

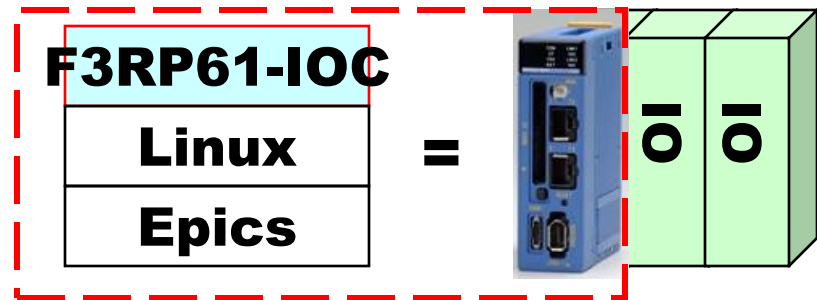
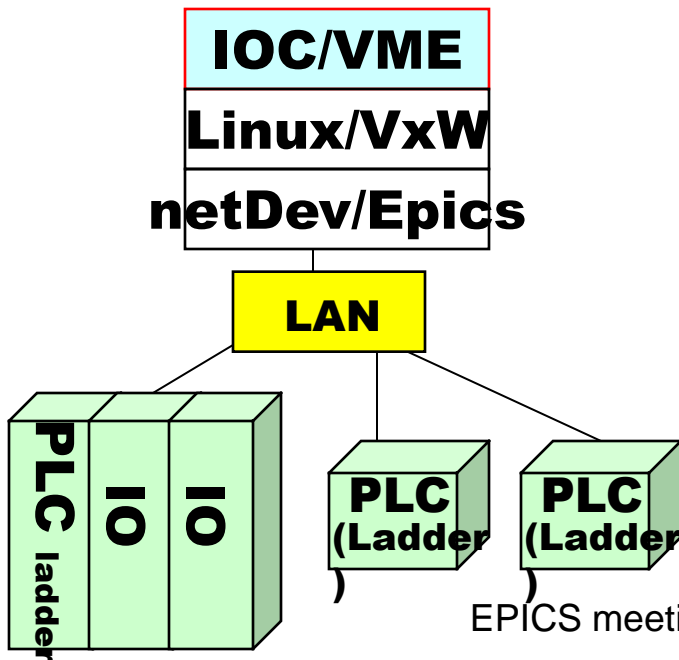
Demonstration of Embedded EPICS on F3RP61 PLC

N. Kamikubota, J-PARC/KEK



1) Impact of F3RP61

- **J-PARC MR/KEK introduced F3RP61 since 2008**
 - Many (40?) F3RP61/Linux-IOC systems are **in operation successfully**
- **When we need simple I/O channels**
 - **Left: before 2008, our standard style is:**
 - **Right: after 2008, new style with F3RP61:**



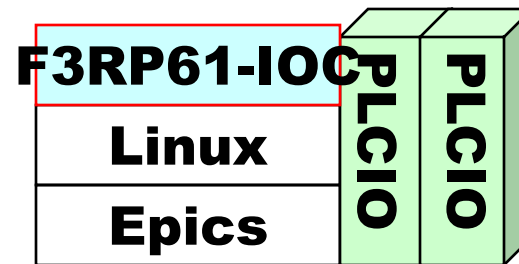
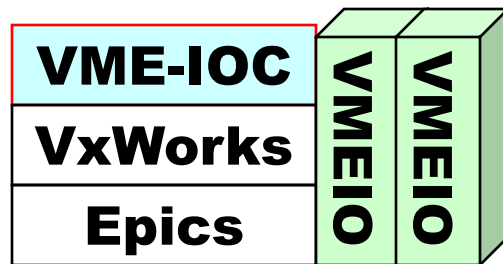
- **No separated IOC**
- **No ladder, but snl**
- **Fit “CA everywhere” idea**

Impact of F3RP61 (continued)

- **Consider VME-IOC and F3RP61/PLC-IOC**

- Left: our traditional style was vme:

- Right: with F3RP61:



