WORKING WITH EXTERNAL DATABASES

DireXions 2024

AGENDA

PxPlus External Database Support

Prefix File

Link File

Using External Databases

External Database Import

External Database Export

How to Convert to External Databases





PXPLUS EXTERNAL DATABASE SUPPORT



PXPLUS EXTERNAL DATABASE SUPPORT

- While most aspects of a business application can be served within the PxPlus family of products, today's end users are often required to work with data that resides in completely different software worlds
 - Businesses may need to integrate popular "off-the-shelf" software with their legacy systems, applications and databases
- PxPlus can work directly with data in a number of **External Databases**, over networks and on completely different operating systems
 - Any external database with an ODBC driver via [ODB]
 - MySQL/MariaDB via [MYSQL]
 - Requires MySQL/MariaDB C Connector: libmysql.dll
 - Microsoft SQL Server via [ADO]
 - Oracle Server via [OCI]
 - Requires Oracle instant client: oci.dll
 - IBM DB2 via [DB2]
 - Requires DB2 CLI client: db2cli.dll

PXPLUS EXTERNAL DATABASE SUPPORT

- An External Database table is accessed via an **OPEN** directive just like a PxPlus native file
 - Use the **[xxx]** prefix depending on the type of database
 - The database connection information and table name are given either after the [xxx] prefix or via OPT=
 - Check the documentation of the specific database prefix you want to use for the exact syntax

open(hfn,iol=*,OPT="SERVER=192.168.1.114;PORT=3306;USER=xxxx;PSWD=xxxxxxx")"[MYSQL]test_db;invoice_header"

- For Read-only data that is not too large, dramatically improve performance with **OPEN LOAD** directive
 - Locally caches the whole table in memory
 - Controlled system wide via the <u>'CL'=value</u> system parameter
 - All tables with a record count below value will be cached, 0 will disable OPEN LOAD caching, default is 1000
 - Individually controlled via OPEN LOAD directive when OPT= clause of CACHE=value is included, overriding 'CL'
 - A value of yes means to always cache, no means to never cache, nnn means to cache if record count is less than nnn

open load(hfn,iol=*,OPT="SERVER=192.168.1.114;PORT=3306;USER=xxxx;PSWD=xxxx;cache=yes")"[MYSQL]test_db;invoice_header"



PREFIX FILE



PREFIX FILE

- Can define a new prefix file entry with the database connection information
 - Code can be kept cleaner or be switched from native file to a database without changing code
 - The prefix file is a PxPlus native variable length keyed file
 - Prefix file entry/record
 - The key is the name you want to access your database table by
 - The first field will contain the database prefix and the DSN/Table declaration
 - The second field will contain the database connection options usually in the OPT=
 - The third field may be specified that contains the IOList to use when opening the file with an IOL=* option

KEYED "PFXFILE",127 OPEN (1) "PFXFILE" WRITE(1,KEY="my_table")"[MYSQL]test_db;my_table;SERVER=192.168.1.114;PORT=3306;USER=xxxx;PSWD=xxxxxxx", "KEY=field1;REC=field1:10,field2:8.2,field3:40,field4:8,field5:2,field6:20", "field1\$,field2,field3\$,field4\$,field5,field6\$" CLOSE (1)

PREFIX FILE

- Use the **PREFIX FILE** directive to start using a prefix file
 - Once setup any open using the name key will actually open the database connection defined in the prefix entry

PREFIX FILE "PFXFILE" OPEN (1,iol=*) "my_table"



LINK FILE



LINK FILE

- Can define a link file with the database connection information
 - Code can be kept cleaner or be switched from native file to a database without changing code
 - An external database link file is a [Pvxdev] Link File that points to a device driver, *dev/extdb
 - Link File Format:
 - Line 1: Typical line for a [Pvxdev] link file, pointing to the device driver, *dev/extdb (256 characters)
 - Line 2: Database Type
 - Line 3: Database Name
 - Line 4: Table Name
 - Line 5 (and higher): Options
 - Any line in the link file (after the first line) that starts with an = (equals sign) will be evaluated
 - This can be used to avoid plain text password in the link file
 - ="USER="+%adoUser\$
 - ="PSWD="+%adoPswd\$
 - The IOL= and OPT= on the OPEN of the link file will be used
 - Any OPT= on the OPEN of the link file overrides the OPT= defined in the link file

LINK FILE

[Pvxdev].	extdb
ADO	
ServerName	
TableName	
DB=databaseName	
NONULLS=YES	
Connect='Provider=SQLOLEDB;'	
EXTROPT=(UPDLOCK)	
DATEFMT=YYYYMMDD	
KEY=fieldOne,*NAME:KeyOne	
KEY=fieldTwo,fieldThree,*NAME:KeyTwo	
REC=fieldOne:12,fieldTwo:40,fieldThree:6.2,field	Four:6.0

- Suppose that you created a link file called "ADOProduct" that defined an ADO connection to the Product table
 - OPEN (chan,IOL=*)"ADOProduct"
- This will then make a connection to the external database as defined in the link file
- It would be as if "ADOProduct" was a PxPlus data file to your program even though it is an external database table





