ODBC Up and Running

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IBM CHAMPION

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Agenda

- “Yes, we can” on IBM i
- OSS = Open Source Software
- Why ODBC
- IBM i ODBC Driver Setup and Options
- First ODBC Connections
- Code Samples
- Additional Resources

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Yes, we can

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We can!

- Bring pleasing, modern user interfaces to IBM i applications
- Say yes to business requests
- Install popular applications on the i
  - Integrate with RPG and Db2 data
- Integrate core applications with cloud and partner applications using APIs
- Create a familiar environment for young talent to work in

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ODBC's Return!

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Alan on ODBC in 2011

- “Don’t use ODBC to connect to IBM i data. It’s not well supported and you can’t run that same code on IBM i.”
- Times have changed!

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Advantages of ODBC

- Strategic direction of IBM i team
- Driver covered by IBM SWMA support
- Same driver runs on IBM i, Windows, Linux and Mac
- Standard unixODBC driver manager
- Write code once, then run it from anywhere

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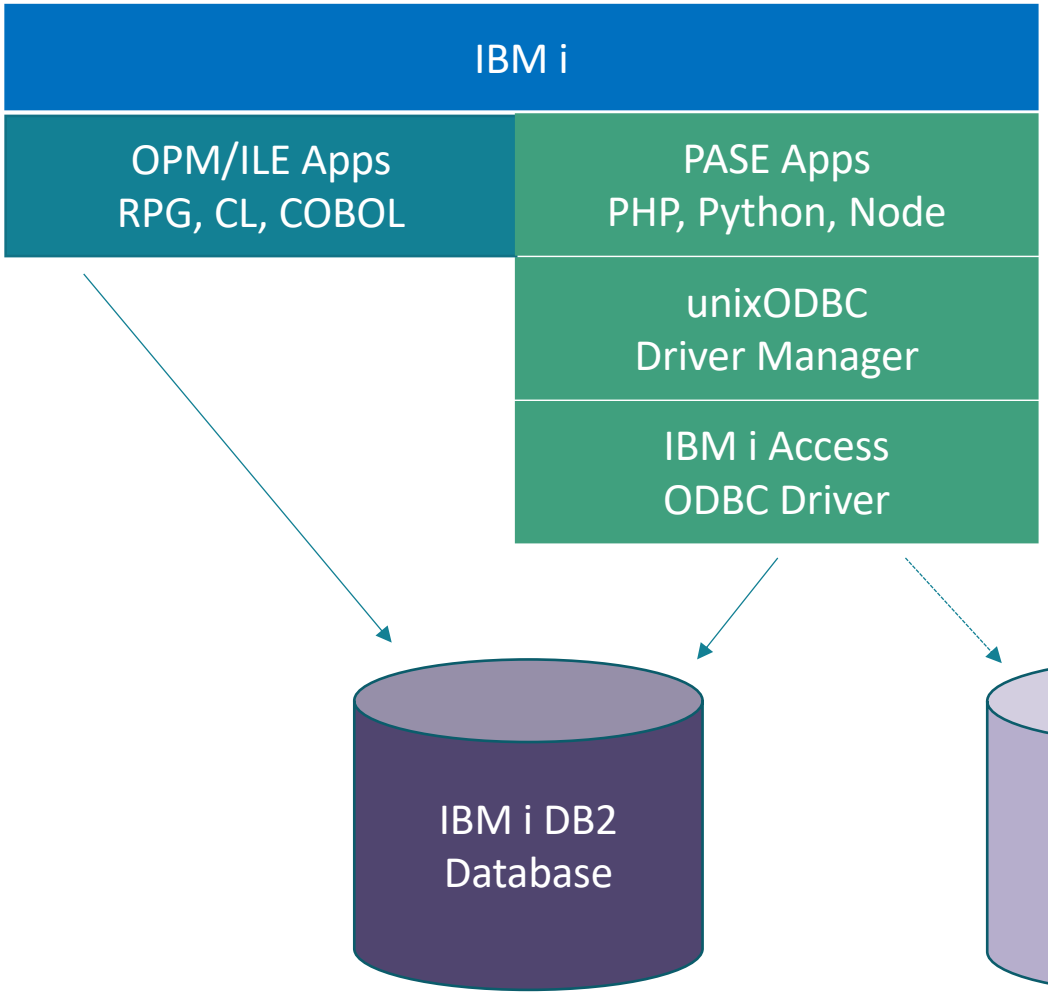
ODBC Architecture



Windows, Linux, Mac and native IBM i Developers can use exact same codebase with no changes

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IBM i ODBC Driver Setup

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Overview: IBM i ODBC Driver Install

- **IBM i Access Client Solutions** (ACS) installed on PC
- Getting started with Open Source environment: https://www.seidengroup.com/php-documentation/how-to-set-up-the-ibm-i-open-source-environment/
- Via IBM ACS, if not already installed, install:
  - (yum, rpm, wget), unixODBC, unixODBC-devel
- Download and install IBM i Access ODBC driver
- Additional reading at IBM ODBC Github Site:
  - https://ibmi-oss-docs.readthedocs.io/en/latest/odbc/README.html

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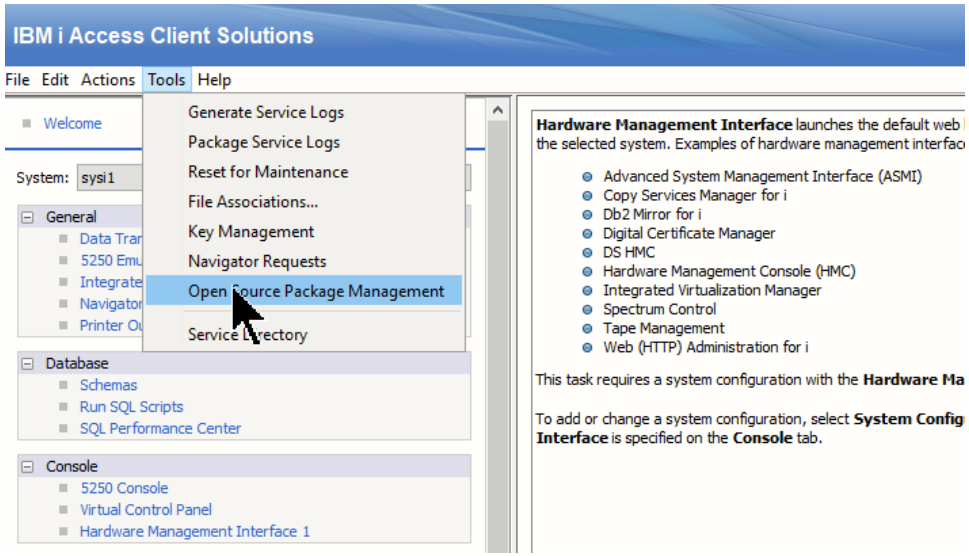
Set Up Open Source Environment

- IBM i SSH server service must be running (port 22)
  - STRTCPSVR *SSHD to start SSH
- Access Client Solutions (ACS) option