- F3RP61-IOC can be an **alternative to VME-IOC**

- **KEK introduced Yokogawa's FAM3 PLC since 1995**

- We believe **high reliability** of PLC IO modules

- Good **partnership with Yokogawa** over 15 years

- **FAM3 PLC modules are small and easy to use**

Reasons why we like F3RP61 style

2) Support for test users of F3RP61

- **Many requests to develop new subsystems**
 - **from non-control groups (mag, beam-diag., rf, ..)**
 - **F3RP61-IOC style fits well for many cases**
 - **But our standard setup for F3RP61 requires J-PARC control network, not available in office rooms**

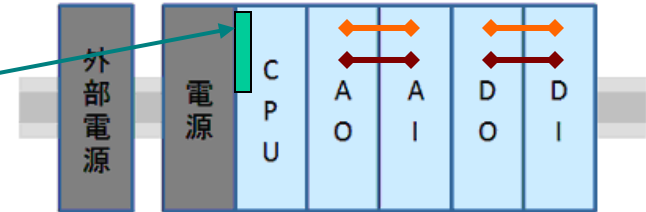
to support such test users

- **(a) F3RP61 setup for J-PARC laboratory LAN**
- **(b) module workshop in J-PARC CCR (to be started very soon)**

(a) F3RP61 setup for laboratory LAN

- **We developed a new CF**

- **Start Linux with DHCP**
- **Start Epics ioc assuming default module-layout**
 - **Default is => Slot2:AO, Slot3:AI, Slot4:DO, Slot5:DI**
- **Automatic generation of Epics PVnames**
 - **Ex) <hostname>:AO_1:SET, <hostname>:AI_2:VAL**
<hostname>="plc159" for plc159.intra.j-parc.jp



```
[root@plc159 ~]# caput plc159:AO_1:SET 0.123
```

```
Old : plc159:AO_1:SET      0
```

```
New : plc159:AO_1:SET      0.123
```

```
[root@plc159 ~]# caget plc159:AI_1:VAL
```

```
plc159:AI_1:VAL          0.123
```

```
[root@plc159 ~]#
```

```
[root@plc159 ~]# caput plc159:BO_1:SET 1
```

```
Old : plc159:BO_1:SET      ZERO
```

```
New : plc159:BO_1:SET      ONE
```

```
[root@plc159 ~]# caget plc159:BI_1:VAL
```

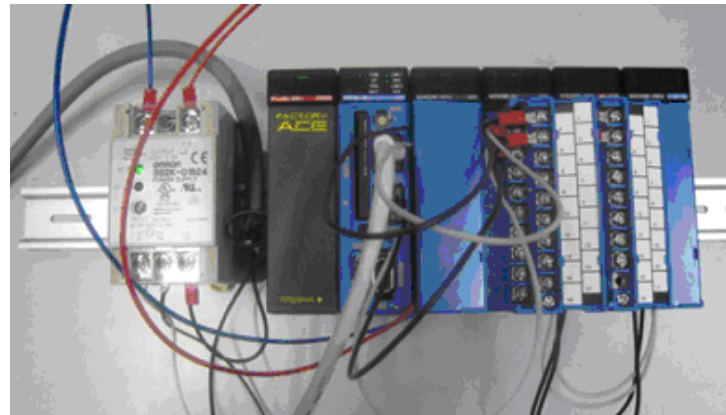
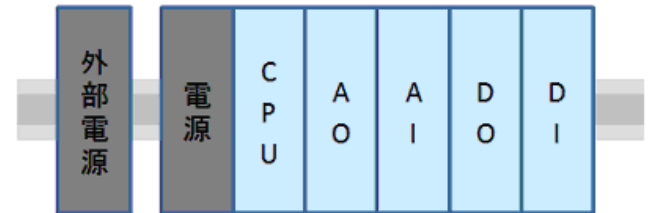
```
plc159:BI_1:VAL          ONE
```

```
[root@plc159 ~]#
```

From a
user-side

How to start F3RP61-IOC ?

