Advanced DataTools Webcast

from the IBM Informix Champions

Informix Tutorial Connecting Users and Tools to Informix Servers

by Lester Knutsen

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Advanced DataTools

Lester Knutsen

Lester Knutsen is President of Advanced DataTools Corporation and has been building large data warehouse and business systems using Informix Database software since 1983. Lester focuses on large database performance tuning, training, and consulting. Lester is a member of the IBM Gold Consultant program and was presented with one of the Inaugural IBM Information Champion awards by IBM. Lester was one of the founders of the International Informix Users Group and the Washington Area Informix User Group.

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Webcast Guidelines

- The Webcast is being recorded. The Webcast replay and slides will be available in a few days.
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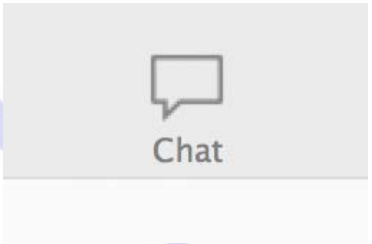

Informix Tutorial: Connecting Users and Tools to Informix Servers

by Lester Knutsen

How do you connect users and tools to an Informix Server from Windows, Unix, and the Web? We will discuss connections using Microsoft ODBC, Informix SDK, REST, MongoDB, Java, PHP, and other options.

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Agenda

- Configuring Informix for Connections
- Configuring Informix SDK and ODBC on Windows
- Configuring Unix ODBC for Informix
- Java Connection Properties
- MondoDB, RESTand more connection examples

Examples and Demos

- Connecting two Informix Servers
- Configuring Informix SDK on Windows
- Setting up ODBC on Windows
- Configuring ODBC on Unix
- Connecting Java Programs to Informix
  - ServerStudio
  - BenchmarkSQL
- Connecting DRDA to Informix
- Connecting MongoDB to Informix

Configuring Informix Network Connections

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Basic Connection Requirements

- Server to Connect to – hostname or IP address
- Port Number to Connect to on the machine
- INFORMIXSERVER
- Database Name
- User Name and Password

Informix Connection Settings

Name	Description	Connection Setup			
		ONCONFIG File	SQLHosts File	Windows SDK Setnet	Windows ODBC
INFORMIXSERVER	The name of an Informix database server on the network	DBSERVERNAME or DBSERVERALIASES	1st field	IBM Informix Server	Server Name
NETTYPE Protocol	Nettype is an 8-character string specifying the protocol in this format: ddiiippp dd = Database product [|ol|on|dr] iii = Interface type [ipc|soc|tli|sql] ppp = Protocol [imc|nmp|shm|spx|str|tcp|ssl|mux]	NETTYPE: protocol, number poll threads, number of connections, (NET|CPU)	2nd field	Protocolname	Protocol
Hostname or IP Address	Hostname is the name of the computer where the database server resides as listed in /etc/hosts or the IP address		3rd field	HostName	Host Name
Service or Port Number	Service name is a service name entry from the services file /etc/services or the port number the database is listening for connection on IANA (www.iana.org) assigned port number/service names for Informix: sqlexec 9088/tcp sqlexec-ssl 9089/tcp		4th field	Service Name	Service
Options	Optional Values examples: b=<connection buffer size> c=<connection redirection> g=<group name> i=<group identifier> e=<end of group> m=<multiplexed connection> k=<keep alive setting> r=<client security setting> s=<server security setting> csm=<communication support module> cfd=<communication files directory>		5th field	Options	Options
Database	The Database Name to connect to on an Informix Server				Database Name
Username	User Login Name				User ID
Password	User Login Password				Password
Data Source Name	ODBC Name for the Connection, may be User DSN or System DSN				Data Source Name

Connect to Informix Requires:

- Hostname of the computer where the database server resides as listed in /etc/hosts or the IP address
- Service name is a “service name” entry from the services file /etc/services or the port number the database is listening for connection
- The name of an Informix database server on the network
- Network Protocol Used
- Database Name
- User and Password
- Connection Software (ODBC, Java, …etc)

Informix Network Configuration

- **Types of Network Configuration**
  - Client to Server
  - Server to Server
- **Network Configuration Process**
  - Setting up the Server
  - Setting up the Client
- **Using SQL across the Network**

Configuration Files

- $INFORMIXDIR/etc/sqlhosts
- $INFORMIXDIR/etc/$ONCONFIG
- /etc/services
- /etc/hosts
- /etc/host.equiv or .rhosts

Server Side

- Server uses $INFORMIXSERVER to identify itself
- Server looks up network services name in the sqlhosts file
- Server looks up port number in the services file
- Server listens for connects on the network port
- Server validates user and password

Client Side

- Client uses $INFORMIXSERVER to identify database server
  - (Note: DBPATH may override INFORMIXSERVER)
- Client looks up $INFORMIXSERVER in sqlhosts file
- Client uses services name from sqlhosts file to look up port number in /etc/services file and host name in /etc/hosts
- Client connects to port number

Configuring the Database Server Network Listener

- The network portion is automatically started, then “oninit” is executed and the ONCONFIG and sqlhost files are configured

File - sqlhosts

- **dbservername** - Identifies $INFORMIXSERVER and the DBSERVERNAME or DBSERVERALIASES name of the database server
- **nettype** - Identifies Informix network protocol used. This is an eight character value composed as follows:
  - Char[1,2] - server type
    - se - Informix Standard Engine (SE)
    - on or ol - Informix OnLine Engine
    - dr - Informix Gateway
  - Char[3,5] - network interface
    - ipc - Interprocess communications
    - soc - Sockets
    - tli - TLI
  - Char[6,8] - network protocol
    - shm - Shared memory connection
    - tcp - TCP/IP protocol
    - spx - IPX/SPX protocol
- **hostname** - Identifies the host name of the database server in /etc/hosts
- **servicename** - Identifies the network services name in /etc/services
- **options** - The options field includes entries for the following features:
    - b - Buffer size
    - c - Connection redirection
    - e - End of group
    - g - Group
    - i - Identifier
    - k - Keep-alive
    - s - Security (database server)
    - r - Security (client)

File - SQLHosts

```
## Informix SQL Hosts File
train1          onipcshm        tiger4  train1
train1tcp       onsoctcp        tiger4  1527

tiger4          onipcshm        tiger4  tiger4
tiger4tcp       onsoctcp        tiger4  sqlexec

train12         onipcshm        tiger4  train12
train12tcp      onsoctcp        tiger4  1528

## HDR Secondary Server
tiger4Stcp      onsoctcp        tiger8  sqlexec

## Informix Default Server
ol_informix1410 onsoctcp tiger4 ol_informix1410
## DRDA Connection
dr_informix1410 drsoctcp tiger4 dr_informix1410
## REST Interface
lo_informix1410 onsoctcp 127.0.0.1 lo_informix1410
```

File - /etc/services

- **services** - This is an operating system file located in /etc. It defines network services supported on your machine. Work with your system administrator in maintaining this file.
  - **servicename** - Unique name given to identify a network service
  - **port/protocol** - Unique port number for the network service and protocol
  - **aliases** - Optional

File - /etc/services

```
sqlexec          9088/tcp                # IBM Informix SQL Interface
sqlexec          9088/udp                # IBM Informix SQL Interface
sqlexec-ssl      9089/tcp                # IBM Informix SQL Interface - Encrypted
sqlexec-ssl      9089/udp                # IBM Informix SQL Interface - Encrypted
websm            9090/tcp                # WebSM
websm            9090/udp                # WebSM
xmltec-xmlmail   9091/tcp                # xmltec-xmlmail
xmltec-xmlmail   9091/udp                # xmltec-xmlmail
XmlIpcRegSvc     9092/tcp                # Xml-Ipc Server Reg
XmlIpcRegSvc     9092/udp                # Xml-Ipc Server Reg
```

File - /etc/hosts

- **hosts** - This is an operating system file located in /etc. It defines the host machines on your network and their IP addresses.
  - **internet address** - The IP address for the computer
  - **hostname** - Unique name for the computer
  - **hostalias** - Optional name for computer
- **Using /etc/hosts saves a DNS lookup to find the IP address of your Server**

File – /etc/hosts

```
informix@tiger8:~ train1 > cat /etc/hosts
127.0.0.1   localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 localhost6.localdomain6


################################################################################
## Module: @(#)hosts     2.0     Date: 01/01/2015
## Author: Lester Knutsen  Email: lester@advancedatatools.com
##         Advanced DataTools Corporation
################################################################################
## /etc/hosts entries for Informix Training
##
## New training machines
192.168.1.221   tiger1 tiger1.addt.com
192.168.1.222   tiger2 tiger2.addt.com
192.168.1.223   tiger3 tiger3.addt.com
192.168.1.224   tiger4 tiger4.addt.com
192.168.1.225   tiger5 tiger5.addt.com
192.168.1.226   tiger6 tiger6.addt.com
192.168.1.227   tiger7 tiger7.addt.com
192.168.1.228   tiger8 tiger8.addt.com
192.168.1.230   apollo apollo.addt.com
```

Trusted Hosts for Server to Server Connections

- Required for Informix High Availability Data Replication (HDR) and Enterprise Replication (ER)
- Unix Level – Less Secure
  - /etc/hosts.equiv
  - .netrc or .rhosts
- Informix ONCONFIG
  - REMOTE_SERVER_CFG

REMOTE_SERVER_CFG

- A file in $INFORMIXDIR/etc with the trusted host names and usernames
- ONCONFIG Parameter names the file
- File must be read/write by the user Informix only – No other access
- SQL administration API task() or admin() function:
  - "cdr add trustedhost"

REMOTE_SERVER_CFG

```
# REMOTE_USERS_CFG - Specifies the name of a file that lists names
# of trusted users that exist on remote hosts. The file specified
# must be located in $INFORMIXDIR/etc. If the configuration
# parameter is set then the file specified is used instead of the
# ~/.rhosts file.
REMOTE_SERVER_CFG HDRtrust
#
```

```
informix@tiger8:/opt/informix/etc train1 > cat HDRtrust

##Trusted Host  ## Trusted User
tiger4          informix
tiger8          informix
```

File - /etc/host.equiv or .netrc

- **hosts.equiv -** This is an operating system file located in /etc. It defines which host machines are trusted on your network. Work with your system administrator in maintaining this file.

