

PQLX System Installation and Configuration

Introduction

This document describes all setup dependencies, requirements and actions necessary to create a PQLX server instance, database(s), and the client-side GUI programs. Please read the entire document before proceeding with the installation as this will provide all the background necessary to get a system up and running in a successful manner.

The PQLX system will compile and execute on any of the following three platforms:

1. LINUX
2. Mac OS
3. Solaris

Setup of the PQLX Server and system is generally defined to comprise the following actions:

- Server-side technical environment setup, performed once per server machine instance;
- PQLX software compilation and installation, executed once per platform the PQLX server and client will run on, for both server- and client-side programs;
- PQLX Database definition and creation, executed once for each database required.

Server-side Technical Setup

Server-side technical environment setup is comprised of the following individual steps:

- Installation of MySQL database server

The database employed to support the PDF Database is MySQL (at <http://www.mysql.org>), it is open-source and fully supported. Download the latest version of the **MySQL Community Edition** (being certain to download the version necessary for development) and install to the machine designated to be the PDF-PQLX server (typically downloadable from <http://www.mysql.org/downloads/>, minimum version = 5.0.18).

This may be installed on either a true server machine (on a network with clients connecting from other machines), a stand-alone installation (server and client to reside on the same machine), or both. From a technical standpoint as regards the MySQL database installation, there are no differences between these possible configurations.

Once the database has been installed, start the server (as per platform-specific instructions, using the `mysqld_safe` script form) and confirm success through execution of the **mysql** client access program. See installation and startup notes of MySQL for details. As well, consider automating the MySQL server execution on system startup (see platform-specific instructions with the MySQL documentation set), otherwise, the MySQL server will be required to be manually started each time the server machine is booted.

N.B. One common problem with the MySQL installation is that the default destination directory for MySQL databases may not be large enough. For reasonably large datasets, the required amount of disk space will also be correspondingly large. Be certain to confirm at time of installation that the directory MySQL will use for its databases is located on a file mount that is ultimately large enough for PQLX usage.

PQLX Software Installation, Compilation, and Production Setup

Installation and configuration of the PQLX system is comprised of the following steps:

- Satisfy all prerequisites
- Compile the system
- Install all executables to Production directories
- Initialize the server database for PQLX usage.

Download the latest version of the available source code tar-ball. Decompress and de-tar to the destination directory of choice.

Compilation Prerequisites

Python

Python is required as part of the build process, which is usually installed by default as part of all OS types. However, an additional requirement for PQLX compilation for Python is that it must be major version 2, and not version 3.

You can check the python version with the command 'python -V'. If this returns major version 3, please re-orient your environment to point to the version 2 installation.

MySQL

Once the installation of the MySQL server has completed, two environment variables must be set up prior to system compilation. The two entries contained in the file \$PQLX/env/mysql.vars define the following MySQL-specific environment variables:

- MYSQLBIN - should be set to the the bin directory of the MySQL installation; subsequently used during system execution.
(This will be the directory containing the MySQL server named **mysqld_safe**)
- MYSQLINC - should be set to the include directory for MySQL; subsequently used only for system compilation.
(This will be the directory containing the MySQL file named **mysql.h**)

For Solaris implementations, the LD_RUN_PATH variable (set at beginning of env/makeVars file) must include both the PQL GTK+ libraries directory (defaults to PASSCAL installation, change if this path is not valid), and the directory containing the MySQL libraries, please modify accordingly.

It is intended that the modifications made to the file env/mysql.vars be saved in a separate location by the compiling user for subsequent use in future complications of the system. This way, when a new release of the PQLX software is made available, this file can be copied into the PQLX/env directory immediately prior to compilation, alleviating the need to make these modifications by hand each time.