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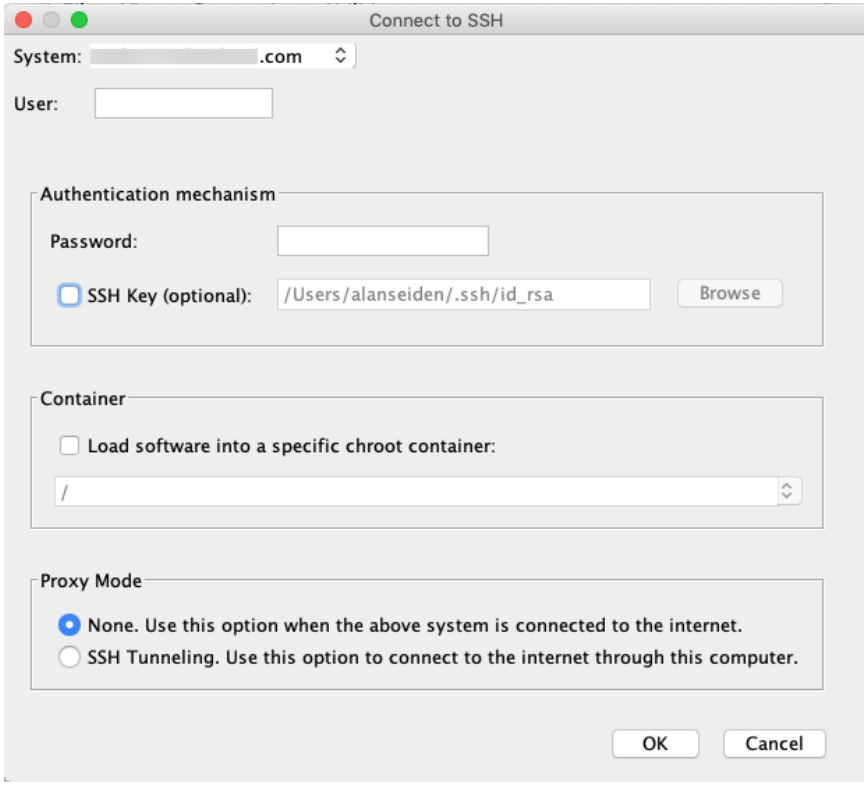
Open Source Package Management

- Log in with an *ALLOBJ level user (not QSECOFR)



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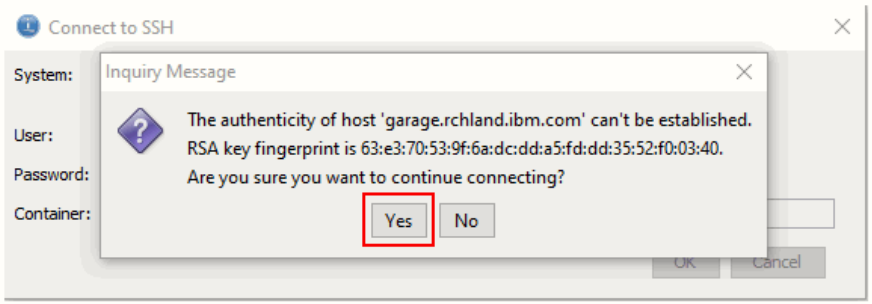
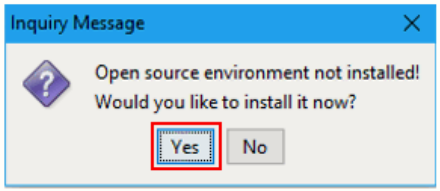
Open Source Package Management

- You may receive these prompts. Just say Yes !

If you receive the following warning, select **"Yes"** to continue.



If the underlying Open Source Package Management YUM utility is not already installed, the following message is displayed. Respond with **"Yes"** and the environment installs.



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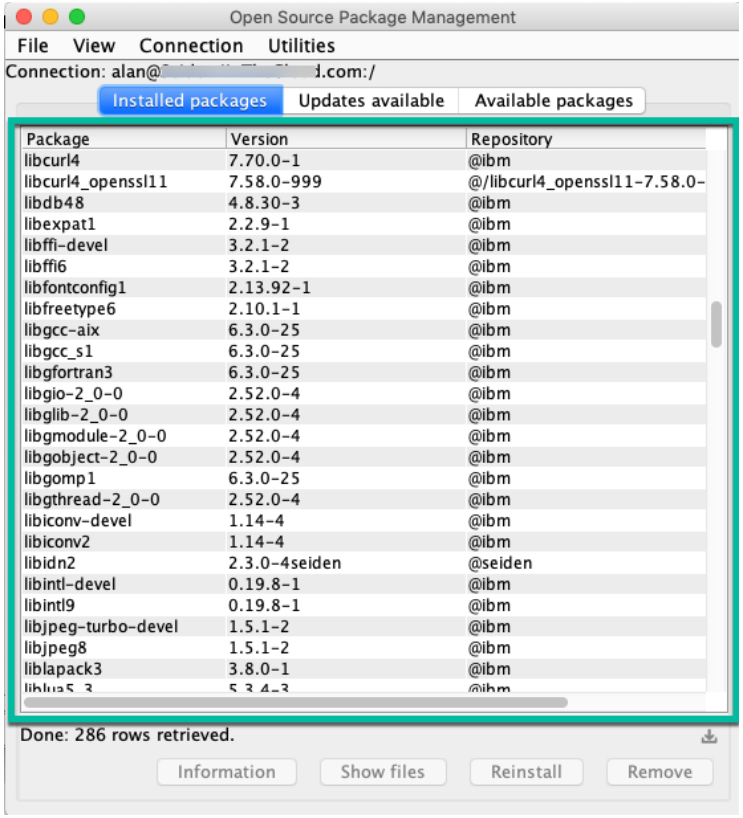
Open Source Package Management

- All is working if you see a list of packages !



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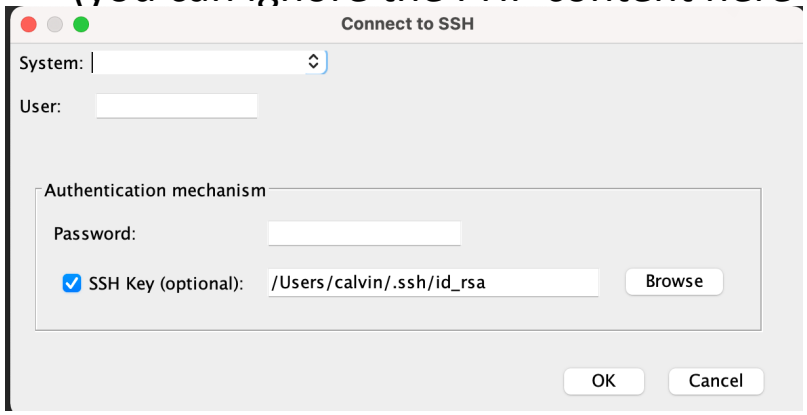
If you have network issues

- If you get timeouts due to IBM i networking being misconfigured or blocked, all is not lost!
  - Try the ACS HTTP Proxy or Mirroring options
  - https://www.seidengroup.com/php-documentation/offline-installation-of-communityplus-php/
    - (you can ignore the PHP content here if not needed)



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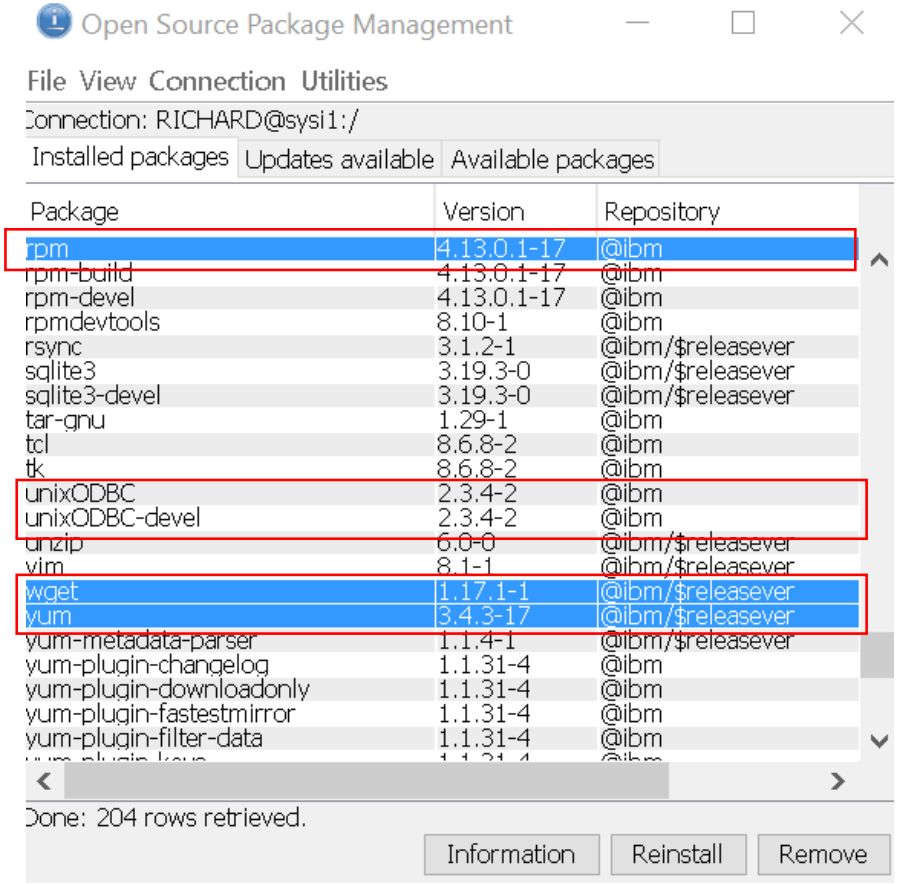
Install ODBC Package Prerequisites