SQL access to Remote Servers

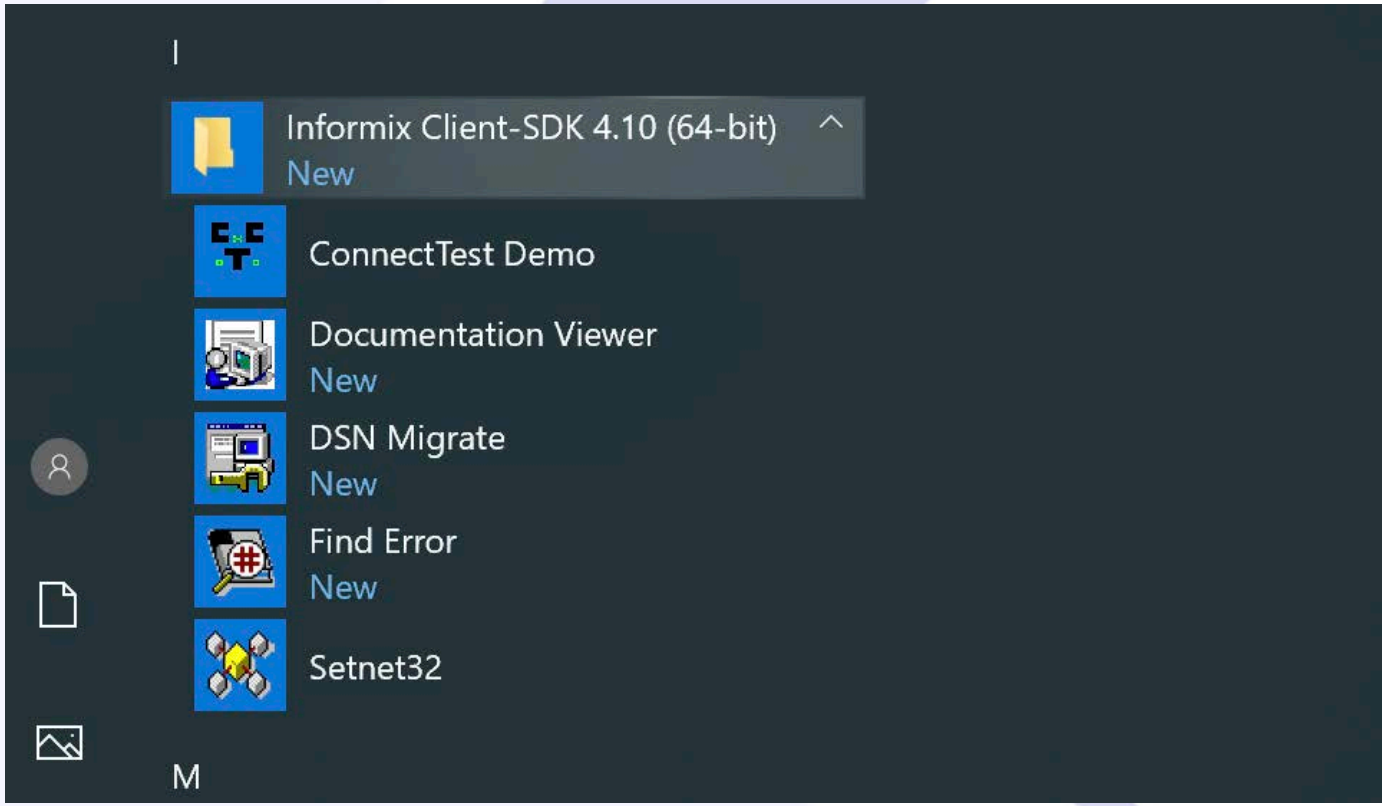
- Remote IDS databases:

```
databasename@dbservername
or
//servername/databasename
```

- Using SQL:

```
select * from database@server:table
e.g.
select * from stores1@train1tcp:items;
```

Setup Informix SDK on Windows



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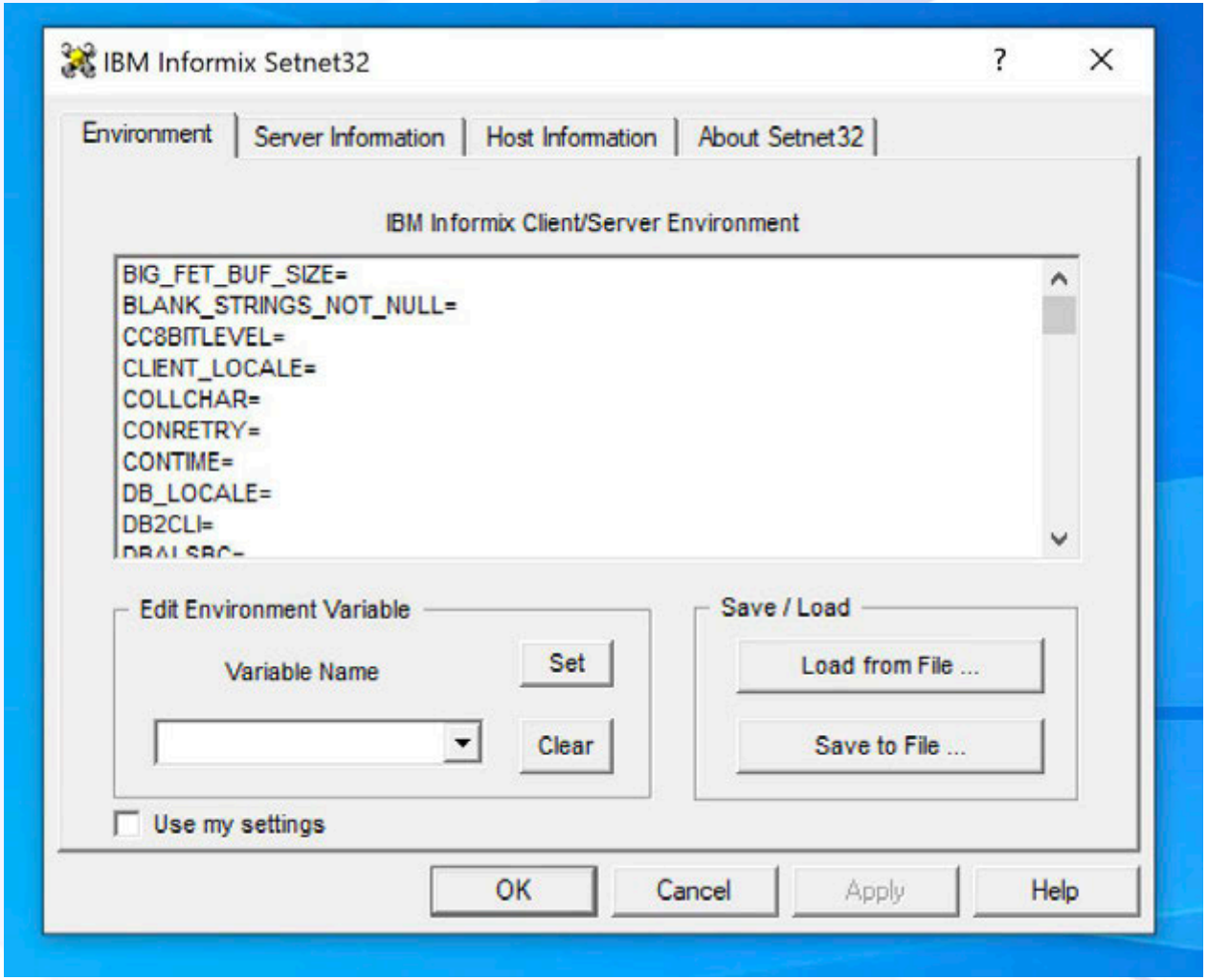
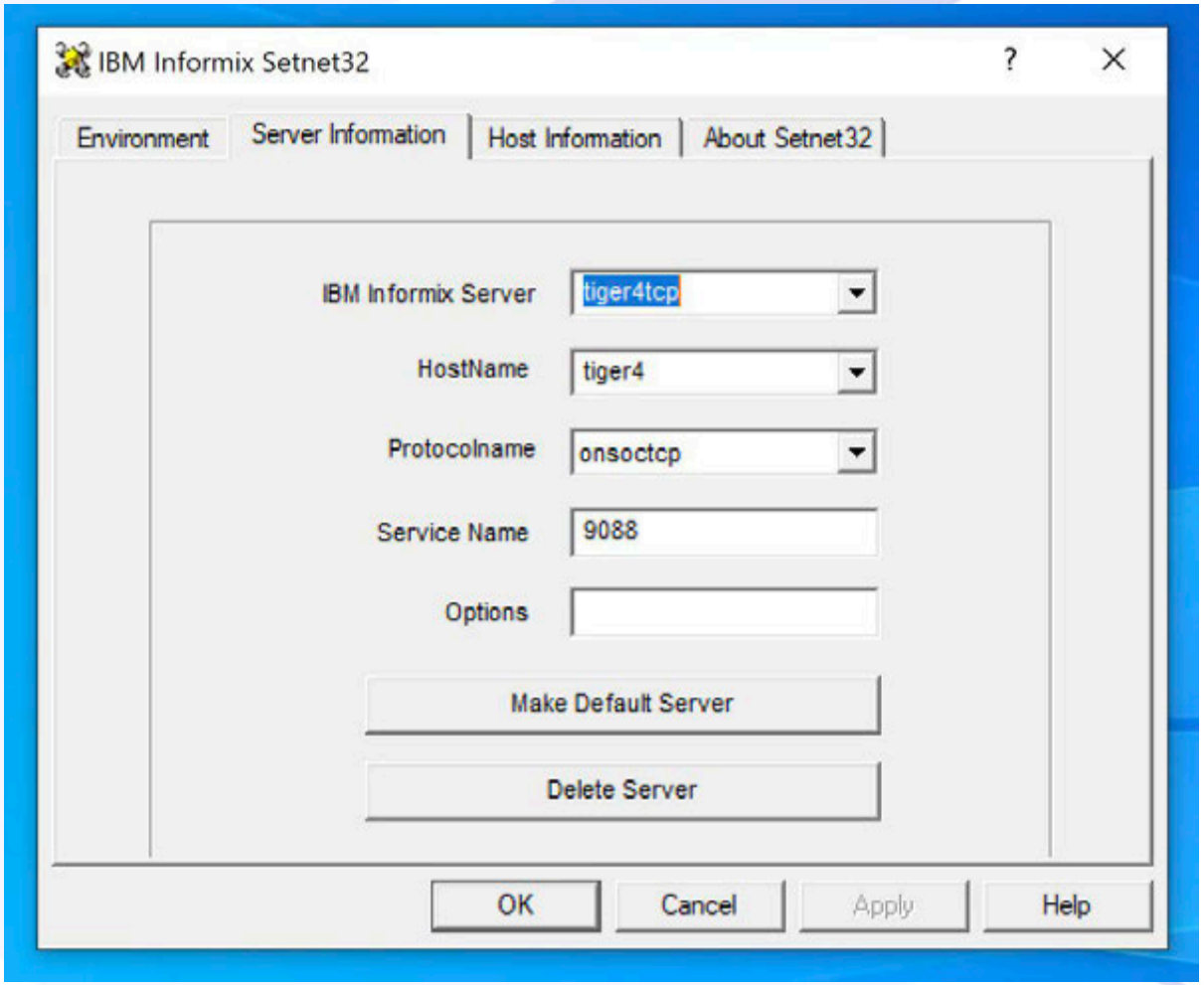
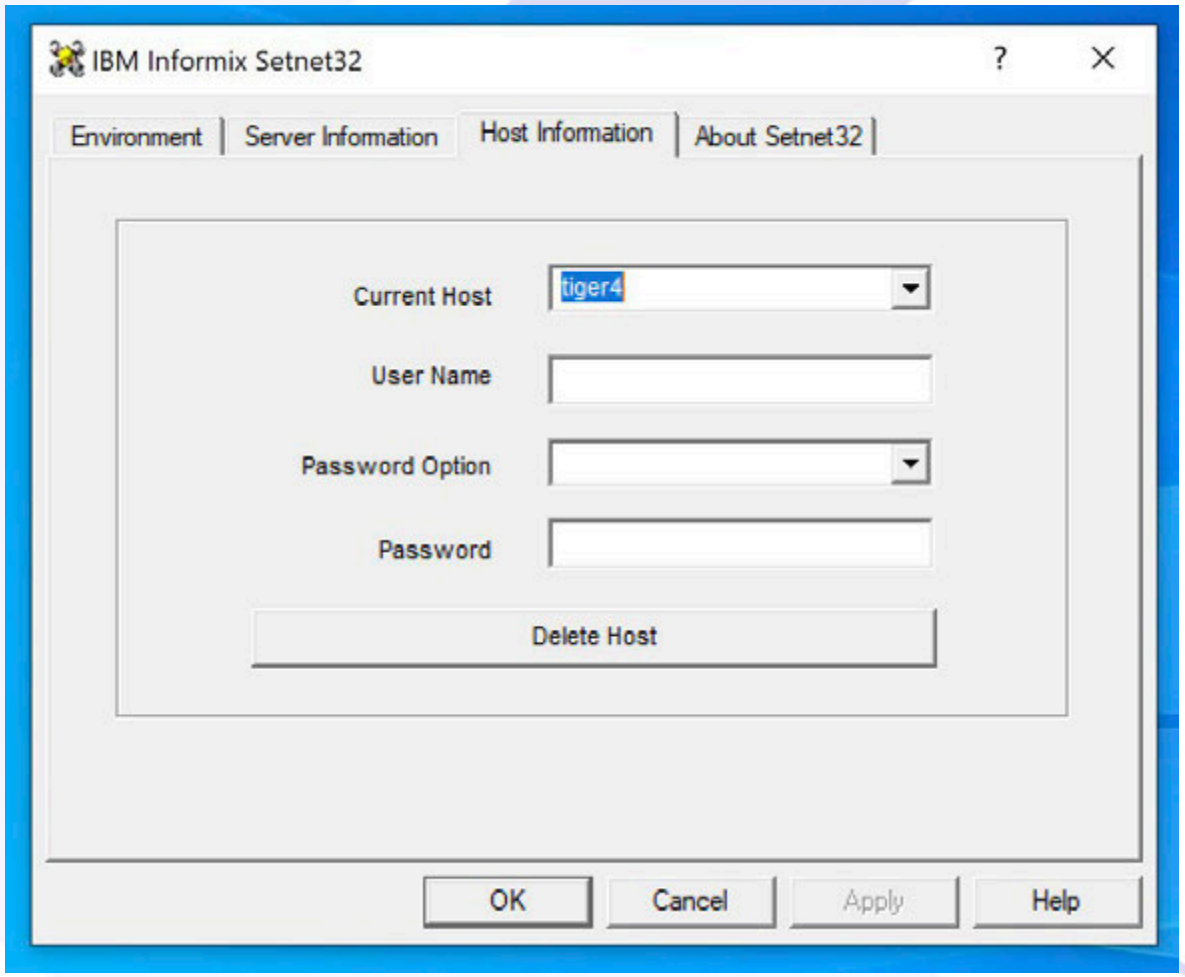