- **How to start a F3RP61-IOC in your office room ?**
 - **1. Ask Computer Center** to register F3RP61's mac-address to DHCP server
 - **2. if you have non-default module-layout, modify st.cmd and execute "make"**
 - **3. Reboot the F3RP61-IOC**



default config in st.cmd

```
dbLoadRecords "db/ao1.db", "name=${HNM},S=2,ch=1"
```

```
dbLoadRecords "db/ao1.db", "name=${HNM},S=2,ch=2"
```

```
dbLoadRecords "db/ai1.db", "name=${HNM},S=3,ch=1"
```

```
dbLoadRecords "db/ai1.db", "name=${HNM},S=3,ch=2"
```

```
dbLoadRecords "db/bo1.db", "name=${HNM},S=4,ch=1"
```

```
dbLoadRecords "db/bo1.db", "name=${HNM},S=4,ch=2"
```

```
dbLoadRecords "db/bi1.db", "name=${HNM},S=5,ch=1"
```

```
dbLoadRecords "db/bi1.db", "name=${HNM},S=5,ch=2"
```

(b) module workshop in J-PARC CCR

- **Basic ideas**

- Prepare **stock boxes** in CCR, which **contain standard PLC modules**
 - Boxes are categorized as:
CPU(F3RP61), CPU(Ladder), D-in, D-out, Analog, Special, ..
- One can pick-up necessary modules from boxes
- **Periodic (every 1-2 month) supply** of modules by control group

**=> One can get modules to make your own F3RP61-IOC setup
no need to order, no need to wait**

no need ~~to~~ pay ? <= pay request will be forwarded later

PLC module workshop

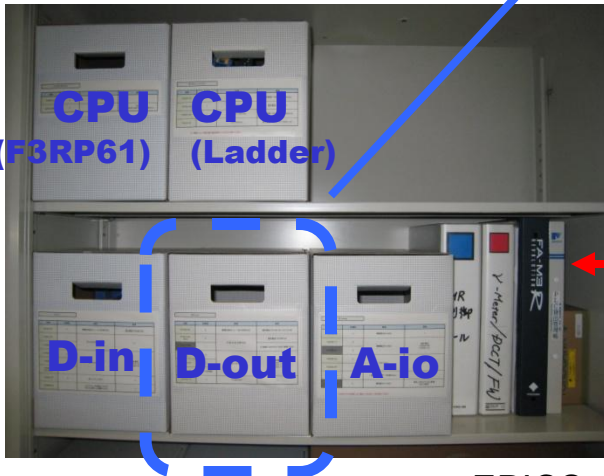
型番	容量数	説明	備考
F3Y08-0C	2	無電圧接点(レール)出力【端子台】	過去製品 F3Y08-0N, F3Y08-0H
F3Y04-5A (Dsk)	2	DC出力(24V)【端子台】	過去製品 F3Y08-5A
F3Y04-5B (Dsk)	1		※ 試験機にはF3Y04-5AをC交換(OK)
F3Y04-1P (Dsk)	2	多+DC出力(24V)	過去製品 F3Y08-1A F3Y04-1P F3Y02-1P
F3Y02-1P	1		
F3M04-3P	※ D-out全参照		
F3Y02-1T	2	TTL出力(5V)	

2) D-out modules are listed:
 relay, DC(8ch,24V),
 DC(64ch,24V), TTL, ..

Box "D-out"

1) Behind a wall, there are hidden boxes ..

3) You can find a necessary module in the box



4) Kindly asked, white down modules you pick up to the notebook



(^ ^) review the procedure again ..

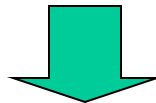
- 9am - you get an inspiration
- 9:30 - visit the **module workshop** to pick up PLC modules needed for your F3RP61 setup
- 10am - **ask to C.C.** to resister your F3RP61
- 11am – assemble PLC modules, edit st.cmd if necessary, make cable connections ..
- 3:30pm – registration to DHCP at C.C. finished
- 4pm – connect your F3RP61 setup to Laboratory network, reboot it .. Get started ?

