QICWARE Handbook

A guide to the QICWARE Runtime System

Revision 1.0.0

by Patrick Melo

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QICWARE is a runtime environment owned and developed by Qantel Technolgies Inc.

Table of Contents

1. Preface 1
    - Book Structure 1
    - Docbook 1
    - Software 1
    - Live Demonstrations 1
    - Downloads 2
2. Basic Administration 3
    - What is QICWARE 3
    - Installation on windows 3
    - Installation on Linux 3
    - vi basics 4
    - Starting QICWARE 5
    - The QCFIG environment variable 5
    - QICWARE configuration file 6
    - Stopping QICWARE 6
    - Addon software 6
    - Terminals 8
    - Printers 8
    - Logical discs 8
    - Tapes 9
    - QICNET 9
    - The QICWARE Shell 9
    - Other system management programs 9
    - Transferring files 9
    - QICBASIC 10
    - QICBASIC SHELL command 11
3. Advanced dministration 13
    - Configuring printers from the shell 13
    - Configuring printers using Printtool on rh7.x 13
    - Spool Filters 16
4. Beginning ODBC 18
    - Introduction 18
    - Application interoperability 18
    - The software components 20
    - Configuring SQL on RedHat (RedHat 7.1 Seawolf) 22
    - Installing ODBC on Microsoft Windows XP 27
    - Configuring ODBC on Windows XP 29
    - Installing ODBC on RedHat (RedHat 7.1 Seawolf) 38
    - Sample Applications 40
    - Microsoft Word mail merge 41
    - Microsoft Excel pie chart 61
5. Advanced ODBC 70
    - Data Manipulation 70
    - Troubleshooting tools 72
    - Data types 75
    - Scalar functions 80
    - Linkage information 81

Security 82
Disk Caching 83
6. LAMP 84
Introduction 84
What is LAMP? 84
Sample PHP application 84
What do I put on the web site? 85
Welcome page 86
Searching inventory 87
Customer information 89
Authentication 91
Driver manager 91
7. Data visualization 92
Introduction 92
8. Appendix 93
QICLOOK demo database 93

List of Examples

1.1. Download script 2
1.2. Installation command 2
2.1. Preparing the system to install QICWARE 3
2.2. Changes in the .bash_profile 3
2.3. Installing the QICWARE software on Linux 4
2.4. Starting QICWARE with qcfig 5
2.5. How not to start the QICWARE service 5
2.6. Creating the QICWARE configuration file 6
2.7. Stopping QICWARE with qconsole 6
2.8. Installing addon software 6
2.9. vi substitution command 7
2.10. Sample QICWARE configuration file 7
2.11. Accessing printers directly 8
2.12. Accessing printers through OS spooler 8
2.13. Creating a sequential file 9
2.14. Formatting sequential files using dd 10
2.15. Sample QICBASIC program 10
2.16. Sample SHELL code 11
3.1. Adding a printer 13
3.2. Removing a printer 13
3.3. Printer filter 16
3.4. Changing permissions 16
3.5. Printcap entry 17
3.6. Restarting lpd 17
3.7. Testing new filter 17
3.8. Printer Config 17
4.1. QICWARE Config file 24
4.2. vi substitution command 24
4.3. Config file changes 24
4.4. Rename the data dictionary 25
4.5. Config changes 26
4.6. Reinstall QICLOOK 26
4.7. Installing ODBC on linux 38
4.8. Config file 40
4.9. Config file 40
5.1. Straight time 70
5.2. Employee hours 70
5.3. Employee name 70
5.4. Personell 71
5.5. Date range 71
5.6. Complete query 71
5.7. Upper and lower on results 71
5.8. Lower on criteria 72
5.9. odbcisql on Linux 72
5.10. Insert record 73
5.11. Update record 74
5.12. Delete record 74

5.13. Like predicate 75
5.14. Underscore character 75
5.15. Selecting various data types 76
5.16. Changing a date field 78
5.17. Inserting a record with a zero-length index field 79
5.18. Inserting a record with a zero-length non-index field 79
5.19. Scalar statements 80
5.20. Joined tables 81
5.21. Unindexed reads 82
5.22. UsageMode 82
5.23. AllowFile 82
5.24. Creating the allow file 83
5.25. Creating the SQL user 83
5.26. AllowFile entry 83
6.1. Adding a printer 85
6.2. Selecting descriptions 88
6.3. Selecting a customer address 90
6.4. Selecting a list of orders 90
6.5. Adding a printer 91
8.1. QICLOOK demo database dictionary (textual) 93
8.2. Server oadrd.ini changes 96
8.3. OS odbc.ini changes 97
8.4. Client odbc.ini changes 97
8.5. Client oadrd.ini changes 97
8.6. unixODBC files 98
8.7. Linking the client oadrd.ini to the web folder 98
8.8. Demo site file list 98
8.9. Adding data source to coldfusion 98
8.10. Coldfusion database entry 101
8.11. Sample string scalar statements 102
8.12. Sample date scalar statements 105
8.13. Sample numeric scalar statements 106
8.14. Sample system scalar statements 107

Chapter 1. Preface

Book Structure

The text of the book is divided into several parts. Chapters 2 and 3 (incomplete) describe how to administer a QICWARE system. Chapters 4 covers the configuration of ODBC and some of its basic uses. Chapter 5 delves into more advanced aspects of ODBC. Chapter 6 part discusses the details of a working ODBC application using LAMP. Part 7 covers the use of Java and JDBC to create flashy graphics. For more information on any of the topics mentioned in this document, please refer to the references section of the appendix at the end of the book. This document is not intended to replace any of those documents, many of which are available online.

If you are reading this book in HTML format, a PDF [../pdf/book.pdf] version is also available.

In this document I'm not going to go through each QICWARE command and detail it feature by feature. The QICWARE reference guide already does a very nice job of this. I'm also not going to outline the changes that the environment has gone through since its inception. This too has already been documented thoroughly in the software announcements and other online documentation. Instead, I'm going to try to describe some things that I do to try and keep our QICWARE systems in-house running smoothly and offer some interesting time saving tricks to make your job as a system administrator easier. I'm going to try and describe what I've done on the systems I've been responsible for and hopefully this will give you some idea of how things tie together. In the latter chapters I will cover some examples of ODBC. These examples are by no means comprehensive. If you use the code, please share the changes so I can pass them on. I am particularly interested in the SQL statements as they can motivate future sections on this text. If you find some of the information useful please let me know, I appreciate any feedback I can get. This is a work in progress and I would be more than happy to expand on areas when I have the time. Your own experiences are very valuable and if you find that you have information that would be useful to someone else please let me know so I can add it in.

Also, it's important to realize that the development process is driven to a great degree by user feedback. Your emails are one of the strongest motivators for enhancements and bug fixes to the software itself. Every time I do a Qantel class I always mention the importance of feedback. There's always the promise of a letter or two from the class but I have yet to see one related to anything discussed in the classes. Every single support email gets read. The ones that are most clear and articulate get the earliest responses. If you like something in the product then that's a great reason to send an email. The more detailed, the better.

Docbook

This book is written completely in DocBook. It's worthwhile to mention this because it highlights a technology relevant to both QICWARE and the computer industry in general: xml. The fact that this book is written in xml makes it very easy to distribute in a variety of formats. When the document needs to be changed, only the DocBook source needs to be modified. The other formats of the document are generated from the single source. Each version (PDF, HTML, etc) is generated using an XSL. I use stock, off-the-shelf XSL files to transform the book into one of the other formats. This allows me to focus my efforts on writing the book rather than the layout and presentation. Another xml document type, other than DocBook, could have been used. One could have been invented just for use by this book, but then I would have had to develop my own XSL.

Software

This book was written using several pieces of software. XMLMind XML Editor Standard Edition V2.5p1 and Microsoft FrontPage 2003. TeraTerm was used to telnet to the various machines. Venkman is running Windows XP and sprout is running Red Hat Linux release 9 (Shrike).

Live Demonstrations

The examples covered in this book are available with the documentation online at http://www.patrick.fremont.ca.us/qantel/qicware/. Feel free to experience them for yourself, first hand.

Demo LAMP Application [section5/dem] (uses QMRP 731-F demo database)

Simple PHP Web page [section5/example/example1.php] (uses QICLOOK Demo database)

Downloads

You can download the accompanying software from the web site as well. Here is a list of available downloads .

qinfo tool [./download/qinfo/qinfo.exe] This handy little program reports installed QICWARE components.

tar ball [http://www.patrick.fremont.ca.us/qantel/qicware/download/dem.tar.Z] of Demo Lamp Application

Administration script [./qw/qw] (ChangeLog [./qw/ChangeLog]) Administration tasks are made easier with this administration script. Once this script is installed it can be updated by invoking the script with the updatescript option. This will cause the script to reload itself from this web site. To install the script, you must first obtain a copy of it. You can obtain a copy of the script by downloading it using a web browser or by coping and pasting the following three lines (replace the paragraph markers with new lines) into a text file, giving it execute permission and running it.

Example 1.1. Download script

```
#!/bin/sh
{ echo "GET /qantel/qicware/qw/qw HTTP/1.1" ; echo "Host: www.patrick.fremont.ca
.us" ; echo ; sleep 3 ; } | /usr/bin/telnet www.patrick.fremont.ca.us 80  2>/dev
/null | tr -d '\15\32' | { while [ "`read r; echo $r`" != "" ]; do true ; done ;
 cat>qw ; }
exit
```

Once the script has been downloaded, move it into the QICWARE administrator's home directory, make qwadmin the owner, give the owner read and execute permission, then execute the script using the full path with the installscript option e.g.

Example 1.2. Installation command

```
$ /home/qicware/qw installscript
```

Chapter 2. Basic Administration

What is QICWARE

The QICWARE environment is the software that allows QICBASIC programs operate on open systems platforms.

Installation on windows

QICWARE for windows has been nicely packaged into a single executable. To install QICWARE one need only double click on the executable and answer a series of brief questions.

Installation on Linux

On Linux the installation is done by uncompressing/untar-ing the provided files. The base software is broken down into four tar files qicrt.tar.Z rpg.tar.Z qcl.tar.Z and qic.tar.Z.

It is very important that you issue QICWARE administration commands as the QICWARE administrator and not as root. Issuing commands as root can actually prevent QICWARE from running and can render your entire operating system inoperable. It's interesting to note that when I did support and found that users were logging into XWindows as root, that I could expect to get a call from them in the future complaining that they were having system problems. Logging into XWindows as root is a sure sign that users are too comfortable using the root login. Having said that, some commands must be executed as root. Below is an example of the steps that must be executed as root to prepare the system for QICWARE.

Example 2.1. Preparing the system to install QICWARE

```
Last login: Fri Aug  9 09:27:51 2002 from venkman.qantel.com
[patrick@sprout patrick]$ su -
Password:
[root@sprout root]# groupadd qicware
[root@sprout root]# useradd -d /home/qicware -g qicware qwadmin
[root@sprout root]# passwd qwadmin
Changing password for user qwadmin
New UNIX password:
Retype new UNIX password:
passwd: all authentication tokens updated successfully
[root@sprout root]# chown qwadmin:qicware /dev/ttyS0
[root@sprout root]# chmod g+rw /dev/ttyS0
[root@sprout root]# mount /dev/cdrom /mnt
mount: block device /dev/cdrom is write-protected, mounting read-only
```

We will need to configure the environment for the QICWARE administrator (qwadmin). To do this we will need to edit the .bash_profile file. The .bash_profile file needs to be edited. We will need to log out and back in again once we've made the changes so that they affect our current session, then we can install and run the software.

Example 2.2. Changes in the .bash_profile

```
[qwadmin@sprout qicware]$ vi .bash_profile
```

```
 # .bash_profile

 # Get the aliases and functions
 if [ -f ~/.bashrc ]; then
       . ~/.bashrc
 fi

 # User specific environment and startup programs

 PATH=$PATH:$HOME/bin
 BASH_ENV=$HOME/.bashrc
+QCFIG=$HOME/etc/m01.cfig
+TERM=vt100

+export BASH_ENV PATH QCFIG TERM
 unset USERNAME

+chgrp qicware ‘tty‘
+chmod g+rw ‘tty‘
```

To install the software, we uncompress the archives and run qsetperms to set the correct permissions for files in the bin directory.

Example 2.3. Installing the QICWARE software on Linux

```
Last login: Thu Aug  8 18:17:35 2002 from venkman.qantel.com
[qwadmin@sprout qicware]$ uncompress -c /mnt/qicware/rh_linux/qicrt.tar.Z | tar xf -
[qwadmin@sprout qicware]$ uncompress -c /mnt/qicware/rh_linux/rpg.tar.Z | tar xf -
[qwadmin@sprout qicware]$ uncompress -c /mnt/qicware/rh_linux/qiclook.tar.Z | tar xf -
[qwadmin@sprout qicware]$ uncompress -c /mnt/qicware/rh_linux/qicode.tar.Z | tar xf -
[qwadmin@sprout qicware]$ cd bin
[qwadmin@sprout bin]$ su
Password:
[root@sprout bin]# ./qsetperms
[root@sprout bin]# exit
[qwadmin@sprout bin]$ exit
Last login: Fri Aug  9 09:34:45 2002 from venkman.qantel.com
```

vi basics

No matter how many text editing packaged you have installed on your QICWARE machine, sooner or later, you will almost certainly be confronted with an occasion to use vi. vi is a standard component of *nix operating system these days and it is worthwhile to take a couple of minutes to learn some of the basic vi commands. There are plenty of online resources for those who decide they want to learn more about this powerful editor.

To open a file simply pass vi the file name (e.g. "vi $QCFIG").

vi has two modes, insert mode and command mode. When you first start vi you are placed in command mode. You can always go back to command mode from insert mode by hitting the ESC key. Any keystrokes you type in command

mode will be interpreted as commands. To exit vi, type a colon followed by a q. If you have made any changes you will need to decide whether you would like to save your changes or discard them. To save your changes and quit, type a colon followed by a w then a q. To exit vi and discard your changes, type a colon followed by a q and a bang (exclamation mark).

You can move your cursor around the document using the h,j,k,l keys (or the arrow keys on some terminals).

You can enter insert mode by hitting the i key. Once in insert mode, any keys you type will be inserted into the document.

To remove a character from a document, enter command modem, position your cursor on top of the character and press the x key.

Starting QICWARE

Starting QICWARE is a very simple task. On UNIX you simply call qcfig and pass it the QICWARE configuration file.

Example 2.4. Starting QICWARE with qcfig

```
[qwadmin@sprout qicware]$ qcfig $QCFIG

                  QANTEL QICWARE(TM)
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   QICWARE Release 06.60 (LINUX)

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   QIC-PC II (TM) is a trademark of Qantel Technologies, Inc.

   QICNET (TM) is a trademark of Qantel Technologies, Inc.

Control segment initialized
[qwadmin@sprout qicware]$
```

On Windows, QICWARE should be started as a service. Starting QICWARE from the command line can cause problems since permissions are different for the logged in user than for the service. Below is an example of how not to start the QICWARE service on Windows.

Example 2.5. How not to start the QICWARE service

```
C:\> SET PATH=%PATH%;"C:\Program Files\Qantel\Qicware\Program\bin"
C:\> QCFIG="C:\Program Files\Qantel\Qicware\Program\etc\m01.cfig"
```

```
C:\> qcfig %QCFIG%
```

The QCFIG environment variable

In the bourne shell, a user can set environment variables. Some variables are used by programs started from that shell. Others are used to save the user keystrokes or possibly save them the work of remembering a long string of characters. For example, if I wanted to store a long directory name such as "/home/qicware/etc", then I would type "a=/home/qicware/etc" at the shell prompt. Then when I wanted to cd to that directory I could call the variable's value by prefacing the variable name with a dollar sign: "cd $a". If I wanted to print out the variable's value, then I could pass the dereferenced variable to the echo command: "echo $a", which would of course, cause a line to be printed to the screen that read "/home/qicware/etc".

When we configure the environment for the QICWARE administrator, a variable named QCFIG is placed in this user's shell startup file (e.g .bash_profile under Linux). If the QICWARE Administrator were to type "echo $QCFIG", they might see "/home/qicware/etc/m01.cfig". This variable can come in very handy. If we wanted to edit the QICWARE configuration file, we could 'cd' to the directory where it resided (if we could remember it). Then we could call 'vi' with the file's name. An easier way would be to type 'vi $QCFIG' and use the environment variable instead.

QICWARE configuration file

Before we start QICWARE for the first time we will need to create a QICWARE configuration file and change it to suit our needs. To make the m01.cfig our own the first thing we do is pull the comments out of the top. Then we enter our passwords, un-comment out the features I want to use, identify the QID, and point at the QICWARE logical DISCs. To do mass substitutions use the following command

Example 2.6. Creating the QICWARE configuration file

```
[qwadmin@sprout qicware]$ cp $QCFIG.rel $QCFIG
[qwadmin@sprout qicware]$ vi $QCFIG
```

Stopping QICWARE

Stopping QICWARE is just as easy as starting it. On UNIX you simply call qconsole and pass it the option to stop qicware (-c) and the QICWARE configuration file.

Example 2.7. Stopping QICWARE with qconsole

```
[qwadmin@sprout qicware]$ qconsole -c $QCFIG
Control process 20043 has been terminated.
[qwadmin@sprout qicware]$
```

Addon software

At this point we can also install any of the addon software. QICWARE also comes with 'addon' software. On windows the software is installed by selecting the appropriate checkbox during the installation of QICWARE. On Linux the files provided must be uncompressed/untar-ed.

Example 2.8. Installing addon software

```
[qwadmin@desi qicware]$ mkdir addons
[qwadmin@desi qicware]$ cd addons
[qwadmin@desi preview]$ tar xf /mnt/qicware/addons/fls.tar
[qwadmin@desi preview]$ tar xf /mnt/qicware/addons/qed.tar
[qwadmin@desi preview]$ tar xf /mnt/qicware/addons/qtx.tar
[qwadmin@desi preview]$ tar xf /mnt/qicware/addons/sed.tar
```

Example 2.9. vi substitution command

```
:%s/usr\/qicware/home\/qicware/g
```

The log file contains mappings of operating system resources to QICWARE names. The QICWARE TERMINAL device T00, for example, is mapped to the Linux device /dev/pts/1. Whenever a user logs in to QICWARE from /dev/pts/1 they obtain the QICWARE device T00.

Example 2.10. Sample QICWARE configuration file

```
LOGFILE       = /tmp/qqlog
IDENTIFY      = /dev/ttyS0, 2
DEVCAP       = /home/qicware/etc/qdevcaps
SYSTEM       = 5, 100, 100, 0, 50, 2
MAILD        = 1, "%b [%h:%m:%s] %u has mail"

QICRTPW       = 2c1df51b544e65c0f57d99f9057e1eca
QICODEPW      = 74bafc74939e3ade4afe7723dd0798ca

PARTITION     = 10, 1

DISC         = DK1, 21, SYS, /home/qicware/sys/sys.fs
DISC         = DK2, 21, RPG, /home/qicware/rpg/rpg.fs
DISC         = DK3, 21, QCL, /home/qicware/qcl/qcl.fs
DISC         = DK4, 21, QIC, /home/qicware/qic/qic.fs

TERMINAL      = T00, 16, /dev/pts/1, qvt, vt100, P00, 0

CLOCK        = CL1, 61, none, qclk, MDY, 130
```

	Clock	Terminal	Fax	IPC	Printer	QPCI	Serial	Spool	Tape
0000			VSI FAX 2.x	Pseudo device					
0001								Shareable	
0002									
0004		Buffered			OS spool				
0008		Non-interrupt							
0010	Start on open	Start on open	Start on open		Start on open	Start on open	Start on open		Start on open
0020	Stop on close	Stop on close	Stop on close		Stop on close	Stop on close	Stop on close		Stop on close
0040		Delay for F2/F3							
0080		Multi Screen							
0100	Driver process	Driver process	Driver process		Driver process	Driver process	Driver process		Driver process
0200					Parallel port				
1000			Fax FX		baud 50				
2000			VSI FAX 3.x		baud 75				
3000					baud 110				
4000					baud 134.5				
5000					baud 150				
6000					baud 200				
7000					baud 300				
8000					baud 600				
9000					baud 1200				
A000					baud 1800				
B000					baud 2400				
C000					baud 4800				
D000					baud 9600				
E000					baud 19200				
F000					baud 38400				

Terminals

When configuring a terminal its a good to have a clear idea of what type of terminal we're configuring. Here is a list of the types of terminals you might run the QICWARE shell from.

Terminal Devices are part of the system such as the console or devices that are physically connected to the machine through a serial cable for example.

Pseudo Terminal Devices are created to accommodate network connections to the machine.

QSOCK Devices...

Printers

Printers may be connected directly to a serial port, directly to a parallel port, or on the network. There are a variety of ways in which printers can be configured in the operating system, they can be accessed through a device in /dev e.g.

Example 2.11. Accessing printers directly

```
cat /dev/lp
```

Printers may be accessed through the OS spooler e.g.

Example 2.12. Accessing printers through OS spooler

```
lp -d
```

Printers may be accessed using the Qantel Print Connector.

QICWARE allows a combination of these possible configurations. In addition QICWARE also allows the administrator to choose how the server that communicates with the printer is started and stopped.

Logical discs

To add support for Qantel file types, such as keyed files, QICWARE files are stored in QICWARE logical discs.

Tapes

One of the most useful features of the tape driver is that it allows the administrator to specify any file as the tape drive. The file may be a device as in /dev/rct0 or a regular file on the file system as in /home/qicware/xtape/MTX.xtape. The reason this feature is so useful is that it allows us to move files in and out of our QICWARE system (and possibly onto another system) without concern for the structure of the QICWARE logical disk on the file system.

QICNET

QICNET allows QICWARE machines to share resources across a network.

The QICWARE Shell

In UNIX you can specify a series of locations for the shell to look when a program is specified. The variable that holds these locations is called PATH. When you type a command and do not specify an absolute path the UNIX shell will look in each directories mentioned in PATH to try and find the program to execute. This is sometimes referred to as file acquisition in some programming languages. QICWARE extends this concept to apply to files as well. Unlike UNIX, you can specify a series of locations to look for a file when it is being opened. These locations are contained in the DAB list. QICWARE will look in each directory in the DAB to find the file to open.

Other system management programs

The programs qcfig and qconsole are but two tools used by QICWARE administrators. Refer to the QICWARE Reference manual (http://dealers.qantel.com/qicware/docs/qwrm/) for information on other system management programs.

Transferring files

The easiest, most reliable way to transfer files from a Qantel system to a QICWARE system is by using *XTAPE.

There are so many ways to transfer files from a QICWARE system that there isn't enough time to cover them all. The easiest way to transfer files from a QICWARE system is to use *QICTRAN.

For creative admins there are a variety of ways to integrate QICWARE with the rest of the OS. It would be possible for example to create a special OS spool device on the system that converts the print job to html.

This next example create s a sequential file using *CREATE. The example following it takes the sequential file and adds windows carriage return/line feeds at the end of each line making it easier to view in programs like notepad.

Example 2.13. Creating a sequential file

```
FILE CREATE UTILITY (*CREATE04.15103189)
```

```
 COPYRIGHT (C) QANTEL BUSINESS SYSTEMS, INC. 1983, 1989.

 FILE NAME: OUT
 DIRECTORY: SYS
 FILE TYPE - KEYED, SEQUENTIAL, OR CONTIGUOUS (K/S/C): S
 RECORD SIZE: 151
 SECURITY CODE:
 'OUT' ON 'SYS' IS CREATED

 FILE NAME:
```

Example 2.14. Formatting sequential files using dd

```
dd if=qout of=qout.txt conv=unblock cbs=151
unix2dos $2
```

QICBASIC

The QICBASIC language is very easy to learn. In this brief section I am going to discuss how to write, compile and run a QICBASIC program.

Example 2.15. Sample QICBASIC program

```
P06/T06
READY:: R *EDIT
 SOURCE FILE EDITOR (*EDIT04.10070592)
 COPYRIGHT (C) DECISION DATA INC. 1983, 1992.
| LIN

LINE SHORT
 NO OPEN FILE
| CR =HELLO,SYS
 '=HELLO' ON 'SYS' IS OPEN
| 10 !S =HELLO,SYS
| 20 !O ?HELLO,SYS
| 30 !L TXX,E
| 40 !R *EDITX
| 100 PRINT(0) "HELLO WORLD"
| 200 INPUT(0) ""
| 999999 RUN "*MONITOR"
| /*QIC
QICWARE (TM) QICBASIC (R) COMPILER (*QIC02.30042602)
Copyright (C) Qantel Technologies, Inc. 1990, 2001.

All or portions of this software are the unpublished,
copyrighted, trade secret, confidential and proprietary property
of Qantel Technologies, Inc. and are furnished under a license
and may be used, copied or disclosed only in accordance
```

```
with the terms of such license and with the inclusion
of this notice. All rights reserved.

!S =HELLO,SYS
!O ?HELLO,SYS
!L TXX,E
!R *EDITX
LISTING FILE NOT READY
qicc -u -X006 -F /home/qicware/etc/m01.cfig -d sys Thello -o
/home/qicware/qic/qic/qicp06.qs -R0 Vhello sys -l
/home/qicware/qic/qic/qcpp06 -f0
qas -e /home/qicware/qic/qic/qicp06.qs -o /home/qicware/qic/qic/YFVhello
-l /home/qicware/qic/qic/qcpp06
qld /home/qicware/qic/qic/YFVhello -o /home/qicware/qic/qic/YFVhello -l
/home/qicware/qic/qic/qcpp06


SOURCE: =HELLO , SYS created: Aug 8, 2002 revised: Aug 8, 2002
OBJECT: ?HELLO , SYS
*COMPILED (2.30.0): Aug 8, 2002 time: 18:24:07 version: 0

no errors.
rm -f /home/qicware/qic/qic/qicp06.qs
'=HELLO' ON 'SYS' IS OPEN
| R ?HELLO                                          HELLO WORLD
P06/T06
READY::
```

QICBASIC SHELL command

One of the most powerful commands available to QICBASIC programmers is the SHELL command. This single command allows QICBASIC programs access to a whole world of tools available on the host OS. Here is an example of a QICBASIC program that calls grep to parse the QICWARE configuration file.

Example 2.16. Sample SHELL code

```
   10| !S =WHO,SYS
   20| !O ?WHO,SYS
   30| !L TXX,E
   40| !R *EDITX
   50| LENGTH 84 & LOCAL LINE$
   60| FLEFMT: FORMAT LINE$
   70| CONFMT: FORMAT (CS); (ET); LINE$
   90| SET CON=0,WHO=1
  100| CREATE "WHO",84,D,DISC="SYS"
  200| SHELL "/bin/sh -c '/bin/grep P00 /home/qicware/etc/m01.cfig > "+_
  210|  "/home/qicware/sys/qsys/qwho'",WAIT="Y"
  300| OPEN (WHO) "WHO",DISC="SYS"
  400| READ (WHO,FLEFMT)
  500| CLOSE(WHO)
  600| ERASE "WHO",DISC="SYS"
```

```
  700| PRINT (CON,CONFMT)
  800| INPUT (CON) ""
99999| RUN "*MONITOR"
```

Chapter 3. Advanced dministration

Configuring printers from the shell

To add the printer, use the following command.

Example 3.1. Adding a printer

```
/usr/sbin/lpadmin -plazy -vlpd://lazy.qantel.com/ -E -m postscript.ppd.gz
```

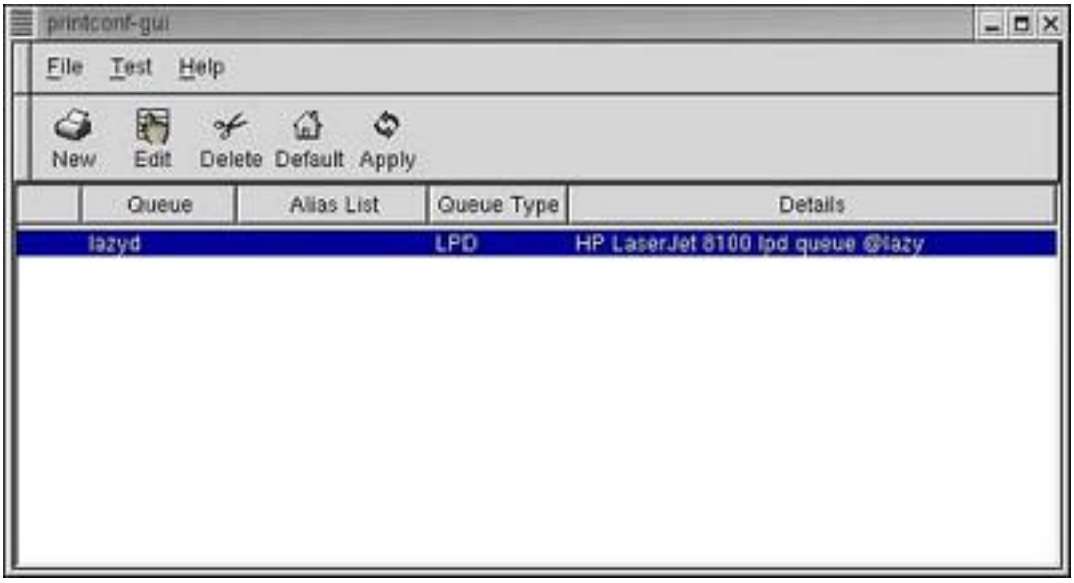
To remove the printer, use the following command.

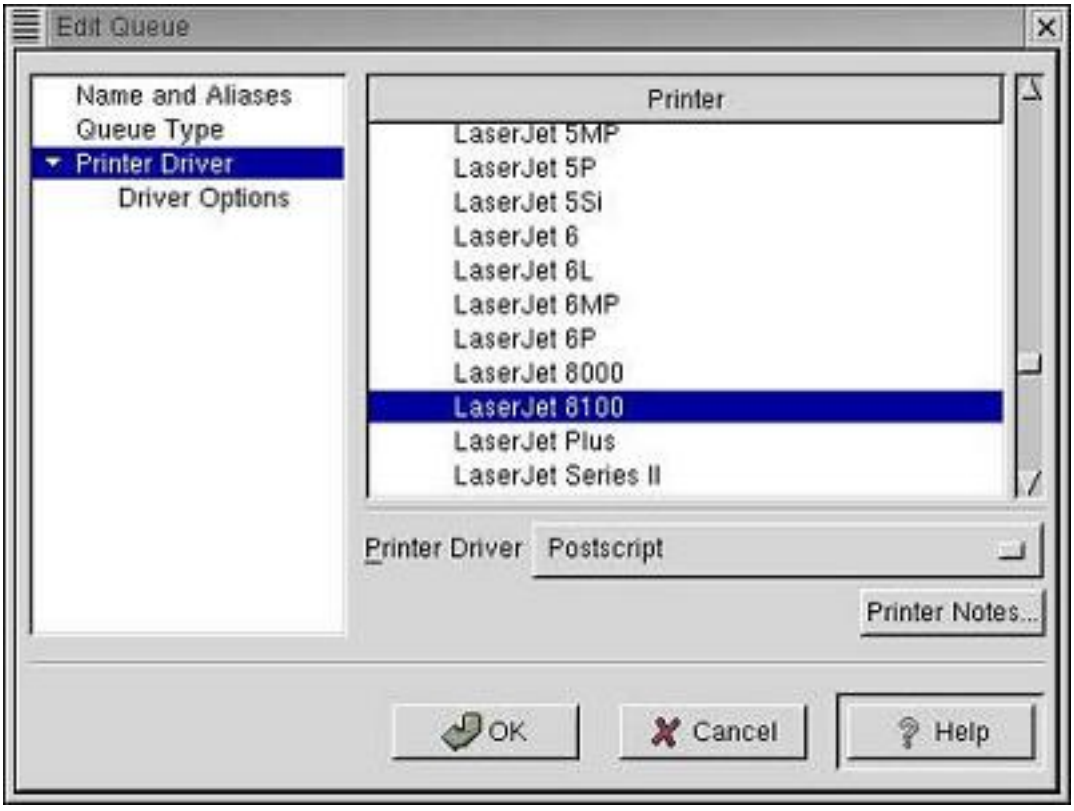
Example 3.2. Removing a printer

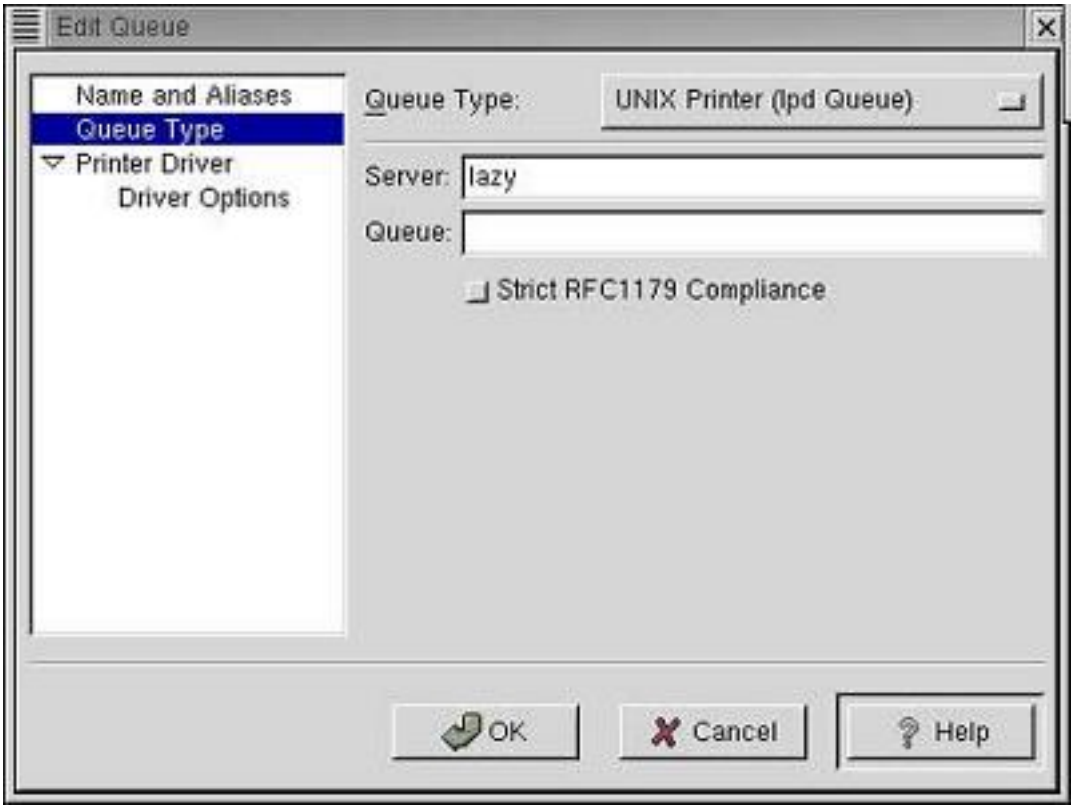
```
/usr/sbin/lpadmin -x lazy
```

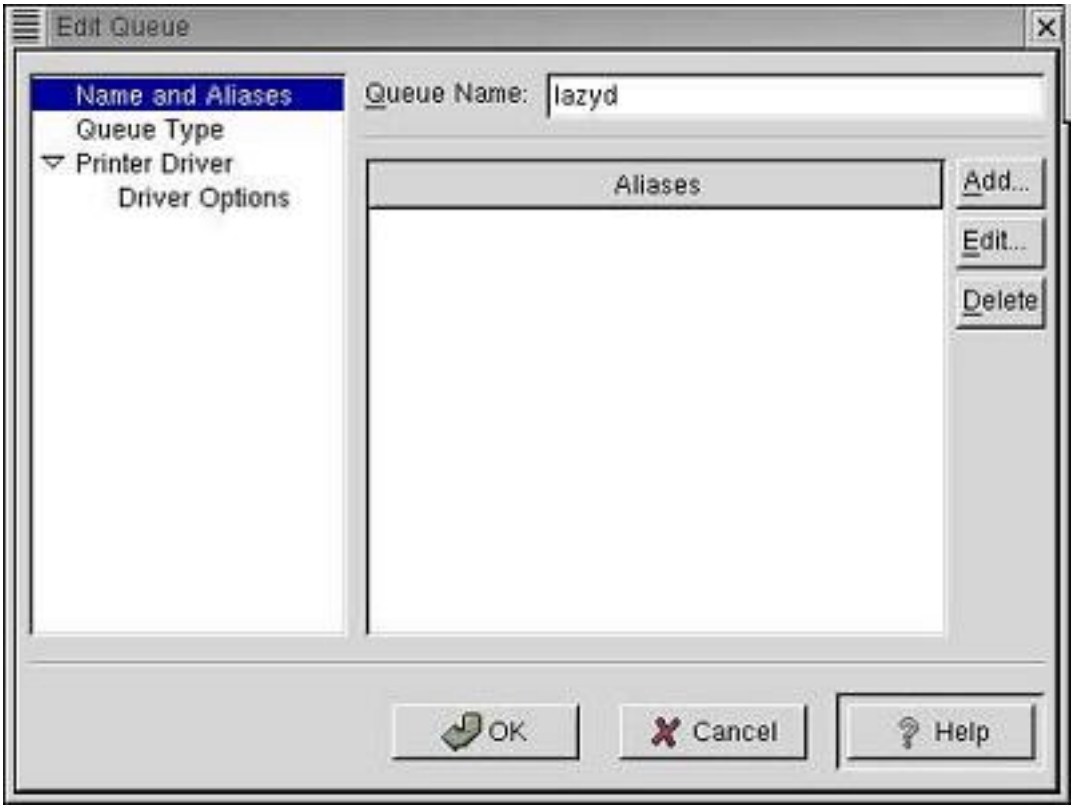
Configuring printers using Printtool on rh7.x

To start print tool, open the run dialog and type ’printtool’. You will be prompted for the root password and then you will see a screen that looks something like this. The first dialog actually lists the printer which the next set of dialogs allow us to create. To create a new printer we click on the new button and respond to a series of questions about the printer. Don’t forget to hit the hit the apply button at the end to make the changes take effect.




