

[04A] START YOUR OWN IOC

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PLC-IOC WITH DO AND DI MODULES

Yokogawa Japan agrees to provide [Yokogawa PLC Training Kits](#) today. With a CF (Compact Flash disk) provided by KEK, it becomes a stand-alone IOC. Each kit has a AD, a DA, a D-out and a D-in modules.

Please connect a LAN cable, then power cable to an AC tap. The PLC-IOC will start in a minute.

LESSONS WITH PLC-IOC

Please try:

- 1) PLC IOC has an IP address 192.168.1.64 (or 65, 66, 67, or 68). From ubuntu Terminal, try a command “ping <IP_address>”. Does it respond ?
- 2) **Login** to a PLC-IOC: “ssh root@192.168.1.xx”. Ask password to Coordinator.
- 3) Go to the location where a startup-script exists. See Fig.1. Edit the script “st.cmd” using a command “emacs -nw st.cmd”. You **MUST CHANGE “user_name”** in st.cmd.
- 4) **Start st.cmd**: “./st.cmd”. You will see a prompt “epics>”. It means **EPICS IOC is running** at a PLC-IOC. 
- 5) In “epics>”, try “db1” (=database list). It is to know PV names running on the IOC. If you did not change st.cmd, you will see BAD PV names as in Fig.3. If so, “exit” from epics, then go back to the 3rd instruction.
- 6) From an ubuntu Terminal, try **caget** (or **caput**) to PVs on the PLC-IOC.

LESSONS WITH D-IO MODULES

- 7) **Dout** module (YD32): Check the associated PV names. Put 0 or 1, and watch at the front-panel indicators. Red number appears (Fig.4) ? Does a **LED of your Training Kit** turn on ?
- 8) **Din** module (XD32) and a **Switches**: Check the PV names. Watch at the PV values (by “camonitor”). Turn on/off switches to simulate signals.

LESSONS WITH A-IO MODULES

- 9) **DA** module (DA02): PVs for DA are not valid yet. Add a line “dbLoadRecords(“db/ai.db”, “slot=6, ch=1,also=1.0”)” in the “st.cmd”. Restart st.cmd. Does a new PV appear in the “db1” list ? How is a meter of your Training Kit?

- 10) **AD** module (AD04): Add multiple PVs for AD signals by yourself. Turn knobs of your Training Kit. Do AD PVs follow your action? Can you show a graph by StripTool?

11)

REF. SCREENSHOTS

```
[root@ioc70 iocf3rp61test]# hostname
ioc70
[root@ioc70 iocf3rp61test]#
[root@ioc70 iocf3rp61test]# cd /opt/epics/f3rp61-ioc/
[root@ioc70 f3rp61-ioc]# ls
Makefile bin/ configure/ db/ dbd/ f3rp61testApp/ include/ iocBoot/ lib/
[root@ioc70 f3rp61-ioc]# cd iocBoot/iocf3rp61test/
[root@ioc70 iocf3rp61test]# ls
Makefile README envPaths st.cmd* st.cmdOld st.cmd*
[root@ioc70 iocf3rp61test]#
```

Figure 1: startup script “st.cmd”

```
## May,2017 test by kami
## CAUTION - you are asked to change "your_name"
## then "./st.cmd"

dbLoadRecords("db/do.db", "head=your_name,slot=9,ch=1")
dbLoadRecords("db/do.db", "head=your_name,slot=9,ch=2")
dbLoadRecords("db/do.db", "head=your_name,slot=9,ch=3")
dbLoadRecords("db/do.db", "head=your_name,slot=9,ch=4")

dbLoadRecords("db/di.db", "head=your_name,slot=8,ch=1,scan=.5 second")
dbLoadRecords("db/di.db", "head=your_name,slot=8,ch=2,scan=.5 second")
dbLoadRecords("db/di.db", "head=your_name,slot=8,ch=3,scan=.5 second")
dbLoadRecords("db/di.db", "head=your_name,slot=8,ch=4,scan=.5 second")
```

Figure 2: part of “st.cmd”

```
[root@ioc70 iocf3rp61test]# ./st.cmd
!./../bin/linux-f3rp61/f3rp61test
## You may have to change f3rp61test to something else
## everywhere it appears in this file
envPaths
epicsEnvSet("ARCH","linux-f3rp61")

dbLoadRecords("db/do.db", "slot=2,ch=33")
dbLoadRecords("db/lo.db", "slot=5,ch=33")
## Set this to see messages from mySub
#var mySubDebug 1
## Run this to trace the stages of iocInit
#tracelocInit
cd /opt/epics/f3rp61-ioc/iocBoot/iocf3rp61test
iocInit
Starting iocInit
#####
## EPICS R3.14.12.3-CSA $Date: Mon 2012-12-17 14:11:47 -0600$
## EPICS Base built Sep 15 2016
#####
iocRun: All initialization complete
## Start any sequence programs
#seq sndExample, "user=rootHost"
epics> db1
your_name:D1:SL0T3:CH1
your_name:D1:SL0T3:CH2
your_name:D0:SL0T4:CH1
your_name:D0:SL0T4:CH2
epics>
```

Figure 3: ioc running with BAD PVs



Figure 4: front-panel indicator of a Dout module

For advanced participants, please try:

- 1) Modify “st.cmd” to have more DI/DO channels.
Modify “st.cmd” to add soft-AO-type PVs.
- 2) Ask a nearby group to give another Din or Dout module. Power must be off when you (un)mount a module. Modify “st.cmd” properly to enable new module.
- 3) You can **“caget” to other PLC-IOCs** – unless they have different PV names. **We are connected** by CA protocol. 😊
- 4) You can start st.cmd automatically at boot-time. Check “rc.local”.
- 5) A PLC-IOC has EPICS database (db files) at “/opt/epics/f3rp61-ioc/f3rp61testApp/Db/”. Read the di.db, do.db, ai.db, ao.db and softao.db files to understand more about today’s lessons.