# **Building EPICS IOCs for Perkin Elmer Detectors**

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This document describes how to build Perkin Elmer IOCs (including EPICS base and required packages) from source code in both Windows 10 and Linux. areaDetectors based IOCs for other detectors may be built similarly.

## **Get source code**

Perkin Elmer IOC is built based on EPICS base, synApps (areaDetector).

### EPICS base

EPICS base source code can be downloaded from:

<https://epics.anl.gov/download/base/index.php>

### synApps

synApps source code can be downloaded from:

<https://www.aps.anl.gov/BCDA/synApps/Where-to-find-it>

### areaDetector

areaDetector is included in synApps. However, if you want to build on a newer version of areaDetector (synApps R6.0 source package includes areaDetector-R3-3-1), follow the instruction on:

<https://github.com/areaDetector/areaDetector/blob/master/INSTALL_GUIDE.md>

To download the source code. Basically, you can always download the latest version of the source code by running command:

|  |
| --- |
| git clone --recursive <https://github.com/areaDetector/areaDetector.git> areaDetector-R-x-x-x |

Separate modules should be downloaded by cloning them from the repository.

Edit AREA\_DETECTOR in synApps/support/Makefile to point to the correct location.

### Update detector driver

Make sure the driver is up to date. For Perkin Elmer, replace the following files:

* perkinElmerSupport/Acq.h
* perkinElmerSupport/os/windows-x64/XISL.lib
* gbif64.dll
* libxml2\_x64.dll
* XISL.dll

## **Install tools/libraries for the compilation**

Building EPICS base and Perkin Elmer IOC requires specific tools and libraries.

|  |  |  |
| --- | --- | --- |
| **Module** | **Platform** | **Download** |
| Perl | Windows | <http://strawberryperl.com/> |
| make | Windows | Find in the shared Dropbox folder.  <https://github.com/mbuilov/gnumake-windows>  V3.8 make cause errors. Latest version recommended. |
| re2c | Linux | <http://re2c.org/install/install.html> (source code) |
| Windows | <https://sourceforge.net/projects/re2c/> (binary) |
| Visual Studio | Windows | <https://visualstudio.microsoft.com/vs/community/> |
| libusb-xxx-dev | Linux | sudo apt-get install libusb-1.0-0-dev |
| libx11-dev | Linux | sudo apt-get install libx11-dev |
| libxext-dev | Linux | sudo apt-get install libxext-dev |
| libusb-dev | Linux | sudo apt-get install libusb-dev |
| libreadline-dev | Linux | sudo apt-get install libreadline-dev |
| gcc | Linux | sudo apt-get install gcc |
| g++ | Linux | sudo apt-get install g++ |

## **Compilation environment setup**

To compile EPICS base and packages/IOCs, EPICS\_HOST\_ARCH must be set. In Windows 10:

|  |
| --- |
| set EPICS\_HOST\_ARCH=windows-x64-static |

Paths to make/Perl/EPICS bin must be set. In Windows 10, for example:

|  |
| --- |
| PATH=C:\Software\make;C:\Software\Strawberry\perl\bin;C:\epics\base-7.0.0.1\bin\windows-x64-static;%PATH% |

Execute the Visual Studio batch file for 64-bit builds in Windows:

|  |
| --- |
| "C:\Software\VS2017Community\VC\Auxiliary\Build\vcvarsall.bat" x86\_amd64 |

## **Building the programs**

### Building EPICS base

To run static build of EPICS base, edit base-xxx/configure/CONFIG\_SITE and set:

|  |
| --- |
| STATIC\_BUILD=YES |

### Building synApps

### First, run **make release** in *synApps/support/* to pass the definition of **EPICS\_BASE** and **SUPPORT** across synApps modules.

### Define **RE2C** in *seq-x-x/configure/CONFIG\_SITE*.

### Remove the modules that are not needed in Makefile.

### If areaDetector source code is downloaded separately:

### Modify **AREA\_DETECTOR** in synApps/support/configure/RELEASE.

### In *areaDetector/configure/*, run commands:

|  |
| --- |
| cp EXAMPLE\_RELEASE.local RELEASE.local  cp EXAMPLE\_RELEASE\_SUPPORT.local RELEASE\_SUPPORT.local  cp EXAMPLE\_RELEASE\_LIBS.local RELEASE\_LIBS.local  cp EXAMPLE\_RELEASE\_PRODS.local RELEASE\_PRODS.local  cp EXAMPLE\_CONFIG\_SITE.local CONFIG\_SITE.local |

### Define **SUPPORT** in *RELEASE\_SUPPORT.local*

### Define **ASYN**, **AREA\_DETECTOR** and **EPICS\_BASE** in *RELEASE\_LIBS.local*. Set

### Define **AUTOSAVE**, **BUSY**, **CALC**, and **SSCAN** in *RELEASE\_PRODS.local*. **SSEQ**, **DEVIOCSTATS** and **ALIVE** are optional.

### Set **WITH\_BOOST**=YES or NO in *CONFIG\_SITE.local*. **WITH\_PVA**=YES for using PVaccess (need EPICS base support), otherwise set WITH\_PVA=NO.

### Uncomment the lines for the modules to be complied in *configure/RELEASE.local*

## **Post-building**

### After build, in ADCore/iocBoot, run commands:

|  |
| --- |
| cp EXAMPLE\_commonPlugins.cmd commonPlugins.cmd  cp EXAMPLE\_commonPlugin\_settings.req commonPlugin\_settings.req |

and edit the two files to enable optional modules.

### In Windows, edit areaDetector-x-x-x\ADPerkinElmer\iocs\perkinElmerIOC\iocBoot\ iocPerkinElmer\start\_epics.bat:

### remove the first line;

### for static build, change the path of perkinelmerApp from ..\..\bin\windows-x64\ to ..\..\bin\windows-x64-static\

Perkin Elmer IOC is now ready to run.

## **Appendix A: Framegrabber driver installation**

When installing vensor software for the detector, the driver may not be installed properly as it maybe unsigned. Be sure to check Device Manager and check if the Framegrabber is recognized by the system. If not, update the driver using the one the provided.

A.1 Disable signature check to enable driver installation.

1. Click the Start menu and select Settings.
2. Click Update and Security.
3. Click on Recovery.
4. Click Restart now under Advanced Startup.
5. Click Troubleshoot.
6. Click Advanced options.
7. Click Startup Settings.
8. Click on Restart.

A.2 Update the driver.

In Device Manager, select the framegrabber to update the driver. For Perkin Elmer, the driver is in XIS\_Inst\_Package\_3.3.4.410\_16018\XISL\WIN64\PCIe\_XRD\_FGe\_OPTO.

## **Reference**

<https://epics.anl.gov/tech-talk/2015/msg01582.php>

<https://github.com/areaDetector/areaDetector/blob/master/INSTALL_GUIDE.md>