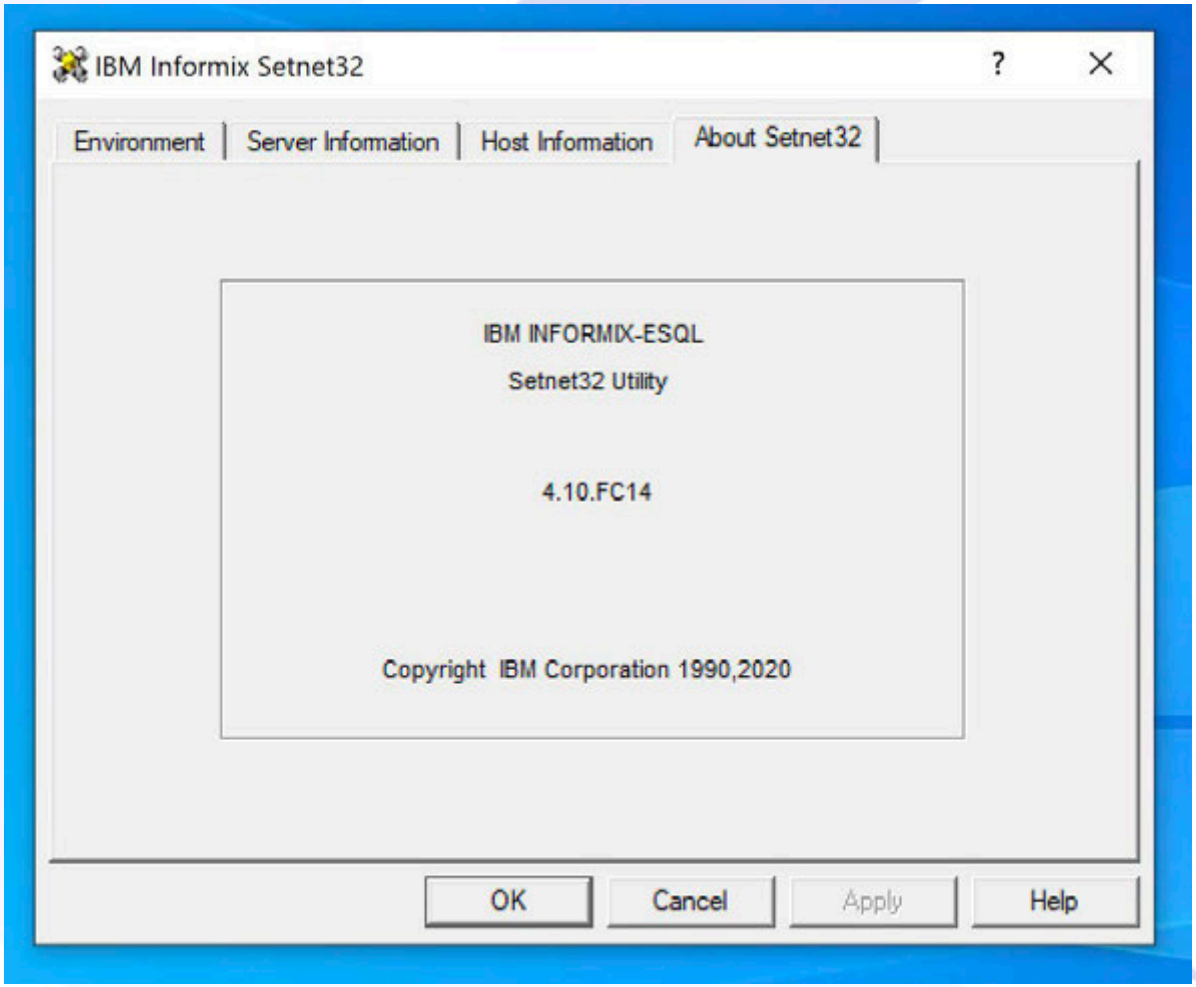
Setup Informix SDK on Windows



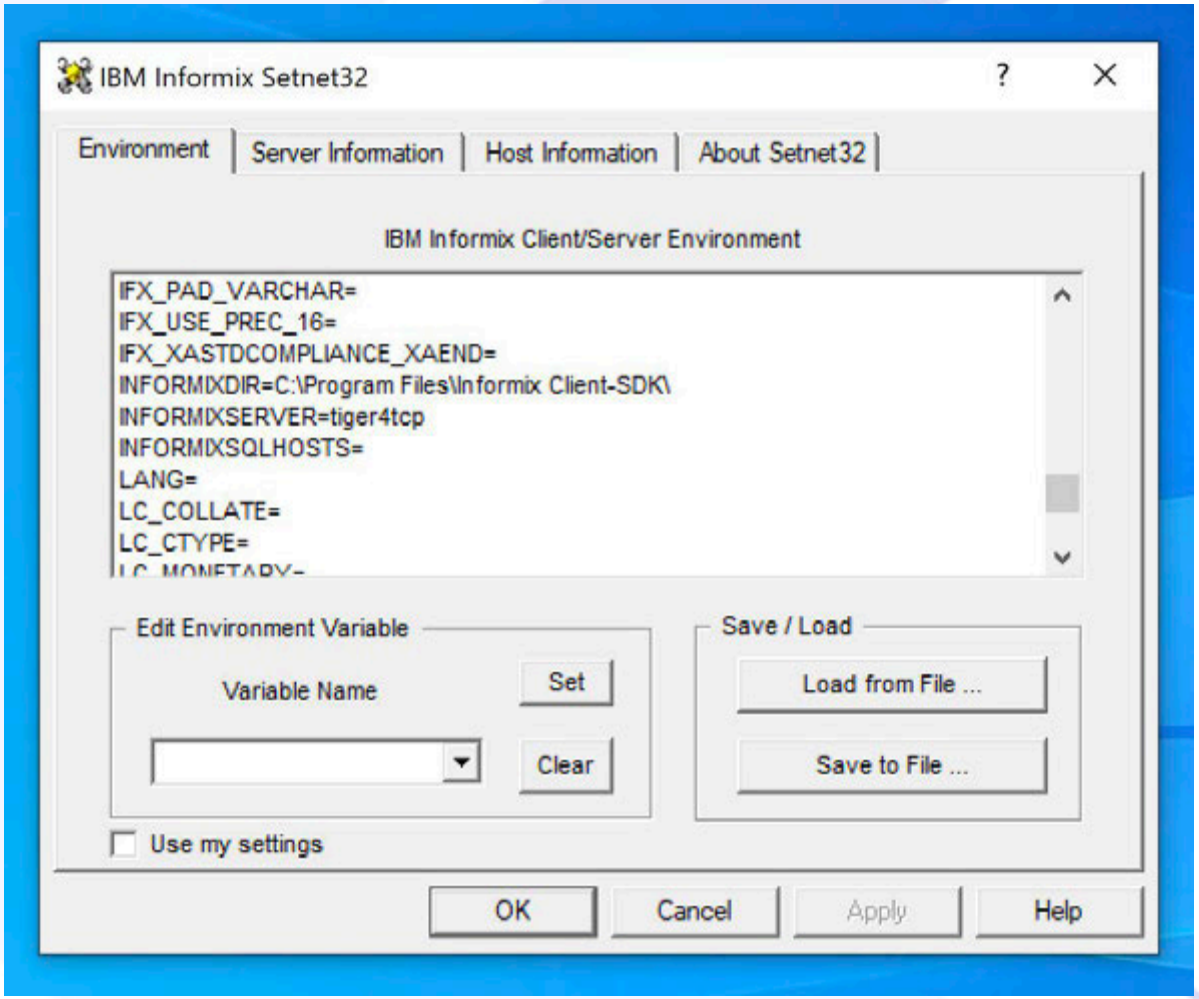
Setup Informix SDK on Windows



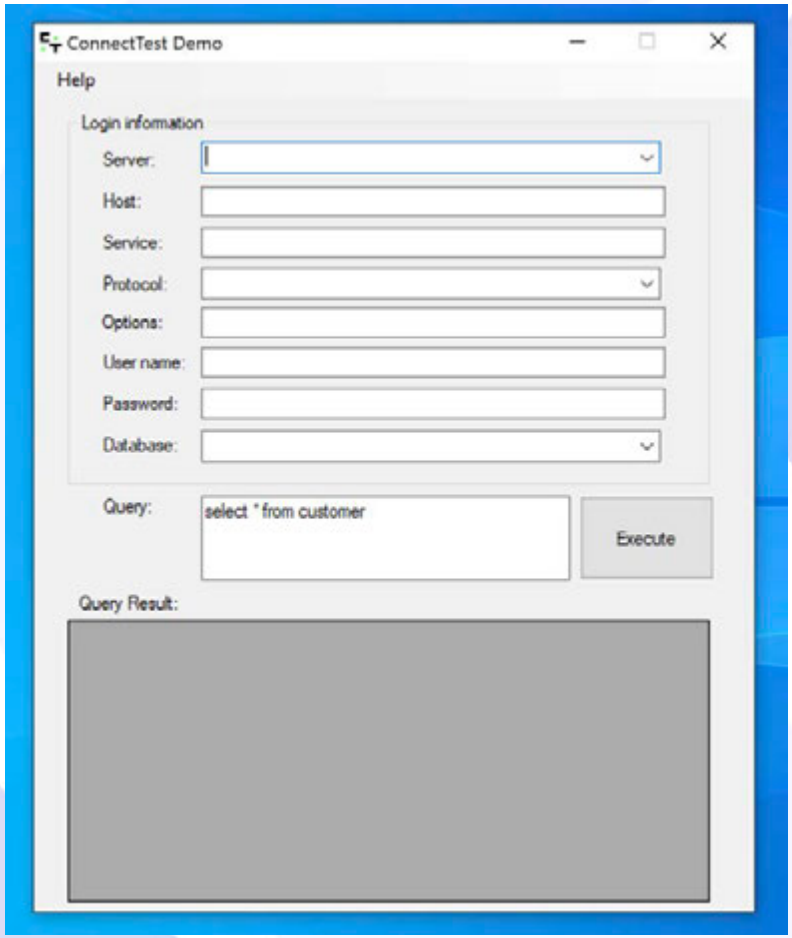
Setup Informix SDK on Windows

