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# Administrator's Guide

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Climsoft Version 3.0

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## Introduction to the Administrator's Guide

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Climsoft is very rich in options, some of which are relevant to key entry and QC operators, others are relevant to the System administrator. The System Administrator is responsible for smooth functioning of the system and the flow of data through the system, which ensures that the system delivers the required outputs to users and customers. This guide is designed to enable the System Administrator to ensure the quality and timeliness of the data, the integrity of the database and prompt and effective recovery from any failures.

It is recommended that the System Administrator has a good understanding of meteorological and climatological data issues and practices, and must also understand the organisation needs and vision.

The layout of the manual reflects the different needs at different stages of the use of the system. As soon as you finish the installation, you need to carry out a number of configurations e.g. setting up [metadata](#) and [users](#).

The section [Data Flow and Database Architecture](#) explains the components of the Climsoft system and how they relate to each other.

The section [Setting up the Climsoft Database](#) is about customising your database away from the basic system supplied in the installation in order to fit the needs of your organisation.

The section [Backup Strategy](#) covers archiving strategy. This is very important because of the huge investment of effort in collection and QC of the data. With the increasing use of automatic weather stations etc., the data may not be recoverable from any other location.

## System Locale

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The ClimSoft system is language aware, and currently it can run in three languages namely, English, French and Portuguese, depending on which language is set as default in the Windows Control panel. As an example, this means that a French locale causes interpretation of “,” as indicating decimals. If the default language is different from those mentioned above, then ClimSoft will appear in English. Visual Basic provides a facility for adding extra languages to the ClimSoft system. A description of how this is done is contained in the *Programmer's Guide*.

## Data Flow and Database Architecture

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The Climsoft database system was designed to support data management practices that aimed at (a) ensuring that data are processed efficiently (b) minimize chances of data loss through accidents or malice (c) ensure high quality data are available for effective decision making.

The [data flow](#) through the system Climsoft recognizes different sources of data – from the traditional paper records, to automatic equipment. Electronic forms have been designed to resemble the paper forms for data entry. Data so captured are held temporarily, quality checked, then uploaded to a central store. This process continues until the central store capacity nears such a limit as the size of the available archive/backup media, the 2GB limit imposed by Access – whichever comes first. This procedure is supported by 3 types of files:

**Temporary work file:** This is a data file in Access format comprising of tables that map directly to the data entry forms. This file is important if you design new data entry forms for a specialized data entry need that is not adequately met by the standard forms shipped with a new Climsoft installation. The details of creating data entry forms in visual basic, creating a table to match in the 'Temporary file' database, and linking the two through a Logbook Export File (LBX) is covered in detail in the programmer's guide. The motivation for holding inputs first in the temporary store before uploading to a centralized database was the need to ensure that what is held in the central store is guaranteed to be of high quality; hence the need to check the data thoroughly before committing it to central store. That is okay for data entered from traditional paper through electronic forms, but what about data, which is already in electronic form, coming from other sources? Enter the intermediate data files.

**Intermediate Database:** The structure of the intermediate database is the same as that of the central store; the function is different. Its purpose is mainly to help implement quality control procedures, to be applied to all data sets – whether coming from input forms or otherwise – before uploading to the central store. One key difference between this and the main database is that it has been pre-loaded with information required for performing specific types of quality control checks. Presently checks to ensure consistency between some related elements have been implemented, as well as range checks that utilize extreme values known for stations. Once checked, the data are sent to the main database (and purged from the intermediate database – once in a while)

**Main Database:** The main database is the starting point for all data retrieval needed for various reports and data products. It effectively integrates data input operations and data outputs, and its structure was designed to support data retrieval and presentation that was difficult to achieve with earlier software used to manage climatic data. You can do crude data retrieval operations fairly easily from the Climsoft user interface, but the real power of the design come from querying the tables that make up the main database. To do this you need to know about the major tables of the database and how they relate to each other. In the section that follows, you will find a general description of the data model that gave rise to the actual tables implemented in the main database.

**ODBC back-end Database:** For relatively large databases exceeding the MS Access database size limit of 2GB, Climsoft has provision for setting up an ODBC back-end database in either MySQL or PostgreSQL. This applies both to the intermediate and main databases. The intermediate databases needs a back-end database particularly if large volumes of AWS data are being imported.

## Networking and System Security

The Climsoft database files may be installed to a network-accessible drive. This will be the normal situation where there is likely to be more than one concurrent user. The ideal installation for running ClimSoft on a network would involve a [back-end database management system](#). Often the networked drive will be on a server, in which case the server should have built-in facilities for data security, such as the use of RAID arrays and automatic backup procedures. You should understand the use of these, and incorporate them in your backup and recovery procedures. Note that these system level failure protections are not sufficient on their own for full protection of your database.

The Windows NT, 2000 and XP operating systems include the ability to apply security to systems and individual files.

It is assumed that your computer system or network already includes the use of Windows logins, and has up-to-date virus protection. You should disable the use of Guest logins, and ensure that only those who need it have Windows Administrator privileges, and that they should only use this login when necessary; at other times they should use a Windows User login.

Climsoft Administrator functions may be performed from a Windows User login; it is not necessary or desirable to use a Windows Administrator login for Climsoft, except possibly when setting up the file locations and privileges.

Ownership of the main database files and the ability to set access rights for named Windows Users should be assigned only to the Climsoft System Administrator, preferably using a special Windows login, not their normal one. For all other users the rights to Delete, Change Permissions and Take Ownership should be denied. Only Windows Users who are tasked to work on data entry of QC should be given write permissions to the main database files. All other users should only have Read & Execute permissions for the main database files.

## Setting up the ClimSoft Database

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The number of databases that an organisation can have depends on the amount of data that it has as the Access database has a limitation on size i.e. it can only hold up to 2Gb of data. Sometimes it will be necessary to have different databases i.e. for Rainfall Data, Synoptic Data, Daily Data and Hourly Data. This concept is referred to as [database segmentation](#). This size of database is also depended on the size of your backup media. It is better to keep a complete database on one CD rather than having several CD's. The begin and the end year should be clearly stated

## Migration from Climsoft Version 2

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The migration from version 2 to version 3 of Climsoft has been designed to make the process as easy as possible. Migration of metadata should be done first before the migration of observation data . Tools for [metadata migration](#) are accessed through the metadata dialogue.

## Relocating the Database

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A different path from that of the executable files (by default **C:\Program Files\Climsoft\**) can be specified for the main database. It is important to make a clear distinction between the data stored in the database and the program or systems file so as to protect the data. From the Welcome form, select the DB Utilities item, then redirect the database locations at the bottom of this form.

## Segmenting the Database

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The database can be segmented in order to:

- Separate recent and historic data
- Separate data types
- Ensure end-user queries run quickly.

These reasons will apply even when the issue of the size limits in Access is not relevant.

Typically, in meteorological services, data ingestion and QC will be operating on recent data, but data more than two years old will need to be changed or added to much less frequently. Hence it is recommended that the database is segmented into a “current data” segment and a “historic data” segment, where the historic data segment may be kept as read-only, except when moving data from the current to historic segments.

In many meteorological services the rainfall data entry section operates separately from the rest of the Climatological data entry section. In this case it might make sense to segment the current data by the data types.

When thinking about the pattern of end-user enquiries, it is usually found that rainfall enquiries are a high proportion of the total use of the database. Hence segmentation by data type to group rainfall data in both the current and historical data segments may help the speed of response to these queries.

## Initializing the Database

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Adding [metadata](#) (stations, element info etc) Metadata is information about the data held in the observation tables.

The metadata capture information such as Station geography whereby it describes the station latitude, longitude, the date it was opened and closed and the type of elements that a station observes. There should be local rules about what sort of site change should result in the closure of the station at the old site and opening at a new site – generally if the site change is significant in climatology terms a new station should be set up; note that this allows the two sites to run concurrently in the database for an overlap period as recommended in WMO guides. The design of the metadata allows multiple instruments to be run at a station (e.g. several rain gauges).

If this information is available in your existing system it should be imported. Climsoft includes facilities for importing metadata and data from CLICOM. If the metadata is not available electronically it must be keyed in before any observation data is entered.

The Systems Administrator is not restricted to the tables that already exists in the metadata new developments can always be added to the metadata of a station.

## User Management

In addition to the management of users provided by the Windows Operating System e.g. Windows NT, there is a separate facility for managing users of the ClimSoft system. At the same time, the user roles defined at the Operating System level on a particular PC, have an implication on the running of ClimSoft. In a Windows NT - based Operating System, all users of ClimSoft should be granted rights of "Power User" or "Administrator" of the PC / Server on which they intend to run ClimSoft. Of course administrative rights on a network server should be granted with due care, and as a recommendation be limited to those individuals responsible for managing the server.

There are a number of [user roles](#) defined in the Climsoft system. It is very important that these are understood and used. In particular, where the same person does several tasks, that person should use a different login to the Climsoft system for each of the roles. It is very bad practice to e.g. to use an administrator login to perform key-entry tasks. These roles are set up to only allow access to the parts of the system which are required for the job in hand; this is to help protect the database from errors or inadvertent modification.

As an added security feature, ClimSoft utilizes the [user-level security](#) facility provided by Microsoft Access.

User management can be carried out through the [ClimSoft VB user-management facility](#) or the [Access-based user-management](#) utility.

## User Roles

User Role	Permissions
Operator	Read/Write access to the key-entry tables in the temporary work file
Rainfall-operator*	Read/Write access to the (rainfall) key-entry tables in the temporary work file.
QC	Able to modify key-entry data and load data from the key-entry forms to the intermediate database
Metadata	Read /Write access to the metadata tables, not to the main data tables
Products	Read-only access
Administrator	Full access to the whole system

## User Level Security

MS Access provides two ways of database security. The simpler form of security is *system security*. This involves the setting of a password for opening a database. When opening a database through Access, only users who type the correct password will be allowed to open the database. This method is secure as Access encrypts the password so that it cannot be accessed by reading the database file directly. However, once the database is open, the logged in user has full access to all objects contained within the database. The second and more secure method of security in Access, which has been implemented in ClimSoft, is *user-level security*. This is more difficult to setup. This involves the setting up of user accounts with both user-names and passwords as in most network systems. Users are assigned to user groups and granted user permissions. User account information is stored in a Workgroup File (or system database) which encrypts and hides passwords and other security information in the system database. Authentication of users is done against information held in this workgroup file. Even if an authorized user (an administrator) opens the system database (which is hidden by default), only user names and user groups can be read. The rest of the information will be encrypted.

In the MS Access workgroup information file, Climsoft user groups have a common prefix "clim\_" to differentiate them from the default user groups provided by Access. Only the Climsoft user groups are available on the Climsoft user interface, but without the prefix "clim\_". Climsoft user groups have pre-defined permissions to do with the climate database. More user groups can be added (Climsoft or otherwise), or existing ones removed at the discretion of the administrator. For example some Met Services may not need the "rainfall" user group which is local to Zimbabwe. Although the administrator can delete users, confirmation is required for each deletion. The ClimSoft system restricts that there must be at least one Climsoft administrator in the Access workgroup file while Access itself does not allow the default user "admin" to be deleted.

## User Management Using VB Interface

[Next](#)

The Climsoft user interface provides basic user management, namely creating a new user, deleting an existing user and changing passwords.



The image shows a Windows-style dialog box titled "Users Information". It features a blue title bar with a lightning bolt icon on the left and a close button (X) on the right. The main area is light gray and contains four input fields: "User Name", "Password", "Confirm Password", and "User type" (a dropdown menu). At the bottom, there are three buttons: "AddNew", "Delete", and "Close".



The dialogue above is for adding or removing users, while the one below is for changing passwords.



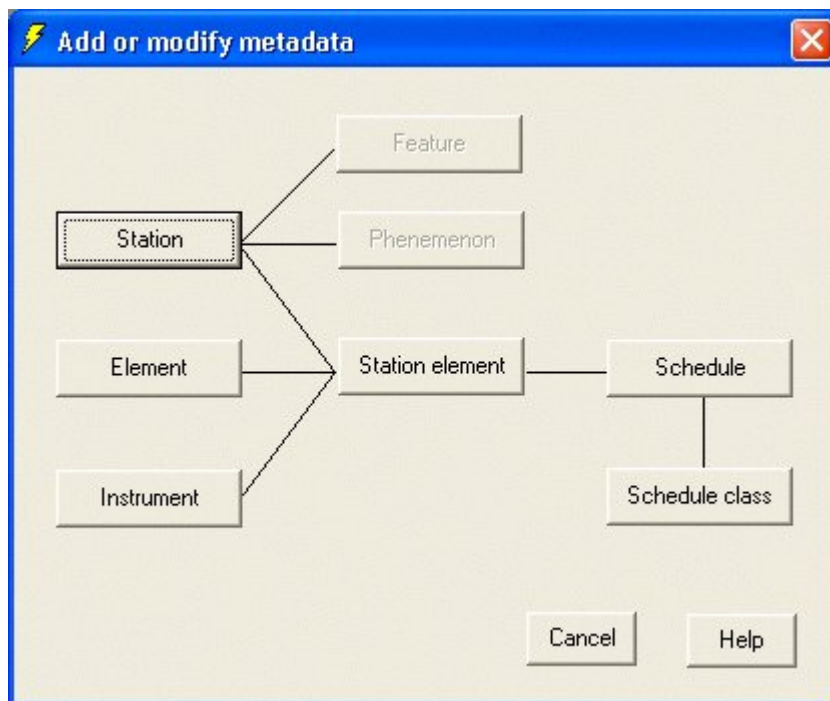
**Note:** Sometimes you may encounter the following error message when managing users through the VB user interface: *"Class does not support automation or does not support expected interface"*.

This error occurs when the file "msadox.dll" in the Windows system folder, normally the folder "...\\system32", has a different version from the file with the same name located in the folder "c:\\program files\\common files\\system\\ado". To correct the error, you need to overwrite the file in the Windows system folder with that located in "c:\\program files\\common files\\system\\ado" and then register the file in the Windows system folder by running the following command from the Command Prompt.

"regsvr32 *syspath*\\msadox.dll" where *syspath* is the path for the Windows system folder e.g. "c:\\windows\\system32" in the case of Windows XP.

## Metadata

Metadata consist of the information about stations, elements, instruments and similar objects in the Climsoft database. You can modify the Metadata defined in the Climsoft database by clicking the Metadata button on the Welcome dialogue, or by clicking the menu item Administration, Metadata.



Clicking on the appropriate command button will display a dialogue for the corresponding type of metadata.

In some cases, the order of updating metadata is important. Instrument metadata should be updated after Element metadata, and Schedule Class after Schedule. Station Element should be updated last..

The Metadata operations modify the contents of the current Intermediate Database. However, the metadata in the Main Database is automatically and silently synchronized with that in the Intermediate Database during the process of updating the Main Database from the Intermediate Database.

# Metadata Migration from V2

This version of Climsoft is capable of importing Stations and Elements metadata. The metadata is easily imported from Climsoft version 2 and from text data (CSV) whose column headers are appropriately named as demonstrated in step 5 below.

## Importing stations metadata

1. From Welcome dialog click **Metadata** → **Station** and obtain the following dialog

The screenshot shows a software dialog box titled "Station Details and Location". It is divided into two main sections: "Station Details" and "Station Location".

