

EPICS IOC

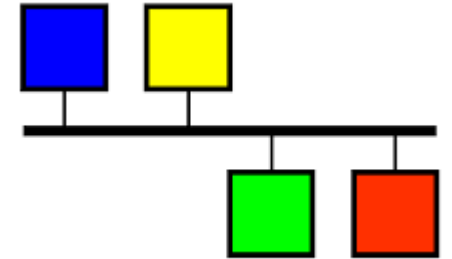
Notes and quick guides



EPICS IOC is a ChannelAccess server & client

Run many of CAS/CAC → Integrate subsystems into your Control System

- LabIOC, EPICS IOC, java-based (CSS, PV-Archivers), python-based, NI-SV-based , etc.
- and also CA gateways



Be aware of LAN

- `EPICS_CA_AUTO_ADDR_LIST="" ; EPICS_CA_ADDR_LIST=""`;
- `EPICS_CAS_IGNORE_ADDR_LIST="" ; EPICS_CAS_INTF_ADDR_LIST=""` ; # starts with 3.15.x
- Other libs & SW should implement this somehow: env, config, INI-file,....
- be aware of localhost

We have mostly three LAN in each controller – only one should talk via CA !

Double-check broadcast strom settings on network switches (10% is fine, but ...)

- your CA implementation might not be perfect (PV search, beacons are UDP bcsts in default)

CA-gateway subsystems

- cagateway or the new pva-based gateway
- Read-only GW, CAC-Archiver specific GW