Edit Queue
Name and Aliases
Queue Type
Printer Driver
Driver Options
Printer
LaserJet 5MP
LaserJet 5P
LaserJet 5Si
LaserJet 6
LaserJet 6L
LaserJet 6MP
LaserJet 6P
LaserJet 8000
LaserJet 8100
LaserJet Plus
LaserJet Series II
Printer Driver
Postscript
Printer Notes...
OK
Cancel
Help


Edit Queue
Name and Aliases
Queue Type
Printer Driver
Driver Options
Queue Type:
UNIX Printer (lpd Queue)
Server:
lazy
Queue:
Strict RFC1179 Compliance
OK
Cancel
Help



Spool Filters

Once you've created the printer, it is possible to configure a filter so that the the print job. This filter can provide a variety of services such as replacing text in our print job.

I called mine hpfilter and place it in the directory created for me by printtool in the previous steps. On my machine this directory is /var/spool/lpd/lazyd.

Example 3.3. Printer filter

```
#!/bin/sh
# Filter for HP printers (echo -ne" assumes that /bin/sh is really bash)
#
echo -ne \\033\&k2G # Termination: convert LF to CRLF
echo -ne \\033\&l0O # Orientation: portrait
echo -ne \\033\(10u # Symbol: PC-8
echo -ne \\033\(s0p16.67h8.00v0s0b0T # fixed 17cpi 8pt solid medium lineprinter
echo -ne \\033\&l1S # Long edge binding
cat
echo -ne \\f      # form feed
```

I need to grant execute permission to the filter so that the spooling subsystem can run it.

Example 3.4. Changing permissions

```
# chown lp.lp hpfilter
# chmod o=rx,g=rx hpfilter
```

We also need to change the /etc/printcap so that it uses your new filter.

Example 3.5. Printcap entry

```
:if=/var/spool/lpd/lazyd/hpfilter:
```

We need to to restart the lpd for the changes to take effect.

Example 3.6. Restarting lpd

```
# service lpd restart
Stopping lpd:                                  [  OK  ]
Starting lpd:                                  [  OK  ]
#
```

Finally you can test your new filter.

Example 3.7. Testing new filter

```
$ lp -d lazyd $QCFIG
```

To add the printer to QICWARE I just add the following line to the m01.cfig and restart QICWARE.

Example 3.8. Printer Config

```
PRINTER      = LP1, 32, lazyd, qlp, q0000,N„15C
```

Chapter 4. Beginning ODBC

Introduction

This chapter is aimed both at people who are already using the Qantel QICWARE ODBC driver and those who have not yet had an opportunity to experience the software firsthand. We're going to go through a lot of information very quickly. For the most part the information you're about to read is an overview. I'll try to point out anything critical. We'll walk through the installation process and configure some working environments so that you can become familiar with the process yourself. We'll also go through a little discussion on the use of SQL so that you can have an idea of how to design queries to fit your needs. I hope you continue to the Advanced section even if you don't feel completely comfortable with the product. The reading will still be valuable because it will get you thinking about other areas where the product might be useful.

You may already have an application in mind that you would like to use with the Qantel QICWARE ODBC Driver. If not, hopefully the demonstrations we will be doing will be done with software that you have available to you. We're going to be doing two demonstrations using Microsoft products. The first uses Microsoft Word to create a mailing list using information from the QICWARE database. The second uses Microsoft Excel to design graphs using real-time information from the QICWARE database.

The examples demonstrate just a few of the uses of the Qantel QICWARE ODBC Driver. The uses of the QICWARE ODBC Driver is by no means limited to these two applications. As we'll see in the advanced section, it is limited to neither Microsoft Office nor the Microsoft Windows operating system for that matter. Covering all the possible applications of the Qantel QICWARE ODBC driver would be impossible. We have chosen these two because of the likeliness that you already have the software installed on your machine.

The tools we will be using really can make your life easier, but only if you use them. Don't be afraid to contact support if you have questions regarding the product. They will be more than happy to assist you, even if it means directing you to a resource that has nothing to do with the product itself (like a book on SQL).

Before we get into some examples, it might be worthwhile to understand how this technology fits with other technologies.

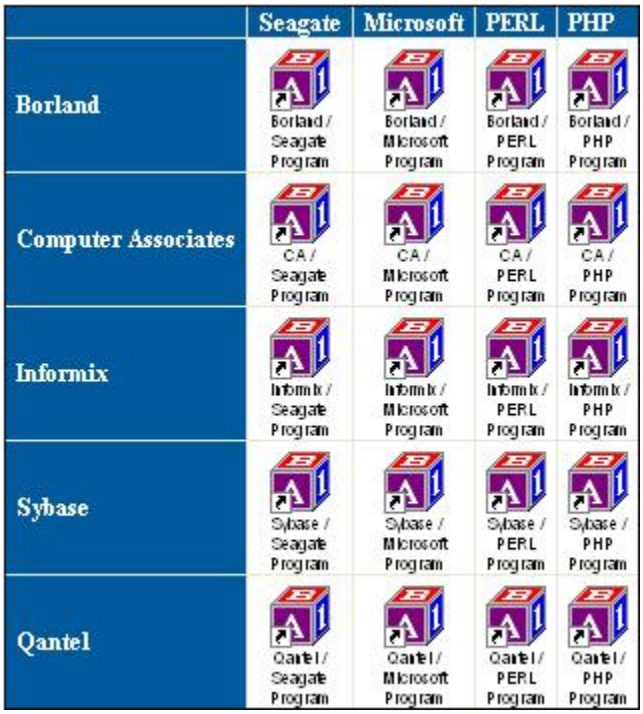
Application interoperability

Wouldn't it be nice to be able to open Microsoft Word and retrieve data without any concern for where the data was coming from. You most likely already keep customer information in your QICWARE database, so why not put it to work in other applications like Microsoft Excel. Imagine the usefulness of a spreadsheet using graphs and pie charts detailing our sales information, using live data. What would it take to be able to do something like that? To get a better understanding of the issues involved, let's take a look at the two applications involved: the database vendor and the provider of the reporting tools.

Think of the challenge of generating a reporting tool. There are several reporting tools currently on the market; Microsoft Excel and Seagate Crystal Reports are but a couple. Each of these products has its own set of advantages and disadvantages. The challenge of developing a reporting tool is nothing simple. These products are successful because the developers are able to focus on their primary objective: creating reporting tools.

Now think of the challenge of maintaining a database. There are several companies who offer products that allow users to create various types of databases. Oracle and Sybase are but a couple. Imagine that all the companies developing databases tried to join forces with all the companies writing reporting tools to create a custom way to have their

products work together. Suppose Borland, for example, got together with Seagate and decided to create a custom interface to allow Seagate's program to retrieve data from the Borland database. Now let's extend this idea to include a couple other providers of reporting technologies like Microsoft and the developers of PERL and PHP. Under this model that would mean that there would have to be four custom interfaces, one to interface the Borland database with the Seagate program, one to interface the Borland database with the Microsoft program, etc. Imagine other database providers were trying to do the same thing and that they were collaborating with Seagate, Microsoft, the developers of PERL and PHP to create interfaces to their databases as well. We'd have n times m pieces of software where n is the number of database vendors and m is the number of reporting tool vendors. In our example that would mean twenty custom applications. What a nightmare this would be to maintain, because every time one of the database companies make a change all the reporting companies would need to change their code as well.



A better solution would be to create a known interface between the database and the application. This would produce n plus m pieces of software. Then anyone developing a database (Borland, Computer Associates, etc) could provide the known interface and anyone wishing to access this interface, like Seagate, Microsoft, etc., could take advantage of that interface. This is the purpose of ODBC. Instead of having to know all the intricacies of connecting to a Borland database, the developer of the reporting tool need only worry about connecting to an ODBC data source. Likewise, the developer of the database only has to worry about providing the ODBC interface. Developers no longer need to write applications for a single database type. They can generalize their code and abstract the database type from the application code. Developers can write custom code to access an Oracle database, rewrite it to access a mysql database, rewrite it again to access a postgresql database or they can use ODBC, write it once and use the same code to access all three database types.

Several software packages available today use ODBC. In fact, you would be hard pressed to find any serious database tool that does not support ODBC. Microsoft Office (Excel, Access and Word), for example, supports ODBC.

In our case, ODBC allows applications to access data on the QICWARE system using off-the-shelf programs without having to worry about whether they specifically support our database. In other words, we can go to the store and buy Microsoft Word and not have to worry whether they know anything about Qantel QICWARE. Likewise we can use our Microsoft Word program to access our any other database that also supports ODBC.

The software components

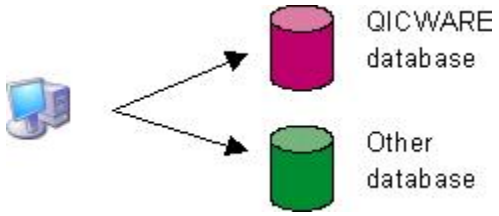
All of the information I am about to cover is documented in great detail in the "QICWARE® SQL Server and ODBC Driver Installation and Reference Guide". In fact I will be following these instructions step-by-step. Before we delve into the details, however, let's discuss a couple of possible configuration scenarios. There are two components to the ODBC software: the software on the server and the software on the client.

The software on the server is called the "QICWARE SQL Server" and, thought it is licensed separately, is part of the part of QANTEL QICWARE runtime. It is this component that waits for connections from the client software. The software on the client is called the "QICWARE ODBC Driver". This is the component that initiates the connection.

The QICWARE SQL Server is part of the QICWARE runtime, it is supported on any platform where QICWARE is supported. The ODBC driver is supported on Microsoft Windows and RedHat Linux platforms.

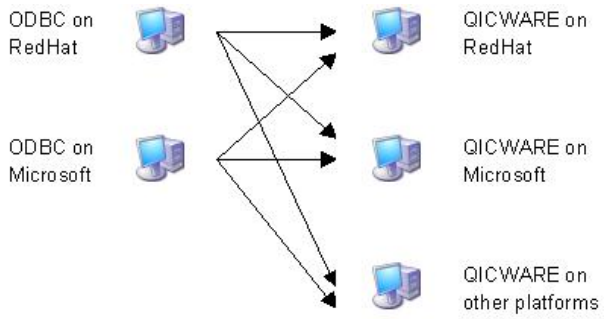
Supported ODBC platforms	Supported QICWARE platforms
Red Hat Linux (IA32) Microsoft Windows XP/2000/NT Microsoft Windows Me/98	COMPAQ Tru64 UNIX HP-UX IBM AIX Red Hat Linux (IA32) SCO OpenServer SCO UnixWare SUN Solaris for x86 Microsoft Windows XP/2000/NT Microsoft Windows Me/98

Some people confuse the QICWARE SQL Server with the Microsoft SQL Server or wonder whether they need the Microsoft SQL Server to run the QICWARE SQL Server. In fact, these are two distinct products. The Microsoft SQL Server allows ODBC applications to access files stored by the Microsoft SQL Server. These may have been comma-delimited files that have been imported, Access files that have been configured, etc. The QICWARE SQL Server allows ODBC applications to access a QICWARE database. Microsoft SQL Server software and QICWARE SQL Server are not in conflict with each other at all. In fact there are times when we may want to use them together. If we had detailed product descriptions on a Microsoft SQL Server and a list of available products on our QICWARE database, we might want to combine the information to get a list of descriptions of available products. We will discuss this more in the advanced section, when we integrate LAMP (discussed later) and QICWARE technologies to create a web site.



To be able to do any of the examples we're about to cover, we first need to configure the software. It is possible install the QICWARE and the ODBC driver on the same computer.

It is also possible to install QICWARE and the ODBC driver on different computers. In this case the QICWARE computer can be any of the supported platforms.



In order for the client and the server to communicate properly, the DSN (Data Source Name) must be configured on both the server and the client. When SQL and ODBC are configured on the same machine you can specify 127.0.0.1 as the address of the computers. If the loopback is used to configure the server in the data source information for the ODBC driver then the same address should be used to configure the client in the QICWARE configuration file.

Configuration of ODBC requires the following steps. (1) Configure SQL in m01.cfig (2) Add client to m01.cfig (3) Create qsqlserver.ini (4) Customize qsqlserver.ini (5) Create oadrd.ini (6) Add data source to oadrd.ini (7) Install software on client (8) Configure DSN on client

To add new client repeat just these steps 2,7 and 8. To add new data source repeat just these steps 6 and 8,

Configuring SQL on RedHat (RedHat 7.1 Seawolf)

Our example will discuss the installation of SQL on a RedHat Linux 7.1 system, ODBC on the RedHat Linux 7.1 system and ODBC on Microsoft Windows XP Professional with Service Pack 1. The details will differ slightly depending on the exact version of the operating system. Since the configuration of the QICWARE SQL Server is relatively similar on all platforms, we will cover only one example.

CONFIGURATION WORKSHEET	
Server's Resolvable Hostname	`sprout (QICWARE on RedHat)`
	(e.g., *myserver*)
Server's IP Address	`208.228.216.118`
	(e.g., *192.168.0.5*)
Client's Resolvable Hostname(s) or IP Address(es)	`sprout (ODBC on RedHat) and venkman (ODBC on Microsoft)`
	(e.g., *myclient* **OR** *192.168.0.3*)
Data Dictionary name (typically #FILES) and location (disc and directory)	`QCL,QCD,QCL#FILE`
	disc,dir,filename (e.g., *QCL,QCD,#FILES*)
Database Name(s)	`qcd`
	the server's resolvable hostname + the directory where #FILES resides separated with an underscore (e.g., *myserver_qcd*)
QICWARE Administrator Login	`qwadmin (for sprout)`
	qwadmin
QICWARE Administrator Password	`qwadmin (for sprout)`
	password
QICWARE SQL Directory	`/home/qicware/etc/qsql`
	absolute path to the qsql directory (e.g., */usr/qicware/etc/qsql)*
QICWARE Configuration File	`/home/qicware/etc/m01.cfig`
	absolute path to the QICWARE Configuration File (e.g., */usr/qicware/etc/m01.cfig*)
SQL Server Log File	`/home/qicware/etc/qsql/qsqlserver.log`
	absolute path to the server log file of QICWARE SQL Server (e.g., */usr/qicware/etc/qsql/qsqlserver.log*)
SQL Client Log File	`/home/qicware/etc/qsql/qsqlclient.log`
	absolute path to the client log file of QICWARE SQL Server (e.g., */usr/qicware/etc/qsql/qsqlclient.log)*

The QICWARE SQL Server is already present on our machine (it was installed along with the QICWARE Runtime), so all that's left to do is configure the SQL Server to start up and add the ODBC clients to the QICWARE configuration file.

Our first step is to add the QICSQLODBCPW, QICSQL and ODBC keywords to the QICWARE configuration file (we

can edit the file by typing 'vi $QCFIG'). The QICSQLODBCPW can be found on the password list that contains the other passwords already in our m01.cfig such as the QICRTPW. The QICSQL keyword points to our qsqlserver.ini, in this case the file itself doesn't exist yet, but we will get that in a moment. We also need to add our new ODBC clients sprout and venkman. Notice that sprout has the 140 flag set. Refer to the Qantel documentation for more information. Below are the lines added to the m01.cfig.

Example 4.1. QICWARE Config file

```
...
QICSQLODBCPW   = 51287f792356d0041c99bebb7a73da04
...
QICSQL        = /home/qicware/etc/qsql/qsqlserver.ini
...
ODBC         = sprout, 140
ODBC         = venkman
...
```

Now we need to create the qsqlserver.ini file. The file is going to reside in $HOME/etc/qsql. There is already a qsqlserver.ini.rel there so we copy qsqlserver.ini.rel to qsqlserver.ini. Then we need to change the paths in our newly created file to point to the correct directories. Here's a little tip: to do a mass substitution of /usr/qicware to /home/qicware, issue the following command.

Example 4.2. vi substitution command

```
:%s/usr\/qicware/home\/qicware/g
```

The following are changes made to the qsqlserver.ini. Lines prefixed with a minus indicate lines that existed in the qsqlserver.ini.rel. Lines prefixed with a plus indicate lines that exist in qsqlserver.ini. The changes we made as a result of the command mentioned above. Changes to this file require QICWARE to be restarted.

Example 4.3. Config file changes

```
--- /home/qicware/etc/qsql/qsqlserver.ini.rel
+++ /home/qicware/etc/qsql/qsqlserver.ini
@@ -1,20 +1,15 @@
 [COMMON]
-SCHEMAPATH=/usr/qicware/etc/qsql
-CONFIG=/usr/qicware/etc/qsql
-OA_ROOT=/usr/qicware/etc/qsql
-QCFIG=/usr/qicware/etc/m01.cfig
-
-;The following can be modified for various security needs.
-;AllowFile=/usr/qicware/etc/qsql/allow
-;UsageMode=read-write
-
+SCHEMAPATH=/home/qicware/etc/qsql
+CONFIG=/home/qicware/etc/qsql
+OA_ROOT=/home/qicware/etc/qsql
```

```
+QCFIG=/home/qicware/etc/m01.cfig
+;AllowFile=/home/qicware/etc/qsql/allow
 ;The following cache options set default values which may be
 ; modified to improve performance
 CacheMemSize=1000
 CacheOptions=PATH=/tmp/;INITIAL_SIZE=10;INCREMENT_SIZE=5;MAX_SIZE=50;DATABLOCK_SIZE=64

 UseThreads=0

 [CLIENT]
 FETCHBLOCK_SIZE=100
 UsageMode=read-write
@@ -16,17 +11,17 @@
 UseThreads=0

 [CLIENT]
 FETCHBLOCK_SIZE=100
 UsageMode=read-write
-TraceFile=/usr/qicware/etc/qsql/qsqlclient.log
+TraceFile=/home/qicware/etc/qsql/qsqlclient.log
 Key=11023-0000-0001-0001-7501-7001-0000-a8c9

 [TRACECLIENT]
 ALL=FATAL|SNO|ERRORS

 [SERVER]
-TraceFile=/usr/qicware/etc/qsql/qsqlserver.log
+TraceFile=/home/qicware/etc/qsql/qsqlserver.log
 TraceOptions=all:f
 Port=1706
 Key=1026076-0000-0003-00bd-9401-0000-0000-5800-0000-f07f
 ForkOnConnect=1
```

We can now restart QICWARE, but before we do there's one last issue we need to take care of. The Data Dictionary that comes with QICLOOK is originally named QCL#FILE, to avoid any conflicts with other data dictionaries that may already be on the system. So the first thing we need to do is rename the file. We can use the qmv command to do just that.

Our first instinct might be be to point at the QCL#FILE file instead of renaming it. The problem is that if we later need to use *FILES to modify the file, we will have to rename the file. This would cause the database to be inaccessible to the QICWARE SQL Server. Worse yet, we might *DFCOPY the file from QCL#FILE to #FILES, edit #FILES and spend hours trying to figure out why our changes weren't taking effect, not realizing that we hadn't updated the oadrd.ini to point at the file we were modifying. I think it's better to cut off any potential problems at the source; that way problems don't creep up when we're trying to troubleshoot a completely different problem. The qmv command can only be used when the logical disc is un-mounted so we first need to stop QICWARE. Once we've renamed the file, we can restart QICWARE.

Example 4.4. Rename the data dictionary

```
[qwadmin@sprout qsql]$ qconsole -c $QCFIG
Control process 21063 has been terminated.
```

```
[qwadmin@sprout qsql]$ cd
[qwadmin@sprout qicware]$ cd qcl
[qwadmin@sprout qcl]$ cd qqcd
[qwadmin@sprout qqcd]$ qmv qqcl+dfile q+dfiles
[qwadmin@sprout qqcd]$ cd

[qwadmin@sprout qicware]$ qcfig $QCFIG

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   QICSQL (TM) is a trademark of Qantel Technologies, Inc.

Control segment initialized
[qwadmin@sprout qicware]$
```

Now we need an oadrd.ini. We copy the oadrd.ini.rel (in the same directory as before) to oadrd.ini and add the entry for our database. The file is reread every time a new connection is made so changes can be made on the fly.

Example 4.5. Config changes

```
--- oadrd.ini.rel
+++ oadrd.ini
@@ -1,4 +1,4 @@
-[myserver_qcd]
+[qcd]
 NAME=QCL,QCD,#FILES
 TYPE=qisam
 REMARKS=QICLOOK Demo #FILES
```

You can revert to the release version of the database by shutting down QICWARE and replacing the QICLOOK software.

Example 4.6. Reinstall QICLOOK

```
[qwadmin@sprout qicware]$ su -c "mount /dev/cdrom /mnt"
```

```
Password:
mount: block device /dev/cdrom is write-protected, mounting read-only
[qwadmin@sprout qicware]$ qconsole -c $QCFIG
Control process 8833 has been terminated.
[qwadmin@sprout qicware]$ mv qcl qcl.evil
[qwadmin@sprout qicware]$ uncompress -c /mnt/qicware/rh_linux/qiclook.tar.Z | tar xf -
[qwadmin@sprout qicware]$ cd qcl/qqcd
[qwadmin@sprout qqcd]$ qmv qqcl+dfile q+dfiles
[qwadmin@sprout qqcd]$ cd
[qwadmin@sprout qicware]$ qcfig $QCFIG
...
```

To add other data source names, copy the four lines in the file, append them to the end of the file, change the path specified in the NAME line to the location of the new data dictionary and change the text in the brackets to give the data source a distinct name. Refer to the appendix for an example. Now that we've configured the QICWARE SQL Server, it's time to configure each of the clients.

Installing ODBC on Microsoft Windows XP

The installation on Microsoft platforms is done using InstallShield. Simply double click the installer and walk through the prompts.


QANTEL® QICWARE ODBC Drivers for Windows Setup
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Please read the following license agreement carefully.
Press the PAGE DOWN key to see the rest of the agreement.
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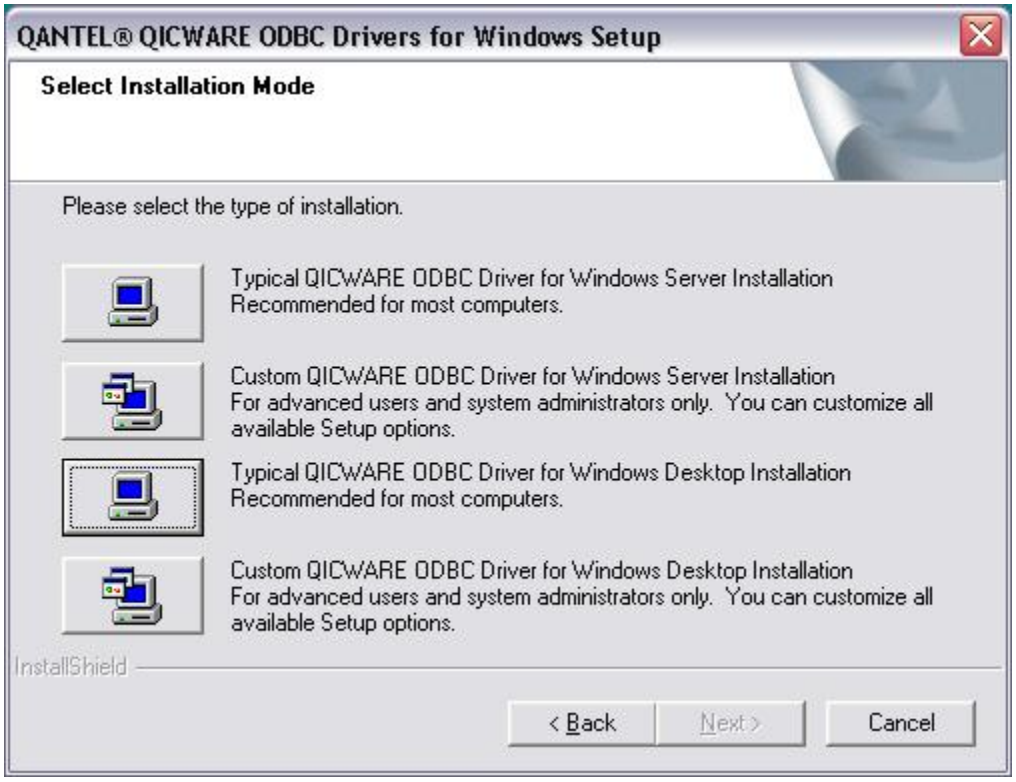
Do you accept all the terms of the preceding License Agreement? If you choose No, the setup will close. To install QANTEL® QICWARE ODBC Drivers for Windows, you must accept this agreement.
InstallShield
< Back
Yes
No


QANTEL® QICWARE ODBC Drivers for Windows Setup
Select Installation Mode
Please select the type of installation.
Typical QICWARE ODBC Driver for Windows Server Installation
Recommended for most computers.
Custom QICWARE ODBC Driver for Windows Server Installation
For advanced users and system administrators only. You can customize all available Setup options.
Typical QICWARE ODBC Driver for Windows Desktop Installation
Recommended for most computers.
Custom QICWARE ODBC Driver for Windows Desktop Installation
For advanced users and system administrators only. You can customize all available Setup options.
InstallShield
< Back
Next >
Cancel

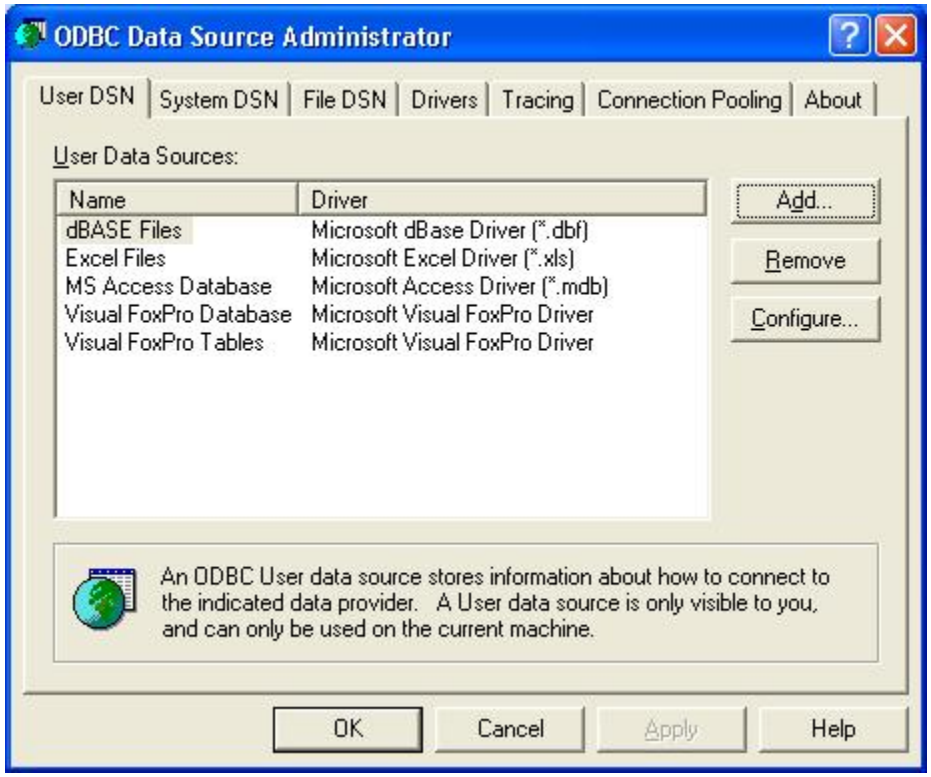

QANTEL® QICWARE ODBC Drivers for Windows Setup
Start Copying Files
Review settings before copying files.
Setup has enough information to start copying the program files. If you want to review or change any settings, click Back. If you are satisfied with the settings, click Next to begin copying files.
Current Settings:
[Destination]
c:\Program Files\Qantel\Qicware\ODBC
[Folder]
Qantel Qicware ODBC
[Components]
ODBC Driver: Client-Server
[License Info]
InstallShield
< Back
Next >
Cancel

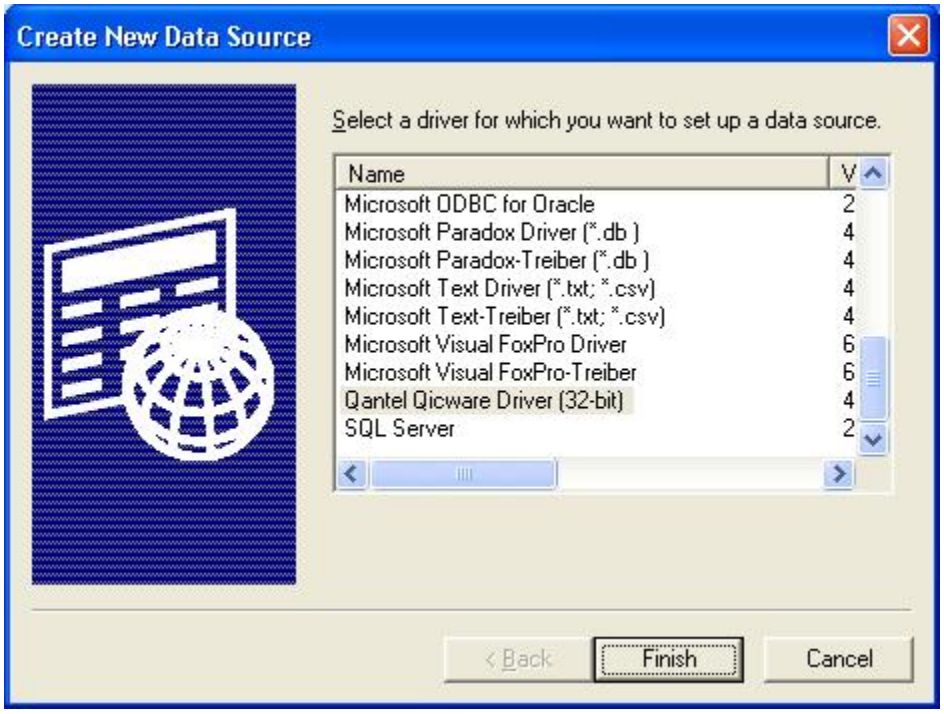

QANTEL® QICWARE ODBC Drivers for Windows Setup
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed QANTEL® QICWARE ODBC Drivers for Windows. Click Finish to exit the wizard.
View the ODBC Readme file
< Back
Finish
Cancel

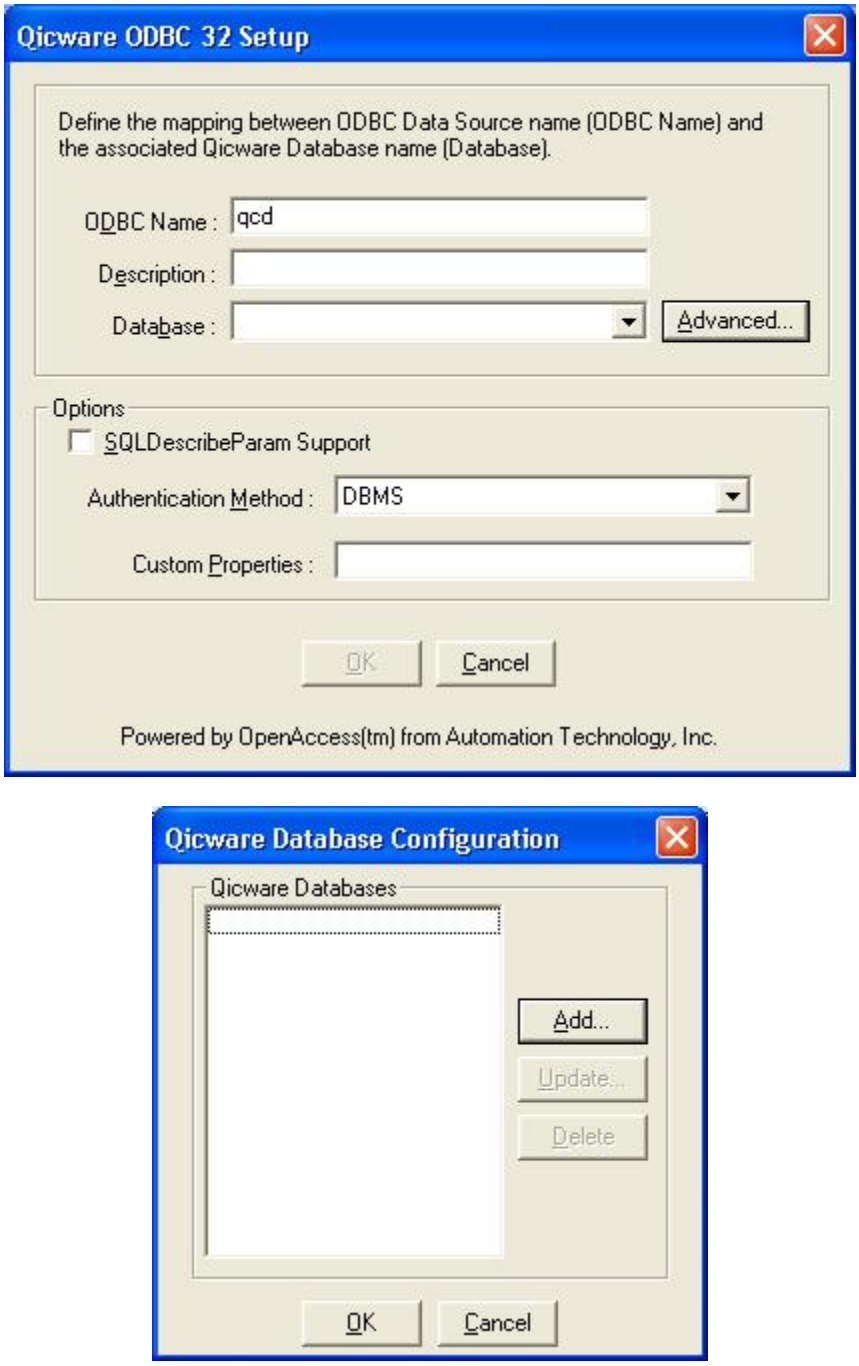
Configuring ODBC on Windows XP

These steps should be repeated for each desired data source. Keep an eye on the active widget. It will give you some clue as to what to click for the next screen. The Data Sources applet can be found in the Administration Tools folder in the Control Panel.

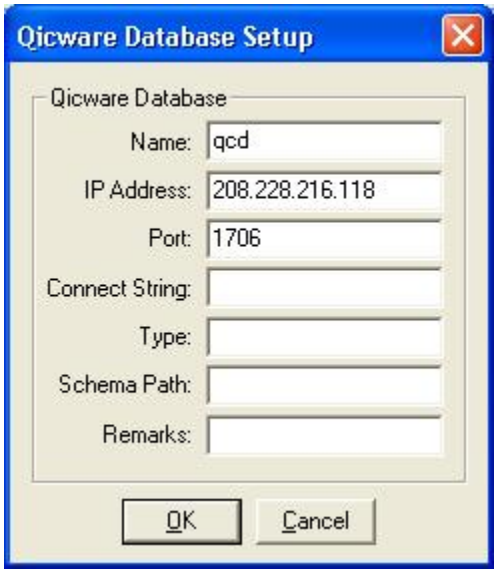
The QICWARE SQL documentation describes the process of creating a user or system DSN. Refer to the QICWARE SQL documentation for the differences between the user and system DSN. The system DSN can be used by any user. The User DSN can only be used by the current user. These two types of DSN may not be supported by older applications but are required to configure the server's symbolic name used by the file DSN. One might argue that creating one type of DSN is sufficient, but creating a file DSN allows the information to be verified, which can save a lot of time in troubleshooting configuration faults. If the validation of the DSN fails, then any application using this DSN will fail as well. The following steps create a file DSN.