- Existing code using native PxPlus files will work without changes
- Queries, Reports, File Maintenance, and Webster+ equivalents will work without changes
- **READ, WRITE, INSERT, UPDATE** and **REMOVE** directives will generate the SQL to work with the database automatically
 - Can generate better optimized SQL if the keys are defined to match the tables index fields



- SELECT, which allows you to use SQL-like syntax in your programs to access native files, also will convert into real SQL to work with the database automatically
 - A WHERE clause in the **SELECT** directive can optimize the SQL generated
 - Only if comparing field variable against literal



• Use STATIC clause to optimize if comparing field variable to a variable



- You can enable a debug mode where the SQL commands generated will be displayed via a msgbox
 - SET_PARAM '!Q'
- Directly execute SQL on the database
 - Use a key="!<SQL>" on a <u>READ</u> directive
 - Read Record also supported
 - Table name from connection ignored

open (1)"[ODB]MYDB;some_table" sqlcmd\$="SELECT first_name FROM students WHERE student_id IN (SELECT student_id FROM grades WHERE grade = 'A')" read record (1, key="!"+sqlcmd\$) result\$

- Open a direct connection to the database by **not** specifying a table name
 - If connection kept open can be used to avoid needing login credentials on each database connection
 - Can query the following with **key=**

KEY=	Action	SQL Function
" ` .	Returns the list of table, catalog, or schema names, and table types	<u>SQLTables()</u>
"*xxxx"	Returns the list of column names in table xxxx	<u>SQLColumns()</u>
"**xxxx"	Returns a list of statistics about table xxxx and the indexes associated with the table	<u>SQLStatistics()</u>

open (chan)"[ODB]MYDB;" read (chan, key="?") tableCatalog\$,tableSchema\$,TableName\$,tableType\$,Remarks\$ while 1 read (chan, err=*break) tableCatalog\$,tableSchema\$,TableName\$,tableType\$,Remarks\$ wend

- Open a direct connection to the database by **not** specifying a table name
 - WRITE RECORD directive allows you to execute SQL directly while the <u>READ RECORD</u> directive returns the results

open (chan)"[ODB]MYDB" sqlcmd\$="SELECT first_name FROM students WHERE student_id IN (SELECT student_id FROM grades WHERE grade = 'A')" write record (chan) sqlcmd\$ read record (chan) result\$

• Same key="!<SQL>" on a <u>READ</u> directive works here too





- **Database Import Utility** allows you to define a connection to an external database and then selectively import tables into the PxPlus data dictionary
 - Create Link Files that point to tables in the database
 - Create Link Files that point to the database itself
 - Add entries to the **<u>Prefix File</u>** that point to tables in the database
 - Add entries to the Prefix File that point to the database itself
 - Create and load data from database tables to native PxPlus data files
- To invoke this utility, use one of the following methods:

Location	Method
From Data Dictionary Maintenance	Click the Import toolbar button in the Database section of the toolbar
From Data Dictionary Maintenance	From the menu bar, select File > Database Import Utility
From the PxPlus Command line	Enter: RUN "*dict/impdb"

- To connect to a database to import from, you must input the database connection information
 - The utility remembers database connection information after successfully connecting to the database
 - Multiple database connections can be remembered, one connection for each database type
 - The connection information is remembered on a "per project" basis

	PLUS		Database	Import Utility		() — 🗆 >
Source Database Database Type: User Name: Additional Options:	DB Da	ta Source: Password: DKEY=Y	Da	atabase Name:	Load Table	Create DB File
Table	In DD File Type	Description	File Name	Group Edit All>	DD Action ▼	File Action ▼
Strip User/Passw	ord from Link Files and Pref	ix Entries		Disable Data Los	ss Warning	9
/				١	∕iew Log	Apply Exit

- <u>Create DB File</u> button allows you to create either a Link File or a Prefix File entry that points to the database itself
 - This may be useful so that you can do a global OPEN to the database, providing the UserID and Password to avoid needing the UserID and Password on every Link/Prefix File entry
 - It can also be used to get a list of tables from the database or if your program needs to make direct queries against the database

TECHNOLOGIES LTD.		Create I	Database	Connection	File
Database File Type:	Link F	ile	- -		
Link File Path:					2
			Ĩ	Create	Cancel

- Load Tables button Lists the tables in the database, sorted in alphabetical order by default
 - In DD column A check mark indicates which table definitions are currently in the data dictionary
 - File Type column Tells you what type of file is in the data dictionary; i.e. No File, Native, ODB Link, etc.
 - **Description, File Name** and **Group** columns Used to specify what the values should be on import and what they are for the imported table
 - If not in the data dictionary, will auto fill with table name from database