- You should already have:
  - Yum, wget, rpm
- Install unixODBC
- Install unixODBC-devel
- We will use **rpm** command when we install the IBM i Access ODBC driver



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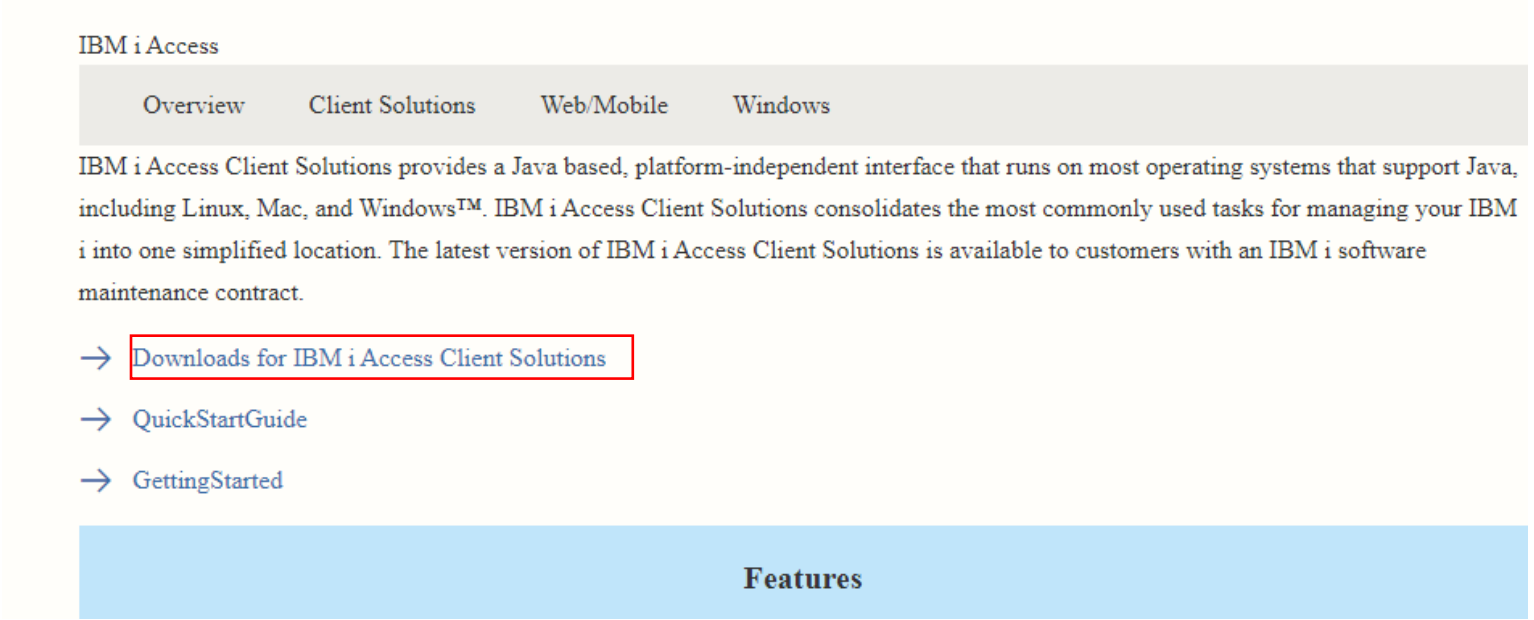
Download IBM i PASE ODBC Driver

- IBM i Access Client Solutions Site: https://www.ibm.com/support/pages/ibm-i-access-client-solutions

**Note: You will need an IBM account to log in and download



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Download IBM i PASE ODBC Driver

Download using http | Download using Download Director

Show 10 entries Search:

Description	Filename	Size	Action
IBM i Access Client Solutions	IBMiAccess_v1r1.zip	128074995 B	Download
Readme file for 5733-XJ1	Readme.txt	5 KB	Download
Quick Start Guide	QuickStartGuide_en.html	11 KB	Download
Getting Started	GettingStarted_en.html	110 KB	Download
ACS EHLLAPI - Version 8.19.338	acshllapi.exe	1120093 B	Download
ACS Windows App Pkg English (64bit)	IBMiAccess_v1r1_WindowsAP_English.zip	53311376 B	Download
ACS Linux App Pkg	IBMiAccess_v1r1_LinuxAP.zip	20797233 B	Download
ACS PASE App Pkg	IBMiAccess_v1r1_PASE_AP.zip	8577229 B	Download

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Upload IBM i Access PASE ODBC Driver

- Download IBMiAccess_v1r1_PASE_AP.zip
- Unzip to ibm-iaccess-1.1.0.xx-0.ibmi7.2.ppc64.rpm
- Upload to IFS root dir as: /ibm-iaccess-1.1.0.xx-0.ibmi7.2.ppc64.rpm (or other location)
  - Use your favorite file transfer tool
- **Note:** "xx" above is file version number in your download.
- **Note:** latest versions, e.g. .15, only available for IBM i 7.3 and higher.

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Install IBM i Access PASE ODBC Driver

- Start Qshell (STRQSH), PASE (CALL QP2TERM) or SSH terminal session using Putty, MobaXterm or other SSH terminal client
- Run commands below to install the IBM i Access ODBC driver
- cd /

  PATH=/QOpenSys/pkgs/bin

  export PATH

  rpm -i ibm-iaccess-1.1.0.xx-0.ibmi7.2.ppc64.rpm
- Once install has completed you will be notified on the command line.

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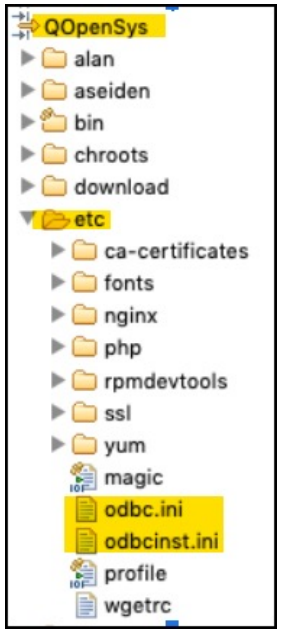
Review default odbc.ini

- From your terminal (**SSH**, QP2TERM, etc.)
- Run commands below to display the IBM i Access ODBC driver defaults from odbc.ini
- cd /QOpenSys/etc

  cat odbc.ini
- **Cat** command displays contents of odbc.ini



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Check for Default ODBC Data Source