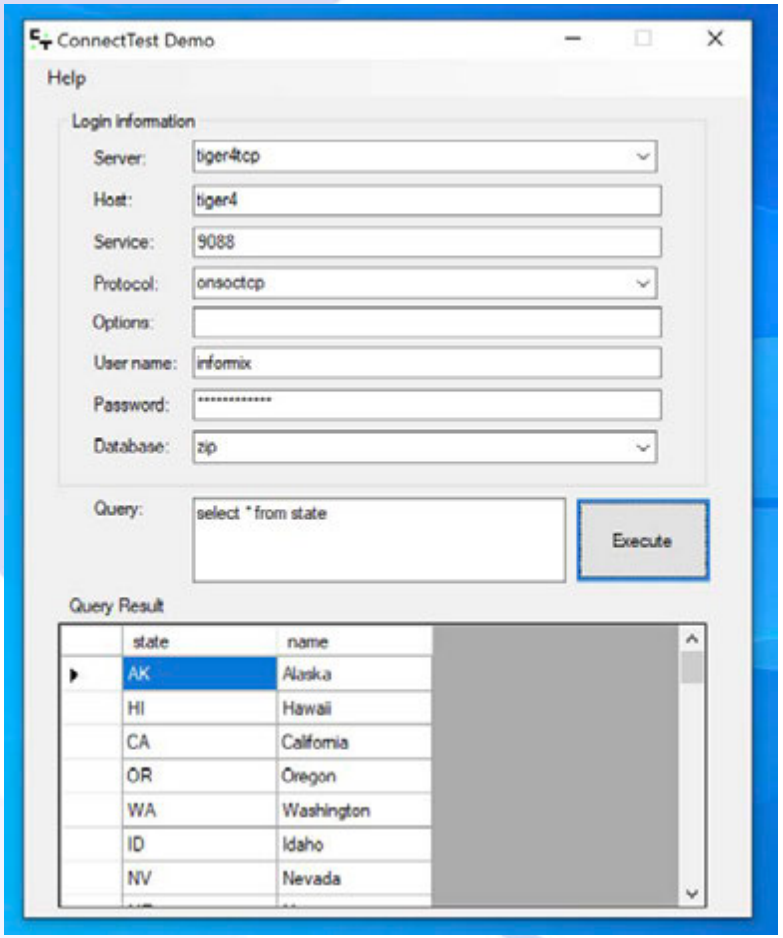


Setup Informix SDK on Windows

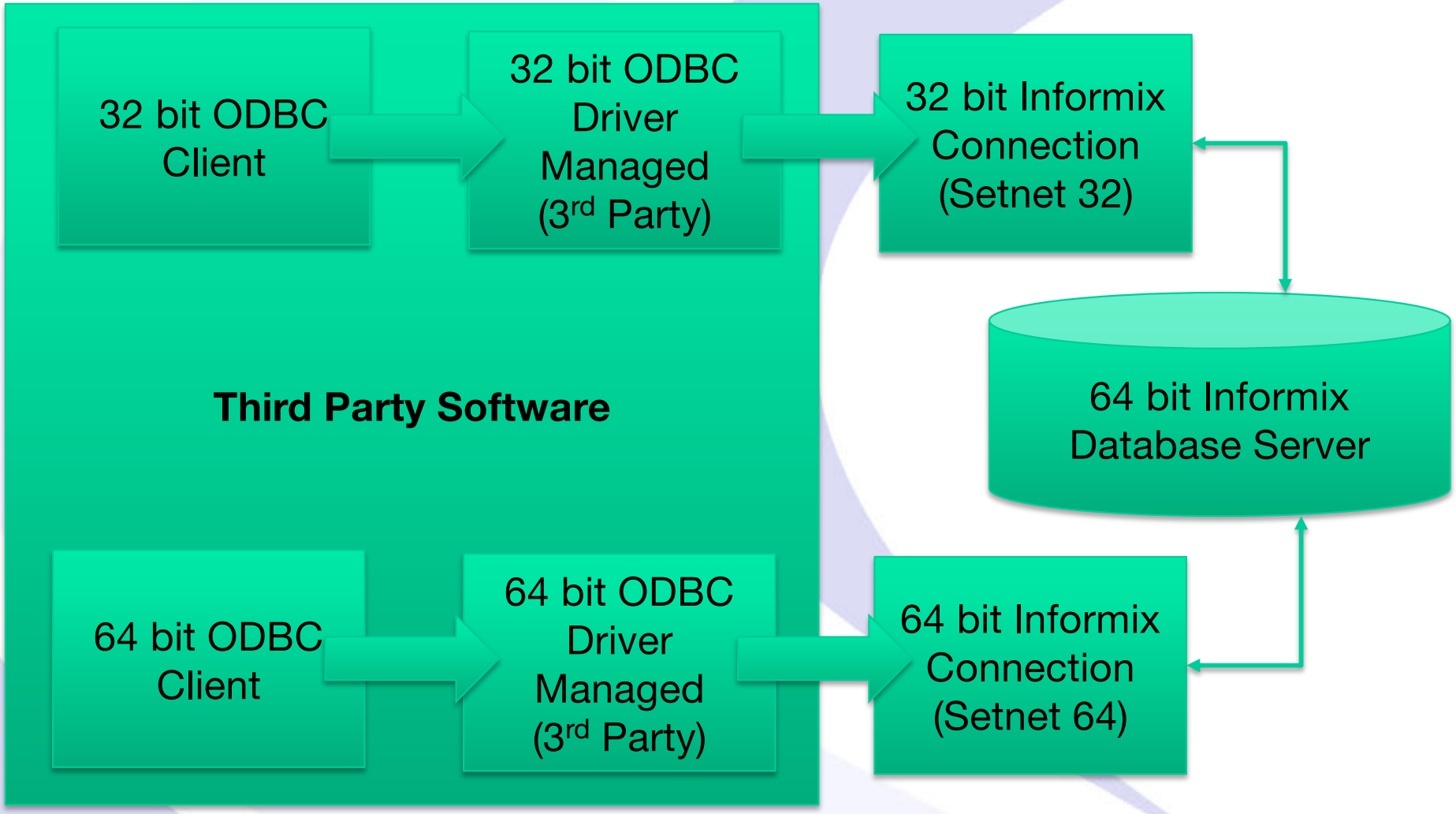


Informix ConnectTest

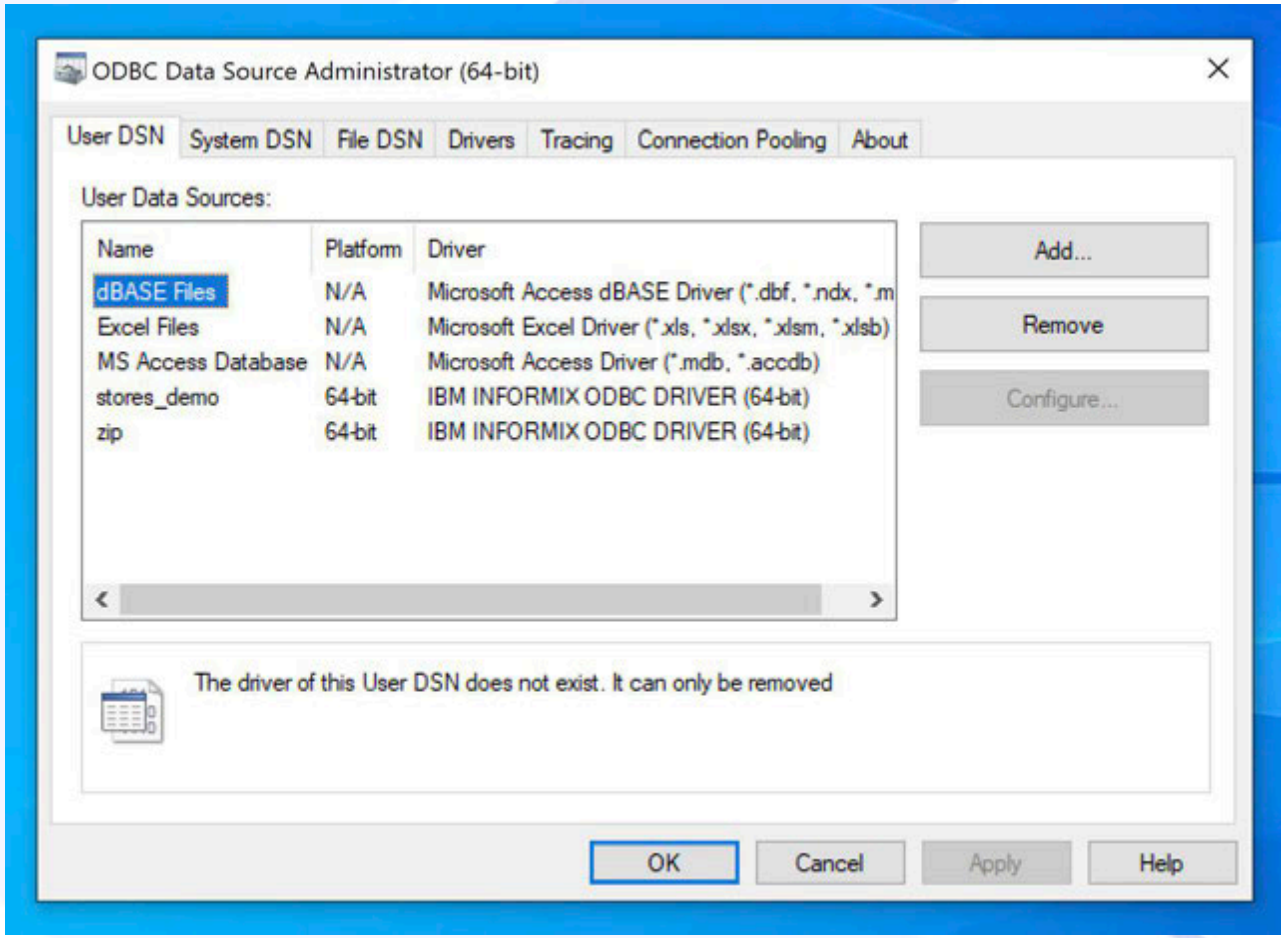




ODBC Connections