	PLU OGIES I	JS.	Database Import Utility							
Source Database					_					
Database Type:	OD	B ~	Data Source: DevonDB	Da	atabase Name: 🗋	evonDB	0	ireate DB File		
User Name:	xxxx	x0000X	Password:	x00000000x						
Additional Options:	NO	NULLS=Y;NULL	PADKEY=Y;DATEFMT=YYY	YMMDD		Load Ta	bles			
Table	In DD	File Type	Description	File Name	Group	DD Action	File Action			
					Edit All>	No Action⊽	No Action	~		
Accounts	×	No File	Accounts	accounts	Devondb	No Action▼	No Action	~		
ARCUST	×	No File	Arcust	arcust	Devondb	No Action▼	No Action	~		
BalanceSheet	×	No File	Balancesheet	balancesheet	Devondb	No Action▼	No Action	~		
BankAccounts	×	No File	Bankaccounts	bankaccounts	Devondb	No Action▼	No Action	~		
Client_Master_Fil	×	No File	Client Master File	client_master_file	Devondb	No Action▼	No Action	~		
clientcontacts	×	No File	Clientcontacts	clientcontacts	Devondb	No Action▼	No Action	~		
ClientMaster	×	No File	Clientmaster	clientmaster	Devondb	No Action▼	No Action	~		
CompanyInfo	×	No File	Companyinfo	companyinfo	Devondb	No Action▼	No Action	~		
Countries	×	No File	Countries	countries	Devondb	No Action▼	No Action	~		
Currency	×	No File	Currency	currency	Devondb	No Action▼	No Action	~		
Departments	×	No File	Departments	departments	Devondb	No Action▼	No Action	~		
Departments2	×	No File	Departments2	departments2	Devondb	No Action▼	No Action	~		
Strip User/Pass	word from	n Link Files and F	Prefix Entries		Disable Data	Loss Warning	9			
						View Log	Apply	Exit		

- Actions can be selected individually or for all tables
 - Use Edit All (first row) to select action for all tables
 - Use table row to select action for individual table
- **DD Action** Can be used to:
 - Create data dictionary records
 - Merge data dictionary records
 - Replace data dictionary records
- File Action Can be used to:
 - Create native PxPlus data files
 - Create database Link Files
 - Add database table entries to the Prefix File
- Actions are performed when the **Apply** button is clicked

		JS		Database	Import Utility			① — C
Source Database	•							
Database Type:	OD	B ~	Data Source: DevonDB	D	atabase Name: D	evonDB	(Create DB File
User Name:	xxxx	X0000X	Password:	X00000000X				
Additional Options:	NO	NULLS=Y;NULL	PADKEY=Y;DATEFMT=YYY	YYMMDD		Load Ta	ables	
Table	In DD	File Type	Description	File Name	Group	DD Action	File Action	
					Edit All>	No Action⊽	No Action	~
Accounts	×	No File	Accounts	accounts	Devondb	No Action 🔻	No Action	~
ARCUST	×	No File	Arcust	arcust	Devondb	No Action 🔻	No Action	~
BalanceSheet	×	No File	Balancesheet	balancesheet	Devondb	No Action 🔻	No Action	~
BankAccounts	×	No File	Bankaccounts	bankaccounts	Devondb	No Action▼	No Action	~
Client_Master_Fil	×	No File	Client Master File	client_master_file	Devondb	Create Rec ▼	No Action	~
clientcontacts	×	No File	Clientcontacts	clientcontacts	Devondb	No Action 🔻	No Action	~
ClientMaster	×	No File	Clientmaster	clientmaster	Devondb	No Action▼	No Action	~
CompanyInfo	×	No File	Companyinfo	companyinfo	Devondb	No Action 🔻	No Action	~
Countries	×	No File	Countries	countries	Devondb	No Action 🔻	No Action	~
Currency	×	No File	Currency	currency	Devondb	No Action 🔻	No Action	~
Departments	×	No File	Departments	departments	Devondb	No Action 🔻	No Action	~
Departments2	×	No File	Departments2	departments2	Devondb	No Action▼	No Action	~
Strip User/Pass	word from	n Link Files and P	refix Entries		Disable Data I	loss Warning	9	
						View Log	Apply	Evä

- Check box option to control whether User/Password are stripped from Link Files and Prefix File entries
 - **On** by default to prevent the User and Password information from being saved in plain text
- Check box option to control whether the data loss warning message is displayed
 - Disable warning for actions that could possibly overwrite data
 - Creating/Replacing a table
 - Loading a table
 - Creating a Prefix File entry
 - Creating a Link File
 - Off by default to help prevent accidental data loss