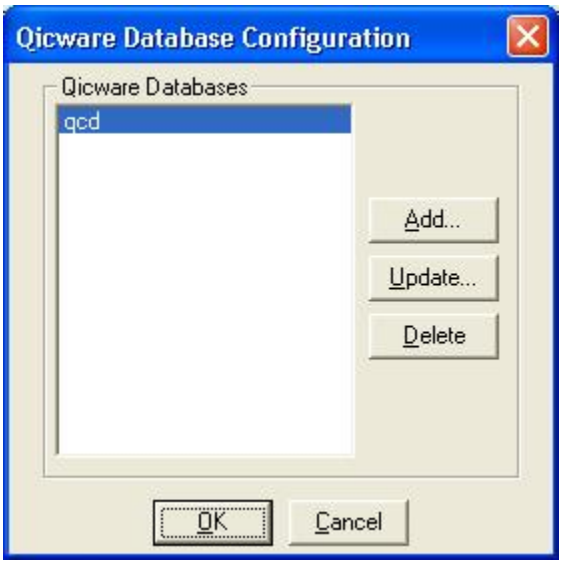

ODBC Data Source Administrator
User DSN
System DSN
File DSN
Drivers
Tracing
Connection Pooling
About
User Data Sources:
Name
Driver
dBASE Files
Microsoft dBase Driver (*.dbf)
Excel Files
Microsoft Excel Driver (*.xls)
MS Access Database
Microsoft Access Driver (*.mdb)
Visual FoxPro Database
Microsoft Visual FoxPro Driver
Visual FoxPro Tables
Microsoft Visual FoxPro Driver
Add...
Remove
Configure...
An ODBC User data source stores information about how to connect to the indicated data provider. A User data source is only visible to you, and can only be used on the current machine.
OK
Cancel
Apply
Help

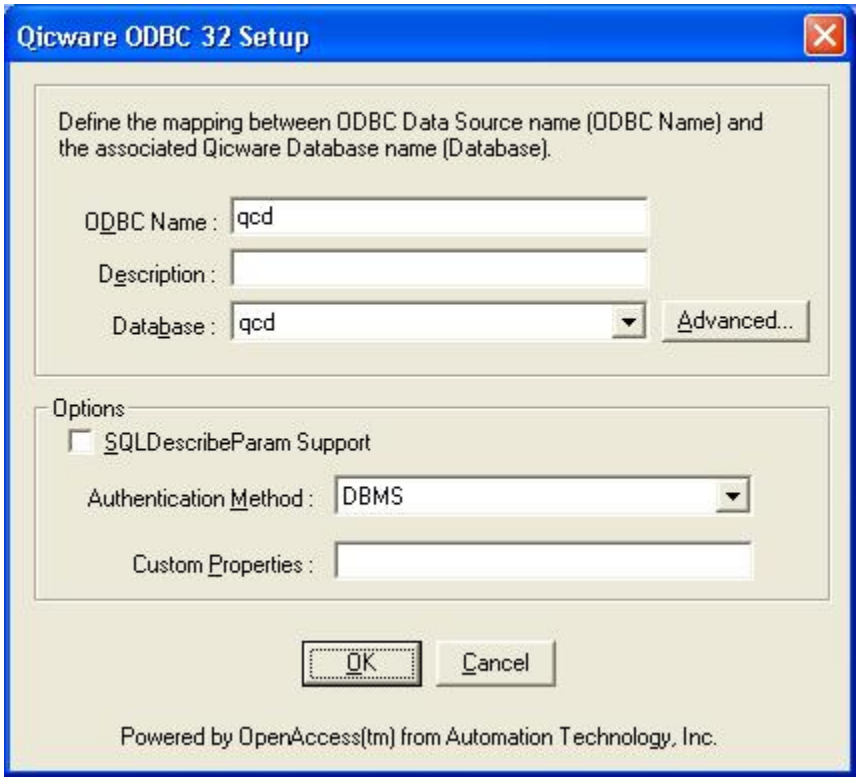

Create New Data Source
Select a driver for which you want to set up a data source.
Name
V
Microsoft ODBC for Oracle
2
Microsoft Paradox Driver (*.db)
4
Microsoft Paradox-Treiber (*.db)
4
Microsoft Text Driver (*.txt; *.csv)
4
Microsoft Text-Treiber (*.txt; *.csv)
4
Microsoft Visual FoxPro Driver
6
Microsoft Visual FoxPro-Treiber
6
Qantel Qicware Driver (32-bit)
4
SQL Server
2
< Back
Finish
Cancel

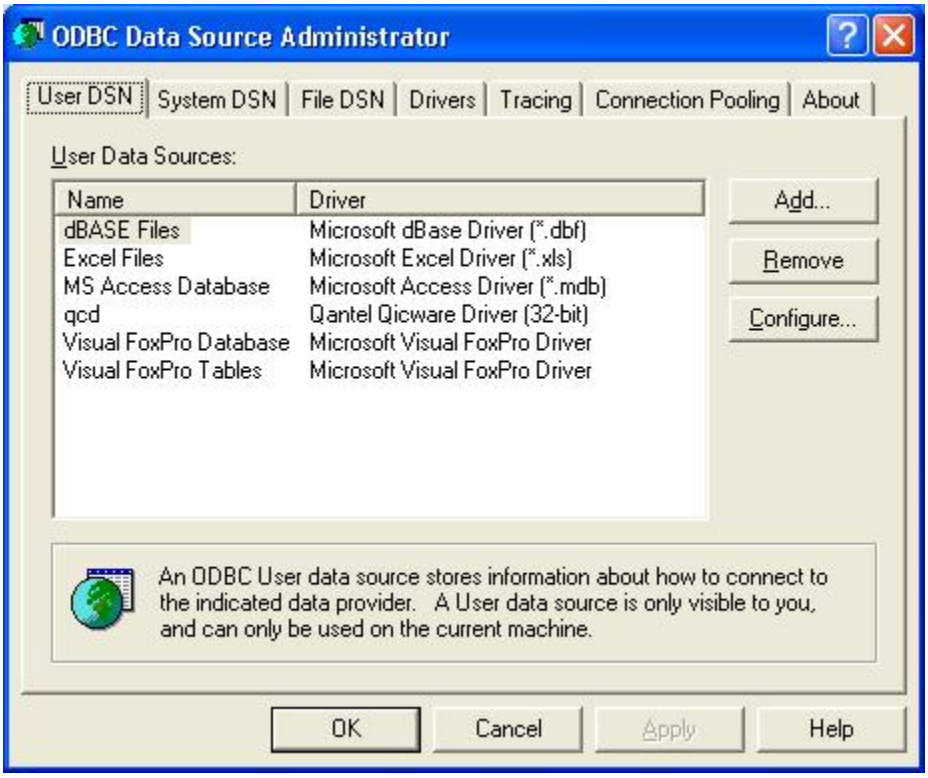


This step provides the data source with information on which machine to make the TCP/IP connection to.

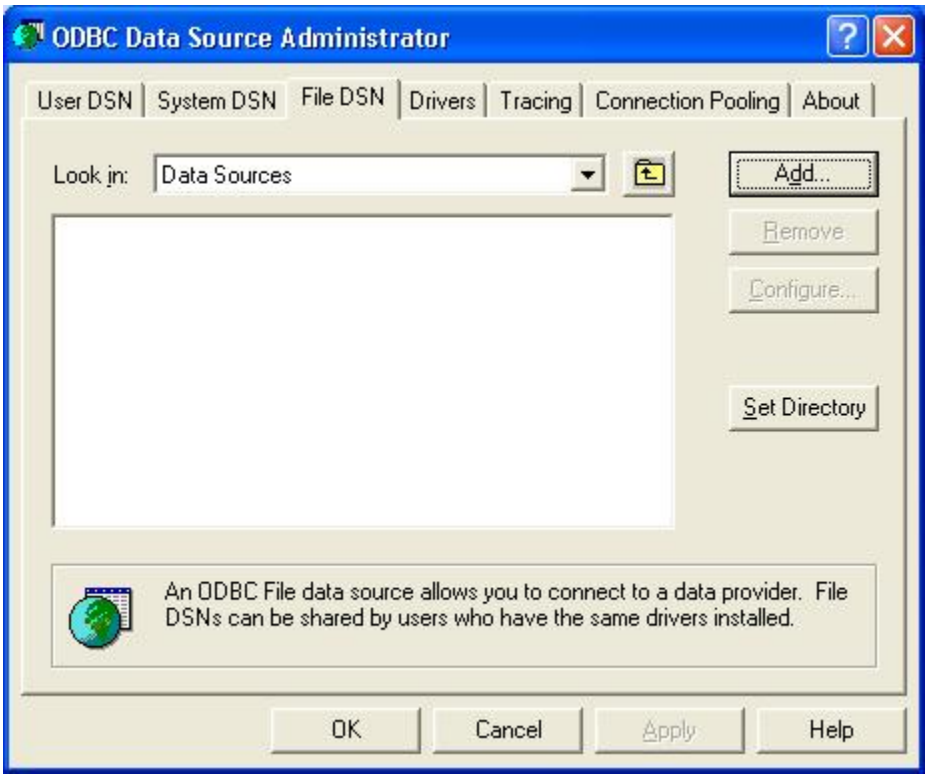

Qicware Database Setup
Qicware Database
Name:
qcd
IP Address:
208.228.216.118
Port:
1706
Connect String:
Type:
Schema Path:
Remarks:
OK
Cancel

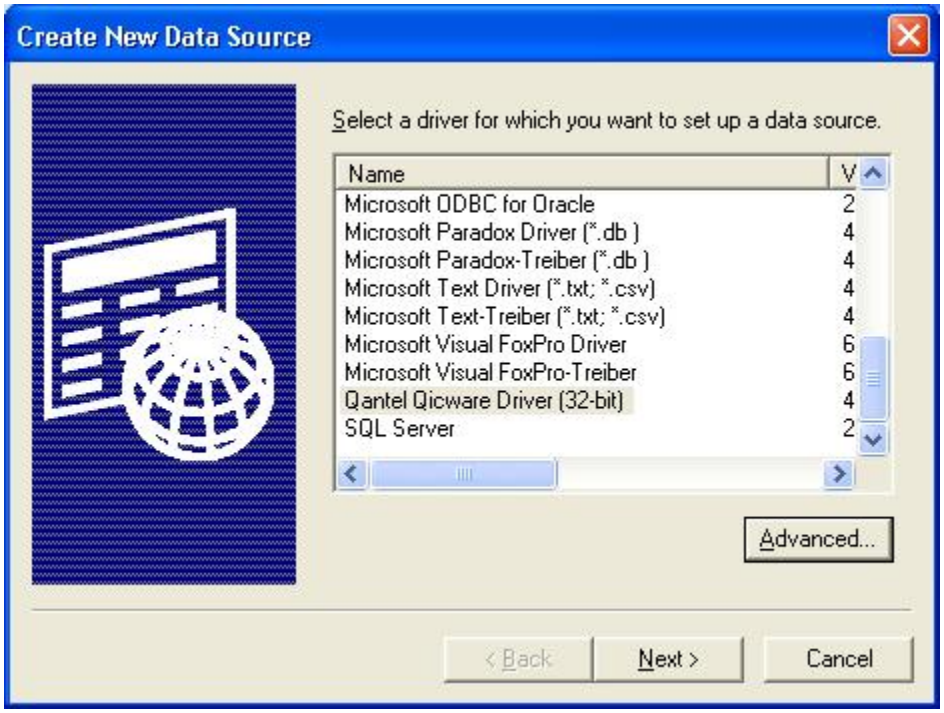

Qicware Database Configuration
Qicware Databases
qcd
Add...
Update...
Delete
OK
Cancel

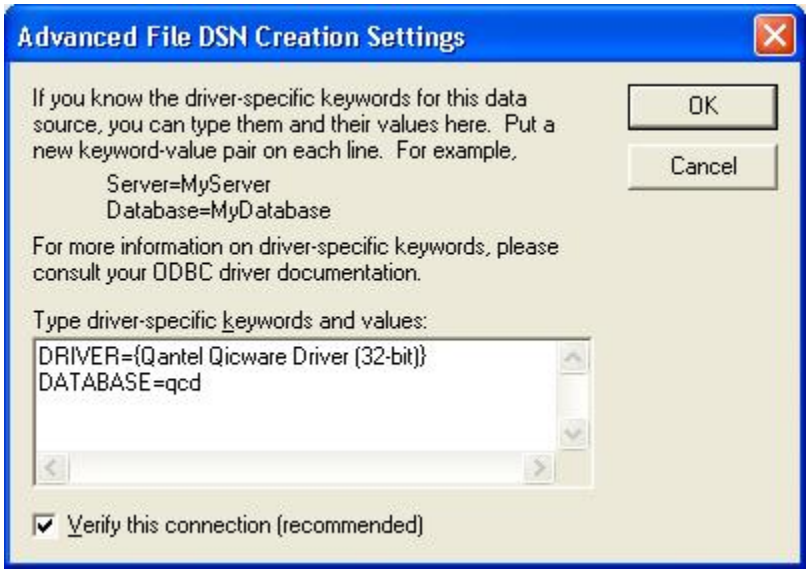

Qicware ODBC 32 Setup
Define the mapping between ODBC Data Source name (ODBC Name) and the associated Qicware Database name (Database).
ODBC Name :
qcd
Description :
Database :
qcd
Advanced...
Options
SQLDescribeParam Support
Authentication Method :
DBMS
Custom Properties :
OK
Cancel
Powered by OpenAccess(tm) from Automation Technology, Inc.

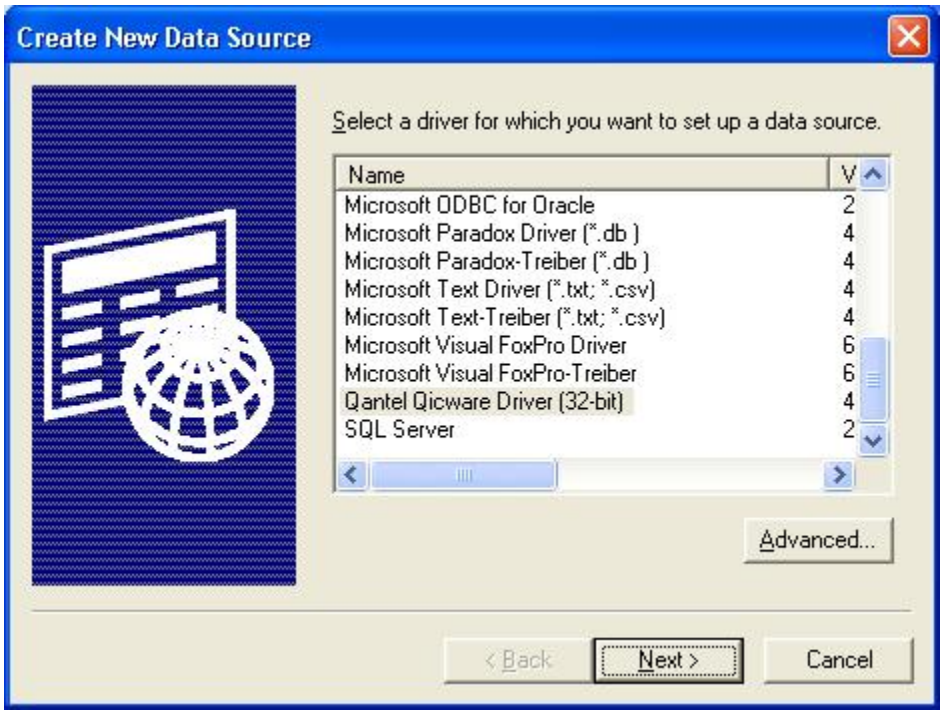

ODBC Data Source Administrator
User DSN
System DSN
File DSN
Drivers
Tracing
Connection Pooling
About
User Data Sources:
Name
Driver
dBASE Files
Microsoft dBase Driver (*.dbf)
Excel Files
Microsoft Excel Driver (*.xls)
MS Access Database
Microsoft Access Driver (*.mdb)
qcd
Qantel Qicware Driver (32-bit)
Visual FoxPro Database
Microsoft Visual FoxPro Driver
Visual FoxPro Tables
Microsoft Visual FoxPro Driver
Add...
Remove
Configure...
An ODBC User data source stores information about how to connect to the indicated data provider. A User data source is only visible to you, and can only be used on the current machine.
OK
Cancel
Apply
Help

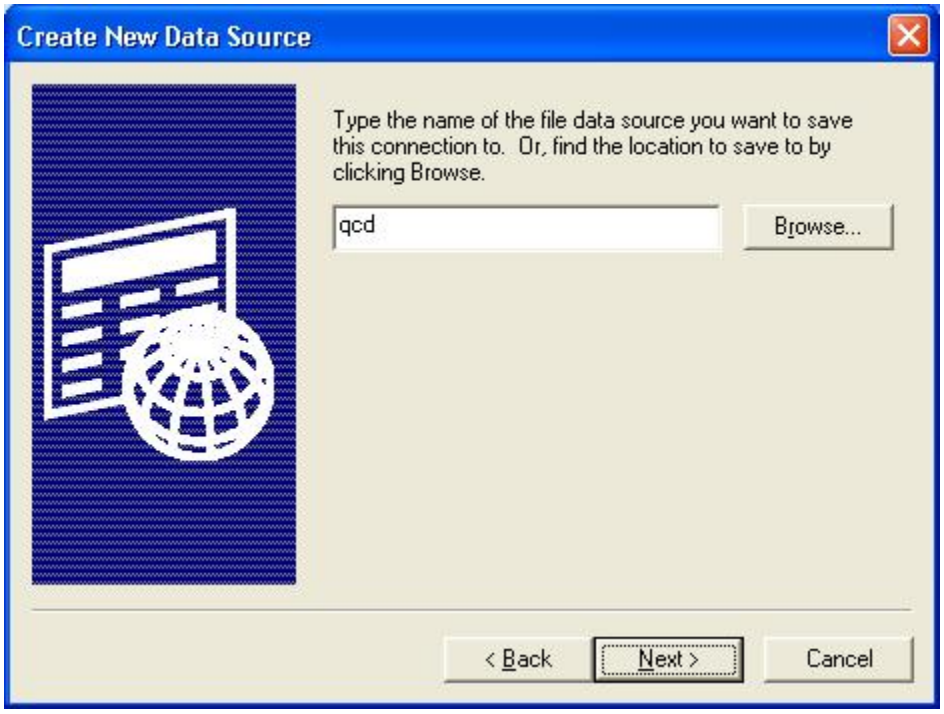
The following steps create a file DSN.

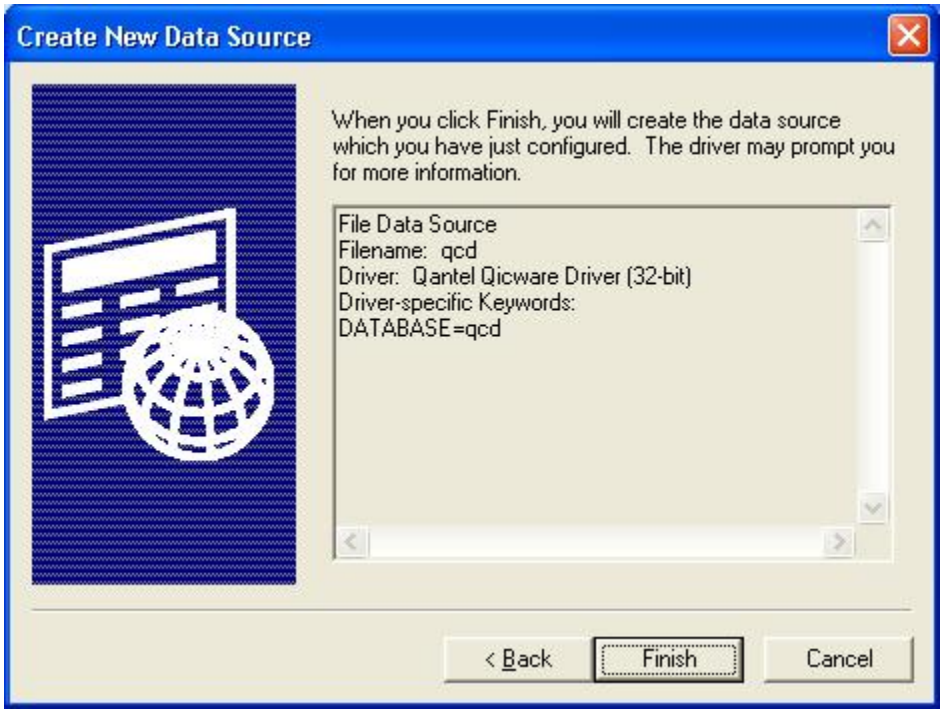




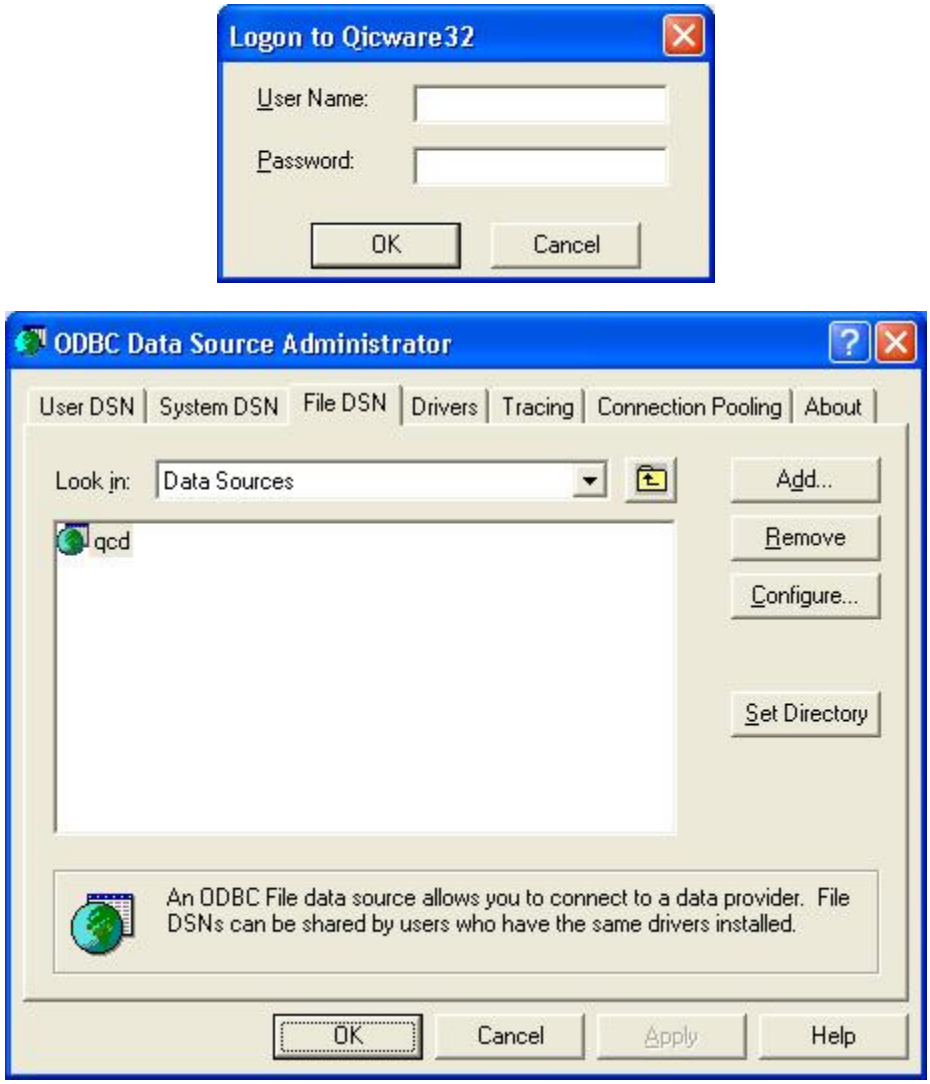

Advanced File DSN Creation Settings
If you know the driver-specific keywords for this data source, you can type them and their values here. Put a new keyword-value pair on each line. For example,
Server=MyServer
Database=MyDatabase
For more information on driver-specific keywords, please consult your ODBC driver documentation.
Type driver-specific keywords and values:
DRIVER={Qantel Qicware Driver (32-bit)}
DATABASE=qcd
Verify this connection (recommended)
OK
Cancel


Create New Data Source
Select a driver for which you want to set up a data source.
Name
V
Microsoft ODBC for Oracle 2
Microsoft Paradox Driver (*.db) 4
Microsoft Paradox-Treiber (*.db) 4
Microsoft Text Driver (*.txt; *.csv) 4
Microsoft Text-Treiber (*.txt; *.csv) 4
Microsoft Visual FoxPro Driver 6
Microsoft Visual FoxPro-Treiber 6
Qantel Qicware Driver (32-bit) 4
SQL Server 2
Advanced...
< Back
Next >
Cancel





This is the final step in the creation of the file DSN. If this logon succeeds, then no further dialogs will appear. If the logon is unsuccessful then an error message will be displayed.



If you have other data source names on the server that you would like to configure on the client, simply repeat these steps for each data source name.

Installing ODBC on RedHat (RedHat 7.1 Seawolf)

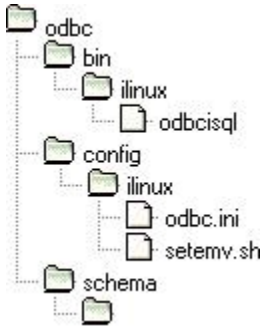
To install the ODBC driver on Linux you must untar / uncompress the distribution file. The tar and uncompress programs are a standard part of the operating system. Refer to documentation on those utilities for more information. The uncompress / untar will create file_set and install directory in /tmp. The installation and configuration of the software is done at the same time.

Example 4.7. Installing ODBC on linux

```
[qwadmin@sprout qicware]$ cd /tmp
[qwadmin@sprout /tmp]$ uncompress -c /mnt/cdrom/qicware/rh_linux/odbc.tar.Z | tar xf -
```

```
[qwadmin@sprout /tmp]$ cd install
[qwadmin@sprout install]$ cd ilinux
[qwadmin@sprout ilinux]$ ./setup.sh

Beginning installation of the OpenRDA ODBC and JDBC Drivers
- Platform: ilinux
- Version: v4.70

Installation target directory :
/home/qicware/odbc

What is the database name (to connect)?
qcd
What is the server IP address ?
208.228.216.118
What is the server IP port number ?
1706
Enter your Client Key ?
11023-0000-0003-0010-0f01-e901-0000-ee2c

Installation Directory : /home/qicware/odbc
Server name : qcd
IP address : 208.228.216.118
Port number : 1706
Client Key : 11023-0000-0003-0010-0f01-e901-0000-ee2c

Are your entries above all correct ? (y/n)
y
- Creating general directories...
- Creating ilinux specific directories...
- Creating shell files...
- Copying files...
- Creating INI files...
- Setting rights on files...

Thank you. Installation successfully completed.

[qwadmin@sprout ilinux]$ cd ..
[qwadmin@sprout install]$ cd ..
[qwadmin@sprout /tmp]$ rm -fr install
[qwadmin@sprout /tmp]$ rm -fr file_set
```

The setup script installs the binaries and configuration files necessary to use the ODBC driver. The data source name information is contained in two files. Since we installed our driver in $HOME/odbc, our files are $HOME/odbc/config/ilinux/odbc.ini and $HOME/odbc/schema/oadrd.ini. Notice that this is a different oadrd.ini file than the one used by the QICWARE SQL Server. Below is a list of files mentioned in this discussion.



To add the data source name to odbc.ini, copy the line under [ODBC Data Sources] and append it to the end of that section. Change the data source name to the data source name you used in the QICWARE SQL Server configuration. Copy the lines in the file, starting at the line with the braces. Append them onto the end and change the data source name.

The following is the oadrd.ini created by our installation process. Do not run the setup program more than once. It will erase previously defined data source names. Refer to the appendix for an example.

Example 4.8. Config file

```
[ODBC Data Sources]
qcd = OpenRDA

[qcd]
Driver       = /home/qicware/odbc/lib/ilinux/oaodbc.so
Description    = OpenRDA DSN
Trace        = 0
TraceFile = /home/qicware/odbc/bin/ilinux/sql.log
```

To add the data source name to oadrd.ini, copy the lines in the file, append them onto the end and change the address of the QICWARE SQL Server specified in the ADDRESS line and the name of the data source specified on the line in braces. The following is the oadrd.ini created by our installation process.

Example 4.9. Config file

```
[qcd]
ADDRESS=208.228.216.118
PORT=1706
REMARKS=Sample test Database
```

Notice that the IP address that we specified for the server in the script is placed in the oadrd.ini. This is the address of the machine that will be running the QICWARE SQL Server. If the address had been 127.0.0.1 (the loopback address), then the ODBC line in the QICWARE Configuration file should also use the loopback address.

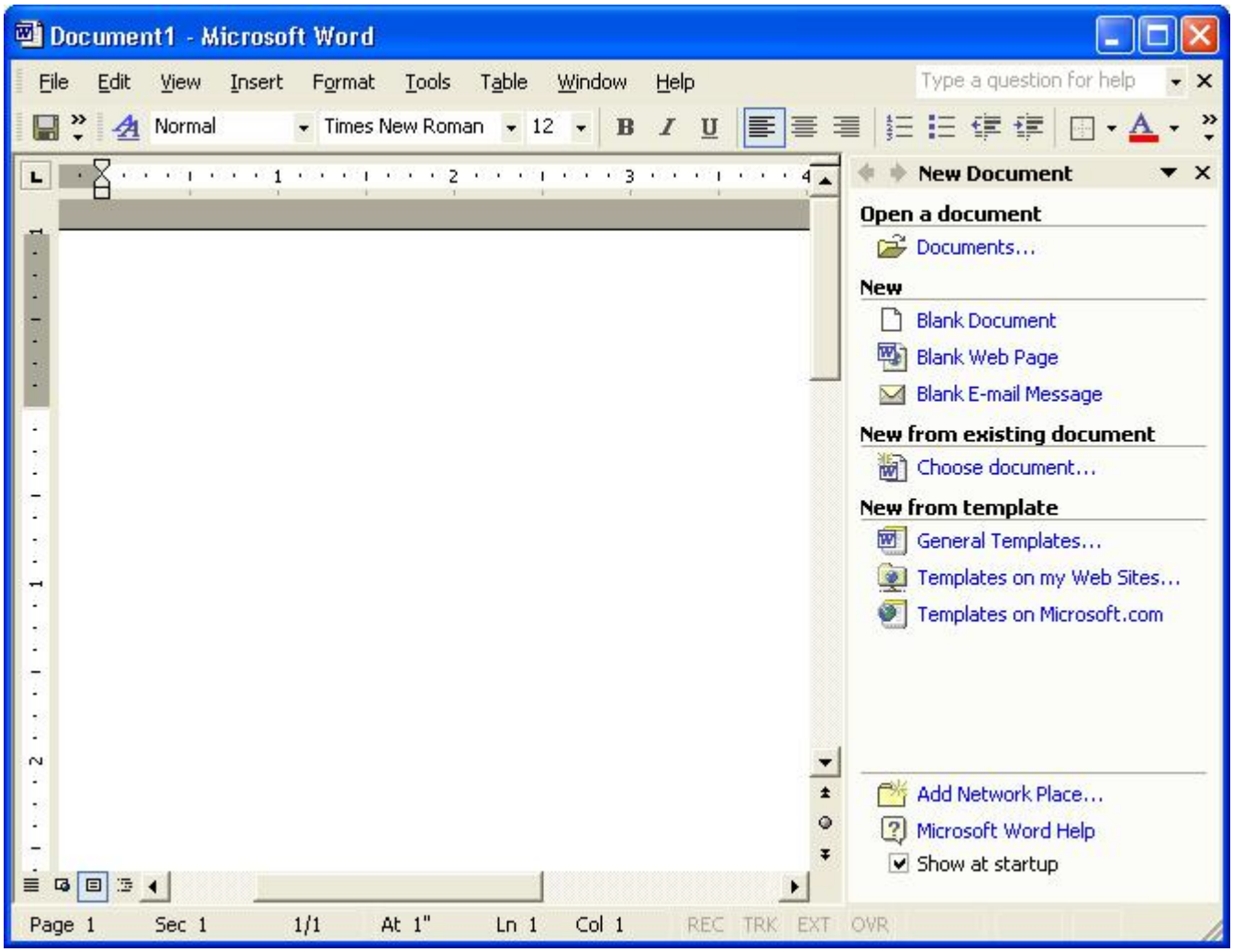
Sample Applications

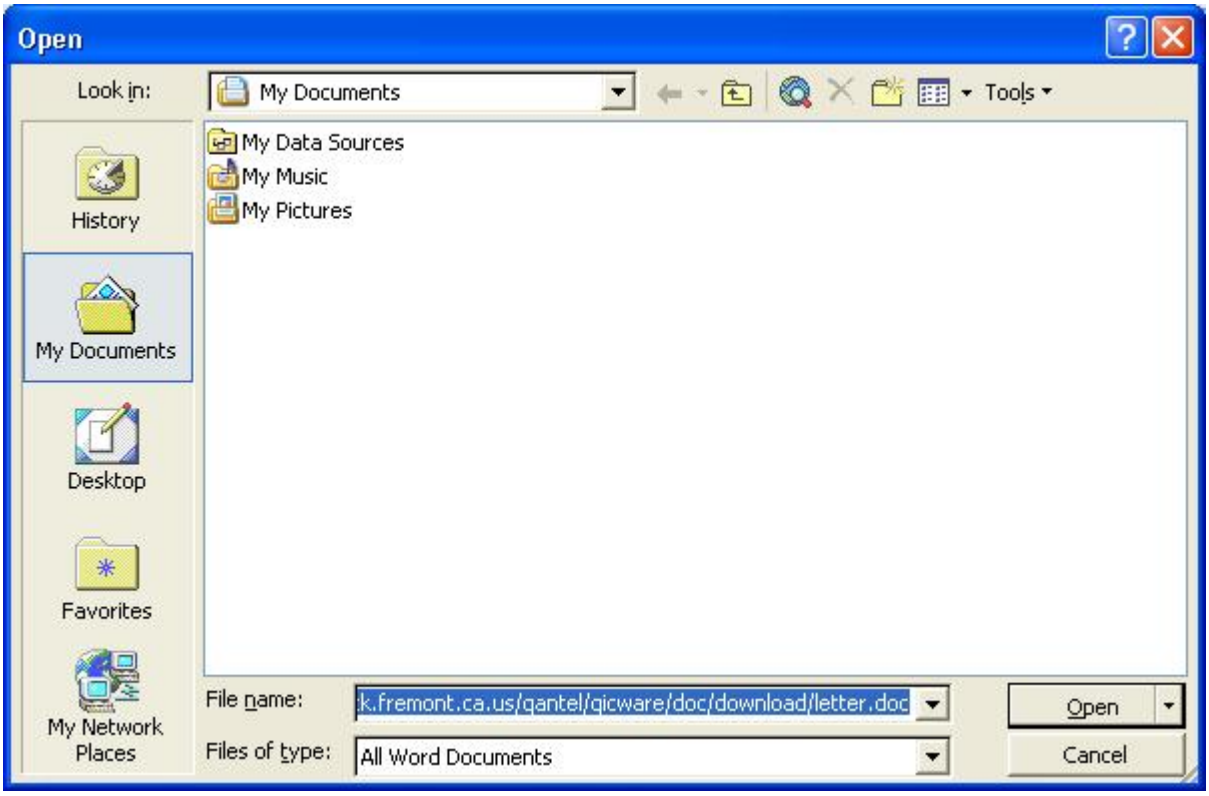
One of the challenges to understanding how to use the QICWARE SQL Server successfully, is overcoming our urge to solve problems with a batch-mode approach. The real advantage of SQL is that it can process complex queries very quickly. If we reduce the QICWARE SQL Server to a means for transfer files, then we are really not using SQL the way it was intended to be used. If we want to transfer files between machines there are better ways of doing that then using SQL. One of the areas where SQL excels is in the parsing of complicated SQL statements. The more criteria we add to the statement, the more opportunity there is for the SQL Server to take advantage of internal optimizations. If we use SQL statements that are short and free of criteria then we are reducing the server to a file transfer tool. Anyway, the human mind, however, can only process small amounts of information at a time. Instead of transferring all the data at one time it would be more efficient and easier on the mind to digest small amounts of data. We can achieve this by increasing the amount of criteria in the SQL statement.

Another drawback to transferring large sums of data is that the information can be stale before the user even has an opportunity to digest it. The SQL Server is really intended to retrieve live real-time data. If we transfer small bite-sized portions of information then the data is more current and takes less bandwidth to refresh.