- Default odbc.ini defines *LOCAL Data Source Name (DSN)
- *LOCAL DSN: default values to connect to local IBM i
  - You could **customize** this DSN or **add** additional DSNs
  - You could **change** localhost to other system host name or IP
    - Password required when connecting to another server

```
### IBM provided DSN - do not remove this line ###
[*LOCAL]
Description = Default IBM i local database
Driver      = IBM i Access ODBC Driver
System      = localhost
UserID      = *CURRENT
### Start of DSN customization
### End of DSN customization
### IBM provided DSN - do not remove this line ###
```


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*CURRENT user or user/password

- You may specify *CURRENT rather than a specific user/password
  - `Driver=IBM i Access ODBC Driver;System=localhost;UID=*CURRENT;`
  - `DSN=*LOCAL`
    - `When odbc.ini contains UserID = *CURRENT`
- Before IBM i 7.4, use of *CURRENT requires a PTF
  - 7.2: SI68113
  - 7.3: SI69058
  - 7.4: Not needed
- *CURRENT works only with your local IBM i system (same partition that your code runs in)

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ODBC Connection Options

- ODBC connection options specify the **server to connect to**, **library list enablement**, and much more.
- Connection options can be specified in two places:
  - **Central DSN definition** in **odbc.ini** (system-wide or user-specific)
  - **In your code**, in a connection string
- The many options are documented here:
  - https://www.ibm.com/support/knowledgecenter/ssw_ibm_i_74/rzaik/connectkeywords.htm

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Popular ODBC Connection Options

Note: Option names differ between Connection Strings and ODBC.INI

Connection String	ODBC.INI	Values/note
DSN	--	DSN to use. E.g. *LOCAL
CONNTYPE	ConnectionType	**0 = Read/Write (all SQL allowed)** 1 = Read/Call (SELECT and CALL) 2 = Read-only (SELECT statements)
CMT	CommitMode	**Default: 2** Use 0 for Commit Immediate (*NONE)
DBQ	DefaultLibraries	Libraries to add to library list (start with ",")
NAM	Naming	**0 = *SQL (dot separator)** 1 = *SYS (slash separator **AND enable library lists**)

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First ODBC Connections

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Test ODBC using isql utility

- isql test utility installed with the unixODBC driver
- Runs from Qshell, PASE or SSH terminal session
- Great for testing ODBC DSN data sources

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isql command line

- Type **isql** and press Enter
- Shows command line options
- Option details:
  - https://www.mankier.com/1/isql

```
-bash-4.4$ isql

+---------------------------------------+
| unixODBC - isql                       |
+---------------------------------------+
| Syntax                                |
|                                       |
|      isql DSN [UID [PWD]] [options]   |
|                                       |
| Options                               |
|                                       |
| -b         batch.(no prompting etc)   |
| -dx        delimit columns with x     |
| -x0xXX     delimit columns with XX, where
|            x is in hex, ie 0x09 is tab|
| -w         wrap results in an HTML table
| -c         column names on first row. |
|            (only used when -d)        |
| -mn        limit column display width to n
| -v         verbose.                   |
| -lx        set locale to x            |
| -q         wrap char fields in dquotes|
| -3         Use ODBC 3 calls           |
| -n         Use new line processing    |
| -e         Use SQLExecDirect not Prepare
| -k         Use SQLDriverConnect       |
| -L         Length of col display (def:300)
| --version  version                    |
|                                       |
| Commands                              |
|                                       |
| help - list tables                    |
| help table - list columns in table    |
| help help - list all help options     |
|                                       |
| Examples                              |
|                                       |
|      isql WebDB MyID MyPWD -w < My.sql|
|                                       |
```


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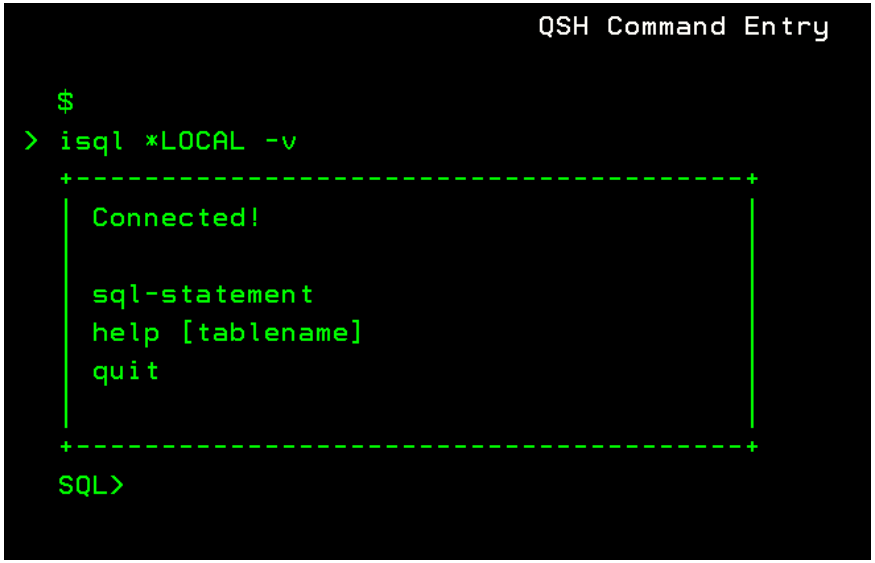
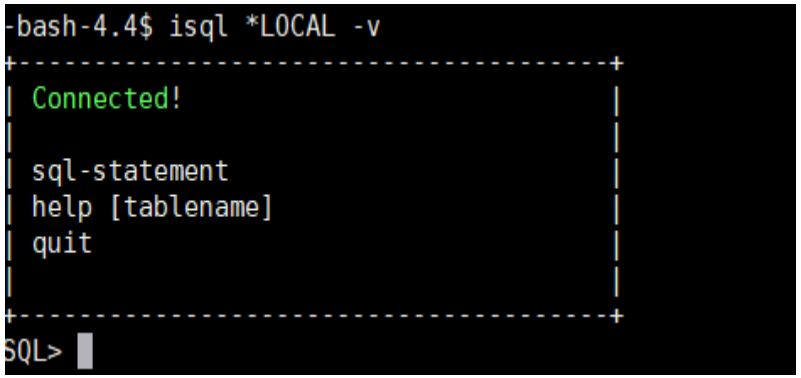
Connecting to DB2 via ODBC

- Type: isql *LOCAL –v (verbose mode) and press Enter





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Running a Query Test

- Type: select * from qiws.qcustcdt and press Enter
- When done, type quit and press Enter to exit isql

```
SQL> select * from qiws.qcustcdt
+---------+---------+-----+--------------+-------+------+--------+-------+-------+---------+---------+
| CUSNUM  | LSTNAM  | INIT| STREET       | CITY  | STATE| ZIPCOD | CDTLMT| CHGCOD| BALDUE  | CDTDUE  |
+---------+---------+-----+--------------+-------+------+--------+-------+-------+---------+---------+
| 938472  | Henning2| G K | 4859 Elm Ave | Dallas| TX   | 75217  | 5000  | 3     | 37.00   | 1234.56 |
| 839283  | Jones   | B D | 21B NW 135 St| Clay  | NY   | 13041  | 400   | 1     | 100.00  | 0       |
| 392859  | Vine    | S S | PO Box 79    | Broton| VT   | 5046   | 700   | 1     | 439.00  | 0       |
| 938485  | Johnson | J A | 3 Alpine Way | Helen | GA   | 30545  | 9999  | 2     | 3987.50 | 33.50   |
| 397267  | Tyron   | W E | 13 Myrtle Dr | Hector| NY   | 14841  | 1000  | 1     | 0       | 0       |
| 389572  | Stevens | K L | 208 Snow Pass| Denver| CO   | 80226  | 400   | 1     | 58.75   | 1.50    |
| 846283  | Alison  | J S | 787 Lake Dr  | Isle  | MN   | 56342  | 5000  | 3     | 10.00   | 0       |
| 475938  | Doe     | J W | 59 Archer Rd | Sutter| CA   | 95685  | 700   | 2     | 250.00  | 100.00  |
| 693829  | Thomas  | A N | 3 Dove Circle| Casper| WY   | 82609  | 9999  | 2     | 0       | 0       |
| 593029  | Williams| E D | 485 SE 2 Ave | Dallas| TX   | 75218  | 200   | 1     | 25.00   | 0       |
| 192837  | Lee     | F L | 5963 Oak St  | Hector| NY   | 14841  | 700   | 2     | 489.50  | .50     |
| 583990  | Abraham | M T | 392 Mill St  | Isle  | MN   | 56342  | 9999  | 3     | 500.00  | 0       |
+---------+---------+-----+--------------+-------+------+--------+-------+-------+---------+---------+
SQLRowCount returns -1
12 rows fetched
```