Source Database Database Type: User Name: Additional Options: Table In DD F Accounts ARCUST BalanceSheet N Client_Master_Fil K ODB	Data S xxx ULLS=Y;NULLPADKI File Type No File No File No File No File	Source: DevonDB Password: EY=Y:DATEFMT=YYY Description Accounts Arcust Balancesheet		atabase Name: D Group Edit All> Devondb Devondb	evonDB Load Ta DD Action No Action⊽ No Action⊽ No Action⊽	Create DB File ables File Action No Action V No Action V No Action
Database Type: ODB User Name: xxxxxx Additional Options: NONU Table In DD F Accounts X N ARCUST X N BalanceSheet X N BankAccounts X N Client_Master_Fil X N	Data S xxx ULLS=Y;NULLPADKI File Type	Source: DevonDB Password: EY=Y:DATEFMT=YYY Description Accounts Arcust Balancesheet	VXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	Group Edit All> Devondb	evonDB Load Ta DD Action No Action No Action No Action	Create DB File
User Name: xxxxxxx Additional Options: NONU Table In DD F Accounts X N ARCUST X N BalanceSheet X N BankAccounts X N Client_Master_Fil X N	xx ULLS=Y;NULLPADKI File Type I No File J No File I No File I No File I	Password: EY=Y;DATEFMT=YYY Description Accounts Arcust Balancesheet	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	Group Edit All> Devondb Devondb	Load Ta DD Action No Action⊽ No Action⊽ No Action⊽	bles File Action No Action ▼ No Action ▼ No Action ▼
Additional Options: NONL Table In DD F Accounts X N ARCUST X N BalanceSheet X N BankAccounts X N Client_Master_Fil X N	ULLS=Y;NULLPADKI	EY=Y;DATEFMT=YYY Description Accounts Arcust Balancesheet	YMMDD File Name accounts arcust	Group Edit All> Devondb Devondb	Load Ta DD Action No Action⊽ No Action⊽ No Action⊽	bles File Action No Action No Action No Action ▼
Table In DD F Accounts X N ARCUST X N BalanceSheet X N BankAccounts X N Client_Master_Fil X N	File Type	Description Accounts Arcust Balancesheet	File Name accounts arcust	Group Edit All> Devondb Devondb	DD Action No Action⊽ No Action⊽ No Action⊽	File Action No Action ▼ No Action ▼ No Action
Accounts X N ARCUST X N BalanceSheet X N BankAccounts X N Client_Master_Fil X N	No File / No File / No File E	Accounts Arcust Balancesheet	accounts arcust	Edit All> Devondb Devondb	No Action⊽ No Action⊽ No Action⊽	No Action ▼ No Action ▼ No Action ▼
Accounts X N ARCUST X N BalanceSheet X N BankAccounts X N Client_Master_Fil X N	No File	Accounts Arcust Balancesheet	accounts arcust	Devondb Devondb	No Action▼ No Action▼	No Action 🔻 No Action 👻
ARCUST X N BalanceSheet X N BankAccounts X N Client_Master_Fil X N	No File A No File E	Arcust Balancesheet	arcust	Devondb	No Action▼	No Action 🗢
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BankAccounts 💥 N Client_Master_Fil 💥 N	lo File		Dalancesheet	Devondb	No Action▼	No Action 🗢
Client_Master_Fil 🐹 N		Bankaccounts	bankaccounts	Devondb	No Action▼	No Action 🗢
	No File	Client Master File	client_master_file	Devondb	No Action▼	No Action 🗢
clientcontacts 🛛 💥 🛛 N	No File	Clientcontacts	clientcontacts	Devondb	No Action▼	No Action 🗢
ClientMaster 🛛 💥 N	No File	Clientmaster	clientmaster	Devondb	No Action▼	No Action 🗢
CompanyInfo 🛛 💥 🛛 N	No File	Companyinfo	companyinfo	Devondb	No Action▼	No Action 🗢
Countries 🛛 💥 N	No File	Countries	countries	Devondb	No Action▼	No Action 🗢
Currency 💥 N	No File	Currency	currency	Devondb	No Action▼	No Action 🗢
Departments 🛛 💥 N	No File	Departments	departments	Devondb	No Action▼	No Action 🗢
Departments2 🛛 💥 🛛 N	No File	Departments2	departments2	Devondb	No Action▼	No Action 🗢

- View Log button
 - Available only when changes have been applied
 - Displays a log of applied changes as a PDF
 - Can print or save the log PDF, if desired

ource Database	•						
Database Type:	OD	B ~	Data Source: DevonDB	Da	atabase Name: D	evonDB	Create DB File
User Name:	xxx	xx	Password:	x000000x			
Additional Options:	NO	NULLS=Y;NULL	PADKEY=Y;DATEFMT=YY)	(YMMDD		Load Ta	bles
		1					
able	In DD	File Type	Description	File Name	Group	DD Action	File Action
					Edit All>	No Action⊽	No Action 🗢
ccounts	×	No File	Accounts	accounts	Devondb	No Action▼	No Action 🔻
RCUST	×	No File	Arcust	arcust	Devondb	No Action▼	No Action 🗢
alanceSheet	×	No File	Balancesheet	balancesheet	Devondb	No Action▼	No Action 🗢
BankAccounts	×	No File	Bankaccounts	bankaccounts	Devondb	No Action▼	No Action 🛛 🔻
Client_Master_Fil	V	No File	Client Master File	client_master_file	Devondbb	No Action▼	No Action 🗢
lientcontacts	×	No File	Clientcontacts	clientcontacts	Devondb	No Action $\mathbf{\nabla}$	No Action 🗢
lientMaster	×	No File	Clientmaster	clientmaster	Devondb	No Action▼	No Action 🗢
CompanyInfo	*	No File	Companyinfo	companyinfo	Devondb	No Action▼	No Action 🗢
Countries	×	No File	Countries	countries	Devondb	No Action▼	No Action 🗢
Currency	×	No File	Currency	currency	Devondb	No Action▼	No Action 🗢
)epartments	×	No File	Departments	departments	Devondb	No Action▼	No Action 🗢
)epartments2	×	No File	Departments2	departments2	Devondb	No Action▼	No Action 🗢
Strip User/Pass	word from	n Link Files and P	refix Entries		Disable Data	loss Waming	(?)

