server, and Web server.)
This summary of management assumes the system is using an Oracle database as shown during the testing. A version also exists with SAPDB.

Three-tier Configuration

Software

Oracle 8i Standard Edition (Alternatively, SAP DB can be used at no charge)
Tomcat (freeware application server)
Web browser

Hardware

This type of architecture could reside on one server or a separate server for each component. For a single server operation the following would be the minimum requirements

Server

Pentium III or equivalent processor with a minimum of 256 MB of RAM with a backup device

Network card

Client
- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

Management of this type of system requires knowledge in four separate components:

- Server Operating System
- Database Administration
- Application Server
- Web Server

Re-occurring Costs

- Software licensing Oracle Standard Edition (Alternatively, SAP DB can be used at no charge)
- Backup media
- 50% of one person Database administration, and 50% of one person for the web and application server management.

Contact :

Mr Alexander V. Besprozvannykh
All-Russian Research Institute of Hydrometeorological Information – World Data Centre
6, Korolyev Str.
249035 OBNINSK
Kaluga Region
Russian Federation
Tel: (+708439) 74959
Fax: (+7095) 2552225
E-Mail: alexander@meteo.ru

SDCLIM

Ver 1.0

Tunisia

Overview

The system submitted for review by Tunisia is SDCLIM version 1.0. The system, which includes a documented system and procedures manual in French, is fully functional but is subject to modifications and enhancements in future versions.

This system was designed to specifically to manage data collection for the Tunisia climate data stations. Data tables are element based making easy to input any observation times and calculate the required average data sets.

A special batch process has been developed to allow the input of automatic station information. Fortran has been used for the generation of wind roses and CLIMAT messages.

Screen navigation was difficult to follow at times but could be easily solved as oracle forms have been used for all the screen development. The metadata structure was sound (Structured around station information) however the data entry and modification was awkward and complex.

Data output is based on SQL scripts. It is planned to start developing standard output reports using Oracle Reports.

Tunisia has a large development team and indicated a willingness to modify the system according to requirements.

Strengths

- Uses Oracle RDBMS for data management offering industry-standard tools and management facilities.
- Organization of system procedures similar to based on Meteorological elements making reporting easier

Weaknesses

- Data model limits the flexibility of introducing new elements. Member having different data storage needs may be required to modify the system's data model.
- System developed only in French.
- Support for Member has not been determined.

Administration Requirements and System Costs

Single User

Software

- Oracle Personnel Edition
- Oracle Discoverer (Czech Federation Only)

Hardware (Minimum)

- Pentium III or equivalent processor with a minimum of 128 MB of RAM with a backup device

Management

- Provided appropriate extent management, backup and recovery procedures are well defined and automated where possible the system could be managed without any special database skills.
- A daily cold backup would be the preferred method of management.

Re-occurring Costs

- Software licensing Oracle Personnel Edition
- Software Licensing Oracle Discoverer (Czech Federation Only)
- 10% of one person for backup, recovery and extent management
- Backup Media

Two Tier Configuration (Server with multiple Clients)

Software

- Oracle 8i Standard Edition
- Oracle Discoverer (Czech Federation Only)

Hardware (Minimum)

Server

- Pentium III or equivalent processor with a minimum of 256 MB of RAM with a backup device
- Network card

Clients

- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

- The network administrator could also manage the database without the need for specialised database skills provided the extent management, backup and recovery procedures are well defined and documented.
- A daily cold backup would be the preferred method of management provided 24-hour access is not required.

Re-occurring Costs

- Software licensing Oracle Standard Edition (Number of licenses user or concurrent)
- Software Licensing Oracle Discoverer (Czech Federation Only)
- 25% of one person for backup, recovery, extent management, user security, network administration
- Backup media

Distributed Network (Multiple Locations)

Software

- Oracle 8i Enterprise Edition
- Oracle Discoverer (Czech Federation Only)

Hardware (Minimum)

Servers

- Depends on the network distribution architecture.