**Station Details:**

- Station ID: 67755030
- Station Name: BINGA
- Qualifier: Climate/Synoptic
- Country: Zimbabwe
- District: (empty)
- Authority: (empty)

Buttons: AddNew, Update, Delete Rec, View

Record: 1

**Station Location:**

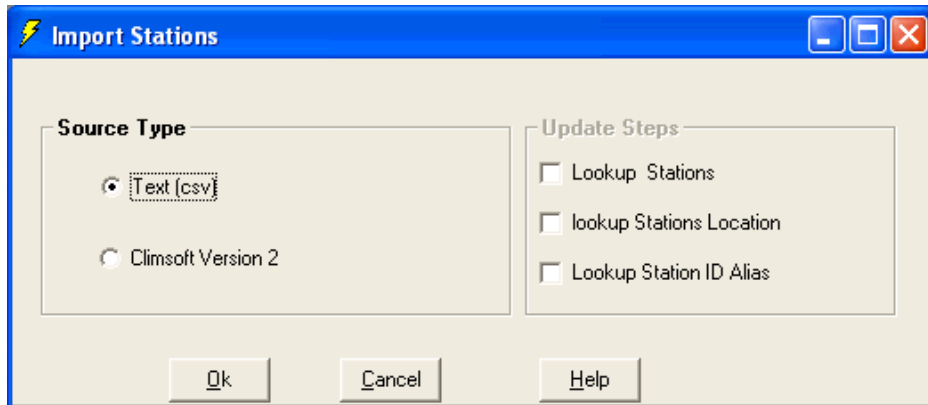
- Site Id: (empty)
- Drainage Basin: (empty)
- Begin Date: (empty)
- End Date: (empty)
- Latitude: (empty)
- Longitude: (empty)
- Elevation (Metres): (empty)

Buttons: AddNew, Update, Delete Rec, View

Record: 1

Buttons: Import, Cancel, Help

2. Click on Import button and obtain the following dialog



3. Select the option that suits the data format to be imported then click **OK**
4. On successful completion of importing operation a message indicating that will be displayed. Only new stations will be imported. Existing ones may be deleted first if replacement is required
5. The stations metadata text (CSV) file to be imported should be structured as the example below;

```
"id","wmoid","aviationid","begin_datetime","end_datetime","station_name","district","country","qualifier","drainagebasin","latitude","longitude","elevation"
"8635000","63612","HKLO","1919","LODWAR METEOROLOGICAL STATION","TURKANA","KENYA","SYNOPTIC","2B",3.11,35.61,"505"
"8641000","63624","HKMA","1936","MANDERA METEOROLOGICAL STATION","MANDERA","KENYA","SYNOPTIC","5H",3.93,41.86,"330"
"8737000","63641","HKMB","1918","MARSABIT MET STATION","MARSABIT","KENYA","SYNOPTIC","5E",2.31,37.98,"1345"
"8834063","1965","1976","SUAM GROUP FARM - ENDEBES","UASIN GISHU","KENYA","RAINFALL","1B",1.21,34.75,"2134"
"8835038","63661","HKKT","1947","1965","KITALE METEOROLOGICAL STATION - OLD","TRANS NZOIA","KENYA","SYNOPTIC","1B",1.00,35.00,"1896"
"8834098","63661","HKKT","1950","KITALE METEOROLOGICAL STATION - NEW","TRANS NZOIA","KENYA","SYNOPTIC","1B",1.00,34.98,"1840"
"8840000","63671","HKWJ","1917","WAJIR METEOROLOGICAL STATION","WAJIR","KENYA","SYNOPTIC","5F",1.75,40.06,"244"
"9136130","63742","HKNW","1951","WILSON AIRPORT METEOROLOGICAL STATION","NAIROBI","KENYA","SYNOPTIC","3A",-1.31,36.81,"1676"
"9136164","63741","HKNC","1954","DAGORETTI CORNER METEOROLOGICAL STATION","NAIROBI","KENYA","SYNOPTIC","3B",-1.30,36.75,"1798"
"9136168","63740","HKNA","1954","J.K.I.A. METEOROLOGICAL STATION","NAIROBI","KENYA","SYNOPTIC","3A",-1.31,36.91,"1624"
"9136169","1959","1964","MWITU ESTATE NGONG","KAJIADO","KENYA","RAINFALL","3A",-1.31,36.68,"1896"
"9136170","1959","1964","HARDY ROAD - LANGATA","NAIROBI","KENYA","RAINFALL","3A",-1.36,36.75,"1806"
```

Note the use of commas (,) to separate the values and the quotes (") to indicate the text data type. The quotes are necessary since they ensure that the required data types are maintained after importing. Several applications can be used to format data in this manner. They include EXCEL and ACCESS. The filename extension for this file should be **CSV**

### Importing Elements metadata

1. From Welcome dialog click **Metadata** → **Element** and obtain the following dialog

2. Click on **Import** button and obtain the following dialog

3. Select the option that suits the data format to be imported then click **OK**
4. On successful completion of importing operation a message indicating that will be displayed. Only new elements will be imported. Existing ones may be deleted first if replacement is required
5. The elements metadata text (CSV) file to be imported should be structured as the example below

code,abbreviation,name,description,scale,upper\_limit,lower\_limit,units,type

- 1,TMPOBS,Temp; daily obs,Temperature; daily at observation time,0.1,440,-50,Degrees C,Degrees C
  - 2,TMPMAX,Temp; daily max,Temperature; daily maximum,0.1,440,0,Degrees C,Degrees C
  - 3,TMPMIN,Temp; daily min,Temperature; daily minimum,0.1,360,-100,Degrees C,Degrees C
  - 4,TMPMN,Temp; daily mean,Temperature; daily mean,0.1,,,Degrees C,Degrees C
  - 5,PRECIP,Precip; daily,Precipitation; daily total,0.1,3000,0,Millimeters,Millimeters
  - 6,PRMX5,PRCP; max 5 min,Precip; greatest amount in 5 minutes,0.1,,,Millimeters,Millimeters
  - 7,PRMX10,PRCP; max 10 min,Precip; greatest amount in 10 minutes,0.1,,,Millimeters,Millimeters
  - 8,PRMX15,PRCP; max 15 min,Precip; greatest amount in 15 minutes,0.1,,,Millimeters,Millimeters
  - 9,PRMX30,PRCP; max 30 min,Precip; greatest amount in 30 minutes,0.1,,,Millimeters,Millimeters
  - 10,PRMX60,PRCP; max 60 min,Precip; greatest amount in 60 minutes,0.1,,,Millimeters,Millimeters
6. On successful completion of importing operation a message indicating that will be displayed. Only new elements will be imported. Existing ones may be deleted first if replacement is required
7. The elements metadata text (CSV) file to be imported should be structured as the example below;

Note the use of commas (,) to separate the values. Several applications can be used to format data in this manner. They include EXCEL and ACCESS. The filename extension for this file should be **CSV**

## Station Information

Station Details and Location

Station Details

Station ID: 67755030      Station Name: BINGA

Qualifier: Climate/Synoptic      Country: Zimbabwe

District:      Authority:     

AddNew    Update    Delete Rec    View

Record: 1

Station Location

Site Id:      Drainage Basin:     

Begin Date:      End Date:     

Latitude:      Degrees:      Minutes:      Seconds:      N/S:     

Longitude:      Degrees:      Minutes:      Seconds:      E/W: E

Elevation (Metres):     

AddNew    Update    Delete Rec    View

Record: 1

Import    Cancel    Help

This dialogue enables you to specify the characteristics of a new meteorological station, or to modify those of an existing station.

Please note that the form is in two sections. The top section is for station information other than station location details while the bottom part is for station coordinates including the begin and end dates at each of the locations occupied by an individual station. In other words, this section is for capturing and managing station history, both station movement plus opening and closing of a station. This section of the form allows the storage of multiple opening and closing of a station at different dates. For a given station, the station ID must be entered first before entering station location details.

New stations can be defined using the **Add New** button. The station ID and station name must be given, but all other fields are optional.

You can modify any of the fields of an existing record by typing into the appropriate boxes. The **Refresh** button re-reads the stored value of the current record, so that you can restore the original values if you have made a mistake. Changes to an existing record are written permanently to the database when you click the **Update** button or if you move to another record.

The **Cancel** button exists from the dialog without updating the current record.

The **Delete** button deletes the current record.

## Element Information

**Elements Update**

Element code

Element Name  Abbreviation

Description

Units  Scale

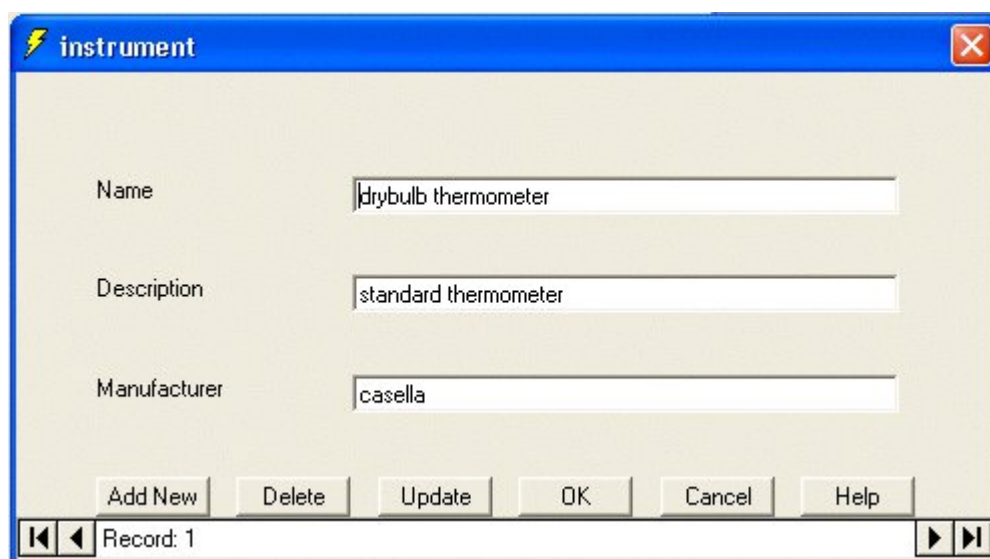
Lower Limit  Upper Limit

Total Required  Selected

Record: 2

This dialogue enables you to specify the characteristics of a new climatic element, or to modify those of an existing element. Generally the elements will be standard types, so the only modifications that are likely to be needed will be to the limits or the scale.

## Instrument Information



The screenshot shows a dialog box titled "instrument" with a blue header bar containing a lightning bolt icon and a close button. The main area is light beige and contains three text input fields. The first field is labeled "Name" and contains the text "drybulb thermometer". The second field is labeled "Description" and contains "standard thermometer". The third field is labeled "Manufacturer" and contains "casella". Below the fields is a row of six buttons: "Add New", "Delete", "Update", "OK", "Cancel", and "Help". At the bottom of the dialog is a status bar with navigation arrows and the text "Record: 1".

This dialogue enables you to specify the characteristics of a particular instrument used to record an element at a station.



## Station Element

**Station element**

Station name or identifier: HARARE BELVEDERE

Element Detail: Temperature, daily minimum

Instrument: thermometer

Schedule: climate

Begin Date: 01/03/1903

End Date: 31/12/9999

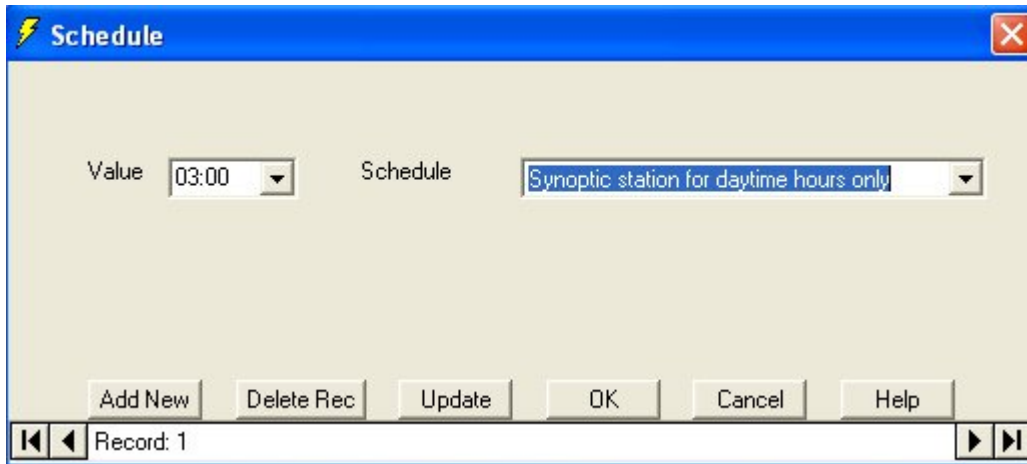
Buttons: Add New, Update, OK, Delete, Cancel, Help

Status: Record: 1

This dialogue enables the editing and updating of element information as recorded at a particular station. It is critical to first update the tables: *station*, *element*, *instrument* and *scheduleclass* before updating the *stationelement* table. After adding one or more new records in the station element dialogue, the **update** button should be clicked before clicking **OK**.

## Schedule

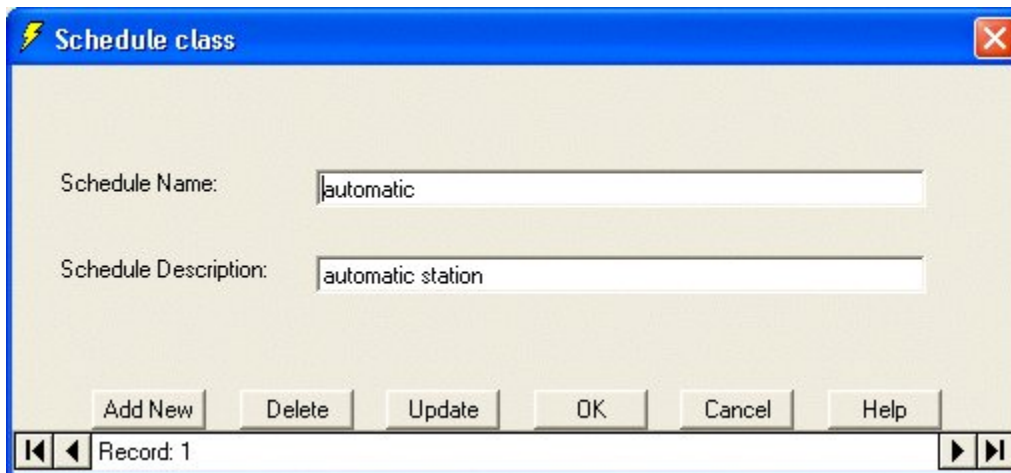
The observation schedule gives the frequency of making observations for a particular type of observing station. For example a fully-fledged synoptic stations makes observations at intervals of three hours for 24 hrs while a typical international airport is scheduled to record standard observations every hour. Fig 1. below shows the dialogue for entering observation schedule data.



The screenshot shows a dialog box titled "Schedule" with a blue header bar. Inside, there are two dropdown menus: "Value" set to "03:00" and "Schedule" set to "Synoptic station for daytime hours only". Below these are six buttons: "Add New", "Delete Rec", "Update", "OK", "Cancel", and "Help". At the bottom, there is a record indicator showing "Record: 1" with navigation arrows on either side.

Fig 1. Dialogue for entering Observation Schedule.

## Schedule Class



The screenshot shows a dialog box titled "Schedule class" with a blue header bar. It contains two text input fields: "Schedule Name" with the text "automatic" and "Schedule Description" with the text "automatic station". Below these are six buttons: "Add New", "Delete", "Update", "OK", "Cancel", and "Help". At the bottom, there is a record indicator showing "Record: 1" with navigation arrows on either side.

Various observation schedule classes can be define in ClimSoft e.g. automatic station observation schedule class as indicated in the dialogue.

## Data Forms

The installation set for Climsoft includes a number of data entry forms as examples, some of which are immediately visible to the user, and others may be added to the user list by the administrator. The administrator can select which forms to be displayed in the list of key-entry forms. This dialogue enable the selection of data entry forms to be displayed by ticking the selection check box provided. These forms may be adapted for local use, as detailed in the Programmers Guide sections 2.3 and 2.4. If you need help with this please contact the Climsoft User Group; you are also encouraged to share your experience and design with others.

The design of the forms should reflect current or historical practices to make it easy and intuitive for staff to use them. It is often appropriate for key-entry forms to reproduce the layout of paper forms, and this may require design of suitable forms.

The screenshot shows a 'Data Forms' dialog box with the following fields and values:

Field	Value
ID	61000
order	3
table name	form_daily1
form_name:	form_daily1
Sequencer	seq_month_day_form_daily1
Description	Data for some elements for one day
form selection	<input checked="" type="checkbox"/>

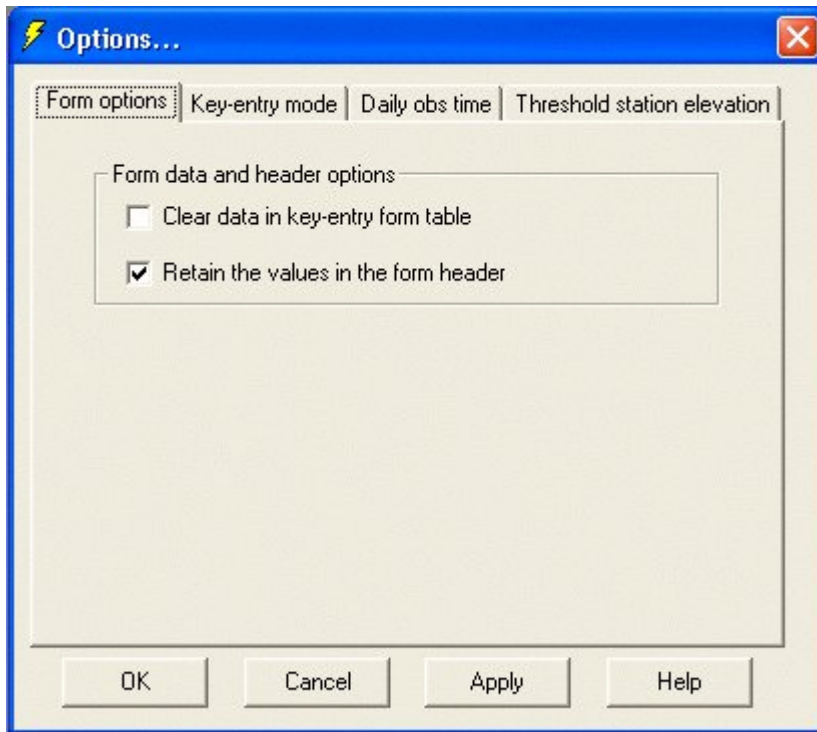
Buttons: Add New, Update, Delete, OK, Cancel, Help

Status bar: Record: 1

## Setting Data Entry Form Options

There are options which need to be set before data can be entered into the Temp Work File or transferred from the Temp Work File into the ClimSoft Intermediate Database. These options

are accessed through the menu item **Tools Options** which will open the dialogue shown below.