**Inspiration => start your F3RP61-IOC
within a day**

**=> 1 month later, you will receive money
accounts**

Summary

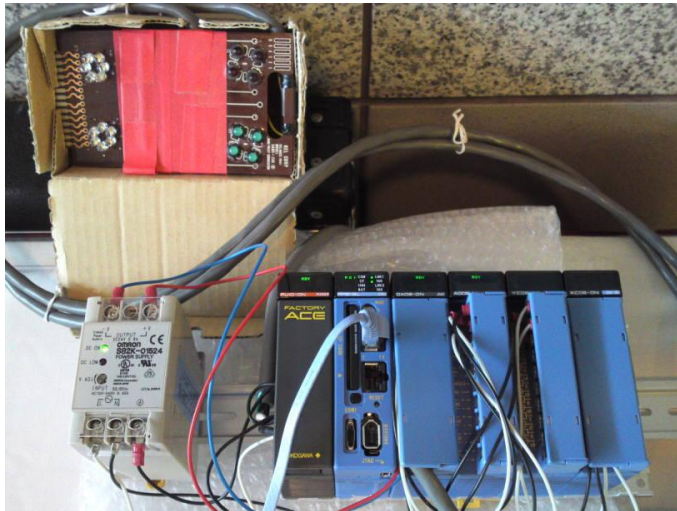
- **Impact of F3RP61-IOC in J-PARC is discussed**
 - **Since 2008, many pieces have been introduced**
 - **Simple architecture than before**
 - **An alternative to VME-IOC**
- **Support for test users of F3RP61 is reported**
 - **Test at Laboratory network**
 - **Easy start with default module-layout**
 - **Module workshop will be started soon**



2 pages more for demonstration

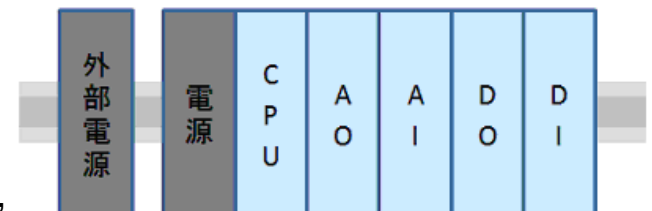
3) Demonstration of F3RP61 startup

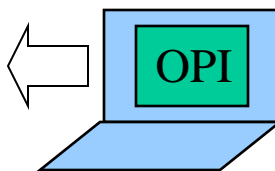
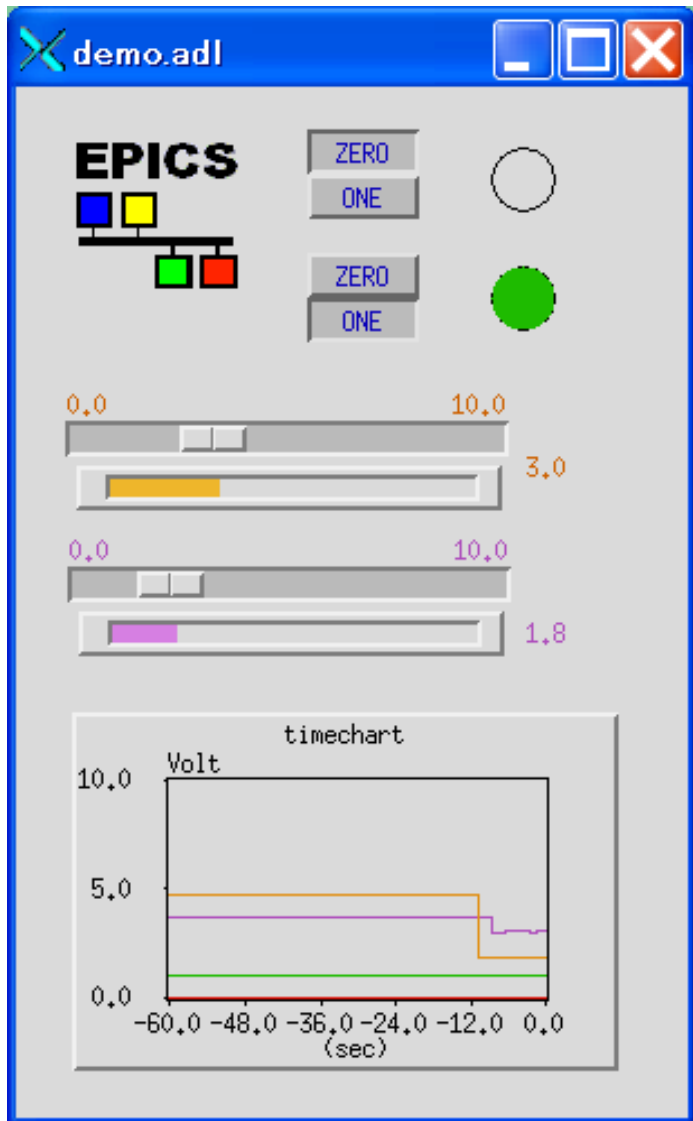
- **Today I don't use DHCP server, thus I modify network configurations:**
 - **fixed IP (10.105.56.159) and hostname "plc159"**
- **Demonstration kit** has default module-layout
 - **Default is => Slot2:AO, Slot3:AI, Slot4:DO, Slot5:DI**
 - **Generated PVnames are:**
 - **Ex) plc159:DO_1:SET, plc159:BI_2:VAL, ..**