Importing external database tables programmatically via the <u>*dict/impdb</u> program

- The individual Import actions can be invoked programmatically
 - Create/Merge/Replace a Database table into the Data Dictionary

Call "*dict/impdb;CreateDDRecord", db_prefix\$, connect\$, db_name\$, db_user\$, db_pass\$, db_options\$, tableName\$, description\$, fileName\$, groupName\$, replace, result\$

• Add to Prefix File Entry for the External Database table

Call "*dict/impdb;AddToPfxFile", db_prefix\$, connect\$, db_name\$, db_user\$, db_pass\$, db_options\$, tableName\$, fileName\$, stripPswd, noDataLossWarning, result\$

Create Link File for the External Database table

Call "*dict/impdb;CreateLinkFile", db_prefix\$, connect\$, db_name\$, db_user\$, db_pass\$, db_options\$, tableName\$, fileName\$, stripPswd, noDataLossWarning, result\$

• Create and Load Physical File from the External Database table

Call "*dict/impdb;CreateAndLoadFile", db_prefix\$, connect\$, db_name\$, db_user\$, db_pass\$, db_options\$, tableName\$, fileName\$, noDataLossWarning, result\$





- PxPlus has two utilities to export a table to an external database
 - **Database Export Utility** To export one table at a time
 - Bulk Database Export Utility To export multiple tables all at the same time
- Utilities are similar in use and function so we will only cover the Bulk Database Export Utility
- The **Bulk Database Export Utility** allows you to define a connection to an external database and then selectively export tables from the PxPlus data dictionary
 - Create Link Files that point to tables in the database
 - Create Link Files that point to the database itself
 - Add entries to the **<u>Prefix File</u>** that point to tables in the database
 - Add entries to the Prefix File that point to the database itself
 - Validate native PxPlus data files
 - Load data from native PxPlus data files to database tables

• To invoke the **Bulk Database Export Utility**, use one of the following methods:

Location	Method
From <u>Database Export Utility</u>	Click the Bulk Export button
From <u>Data Dictionary Maintenance</u>	Click the Export button in the Database section of the toolbar if no table with a native PxPlus data file is currently selected
From <u>Data Dictionary Maintenance</u>	From the menu bar, select File > Database Export Utility if no table with a native PxPlus data file is currently selected
From the PxPlus Command line	Enter: RUN "*dict/expdde"

- To connect to a database to export to, you must input the database connection information
 - The utility remembers database connection information after successfully connecting to the database
 - Multiple database connections can be remembered, one connection for each database type
 - The connection information is remembered on a "per project" basis

	LUS			Bulk Database	e Export U	Itility		() — □ X
Target Database Database Type: User Name: Additional Options:	DDB ~	Data Source: Par Par NULLPADKEY=Y	ssword:	Data	base Name:		ad Tables	Create DB File
Table G	roup	Description	In DB	-ile Type Edit All>	Validate	DB Action No action ▽	Load Table	File Action No action マ
Strip User/Passwor	rd from Link Files	and Prefix Entries			Disable	e Data Loss Warni	ing 🦻	
						View Log	Apply	Exit

- <u>Create DB File</u> button allows you to create either a Link File or a Prefix File entry that points to the database itself
 - This may be useful so that you can do a global OPEN to the database, providing the UserID and Password to avoid needing the UserID and Password on every Link/Prefix File entry
 - It can also be used to get a list of tables from the database or if your program needs to make direct queries against the database

TECHNOLOGIES LTD.		Crea	ate Data	abase	Connection	n File
Database File Type: Link File Path:	Link F	ile	10	~		-
				ĺ	Create	Cancel

- Load Tables button Lists the tables in the data dictionary, sorted in alphabetical order by default
 - In DB column A check mark indicates which table definitions are currently in the database
 - Group and Description columns Describe the table
 - **File Type** column Tells you what type of file is in the data dictionary; i.e. No File, Native, ODB Link, etc.