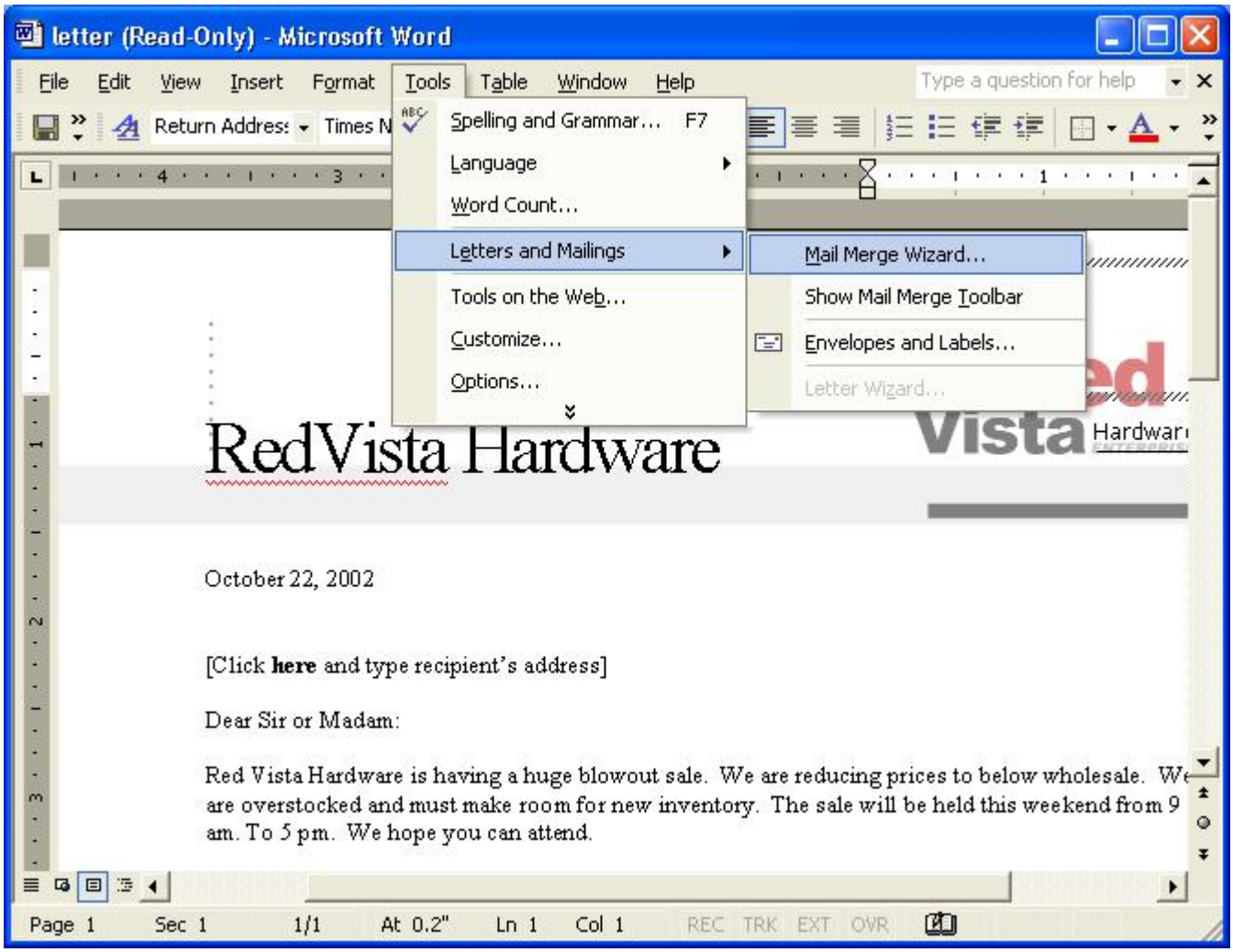
The examples we will be demonstrating try to exemplify these positive SQL strategies. They will include a form letter which can be used to send mass mailings and an Excel spreadsheet which can be used to analyze data. Both the form letter [../download/letter.doc] and the excel graphs [../download/letter.doc] can be downloaded for closer examination. Both demonstrations use the QICLOOK Demo database. This will allow users to try the examples themselves regardless of the state of their live database. The examples can easily be modified to use a live database with more relevant information.

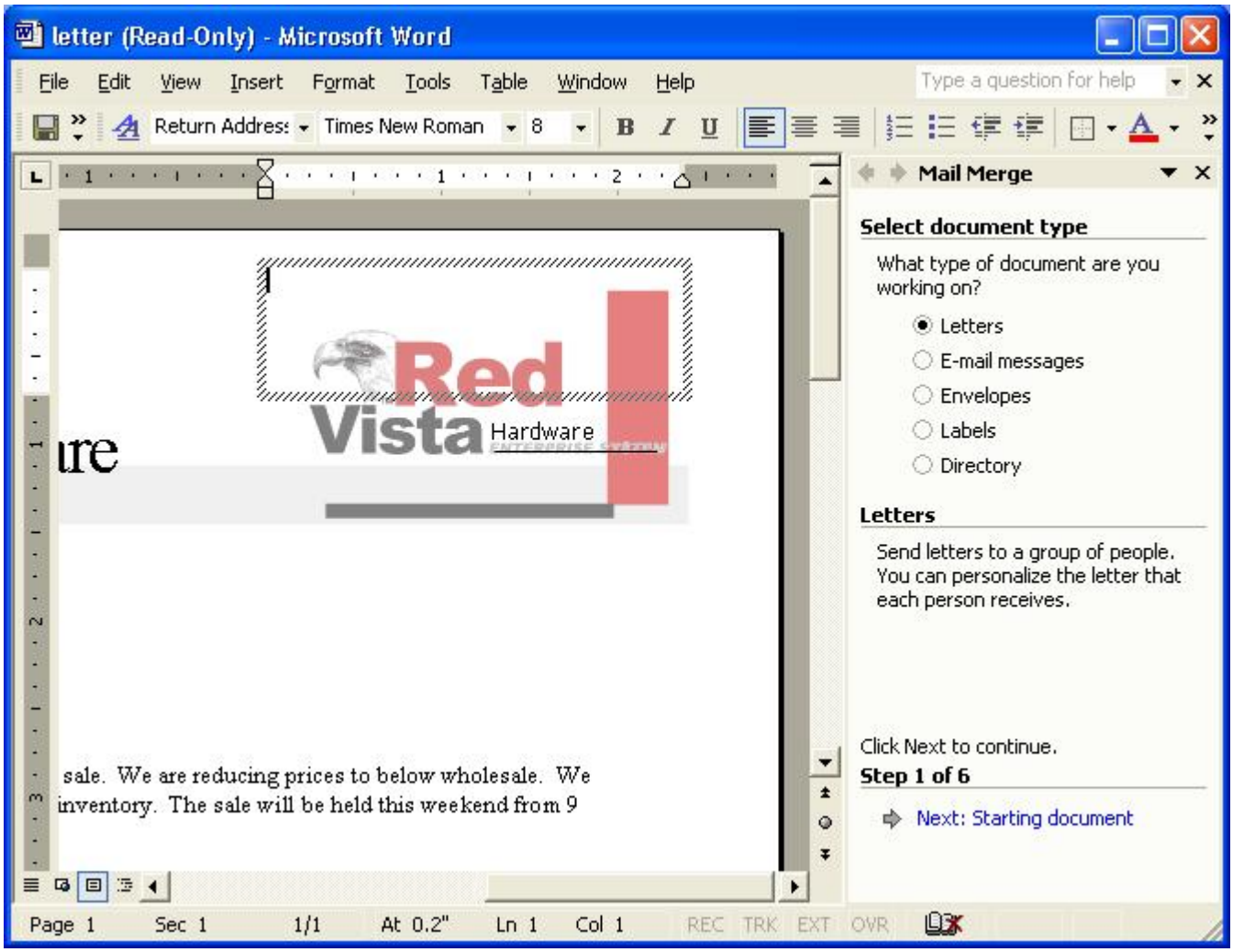
Microsoft Word mail merge

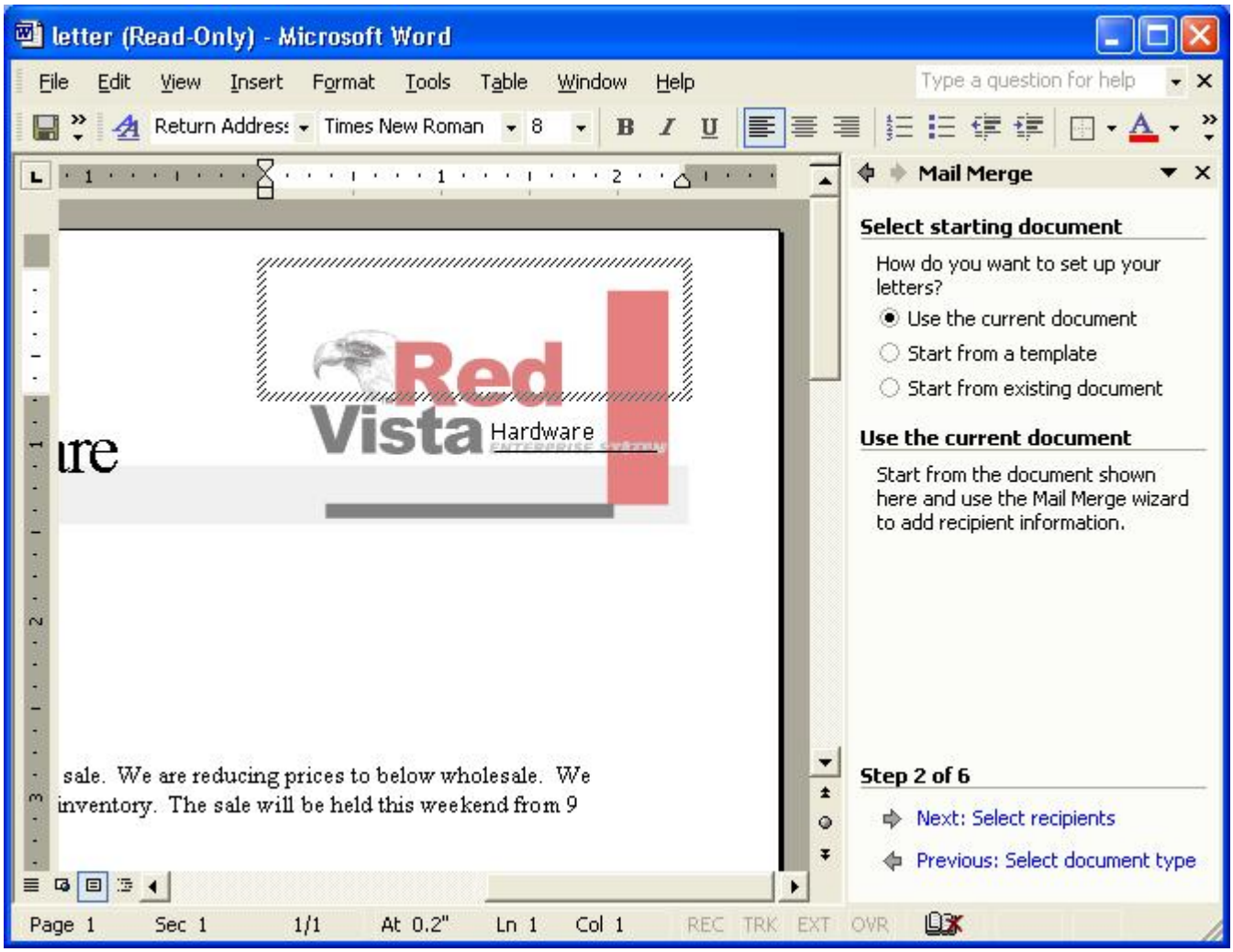

Document1 - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Normal
Times New Roman
12
New Document
Open a document
Documents...
New
Blank Document
Blank Web Page
Blank E-mail Message
New from existing document
Choose document...
New from template
General Templates...
Templates on my Web Sites...
Templates on Microsoft.com
Add Network Place...
Microsoft Word Help
Show at startup
Page 1 Sec 1 1/1 At 1" Ln 1 Col 1 REC TRK EXT OVR

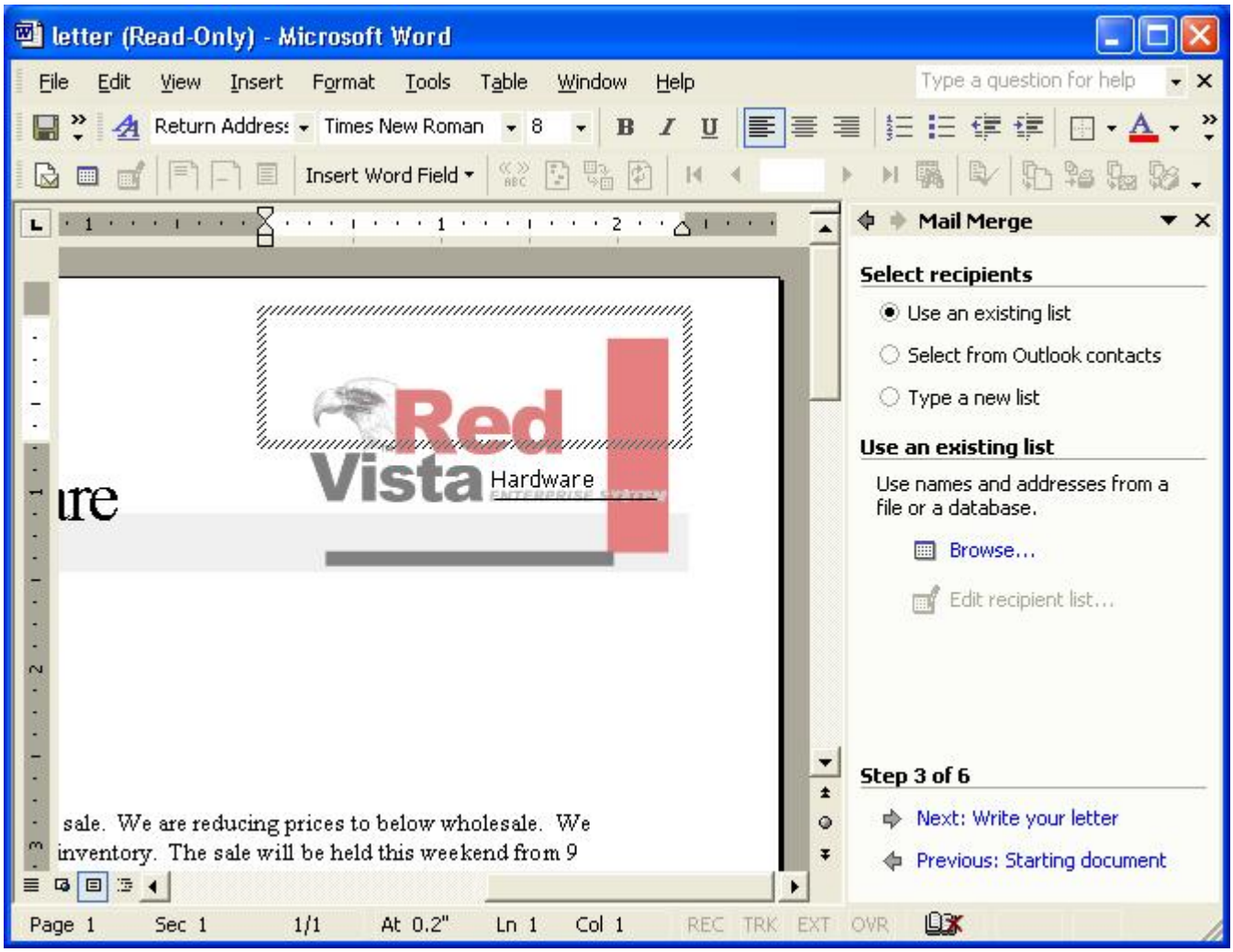

Open
Look in:
My Documents
Tools
My Data Sources
My Music
My Pictures
History
My Documents
Desktop
Favorites
My Network Places
File name:
k.fremont.ca.us/qantel/qicware/doc/download/letter.doc
Open
Files of type:
All Word Documents
Cancel

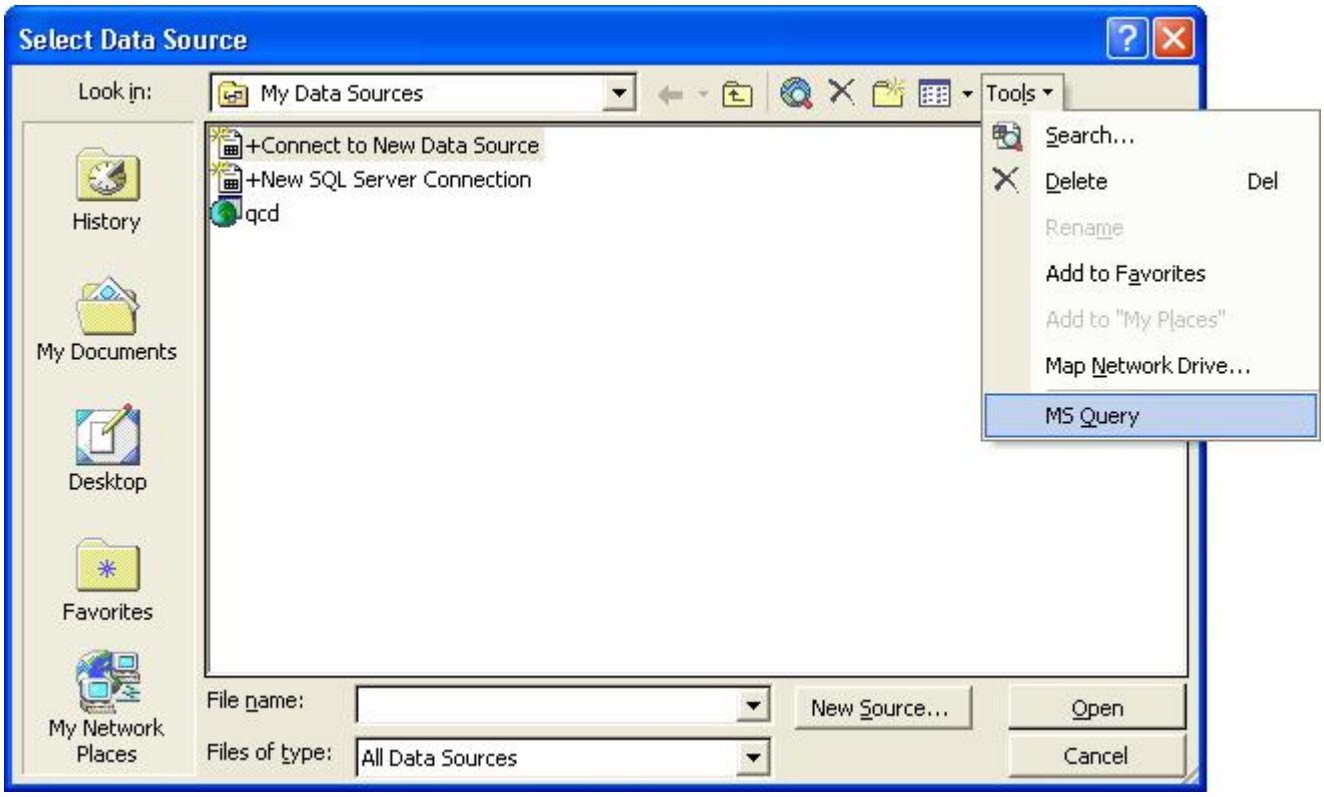

letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Return Address
Times New Roman
8
RedVista Hardware
October 22, 2002
[Click here and type recipient's address]
Dear Sir or Madam:
Red Vista Hardware is having a huge blowout sale. We are reducing prices to below wholesale. We are overstocked and must make room for new inventory. The sale will be held this weekend from 9 am. To 5 pm. We hope you can attend.
Page 1 Sec 1 1/1 At 0.2" Ln 1 Col 1 REC TRK EXT OVR

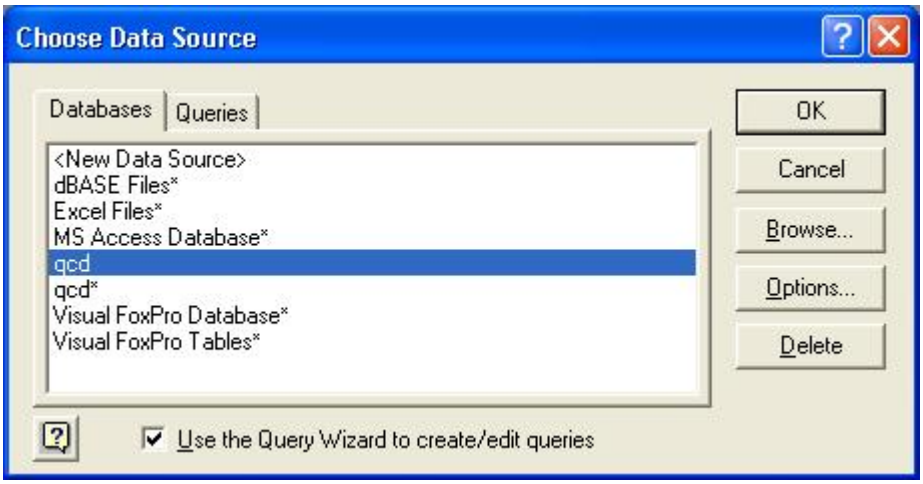

letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Spelling and Grammar... F7
Language
Word Count...
Letters and Mailings
Tools on the Web...
Customize...
Options...
Mail Merge Wizard...
Show Mail Merge Toolbar
Envelopes and Labels...
Letter Wizard...
RedVista Hardware
October 22, 2002
[Click here and type recipient's address]
Dear Sir or Madam:
Red Vista Hardware is having a huge blowout sale. We are reducing prices to below wholesale. We are overstocked and must make room for new inventory. The sale will be held this weekend from 9 am. To 5 pm. We hope you can attend.
Page 1 Sec 1 1/1 At 0.2" Ln 1 Col 1 REC TRK EXT OVR


letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Return Address
Times New Roman
8
Mail Merge
Select document type
What type of document are you working on?
Letters
E-mail messages
Envelopes
Labels
Directory
Letters
Send letters to a group of people. You can personalize the letter that each person receives.
Click Next to continue.
Step 1 of 6
Next: Starting document
Red Vista Hardware
sale. We are reducing prices to below wholesale. We
inventory. The sale will be held this weekend from 9
Page 1 Sec 1 1/1 At 0.2" Ln 1 Col 1 REC TRK EXT OVR

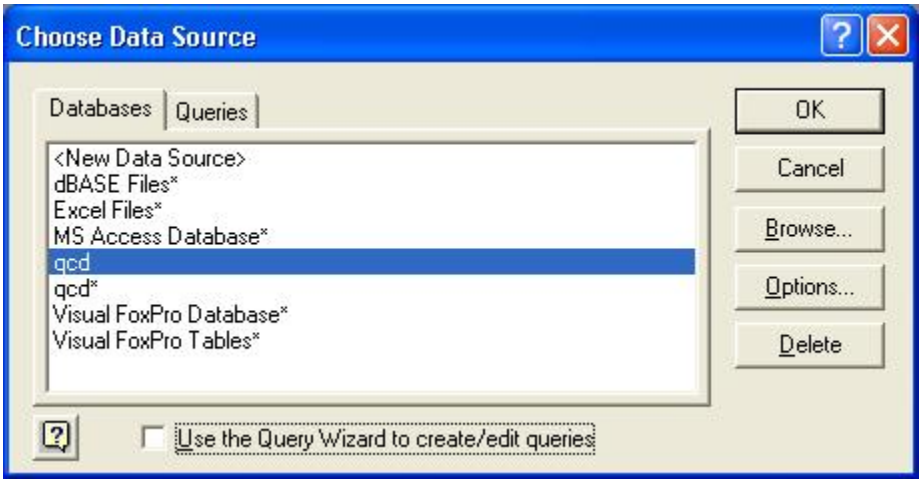

letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Return Address
Times New Roman
8
Mail Merge
Select starting document
How do you want to set up your letters?
Use the current document
Start from a template
Start from existing document
Use the current document
Start from the document shown here and use the Mail Merge wizard to add recipient information.
Red Vista Hardware
sale. We are reducing prices to below wholesale. We
inventory. The sale will be held this weekend from 9
Step 2 of 6
Next: Select recipients
Previous: Select document type
Page 1 Sec 1 1/1 At 0.2" Ln 1 Col 1 REC TRK EXT OVR


letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Return Address
Times New Roman
8
Insert Word Field
Mail Merge
Select recipients
Use an existing list
Select from Outlook contacts
Type a new list
Use an existing list
Use names and addresses from a file or a database.
Browse...
Edit recipient list...
Step 3 of 6
Next: Write your letter
Previous: Starting document
Red Vista Hardware
sale. We are reducing prices to below wholesale. We
inventory. The sale will be held this weekend from 9
Page 1 Sec 1 1/1 At 0.2" Ln 1 Col 1 REC TRK EXT OVR

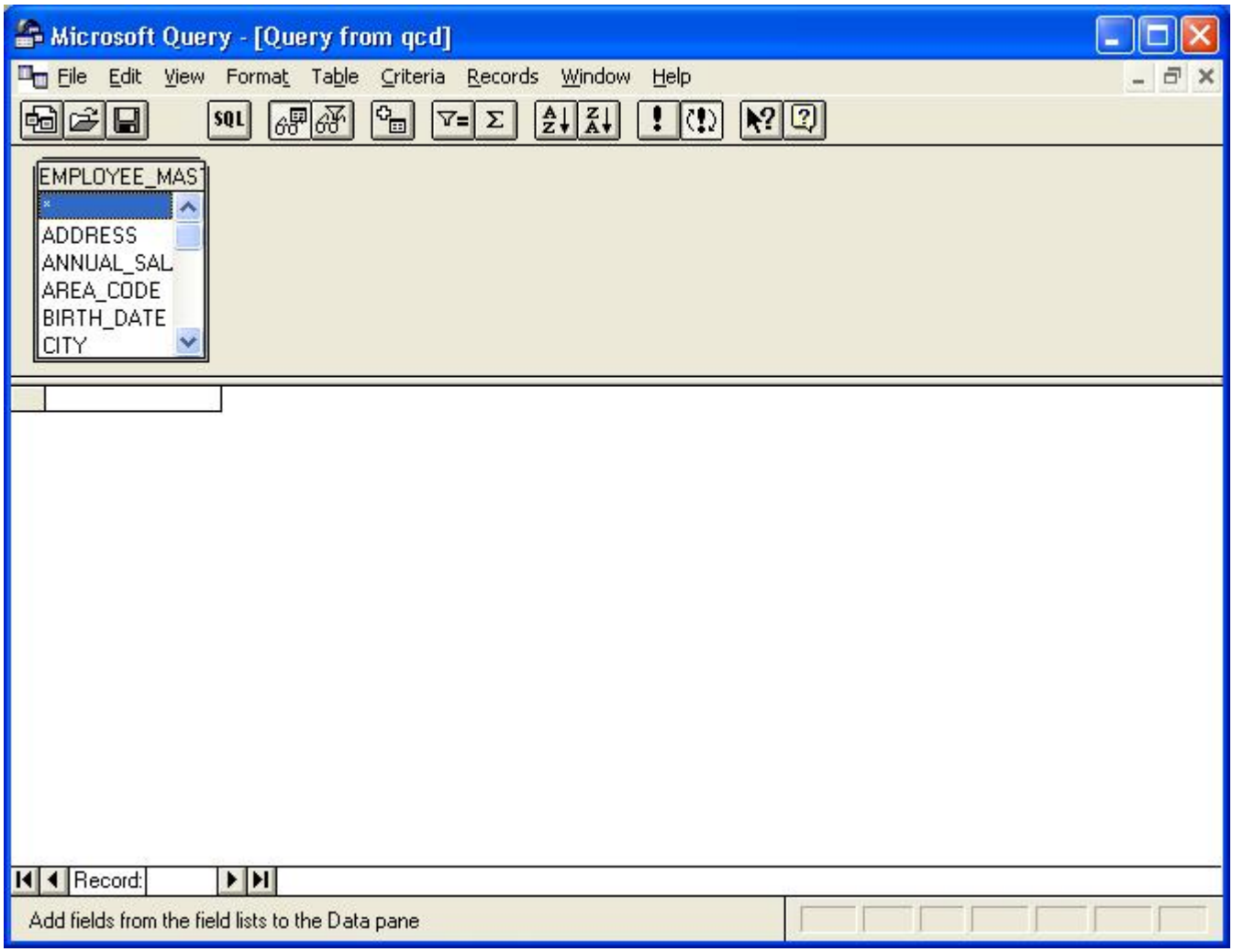

Select Data Source
Look in:
My Data Sources
Tools
+Connect to New Data Source
+New SQL Server Connection
qcd
Search...
Delete Del
Rename
Add to Favorites
Add to "My Places"
Map Network Drive...
MS Query
History
My Documents
Desktop
Favorites
My Network Places
File name:
Files of type:
All Data Sources
New Source...
Open
Cancel

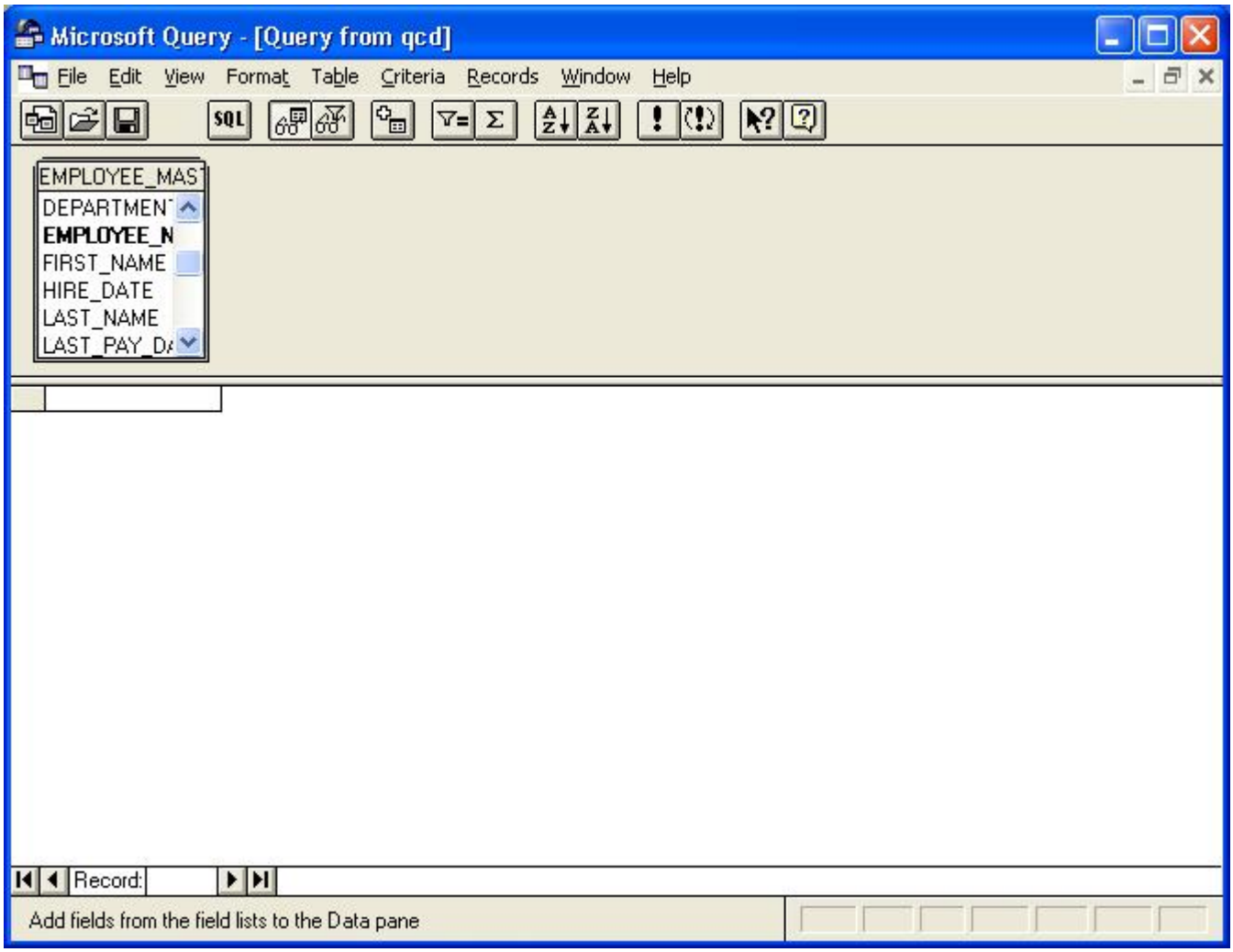

Choose Data Source
Databases
Queries
<New Data Source>
dBASE Files*
Excel Files*
MS Access Database*
qcd
qcd*
Visual FoxPro Database*
Visual FoxPro Tables*
OK
Cancel
Browse...
Options...
Delete
Use the Query Wizard to create/edit queries

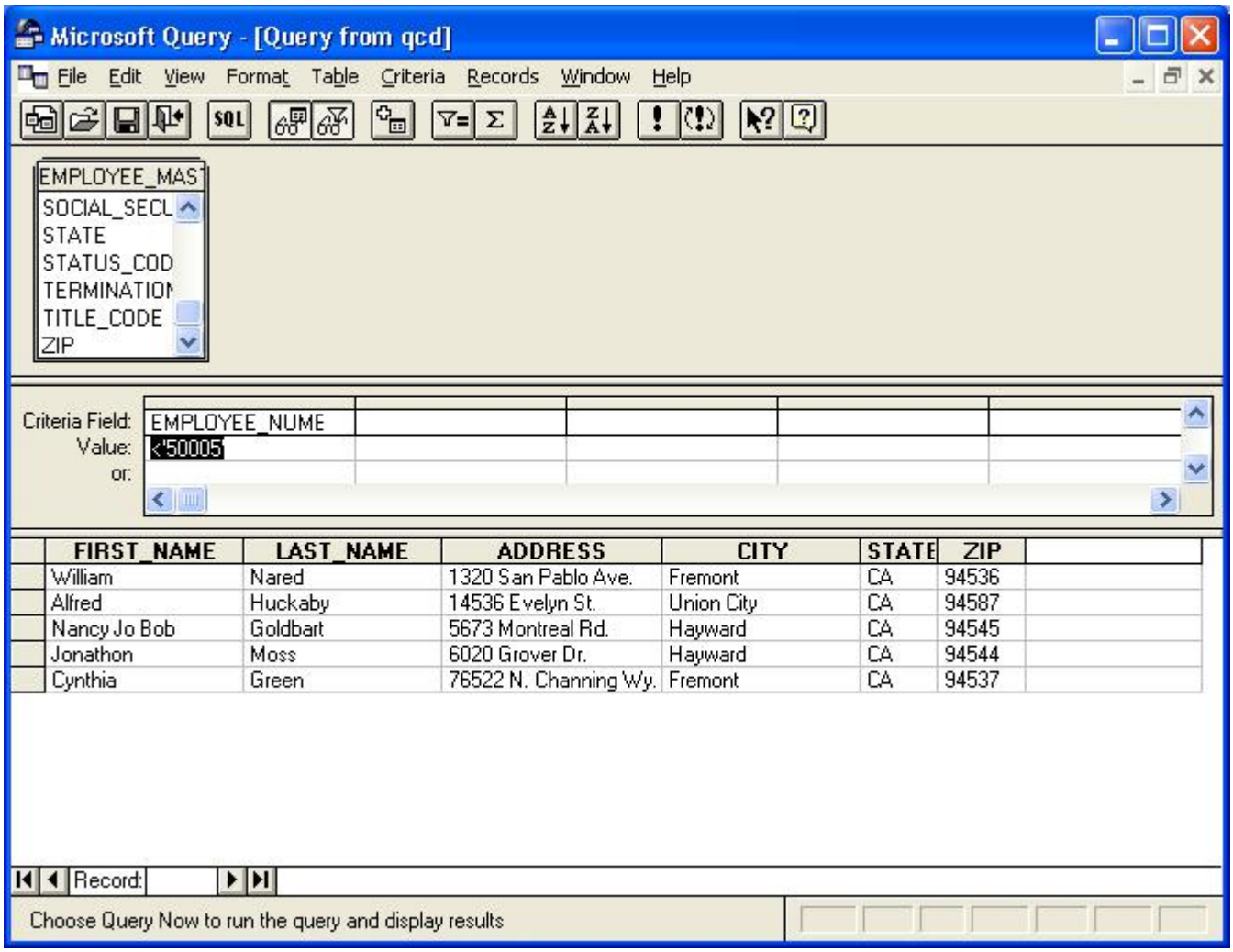

Logon to Qicware32
User Name:
Password:
OK
Cancel

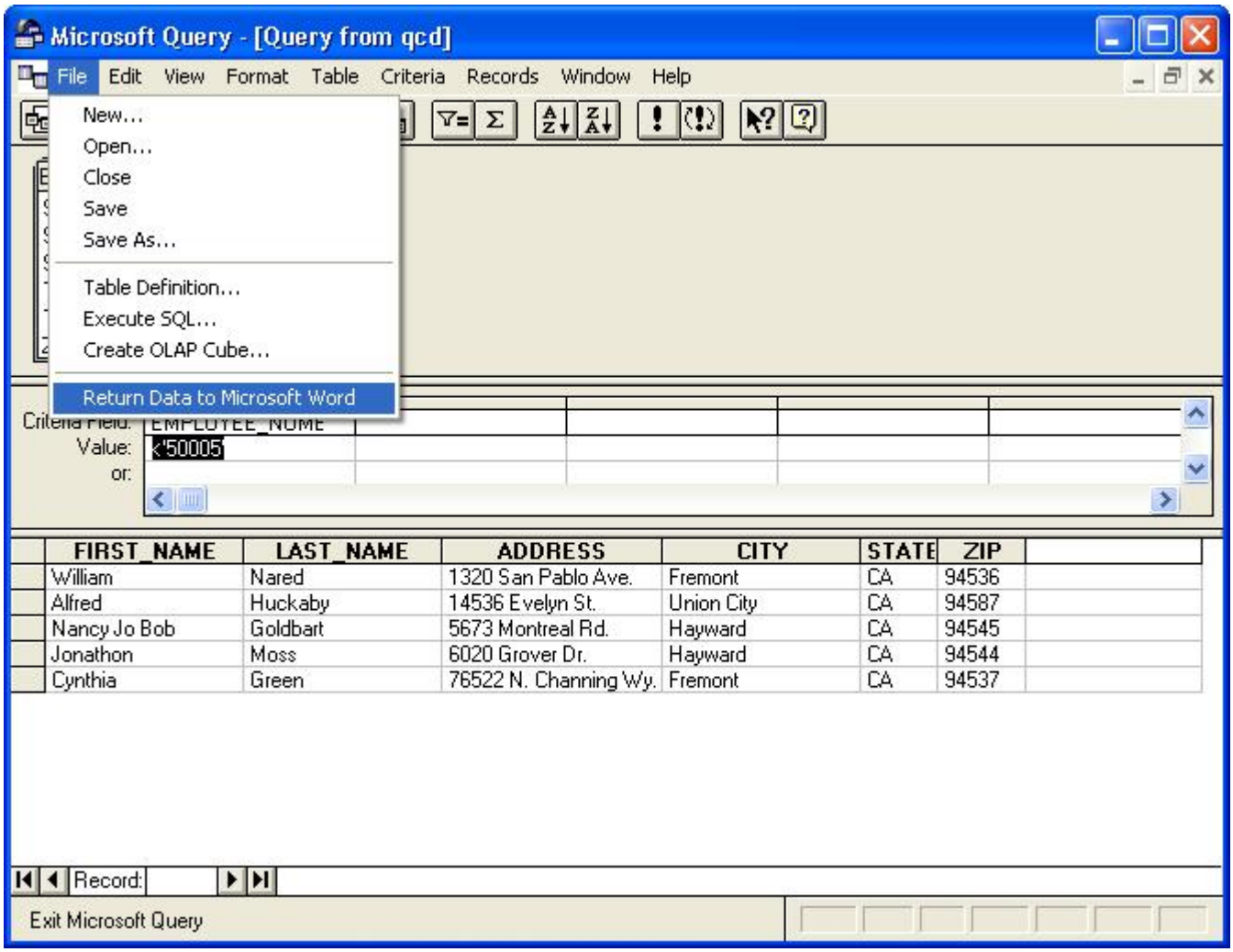

Choose Data Source
Databases
Queries
<New Data Source>
dBASE Files*
Excel Files*
MS Access Database*
qcd
qcd*
Visual FoxPro Database*
Visual FoxPro Tables*
OK
Cancel
Browse...
Options...
Delete
Use the Query Wizard to create/edit queries