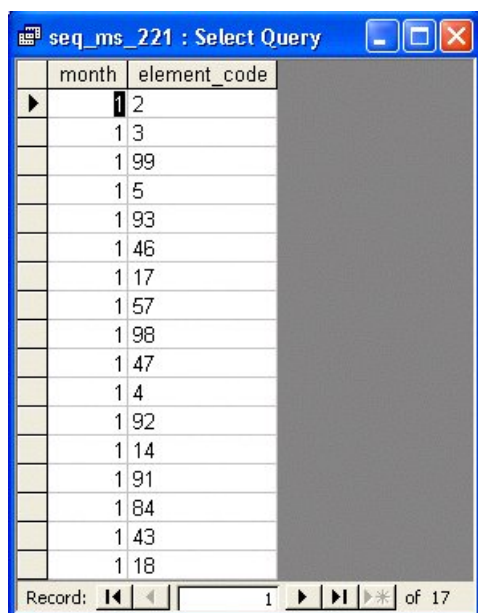
The administrator must decide if data should be cleared from the data table in the Temp Work File, corresponding to a key entry form from which data have been uploaded. All key-entry forms in ClimSoft have a header area at the top, normally consisting of station and element identification and the date/time of observation for data being captured.

In most cases it will be convenient to maintain the header information when adding a new record. The second option in the dialogue allows this configuration to be set. In addition to maintaining the header information, ClimSoft has a facility called the [sequencer](#) which can be configured to change selected values in the header area in a pre-determined sequence when adding new records in a key entry form.

Key-entry mode can be set to either single key-entry or [double key-entry](#) through the same dialogue. Other options include the setting of the time for daily observation and the setting of threshold elevation to distinguish between inland and coastal stations. The time for daily observation indicates when certain daily elements are expected to be reported e.g. minimum temperature and ground (grass) minimum temperature. Inland stations are required to report geopotential altitude while coastal stations are required to report pressure reduced to mean sea level. See [form\\_synoptic2](#) for entering data for many elements for the same synoptic observation time.

## Configuring the Sequencer

Data entry forms in ClimSoft are designed to capture one record of data at a time. An example of such a record may be a column of monthly values for a particular element recorded at a given station at a particular date and time. The paper form containing the data to be captured would normally have data for a number elements in adjacent columns. In this case, an appropriate sequencer will automatically adjust the header field for element when entering a new record corresponding to a new element. The screen-shot below shows an example of a query designed to give a sequence of elements in a data entry table called **form\_daily2** in the **Temp Work File**. The name of the query is **seq\_ms\_221**. The **sequencer** control property of **recordset\_name** is set to the name of this query **seq\_ms\_221** on the The Visual Basic data entry form called **form\_daily2** with controls bound to table **form\_daily2**. See [sequencer](#) control in the Programmer's Guide. **Fig.1** below shows an example of the sequencer for form\_daily2.



**Fig.1**

In order to customize the sequencer, one needs to edit the sequencer query or underlying table on which this sequencer query is based. The table below (**Fig.2**) shows the associated sequencer and underlying table for each of the given key-entry forms. The query or base table which may need to be edited to suit a particular Met Service is highlighted in **bold** font. One may also design a new query altogether and give it a unique name. In Climsoft version 3, A data entry form may be associated with a new sequencer through the data forms configuration.

<b>Form Description</b>	<b>Form Name</b>	<b>Query_name (sequencer)</b>	<b>Base Table(s)</b>
Data for Agromet elements for one day	form_agro1	seq_month_day	seq_day, seq_month
Data for some elements for one day	form_daily1	seq_month_day	seq_day, seq_month
Data for one element for the whole month	form_daily2	seq_ms_221	<b>seq_element_221</b>
Data for one element for 24 hours	form_hourly	seq_month_day	seq_day, seq_month
Hourly wind data	form_hourlywind	seq_month_day	seq_day, seq_month
Synoptic data for one hour for one element for the whole month	form_synoptic1	seq_synoptime_element	<b>seq_synoptime, seq_element</b>
Synoptic data for many elements for one observation time	form_synoptic2	<b>seq_month_day_synoptime</b>	<b>seq_synoptime</b>
Synoptic data for all hours for one element	form_synoptic3	seq_month_day	seq_day, seq_month
Temperature data for some elements for one day	Form_temp0	seq_month_day	seq_day, seq_month

**Fig. 2**

## Configuring Global Limits

element	code	abbreviation	name	description	scale	upper_limit	lower_limit	units
1	1	TMPOBS	Temp, daily obs	Temperature, daily at obs	0.1			Degrees C
10	10	PRMX60	PRCP, max 60 min	Precip, greatest amount ir	0.1			Millimeters
85	101	TEMPDB	Temp, dry bulb	Temperature, dry bulb	0.1	46.4	8.0	Degrees C
86	102	TEMPWB	Temp, wet bulb	Temperature, wet bulb	0.1			Degrees C
87	103	TEMPDP	Temp, dew point	Temperature, dew point	0.1			Degrees C
88	104	PRECIP	Precip, hourly	Precipitation, total hourly	0.1			Millimeters
89	105	RELHUM	Relative Humidity	Relative humidity	1			Percent
90	106	PRESST	Pressure, stn	Pressure, station	0.1			Hectopasca
91	107	PRESSL	Pressure, sea lv	Pressure, sea level	0.1			Hectopasca
92	108	ALTMTR	Altimeter Setting	Altimeter setting	0.1			Millibars
93	109	CEIL	Ceiling	Ceiling	1			Coded
11	11	PRMX2H	PRCP, max 2 hour	Precip, greatest amount ir	0.1			Millimeters
94	110	VISBY	Visibility	Visibility, horizontal	1			Coded
95	111	WNDSPD	Wind Speed	Wind speed	1	99	0	Knots
96	112	WNDDIR	Wind Direction	Wind direction	1	36	0	Degrees
97	113	WINDMILE	Wind mileage	Wind mileage, hourly	1			Kilometers

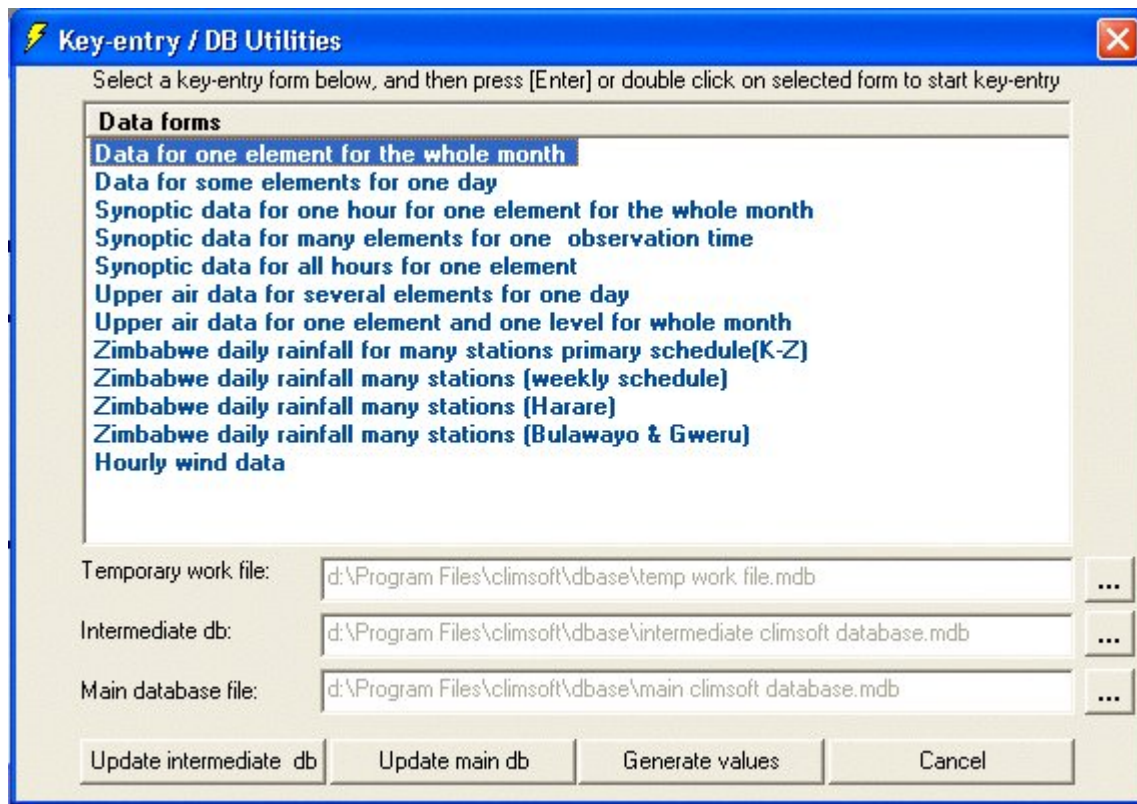
The extreme values (global limits) recorded for particular elements in a given country can be defined in the appropriate fields of the **lookup\_element** table in the **Temp Work File**. These limits are used by the ClimSoft quality checking routines. In the screen-shot above, the highest dry bulb temperature ever recorded in Zimbabwe is set to 46.4°C and the lower limit set to 8.0°C. Note that the temperature values are recorded according to a scale of tenths of a degree.



## Database Utilities

Most database functions are available on the control panel showing key-entry forms, database locations and command buttons for database operations as shown below. This is accessed

through the menu item **File** → **DB Utilities**, or the **DB Utilities** command button on the **Welcome** screen.



## Importing Data into Intermediate Database

Climsoft does not restrict the user to key in data from the key Entry form. It has the flexibility of importing data from other sources such as Clicom, spreadsheet or ASCII formats.

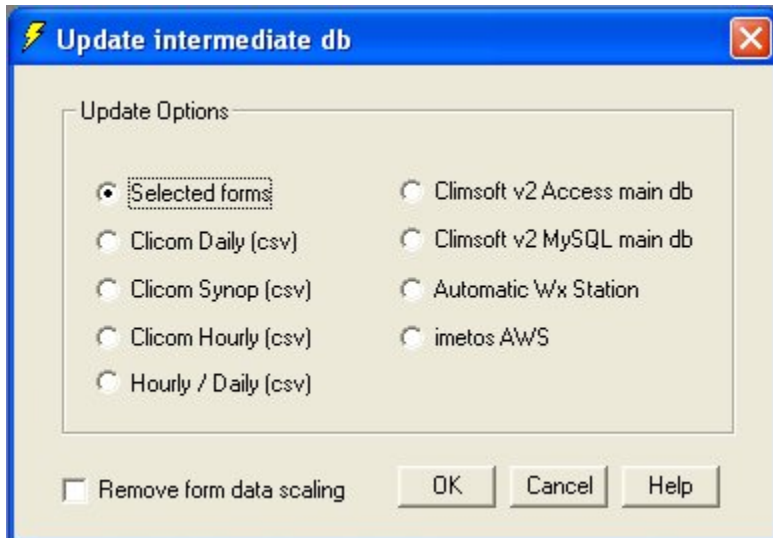
The facility for importing data into the intermediate database is accessed through the general form for [database utilities](#), followed by clicking the appropriate command button at the bottom of the form showing a list of available key-entry forms.

A number of options exist for importing data into the intermediate database as shown in the following dialogue.

External data can be appended into existing Climsoft key-entry tables in the Temp Work File and uploaded into the Intermediate database just like data which came from the Climsoft key-



entry process. The key-entry tables have different layouts to the extent that they can accommodate possibly all layouts which can be used in arranging meteorological observations, except for AWS data which has a separate routine. A check box has been provided on the dialogue for uploading the data to indicate if the external data values have decimal points for some elements like temperature, which is typical of data from CLICOM.



## From Key-entry Forms

This is the default option for uploading data into the intermediate database. Data can be uploaded from one or more selected key-entry forms at the same time.

## Clicom Daily

The data to be imported is assumed to be in (.CSV) format. By following the importing procedures intuitively suggested by the dialogue box for importing data, CLICOM data will be effortlessly loaded into the Climsoft intermediate data base.

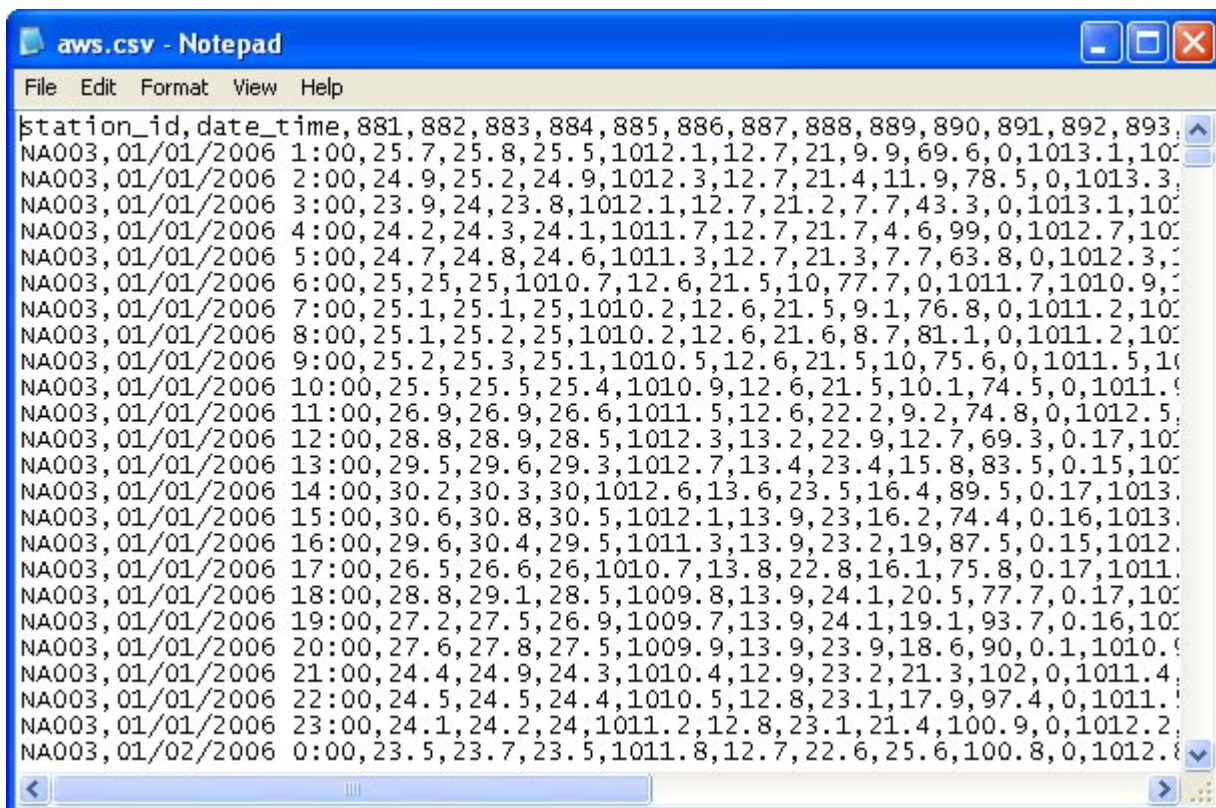
## Clicom Synop

The data to be imported is assumed to be in (.CSV) format. By following the importing procedures intuitively suggested by the dialogue box for importing data, CLICOM data will be effortlessly loaded into the Climsoft intermediate data base.

## From AWS

To be imported into Climsoft, AWS data needs to be in comma separated value (CSV) format. The data file to be imported should have a field for station ID, a field for datetime and fields for element codes. The Station ID should first be defined in the **lookup\_station** in the **Temp work file** and in the **station** table in the **Intermediate database**. Likewise, the element codes should first be defined in the **lookup\_element** table and the **element** table in the **Temp work file** and **Intermediate database** respectively. The field name for Station ID must be **station\_id** and that for datetime must be **date\_time**. This requirement is critical. Sample AWS data file for import into Climsoft is shown in Fig 1. below. Typically the data will be originally in Text format. A spreadsheet like MS Excel can be used to edit the data and produce the required CSV format.