GTK+

A local GTK+ installation must exist on the compiling machine; this can be achieved in one of two ways. It is possible that the minimum version of GTK+ is already installed on

the machine. To check if this is the case, execute the following command:

```
bash> pkg-config --modversion gtk+-2.0
```

If this returns a version greater than or equal to 2.14, then the GTK+ requirement is already satisfied for this machine; you may skip to the next section **Compilation**.

If there is no version of GTK+ installed or the version installed does not satisfy the minimum requirement, a development version of GTK+ can be installed according to the platform-specific standard procedures.

Once GTK+ has been installed, verify that the program **pkg-config** exists in the **\$PATH** environment variable of the compiling user.

Compilation

Compilation is carried out through the following steps:

1. Define the installation directory where the PQLX system will be held on disk and de-tar the PQLX source distribution to this directory.
2. Add the following two lines to the login .rc script (e.g., ~/.bashrc) for the executing user of the compilation:

```
export PQLX=PQLX-install-directory-fullpath
```

3. Source the .rc file modified in step 2, or open a new window.
4. In the uppermost PQLX installation directory, compile all source code:

```
bash> cd $PQLX  
bash> env/makeALL
```

The compilation and installation will verify success. If not, a message will indicate which programs are missing (failed) and the name of the log file containing the compilation output to be consulted for investigation.

If the verification fails, the named logfile contains all compiler and linker output messages. As the PQLX system comprises many diverse components, the relevant error message(s) will be located in the logfile in the specific section of each component. The verification message, when indicating failure, will indicate which specific components (libraries and/or executables) are missing. Use this message to position yourself correctly in the output logfile to determine the nature of the failure.

Sever-Only Compilation

In the case where it is not desired to compile the client GUI programs on the server (if, for example, the GTK+ libraries are not easily provided for the server platform and/or the client is simply not necessary to be compiled for the server platform), It is also possible to compile only server-side programs.

In this case, follow all procedures as laid out in the section **Compilation**, including an additional compilation argument to env/makeALL:

```
bash> env/makeALL srvr
```

Executed in this manner, no client GUI programs will be compiled, thus requiring no GTK+ graphics files (includes and libraries) be resident on the target server machine.

Installation

Upon successful compilation, the \$PQLXPROD sub-directories will contain all files required for PDF Server and PQLX system execution. Once compilation is complete, the \$PQLXPROD directory and sub-directories may be copied to another directory designated for production execution purposes.

All users who wish to execute any portion of PQLX, either server- or client-side, will require their .bashrc file to source the file **PQLXprodVars** thus:

```
export PQLX=PQLX-production-directory-fullpath
source ${PQLX}/PROD/PQLXprodVars
```

The file **PQLXprodVars** defines the following environment variables, each required for execution of PQLX and its various components in a production environment:

```
export PQLXPROD=${PQLX}/PROD
export PQLXLOG=${PQLXPROD}/log
export PQLXBIN=${PQLXPROD}/bin/${PQLXARCH}
export PQLXDBDEF=${PQLXPROD}/dbdef
export PQLXXML=${PQLXPROD}/XMLINPUT
export PQLXTRASH=${PQLXPROD}/trash
```

Once compilation and installation has completed successfully, the MySQL database is ready for PQLX initialization and usage. Please see documents **PQLX-1_Getting_Started.pdf** and **PQLX-2_DB_Setup_&_Prep.pdf** for details.

Subsequent updates/upgrades to the system can be made by compiling the release in question, followed by **copying** the PROD directory and subdirectories to the local production directory system. It is important that this be a **copy** operation since there are files generated and installed once the PQLX system is initialized with **initPQLXdb.sh**.

Client/GUI Installation

For the server, once compilation succeeds, the \$PQLXBIN directory will contain all executables to execute the PQLX client GUI programs. To install this on a client machine, the following steps must be carried out for each machine (instructions for each are detailed above):

1. Verify if GTK+ already installed and is minimum version required (2.14).
2. If GTK+ is not installed, or is a version less than 2.14, install or upgrade to a more recent version.
3. Install client programs pqlx, pql, and pqlxPNG to directory of choice, making certain this directory is included in the user's PATH environment variable.