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Debugging

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Use tracing to diagnose issues

- Use only when necessary (slows your queries)
- In /QOpenSys/etc/odbcinst.ini, add the [ODBC] key and these two lines beneath it:
  - `[ODBC]`
  - `Trace        = Yes`
  - `TraceFile    = /tmp/odbc.log`

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Sample trace log

```
[ODBC][1172450][1583089933.299842][SQLPrepare.c][196]
Entry:
Statement = 18003bd50
SQL = [select * from qiws.qcustcdt ][length = 28]

[ODBC][1172450][1583089933.301607][SQLPrepare.c][377]
Exit:[SQL_SUCCESS]

[ODBC][1172450][1583089933.301646][SQLExecute.c][187]
Entry:
Statement = 18003bd50

[ODBC][1172450][1583089933.303731][SQLExecute.c][357]
Exit:[SQL_SUCCESS]

[ODBC][1172450][1583089933.303770][SQLNumResultCols.c][156]
Entry:
Statement = 18003bd50
Column Count = ffffffffffff6f0

[ODBC][1172450][1583089933.303801][SQLNumResultCols.c][251]
Exit:[SQL_SUCCESS]
Count = ffffffffffff6f0 -> 11

[ODBC][1172450][1583089933.303839][SQLNumResultCols.c][156]
Entry:
Statement = 18003bd50
Column Count = ffffffffffff5f0

[ODBC][1172450][1583089933.303868][SQLNumResultCols.c][251]
Exit:[SQL_SUCCESS]
Count = ffffffffffff5f0 -> 11
```


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Performance Tuning

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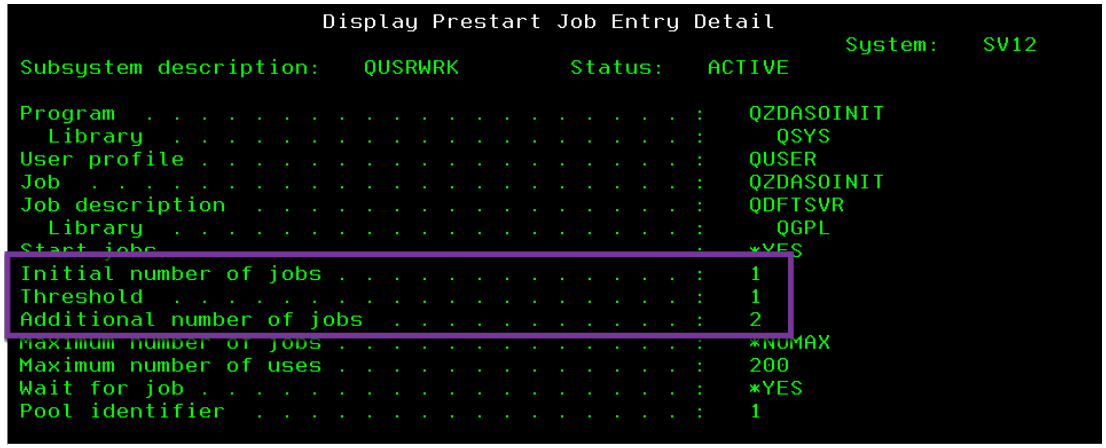
Configure ODBC Prestart jobs

- Configure the right number of prestart jobs
  - ODBC prestart jobs are QZDASOINIT in QUSRWRK
- Check out your current configuration:
  - DSPSBSD SBSD(qusrwrk)
  - Choose 10, Prestart job entries
  - Type 5 next to QZDASOINIT



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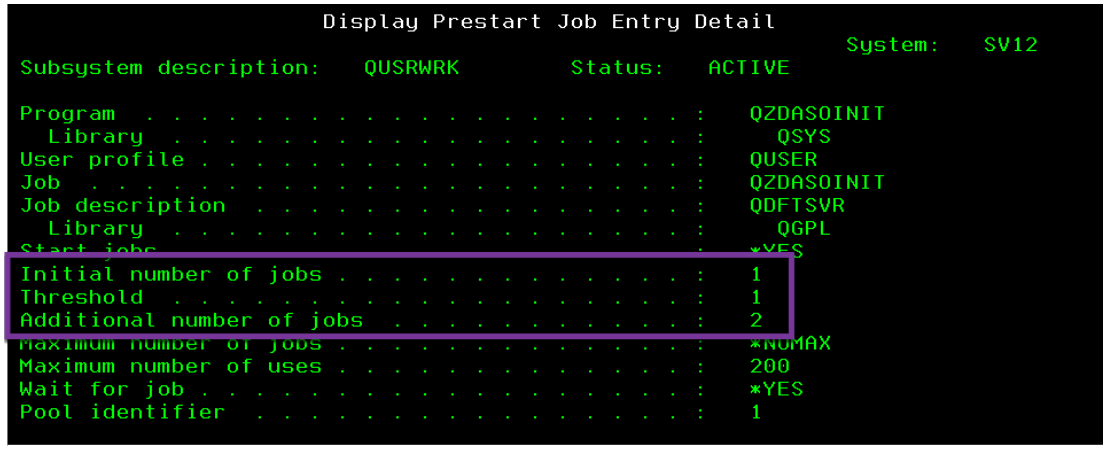
Typical ODBC prestart job settings



- Low defaults
  - Initial jobs = 1, threshold = 1, adljobs = 2
  - Change as needed:

```
CHGPJE SBSD(QSYS/QUSRWRK) PGM(QSYS/QZDASOINIT)
       STRJOBS(*YES) INLJOBS(xx) THRESHOLD(xx)
       ADLJOBS(xx)
```

  - How to determine **optimal values**? DSPACTPJ (coming up)

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How many ODBC jobs are needed?

- DSPACTPJ SBS(QUSRWRK) PGM(QZDASOINIT)
- https://www.ibm.com/docs/en/i/7.4?topic=jobs-tuning-prestart-job-entries

```
 Prestart jobs:
   Current number . . . . . :   29
   Average number . . . . . :   21.9
   Peak number  . . . . . :   49

 Prestart jobs in use:
   Current number . . . . . :   27
   Average number . . . . . :   18.4
   Peak number  . . . . . :   46
```

```
 Program start requests:
   Current number waiting . . . . . :   0
   Average number waiting . . . . . :   .0
   Peak number waiting  . . . . . :   6
   Average wait time  . . . . . :   00:00:00.0
   Number accepted  . . . . . :   100299
   Number rejected  . . . . . :   0
```


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Additional Performance Tips

- IBM i ODBC performance page:
- https://www.ibm.com/docs/en/i/7.4?topic=odbc-performance
- Link is Windows-related but some tips are relevant for PASE
  - E.g. using multiple-row inserts
- Persistent connections (language-specific) and connection pooling reduce startup time
  - http://www.unixodbc.org/doc/conn_pool.html
  - **Pooling = Yes** in odbcinst.ini
- Language-specific modules are adding optimizations
  - Example: node-odbc 2.0 changed data retrieval strategy from using SQLGetData to SQLBindCol to optimize for larger queries.