									1		
TECHNOLOGI	ES LTD.			Bulk Databas	e Export l	Jtility					
arget Database											
Database Type:	ODB	> Data Source: Devo	nDB	Da	Database Name: DevonDB					Create DB File	
User Name:	X00000X	Passy	vord:	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX							
Additional Options:	NONLILI S-Y							and Tables			
Additional Options.	NONOEES-1	NOLLI ADRET-T						oau rables			
Table	Group	Description	In DB	File Type	Validate	DB Action		Load Table	File Action		
				Edit All>		No action	~		No action	~	
0P000			*	Native		No action	~		No action	~	
404			*	No File		No action	~		No action	~	
AAwebster		PO EXPEDITE EXTENTION DATA B	×	Native		No action	~		No action	~	
Accounts		Accountszzzz	V	No File		No action	~		No action	~	
Activations	PXPLUS	Activations	*	Native		No action	~		No action	~	
mike1		ADDITIONAL INFORMATION DAT	×	Native		No action	~		No action	~	
ARCUST		AR Customer	~	No File		No action	~		No action	~	
adkey			×	Native		No action	~		No action	~	
alanceSheet		Balancesheet	<i></i>	ODB Link		No action	~		No action	~	
C_Header	B/C	BC Header	×	Native		No action	~		No action	~	
igData			×	Native		No action	~		No action	~	
			*	No File		No action	~		No action	~	

- Validate Will have PxPlus check that the contents of the file match the elements definition
- **DB Action** Can be used to:
 - Create table in external database
 - Merge table in external database
 - Replace table in external database
- Load Table Will populate the database table with the data in the native PxPlus data file
- File Action Can be used to:
 - Create database link files
 - Add database table entries to the prefix file
- Actions are performed when the **Apply** button is clicked

	PLUS		Bulk Database Export Utility									
Target Database)											
Database Type:	ODB	✓ Data Source: Devo	nDB	D	atabase Nan		Create DE	3 File				
User Name:	XXXXXXXX	Passv										
Additional Options: NONULLS=Y;NULLPADKEY=Y Load Tables												
Table	Group	Description	In DB	File Type	Validate	DB Action	Load Table	File Action				
				Edit All>		No action 🛛 🔻		No action	~			
10POOO			×	Native		No action 🛛 🔻		No action	~			
7404			×	No File		No action 🔻		No action	~			
AAAwebster		PO EXPEDITE EXTENTION DATA B	×	Native		No action 🛛 🔻		No action	~			
Accounts		Accountszzzz	V	No File		No action 🔍		No action	~			
Activations	PXPLUS	Activations	×	Native		No action 🗢		No action	~			
amike1		ADDITIONAL INFORMATION DAT	×	Native		No action 🗢		No action	~			
ARCUST		AR Customer	V	No File		No action 🗢		No action	~			
badkey			×	Native		No action 🗢		No action	~			
BalanceSheet		Balancesheet	V	ODB Link		No action 🗢		No action	~			
BC_Header	B/C	BC Header	×	Native		No action 🔍 🔻		No action	~			
bigData			×	Native		No action 🗢		No action	~			
bigpasswordnew			×	No File		No action 🗢		No action	~			
Strip User/Pas	ssword from Link Files	and Prefix Entries			🗌 Disal	ble Data Loss Warni View Los	ing 🦻 g Apply	E	Exit			

- Check box option to control whether User/Password
 are stripped from Link Files and Prefix File entries
 - **On** by default to prevent the User and Password information being saved in plain text
- Check box option to control whether the data loss warning message is displayed
 - Disable warning for actions that could possibly overwrite data
 - Creating/Replacing a table
 - Loading a table
 - Creating a Prefix File entry
 - Creating a Link File
 - Off by default to help prevent accidental data loss

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TECHNOLO	OGIES LTD.			Bulk Databas	se Export l	Jtility				
Farget Database	,									
Database Type:	ODB	✓ Data Source: Dev	onDB	Da	atabase Nar	ne: DevonDE		Create D	B File	
User Name:	XXXXXXXX	Password: xxxxxxxxx								
Additional Options	NONULLS	=Y;NULLPADKEY=Y	ULLPADKEY=Y Load Tables							
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BC_Header	B/C	BC Header	×	Native		No action	~		No action	~
bigData			×	Native		No action	~		No action	~
bigpasswordnew			×	No File		No action	~		No action	~
Strip User/Pass	sword from Link File:	s and Prefix Entries			Disal	ole Data Loss	Warnin	g 🦻		
						Vie	ewLog	Apply	r I	Exit

• View Log button

- Available only when changes have been applied
- Displays a log of applied changes as a PDF
- Can print or save the log PDF, if desired

🔹 PVX	PLUS	·		Bulk Databas	o Evport I	Itility			0 -	- 🗆
TECHNOL	OGIES LTD.			Duik Databa		Juilty				
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User Name:	XXXXXXXX	Passv	Password: xxxxxxxxx							
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ARCUST		AR Customer	V	No File		No action	~		No action	~
badkey			*	Native		No action	~		No action	~
BalanceSheet		Balancesheet	V	ODB Link		No action	~		No action	~
BC_Header	B/C	BC Header	*	Native		No action	~		No action	~
bigData			×	Native		No action	~		No action	~
bigpasswordnew			*	No File		No action	~		No action	~
Strip User/Pas	ssword from Link Files	and Prefix Entries			Disa	ble Data Loss V	Varnin	g 🔉		
						Vie	w Log	Apply	E	Exit

Exporting tables to an external database programmatically via the <u>*dict/sqlmake</u> program

• Create a table, Load a table and optionally Create the Prefix File entry and Link File

Call "*dict/sqlmake;Convert",fileName\$, db_type\$, connect\$, db_name\$, db_table\$, db_altname\$, db_user\$, db_pass\$, db_options\$,pfx_file\$,link_file\$,noOverwrite,noStripPrompt