**Note:** *Data for a station and elements which have not been defined in the metadata will not be imported.*



```
aws.csv - Notepad
File Edit Format View Help
station_id,date_time,881,882,883,884,885,886,887,888,889,890,891,892,893,
NA003,01/01/2006 1:00,25.7,25.8,25.5,1012.1,12.7,21,9.9,69.6,0,1013.1,10
NA003,01/01/2006 2:00,24.9,25.2,24.9,1012.3,12.7,21.4,11.9,78.5,0,1013.3,
NA003,01/01/2006 3:00,23.9,24,23.8,1012.1,12.7,21.2,7.7,43.3,0,1013.1,10
NA003,01/01/2006 4:00,24.2,24.3,24.1,1011.7,12.7,21.7,4.6,99,0,1012.7,10
NA003,01/01/2006 5:00,24.7,24.8,24.6,1011.3,12.7,21.3,7.7,63.8,0,1012.3,
NA003,01/01/2006 6:00,25,25,25,1010.7,12.6,21.5,10,77.7,0,1011.7,1010.9,
NA003,01/01/2006 7:00,25.1,25.1,25,1010.2,12.6,21.5,9.1,76.8,0,1011.2,10
NA003,01/01/2006 8:00,25.1,25.2,25,1010.2,12.6,21.6,8.7,81.1,0,1011.2,10
NA003,01/01/2006 9:00,25.2,25.3,25.1,1010.5,12.6,21.5,10,75.6,0,1011.5,10
NA003,01/01/2006 10:00,25.5,25.5,25.4,1010.9,12.6,21.5,10.1,74.5,0,1011.
NA003,01/01/2006 11:00,26.9,26.9,26.6,1011.5,12.6,22.2,9.2,74.8,0,1012.5,
NA003,01/01/2006 12:00,28.8,28.9,28.5,1012.3,13.2,22.9,12.7,69.3,0.17,10
NA003,01/01/2006 13:00,29.5,29.6,29.3,1012.7,13.4,23.4,15.8,83.5,0.15,10
NA003,01/01/2006 14:00,30.2,30.3,30,1012.6,13.6,23.5,16.4,89.5,0.17,1013.
NA003,01/01/2006 15:00,30.6,30.8,30.5,1012.1,13.9,23,16.2,74.4,0.16,1013.
NA003,01/01/2006 16:00,29.6,30.4,29.5,1011.3,13.9,23.2,19,87.5,0.15,1012.
NA003,01/01/2006 17:00,26.5,26.6,26,1010.7,13.8,22.8,16.1,75.8,0.17,1011.
NA003,01/01/2006 18:00,28.8,29.1,28.5,1009.8,13.9,24.1,20.5,77.7,0.17,10
NA003,01/01/2006 19:00,27.2,27.5,26.9,1009.7,13.9,24.1,19.1,93.7,0.16,10
NA003,01/01/2006 20:00,27.6,27.8,27.5,1009.9,13.9,23.9,18.6,90,0.1,1010.
NA003,01/01/2006 21:00,24.4,24.9,24.3,1010.4,12.9,23.2,21.3,102,0,1011.4,
NA003,01/01/2006 22:00,24.5,24.5,24.4,1010.5,12.8,23.1,17.9,97.4,0,1011.
NA003,01/01/2006 23:00,24.1,24.2,24,1011.2,12.8,23.1,21.4,100.9,0,1012.2,
NA003,01/02/2006 0:00,23.5,23.7,23.5,1011.8,12.7,22.6,25.6,100.8,0,1012.8
```

Fig 1. Sample AWS data in CSV format

## Migrating Data from V2

Data from Climsoft version 2 main database is imported into the version 3 intermediate database so that the data goes through enhanced QC checks before the data can be uploaded into the version 3 main database. Fig 2 below shows the dialogue for importing data from version 2 main database in MS Access while Fig 3 shows the dialogue for importing from version 2 MySQL main database. Please note that in the case of v2 Access database, one browses for the database while in the case of v2 MySQL main database one is required to specify the Data Source Name as configured in the Windows Control Panel.

Both dialogues for data migration from V2 are accessed through the main dialogue for updating the intermediate database shown in Fig 1.

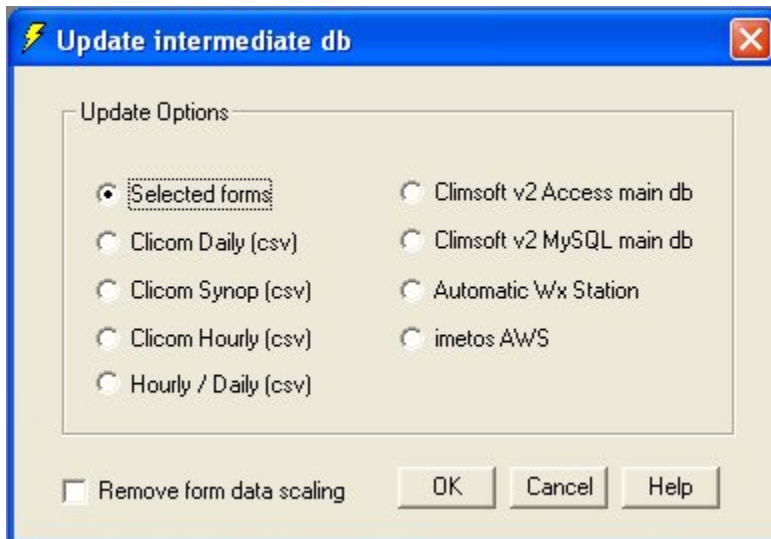


Fig 1. Options for Updating Intermediate Database

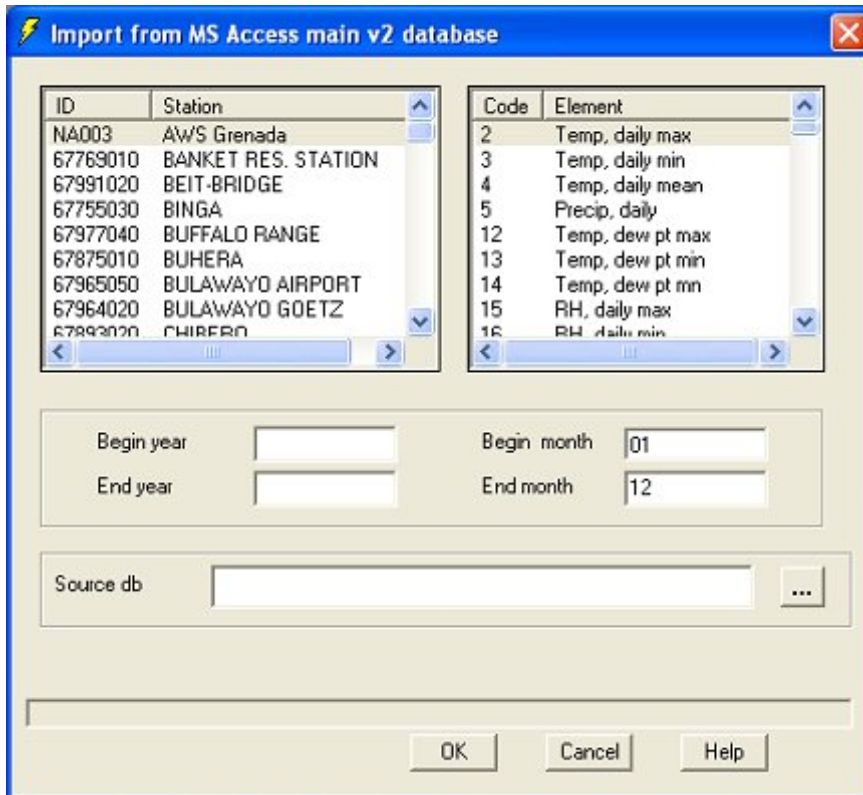


Fig 2. Importing data from version 2 MS Access main database

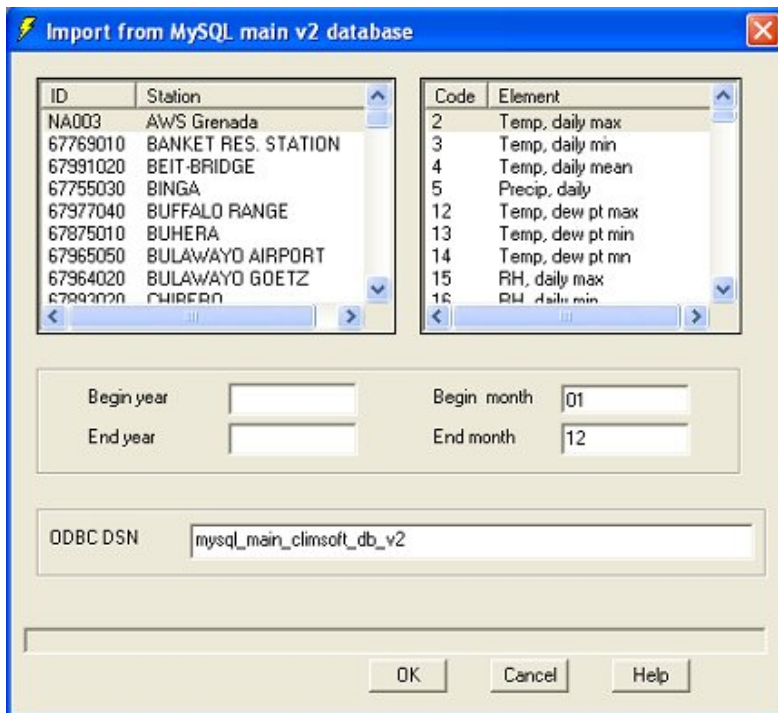


Fig 3. Importing data from version 2 MySQL main database

## Uploading Data into Main Database

Access to this facility is via the [database utilities](#) control panel. Clicking the **update main db** button brings up the dialogue shown below. There are a number of options for uploading data into the main database including from an ODBC intermediate database to an ODBC main database e.g. MySQL or PostgreSQL back-end databases. It is necessary to specify the required period for the data to be imported otherwise the routine will try to import all the data from the source database which may be beyond what the computer system resources can manage.

The intermediate database targeted for uploading into the main database, is the one indicated on the [Database Utilities](#) dialogue. Importing from another main database requires the source database to be indicated in the intermediate database location on the Database Utilities dialogue.

**Uploading to Main DB**

Update Options

Upload from intermediate database     Upload from ODBC intermediate database to ODBC main database

Import from main database backup     ...

Import from main MS Access database

Begin year:     Begin month:

End year:     End month:

OK    Cancel    Help

## Quality Control

A number of Quality Control procedures are available in Climsoft for data that have been entered using the Climsoft key-entry module or data that have been imported in digital format e.g. from Climsoft version 2 database or from CLICOM. Fig 1. shows the dialogue for selecting and executing the various QC procedures.

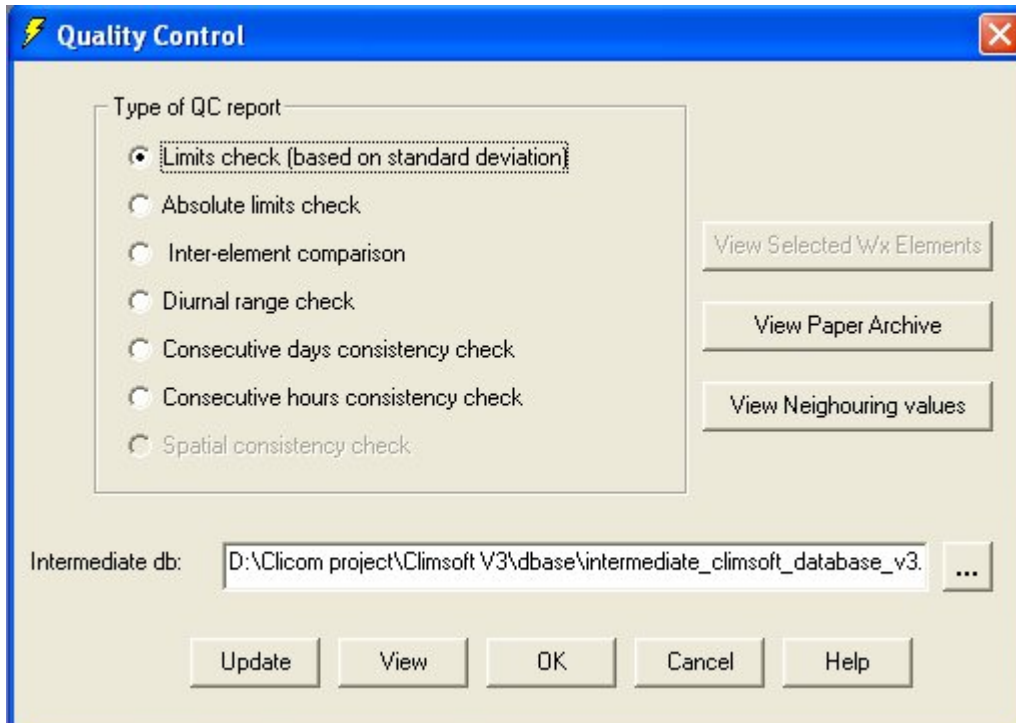


Fig 1. QC options for data in the Climsoft intermediate database

After selecting a particular option for QC, another dialogue comes up for specifying parameters for the selected QC option as shown in fig 2. which is the dialogue for tolerance or limits checks against number of standard deviations of recorded values from the mean. For this particular Q option, in addition to selecting the element and specifying the element and time period for QC, one also needs to give the number of standard deviations from the mean as a measure against which values are checked for tolerance.

Fig 2. also a button for generating long-term means used for calculating the standard deviation values used for the tolerance QC checks. This operation is carried out only when there is need to generate or update the long-term statistics.



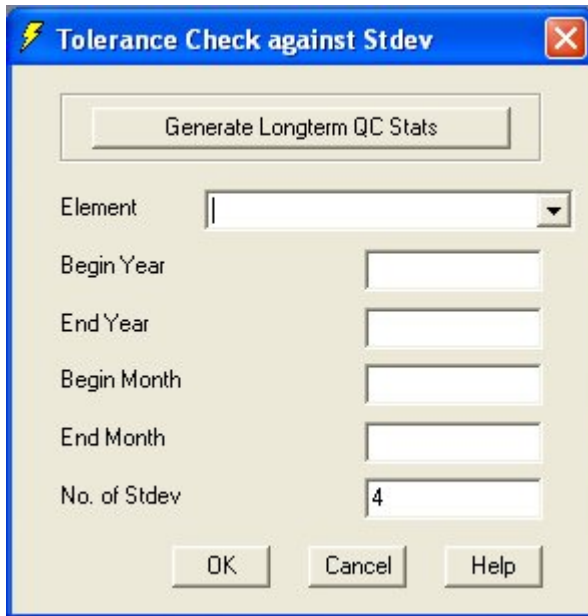


Fig 2. Specifying parameters for QC checks

After clicking OK to run the QC check, an output showing values failing the QC checks is automatically displayed in Excel. See Fig 3.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	recorded_from	recorded_at	yyyy	mm	dd	hh	described_by	obs_val	mean	diff_n	stdv	qc_status	acquisition_type	data_form	captured_by
2	67775050	10/04/1975 6:00	1975	10	4	6	2	157	283	7	1	1	2	form_daiy2	operator1
3	67785020	18/10/1976 6:00	1976	10	18	6	2	165	301	17	1	1	2	form_daiy2	operator1
4	67791010	10/04/1975 6:00	1975	10	4	6	2	157	282	6	1	1	2	form_daiy2	operator1
5	67791010	01/08/1976 6:00	1976	1	8	6	2	26	263	144	3	3	2	form_daiy2	operator1
6	67963040	09/04/1974 6:00	1974	9	4	6	2	80	279	26	1	1	2	form_daiy2	operator1
7	67964020	09/04/1974 6:00	1974	9	4	6	2	83	281	27	1	1	2	form_daiy2	operator1

Fig 3. QC output displayed in Excel

In addition to showing the station, date/time and values failing QC, the output also shows the QC status of each record, the acquisition type indicating the source of data e.g. key-entry or imported digital data from CLICOM, the key-entry form used and the name of the operator who was logged in for the data entry. The QC status indicates whether a value has previously gone through some QC check(s) or has been modified. A number of QC status flags have been defined in the qc\_status\_definition table in the Climsoft intermediate database. A record which has not gone through QC is assigned a QC status of "0". Once a record has QC checked, its status flag is changed to "1". If the record value is modified the QC status is incremented by 1.

A log of the different types of QC checks carried out on a value is recorded in the observation table in the field qc\_type\_log in the intermediate database. The various QC types are defined in the table qc\_type.

The values can be modified in Excel and later updated in the database by clicking the Update button on the QC dialogue shown in Fig 1. After clicking the Update button, a dialogue will appear for one to browse for the input QC file to be used for updating. The updating can be done soon after making the changes or at a later stage on a difference instance of running Climsoft.

When later transferring data to the main database, only values with QC status greater than zero will be uploaded.

If there is need to view data as written on the original paper recorded, clicking the button View paper Archive on the main QC dialogue shown in Fig.1 will bring up a dialogue for specifying parameters for the required paper archive as shown in Fig 4. On clicking OK, an MS Access form will be displayed with details of the paper archive as shown in Fig 5. Double clicking on the image icon will display a full image of the paper archive.

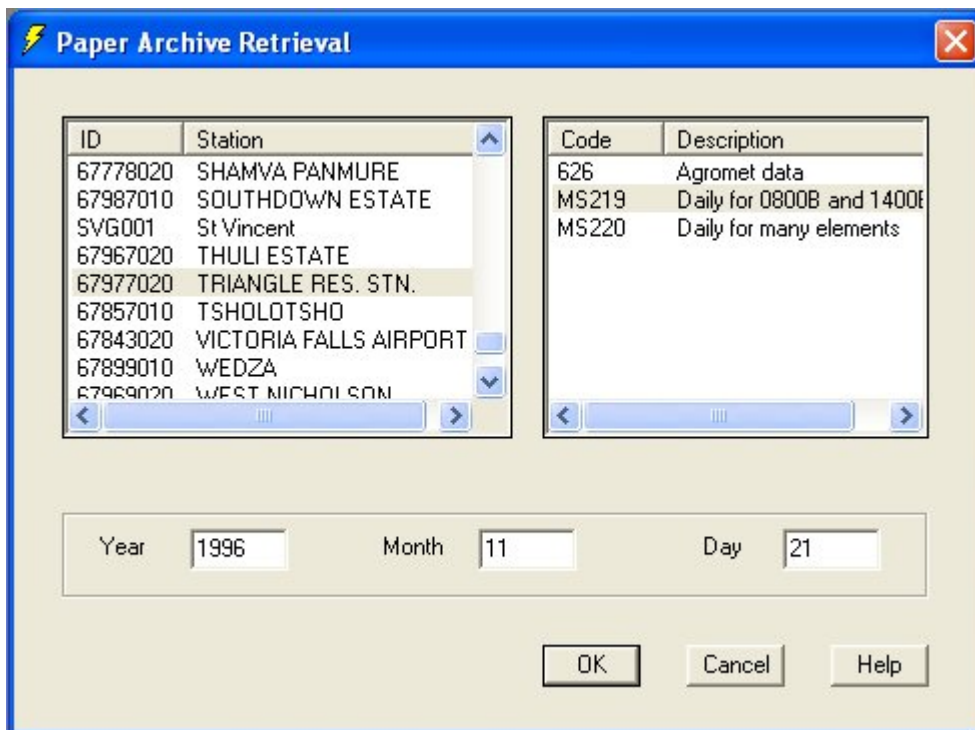


Fig 4. Dialogue for specifying parameters for paper archive image

Spatial consistency can be checked visually by clicking the button View Neighbouring Values. This will display the dialogue to specify required parameters as shown on Fig 6.