Configuring ODBC



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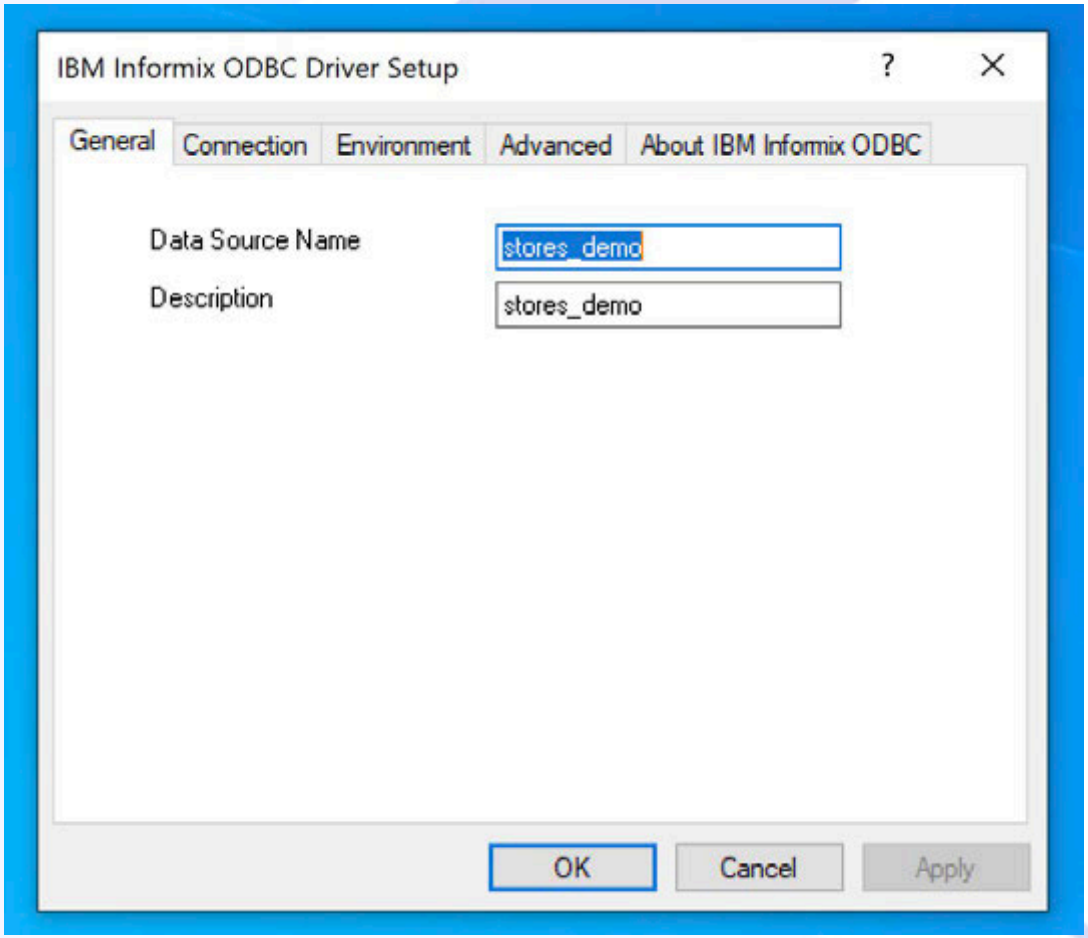

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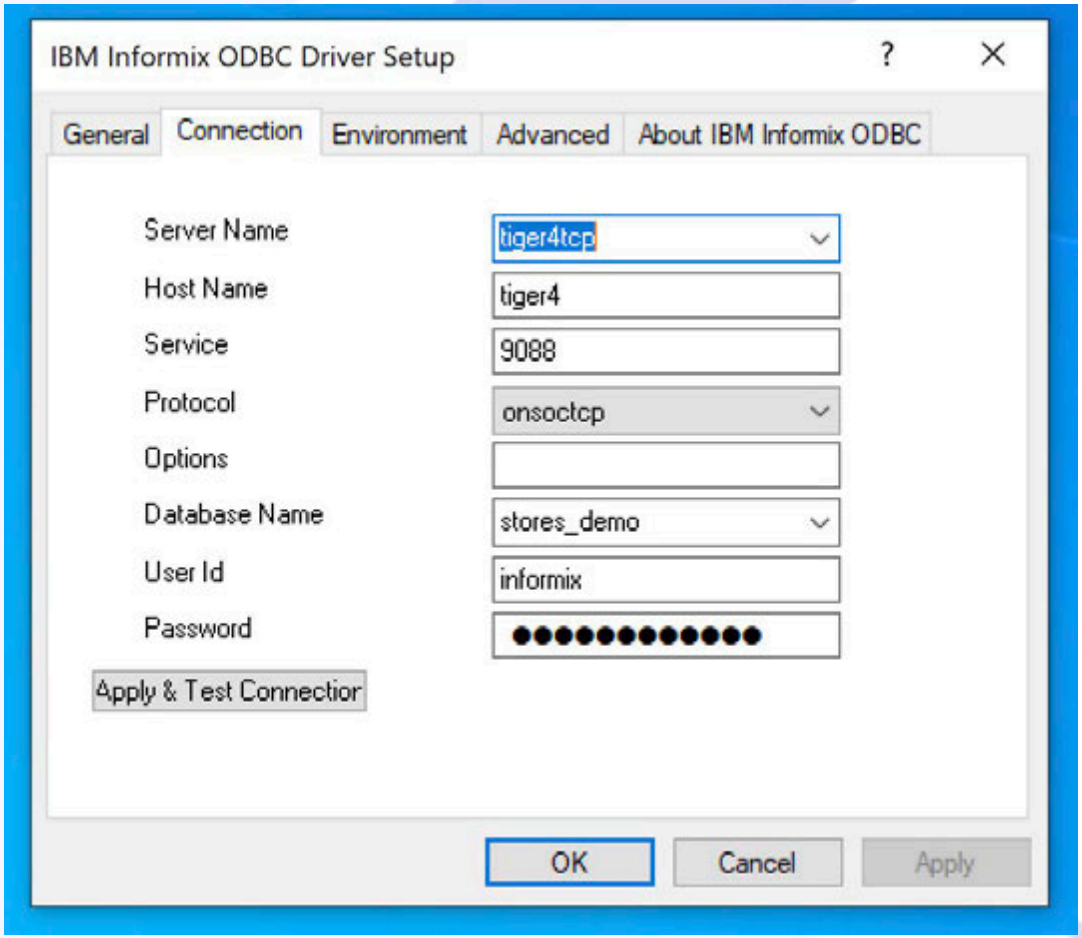