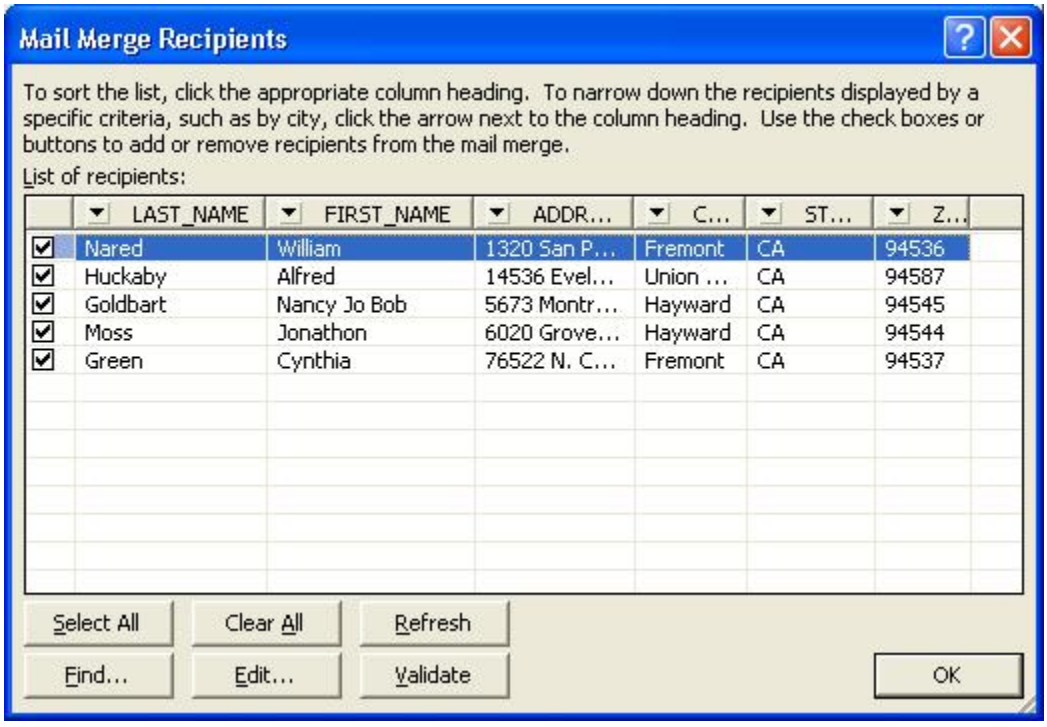

Add Tables
Table:
DEPARTMENTS
EMPLOYEE_HOURS
EMPLOYEE_MASTER
EMPLOYEE_STATUS
EMPLOYEE_TITLES
Add
Close
Options...
Owner:
<All>
Database:

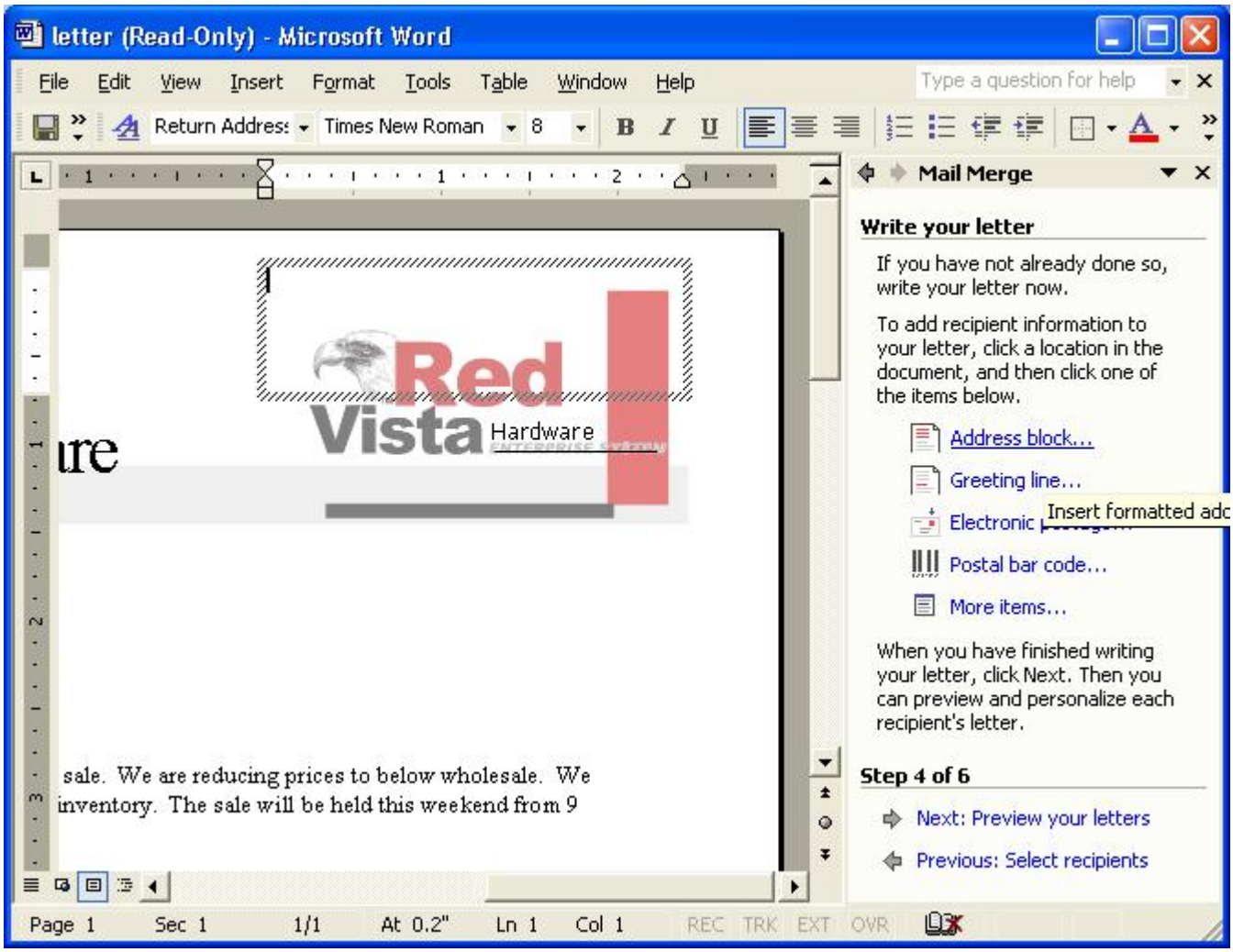

Microsoft Query - [Query from qcd]
File Edit View Format Table Criteria Records Window Help
SQL
EMPLOYEE_MAS
*
ADDRESS
ANNUAL_SAL
AREA_CODE
BIRTH_DATE
CITY
Record:
Add fields from the field lists to the Data pane

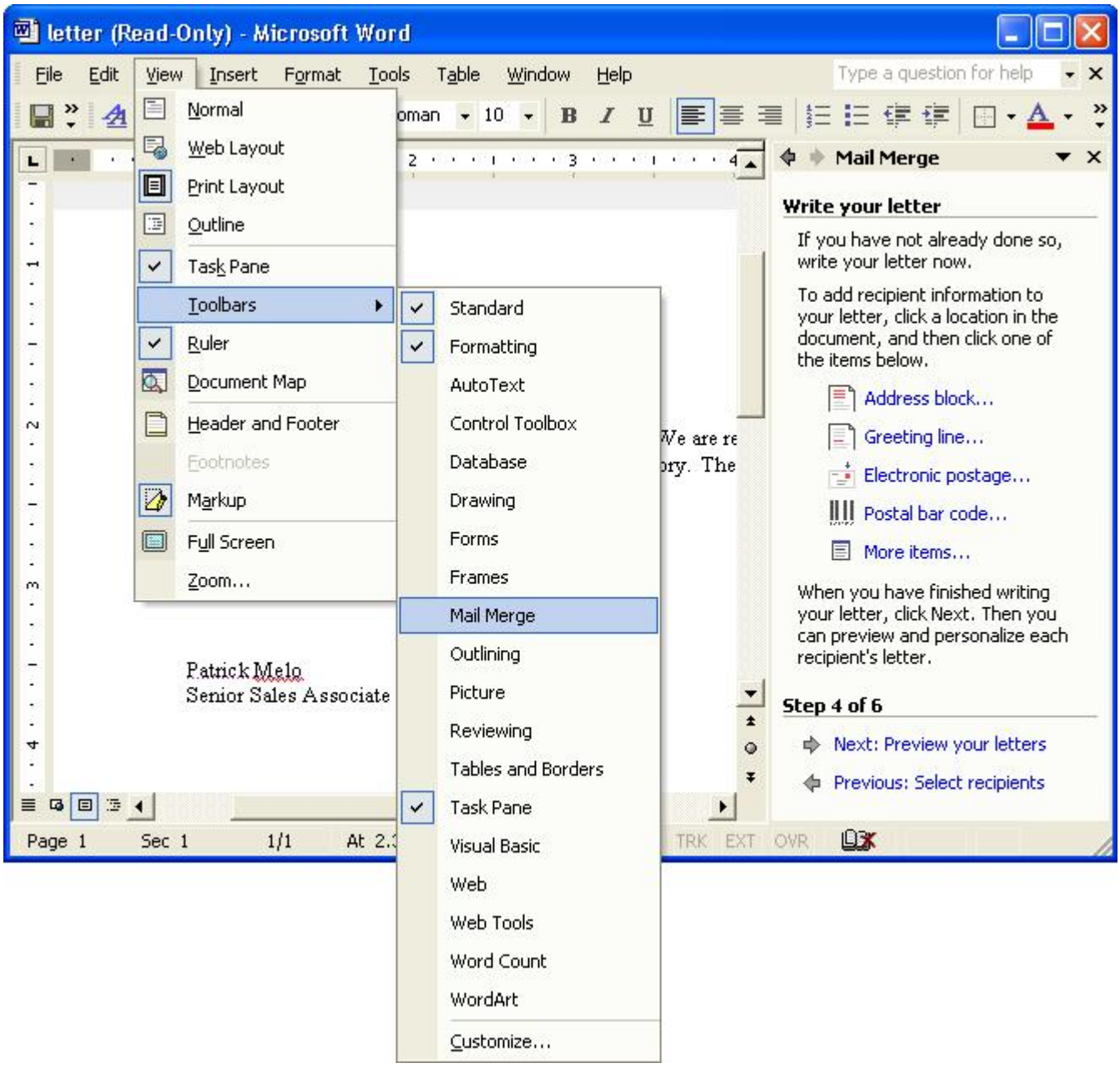

Microsoft Query - [Query from qcd]
File Edit View Format Table Criteria Records Window Help
SQL
EMPLOYEE_MAS
DEPARTMEN
EMPLOYEE_N
FIRST_NAME
HIRE_DATE
LAST_NAME
LAST_PAY_D
Record:
Add fields from the field lists to the Data pane

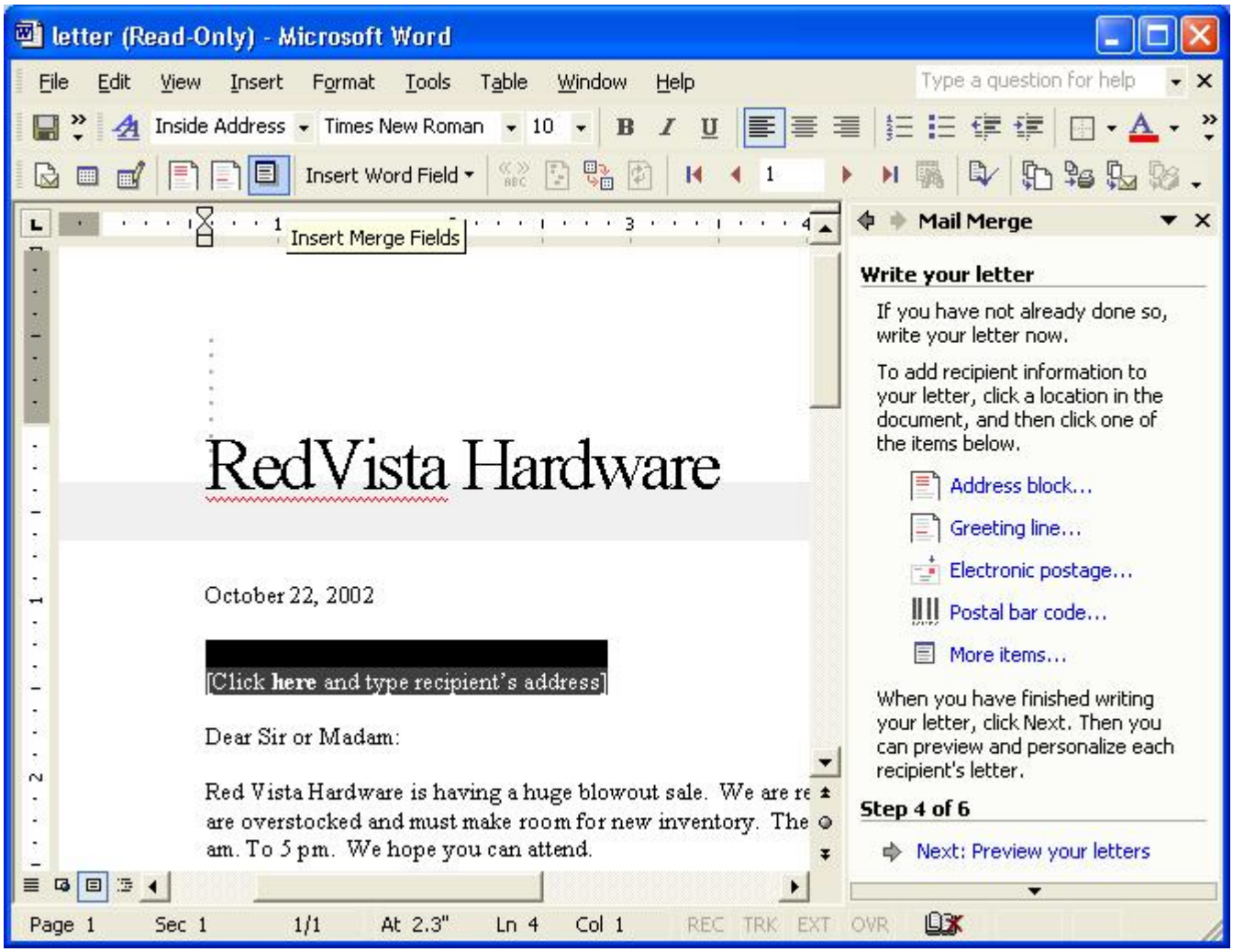

Microsoft Query - [Query from qcd]
File Edit View Format Table Criteria Records Window Help
SQL
EMPLOYEE_MAS
SOCIAL_SECU
STATE
STATUS_COD
TERMINATIOI
TITLE_CODE
ZIP
Criteria Field: EMPLOYEE_NUME
Value: <'50005
or:
FIRST_NAME LAST_NAME ADDRESS CITY STATE ZIP
William Nared 1320 San Pablo Ave. Fremont CA 94536
Alfred Huckaby 14536 Evelyn St. Union City CA 94587
Nancy Jo Bob Goldbart 5673 Montreal Rd. Hayward CA 94545
Jonathon Moss 6020 Grover Dr. Hayward CA 94544
Cynthia Green 76522 N. Channing Wy. Fremont CA 94537
Record:
Choose Query Now to run the query and display results

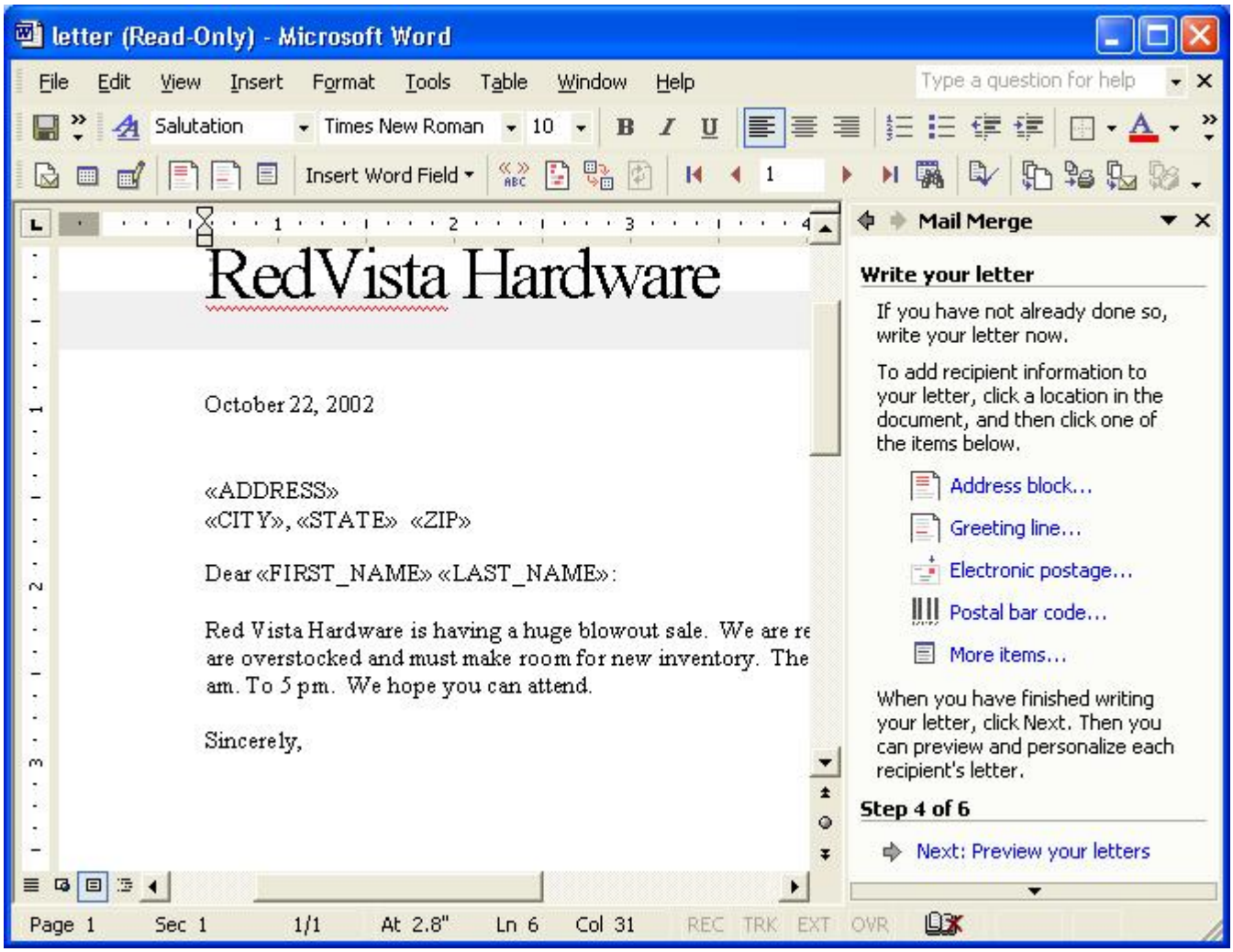

Microsoft Query - [Query from qcd]
File Edit View Format Table Criteria Records Window Help
New...
Open...
Close
Save
Save As...
Table Definition...
Execute SQL...
Create OLAP Cube...
Return Data to Microsoft Word
Value:
<'50005
or:
FIRST_NAME LAST_NAME ADDRESS CITY STATE ZIP
William Nared 1320 San Pablo Ave. Fremont CA 94536
Alfred Huckaby 14536 Evelyn St. Union City CA 94587
Nancy Jo Bob Goldbart 5673 Montreal Rd. Hayward CA 94545
Jonathon Moss 6020 Grover Dr. Hayward CA 94544
Cynthia Green 76522 N. Channing Wy. Fremont CA 94537
Record:
Exit Microsoft Query


Mail Merge Recipients
To sort the list, click the appropriate column heading. To narrow down the recipients displayed by a specific criteria, such as by city, click the arrow next to the column heading. Use the check boxes or buttons to add or remove recipients from the mail merge.
List of recipients:
LAST_NAME
FIRST_NAME
ADDR...
C...
ST...
Z...
Nared
William
1320 San P...
Fremont
CA
94536
Huckaby
Alfred
14536 Evel...
Union ...
CA
94587
Goldbart
Nancy Jo Bob
5673 Montr...
Hayward
CA
94545
Moss
Jonathon
6020 Grove...
Hayward
CA
94544
Green
Cynthia
76522 N. C...
Fremont
CA
94537
Select All
Clear All
Refresh
Find...
Edit...
Validate
OK

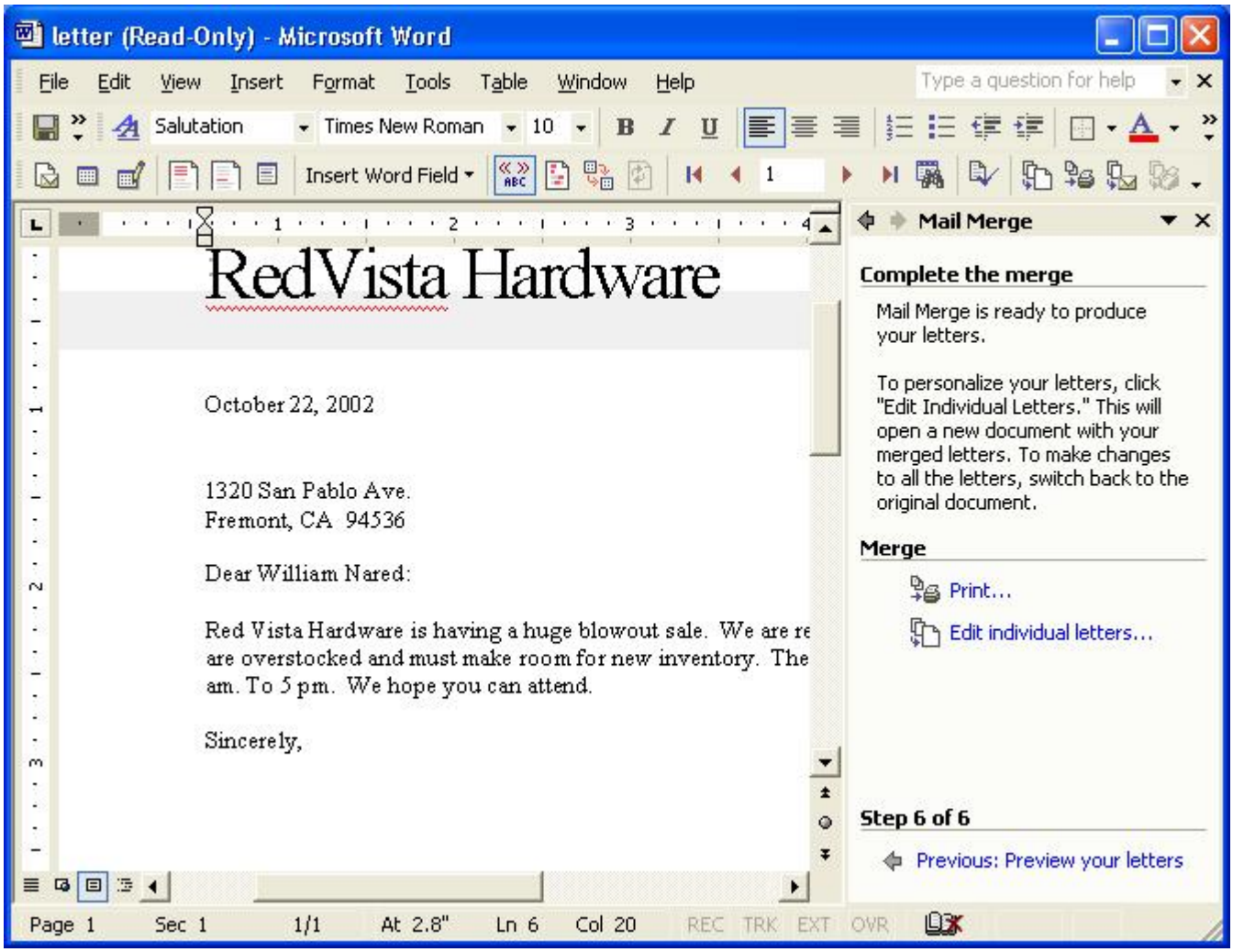

letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Return Address
Times New Roman
8
Mail Merge
Write your letter
If you have not already done so, write your letter now.
To add recipient information to your letter, click a location in the document, and then click one of the items below.
Address block...
Greeting line...
Electronic
Insert formatted add
Postal bar code...
More items...
When you have finished writing your letter, click Next. Then you can preview and personalize each recipient's letter.
Step 4 of 6
Next: Preview your letters
Previous: Select recipients
Red Vista Hardware
sale. We are reducing prices to below wholesale. We
inventory. The sale will be held this weekend from 9
Page 1 Sec 1 1/1 At 0.2" Ln 1 Col 1 REC TRK EXT OVR


letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Normal
Web Layout
Print Layout
Outline
Task Pane
Toolbars
Ruler
Document Map
Header and Footer
Footnotes
Markup
Full Screen
Zoom...
Standard
Formatting
AutoText
Control Toolbox
Database
Drawing
Forms
Frames
Mail Merge
Outlining
Picture
Reviewing
Tables and Borders
Task Pane
Visual Basic
Web
Web Tools
Word Count
WordArt
Customize...
Mail Merge
Write your letter
If you have not already done so, write your letter now.
To add recipient information to your letter, click a location in the document, and then click one of the items below.
Address block...
Greeting line...
Electronic postage...
Postal bar code...
More items...
When you have finished writing your letter, click Next. Then you can preview and personalize each recipient's letter.
Step 4 of 6
Next: Preview your letters
Previous: Select recipients
Patrick Melo
Senior Sales Associate
Page 1 Sec 1 1/1
TRK EXT OVR


letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Inside Address
Times New Roman
10
Insert Word Field
Insert Merge Fields
RedVista Hardware
October 22, 2002
[Click here and type recipient's address]
Dear Sir or Madam:
Red Vista Hardware is having a huge blowout sale. We are re
are overstocked and must make room for new inventory. The
am. To 5 pm. We hope you can attend.
Mail Merge
Write your letter
If you have not already done so, write your letter now.
To add recipient information to your letter, click a location in the document, and then click one of the items below.
Address block...
Greeting line...
Electronic postage...
Postal bar code...
More items...
When you have finished writing your letter, click Next. Then you can preview and personalize each recipient's letter.
Step 4 of 6
Next: Preview your letters
Page 1 Sec 1 1/1 At 2.3" Ln 4 Col 1 REC TRK EXT OVR

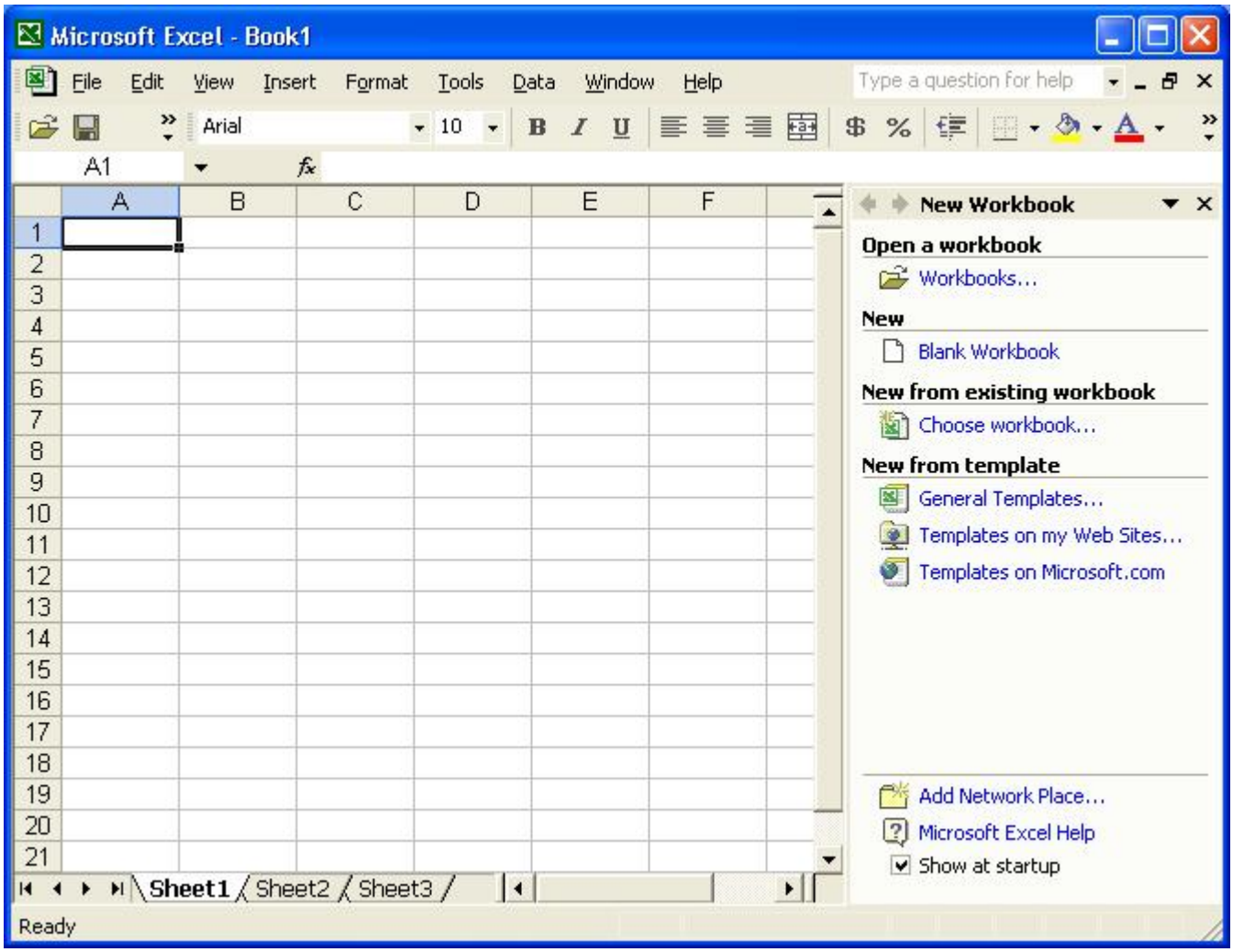

letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Salutation
Times New Roman
10
Insert Word Field
RedVista Hardware
October 22, 2002
«ADDRESS»
«CITY», «STATE» «ZIP»
Dear «FIRST_NAME» «LAST_NAME»:
Red Vista Hardware is having a huge blowout sale. We are re
are overstocked and must make room for new inventory. The
am. To 5 pm. We hope you can attend.
Sincerely,
Mail Merge
Write your letter
If you have not already done so, write your letter now.
To add recipient information to your letter, click a location in the document, and then click one of the items below.
Address block...
Greeting line...
Electronic postage...
Postal bar code...
More items...
When you have finished writing your letter, click Next. Then you can preview and personalize each recipient's letter.
Step 4 of 6
Next: Preview your letters
Page 1 Sec 1 1/1 At 2.8" Ln 6 Col 31 REC TRK EXT OVR

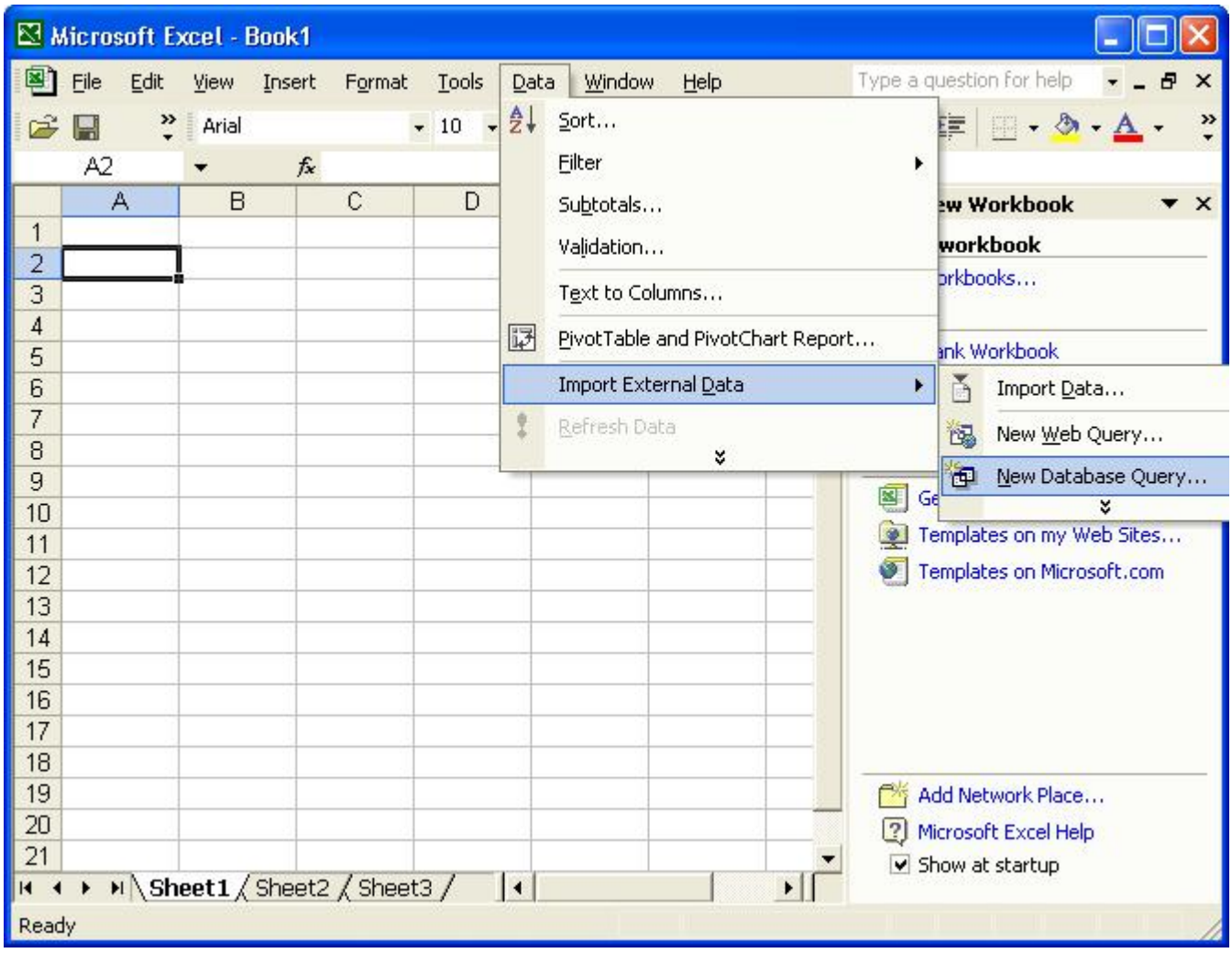

letter (Read-Only) - Microsoft Word
File Edit View Insert Format Tools Table Window Help
Type a question for help
Salutation
Times New Roman
10
Insert Word Field
RedVista Hardware
October 22, 2002
1320 San Pablo Ave.
Fremont, CA 94536
Dear William Nared,
Red Vista Hardware is having a huge blowout sale. We are re
are overstocked and must make room for new inventory. The
am. To 5 pm. We hope you can attend.
Sincerely,
Mail Merge
previewed here. To preview another letter, click one of the following:
<<
Recipient: 1
>>
Find a recipient...
Make changes
You can also change your recipient list:
Edit recipient list...
Exclude this recipient
When you have finished previewing your letters, click Next. Then you can print the merged letters or edit individual letters to add personal comments.
Step 5 of 6
Next: Complete the merge
Previous: Write your letter
Page 1 Sec 1 1/1 At 2.8" Ln 6 Col 20 REC TRK EXT OVR

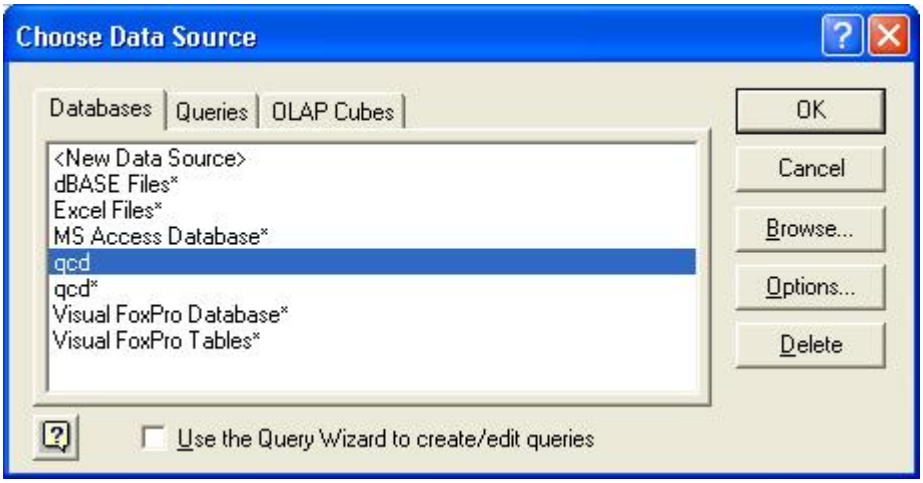


Microsoft Excel pie chart

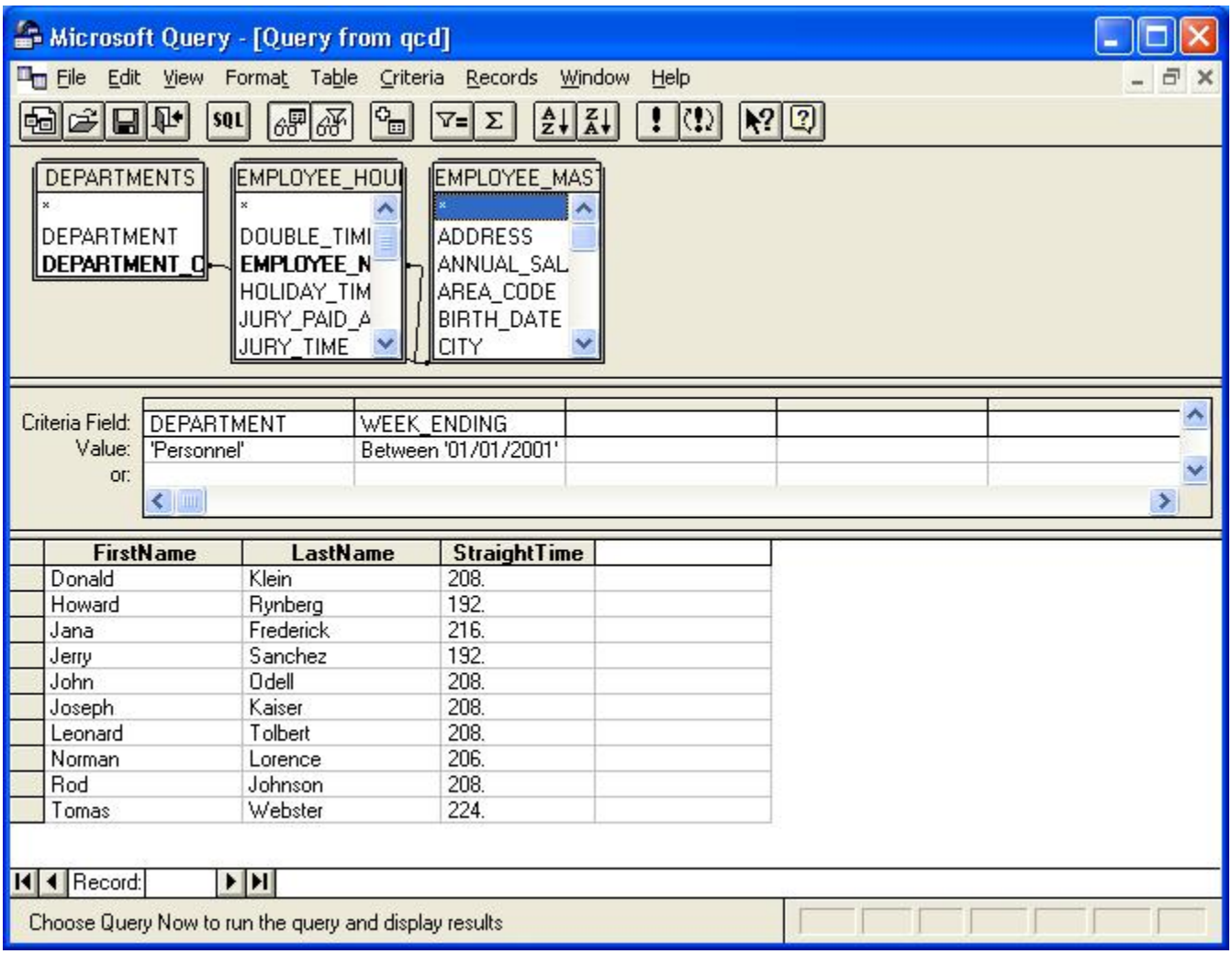
Our second example will use Excel to help us analyze information in our QICWARE database. Lets start off with a simple query. This one retrieves a result set with the first few employee numbers in our database along with the total amount of straight time for each of those employees.