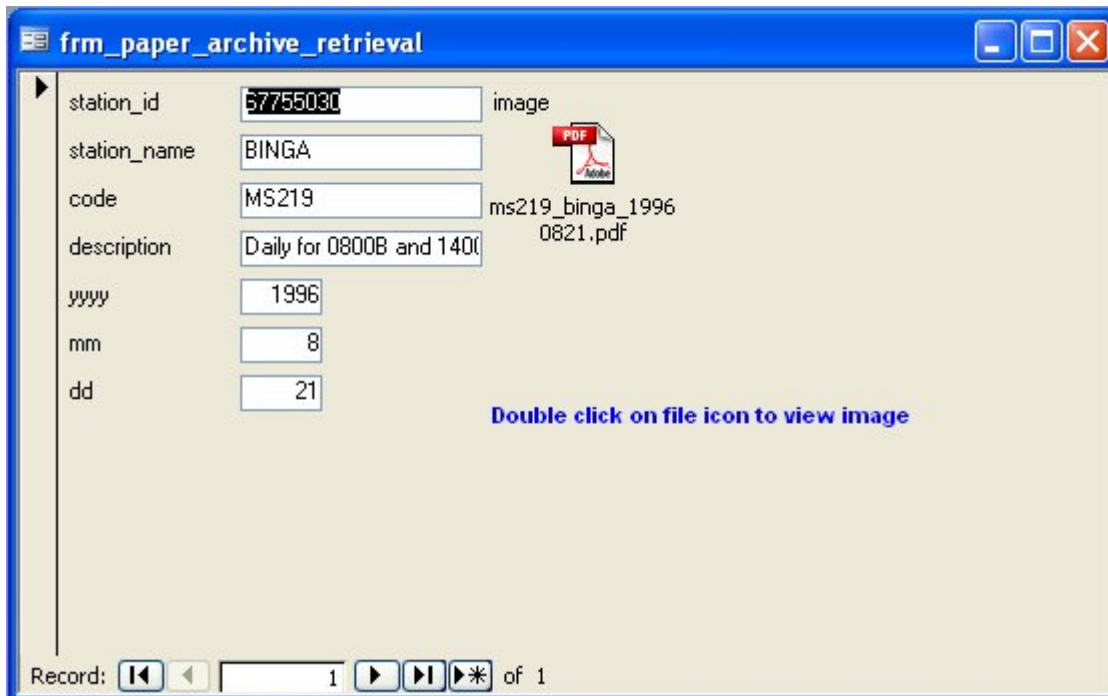


Fig 5. Paper archive form view in MS Access

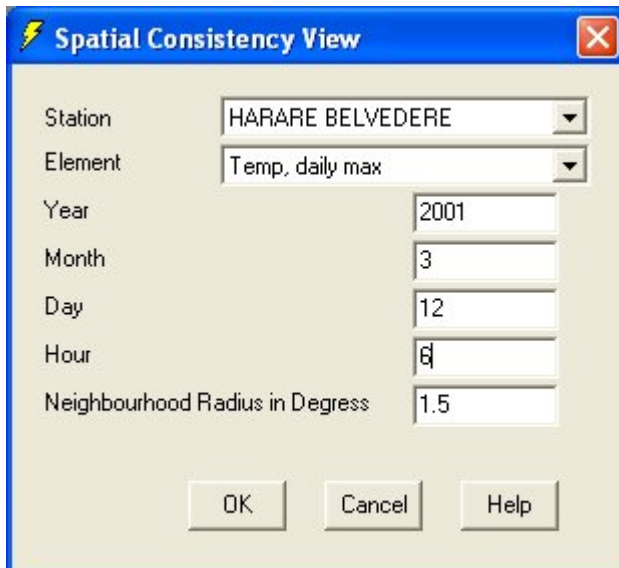


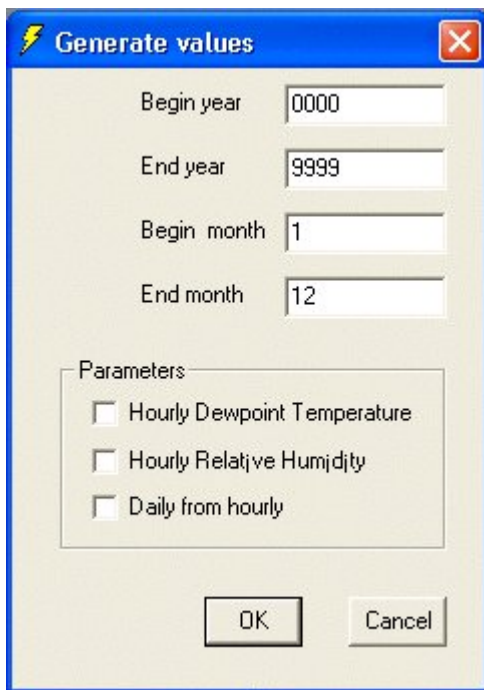
Fig 6. Specifying Parameters for viewing data for neighbouring stations

## Generating Values

The command button **Generate values** available on the [database utilities](#) dialogue, points to a facility for generating meteorological elements from other elements e.g. dewpoint temperature can be calculated from drybulb and wetbulb temperatures. Similarly, relative humidity can be calculated from drybulb and dewpoint temperatures. See the appendices topic [calculation of dewpoint temperature and relative humidity](#) for a detailed description on how these calculations are carried out.

There are also some daily elements which may be captured into the database but these elements would have been derived from hourly elements.


Clicking the **Generate values** command button brings up the following dialogue. Elements to be generated should be selected and the required period specified.



The screenshot shows a dialog box titled "Generate values". It has a blue title bar with a lightning bolt icon on the left and a close button (X) on the right. The main area is light gray and contains four input fields: "Begin year" (0000), "End year" (9999), "Begin month" (1), and "End month" (12). Below these is a section titled "Parameters" with three unchecked checkboxes: "Hourly Dewpoint Temperature", "Hourly Relative Humidity", and "Daily from hourly". At the bottom are "OK" and "Cancel" buttons.

The screen-shot below, shows a table in the main database where daily elements required to be calculated from hourly should be specified.

generation_of_daily_from_hourly : Table				
hourly_element_code	hourly_element_name	generated_daily_element_code	operation	
101	Temperature, drybulb	4	Avg	
102	Temperature, wetbulb	92	Avg	
▶ 103	Temperature, dewpoint	14	Avg	
105	RH	17	Avg	
106	Pressure, stn	47	Avg	
111	Wind speed, cup anem	57	Avg	
111	Wind speed, Dines	98	Avg	
114	Sky cover	43	Avg	
132	Sunshine	84	Sum	
133	Insolation	46	Sum	
198	VPD	91	Avg	
*				

Record:  3 of 11

## Database Maintenance and Backup Strategy

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**Overview:** Uploading moves data from the temp work files into the intermediate database and deletes the temp work file. QC and other checks are performed on the intermediate database, and then the data is moved into the main database. Note that the data in the intermediate database is not deleted as part of this process, so if a failure occurs, the main database can be restored and the move repeated. Checks should be performed to ensure that all the data has been moved before clearing the intermediate database.

The uploading schedule is a local decision of the administrator, typically after finishing the capturing of a pre-determined batch of data e.g. one month's data. Factors to be considered are the amount of data in the temp work file, as well as business needs. Such business needs will include the schedule for production of reports.

Depending on the choice made in [setting up data entry form options](#) the uploading of data from the temp work file to the intermediate database may clear the temporary database thereby creating space for saving more data. This should probably be the preferred option.

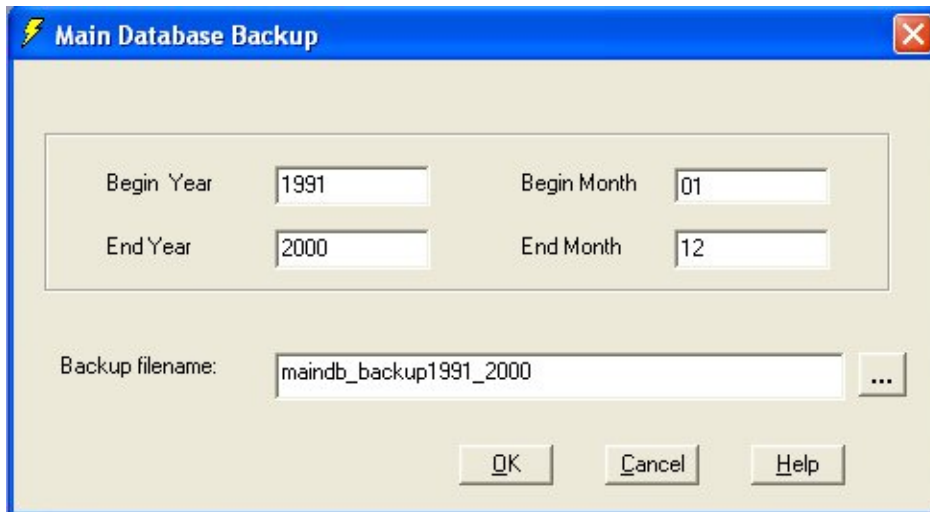
When uploading data to the main database it is very important to monitor the size of your Access database so that it does not exceed any required limit (e.g. for backup media) and also to compact the database before exiting. The database size is not likely to be an issue for MySQL back-end database.

**Backup of intermediate database:** It is recommended to keep blank copy of Climsoft intermediate database under a different name. After uploading data from the temp work file into the intermediate database (typically after entering a month's data in the temp work file), rename the intermediate database to `climsoft_intermediate database_mm_yyyy.mdb` (where mm=month and yyyy=year), so that there will be copies of the intermediate database for each month of data imported from the temp work file. A number of these datasets organized on a monthly basis can be archived on a single CD or DVD, avoiding the problem of handling one large intermediate database. This will provide one option of re-generating the main database in case of disaster.

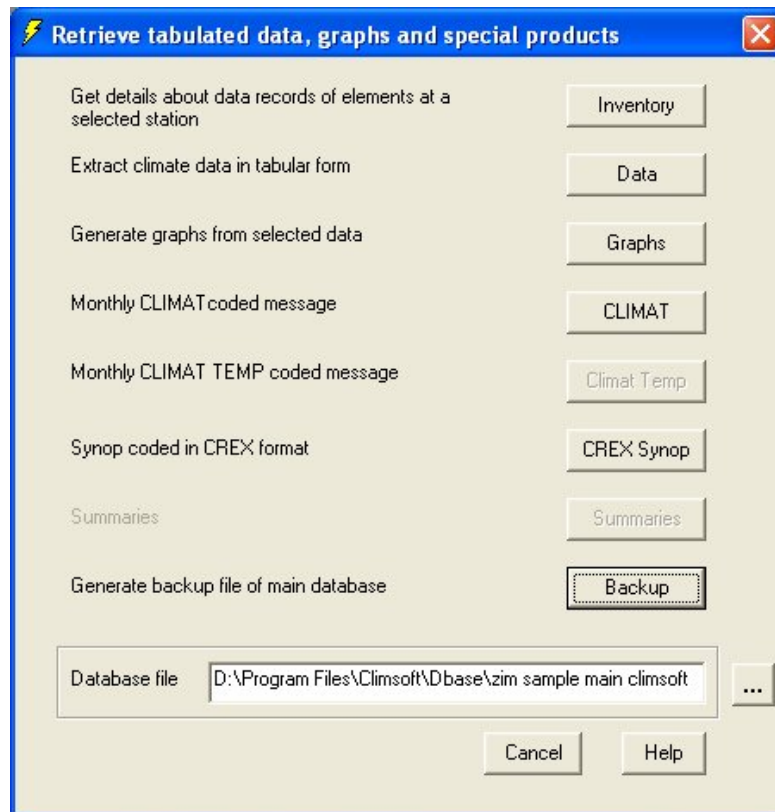
**Backup of main database:** As in the case of the intermediate database, it is also recommended to keep a blank copy of the main database. One or more copies of the entire main database should be kept on the network both in the case of an Access or MySQL database. For offline storage it may be necessary to use file splitting software to break up a large database into smaller chunks that will fit on CD or DVD. A new backup should be made after each upload operation from the intermediate database.

### Backup and Restore Facility in Climsoft

A tool for backup and restore has now been included in the latest version of Climsoft. The backup dialogue shown on Fig 1. is accessed via the main dialogue for **Products**. See Fig 2. The backup file is in CSV format to conserve space. The file size can be reduced further, by about ten times, using a compression tool like Winzip.

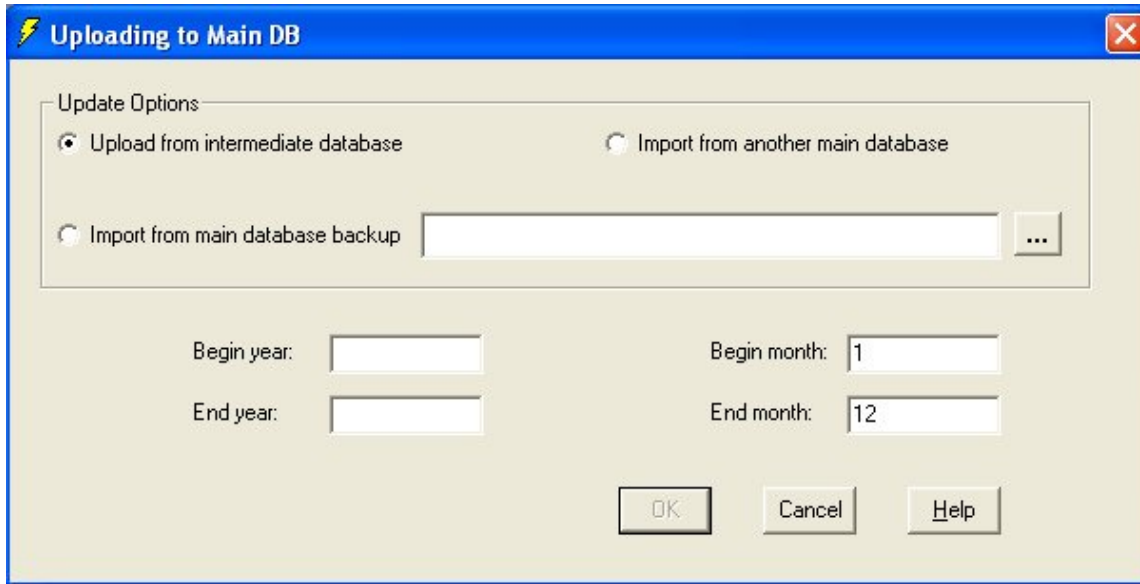


**Fig 1. Backup dialogue**



**Fig 2. Products Dialogue**

The dialogue for updating the main database now includes an additional option for database restore from a backup file as shown on Fig 3.



**Fig 3. Option for database restore from backup**

**How frequently should I backup?** A backup should be made after each upload operation – this ensures that the data just added is not lost in a subsequent failure.

The backups should be taken in rotation, ideally in a grandfather, father, son sequence. This means that if the latest backup copy fails, earlier ones exist. Sometimes an error may not be noticed for a time and it will be necessary to roll back to an earlier version.

You should check that backup copies are readable, and that you are familiar with restoring from the backups.

For an installation on a server, there will probably be facilities provided for recovery and restoration at the system level. You should understand what these are, but these are intended to restore the entire server to a working system, and this may not be suitable for individual file restores. If the problem is a server or network crash, then the system restore will probably be the best available, but if the problem is internal to Climsoft, then a separate file backup will usually be better.

Note that the database size is not likely to be significant compared to modern PC storage, so it may be effective to take frequent copies to an on-line disk area, but you should ensure that this copy is not used for any other purpose. You should still take copies to off-line media, e.g. CD or DVD.

**Where should I keep my backups?** Recommended storage media is CD or DVD which can be easily read on most PCs unlike tapes which can usually be read on only on machine. If data are archived on tape, serious problems can arise if the tape drive becomes faulty or the requisite drivers are corrupted and cannot be replaced.

Backup copies should be kept on site locked up in a secure place e.g. a steel cabinet or fire safe for easy access when needed.

Other copies should be kept off site for security reasons.

The location and schedule for backups should be documented, and the documentation should be accessible. The process must not depend on knowledge held by any single person.

## Backend Database

MS Access imposes a database size limit of 2GB. This may be adequate for Met Services with a few stations. For those Met Services with many stations and long records of data, a storage capacity of 2GB is likely to be too small. To overcome the MS Access database size limitation, the work-around in Climsoft has been to setup a back-end database connected to the MS Access front-end database. Any back-end database with suitable ODBC drivers can be setup to work with the Climsoft MS Access database. However, the Climsoft setup has been designed to incorporate a choice between two popular open source databases as back-end databases namely MySQL and PostgreSQL.