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Code Samples

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Quick Code Samples using ODBC

- PHP
- Node.js
- Python
- C# / .NET
- R

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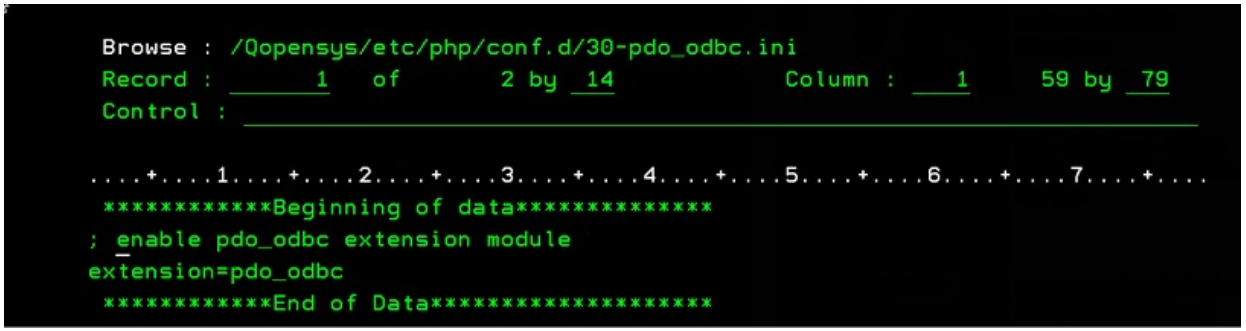
PHP and ODBC

- PHP RPMs are 64-bit; compatible with IBM i ODBC driver
- Use **odbc** extension by itself or with **PDO** on top
  - Plain odbc extension (odbc_connect(), etc.)
  - PDO (**P**HP **D**atabase **O**bjects) ($conn = new PDO())
    - PDO is an object-oriented wrapper for many database types
    - Makes it easy to change database connections
    - Uncomment the “extension=pdo_odbc” line to enable PDO:



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PHP with odbc extension

```
<?php

$conn = odbc_connect('*LOCAL', '', '');

$stmt = odbc_exec($conn,
        'select * from QIWS.QCUSTCDT');

while ($row = odbc_fetch_array($stmt))
{
    print_r($row);
}

?>
```

```
Array
(
    [CUSNUM] => 938472
    [LSTNAM] => Henning
    [INIT] => G K
    [STREET] => 4859 Elm Ave
    [CITY] => Dallas
    [STATE] => TX
    [ZIPCOD] => 75217
    [CDTLMT] => 5000
    [CHGCOD] => 3
    [BALDUE] => 37.00
    [CDTDUE] => 0
)
Array
(
    [CUSNUM] => 839283
    [LSTNAM] => Jones
    [INIT] => B D
    [STREET] => 21B NW 135 St
    [CITY] => Clay
    [STATE] => NY
    [ZIPCOD] => 13041
    [CDTLMT] => 400
```


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PHP with PDO extension

```
<?php

$conn =
new
PDO('odbc:DSN=*LOCAL;','MYUSR','mypass',
 array(
    // optional persistence
    PDO::ATTR_PERSISTENT => true
));

$query = $conn->prepare(
'select * from QIWS.QCUSTCDT');

$query->execute();

// fetchAll() is efficient and fast
$result = $query->fetchAll();

print_r($result);

?>
```

```
Array
(
    [CUSNUM] => 938472
    [LSTNAM] => Henning
    [INIT] => G K
    [STREET] => 4859 Elm Ave
    [CITY] => Dallas
    [STATE] => TX
    [ZIPCOD] => 75217
    [CDTLMT] => 5000
    [CHGCOD] => 3
    [BALDUE] => 37.00
    [CDTDUE] => 0
)
Array
(
    [CUSNUM] => 839283
    [LSTNAM] => Jones
    [INIT] => B D
    [STREET] => 21B NW 135 St
    [CITY] => Clay
    [STATE] => NY
    [ZIPCOD] => 13041
    [CDTLMT] => 400
```


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Laminas (formerly Zend Framework)

```
// in application config file

$databaseDriverConfigs = [

   'odbc' => [

       'dsn' => "odbc:DSN=*LOCAL;NAM=1;DBQ=,LIB1 LIB2 QGPL;CMT=0;TSFT=1”,

       'driver' => 'Pdo',

       'platform' => 'IbmDb2',

       'platform_options' => [

           'quote_identifiers' => true,

       ],

       'username' => $username,

       'password' => $password,

   ],
```


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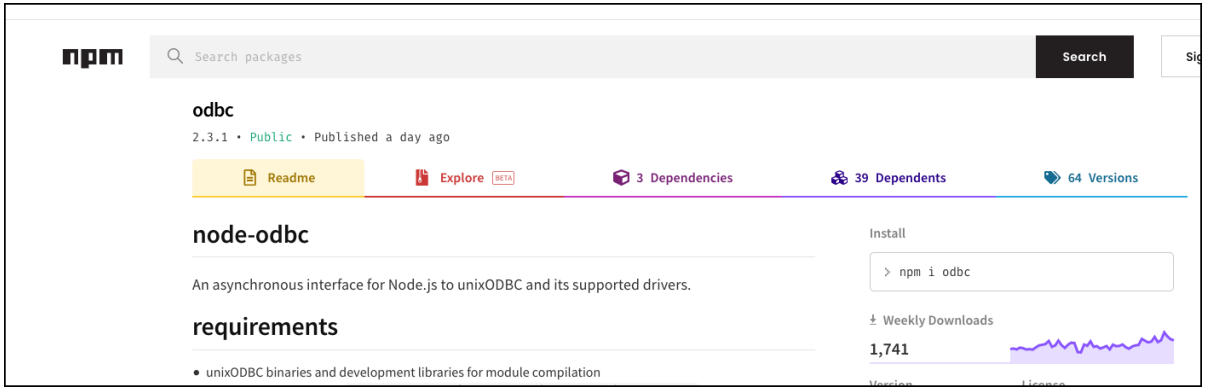
Node.js and node-odbc

- **node-odbc** package lets Node.js connect via ODBC
  - "An asynchronous interface for Node.js to unixODBC and its supported drivers."
  - Actively developed and enhanced
  - https://www.npmjs.com/package/odbc and
  - https://github.com/markdirish/node-odbc
  - `npm install odbc`



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Node.js Example with node-odbc

```
const odbc = require('odbc');

const connection =
odbc.connect(connectionString,
(error, connection) => {
    connection.query(
    'SELECT * FROM QIWS.QCUSTCDT',
   (error, result) => {
    if (error)
    { console.error(error) }
        console.log(result);
    });
});
```

```
[ { CUSNUM: 938472,
    LSTNAM: 'Henning ',
    INIT: 'G K',
    STREET: '4859 Elm Ave ',
    CITY: 'Dallas',
    STATE: 'TX',
    ZIPCOD: 75217,
    CDTLMT: 5000,
    CHGCOD: 3,
    BALDUE: 37,
    CDTDUE: 0 },
  { CUSNUM: 839283,
    LSTNAM: 'Jones    ',
    INIT: 'B D',
    STREET: '21B NW 135 St',
    CITY: 'Clay  ',
    STATE: 'NY',
    ZIPCOD: 13041,
    CDTLMT: 400,
    CHGCOD: 1,
    BALDUE: 100,
    CDTDUE: 0 },
```