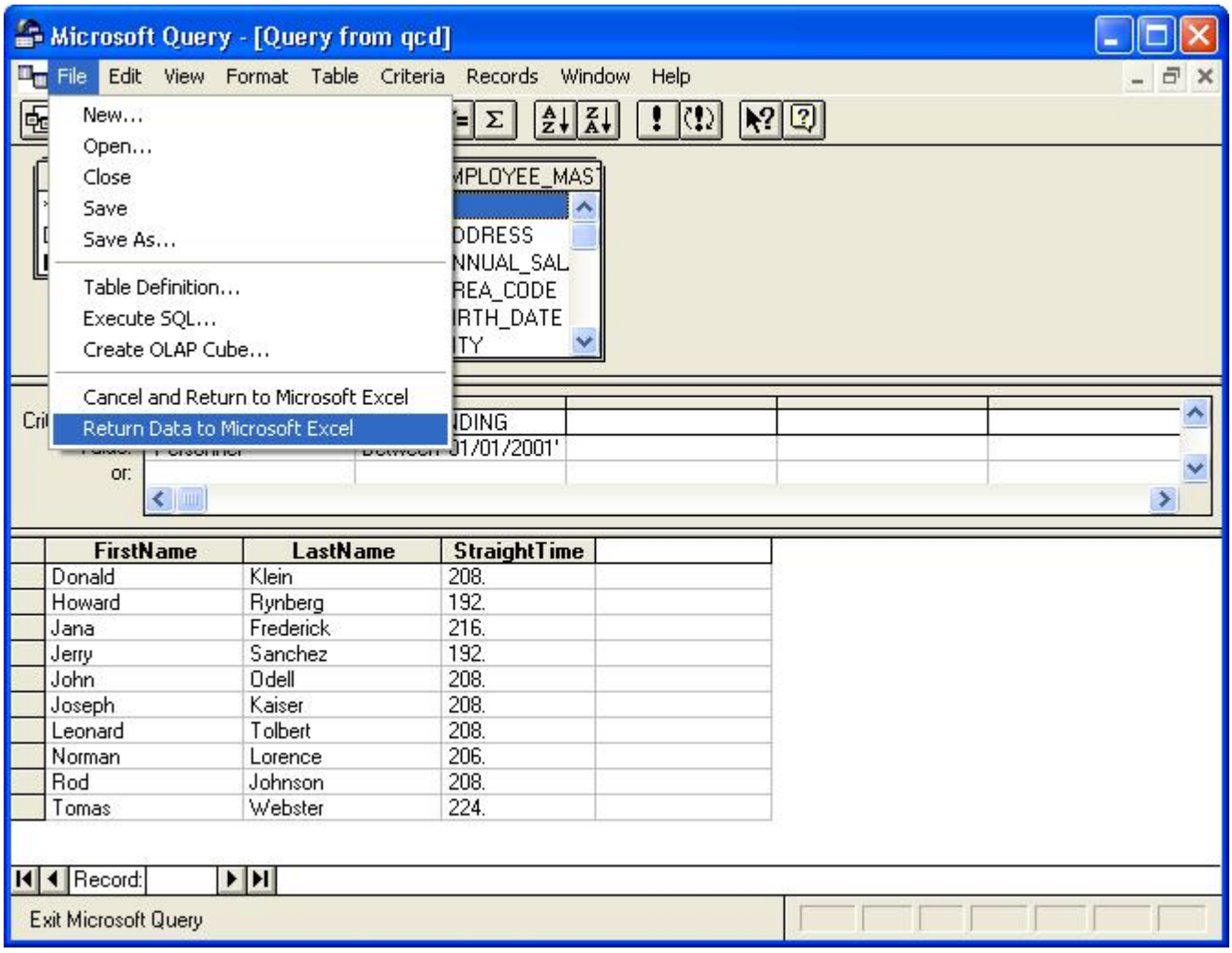

Microsoft Excel - Book1
File Edit View Insert Format Tools Data Window Help
Type a question for help
Arial 10
A1
A B C D E F
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
Sheet1 Sheet2 Sheet3
Ready
New Workbook
Open a workbook
Workbooks...
New
Blank Workbook
New from existing workbook
Choose workbook...
New from template
General Templates...
Templates on my Web Sites...
Templates on Microsoft.com
Add Network Place...
Microsoft Excel Help
Show at startup

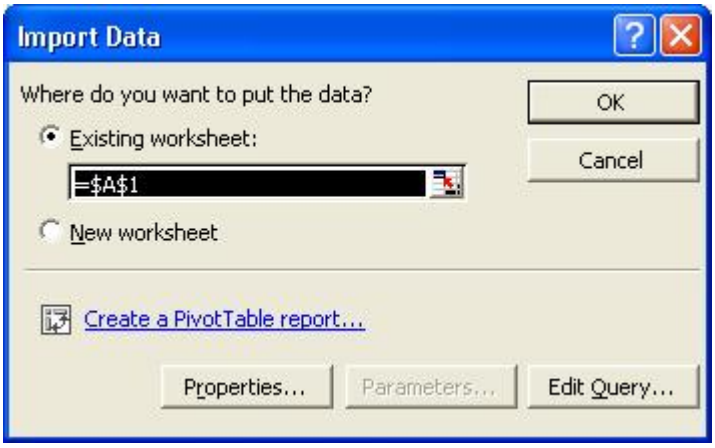

Microsoft Excel - Book1
File Edit View Insert Format Tools Data Window Help
Type a question for help
Arial 10
A2
Sort...
Filter
Subtotals...
Validation...
Text to Columns...
PivotTable and PivotChart Report...
Import External Data
Refresh Data
Import Data...
New Web Query...
New Database Query...
Templates on my Web Sites...
Templates on Microsoft.com
Add Network Place...
Microsoft Excel Help
Show at startup
Sheet1 Sheet2 Sheet3
Ready

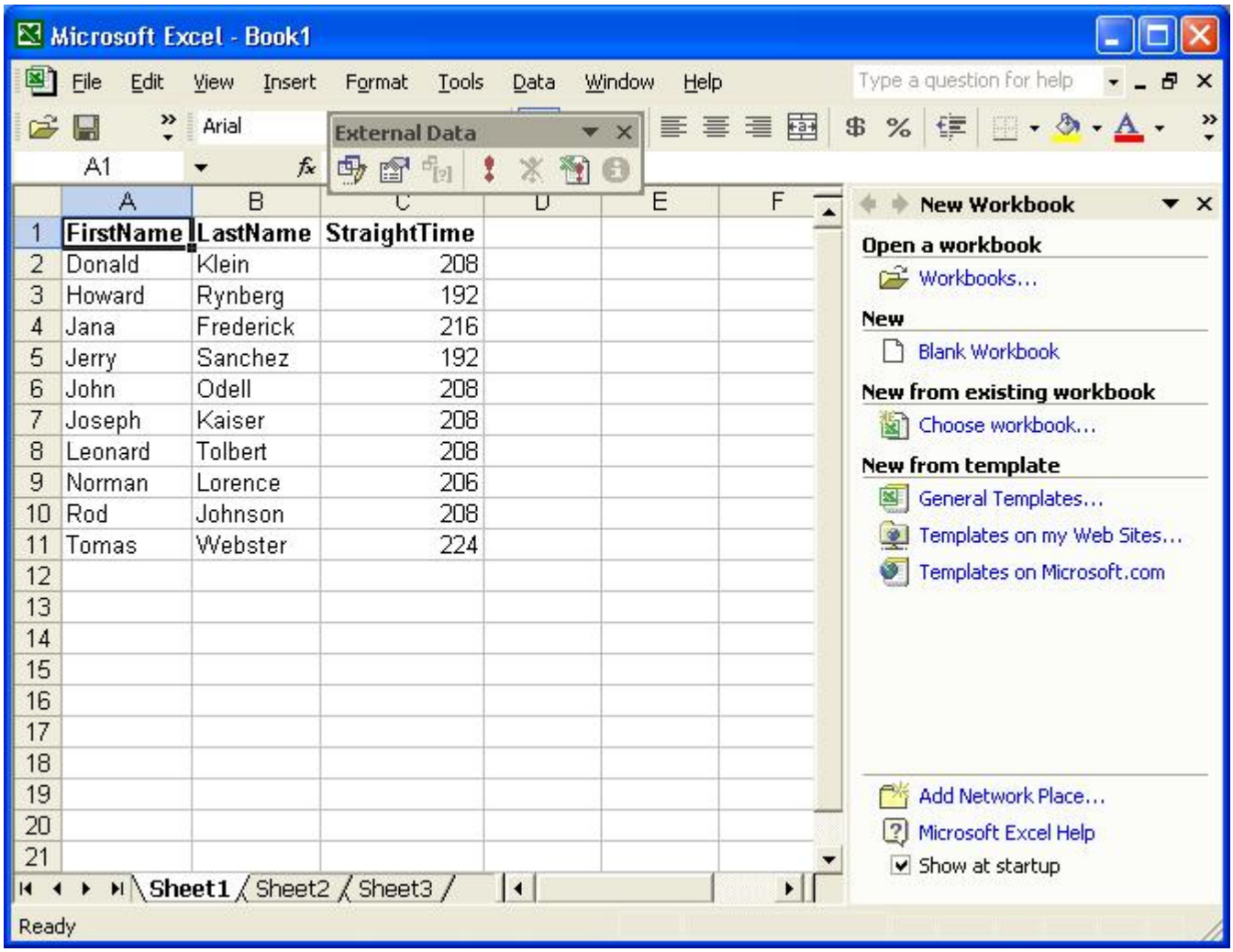

Choose Data Source
Databases
Queries
OLAP Cubes
<New Data Source>
dBASE Files*
Excel Files*
MS Access Database*
qcd
qcd*
Visual FoxPro Database*
Visual FoxPro Tables*
OK
Cancel
Browse...
Options...
Delete
Use the Query Wizard to create/edit queries

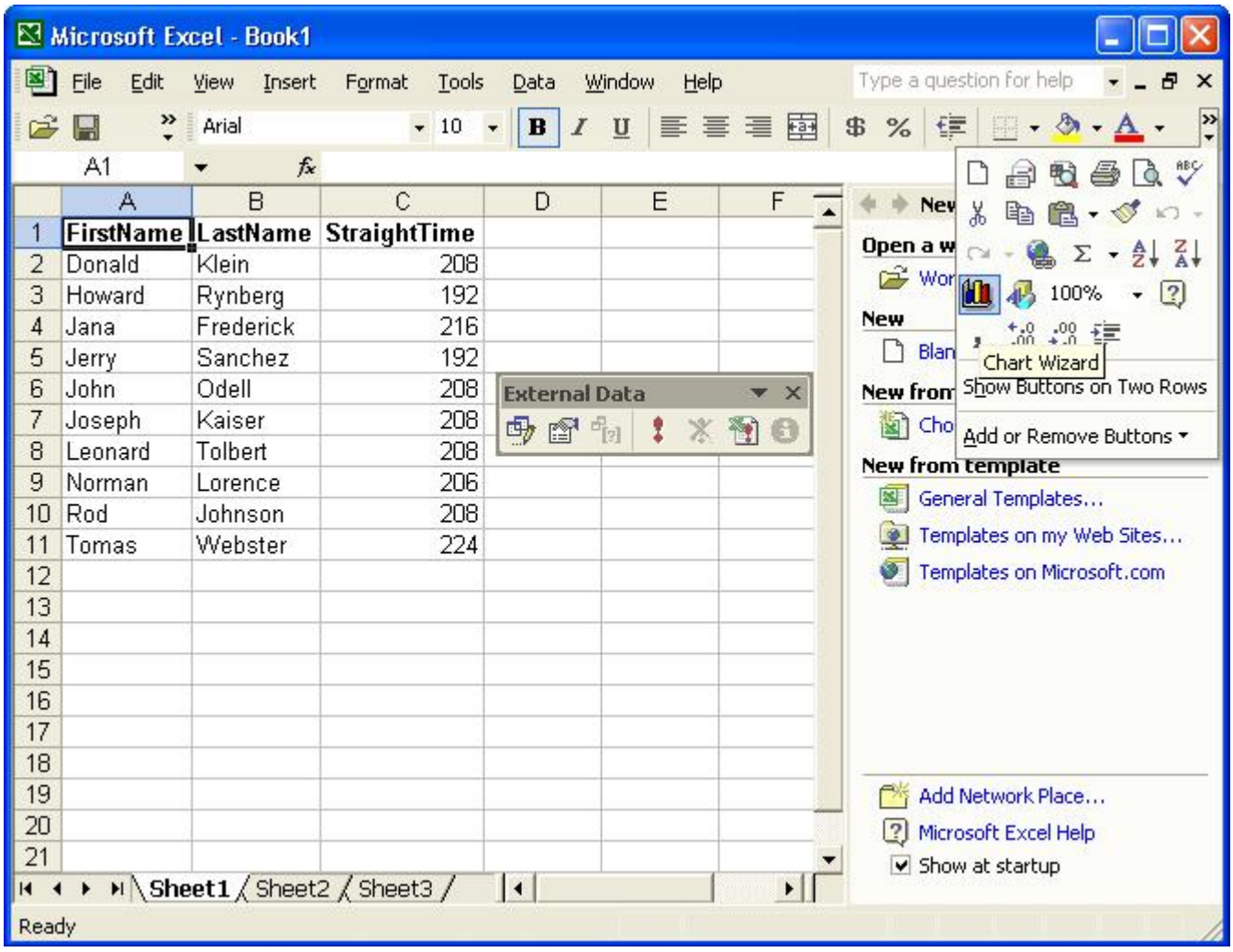

Logon to Qicware32
User Name:
Password:
OK
Cancel


Microsoft Query - [Query from qcd]
File Edit View Format Table Criteria Records Window Help
SQL
DEPARTMENTS
*
DEPARTMENT
DEPARTMENT_C
EMPLOYEE_HOU
*
DOUBLE_TIMI
EMPLOYEE_N
HOLIDAY_TIM
JURY_PAID_A
JURY_TIME
EMPLOYEE_MAS
*
ADDRESS
ANNUAL_SAL
AREA_CODE
BIRTH_DATE
CITY
Criteria Field: DEPARTMENT WEEK_ENDING
Value: 'Personnel' Between '01/01/2001'
or:
FirstName LastName StraightTime
Donald Klein 208.
Howard Rynberg 192.
Jana Frederick 216.
Jerry Sanchez 192.
John Odell 208.
Joseph Kaiser 208.
Leonard Tolbert 208.
Norman Lorence 206.
Rod Johnson 208.
Tomas Webster 224.
Record:
Choose Query Now to run the query and display results


Microsoft Query - [Query from qcd]
File Edit View Format Table Criteria Records Window Help
New...
Open...
Close
Save
Save As...
Table Definition...
Execute SQL...
Create OLAP Cube...
Cancel and Return to Microsoft Excel
Return Data to Microsoft Excel
FirstName LastName StraightTime
Donald Klein 208.
Howard Rynberg 192.
Jana Frederick 216.
Jerry Sanchez 192.
John Odell 208.
Joseph Kaiser 208.
Leonard Tolbert 208.
Norman Lorence 206.
Rod Johnson 208.
Tomas Webster 224.
Record:
Exit Microsoft Query


Import Data
Where do you want to put the data?
Existing worksheet:
=A1
New worksheet
OK
Cancel
Create a PivotTable report...
Properties...
Parameters...
Edit Query...


Microsoft Excel - Book1
File Edit View Insert Format Tools Data Window Help
Type a question for help
Arial
External Data
A1
FirstName LastName StraightTime
Donald Klein 208
Howard Rynberg 192
Jana Frederick 216
Jerry Sanchez 192
John Odell 208
Joseph Kaiser 208
Leonard Tolbert 208
Norman Lorence 206
Rod Johnson 208
Tomas Webster 224
Sheet1 Sheet2 Sheet3
Ready
New Workbook
Open a workbook
Workbooks...
New
Blank Workbook
New from existing workbook
Choose workbook...
New from template
General Templates...
Templates on my Web Sites...
Templates on Microsoft.com
Add Network Place...
Microsoft Excel Help
Show at startup


Microsoft Excel - Book1
File Edit View Insert Format Tools Data Window Help
Type a question for help
Arial 10
A1
FirstName LastName StraightTime
Donald Klein 208
Howard Rynberg 192
Jana Frederick 216
Jerry Sanchez 192
John Odell 208
Joseph Kaiser 208
Leonard Tolbert 208
Norman Lorence 206
Rod Johnson 208
Tomas Webster 224
External Data
Chart Wizard
Show Buttons on Two Rows
Add or Remove Buttons
New from template
General Templates...
Templates on my Web Sites...
Templates on Microsoft.com
Add Network Place...
Microsoft Excel Help
Show at startup
Sheet1 Sheet2 Sheet3
Ready

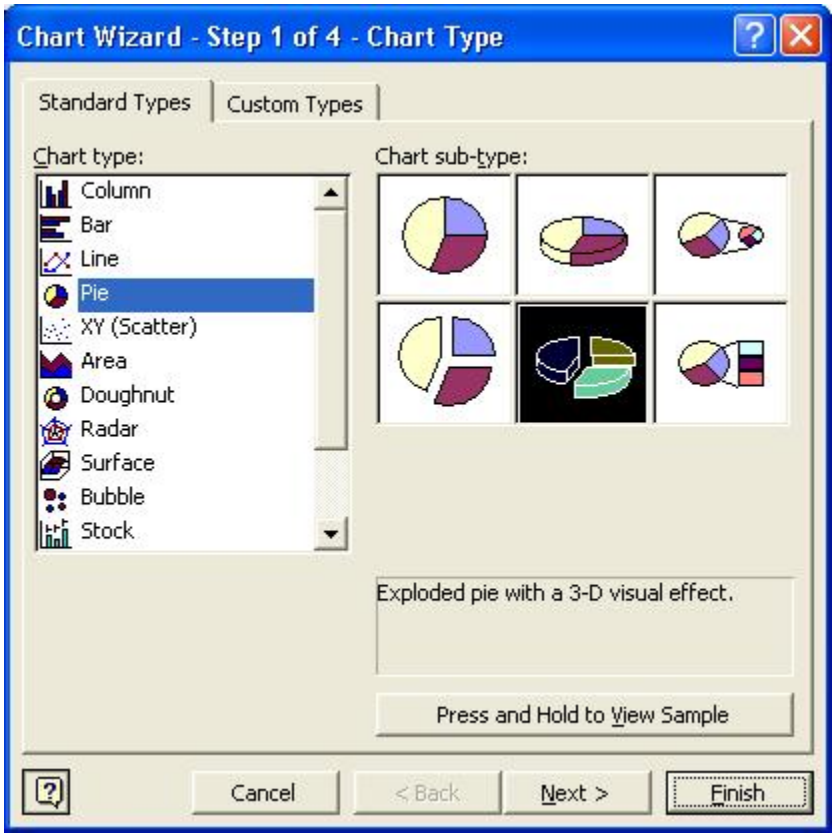
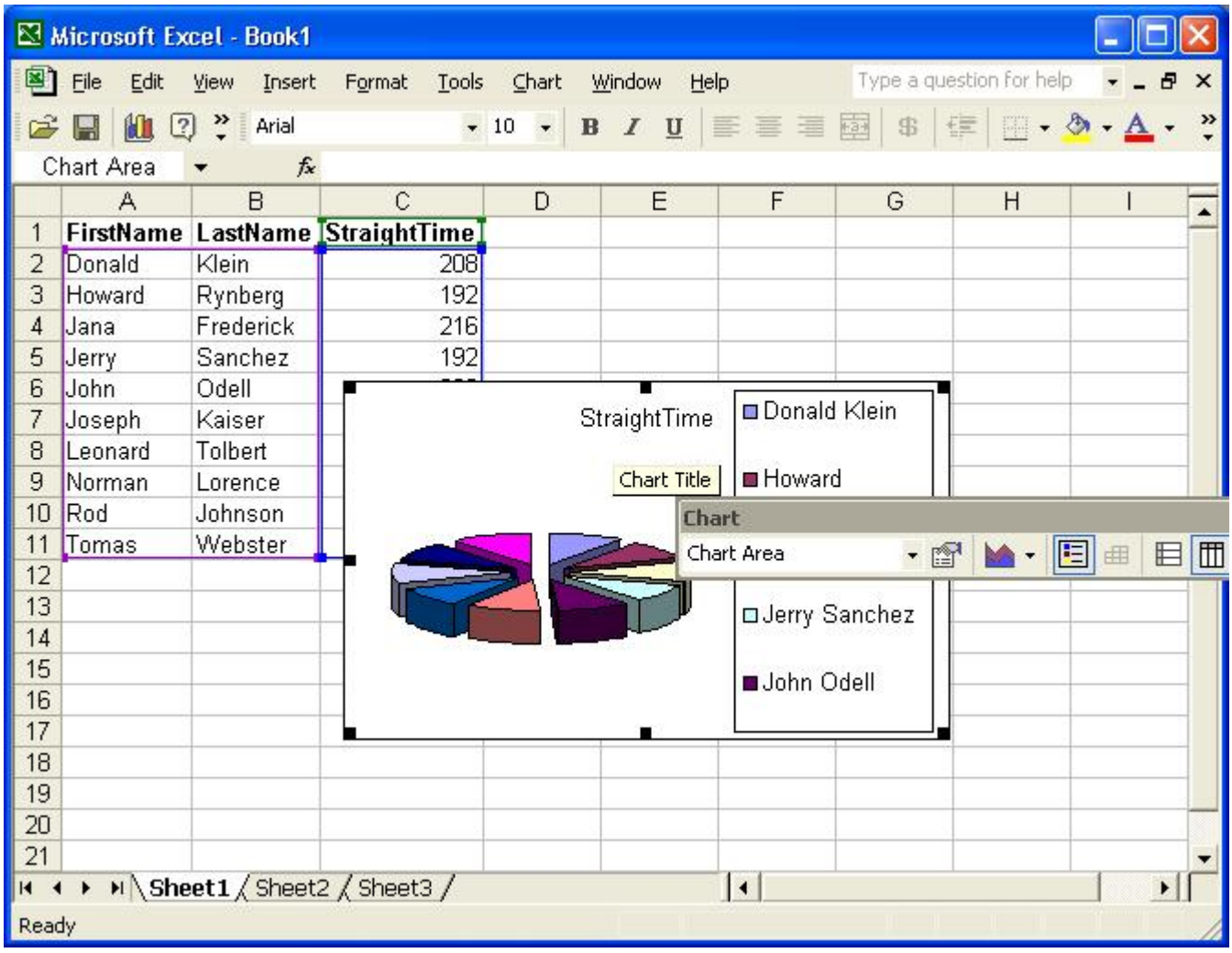


Chart Wizard - Step 1 of 4 - Chart Type
Standard Types
Custom Types
Chart type:
Column
Bar
Line
Pie
XY (Scatter)
Area
Doughnut
Radar
Surface
Bubble
Stock
Chart sub-type:
Exploded pie with a 3-D visual effect.
Press and Hold to View Sample
Cancel
< Back
Next >
Finish



The SQL Server is a very powerful tool. Because it's so powerful, it can also be very dangerous. Requests to delete entire tables can be executed with impunity. Administrators should be very careful who they grant unlimited power to.

Chapter 5. Advanced ODBC

Data Manipulation

Below is a simple query to retrieve the total straight time for a range of employees.

Example 5.1. Straight time

```
SELECT EMPLOYEE_NUMBER,
Sum(STRAIGHT_TIME)
FROM EMPLOYEE_HOURS
WHERE EMPLOYEE_NUMBER BETWEEN 50000 AND 50005
GROUP BY EMPLOYEE_NUMBER
```

You might notice the word sum in the query. This is called a scalar function. The function performs an arithmetic function on all the rows that are grouped together. In this case the records are grouped by employee number, therefore one row for each employee is displayed with the total straight time for that employee. We could done the same thing will other columns in the table as well.

Example 5.2. Employee hours

```
SELECT EMPLOYEE_NUMBER AS 'Employee',
Sum(DOUBLE_TIME) AS 'Double',
Sum(HOLIDAY_TIME) AS 'Holiday',
sum(JURY_PAID_AMT) AS 'JuryAmt',
sum(JURY_TIME) AS 'Jury',
sum(MILITARY_PAID_A) AS 'MilitaryAmt',
sum(MILITARY_TIME) AS 'Military',
sum(OTHER_PAID_TIME) AS 'Other',
sum(OTHER_UNPD_TIME) AS 'OtherUnpaid',
sum(OVERTIME) AS 'Overtime',
sum(PAID_ILLNESS) AS 'Illness',
Sum(PERSONAL_TIME) AS 'Personal',
sum(STRAIGHT_TIME) AS 'Straight',
sum(UNPAID_ILLNESS) AS 'IllnessUnpaid',
sum(VACATION_TIME) AS 'Vacation'
FROM EMPLOYEE_HOURS
WHERE EMPLOYEE_NUMBER BETWEEN 50005 AND 50010
GROUP BY EMPLOYEE_NUMBER
```

These queries are nice as simple example of the SELECT statement but they're not very useful. One reason is that EMPLOYEE_NUMBER doesn't really relay any useful information. What we really want is employee's name so that we can make sense of the information. To do this we need to add the EMPLOYEE_MASTER file to the query. In fact we don't really want just the first few employees, what we really want is employee's that belong to a certain department. Since we're adding the EMPLOYEE_MASTER file we now have that information available to us as well.

Example 5.3. Employee name

```
SELECT FIRST_NAME AS 'FirstName',
LAST_NAME AS 'LastName',
Sum(HOLIDAY_TIME) As 'Holiday'
FROM EMPLOYEE_HOURS, EMPLOYEE_MASTER
WHERE EMPLOYEE_MASTER.EMPLOYEE_NUMBER = EMPLOYEE_HOURS.EMPLOYEE_NUMBER
AND DEPARTMENT_CODE='510'
GROUP BY FIRST_NAME, LAST_NAME
```

Suppose we didn't know that the department code for personnel was 510. We could join the DEPARTMENTS table and search for 'Personnel' instead of the obscure number we used in the last query.

Example 5.4. Personell

```
SELECT FIRST_NAME AS 'FirstName',
LAST_NAME AS 'LastName',
Sum(STRAIGHT_TIME) AS 'Holiday'
FROM DEPARTMENTS, EMPLOYEE_HOURS, EMPLOYEE_MASTER
WHERE EMPLOYEE_MASTER.EMPLOYEE_NUMBER = EMPLOYEE_HOURS.EMPLOYEE_NUMBER
AND DEPARTMENTS.DEPARTMENT_CODE = EMPLOYEE_MASTER.DEPARTMENT_CODE
AND DEPARTMENTS.DEPARTMENT='Personnel'
GROUP BY EMPLOYEE_MASTER.FIRST_NAME, EMPLOYEE_MASTER.LAST_NAME
```

We can also add criteria to limit the search to just 2001.

Example 5.5. Date range

```
AND ((EMPLOYEE_HOURS.WEEK_ENDING Between '01/01/2001' And '12/31/2001'))
```

Here is our finished SQL statement. It retrieves the the first name, last name and amount of straight time in 2001 of employees who work in the personnel department.

Example 5.6. Complete query

```
SELECT FIRST_NAME AS 'FirstName',
LAST_NAME AS 'LastName',
Sum(STRAIGHT_TIME) AS 'StraightTime'
FROM DEPARTMENTS, EMPLOYEE_HOURS, EMPLOYEE_MASTER
WHERE EMPLOYEE_MASTER.EMPLOYEE_NUMBER = EMPLOYEE_HOURS.EMPLOYEE_NUMBER
AND DEPARTMENTS.DEPARTMENT_CODE = EMPLOYEE_MASTER.DEPARTMENT_CODE
AND DEPARTMENTS.DEPARTMENT='Personnel'
AND ((EMPLOYEE_HOURS.WEEK_ENDING Between '01/01/2001' And '12/31/2001'))
GROUP BY EMPLOYEE_MASTER.FIRST_NAME, EMPLOYEE_MASTER.LAST_NAME
```

Notice that the criteria we added to limit our search to Personnel is actually case sensitive. Had we asked for 'personnel' or 'PERSONNEL' the result would have contained zero records. We could have made our search case insensitive with the lower and upper scalar functions.

Example 5.7. Upper and lower on results

```
AND lower(DEPARTMENTS.DEPARTMENT)='personnel'
or
AND upper(DEPARTMENTS.DEPARTMENT)='PERSONNEL'
```

Since we are providing the name we can set it to match the function but if we were using the query as part of a more sophisticated program we could use lower on the search text to have it match the data in the column.

Example 5.8. Lower on criteria

```
AND lower(DEPARTMENTS.DEPARTMENT)=lower('personnel')
```

Troubleshooting tools

The QICWARE ODBC Driver installer copies some troubleshooting tools along with the driver. One such tool is Interactive SQL (ODBC). This tool can be found in the Start Menu under Qantel QICWARE ODBC on Microsoft Windows systems or under the ODBC driver directory on RedHat Linux systems. The tool is particularly useful for troubleshooting SQL problems, optimizing queries and testing SQL statements. Our next few examples will cover some example SQL statements using this tool.

The first few steps start the C-Shell and configure the environment. Running ./odbcisql puts us at a 'ISQL>' prompt. Commands entered here are translated by the Interactive SQL (ODBC) program.

Once we're in the odbcisql program, we issue is to connect to the appropriate data source. We provide the username and password separated by an asterisk and then the data source name separated with an @. When we're connected, we can start issuing SQL statements, which we terminate with a semicolon. When we're done, we issue the command 'quit'. For additional commands, type 'help'. Our SQL statement retrieves a list of employee statuses.

Example 5.9. odbcisql on Linux

```
[qwadmin@sprout qicware]$ csh
[qwadmin@sprout ~]$ cd odbc
[qwadmin@sprout ~/odbc]$ source config/ilinux/setenv.sh

OpenRDA Environment Configuration

Platform: ilinux
   Root: /home/qicware/odbc
Makefile: /home/qicware/odbc/config/ilinux/env.mk
    INI: /home/qicware/odbc/config/ilinux/openrda.ini

[qwadmin@sprout ~/odbc]$ cd bin
```

```
[qwadmin@sprout bin]$ cd ilinux
[qwadmin@sprout ilinux]$ ./odbcisql
OpenAccess ISQL v4.80

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SPECIAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT
OF THE EXISTANCE, FURNISHING, FAILURE TO FURNISH, OR USE OF ANY
LICENSED PROGRAM AND/OR RELATED MATERIAL AND/OR DEVICE.


ISQL> connect qwadmin*qwadmin@qcd
SQL: connecting to database: qcd...
Elapsed time 152 ms.
ISQL>  SELECT * from EMPLOYEE_STATUS;
STATUS  STATUS_CODE

Active  A
Leave (unpaid)  L
Other  O
Quit   Q
Sick/Disabled  S
Terminated    T

SQL: 6 rows selected
SQL: Operation successful.
Elapsed time 44 ms.
ISQL> quit
SQL: disconnecting from database: qcd...
Elapsed time 5 ms.
**************************************************
* Interactive SQL session has finished successfully *
**************************************************
[qwadmin@sprout ilinux]$ exit
exit
[qwadmin@sprout qicware]$
```

The following statement inserts a new record into our table.

Example 5.10. Insert record

```
ISQL> INSERT INTO EMPLOYEE_STATUS (STATUS, STATUS_CODE) VALUES ('Lazy', 'Z');
SQL: 1 rows affected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> select * from EMPLOYEE_STATUS;
```

```
STATUS  STATUS_CODE

Active  A
Leave (unpaid)  L
Other  O
Quit   Q
Sick/Disabled  S
Terminated    T
Lazy   Z

SQL: 7 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL>
```

Now we update the new record.

Example 5.11. Update record

```
ISQL> UPDATE EMPLOYEE_STATUS SET STATUS='Asleep' WHERE STATUS_CODE='Z';
SQL: 1 rows affected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> select * from EMPLOYEE_STATUS;
STATUS  STATUS_CODE

Active  A
Leave (unpaid)  L
Other  O
Quit   Q
Sick/Disabled  S
Terminated    T
Asleep  Z

SQL: 7 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL>
```

Finally we delete the record and return the table to its previous state. Keep in mind that QICBASIC programs can be very sophisticated. It's not unheard of for programs to maintain several tables at a time. If these tables are modified externally, without regard for the programs themselves, there's no telling what the program will think.