## Setting Up MySQL Back-end Database

### Introduction

The standard ClimSoft system, which runs on MS Access, is intended for small databases whose size does not exceed the limit imposed by MS Access (2 GB for Access 2000). There are basically two possibilities to work with ClimSoft databases whose size is greater than the Access limit, without trading off the powerful features of Access. One way is to segment the Access database. The other way is to set up a back-end database using a more powerful Relational Database Management System (RDBMS) like Microsoft SQL Server, Oracle or the open source MySQL. The option of setting up a back-end database is more suitable for a large network environment with a large number of concurrent users. MS Access's capability in this area is rather limited. The example of setting up the ClimSoft back-end database given here is that of using MySQL but the same approach should work for any other RDBMS. The limit of a MySQL database is on the order of Terabytes. Apart from its large capacity for data storage which is comparable to other enterprise level database management systems like Microsoft SQL Server and Oracle, MySQL has been found to be very stable and extremely fast in data retrieval.

### Pre-requisites

- Windows 2000/XP/Vista/Windows 7
- MS Access 2000 or later
- MySQL version 4.0 or later
- MyODBC driver version 3.51 or later
- Script file "mysql\_main climsoft database.sql"

### 1. Installing MySQL Database Server

MySQL version 4.1 is installed by running the file **mysql-essential-4.1.10a-win32.msi**. The first dialogue to appear is shown in Fig 1.



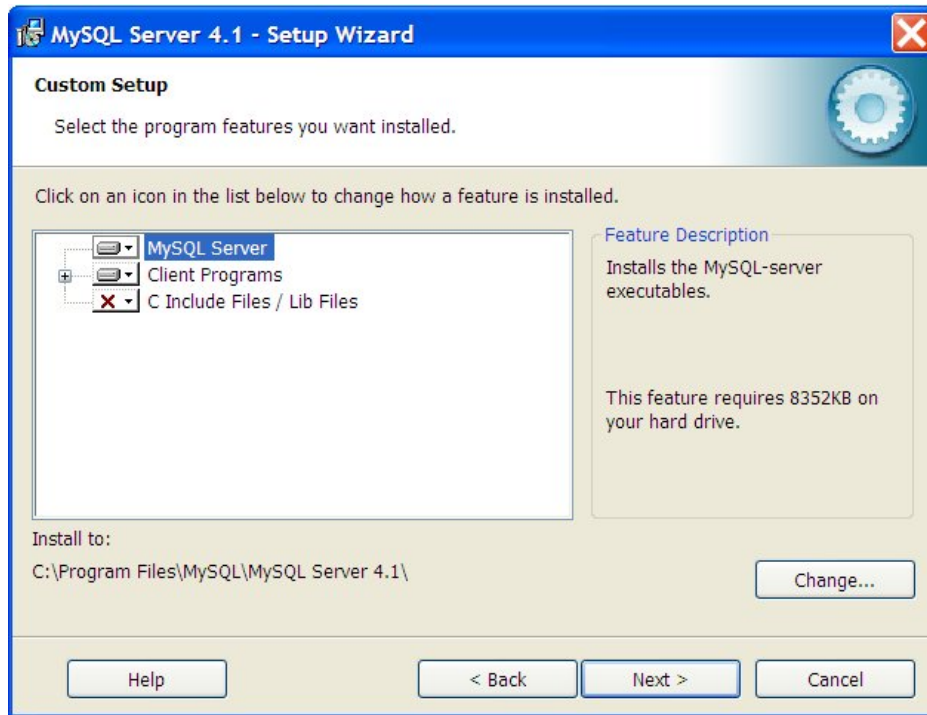
**Fig 1. Starting MySQL setup**

After clicking **Next**, the next dialogue shown in Fig 2, gives options for the type of installation. Custom setup is recommended as this gives flexibility in the installation e.g. to choose the location for installing the application as shown in Fig 3.



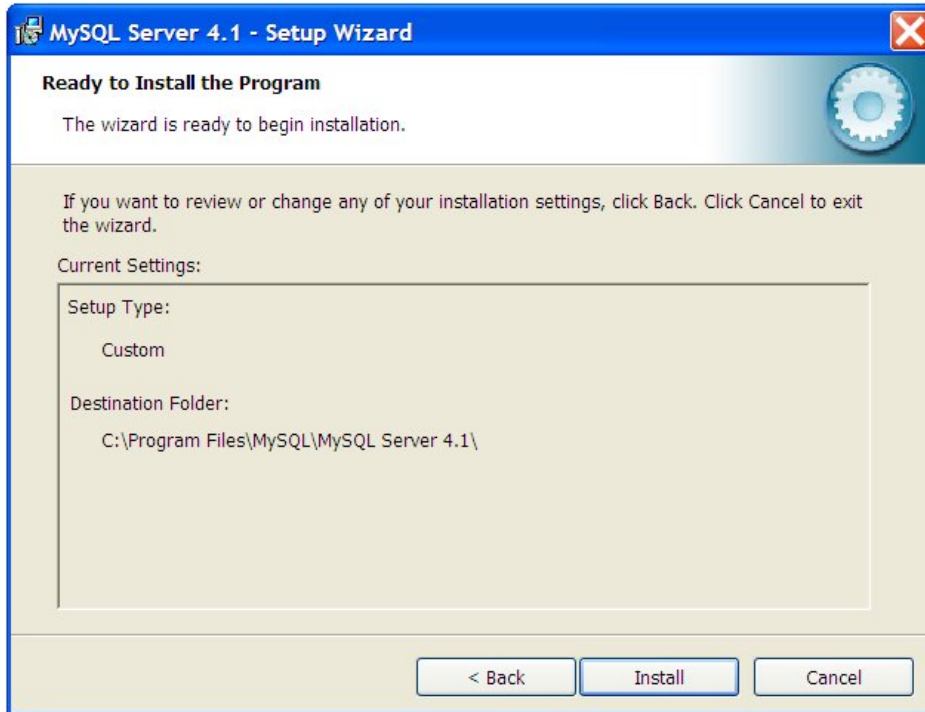


**Fig 2. Setup options for MySQL 4.1**



**Fig 3. MySQL custom setup**

After clicking **Next** on the dialogue shown in Fig 3, installation can then begin on clicking the **Install** button.



**Fig 4. Confirmation of custom setup options**



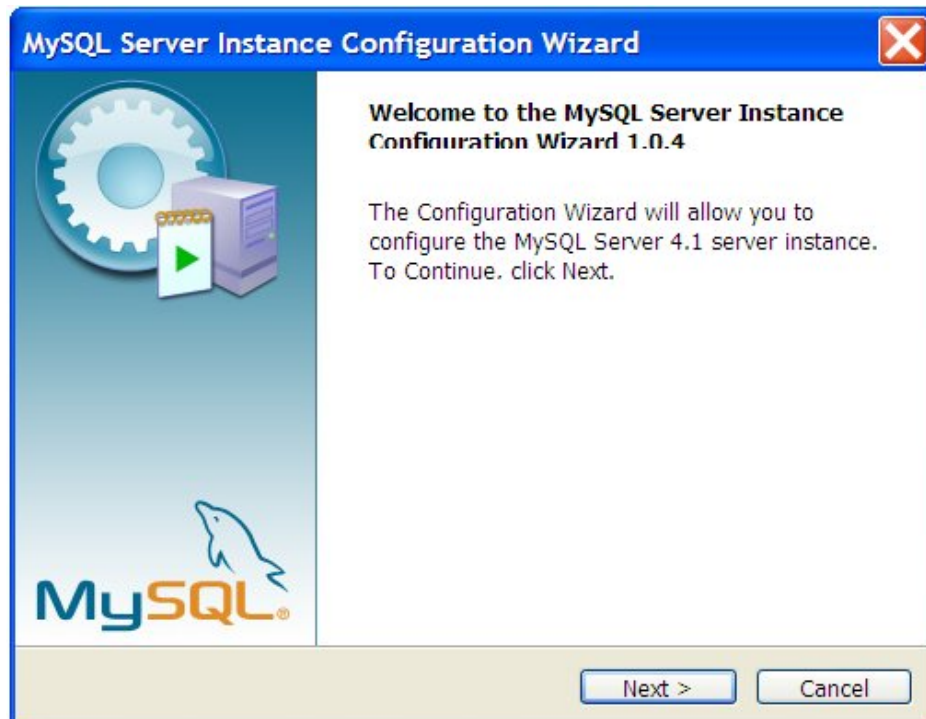
**Fig 5. MySQL sign-up**

Sign-up for the software is optional as shown in Fig 5.



**Fig 6. End of Installation.**

The dialogue above (Fig 6) indicates end of MySQL installation. After clicking **Finish**, the dialogue which comes up next will be for the configuration of the MySQL database system as shown in Fig 7.



**Fig 7. First dialogue for MySQL configuration**

The next dialogue shown in Fig 8, gives two options for the configuration, and the recommended option is **detailed configuration**.



**Fig 8. Configuration Options.**



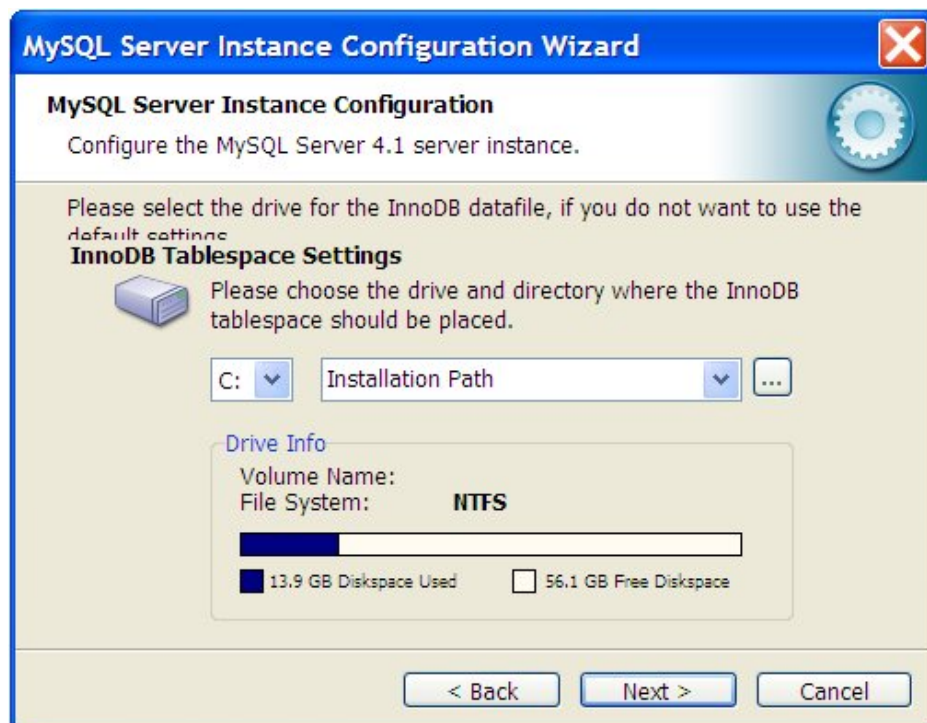
Fig 9. Options on how the MySQL server will operate

The recommended option on the dialogue shown in Fig 9 will be **Developer Machine**.



Fig 10. Database usage.

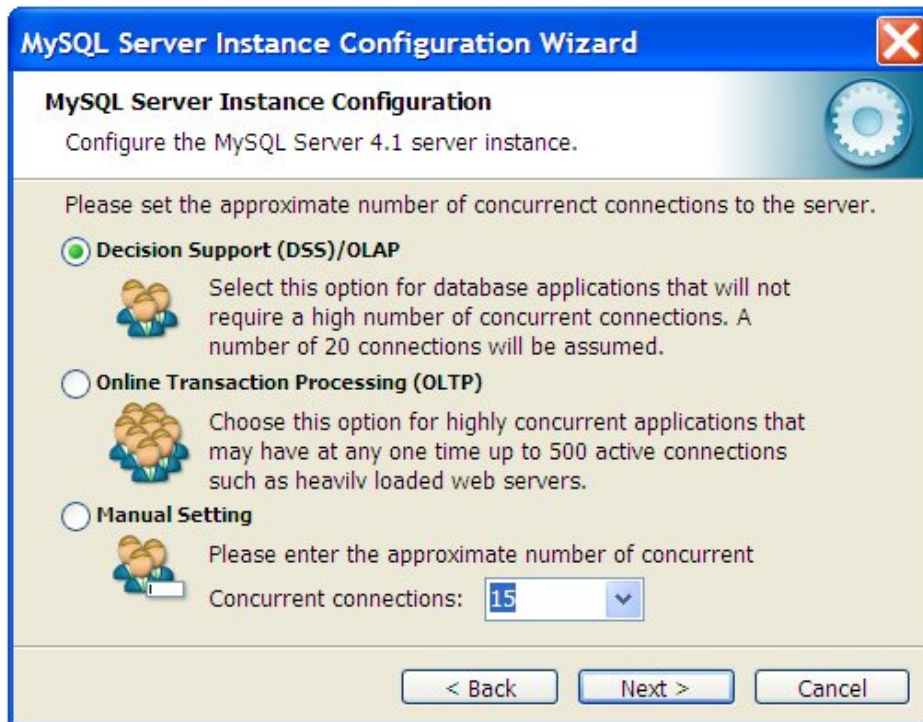
On the dialogue selecting the type of database usage shown in Fig 10 above, **Multifunctional Database** is recommended.



**Fig 11. Location of the data file.**

In the next dialogue for specifying the location of the data file, shown in Fig 11, what is recommended is the default location, which is in the **Installation Path**.





**Fig 12. Setting number of concurrent connections.**

On the dialogue for setting the number of concurrent connections the recommended setting for small networks is **Decision Support**.



**Fig 13. Selection of character set.**

On the dialogue shown in Fig 13, for selecting the character set, the recommended option for English and other West European languages is **Standard Character Set**.



**Fig 14. Windows Service setup option.**

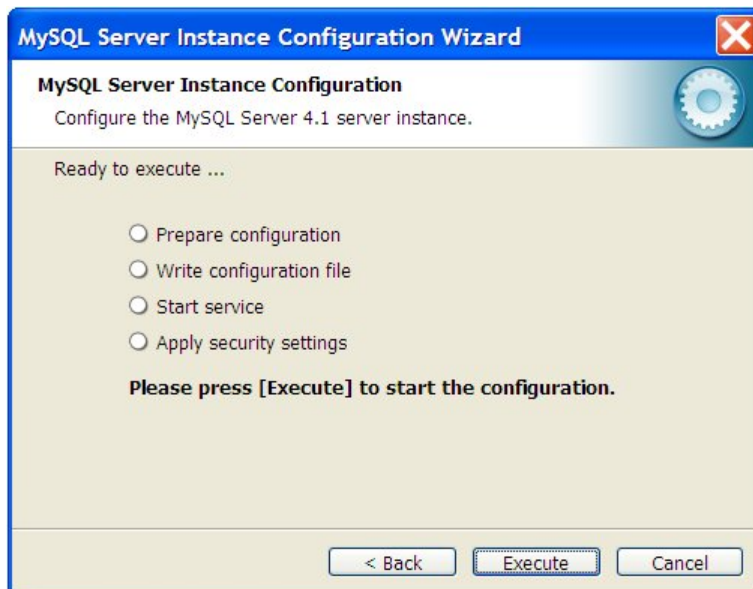
It is recommended to run MySQL as a Windows service as shown in fig 14 above.





**Fig 15. Setting of root password.**

Although there is freedom in defining the root password, it is recommended to enter the password as **admin** during the installation. This is meant to minimize problems of authentication against information held in the ClimSoft MySQL database which comes with the initial setup. The password can be changed later after the initial configuration.



**Fig 16. Final dialogue for MySQL configuration.**

In the final dialogue for MySQL configuration shown in Fig 16 above, clicking the **Execute** button, will put the configuration into effect. This configuration may take a while before all the tasks are automatically ticked and the dialogue appears as shown in Fig 17 below.



**Fig 17. Finishing MySQL configuration.**

If the configuration fails, most probably on the last task of applying security settings, what is recommended is to uninstall MySQL, delete the folder containing the MySQL installation and then reinstall MySQL.

## 2. Creating Climsoft Database in MySQL

The Climsoft database in MySQL is created according to the restore procedure described under the topic [MySQL Backup and Restore](#). The procedure for creating the Climsoft main database in MySQL is the same for creating the intermediate database in MySQL. What is important is to use the correct script file. The script file names are **mysql\_main\_climsoft\_db.sql** for the main database and **mysql\_intermediate\_climsoft\_db.sql** for the intermediate database.