Clients

- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

- Requires a fulltime database administrator and a full time network administrator

Re-occurring Costs

Would depend on the network distribution architecture. However the following would need to be considered

- Software licensing Oracle Enterprise Edition
- Software Licensing Oracle Discoverer (Czech Federation Only)
- 2 full time people for network and database administration
- Backup media

Contact :

Mr Jameleddine El Kamel
Institut National de la Météorologie
B.P. 156
2035 TUNIS-CARTHAGE
Tunisia
Tel: *(+216-71) 773400*
Fax: *(+216-71) 772609*
E-Mail: *elkamel@meteo.nat.tn*

CLIMSOFT

Ver 1.0

Zimbabwe

Overview

The system submitted by Zimbabwe (CLIMSOFT v.1.0) was noticeably different from the other systems submitted for evaluation by the WMO in May, 2002. It was the only system that was based, entirely, on MicroSoft software and utilized the MicroSoft Access RDBMS as the core of the system. Its design was based on the decision to utilize readily available software that would lower the cost of ownership in terms of initial acquisition cost and personnel required to manage and maintain the system. It is targeted to small meteorological services that will be archiving and managing relatively small amounts of data. The data capacity is currently limited to 2 Gbytes of data imposed by limits of MicroSoft Access.

The system was packaged on a single CD-ROM with an installation script. Assuming that a working version of MicroSoft Access is running on an existing computer system, the installation process can be completed in a few minutes. Initial problems existed in installing the package but were overcome. The security model is not segregating users responsible for data entry and administration and this deficiency will be addressed in future version releases. The data model used to structure the tables is fully normalized and data are stored in a single table to handle multiple variable attributes and various observation reporting intervals. All data are stored as text fields in the database.

Data are entered into the system via a key entry form that loads data into a temporary file that is then loaded into the database. Quality control is applied to the data using global limits and station specific limits that employ granularity on a monthly basis. Product generation and data extraction is handled using standard routines available in Access. Very limited data checking is performed during the analyses that caused incorrect values to be returned from several of the analyses. Checks need to be implemented for missing data and improper data values during the generation of the products.

A notable problem with the system was extremely slow access time in comparison with other systems evaluated. The reviewers are not sure whether this is a problem associated with MicroSoft Access or is caused by the particular data model chosen by the developers.

Strengths

- Use of MicroSoft Access RDBMS should appeal to users that have expertise with this system.
- Installation of the system is simple, straightforward, and requires very little time.
- Cost of ownership is small if standard MicroSoft software is already installed.
- The developers have designed the system with the goal of low initial and on-going ownership costs and plan to develop an infrastructure to provide on-going support for the system.
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Weaknesses

- System performance was <u>very</u> sluggish. It was not clear to the reviewers if this was a weakness of the MicroSoft Access database or a deficiency in the design of the fully normalized data model.
- The system, as evaluated, had many errors in the data processing and reporting routines. The system needs to be fully debugged before it is implemented in an operational environment.

- Use of MicroSoft Access limits the system to a database size of 2 GBytes making this system suitable for relatively small organizations.

Administration Requirements and System Costs

Single User

Software

- Microsoft Access 2000

Hardware (Minimum)

- Pentium III or equivalent processor with a minimum of 128 MB of RAM with a backup device

Management

- Appropriate backup procedure

Re-occurring Costs

- 5% of one person for backup
- Backup media

Two Tier Configuration (Server with multiple Clients)

Software

- Microsoft Access 2000 per client

Hardware (Minimum)

Server

- Pentium III or equivalent processor with a minimum of 256 MB of RAM with a backup device
- Network card

Clients

- Pentium III or equivalent processor with a minimum of 64 MB of RAM
- Network card

Management

- The Network Administrator could perform all tasks. No special database skills are required. Server would be used as file server for the Access tables. An appropriate backup procedure needs to be defined.

Re-occurring Costs

- 10% of a person for network administration, backup, recovery and user management
- Backup media

Distributed Network (Multiple Locations)

Not applicable unless moving to web based structure.

Contact :

Mr Albert Mhanda
Department of Meteorological Services
P.O. Box BE 150, Belvedere
HARARE
Zimbabwe
Tel: (+263-4) 778173
Fax: (+263-4) 778172/778161
E-Mail: amhanda@weather.utande.co.zw