• Validate a PxPlus Native data file

Call "*dict/sqlmake;Validate", fileName\$, result\$

• Create/Merge/Replace a table in the Database from Data Dictionary table

Call "*dict/sqlmake;CreateTable", fileName\$, ddf_table\$, db_prefix\$, connect\$, db_name\$, db_table\$, db_user\$, db_pass\$, _db_options\$, replace, result\$

Load an External Database table with data from a PxPlus Native data file

Call "*dict/sqlmake;LoadTable", fileName\$, db_prefix\$, connect\$, db_name\$, db_table\$, db_user\$, db_pass\$, db_options\$, overwrite

• Add to Prefix File entry for the External Database table

Call "*dict/sqlmake;PrefixFile", fileName\$, db_prefix\$, connect\$, db_name\$, db_table\$, db_altname\$, db_user\$, db_pass\$, _db_options\$, pfx_file\$, stripPswd

Create Link File for the External Database table

Call "*dict/sqlmake;LinkFile", fileName\$, db_prefix\$, connect\$, db_name\$, db_table\$, db_user\$, db_pass\$, db_options\$, link_file\$, overwrite, stripPswd





- Let's convert the Cats demo from using PxPlus native keyed files to using a MariaDB external database
- Important: Make sure you back up your PxPlus native keyed files before you start

	P	Canadian Automotive Toy Store		Main Menu	● - □ ×
		Accounts Receivable Client Maintenance Salesrep Maintenance	Men	u System M	aintenance
		State Maintenance Department Maintenance Client List Client by Salesrep List Sales Order Invoice Entry Print Invoice Print Unpaid Invoices by Date Inventory Management Product Maintancne Product List Product Sales by Department File Maintenance Clients Products Salesreps Departments States	Define functions ar management. First we <u>define the</u> the transactions to Defi run) E Laye	id control access to <u>transactions</u> that a the <u>menu structure</u> ine the transac put/Define me	the system via Menu re available to run, then add ction (what to enu structure
New Update L	PLUS ogies LTD. Jpdate Files	py Rename Delete	Data Dictionary M Define IO Keys Procedure	e Export Import Data	 ● - □ × Print
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(Options	🔮 Lookup Table Names		- D X	
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- Install and setup a database server if you don't already have one
 - Use the software/tools provided by the database vendor to install and set up the database server
 - We used <u>MariaDB</u> (free MySQL)
- Create a new database/schema on the server where the exported tables will go
 - Use database management software or command line tools provided by database server to create the database/schema
 - We used <u>MySQL Workbench</u>



MariaDB

- May need to install database connector
 - [MYSQL], [DB2], and [OCI] interfaces all require a database connector
 - [ODB] requires a ODBC driver for the database and a data source name
- Working with MariaDB, we need [MYSQL] interface so must download <u>MySQL C Connector</u>
- Install/Extract library file (libmysql.dll/libmysqlclient.so) to PxPlus install directory
 - Use <u>System Analysis Tool</u> to test if [MYSQL] interface is working

PxPlus 2024		×	+			
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🚯 libmysql.dll			2	2017-07-13	1:38 PM	
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No issu	es found	Possi	ble issues	found 📕 Issue	es found	
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- Open the Data Dictionary
 - On the IDE, expand the Data Management category and click on Data Dictionary Maintenance
- Launch the Bulk Database Export Utility
 - In Data Dictionary Maintenance, click the Export button in the Database section of the top toolbar
- Input the connection information to connect to your database (in our case, MariaDB)
- Click the Load Tables button

	Define Keys Define	IO Procedure	Ex Im	port Dat	ta f	Print	國	Sexport	File	ing
	PLUS	_		Bulk Databas	e Export	Utility			0 -	
arget Databas	se									
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- To prevent plain text login credentials and make it easier to change login credentials in the future:
 - Click the **Create DB File** button to create a database Link File
 - Modify DB Link File to use a global variable for the User Name and Password
 - Add definition of User and Password and an OPEN of the DB Link File to the START_UP program
 - Password protect the START_UP program



- Scroll through the list of tables from the data dictionary, and for all the tables you want to export:
 - Click the **Validate** check box to ensure that the data in the file matches the data definition
 - If not a match, fix the definition or the data so that they do match; otherwise, the database will display an error when trying to load the data
 - Select the **Create Table** option from the **DB Action** drop-down list to create the table in the database
 - Click the **Load Table** check box to copy the data from the PxPlus native file to the database table
 - Select the **Create Link File** option from the **File Action** drop-down list to create a Link File to the table in the database, overwriting the PxPlus native file