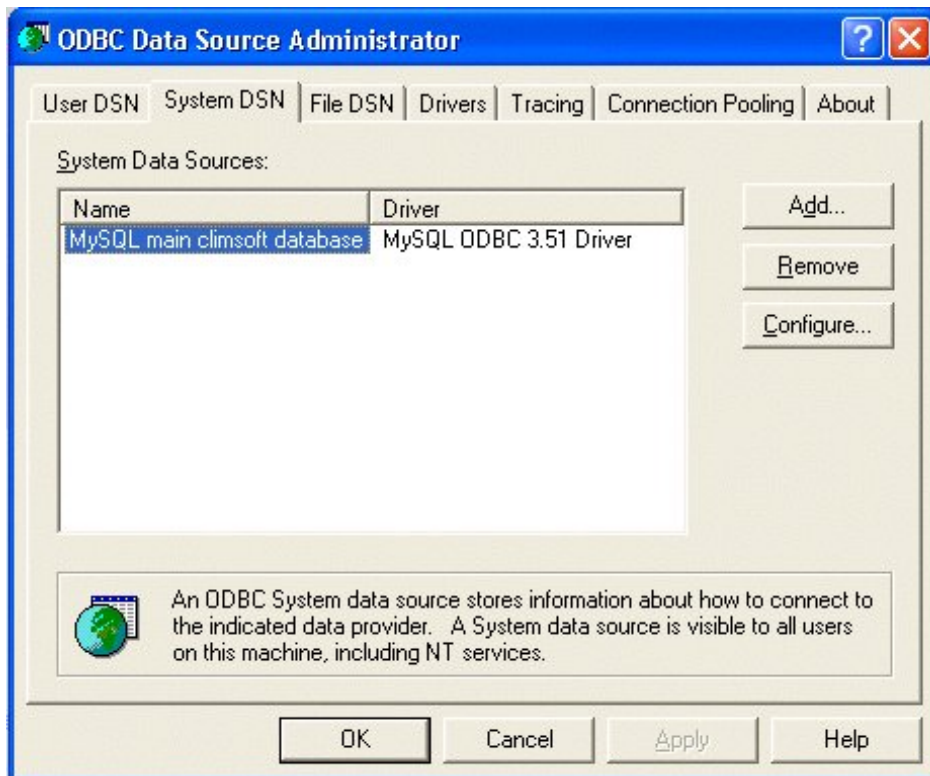
A MySQL back-end database may be required for the intermediate database particularly due to large volumes of data ingested from AWS.

## 3. Installing MySQL ODBC driver

To be able to connect to MySQL database from a Microsoft application like MS Access, there is need to install the MySQL ODBC driver by simply running the file **MyODBC-3.51.11-1-win.exe**.

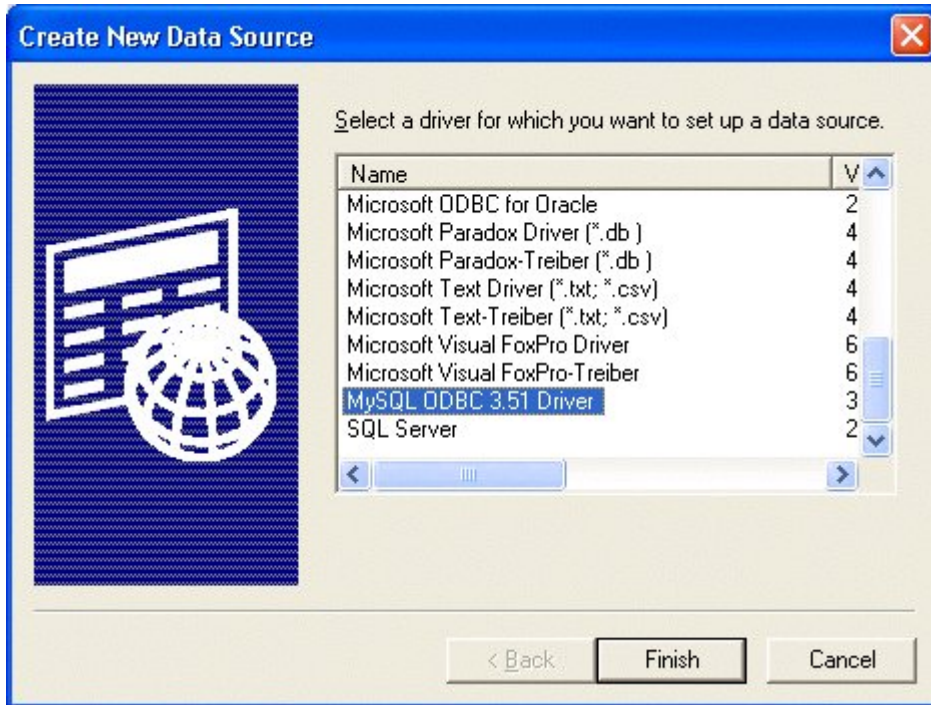
## 4. setting up the ODBC connection to MySQL

A connection to MySQL server is done via the Control Panel using **the ODBC Data Source Administrator** as shown in Fig 22.



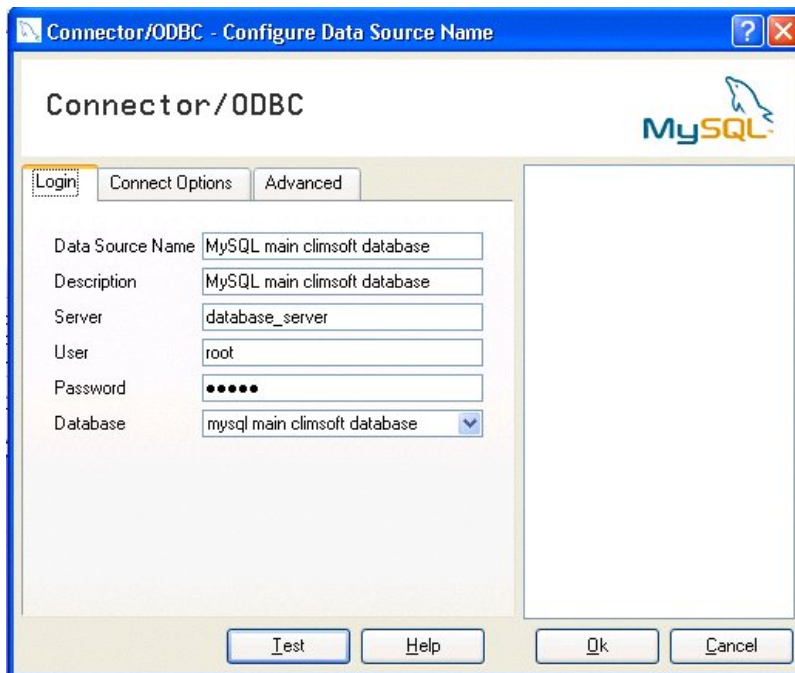
**Fig 22. ODBC Data Source Administrator**

On the ODBC Data Source Administrator dialogue, select System DSN and click the **Add** command button. This will bring up the next dialogue shown in Fig 23.



**Fig 23. List of available data source drivers**

On the list of installed ODBC drivers select the MySQL ODBC driver and click **Finish**. The dialogue for the MySQL ODBC driver follows. (See Fig 24).

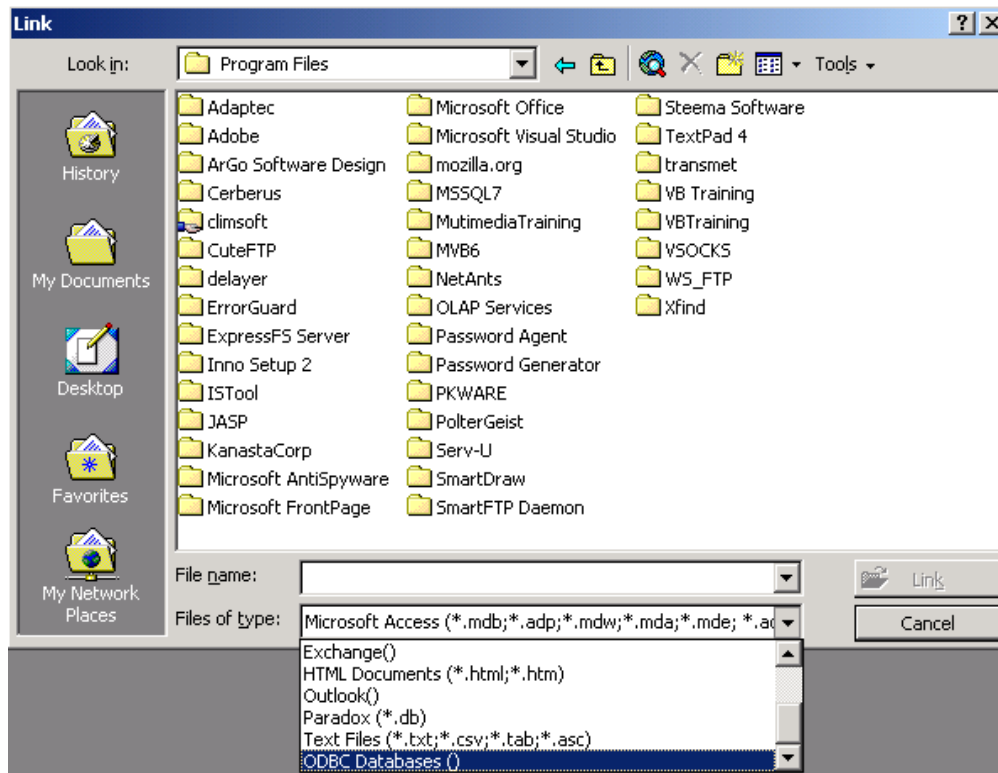


**Fig 24. Configuring MySQL ODBC driver**

On the ODBC dialogue, enter the details as shown in Fig 24. You can specify any meaningful **Data Source Name**, but it is recommended to keep it as **MySQL main climsoft database**. The name of your server containing the MySQL installation should be entered in the **Server** textbox. This can be the name of the server on a network or the network name of the PC on which MySQL has been installed. The user name (root) and password which should have been defined during the MySQL configuration are also required. The **Database** combo box will show a list of databases available in MySQL. Select **mysql main climsoft database** and test the connection. Click OK to finish the ODBC configuration.

## 5. Linking MySQL data tables to Access

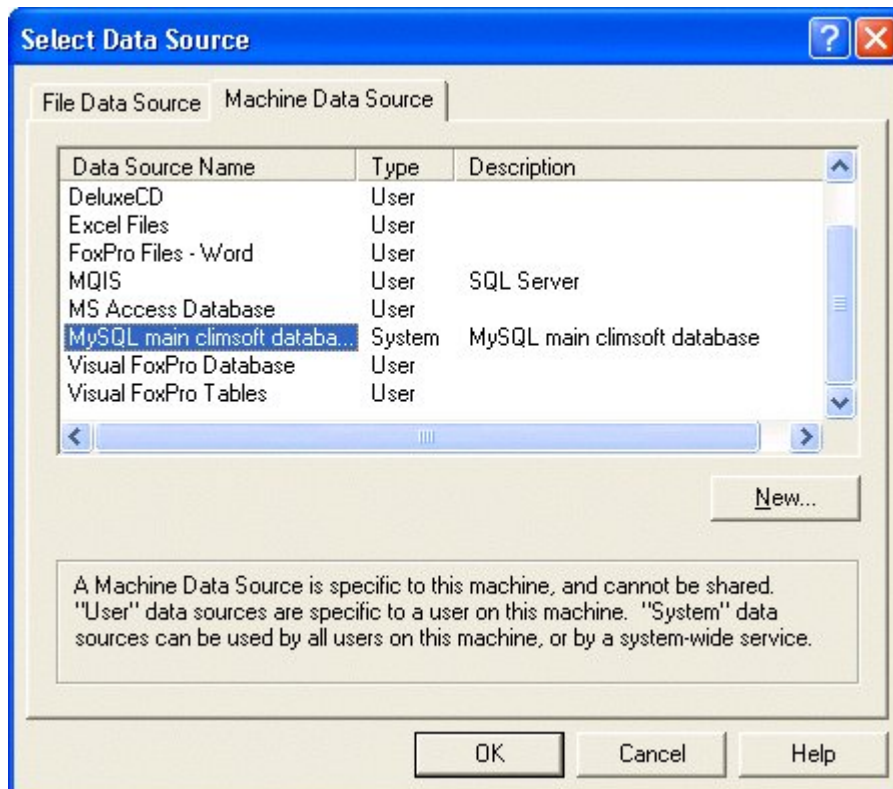
After configuring MySQL ODBC driver, the next step is to link MySQL data tables from the Access database. To do this, you need to start Access and open **MySQL main climsoft database**, which is located in the subfolder **dbase** of the **ClimSoft** installation parent folder. Click **File** on the main Access menu followed by **Get External Data** and then **Link Tables**. This will lead to the dialogue shown in Fig 25.



**Fig 25. Selecting the type of file for the data source.**

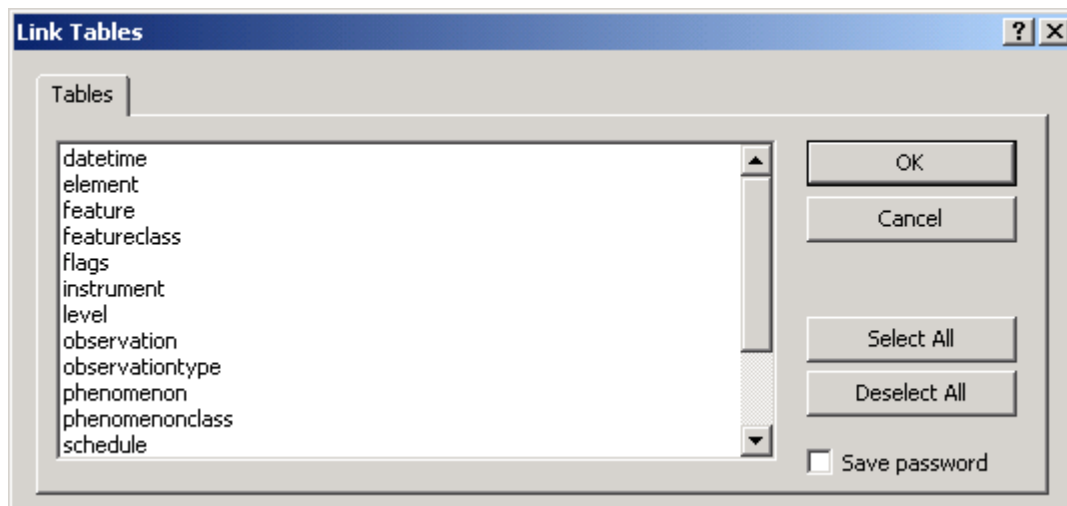
From the drop down list showing the type of data files select **ODBC Databases ()** which will lead to the following dialogue shown in Fig 26.





**Fig 26. Available Data Sources**

On this dialogue, select **MySQL main climsoft database** under **Machine Data Source** and click **OK** which should result in a list of table objects available in the selected MySQL database as shown in Fig 27.



**Fig 27. Tables in the selected MySQL database.**

On this dialogue, select all the tables, except **flags**, and click **OK** to establish the table links. The table relationships are already defined in MySQL but you may need to re-establish them graphically in Access

on the basis of the entity relationship diagram given in **the main climsoft database** which comes with the ClimSoft setup.

**Note:** Station information for products from **MySQL main climsoft database** is contained in the table **lookup\_station**. This table is originally empty in a new ClimSoft setup. There is need to append station information to this table in **MySQL main climsoft database.mdb** from the table **lookup\_station** in **temp work file.mdb**. After this configuration, **MySQL main climsoft database** will be ready for data upload from the **intermediate climsoft database** and subsequent extraction of products.

## Setting Up PostgreSQL Back-end Database

The procedure for setting up the main climsoft back-end database in PostgreSQL is the same for setting up the intermediate climsoft database in PostgreSQL. The latter is a new addition in Climsoft v3 in order to take care of large intermediate databases resulting mostly from the ingestion of AWS data.

The required steps for setting up the PostgreSQL back-end database are:

- **Installation of PostgreSQL** (*This can be done during Climsoft setup or separately*). The installation wizard guides you through the necessary installation steps. This is a fairly intuitive process. If the installation is not done during the Climsoft setup, it can be started by running the file [**postgresql-8.4.2-1-windows.exe**] located in the [...\climsoft\bin] folder
- **Installation of PostgreSQL ODBC connector** (This can be done during Climsoft setup or by running the file [**psqlodbc.msi**] located in the [...\climsoft\bin] folder),
- **Creating Climsoft database in PostgreSQL**. This is done by following the Restore Procedure explained under [PostgreSQL Backup and Restore](#).
- **Configuring PostgreSQL ODBC in Windows Control Panel**. In the Control Panel, open **Administrative Tools** and then **Data Sources**. This should give the ODBC Data Source Administrator shown in Fig. 1 below. Select System DSN tab and click **Add**. This will bring up the dialogue for creating a new Data Source as shown in Fig 2. Select PostgreSQL Unicode and click **Finish**. This will open the dialogue for configuring the Data Source for a PostgreSQL database as shown in Fig 3. On the dialogue, give a name for the Data Source e.g. **PostgreSQL\_main\_Climsoft\_db** and a description. You should also specify the Database (**pgsql\_main\_climsoft\_db**), the Server for the database, User Name (**postgres**) and the password defined during PostgreSQL setup.

It is important to test the configuration by clicking **Test** and then click **Save** to finish.