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Python and pyodbc

- **pyodbc** package lets Python connect via ODBC
  - https://pypi.org/project/pyodbc/
  - `pip3 install pyodbc`

```
import pyodbc
conn =
pyodbc.connect("DSN=*local")
cur = conn.cursor()
cur.execute("select * from
qiws.qcustcdt")
for row in cur:
        print(row)
```

```
alan@Seiden:~/python$ python3 odbc.py
(Decimal('938472'), 'Henning ', 'G K', '4859 Elm Ave ', 'Dall
'75217'), Decimal('5000'), Decimal('3'), Decimal('37.00'), De
(Decimal('839283'), 'Jones   ', 'B D', '21B NW 135 St', 'Clay
'13041'), Decimal('400'), Decimal('1'), Decimal('100.00'), De
(Decimal('392859'), 'Vine    ', 'S S', 'PO Box 79    ', 'Brot
'5046'), Decimal('700'), Decimal('1'), Decimal('439.00'), Dec
(Decimal('938485'), 'Johnson ', 'J A', '3 Alpine Way ', 'Hele
'30545'), Decimal('9999'), Decimal('2'), Decimal('3987.50'),
(Decimal('397267'), 'Tyron   ', 'W E', '13 Myrtle Dr ', 'Hect
'14841'), Decimal('1000'), Decimal('1'), Decimal('0'), Decima
(Decimal('389572'), 'Stevens ', 'K L', '208 Snow Pass', 'Denv
'80226'), Decimal('400'), Decimal('1'), Decimal('58.75'), Dec
(Decimal('846283'), 'Alison  ', 'J S', '787 Lake Dr  ', 'Isle
'56342'), Decimal('5000'), Decimal('3'), Decimal('10.00'), De
(Decimal('475938'), 'Doe     ', 'J W', '59 Archer Rd ', 'Sutt
'95685'), Decimal('700'), Decimal('2'), Decimal('250.00'), De
(Decimal('693829'), 'Thomas  ', 'A N', '3 Dove Circle', 'Casp
'82609'), Decimal('9999'), Decimal('2'), Decimal('0'), Decima
```


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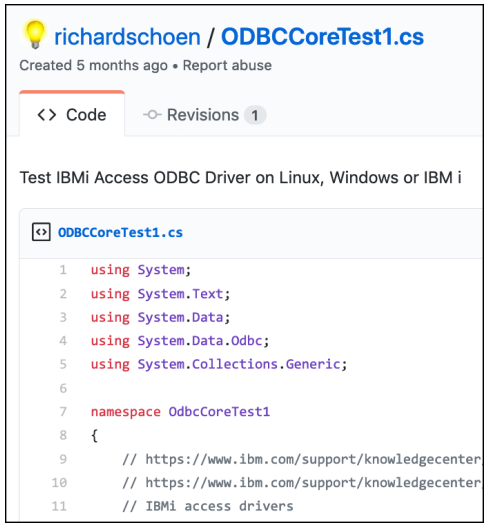
C# - Mono .Net Example

- Sample C# program to query DB2 database
- OdbcCoreTest1.cs – on Github gist
  https://gist.github.com/richardschoen/3ac6a84151f2f9e5830716849f188b5d
- Uses Mono package
- Compile and run (Qshell/Qp2term/ssh terminal)

  export PATH=/QOpenSys/pkgs/bin

  mcs OdbcCoreTest1.cs –r:System.Data.dll

  mono OdbcCoreTest1.exe



- Works with .Net Core 3.1 and Mono on Windows/Linux/Mac

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C# - Mono .Net Example (continued)

```
if (args.Length > 0)
{
    connstring = args[0];
} else {
                        connstring = "DSN=*LOCAL;NAM=1";
                }

// Log connection string
Console.WriteLine(connstring);

// Get connection
IDbConnection conn = new OdbcConnection(connstring);

// Open connection
Console.WriteLine("Before Open");
conn.Open();
Console.WriteLine("After Open");

// Get command and run query
Console.WriteLine("Before Query");
string sql = "select lstnam from qiws/qcustcdt
IDbCommand cmd = conn.CreateCommand();
cmd.CommandText = sql;
Console.WriteLine("Before Reader");
cmd.CommandType = System.Data.CommandType.Text;
                // Execute reader to query. This blows on Linux, Works on IBMi and Windows
IDataReader rdr = cmd.ExecuteReader();
    {
        Console.WriteLine("Before Field Count");
        Console.WriteLine("Fields:" + rdr.FieldCount);
        rdr.Close();
    }
Console.WriteLine("After Reader");
Console.WriteLine("After Query");
exitcode = 0;
```


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ODBC opens doors to new tools—”R”

- ‘R’ gives meaning to your data
- We plotted WRKACTJOB in several lines of R code
  - `library(RODBC)`
  - `library(ggplot2)`
  - `library(DBI)`
  - `library(dplyr)`
  - `con <- dbConnect(odbc::odbc(), ”MYIBMI", UID=”myuser", PWD=”mypass”)`
  - `res <- dbSendQuery(con, "select * from table(qsys2.active_job_info(RESET_STATISTICS => 'YES'))")`
  - `chunk <- dbFetch(res)`
  - `ggplot(chunk, aes(x=SUBSYSTEM, y=CPU_TIME, color=JOB_STATUS, size=TEMPORARY_STORAGE)) + geom_point()  + theme(axis.text.x = element_text(angle = 90, hjust = 1))`

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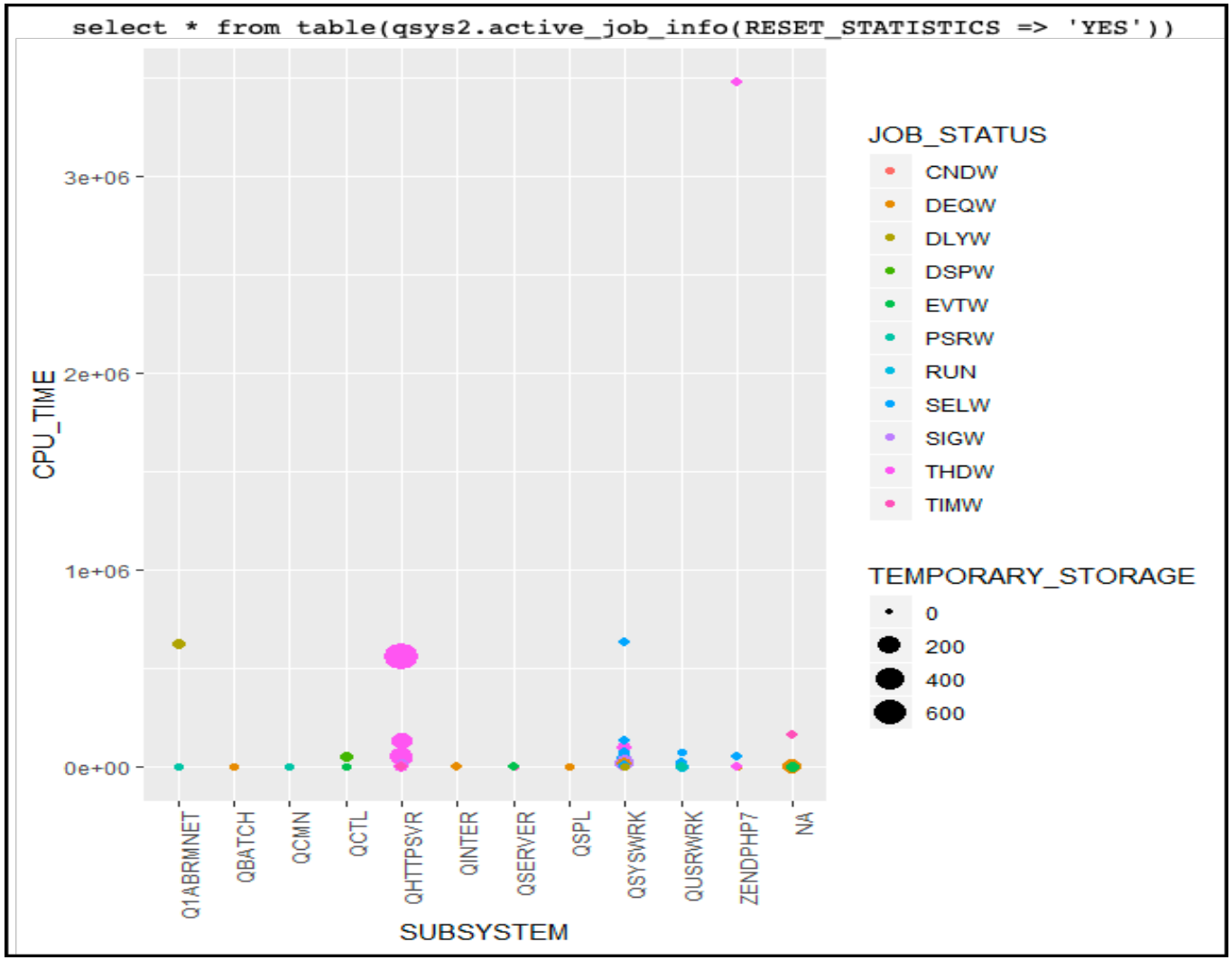