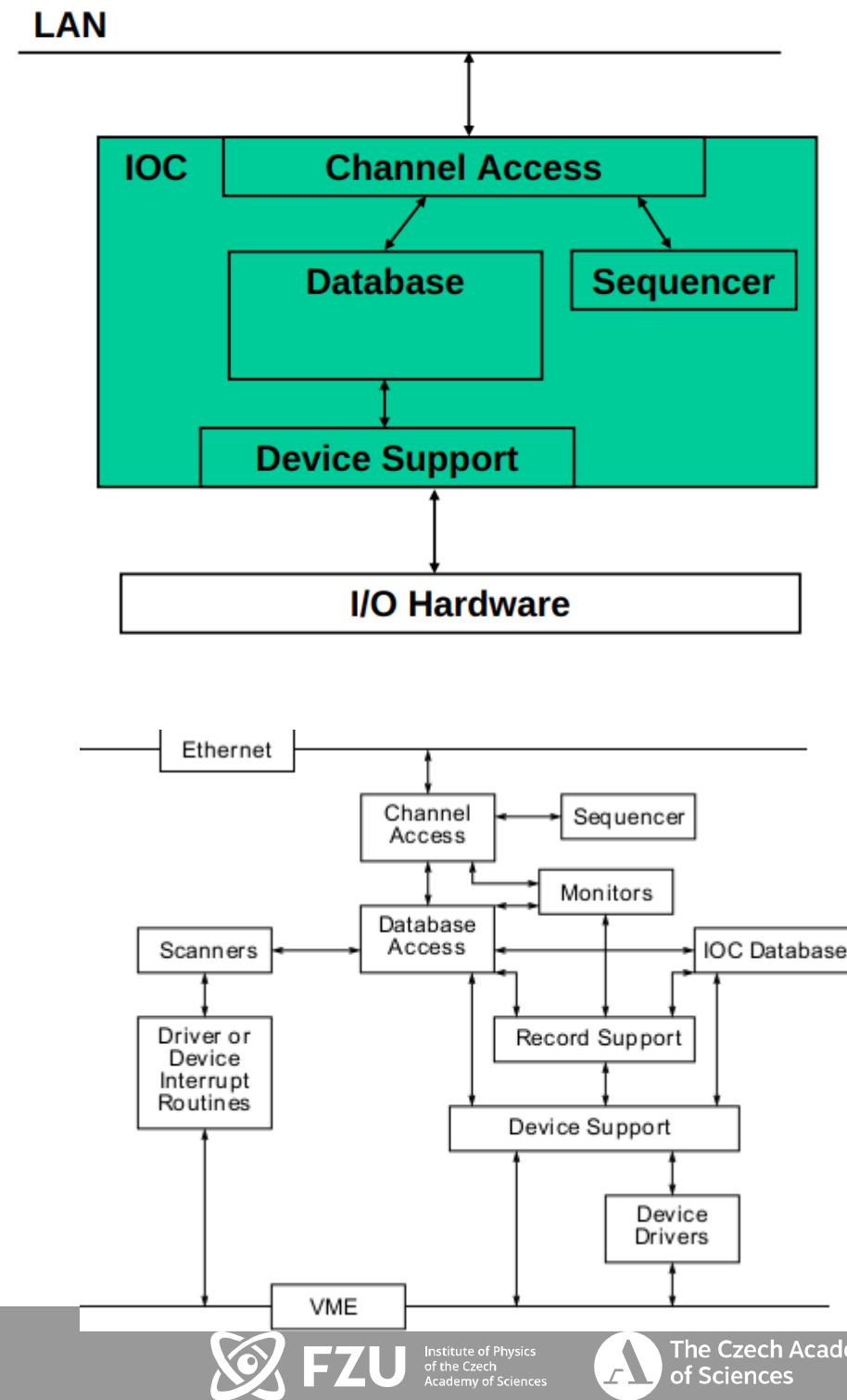


EPICS IOC – Why to like it ?

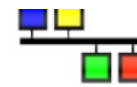
- because of records – that implement control system process
- because of auto channel access access to values & attributes
- multi-threaded, multi-platform SW
- from ARMv7 to server CPU beasts (base-3.15.8/configure/os/*)
- Linux, Windows, and others (base-3.15.8/configure/os/*)

IOC shell

- epicsThreadShow
- casr ; casr 255;
- dbpf DEMO:aiExample.TPRO 1



Graphical view of a record



ao
DemandTemp

DESC=Temperature Demand
SCAN=1 second
EGU=Celcius
HOPR=80
LOPR=20
DRVH=100
DRVL=0
DTYP=Soft Channel
PINI=NO
DOL=UserDemand

NPP NMS DOL

Inspector - DemandTemp

DemandTemp (ao)

Group	Alphabetical	DBD Order
GUI_COMMON		
DESC		Temperature Dem...
ASG		
UDF		1
GUI_LINKS		
DTYP		Soft Channel
FLNK		
GUI_INPUTS		
SIOL		
SIML		
SIMS		<none>
GUI_OUTPUT		
VAL		
OUT		
OROC		
DOL		UserDemand

Comment

No object selected Frozen ☐

```
record(ai, "$(NAME):aiExample")
{
<----->field(DESC, "Analog input")
<----->field(INP, "$(NAME):calcExample.VAL  NPP NMS")
<----->field(EGUF, "10")
<----->field(EGU, "Counts")
<----->field(HOPR, "10")
<----->field(LOPR, "0")
<----->field(HIHI, "8")
<----->field(HIGH, "6")
<----->field(LOW, "4")
<----->field(LOLO, "2")
<----->field(HHSV, "MAJOR")
<----->field(HSV, "MINOR")
<----->field(LSV, "MINOR")
<----->field(LLSV, "MAJOR")
}
```



EPICS IOC

Folder structure – really ?

- the Makefile includes includes ...
- very well managed “chain” but not for the start

```
makeBaseApp.pl -t ioc mytest_SoftIOC
makeBaseApp.pl -i -t ioc mytest_SoftIOC
```

Advanced:

```
/epics/base-3.15.4/src/template/base/top/eli_sw_SoftIOCAApp
/epics/base-3.15.4/src/template/base/top/eli_sw_SoftIOCBoot
```

Easy DEMO:

PATH=

LD_LIBRARY_PATH=

```
/usr/local/epics/R3.15/bin/linux-x86_64/softIoc stexplicit.cmd
```

```
../
bin
configure
db
dbd
iocBoot
softiocApp
Makefile
```

```
bin
configure
db
dbd
iocBoot
softiocApp
Makefile
```

```
dbExample1.template
envPaths
run.sh
stexplicit.cmd
```

```
../
dbExample1.template
envPaths
*run.sh
stexplicit.cmd
```

Getting prebuilt stuff – mainly the base

* NSLS-II Debian packages <https://epicsdeb.bnl.gov/debian/>
and its source from epicsdeb project <https://github.com/epicsdeb>
– e.g. Dockerfile

* Conda package already contains the binaries
#conda install -c gsecars pyepics
Look for filename “softloc”

* Shown yesterday: epics-containers project <https://github.com/epics-containers>
<https://github.com/epics-containers/epics-base/archive/refs/tags/23.3.1.tar.gz>
<https://github.com/epics-containers/epics-base.git>

* And some others
https://github.com/prjemian/epics-docker/blob/main/docs/docker_images.md

* Make the base on your own
– Dockerfile nowadays ?

```
#!/bin/bash
source ~/env-anaconda3.sh
conda activate py36
/home/anaconda3/envs/py36/opt/
epics/bin/softIoc stexplicit.cmd
```

./
Dockerfile

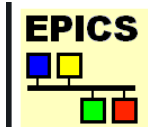
```
base-3.15.8.orig-patch.diff
ca-gateway.orig-patch.diff
CONFIG_SITE.local
RELEASE.local
```

```
./files:
base-3.15.8.tar.gz
extensions.tar.gz
softioc.tar.gz
```


Windows CA tools prebuilt - also search somewhere else
<https://epics.anl.gov/download/distributions/index.php>
-> camonitor.exe via cmd.exe

Searching throught the <https://epics.anl.gov/docs/training.php>
– prebuit *.EXE with tutorials
– there is also a VM from USPAS (US Particle Accelerator School) at
<https://epics-controls.org/resources-and-support/distributions/>

https://epics-controls.org/resources-and-support/distributions/#USPAS_US_Particle_Accelerator_School_Virtual_Machine_image



Home
News
About
Base
Modules
Extensions
Distributions
Download
Search
EPICS V4
IRMIS
Talk
Bugs
Documents
Wiki
Record Types
How To ...
Core dev's
CA
Training
USPAS 2019
APS 2015
APS 2014



EPICS Training

EPICS Training courses have been run by various organizations at various times as the demand arises. The [US Particle Accelerator School](#) (USPAS) has been a major provider of training for many years.

The following commercial companies may be able to run EPICS training courses tailored to specific needs, for a fee:

- [Cosylab Limited](#) (EU)
- [Observatory Sciences Ltd.](#) (UK)
- [Osprey DCS](#) (USA)

Training Materials

The following are links to the training materials available online that I know about.

USPAS 2019: EPICS Control Systems

Kay Kasemir and colleagues from the SNS ran a USPAS EPICS course in Knoxville TN in January, 2019. The materials used in the course are available on [Brookhaven's Website](#).

NSLS-II 2018: Asyn, Motion and AreaDetector

A 3-day series of lectures by Mark Rivers which are available as YouTube videos on [Brookhaven's Website](#).

APS 2014 and 2015: EPICS Training Series

The Software Services group at APS ran a 6-month series of courses aimed at local users, with most of the lectures being recorded.

Distributions

The following is a list of EPICS distributions – analogous to a Linux distribution, these collections of EPICS software are much quicker to download and install a distribution than it would be to obtain all of the individual pieces and install them. The distributions contain binaries from EPICS Base and/or various extensions, others may comprise source code only. For distributions distributed by the APS Controls group check the [EPICS Distributions Downloads](#) page.

Contents

1. synApps
2. NSLS-II Controls Package Repository
3. ITER CODAC Core System
4. Windows Tools
5. USPAS (US Particle Accelerator School) Virtual Machine image
6. STAR EPICS VM environment

Thank you for your attention

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