Example 5.12. Delete record

```
ISQL> DELETE FROM EMPLOYEE_STATUS WHERE STATUS_CODE='Z';
SQL: 1 rows affected
SQL: Operation successful.
Elapsed time 7 ms.
```

```
ISQL> select * from EMPLOYEE_STATUS;
STATUS  STATUS_CODE

Active  A
Leave (unpaid)  L
Other  O
Quit   Q
Sick/Disabled  S
Terminated    T

SQL: 6 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL>
```

In previous examples we have specified the exact record in the WHERE clause but the LIKE predicate can be used to perform pattern matching instead. The percent and underscore can be used to indicate wildcards in the pattern.

Example 5.13. Like predicate

```
ISQL> SELECT * FROM EMPLOYEE_STATUS WHERE STATUS LIKE '%er%';
STATUS  STATUS_CODE

Other  O
Terminated    T

SQL: 2 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL>
```

The percent symbol (%) indicates zero or more characters in the search pattern and the underscore can be used to indicate exactly one character. Access users might be familiar with the asterisk and the question mark to perform similar pattern matches in Access databases.

Example 5.14. Underscore character

```
ISQL> SELECT * FROM EMPLOYEE_STATUS WHERE STATUS LIKE '_er%';
STATUS  STATUS_CODE

Terminated    T

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL>
```

Data types

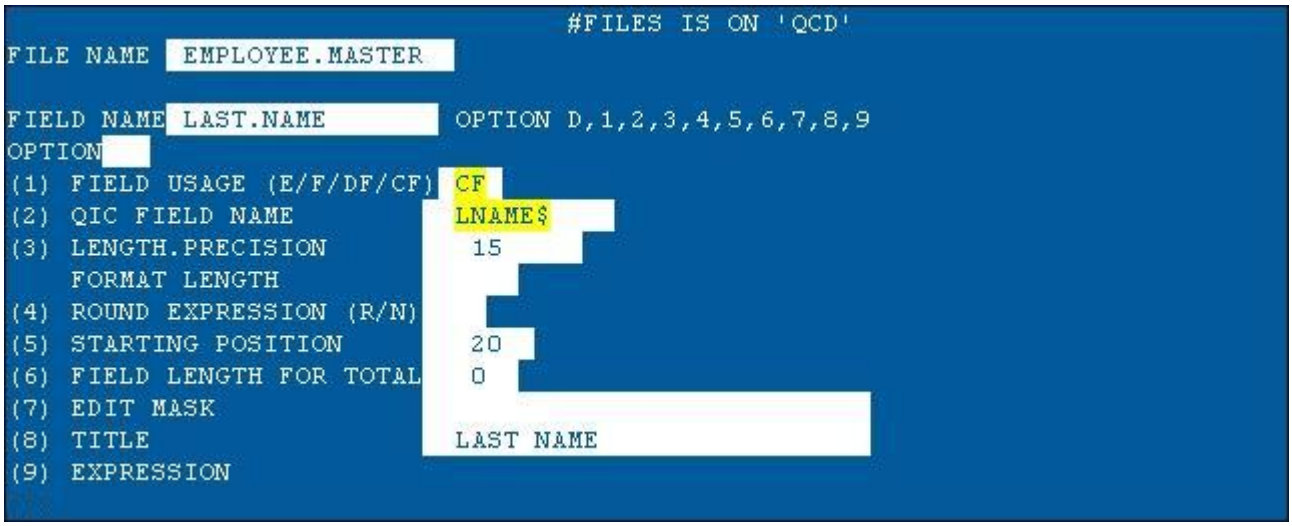
Remember that the QICWARE SQL Server abstracts certain aspects of the underlying database from the user. In the following sections we will be discussing some internals of how the data relates to QICWARE. Our examples deal with the EMPLOYEE.MASTER table of the QICLOOK Demo Database.

The QICWARE SQL Server supports 4 data types. These data types are CHAR, VARCHAR, NUMERIC and DATE. In the query below we have selected four fields (FIRST_NAME, LAST_NAME, ANNUAL_SALARY and BIRTH_DATE) from the EMPLOYEE_MASTER. These fields are data types VARCHAR(15), CHAR(15), NUMERIC and DATE respectively. You will notice that FIRST_NAME returned is actually stripped of trailing spaces while the LAST_NAME is not.

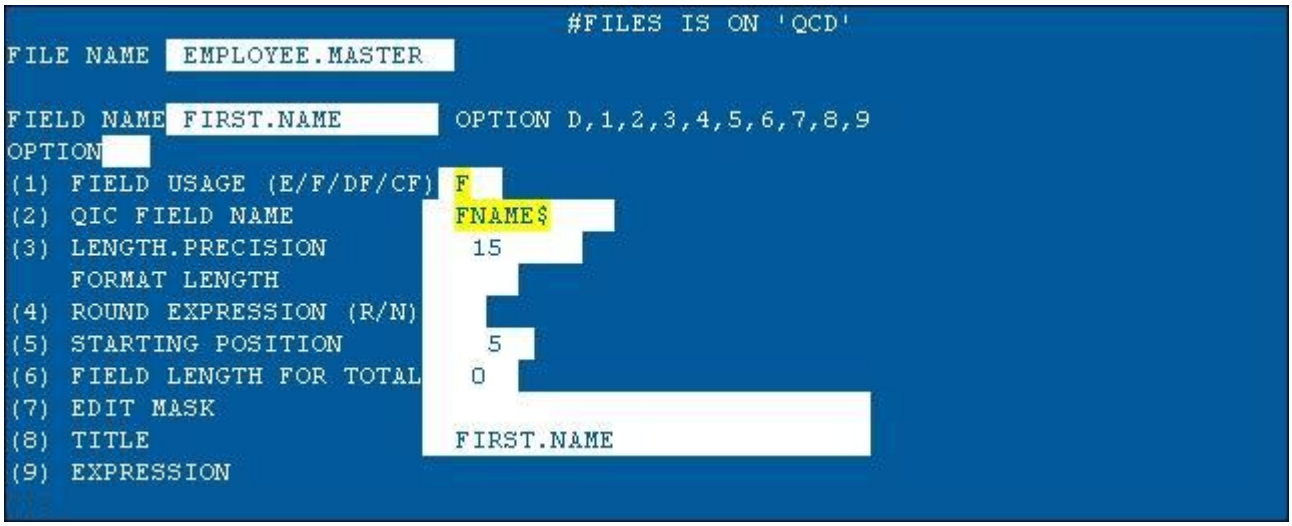
Example 5.15. Selecting various data types

```
ISQL> SELECT '"' + FIRST_NAME + '"', '"' + LAST_NAME + '"', ANNUAL_SALARY,
BIRTH_DATE, ANNUAL_SALARY from EMPLOYEE_MASTER WHERE EMPLOYEE_NUMBER='50000';
"+FIRST_NAME+" "+LAST_NAME+"  ANNUAL_SALARY  BIRTH_DATE    ANNUAL_SALARY

"William"     "Nared       "     145600  1955-06-09    145600

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 29 ms.
ISQL>
```

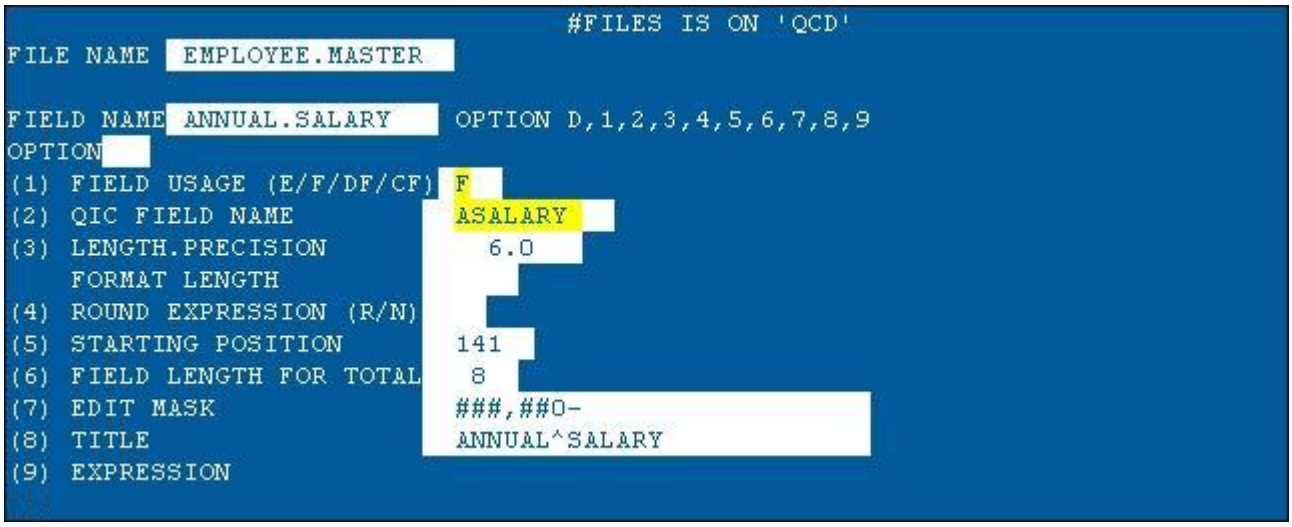
To demonstrate the use of CHAR, we have changed the LAST.NAME field from a VARCHAR to a CHAR by changing the FIELD USAGE field from an F to a CF.



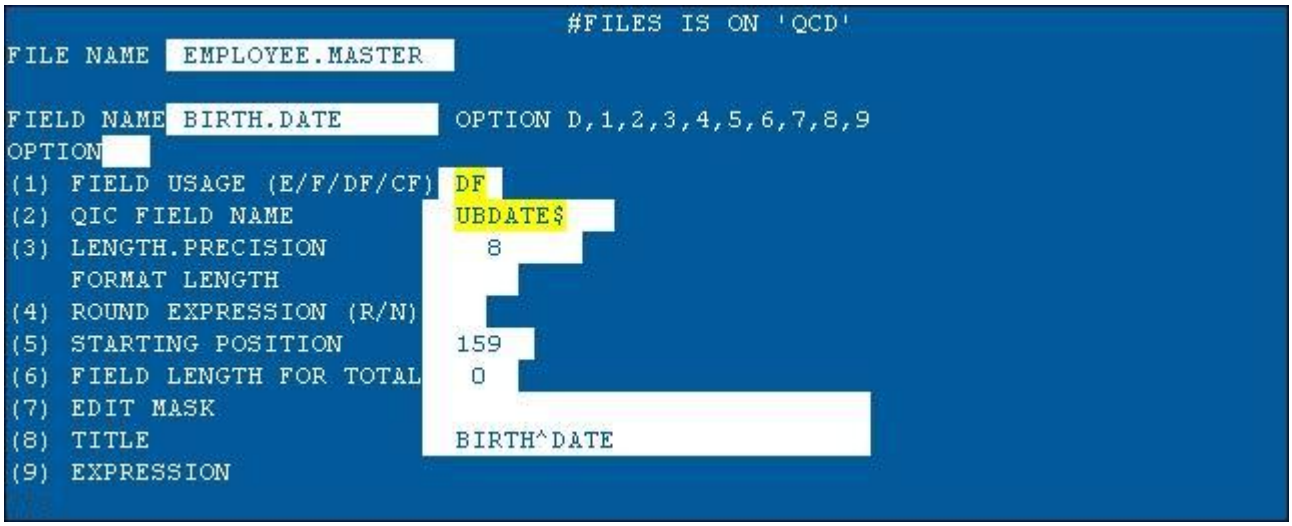
The following is an example of a Data Dictionary definition of a VARCHAR. The FIELD USAGE is set to F. Also, notice the trailing dollar sign.



The following is a NUMERIC field. The FIELD USAGE is set to F as in the other fields but the QIC FIELD NAME does not have a trailing dollar sign.



The following is a DATE field. The FIELD USAGE is set to DF.



Example 5.16. Changing a date field

```
ISQL> SELECT EMPLOYEE_NUMBER, WEEK_ENDING, OVERTIME FROM EMPLOYEE_HOURS WHERE EM
PLOYEE_NUMBER='50000' AND WEEK_ENDING='2001-11-25';
EMPLOYEE_NUMBER WEEK_ENDING    OVERTIME

50000  2001-11-25    .00

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 50 ms.
ISQL> UPDATE EMPLOYEE_HOURS SET OVERTIME=NULL WHERE EMPLOYEE_NUMBER='50000' AND
WEEK_ENDING='2001-11-25';
SQL: 1 rows affected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT EMPLOYEE_NUMBER, WEEK_ENDING, OVERTIME FROM EMPLOYEE_HOURS WHERE EM
PLOYEE_NUMBER='50000' AND WEEK_ENDING='2001-11-25';
EMPLOYEE_NUMBER WEEK_ENDING    OVERTIME

50000  2001-11-25    (Null)

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> UPDATE EMPLOYEE_HOURS SET OVERTIME='0' WHERE EMPLOYEE_NUMBER='50000' AND W
EEK_ENDING='2001-11-25';
SQL: 1 rows affected
SQL: Operation successful.
Elapsed time 45 ms.
ISQL> SELECT EMPLOYEE_NUMBER, WEEK_ENDING, OVERTIME FROM EMPLOYEE_HOURS WHERE EM
PLOYEE_NUMBER='50000' AND WEEK_ENDING='2001-11-25';
```

```
EMPLOYEE_NUMBER WEEK_ENDING    OVERTIME

50000  2001-11-25    .00

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 9 ms.
ISQL>
```

Just as you would expect, zero-length string fields can be used in index and non-index columns to represent empty data. The following statement demonstrates the use of a zero length string field in a non-index column.

Example 5.17. Inserting a record with a zero-length index field

```
ISQL> INSERT INTO EMPLOYEE_STATUS (STATUS, STATUS_CODE) VALUES (”, ’Z’);
SQL: 1 rows affected
SQL: Operation successful.
Elapsed time 6 ms.
ISQL> SELECT * from EMPLOYEE_STATUS;
STATUS  STATUS_CODE

Active  A
Leave (unpaid)  L
Other  O
Quit   Q
Sick/Disabled  S
Terminated    T
      Z

SQL: 7 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> DELETE FROM EMPLOYEE_STATUS WHERE STATUS_CODE=’Z’;
```

The following statement represents the use of a zero length string field in an index column.

Example 5.18. Inserting a record with a zero-length non-index field

```
ISQL> INSERT INTO EMPLOYEE_STATUS (STATUS, STATUS_CODE) VALUES (’apple’, ”);
SQL: 1 rows affected
SQL: Operation successful.
Elapsed time 77 ms.
ISQL> SELECT * from EMPLOYEE_STATUS;
STATUS  STATUS_CODE

apple
Active  A
Leave (unpaid)  L
Other  O
```

```
Quit   Q
Sick/Disabled  S
Terminated    T

SQL: 7 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> DELETE FROM EMPLOYEE_STATUS WHERE STATUS_CODE='Z';
SQL: 0 rows affected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL>
```

Zero length string fields are stored differently on image and non-image files. Refer to the QICWARE SQL Server documentation for more information.

Scalar functions

The QICWARE SQL Server supports scalar functions. Below are some examples that use scalar functions. The first example lists users that were hired on Friday. The second lists users that were hired on Friday the thirteenth. Refer to the appendix for a more complete list of examples.

Example 5.19. Scalar statements

```
ISQL> SELECT FIRST_NAME, LAST_NAME FROM EMPLOYEE_MASTER WHERE dayname(HIRE_DATE)
='Friday';
FIRST_NAME    LAST_NAME

Tomas  Webster
Tiffany Granger
Mike   Cockerham
Donald  Graham
Alice Marie   Esterly
Justin  Walton
Oscar  Medeiros
Delila  Scharlin
Andrew  Washington
Sarah  Lawson
Larry  Sand
Rocca  Robinson
Charley Pedigo
Annie  Otto
Rudy   Rice
Mark   Knapp
Donald  Mc Call

SQL: 17 rows selected
SQL: Operation successful.
Elapsed time 30 ms.
ISQL> SELECT FIRST_NAME, LAST_NAME FROM EMPLOYEE_MASTER WHERE dayname(HIRE_DATE)
='Friday' AND dayofmonth(HIRE_DATE)='13';
FIRST_NAME    LAST_NAME
```

```
SQL: 0 rows selected
SQL: Operation successful.a
Elapsed time 30 ms.
ISQL>
```

Linkage information

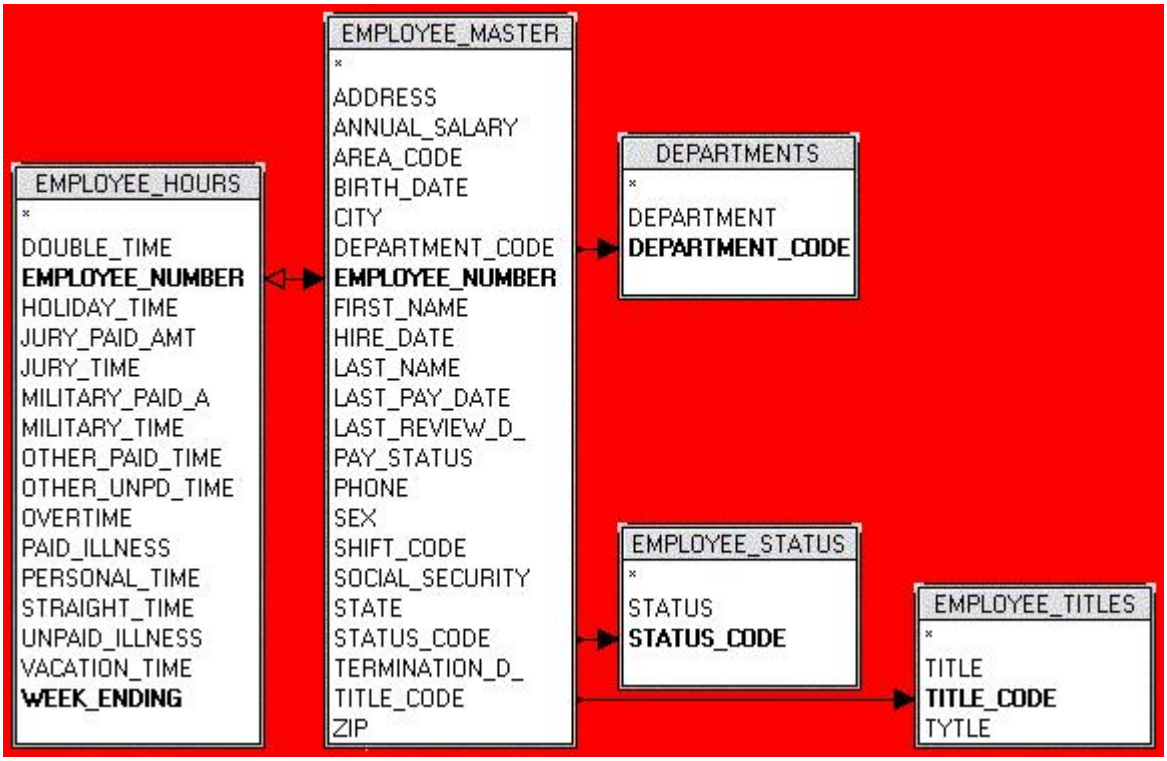
One of the most important aspects of the data dictionary is the file linkage information. This linkage information provides the SQL Server with hints on how to produce result sets when multiple files are involved. A link is a relationship from a field in one file to a key in another file. It tells the server that if the field in a given file is used it will allow the second file to be read, using that record as the key instead of reading the file sequentially. Let's look at the following SQL statement as an example.

Example 5.20. Joined tables

```
SELECT FIRST_NAME, LAST_NAME, DEPARTMENT
FROM EMPLOYEE_MASTER, DEPARTMENTS
WHERE EMPLOYEE_NUMBER='50000'
AND DEPARTMENTS.DEPARTMENT_CODE = EMPLOYEE_MASTER.DEPARTMENT_CODE;
```

The SQL Server has, built into it, rules for join optimization. One such optimization is the order in which the files are read. The linkage information in the data dictionary provides the SQL Server with information as to the order in which the files should read. If no linkage is available then the files are read in the order in which they appear in the SQL statement.

In the example above the linkage information indicates that the EMPLOYEE_MASTER file should be read first. One of the fields in that file should then be used to index into the DEPARTMENTS file. Without the server's optimization, the files could be read in an arbitrary order. This could mean, for example, that the DEPARTMENTS file could be read first. In which case, the DEPARTMENTS file would be read in its entirety once for every record of the EMPLOYEE_MASTER file in search of a matching DEPARTMENT_CODE.



Fortunately the SQL Server has options built in to warn users of this inefficient use of the software. The ODBC lines in the QICWARE configuration file have options to enable logging of this sort. Here is a sample log file with the EMPL.TO.DEPTS key removed. Notice the line that contains 'unindexed reads'. This is an indication that the file is being read without an index.

Example 5.21. Unindexed reads

```
[10/16/02 12:40:28]: qsqlserver:start unindexed reads of↩
/home/qicware/qcl/qqcd/qqcldata1
[10/16/02 12:40:28]: qsqlserver:indexed read of /home/qicware/qcl/qqcd/qqcldata4, key↩
[500]
```

Security

One of the features of the QICWARE SQL Server is the ability to control the amount of access a user has to the system. The first option comes in the form of a watermark. The qsqlserver.ini stores an option that controls the maximum amount of access ODBC users have to the system.

Example 5.22. UsageMode

```
UsageMode=read-write
```

The second option allows more control over which users have access and what they are able to do. To take advantage of this feature, we must add the AllowFile option to the qsqlserver.ini.

Example 5.23. AllowFile

```
AllowFile=/home/qicware/etc/qsql/allow
```

We will also need to create an empty allow file and restart QICWARE.

Example 5.24. Creating the allow file

```
[qwadmin@sprout qicware]$ cd
[qwadmin@sprout qicware]$ cd etc
[qwadmin@sprout etc]$ cd qsql
[qwadmin@sprout qsql]$ touch allow
```

In general we don't want to give out the qwadmin password, so we create a user for unattended queries, such as the Web pages used in the Advanced section.

Example 5.25. Creating the SQL user

```
[root@sprout root]# /usr/sbin/useradd -r -s /sbin/nologin -c "QICWARE SQL User"
-p qsql qsql
[root@sprout root]# passwd qsql
Changing password for user qsql
New UNIX password: qsql
BAD PASSWORD: it is too short
Retype new UNIX password: qsql
passwd: all authentication tokens updated successfully
[root@sprout root]#
```

We'll use this user to demonstrate the allow file. If the user is not listed in the file, they do not have access to the QICWARE SQL Server, with the exception of qwadmin. To grant qsql read access to the database, we must add the following line to the allow file.

Example 5.26. AllowFile entry

```
qsql read
```

We can add other users by appending the user name to the file.

The QICWARE™ SQL and ODBC Installation and Reference Guide has a lot more information on the different types of security.

Disk Caching

The disk caching option is particularly important with result sets that require post-processing sorts. Refer to the QICWARE SQL Server documentation for more information.

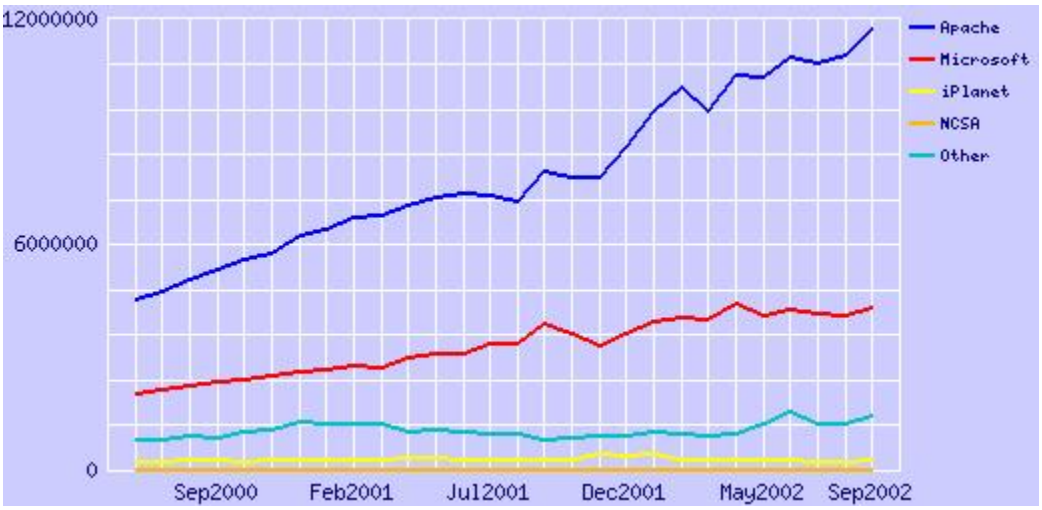
Chapter 6. LAMP

Introduction

We know that we can use ODBC and SQL in languages such as Visual Basic, CFML, ASP, PHP, etc. We know that we can use already written ODBC applications to access data in our QICWARE database and we know that ODBC is invaluable at integrating data in a QICWARE database with other data sources such as information in other databases, html pages, etc. This chapter focuses on one concrete example. We will concentrate on an example of a Web site for a imaginary company called RedVista Hardware using a technology called LAMP. This is not an example of an e-commerce solution; it is simply a demonstration of a use of ODBC to spruce up the data on a web site by providing users with real-time data from a QICWARE database.

What is LAMP?

Few people in the computer industry haven't heard of Linux. In '99 Linux was the fastest growing Operating System with sales growing 166% from Q4 of '98 to Q4 of '99. Exact numbers of the operating systems' acceptance are unclear since sales figures of any of the hundreds of distributions cannot accurately reflect the systems user base. Many companies [http://www.aaxnet.com/design/linux2.html] have backed Linux as their primary platform. These companies include technical companies like Google [http://www.wired.com/news/technology/0,1282,54504,00.html] who uses Linux both for their web site and in commercial product, a network appliance. It also includes companies like Burlington Coat Factory. In fact, in distributions like RedHat, using Linux most likely means you'll be using powerful software packages like apache. A recent survey conducted by Net Craft shows that the Apache server surpasses other web servers in popularity. The Linux operating system has attracted all sorts of people ranging from common users looking for powerful database applications like mysql to developers seeking robust web development languages such as PHP. Many users turn to Linux because of its powerful set of technologies. One such technology combines the Linux operating system with the Apache server, mysql and PHP. This technology is commonly referred to as LAMP, which represents the first letter of the technologies involved. This section focuses on the use of LAMP technology and the integration of the QICWARE ODBC Driver.



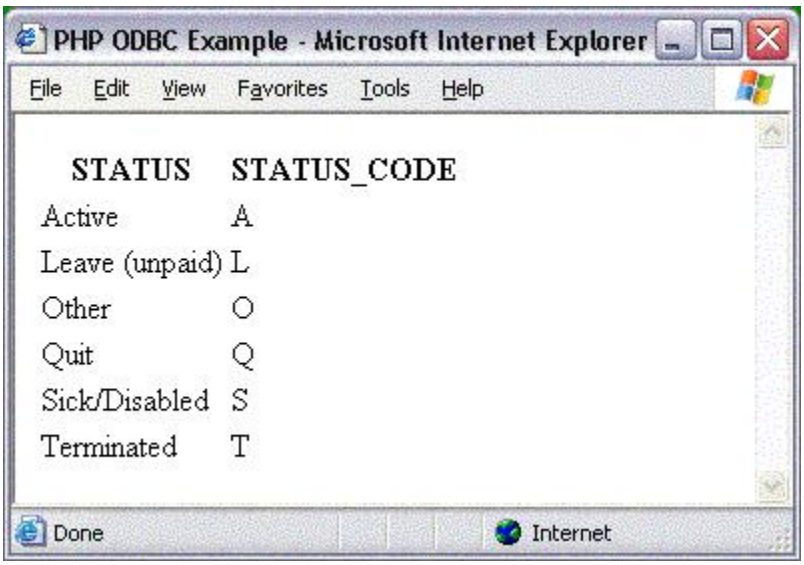
source [http://www.netcraft.com/survey/]

Sample PHP application

We will be covering a PHP application on a Linux machine but before we get into that I want to cover a simple example of PHP so that we get a perspective of what we're doing. The reason we're developing Web-based applications is that they are very easy to maintain, deploy and prototype. Below is a sample PHP page. PHP is interpreted by the Web Server and output html. Here is an example of a simple PHP Web page [example/example1.php]. If you wish to use this page on your web server, you will need to change the connection information to include the proper data source name, login and password.

Example 6.1. Adding a printer

```
<html>
<head>
<title>PHP ODBC Example</title>
</head>
<?
putenv("OA_ROOT=/home/qicware/odbc");
putenv("LD_LIBRARY_PATH=/home/qicware/odbc/lib/ilinux");
putenv("ODBCINI=/home/qicware/odbc/config/ilinux/odbc.ini");
putenv("OPENRDA_INI=/home/qicware/odbc/config/ilinux/openrda.ini");

$conn = odbc_connect("qcd", "qsql", "qsql");
($conn > 0) || die ("Unable to connect to database");
$sql="SELECT * from EMPLOYEE_STATUS;";
$recordset = odbc_exec($conn, $sql);
odbc_result_all($recordset);
odbc_close($conn);
?>
</html>
```



What do I put on the web site?

One of the challenges when designing a customer-based web site is deciding exactly what to make available to our audience. The QMRP database contains a lot of interesting information, but much of it would be inappropriate to share with our customers. We probably don't want customers looking through product prices, for example.

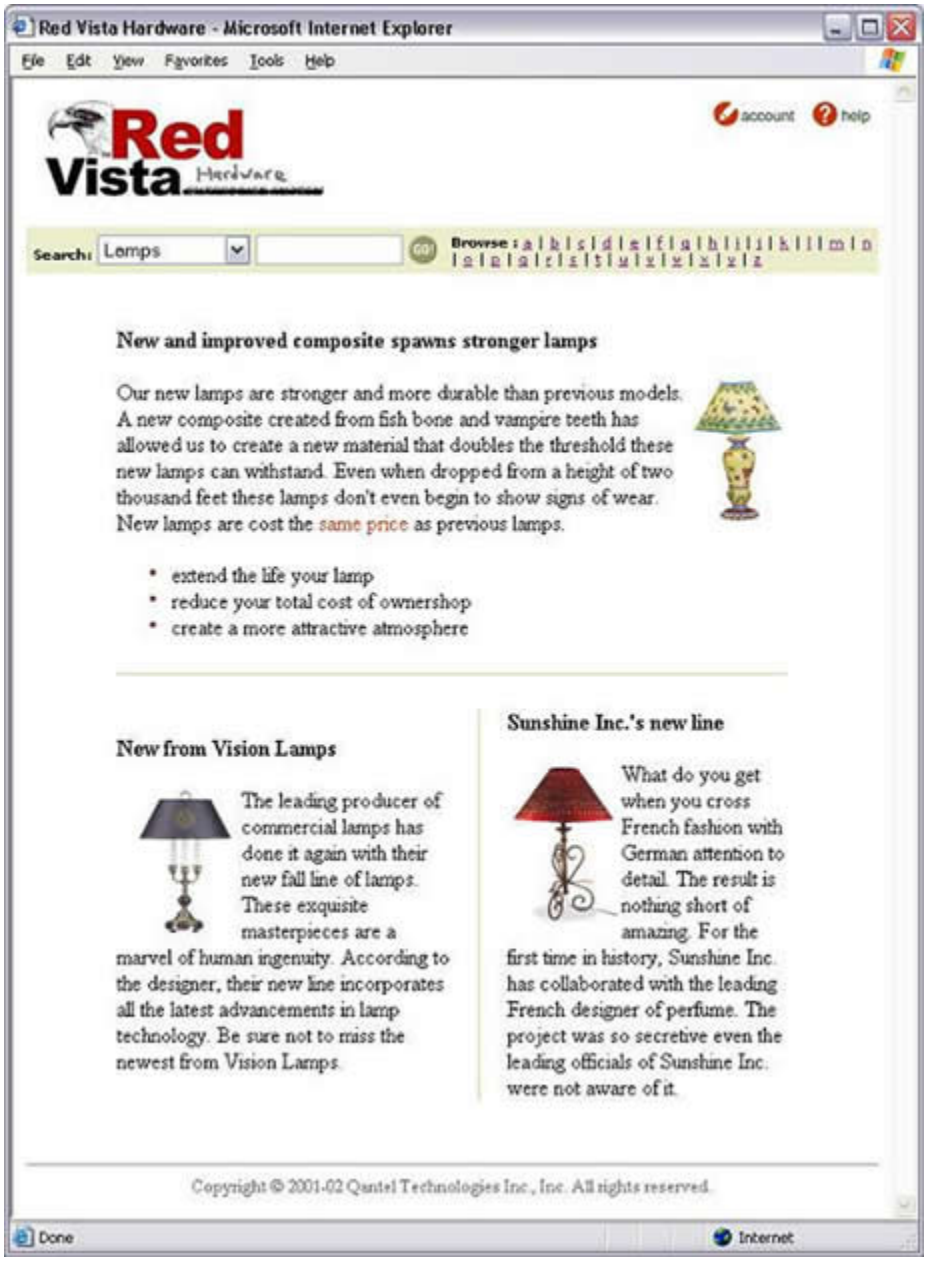
When designing the sample application, I wanted to create a realistic scenario that might actually be useful. I wanted to create a web site with information that we would feel comfortable sharing with customers. I also wanted to avoid rewriting code that was already written in QICBASIC.

If we look at all the software we're using to run our business, the sample web site offers a distinct role. The QMRP manufacturing software, written in QICBASIC offers information that is designed to be used internally. The web site offers a very different view, one that is designed for the customer. Even so I have been careful to avoid reproducing any functionality that might already be available in the QMRP system since it makes little sense to have the code maintained in two different places by two different people.

Also I have chosen to avoid the temptation of going as far as a fully functional e-commerce site with online transactions, for example. I felt that approaching the challenge of online transaction processing would need some other tool that could communicate directly with the QICBASIC programs instead of just reading the QICWARE database. I felt more comfortable using ODBC; it's strengths lie in retrieving information not submitting it. So our web site fills this niche of producing information from the QICWARE database and making it available to customers.

Welcome page

Our first stop in exploring the web site is with the main screen. Many web sites offer an introductory web site that highlights a variety of aspects of the web site. These pages are typically dynamic and offer information specific to the user. AMAZON.COM is one such site. It details information based on customer's past purchases. When the user visits their site, they display products which the site feels the customer may be interested in.



Searching inventory

Our second stop takes us to the Search results page. This page is found by entering text into the search toolbar at the top of the page or by selecting one of the letters in the browse section of the toolbar.

The items listed on this page are determined by an SQL statement inside the web page. As it goes through the records in the result set, it checks to see if there is any additional information on that item and if so creates a hyperlink to that additional information. This is useful because we may not have additional information on every item; this method allows us to link only to items that actually have additional information.

The query is not as efficient as we would like, but there is no way to optimize it any more than it already is. This is because the information we are trying to retrieve can be anywhere in the description and the description field is not an index to the table. The query would be much more efficient if we added a condition to the WHERE clause that used a index.

Example 6.2. Selecting descriptions

```
SELECT ITEM_NUMBER, DESCRIPTION FROM INVENTORY WHERE (lower(DESCRIPTION) Like 'b%')
```

The information that we link to from the search results page is contained in an HTML page. The file is named after the item number. This was done for simplicity. The information could be contained anywhere, for example a mysql database. There are many advantages to storing the information in a mysql over an HTML file. One advantage is that we could use pieces of information in other places on the web site without having to parse a file. For example, we

could use the detailed description or reviews on our main page. In fact the main page could have been designed using descriptions from the mysql database that were custom to the individual user. We could also have web pages that list documentation or have any number of cross-references for the information e.g. a list of documentation. We could search for items based on words in the description, etc. It is features like these that really bring our site to life.

Customer information

The last leg of our journey takes us to the account information page. This page features information from several tables. There are actually two SQL statements that control the information displayed on this page. The first query

controls the shipping address; this is obtained from the customer master file. The second query displays the list of orders in the table at the lower-half of the page.

The first query is very straight forward. It is actually simpler than the one we used before in searching the inventory file. This is because we already have the customer number, which acts as an index to the file.

Example 6.3. Selecting a customer address

```
SELECT CUSTOMER_NUMBER, CUSTOMER_NAME, ADDRESS_ONE, ADDRESS_TWO, CITY, STATE,
  COUNTRY, ZIP_CODE, PHONE_NUMBER, FAX_NUMBER
FROM CUSTOMER_MASTER
WHERE CUSTOMER_NUMBER=’ 100’
```

The second query is much more sophisticated than any of the other queries we’ve used so far. If you’ll notice, you can see that we are joining three separate tables.