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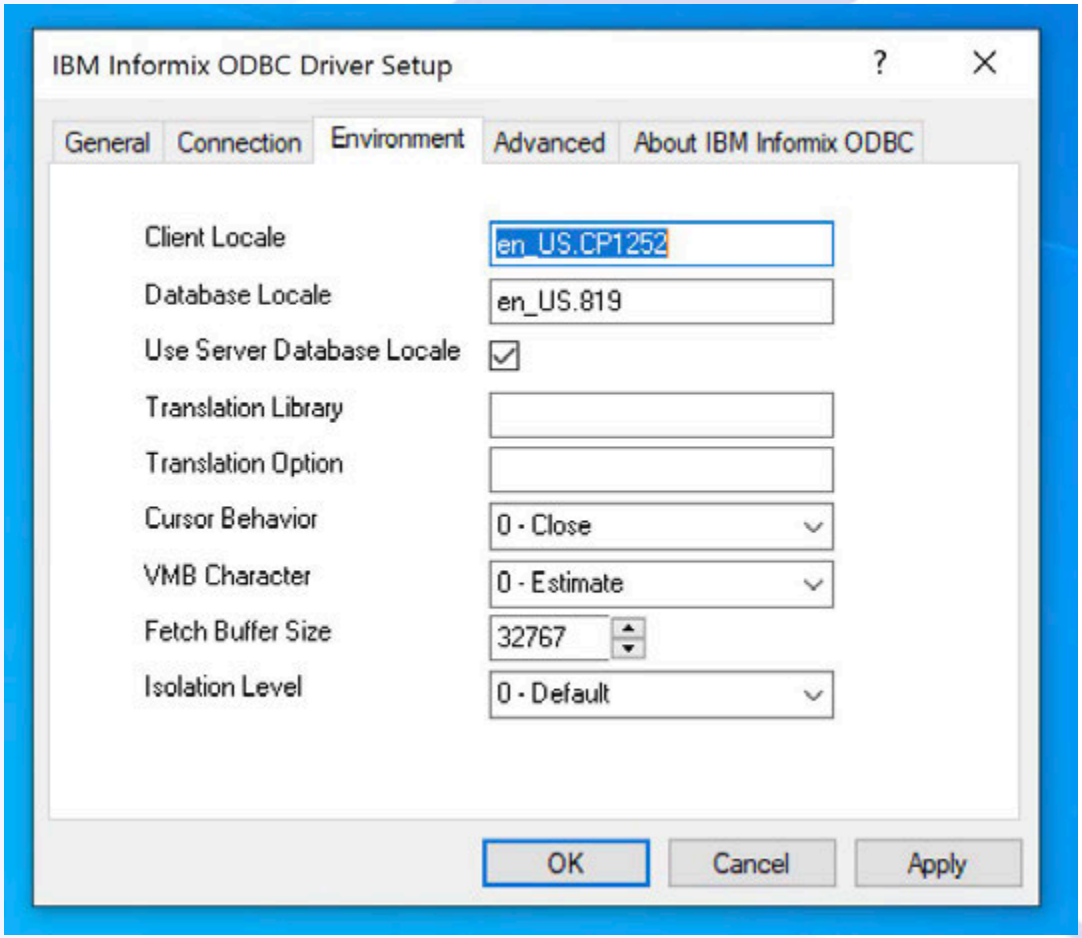

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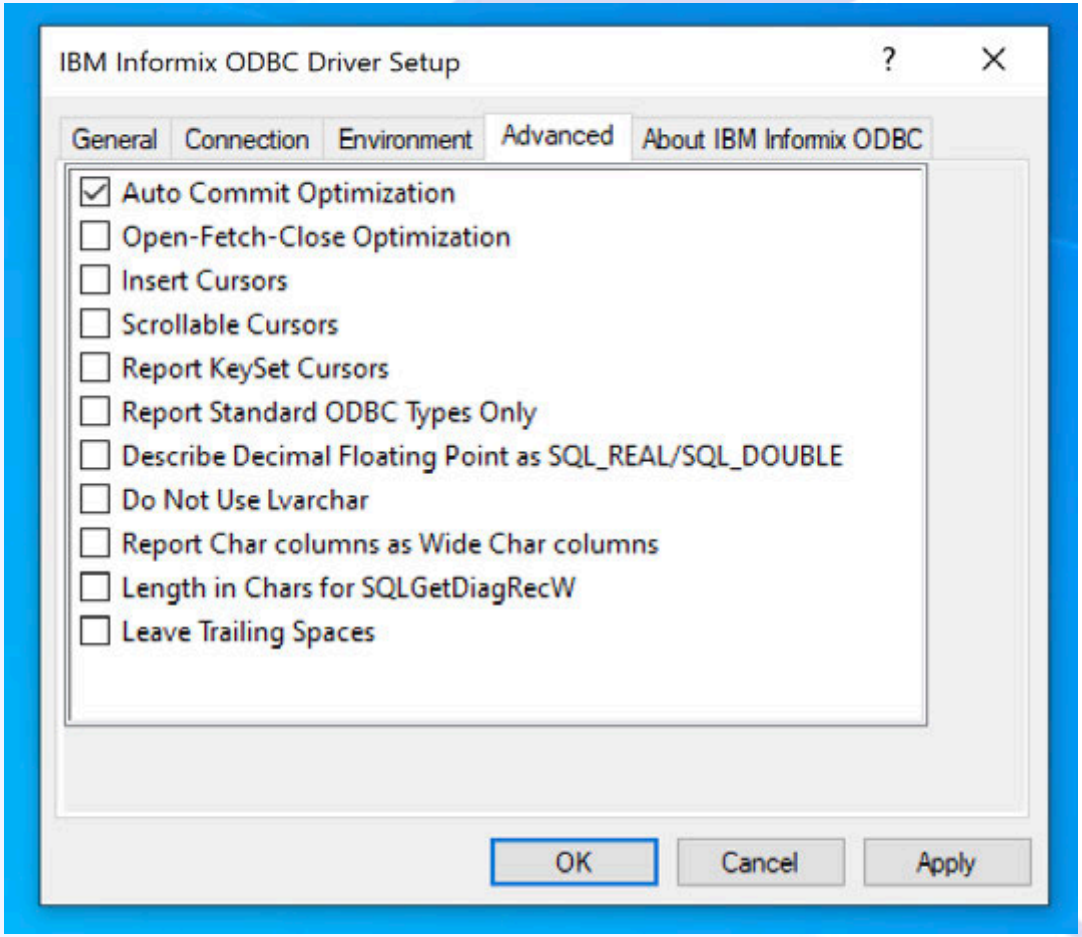
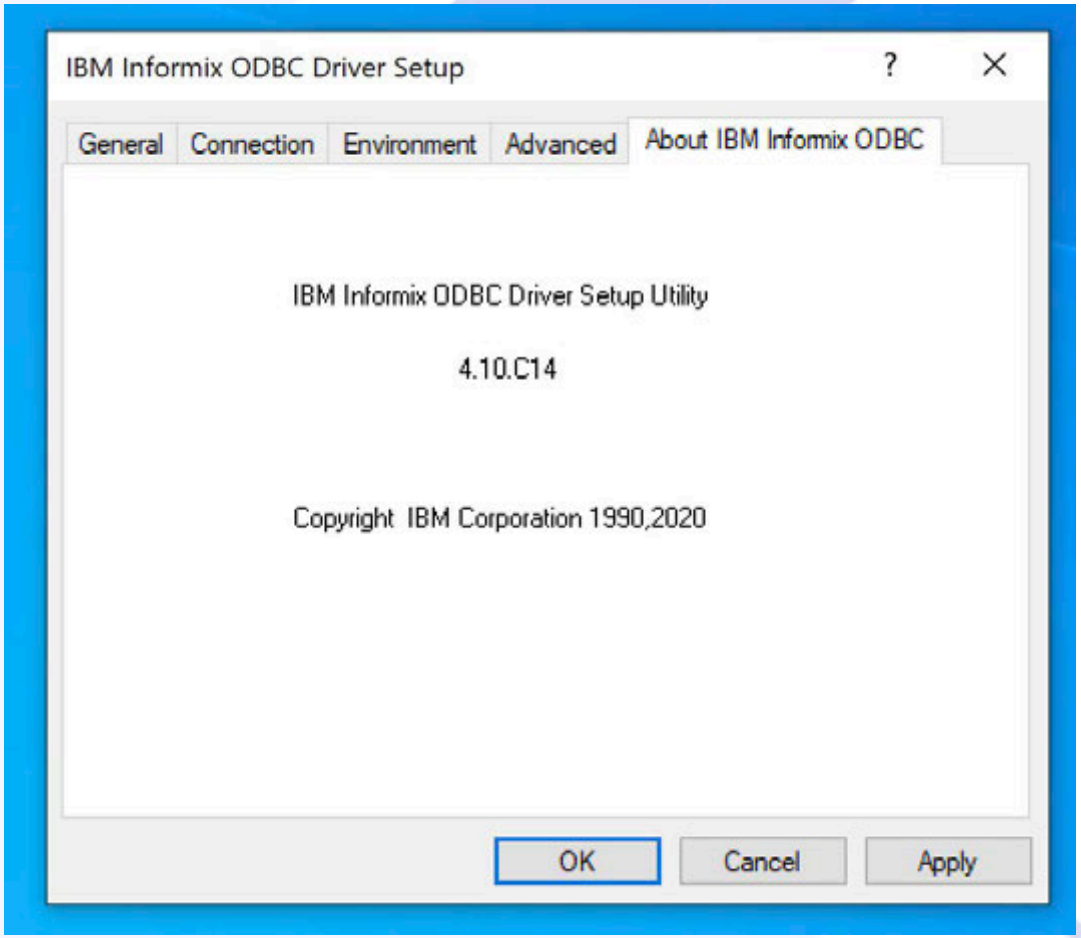
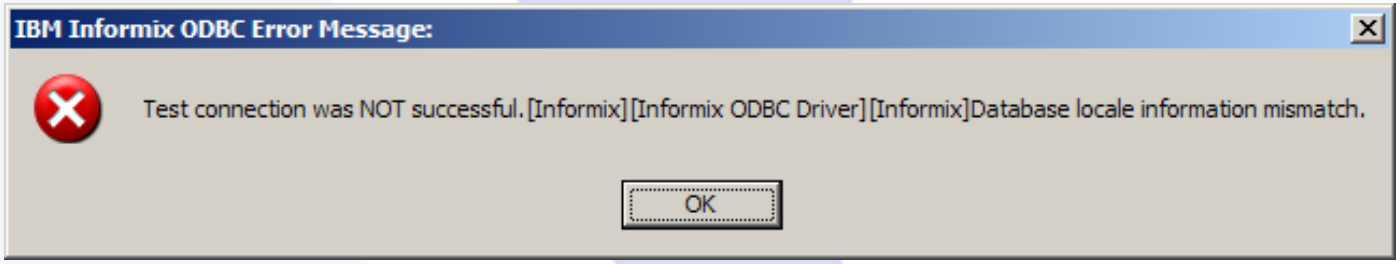