	PLUS			Bulk Database	e Export	Utility		🕚 — 🗆 🗙
Target Databas	e MvSQL ~	Server Address: rocky	.pvxplu	s.ca Databa	ase Name:	cats_demo		Create DB File
User Name: XXXXXX Password: XXXXXX								
Additional Option	ns: NONULLS=	Y;NULLPADKEY=Y				Los	ad Tables	
Table	Group	Description	In DB	File Type Edit All>	Validate	DB Action Create or Mi⊽	Load Table	File Action
Client Master File	APPLICATION	Client Master File	×	Native	_ 	Create Table▼		Create Link f▼
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Department	APPLICATION	Department file	×	Native	⊡	Create Table▼	⊻	Create Link f▼
Invoice Detail	APPLICATION	Invoice Detail file	×	Native		Create Table▼	⊻	Create Link f▼
Invoice Header	APPLICATION	Invoice Header File	×	Native	¥	Create Table▼	⊻	Create Link f▼
Menu tree view	SYSTEM	Menu Tree structure	×	Native	¥	Create Table▼	⊻	Create Link f▼
Product	APPLICATION	Product File	×	Native	⊻	Create Table▼		Create Link f▼
Sales Rep	APPLICATION	Sales Rep file	×	Native	⊻	Create Table▼		Create Link f▼
States	APPLICATION	States / Provinces file	×	Native	⊻	Create Table▼	⊻	Create Link f▼
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Strip User/Pas	ssword from Link	Files and Prefix Entries			Disab	le Data Loss Wa	rning 🦻	
						View Log	Apply	Exit

- Make sure that the Strip User/Password from Link Files and Prefix Entries check box is selected
- Select the Disable Data Loss Warning check box to avoid a warning for each table exported
 - This is why we said earlier to backup your files so that you can always go back
- Click the Apply button to perform the export
 - When completed, a message box displays to list all the changes that were done

	PLUS			Bulk Database	e Export	Utility		
Target Databas	e							
Database Type:	MySQL ~	Server Address: rocky	.pvxplu	s.ca Datab	ase Name:	cats_demo		Create DB File
User Name:	XXXXXX	Pass	word:	XXXXXXX				
Additional Option	ns: NONULLS	Y;NULLPADKEY=Y				Lo	ad Tables	
Table	Group	Description			Validate		Load Table	File Action
I abic		Description		Edit All>		Create or Re [▽]		Create Link f▽
Client Master File	APPLICATION	Client Master File	×	Native	V	Create Table▼	Y	Create Link f▼
Clients	APPLICATION	Client Master File	×	Native	I	Create Table▼	I	Create Link f▼
Department	APPLICATION	Department file	×	Native		Create Table▼	⊻	Create Link f▼
nvoice Detail	APPLICATION	Invoice Detail file	×	Native	I	Create Table▼	⊻	Create Link f▼
nvoice Header	APPLICATION	Invoice Header File	×	Native	I	Create Table▼	Ĭ	Create Link f▼
Menu tree view	SYSTEM	Menu Tree structure	×	Native	⊻	Create Table▼		Create Link f▼
Product	APPLICATION	Product File	×	Native		Create Table▼	⊻	Create Link f▼
Sales Rep	APPLICATION	Sales Rep file	×	Native	⊻	Create Table▼	⊻	Create Link f▼
States	APPLICATION	States / Provinces file	×	Native	I	Create Table▼	Ĭ	Create Link f▼
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Strip User/Pas	ssword from Link	Files and Prefix Entries			🖌 Disab	le Data Loss Wa	rning 🦻	

- Click the View Log button to view/save/print the log
 - If any errors occurred, more details can be found in the log
- Exit the Bulk Database Export Utility

	DGIES LTD.			Bulk Database	e Export	Utility		
Target Databas	se							
Database Type:	MySQL ~	Data Source: rocky	y.pvxplu:	s.ca Datab	ase Name	cats_demo		Create DE
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Department	APPLICATION	Department file	V	MySQL Link		No Action	▼ □	No actio
Invoice Detail	APPLICATION	Invoice Detail file	~	MySQL Link		No Action	▼ □	No actio
Invoice Header	APPLICATION	Invoice Header File	V	MySQL Link		No Action	•	No actio
Menu tree view	SYSTEM	Menu Tree structure	V	MySQL Link		No Action	▼ □	No actio
Product	APPLICATION	Product File	V	MySQL Link		No Action	•	No actio
Sales Rep	APPLICATION	Sales Rep file	 	MySQL Link		No Action	•	No actio
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Now if you look in the data dictionary, the files ٠ exported will display MySQL Link File as File Type

Now if we open our Cats demo, it will work as ٠ before but the data is in the MariaDB database

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SES		New Update Update C Link Files	Copy Rename Delete	Define t Keys	IO Procedure	rt 🔍 rt Data	Print Export	t File Splitting
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		Тоу	Store Client ID: 032475			nance		
Client Maintenance (Custom Ir	nformation)	General	Name: Address:	Brewster Lighting 5998 Dusty Circle				
Credit Used	0	Accounting	Address: City:	Methlakahtla				
Alternate Contact	Joe Blow (555) 123-4567	Invoices	Zip/Postal Code:	V1M 6Z2	Phone Number:	(778) 555	-3834	
			State / Province:	BC ⊽	Phone Extension:			
BRIDGING THE PAST	AND THE FUTURE		Country:	Canada	Contact Name:	Rebecca	Mitchell	E <u>x</u> it
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