Example 6.4. Selecting a list of orders

```
SELECT CUST_ORD_INQUIR.CUSTOMER_NUMBER, CUST_ORD_INQUIR.ORDER_NUMBER,
  OPN_ORD_HDR.DATE_ORDERED, OPN_ORD_HDR.DATE_WANTED,
  OPN_ORD_HDR.CUST_ORD_NUMBER, OPN_ORD_HDR.ORDER_STATUS,
  OPN_ORD_NAME.SHIP_VIA, OPN_ORD_NAME.SHIP_TO_ADDRES1,
  OPN_ORD_NAME.ZIP_CODE
FROM OAUSER.CUST_ORD_INQUIR CUST_ORD_INQUIR,
  OAUSER.OPN_ORD_HDR OPN_ORD_HDR, OAUSER.OPN_ORD_NAME OPN_ORD_NAME
WHERE CUST_ORD_INQUIR.ORDER_NUMBER = OPN_ORD_HDR.ORDER_NUMBER
  AND OPN_ORD_NAME.ORDER_NUMBER = OPN_ORD_HDR.ORDER_NUMBER
  AND ((OPN_ORD_HDR.CUSTOMER_NUMBER=' 100'))
```

Authentication

We don't want users to be able to see information on other users, so we authorize users based on their customer number and a password that is stored in a memo field of the customer master. The advantage of storing the information the QICWARE database is that it can be edited from within QICWARE. In real life the passwords are probably controlled by someone in IT, who probably doesn't use the QICWARE database. It was put in the QICWARE database for simplicity.

Driver manager

I have chosen to use the driver manager installed with the ODBC Driver instead of the one provided by Linux. The one provided with Linux is called unixODBC. We will be using iODBC. This requires us to include the following lines

Example 6.5. Adding a printer

```
putenv("OA_ROOT=/home/qicware/odbc");
putenv("LD_LIBRARY_PATH=/home/qicware/odbc/lib/ilinux");
putenv("ODBCINI=/home/qicware/odbc/config/ilinux/odbc.ini");
putenv("OPENRDA_INI=/home/qicware/odbc/config/ilinux/openrda.ini");
```

Chapter 7. Data visualization

Introduction

This information will be presented at the 2004 QMRP User Group.

Chapter 8. Appendix

QICLOOK demo database

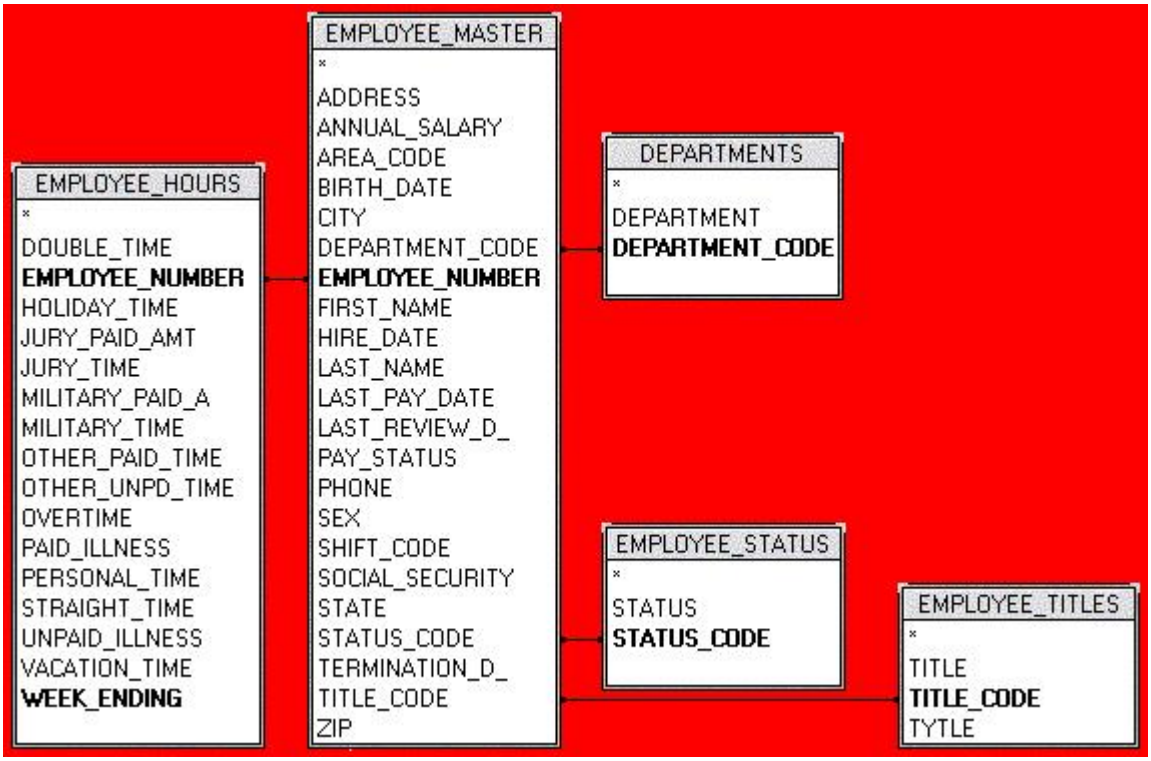
Example 8.1. QICLOOK demo database dictionary (textual)

```
      10      20      30      40      50      60      70      80      90     100     110↩
    120
---------+---------+---------+---------+---------+---------+---------+---------+---------+---------+---------+

FILE          ACTUAL   QIC    FIL TYPE REC KEY    DIR / DISC       FILE TITLE           FIELD
NAME OR FIELD   FILE  OR FIELD    OR    SIZ SIZ  I     OR           OR               EDIT
      NAME    NAME    NAME   FLD TYPES OR  OR    PREC POS TOTAL    FIELD TITLE          MASK
                             FLD FOR       OR
                             SIZ SIZ   EXPRESSION


DEPARTMENTS     QCLDATA4          K   18  3              QICLOOK SAMPLE DATA -↩
DEPARTMENT MASTER FILE
KEY FORMAT =  DEPARTMENT.CODE

    DEPARTMENT.CODE  DCODE$     S F    3          0        DEPARTMENT^CODE
    DEPARTMENT      DEPARTME$   S F   15          3        DEPARTMENT

EMPLOYEE.HOURS  QCLDATA2          K   58  13  I            QICLOOK SAMPLE DATA - EMPLOYEE↩
HOURS TRA
KEY FORMAT =  EMPLOYEE.NUMBER + WEEK.ENDING
LINK FIELD: EMPLOYEE.NUMBER  LINK NAME: HOURS.TO.EMPL    DESTINATION: EMPLOYEE.MASTER
LINK FIELD: HOURS.KEY       LINK NAME: HOURS.TO.HOURS   DESTINATION: EMPLOYEE.HOURS

    EMPLOYEE.NUMBER  ENUMBER$   S F    5     0    0   0     EMPLOYEE^NUMBER
    HOURS.KEY       HRSKEY$    S E   13     0    0   0     HOURS^KEY
                                     EMPLOYEE.NUMBER + WEEK.ENDING
    WEEK.ENDING     UWENDING$  S F D  8     0    6   0     WEEK^ENDING
    STRAIGHT.TIME    STIME      N F    4     2   15   6     STRAIGHT^TIME
    OVERTIME        OVERTIME   N F    4     2   18   6     OVERTIME
    DOUBLE.TIME      DTIME      N F    4     2   21   6     DOUBLE^TIME
    PAID.ILLNESS     PILLNESS   N F    4     2   24   6     PAID^ILLNESS
    HOLIDAY.TIME     HTIME      N F    4     2   27   6     HOLIDAY^TIME
    VACATION.TIME    VTIME      N F    4     2   30   6     VACATION^TIME
    JURY.TIME       JTIME      N F    4     2   33   6     JURY^TIME
    JURY.PAID.AMT    JPAIDA     N F    5     2   36   7     JURY^PAID^AMOUNT
    MILITARY.TIME    MTIME      N F    4     2   39   6     MILITARY^TIME
    MILITARY.PAID.A  MPAIDA     N F    5     2   42   7     MILITARY^PAID^A
    OTHER.PAID.TIME  OPAIDT     N F    4     2   45   6     OTHER^PAID^TIME
    UNPAID.ILLNESS   UILLNESS   N F    4     2   48   6     UNPAID^ILLNESS
    PERSONAL.TIME    PTIME      N F    4     2   51   6     PERSONAL^TIME
    OTHER.UNPD.TIME  OUNPDT     N F    4     2   54   6     OTHER^UNPD^TIME

EMPLOYEE.MASTER  QCLDATA1          K  189  5              QICLOOK SAMPLE DATA - EMPLOYEE↩
MASTER FILE
```

```
KEY FORMAT =  EMPLOYEE.NUMBER
LINK FIELD: DEPARTMENT.CODE  LINK NAME: EMPL.TO.DEPTS    DESTINATION: DEPARTMENTS
LINK FIELD: EMPLOYEE.NUMBER  LINK NAME: EMPL.TO.EMPL     DESTINATION: EMPLOYEE.MASTER
LINK FIELD: EMPLOYEE.NUMBER  LINK NAME: EMPL.TO.HOURS    DESTINATION: EMPLOYEE.HOURS
LINK FIELD: STATUS.CODE     LINK NAME: EMPL.TO.STATUS   DESTINATION: EMPLOYEE.STATUS
LINK FIELD: TITLE.CODE      LINK NAME: EMPL.TO.TITLES   DESTINATION: EMPLOYEE.TITLES

    EMPLOYEE.NUMBER  ENUMBER$   S F    5     0    0   0     EMPLOYEE^NUMBER
    FIRST.NAME      FNAME$     S F   15     0    5   0     FIRST NAME
    LAST.NAME       LNAME$     S F   15     0   20   0     LAST NAME
    ADDRESS        ADDRESS$    S F   30     0   35   0     ADDRESS
    CITY           CITY$      S F   15     0   65   0     CITY
    STATE          STATE$      S F    2     0   80   0     STATE
    ZIP            ZIP$       S F    5     0   82   0     ZIP
    AREA.CODE       ACODE$     S F    3     0   87   0     AREA^CODE
    PHONE          PHONE$     S F    8     0   90   0     PHONE
    SOCIAL.SECURITY  SSECURIT$  S F   11     0   98   0     SOCIAL SECURITY
    HIRE.DATE       UHDATE$    S F D  8     0  109   0     HIRE^DATE
    LAST.PAY.DATE    ULPAYD$    S F D  8     0  117   0     LAST^PAY^DATE
    LAST.REVIEW.D.   ULREVIEW$  S F D  8     0  125   0     LAST^REVIEW^DATE
    TERMINATION.D.   UTD$      S F D  8     0  133   0     TERMINATION^DATE
    ANNUAL.SALARY    ASALARY    N F    6     0  141   8     ANNUAL^SALARY
###,##0-
    PAY.STATUS      PSTATUS$   S F    1     0  149   0     PAY^STATUS
    STATUS.CODE     SCODF$     S F    1     0  150   0     STATUS^CODE
    SHIFT.CODE      SCODE$     S F    1     0  151   0     SHIFT^CODE
    TITLE.CODE      TCODE$     S F    4     0  152   0     TITLE^CODE
    DEPARTMENT.CODE  DCODE$     S F    3     0  156   0     DEPARTMENT^CODE
    BIRTH.DATE      UBDATE$    S F D  8     0  159   0     BIRTH^DATE
    SEX            SEX$       S F    1     0  167   0     SEX

EMPLOYEE.STATUS  QCLDATA5         K   16  1             QICLOOK SAMPLE DATA - EMPLOYEE
STATUS MASTER FILE
KEY FORMAT =  STATUS.CODE

    STATUS.CODE     SCODE$     S F    1          0        STATUS^CODE
    STATUS         STATUS$    S F   15          1        STATUS

EMPLOYEE.TITLES  QCLDATA3         K   19  4             QICLOOK SAMPLE DATA - EMPLOYEE
TITLES MASTER FILE
KEY FORMAT =  TITLE.CODE

    TITLE.CODE      TCODE$     S F    4          0        TITLE^CODE
    TITLE          TITLE$     S F   15          4        TITLE
    TYTLE          TYTLE$     S F   15          4        TYTLE
  ITEM DESCRIPTION
**************************
* FIELD: LINK FIELD     *
* LINK:  LINK NAME      *
* DEST:  DESTINATION FILE *
**************************

MAP OF FILES FROM EMPLOYEE.HOURS
```

```
 FIELD: EMPLOYEE.NUMBER
 LINK:  HOURS.TO.EMPL
 DEST:  EMPLOYEE.MASTER(FULL)

      FIELD: DEPARTMENT.CODE
      LINK:  EMPL.TO.DEPTS
      DEST:  DEPARTMENTS   (FULL)

      FIELD: EMPLOYEE.NUMBER
      LINK:  EMPL.TO.EMPL
      DEST:  EMPLOYEE.MASTER(FULL)

      FIELD: EMPLOYEE.NUMBER
      LINK:  EMPL.TO.HOURS
      DEST:  EMPLOYEE.HOURS (PART)

      FIELD: STATUS.CODE
      LINK:  EMPL.TO.STATUS
      DEST:  EMPLOYEE.STATUS(FULL)

      FIELD: TITLE.CODE
      LINK:  EMPL.TO.TITLES
      DEST:  EMPLOYEE.TITLES(FULL)

 FIELD: HOURS.KEY
 LINK:  HOURS.TO.HOURS
 DEST:  EMPLOYEE.HOURS (FULL)

   ITEM DESCRIPTION
**************************
* FIELD: LINK FIELD     *
* LINK:  LINK NAME      *
* DEST:  DESTINATION FILE *
**************************

MAP OF FILES FROM EMPLOYEE.MASTER

 FIELD: DEPARTMENT.CODE
 LINK:  EMPL.TO.DEPTS
 DEST:  DEPARTMENTS   (FULL)

 FIELD: EMPLOYEE.NUMBER
 LINK:  EMPL.TO.EMPL
 DEST:  EMPLOYEE.MASTER(FULL)

 FIELD: EMPLOYEE.NUMBER
 LINK:  EMPL.TO.HOURS
 DEST:  EMPLOYEE.HOURS (PART)

      FIELD: EMPLOYEE.NUMBER
      LINK:  HOURS.TO.EMPL
      DEST:  EMPLOYEE.MASTER(FULL)

      FIELD: HOURS.KEY
```

```
     LINK:  HOURS.TO.HOURS
     DEST:  EMPLOYEE.HOURS (FULL)

FIELD: STATUS.CODE
LINK:  EMPL.TO.STATUS
DEST:  EMPLOYEE.STATUS(FULL)

FIELD: TITLE.CODE
LINK:  EMPL.TO.TITLES
DEST:  EMPLOYEE.TITLES(FULL)
```



Demo Application Configuration

The following changes were used to configure the Demo application used in this document.

Example 8.2. Server oadrd.ini changes

```
--- /home/qicware/etc/qsql/oadrd.ini.rel
+++ /home/qicware/etc/qsql/oadrd.ini
@@ -1,4 +1,11 @@
[qcd]
NAME=QCL,QCD,QCL#FILE
TYPE=qisam
REMARKS=QICLOOK Demo #FILES
```

```
+
+[dem]
+NAME=DEM,DEM,#FILES
+TYPE=qisam
+REMARKS=QICLOOK Demo #FILES
```

Example 8.3. OS odbc.ini changes

```
--- /etc/odbc.ini Before
+++ /etc/odbc.ini After
@@ -1,4 +1,11 @@
+[dem]
+Driver=/home/qicware/odbc/lib/ilinux/oaodbc.so
```

Example 8.4. Client odbc.ini changes

```
--- /home/qicware/odbc/config/ilinux/odbc.ini Before
+++ /home/qicware/odbc/config/ilinux/odbc.ini After
@@ -1,4 +1,11 @@
[ODBC Data Sources]
qcd = OpenRDA
+dem = OpenRDA

[qcd]
Driver       = /home/qicware/odbc/lib/ilinux/oaodbc.so
Description    = OpenRDA DSN
Trace        = 0
TraceFile = /home/qicware/odbc/bin/ilinux/sql.log

+[dem]
+Driver       = /home/qicware/odbc/lib/ilinux/oaodbc.so
+Description    = OpenRDA DSN
+Trace        = 0
+TraceFile = /home/qicware/odbc/bin/ilinux/sql.log
```

Example 8.5. Client oadrd.ini changes

```
--- /home/qicware/odbc/schema/oadrd.ini Before
+++ /home/qicware/odbc/schema/oadrd.ini After
@@ -1,4 +1,11 @@[qcd]
ADDRESS=208.228.216.118
PORT=1706
REMARKS=Sample test Database

+[dem]
+ADDRESS=208.228.216.118
+PORT=1706
```

```
+REMARKS=Sample test Database
```

unixODBC

If you decide to use unixODBC and want to use the sample application in addition to the instructions in the administration guide, you also need to add data source information to the following files.

Example 8.6. unixODBC files

```
/home/qicware/odbc/config/ilinux/odbc.ini
/etc/odbc.ini
```

In the directory where the PHP files reside, you need to issue the following command

Example 8.7. Linking the client oadrd.ini to the web folder

```
ln -s /home/qicware/odbc/config/ilinux/openrda.ini openrda.ini
```

Example 8.8. Demo site file list

```
assets          Directory containing images used on the Web site
docs           Directory containing item detail information

about.php3       About popup
account.php3      Displays account information
favicon.ico       Icon for IE
index.php3       Welcome Page
inventory.php3    Search results page
item.php3        Item detail page
standard_bot.php3  Code included at the bottom of each page e.g. copyright
standard_hdr.php3  Code included in the header of each page e.g. style sheet
standard_top.php3  Code included at the top of each page e.g. banner
```

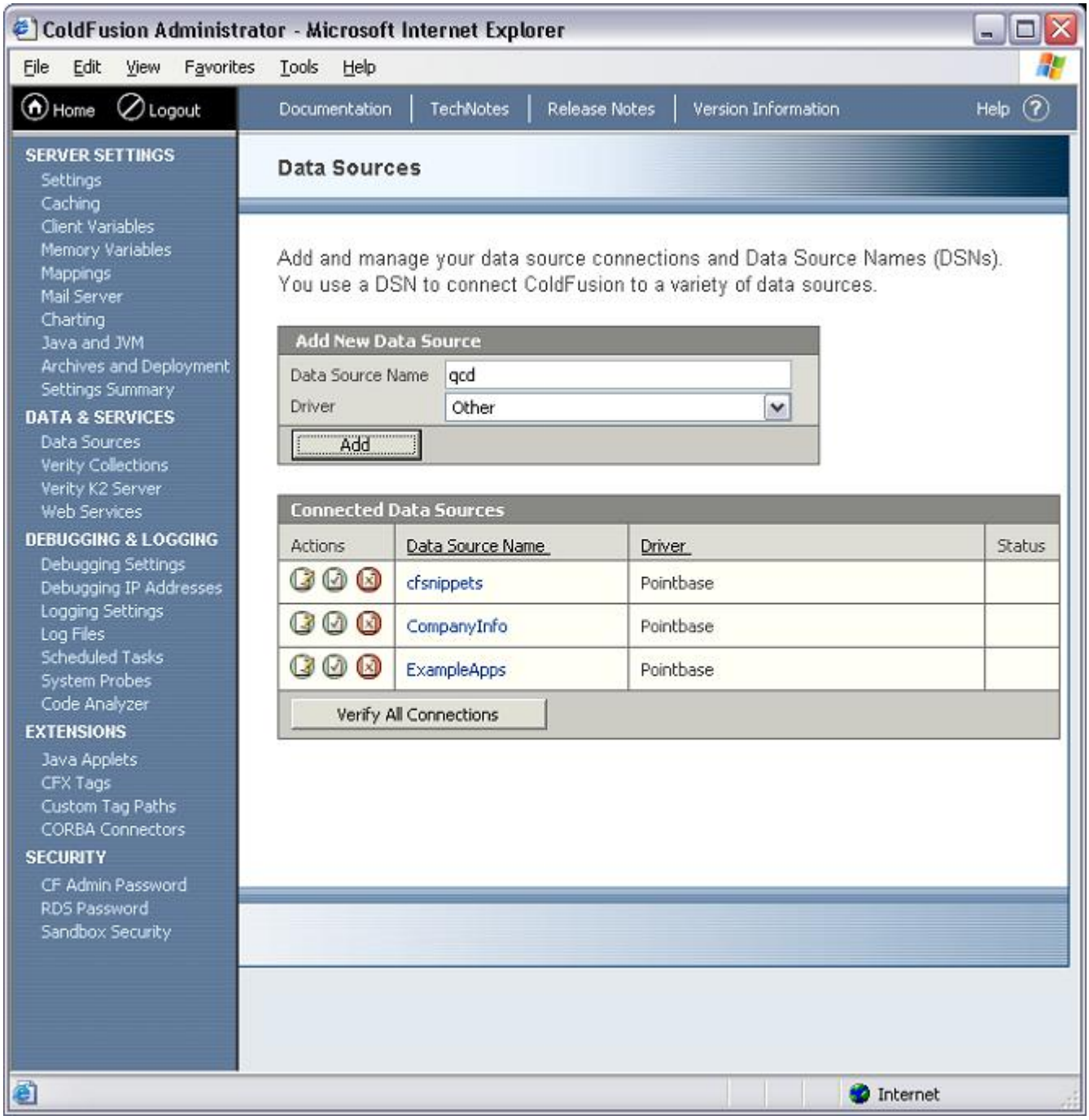
ColdFusion MX

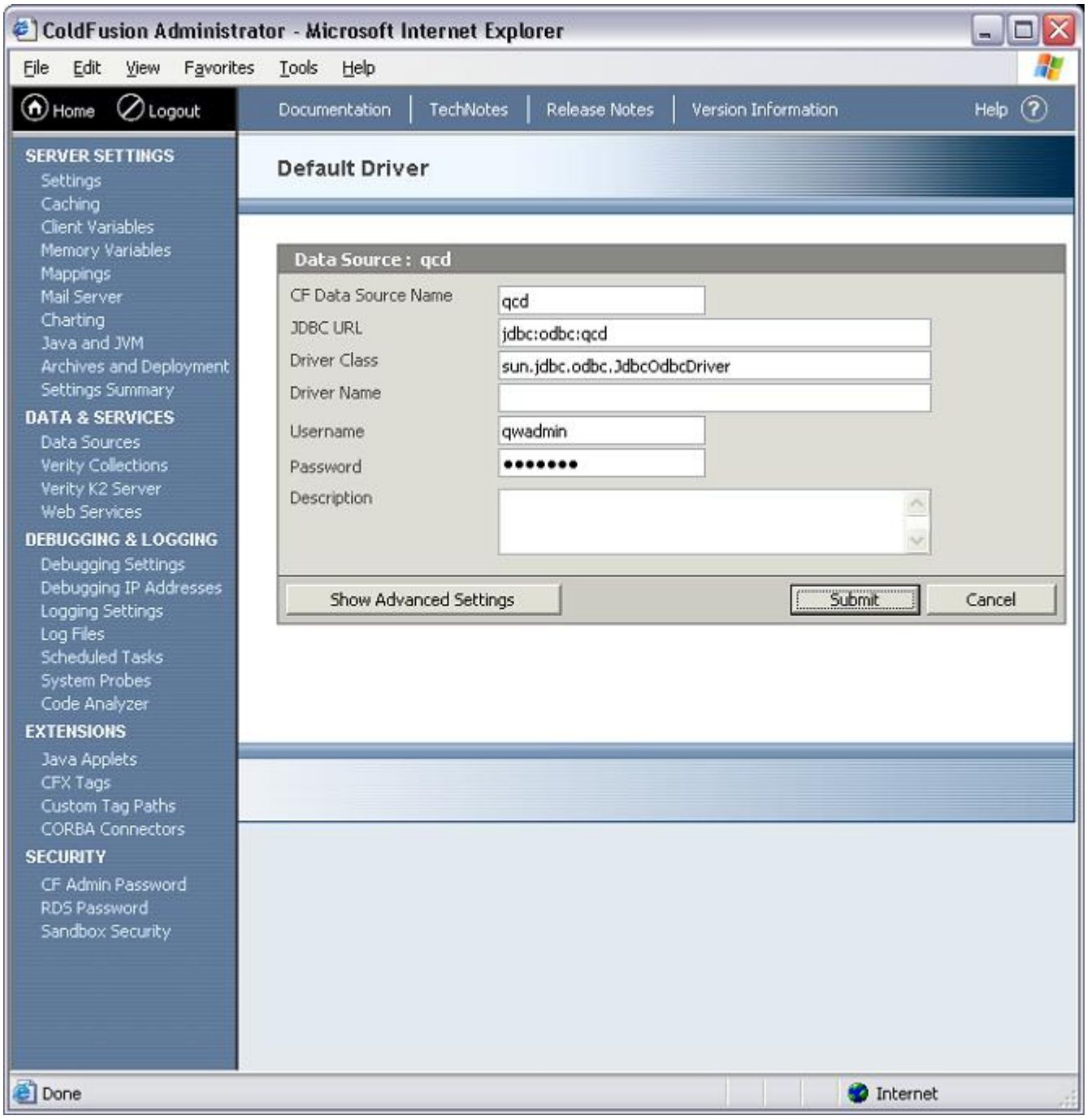
Adding a data source to ColdFusion is very straight forward. Here are some notes on the process involved.

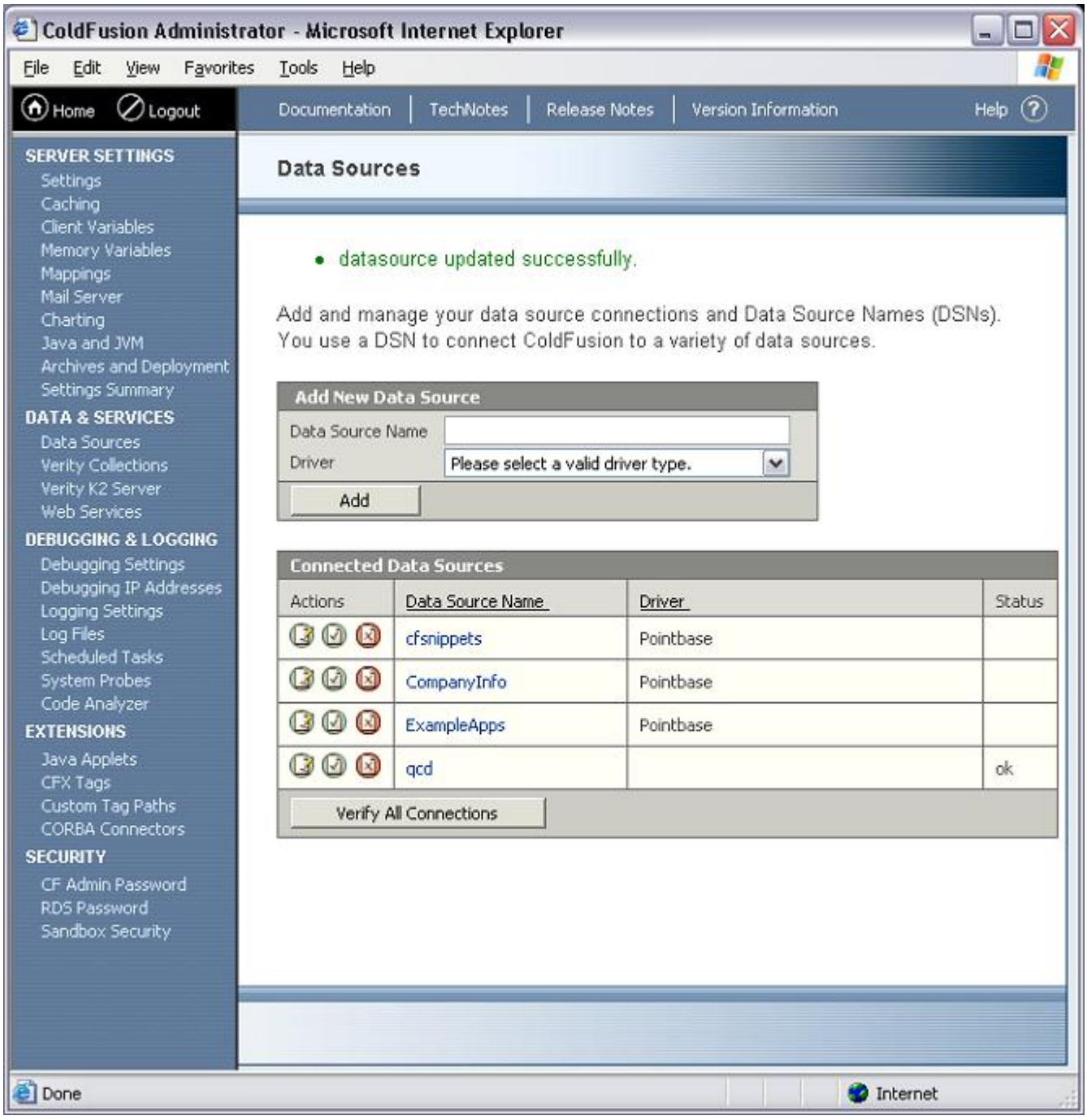
Example 8.9. Adding data source to coldfusion

```
Add dsn to /etc/odbc.ini
Add dsn to coldfusion
```

Go to the ColdFusion administrator | Data & Services | Data Sources.




ColdFusion Administrator - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Home Logout
Documentation TechNotes Release Notes Version Information Help
SERVER SETTINGS
Settings
Caching
Client Variables
Memory Variables
Mappings
Mail Server
Charting
Java and JVM
Archives and Deployment
Settings Summary
DATA & SERVICES
Data Sources
Verity Collections
Verity K2 Server
Web Services
DEBUGGING & LOGGING
Debugging Settings
Debugging IP Addresses
Logging Settings
Log Files
Scheduled Tasks
System Probes
Code Analyzer
EXTENSIONS
Java Applets
CFX Tags
Custom Tag Paths
CORBA Connectors
SECURITY
CF Admin Password
RDS Password
Sandbox Security
Default Driver
Data Source : qcd
CF Data Source Name
qcd
JDBC URL
jdbc:odbc:qcd
Driver Class
sun.jdbc.odbc.JdbcOdbcDriver
Driver Name
Username
qwadmin
Password
Description
Show Advanced Settings
Submit
Cancel
Done
Internet



Use the following information in the Web based administration.

Example 8.10. Coldfusion database entry

```
CF Data Source Name: qcd
JDBC URL: jdbc:odbc:qcd
```

```
Driver Class: sun.jdbc.odbc.JdbcOdbcDriver
Driver Name:
Username: qsql
Password: qsql
Description:
```

Sample SQL statements

Here are some sample SQL statements you might consider using in your queries.

Example 8.11. Sample string scalar statements

```
ISQL> SELECT ascii(STATUS_CODE) from EMPLOYEE_STATUS WHERE STATUS_CODE='A';
ascii(STATUS_CODE)

65

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT char(ascii(STATUS_CODE)) from EMPLOYEE_STATUS WHERE STATUS_CODE='A';
char(ascii(STATUS_CODE))

A

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT concat(STATUS, STATUS_CODE) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
concat(STATUS, STATUS_CODE)

ActiveA

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT lcase(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
lcase(STATUS)

active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT lower(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
lower(STATUS)

active

SQL: 1 rows selected
SQL: Operation successful.
```

```
Elapsed time 7 ms.
ISQL> SELECT left(STATUS, 2) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
left(STATUS, 2)

Ac

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT length(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
length(STATUS)

6

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT locate('i', STATUS, 0) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
locate(i, STATUS, 0)

4

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT ltrim(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
ltrim(STATUS)

Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT rtrim(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
rtrim(STATUS)

Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT ucase(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
ucase(STATUS)

ACTIVE

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT upper(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
upper(STATUS)

ACTIVE
```

```
SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 24 ms.
ISQL> SELECT bit_length(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
bit_length(STATUS)

48

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT char_length(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
char_length(STATUS)

6

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT character_length(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
character_length(STATUS)

6

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT character_length(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
character_length(STATUS)

6

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT "insert"('1', 1, 1, '94') FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A
';
insert(1, 1, 1, 94)

94

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT octet_length(STATUS) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
octet_length(STATUS)

6

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT position(STATUS, STATUS_CODE) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
position(STATUS, STATUS_CODE)
```

```
0

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT replace(STATUS, 've', 'vate') FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
replace(STATUS, ve, vate)

Activate

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT repeat('a', 3), STATUS_CODE from EMPLOYEE_STATUS WHERE STATUS_CODE='A';
repeat(a, 3)   STATUS_CODE

aaa    A

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT space(3), STATUS, space(3) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
space(3)      STATUS  space(3)

      Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT substring(STATUS, 1, 3) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
substring(STATUS, 1, 3)

Act

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT substr(STATUS, 1, 3) FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
substr(STATUS, 1, 3)

Act

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
```

Example 8.12. Sample date scalar statements

```
ISQL> SELECT curdate(), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
curdate()     STATUS

2002-10-14    Active
```

```
SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT curtime(), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
curtime()     STATUS

16:58:48      Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT dayname(curdate()), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
dayname(curdate())    STATUS

Monday  Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT dayofmonth(curdate()), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
dayofmonth(curdate())  STATUS

14    Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT hour(curtime()), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
hour(curtime()) STATUS

16    Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL> SELECT now(), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
now()  STATUS

2002-10-14 16:58:57    Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
ISQL> SELECT year(now()), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
year(now())    STATUS

2002   Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
```

Example 8.13. Sample numeric scalar statements

```
ISQL> SELECT mod(5,2), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
mod(5, 2)     STATUS

1     Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 7 ms.
```

Example 8.14. Sample system scalar statements

```
ISQL> SELECT user(), database(), STATUS FROM EMPLOYEE_STATUS WHERE STATUS_CODE='A';
user()  database()    STATUS

qwadmin qcd    Active

SQL: 1 rows selected
SQL: Operation successful.
Elapsed time 8 ms.
ISQL>
```

ASCII Table

The following table summarizes the flags in the m01.cfig. For a more complete explanation refer to the QICWARE Reference Manual.

Dec	Hx	Oct	Char	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
0	0	000	NUL (null)	32	20	040		Space	64	40	100	@	@	96	60	140	`	`
1	1	001	SOH (start of heading)	33	21	041	!	!	65	41	101	A	A	97	61	141	a	a
2	2	002	STX (start of text)	34	22	042	"	"	66	42	102	B	B	98	62	142	b	b
3	3	003	ETX (end of text)	35	23	043	#	#	67	43	103	C	C	99	63	143	c	c
4	4	004	EOT (end of transmission)	36	24	044	$	$	68	44	104	D	D	100	64	144	d	d
5	5	005	ENQ (enquiry)	37	25	045	%	%	69	45	105	E	E	101	65	145	e	e
6	6	006	ACK (acknowledge)	38	26	046	&	&	70	46	106	F	F	102	66	146	f	f
7	7	007	BEL (bell)	39	27	047	'	'	71	47	107	G	G	103	67	147	g	g
8	8	010	BS (backspace)	40	28	050	(	(	72	48	110	H	H	104	68	150	h	h
9	9	011	TAB (horizontal tab)	41	29	051	)	)	73	49	111	I	I	105	69	151	i	i
10	A	012	LF (NL line feed, new line)	42	2A	052	*	*	74	4A	112	J	J	106	6A	152	j	j
11	B	013	VT (vertical tab)	43	2B	053	+	+	75	4B	113	K	K	107	6B	153	k	k
12	C	014	FF (NP form feed, new page)	44	2C	054	,	,	76	4C	114	L	L	108	6C	154	l	l
13	D	015	CR (carriage return)	45	2D	055	-	-	77	4D	115	M	M	109	6D	155	m	m
14	E	016	SO (shift out)	46	2E	056	.	.	78	4E	116	N	N	110	6E	156	n	n
15	F	017	SI (shift in)	47	2F	057	/	/	79	4F	117	O	O	111	6F	157	o	o
16	10	020	DLE (data link escape)	48	30	060	0	0	80	50	120	P	P	112	70	160	p	p
17	11	021	DC1 (device control 1)	49	31	061	1	1	81	51	121	Q	Q	113	71	161	q	q
18	12	022	DC2 (device control 2)	50	32	062	2	2	82	52	122	R	R	114	72	162	r	r
19	13	023	DC3 (device control 3)	51	33	063	3	3	83	53	123	S	S	115	73	163	s	s
20	14	024	DC4 (device control 4)	52	34	064	4	4	84	54	124	T	T	116	74	164	t	t
21	15	025	NAK (negative acknowledge)	53	35	065	5	5	85	55	125	U	U	117	75	165	u	u
22	16	026	SYN (synchronous idle)	54	36	066	6	6	86	56	126	V	V	118	76	166	v	v
23	17	027	ETB (end of trans. block)	55	37	067	7	7	87	57	127	W	W	119	77	167	w	w
24	18	030	CAN (cancel)	56	38	070	8	8	88	58	130	X	X	120	78	170	x	x
25	19	031	EM (end of medium)	57	39	071	9	9	89	59	131	Y	Y	121	79	171	y	y
26	1A	032	SUB (substitute)	58	3A	072	:	:	90	5A	132	Z	Z	122	7A	172	z	z
27	1B	033	ESC (escape)	59	3B	073	;	;	91	5B	133	[	[	123	7B	173	{	{
28	1C	034	FS (file separator)	60	3C	074	<	<	92	5C	134	\	\	124	7C	174			|
29	1D	035	GS (group separator)	61	3D	075	=	=	93	5D	135	]	]	125	7D	175	}	}
30	1E	036	RS (record separator)	62	3E	076	>	>	94	5E	136	^	^	126	7E	176	~	~
31	1F	037	US (unit separator)	63	3F	077	?	?	95	5F	137	_	_	127	7F	177	&#127;	DEL

Source: www.asciitable.com

Bibliography

[00] ANSI X3.135-1992, "Database Language SQL". .