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Recent ODBC support questions

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ODBC support problems/solutions

- “Getting a lock on *SQLPKG objects”
  - Set **ExtendedDynamic=0** in odbc.ini
- “ODBC crashing with core dump error”
  - Do not journal /QOpenSys
- “Characters with ’accents’ caused a crash”
  - Set **AlwaysCalculateResultLength=1** in odbc.ini
- “Characters with ‘accents’ garbled on IBM i 7.4”
  - Set **CCSID=1208** in odbc.ini (or connection string)

— from the Seiden PHP/Open Source support desk

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Additional Resources

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Online Articles

- IBM ODBC Github Site:
  - https://ibmi-oss-docs.readthedocs.io/en/latest/odbc/README.html
- ODBC Q&A with Seiden Group's Stephanie Rabbani:
  - https://www.seidengroup.com/2020/08/28/qa-ibm-i-odbc-driver/
- ODBC connectivity options on multiple client platforms to IBM i via ACS
  - https://www.ibm.com/support/pages/ibm-i-access-client-solutions

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Learn More About unixODBC

- IBM i unixODBC driver manager platforms:
  - Linux
  - IBM i – PASE
  - MacOS
  - (Windows has its own driver manager)
- unixODBC Project home page:
  - http://www.unixodbc.org

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Bringing it together

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Next steps

- Install Yum and open source environment
- Install and test native ODBC driver
- Start developing Open Source apps on IBM i
- What would impress your boss? The boss above and the boss above?
- Questions/Comments?

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About Seiden Group (the commercial)

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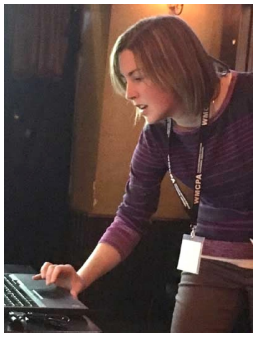
Modernization using open source on the IBM i platform

- Develop with and support Node.js / Python / PHP with RPG/DB2
- APIs, Git, more
- CommunityPlus+ PHP

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CommunityPlus+ PHP

- License-free PHP with optional paid support
  - Compatible with Zend Framework, Laminas, Laravel, Slim…
- Verified for use with:
  - AUCTION EDGE
  - START YOUR DASHBOARD
  - WebSmart
  - HARRISDATA
  - K3S Replenish & ReStore
- **Free migration assessment with Alan:**
  - **https://www.seidengroup.com/free-php-upgrade-assessment/**

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Professional CommunityPlus+ Support

- Trusted setup and support by Seiden Group
  - https://www.seidengroup.com/php-ibm-i-production-support/
- Installation service via screen share for $995 USD
  - Learn alongside Seiden Group PHP experts
- Upgrade to PHP 7.x or 8.x, migration and testing services
- CommunityPlus+ Business
  - Developer Productivity Package
  - Proactive Tune-Ups
  - Production break/fix support (up to 24x7)
    - Full-stack help with PHP, Apache, Db2 connectivity, MariaDb, Toolkit
  - Framework upgrade consulting

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Free Strategy & Tips Monthly

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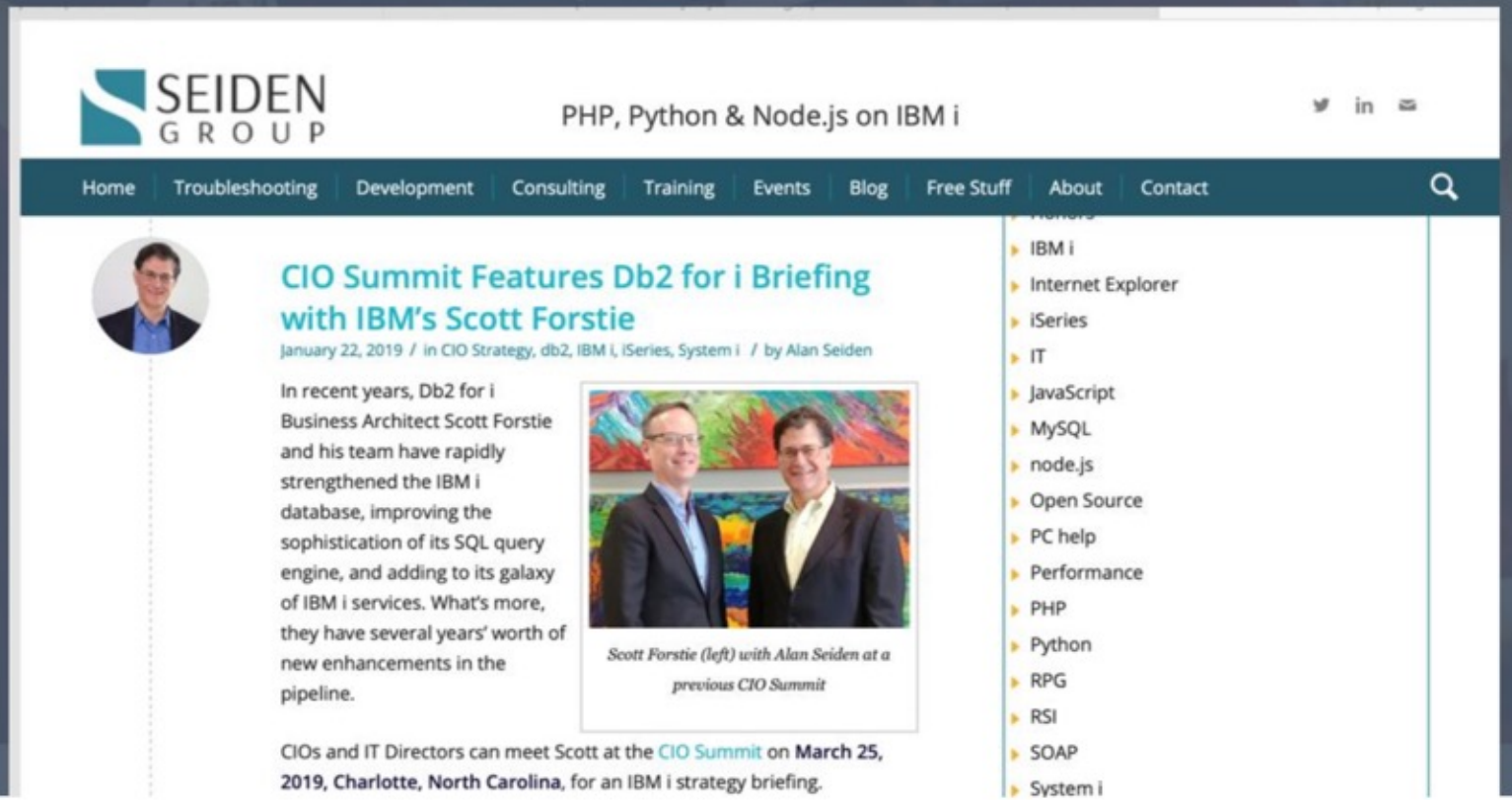

Contact | Stay in Touch

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