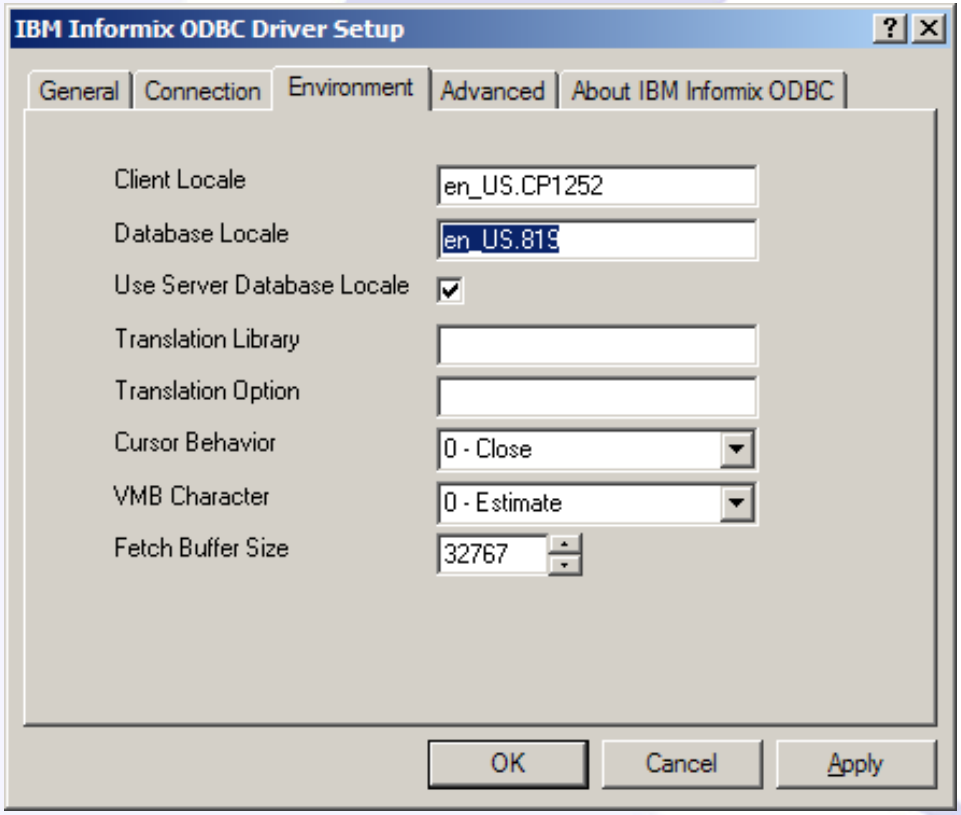
Configuring ODBC



Informix Locale Mismatch



Environment



Local on Database and Client Must be the same!

Configuring Unix ODBC

- Example Files: (In user home directory)
  - Odbcinst.ini
  - Odbc.ini
- Requires the following Environment Variables Set:
  - INFORMIXDIR
  - PATH
  - INFORMIXSERVER
  - LD_LIBRARY_PATH=${INFORMIXDIR}/lib:${INFORMIXDIR}/lib/cli:${INFORMIXDIR}/lib/esql

Use INFORMIXSERVER Network connection

Unix ODBC - Odbcinst.ini

```
[ODBC Drivers]
IBM Informix Informix ODBC DRIVER=Installed
[IBM Informix Informix ODBC DRIVER]
Driver=/opt/informix/lib/cli/iclit09b.so
Setup=/opt/informix/lib/cli/iclit09b.so
APILevel=1
ConnectFunctions=YYY
DriverODBCVer=03.51
FileUsage=0
SQLLevel=1
smProcessPerConnect=Y
```

Unix ODBC - Odbc.ini

```
[ODBC Data Sources]
dns1=IBM Informix Informix ODBC DRIVER
dns2=IBM Informix Informix ODBC DRIVER
;
; Define ODBC Database Driver's Below - Driver Configuration Section
;
[dns1]
Driver=/opt/informix/lib/cli/iclit09b.so
Description=IBM Informix Informix ODBC DRIVER
Database=stores_demo
LogonID=student
pwd=odbc
Servername=ids_server1
```

Unix ODNC.ini UNICODE Connection Section

- The Unicode parameter is the only change in the odbc.ini file that may be required. If the value of this parameter is correct, then the application will fail without any meaningful error message.

```
;
; UNICODE connection Section
;
[ODBC]
;uncomment the below line for UNICODE connection
UNICODE=UCS-4
;
; Trace file Section
;
```

UNICODE Setting

Testing Unix ODBC Using Open Source UnixODBC

- Link - http://www.unixodbc.org
- To test the install
  - odbcinst –j
- To test using Open Source ISQL
  - isql –v stores_demo

Testing Unix ODBC

```
student@tiger8:~ train1 >  odbcinst -j
unixODBC 2.3.6
DRIVERS............: /etc/unixODBC/odbcinst.ini
SYSTEM DATA SOURCES: /etc/unixODBC/odbc.ini
FILE DATA SOURCES..: /etc/unixODBC/ODBCDataSources
USER DATA SOURCES..: /home/student/.odbc.ini
SQLULEN Size.......: 8
SQLLEN Size........: 8
SQLSETPOSIROW Size.: 8
```

Testing Unix ODBC Using isql

```
student@tiger8:~ train1 > isql -v stores_demo
+---------------------------------------+
| Connected!                            |
|                                       |
| sql-statement                         |
| help [tablename]                      |
| quit                                  |
|                                       |
+---------------------------------------+
SQL> select * from customer;
+------------+---------------+---------------+--------------------+--------------------+------------------
----------+------+--------+------------------+
| customer_num| fname          | lname          | company            | address1           | address2
          | state| zipcode| phone            |
+------------+---------------+---------------+--------------------+--------------------+------------------
----------+------+--------+------------------+
| 101         | Ludwig         | Pauli          | All Sports Supplies | 213 Erstwild Court  |
yvale       | CA   | 94086  | 408-789-8075     |
| 102         | Carole         | Sadler         | Sports Spot        | 785 Geary St        |
Francisco   | CA   | 94117  | 415-822-1289     |
| 103         | Philip         | Currie         | Phil's Sports      | 654 Poplar          | P. O. Box 3498
 Alto       | CA   | 94303  | 415-328-4543     |
| 104         | Anthony        | Higgins        | Play Ball!         | East Shopping Cntr. | 422 Bay Road
ood City    | CA   | 94026  | 415-368-1100     |
```

Java Connection Properties

- Example Properties File:

informix.properties

driver=com.informix.jdbc.IfxDriver

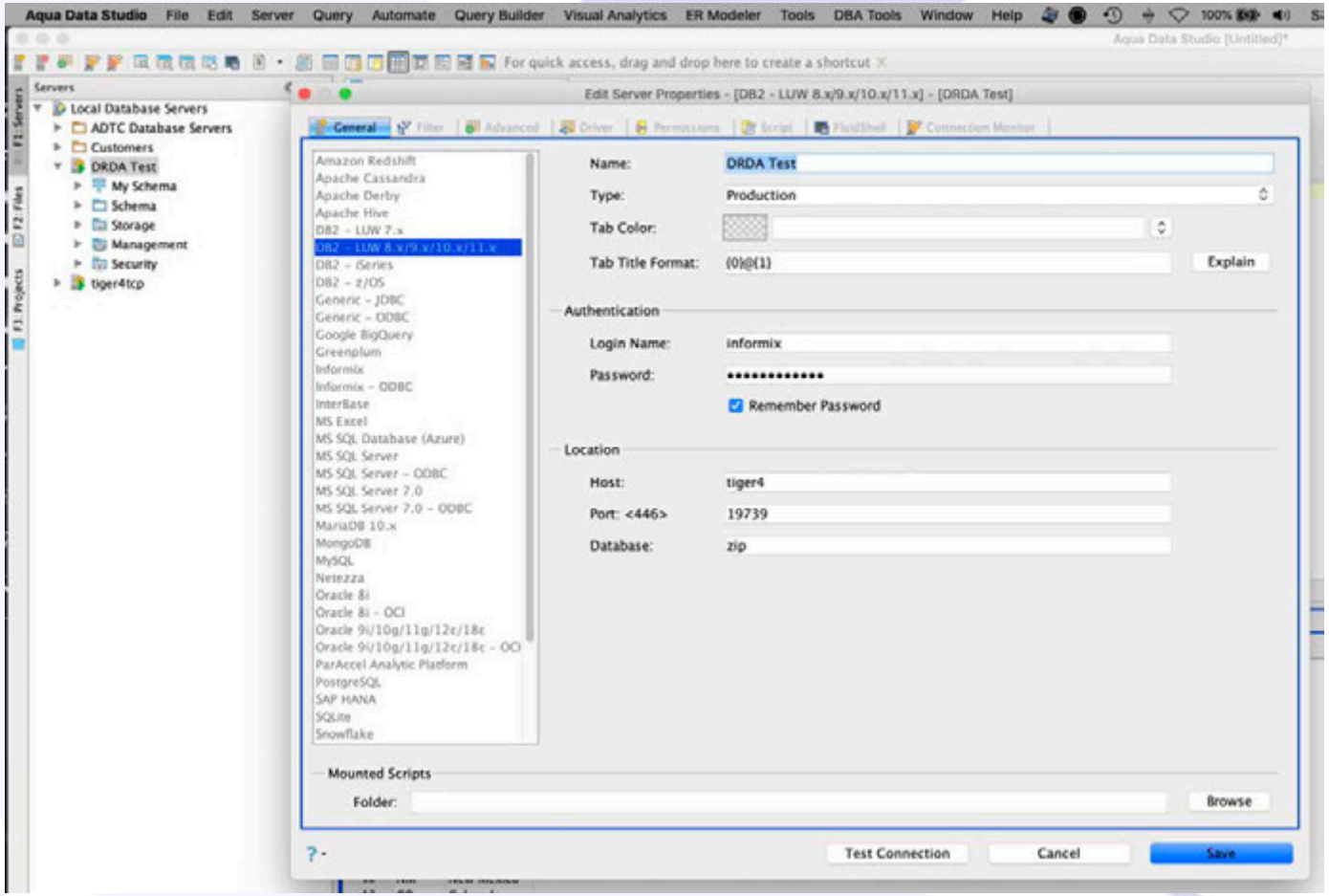
conn=jdbc:informix-sqli://tiger2:9088/benchmark3:INFORMIXSERVER=train1tcp

user=informix

password=XXXXXXXX

- Connection String:
  - Jdbc driver - jdbc:informix-sqli
  - Host - tiger2
  - Port - 9088
  - Database - benchmark2
  - InformixServer - train1tcp

Connecting DRDA to Informix



JSON/REST Connection Properties

- Example:

url=jdbc:informix-sqli://localhost:9088/sysmaster:INFORMIXSERVER=ids;
USER=informix; PASSWORD=informix