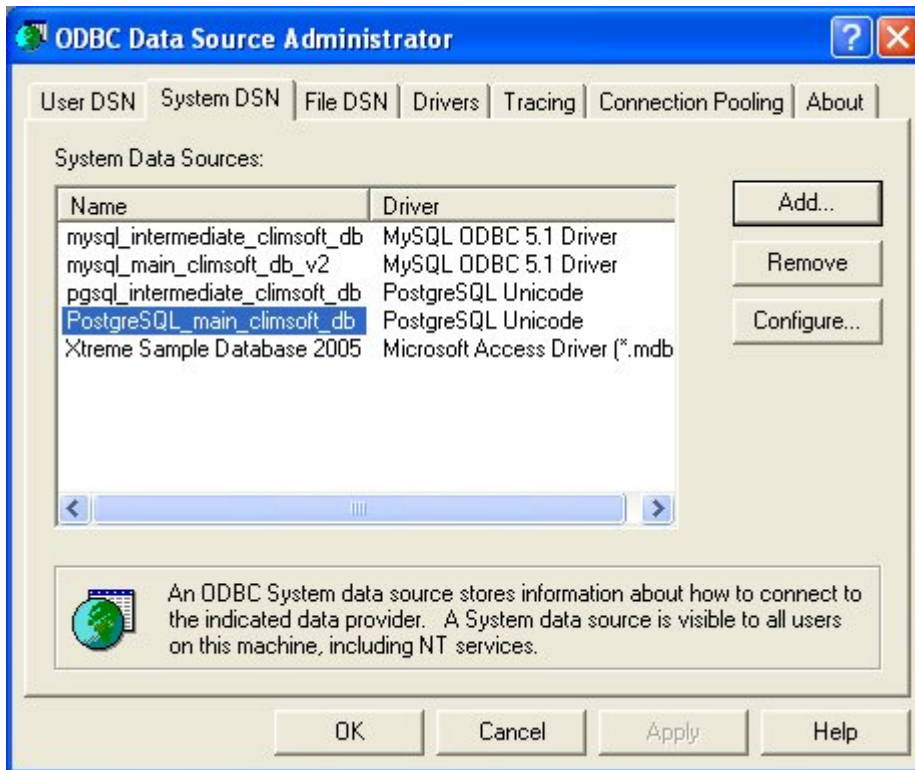


Fig 1. ODBC Data Source Administrator

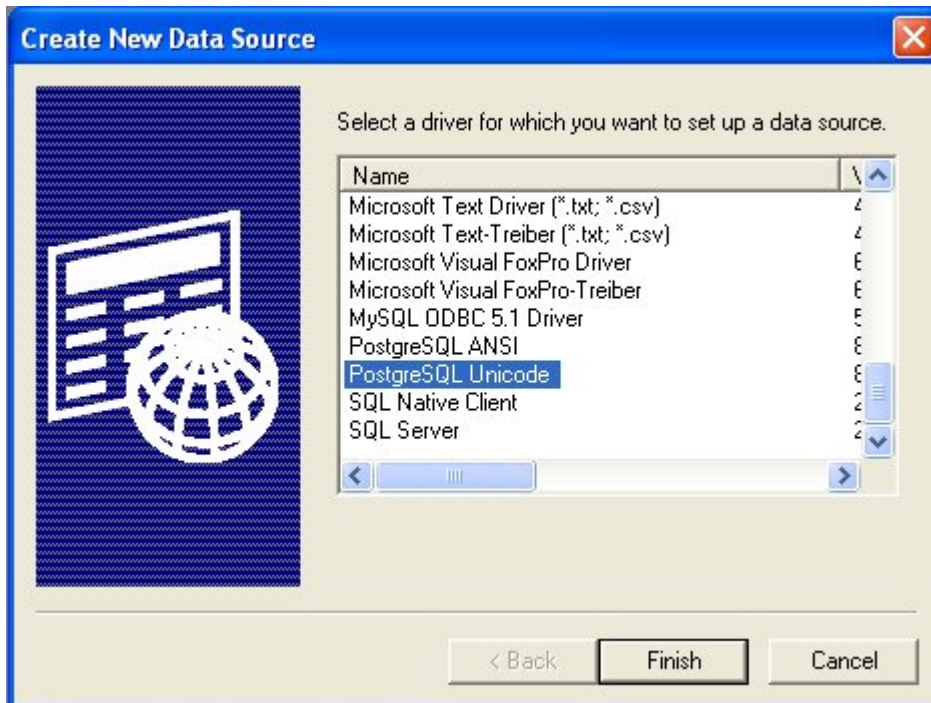


Fig 2. Creating a new ODBC Data Source



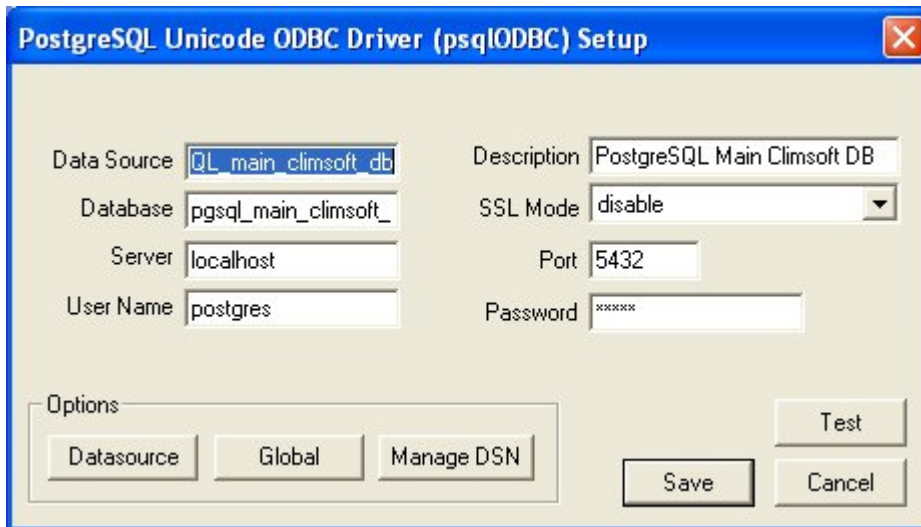
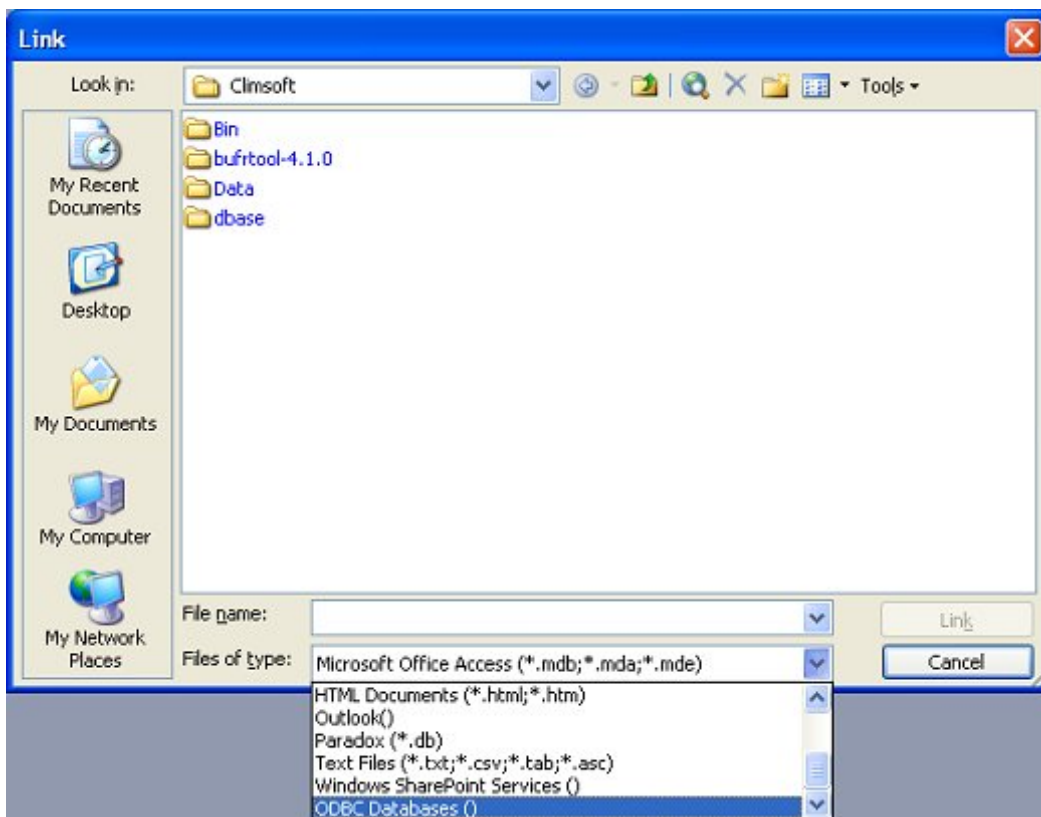


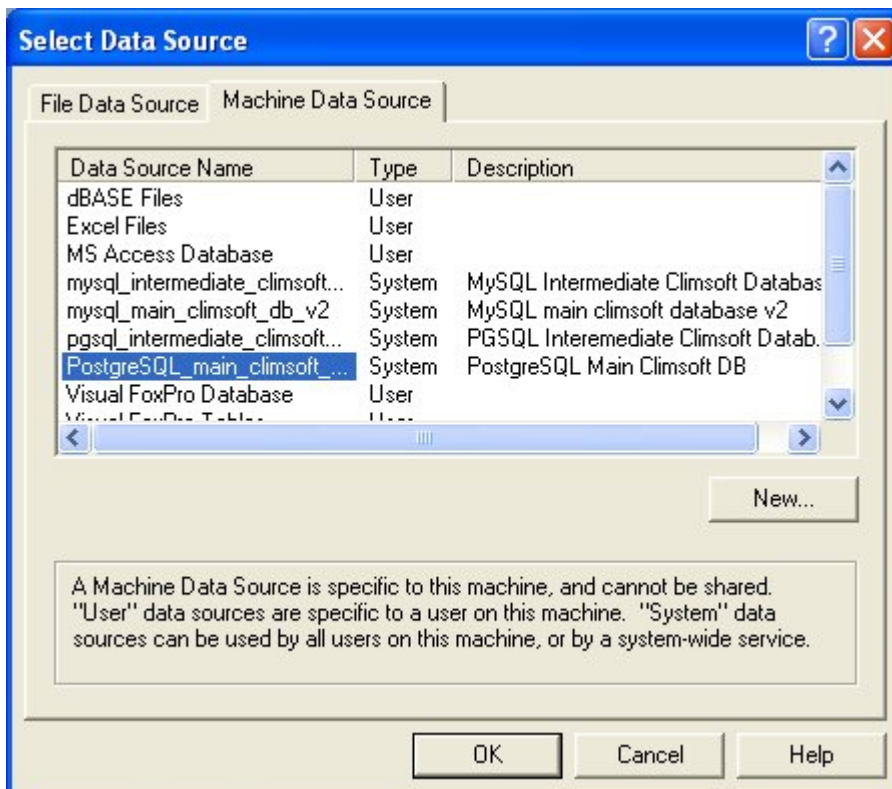
Fig 3. Configuring ODBC Connection to a PostgreSQL Database

- Linking PostgreSQL tables to MS Access database.** The final step is to link tables in the PostgreSQL main climsoft database to the MS Access database [pgsql\_main\_climsoft\_database\_v3.mdb] located in the folder [...\climsoft\dbase]. To do this you need to open the above database in MS Access. From the Access menu, click **File --> Get External Data --> Link Tables** to get the dialogue shown in Fig 4,

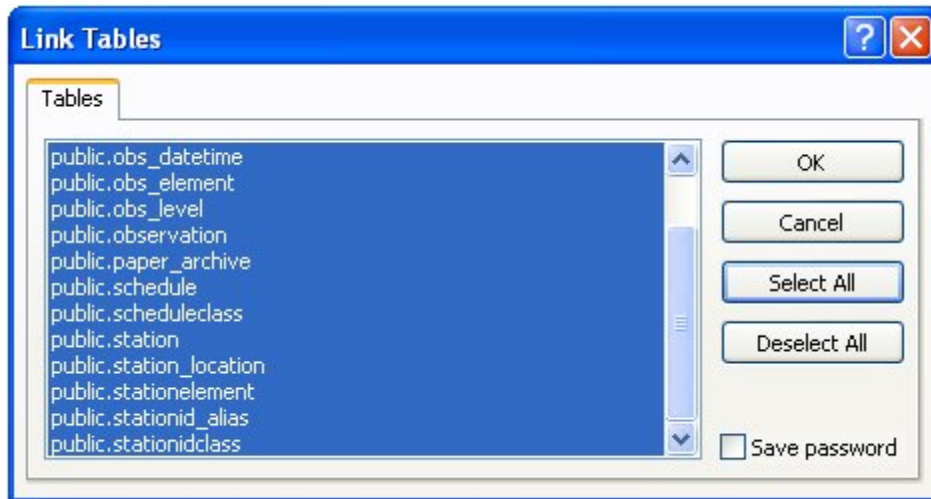


**Fig 4. Dialogue for linking tables via ODBC**

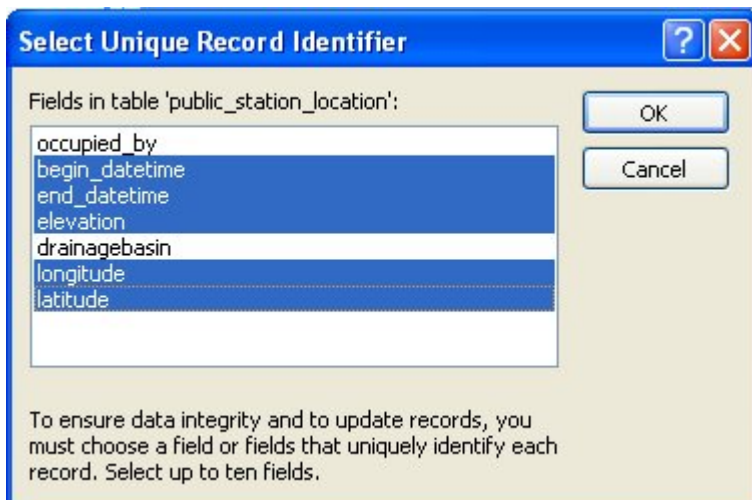
Click on the **File of type** drop-down list and select **ODBC Databases()** and then click on **Link**. This will bring up the dialogue for selecting the ODBC Data Source as shown in Fig 5. On **Machine Data Source** tab, select the ODBC data source you configured in the Control Panel e.g. **PostgreSQL\_main\_climsoft\_db** and then click **OK**. This will bring up another dialogue with a list of tables in the PostgreSQL main climsoft database as shown in Fig 6. Select all the tables and click **OK**. Please note that the table names have a prefix **[Public]**. After clicking OK, another dialogue may come up asking you to specify the fields which uniquely identify each record in the table **station\_location** as shown in Fig 7. Select the fields *begin\_datetime*, *end\_datetime*, *elevation*, *longitude* and *latitude*, and then click **OK**. The dialogue comes up of PostgreSQL fails to determine the unique record identifier from the Index.



**Fig 5. Selecting ODBC Data Source**



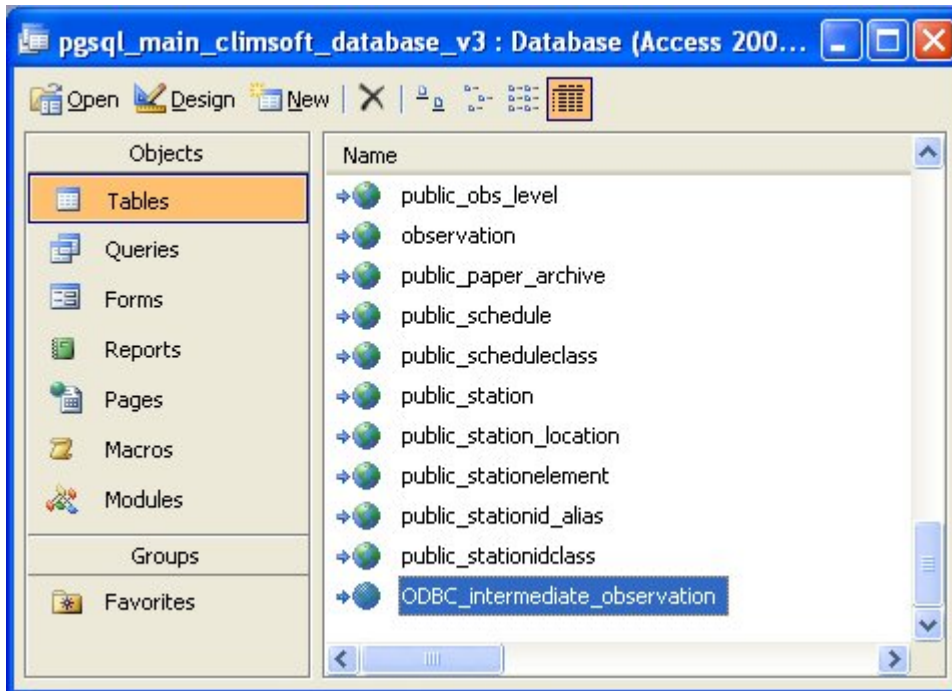
**Fig 6. Linking PostgreSQL tables in MS Access**



**Fig 7. Unique Record Identifier**

The selected tables will then be linked to the Access database as shown in Fig 8.

**NOTE:** It is essential to rename the linked tables by removing the prefix **[Public]** as shown for the table **[observation]** If you have configured an ODBC connection to the climsoft intermediate database in PostgreSQL, you are also required to link the observation table from that database and rename it to **ODBC\_intermediate\_observation**.



**Fig 8. Renaming linked PostgreSQL tables**

**NOTE:** To avoid problems with population listboxes for stations and observation elements when retrieving products from the Climsoft back-end main database, it is required to import the populated tables **lookup\_station** and **lookup\_element** from the Temp work file.