PQLX System Files

The following tables detail the binary and script executables, as well as support files currently making up the PQLX system:

Server-Specific Files	Description
\$(PQLXBIN)/initPQLXdb.sh	bash shell script - initializes MySQL for PQLX usage, executed once per MySQL server instance.
\$(PQLXBIN)/re-initPQLXdb.sh	bash shell script - re-initializes MySQL for PQLX usage, executed only when wanting to delete ALL currently defined databases. Use this command with extreme caution, ALL PDF/PQLX databases held on specified MYSQL server are deleted forever!
\$(PQLXBIN)/makePQLXdb.sh	bash shell script - creates a PQLX database instance, executed once per PQLX database instance.
\$(PQLXBIN)/delPQLXdb.sh	bash shell script - deletes a PQLX database instance, executing user must provide PDF Database password provided in PQLX Database Definition File.
\$(PQLXBIN)/pqlxSrvr	binary executable - PDF-PQLX server program
\$(PQLXBIN)/pqlxSrvr_safe	bash shell script - executes pqlxSrvr from within a shell
\$(PQLXBIN)/listQ.sh	bash shell script - list status of EVENTQ in various formats
\$(PQLXBIN)/pqlxDBMaint	binary executable - perform necessary database maintenance on a PQLX database.
\$(PQLXBIN)/rePSD	bash shell script - re-execute PSD analyses for a given channel and time range.
\$(PQLXBIN)/refreshSysPDF.sh	bash shell script - create events to recompute all System PDF's.
\$(PQLXBIN)/updatePQLXdb.sh	Re-read contents of \$PQLXDBDEF (PQLX database definition) file and update to the PQLX database.
\$(PQLXBIN)/PQLXDataDirectory.sh	Manage data directories for scanning by a PQLX database.
\$(PQLXBIN)/delChannel.sh	Remove a specified channel completely from a PQLX database.

Client-Specific Files	Description
\$(PQLXBIN)/pqlx	binary executable - PQL-eXtended - PQL II - Waveform Viewer PDF Viewer/Analyzer STN (station) Viewer/Analyzer
\$(PQLXBIN)/pqlxPNG	binary executable - produce PNG versions of PDF plots (can also be executed server-side)
\$(PQLXBIN)/listPSDChannels.sh	bash shell script - return all channels qualifying for PSD analysis
\$(PQLXBIN)/exFREQS	bash shell script - return list of PSD frequencies for a given channel
\$(PQLXBIN)/exPDFfreq	bash shell script - return a PDF for a given date range and frequency range
\$(PQLXBIN)/exPDFhour	bash shell script - return a PDF for a given channel and time and month range
\$(PQLXBIN)/exPSDhour	bash shell script - return PSDs for a given channel and date and time range
\$(PQLXBIN)/exPDFstat	bash shell script - return requested statistics for specific System PDF and channel
\$(PQLXBIN)/zeroFillPDF.sh	Bash shell script - zero fill period/dB bins (output from exPDF* scripts outputs only bins with hits) where no hit is defined. Useful when extracting PDF data for onward use in other analysis programs, e.g., MatLab.

Support Files	Description
\$(PQLXPROD)/dbdef/PQLXdb.template.pqlx	text file - template file used for defining a PQLX database
\$(PQLXPROD)/dbdef/sql/sql-sup/initPQLXdb.sql	SQL referenced by initPQLXdb.sh script. Responsible for setting the PQLX database users in MySQL.
\$(PQLXPROD)/dbdef/sql/sql-sup/makePQLXMETAdb.sql	SQL referenced by initPQLXdb.sh script. Responsible for creating the PQLXMETA database.
\$(PQLXPROD)/dbdef/sql/sql-sup/makePQLXdb.sql	SQL referenced by makePQLXdb.sh. Responsible for creating a PQLX database instance.