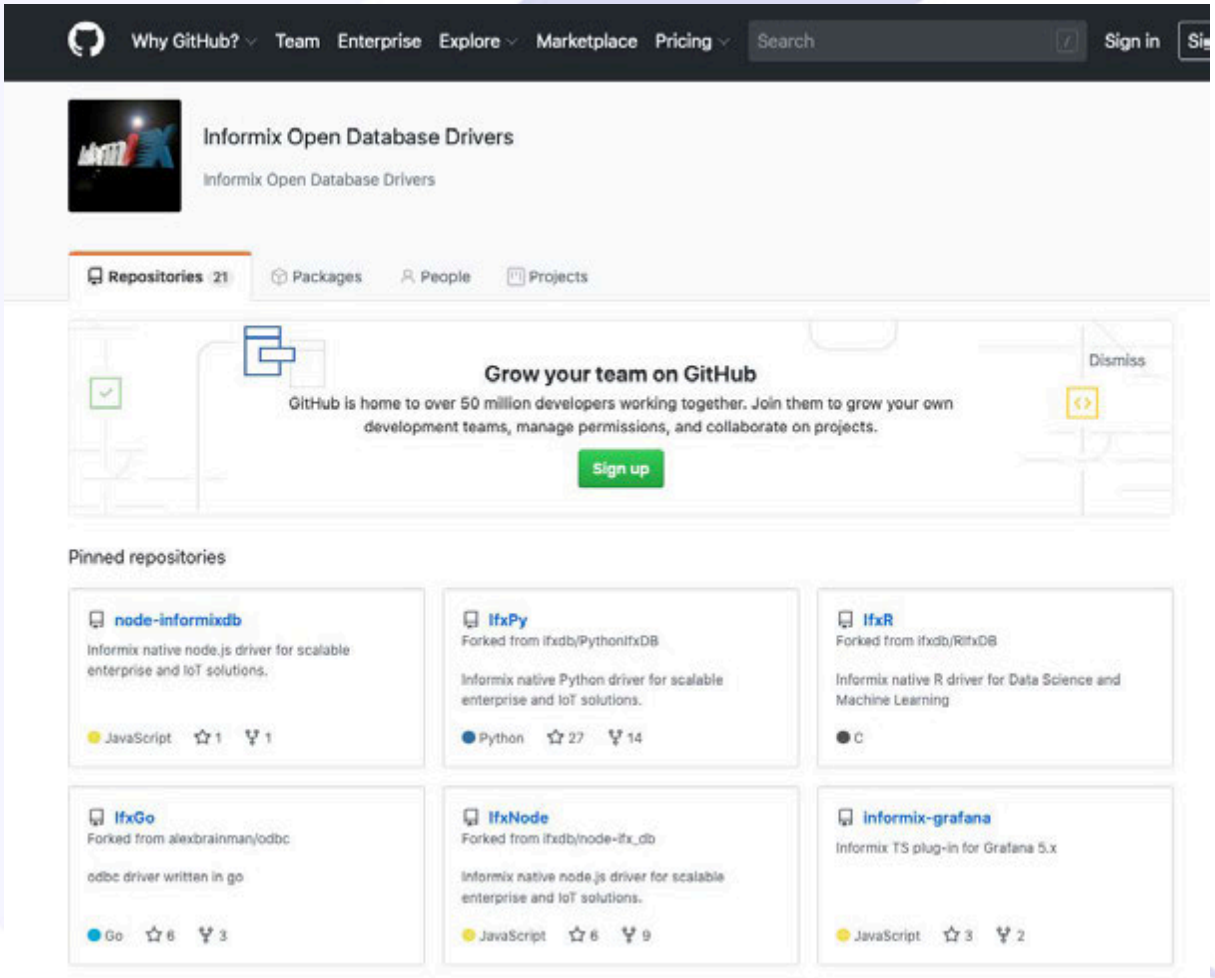
Python Connection Properties

- Example:

```
ConStr = "SERVER=ids0;DATABASE=db1;HOST=127.0.0.1;SERVICE=9088;UID=informix;PWD=xxxxx;"
        try:
                # netstat -a | findstr 9088
                conn = IfxPy.connect( ConStr, "", "")
        except Exception as e:
                print ('ERROR: Connect failed')
                print ( e )
                quit()
```

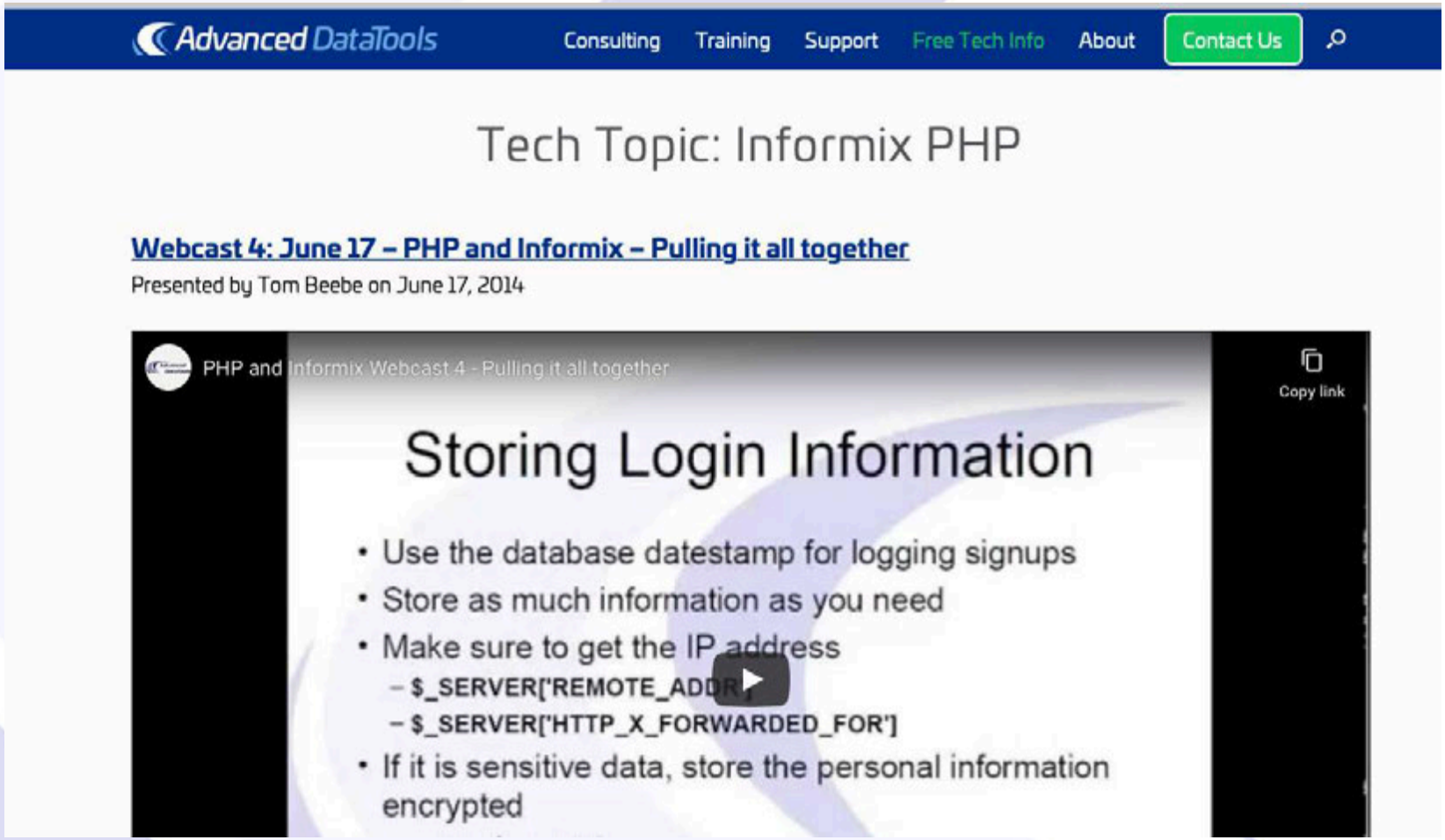
Visit - https://github.com/OpenInformix

Informix Open Database Drivers



Tech Topic: Informix PHP by Tom Beebe

- Visit - https://advancedatatools.com/tech-info/all-tech-topics/tech-php/



Informix Connection Settings

Name	Description	Connection Setup			
		ONCONFIG File	SQLHosts File	Windows SDK Setnet	Windows ODBC
INFORMIXSERVER	The name of an Informix database server on the network	DBSERVERNAME or DBSERVERALIASES	1st field	IBM Informix Server	Server Name
NETTYPE Protocol	Nettype is an 8-character string specifying the protocol in this format: ddiiippp dd = Database product [|ol|on|dr] iii = Interface type [ipc|soc|tli|sql] ppp = Protocol [imc|nmp|shm|spx|str|tcp|ssl|mux]	NETTYPE: protocol, number poll threads, number of connections, (NET|CPU)	2nd field	Protocolname	Protocol
Hostname or IP Address	Hostname is the name of the computer where the database server resides as listed in /etc/hosts or the IP address		3rd field	HostName	Host Name
Service or Port Number	Service name is a service name entry from the services file /etc/services or the port number the database is listening for connection on IANA (www.iana.org) assigned port number/service names for Informix: sqlexec 9088/tcp sqlexec-ssl 9089/tcp		4th field	Service Name	Service
Options	Optional Values examples: b=<connection buffer size> c=<connection redirection> g=<group name> i=<group identifier> e=<end of group> m=<multiplexed connection> k=<keep alive setting> r=<client security setting> s=<server security setting> csm=<communication support module> cfd=<communication files directory>		5th field	Options	Options
Database	The Database Name to connect to on an Informix Server				Database Name
Username	User Login Name				User ID
Password	User Login Password				Password
Data Source Name	ODBC Name for the Connection, may be User DSN or System DSN				Data Source Name

Questions?

Send follow-up questions to
Lester@advancedatatools.com

International Informix User Group: http://www.iiug.org

Free Informix Tutorials Webcasts

from the IBM Informix Champions

A step by step guide to using Informix Database Servers

- **Getting Started with Informix by Lester Knutsen – January Replay**
- **Configuring a New Informix Server by Lester Knutsen – February Replay**
- **Managing Informix Disk Space – March Replay**
- **Managing Informix Logs – April Replay**
- **Informix Backup, Recovery, and High Availability – May Replay**
- **Connecting Users to Informix Servers – June Replay**
- **Creating Databases and Tables in Informix – July 23, 2020 at 2:00 pm EDT**
  - **Databases, Tables, Partitioning, System Catalogs, and Security**
- **Basic Informix Server Monitoring – August 20, 2020 at 2:00 pm EDT**
  - **Onstat, Oncheck, and Informix HQ**

Registration and more information: https://advancedatatools.com/tech-info/next-webcasts/

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