van, June.2011,

(default module-layout)

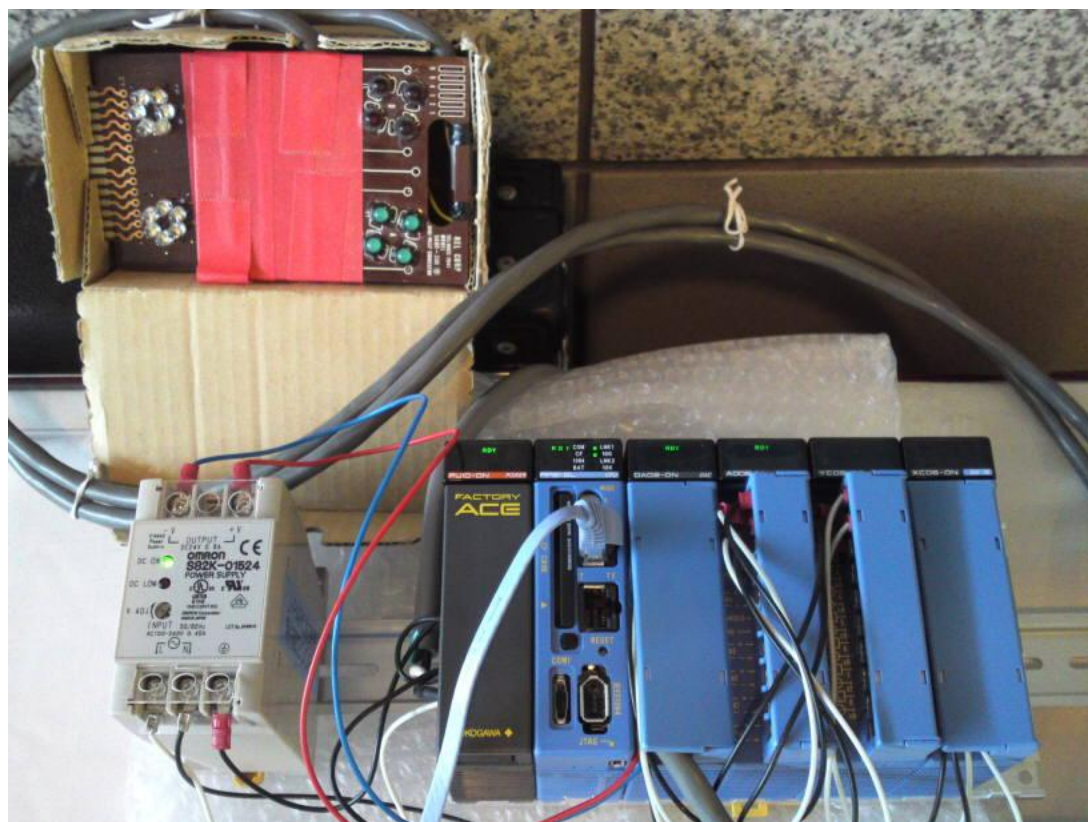




Demonstration will be

- during next break

- at the entrance hall



EPICS meeting in Taiwan, June.2011, kami, KEK