

Application of EPICS on F3RP61 to Accelerator control

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Background

- Recently, more and more PLCs are being adopted as front-end controllers for accelerator control
- They are placed under IOCs in EPICS-based control systems
- But...
- Isn't IOC (Input / Output Controller) itself originally the front-end controller?

The Point of my talk

- What's the point of having yet another front-end controller (PLC) below a front-end controller (IOC)?
 - Yes, there are a few reasons
 - But, in other many cases, it pointlessly increases our workload
 - Additional learning cost to use PLCs
 - Trouble shooting becomes harder
 - Complicated asynchronous drivers

Let's turn PLCs into IOCs!

- By using F3RP61
- A new PLC's CPU running Linux
 - Can work as IOC
 - Can work with wide variety of I/O modules for FA-M3 PLC
 - Can replace ladder programs with EPICS sequencer programs
 - Can work with ordinary PLC's CPU side-by-side on the same PLC-bus



Applications in KEKB & J-PARC

- Power supply control
 - M. Takagi, *et. al.*, WEP076
 - K. Mikawa, *et. al.*, WEP082



Applications in KEKB & J-PARC

- Stepping motor control
 - N. Nakamura, *et. al.*, WEP074
 - M. Takagi, *et. al.*, WEP076



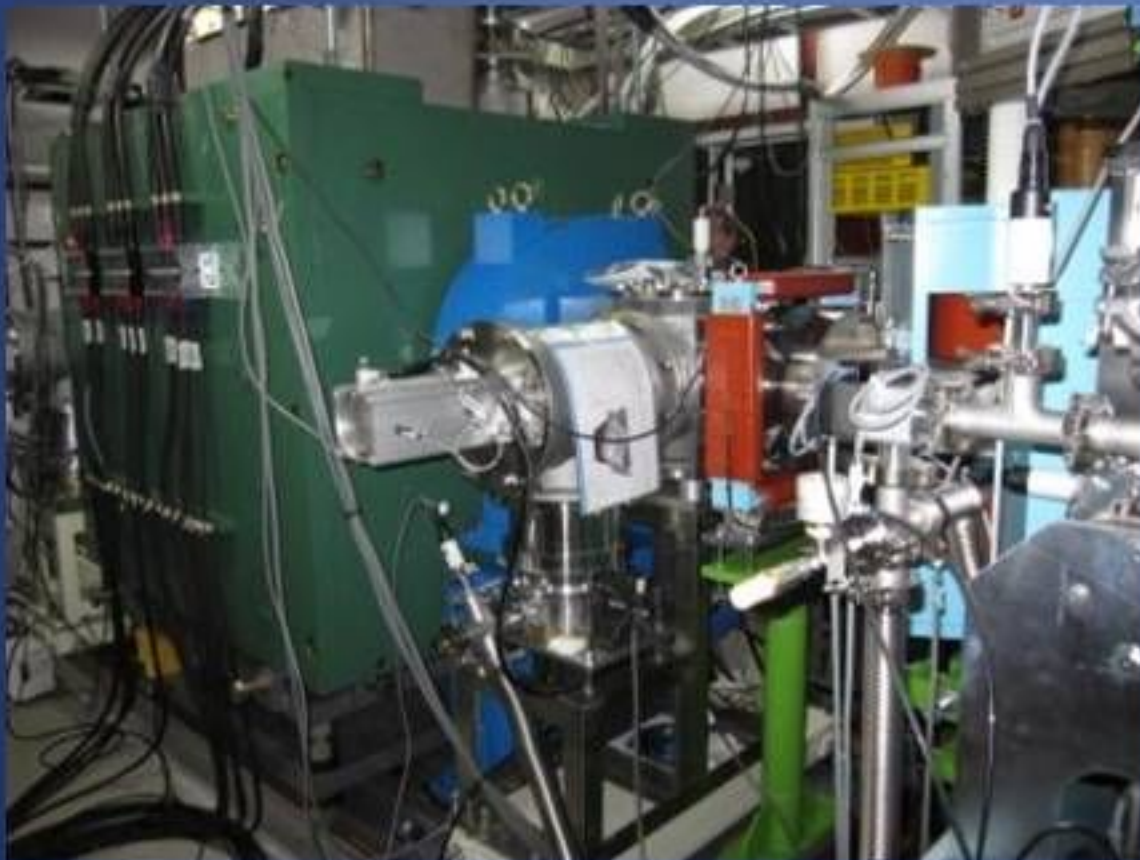
Applications in KEKB & J-PARC

- Data acquisition
 - S. Motohashi, *et. al.*,
WEP070



Applications in RIBF

- Ion source control
 - M. Komiyama, *et. al.*, TUP084



Operational Experiences

- How many F3RP61-based IOCs are in operation?
 - I don't know, since it's rapidly expanding
- How long have they been used?
 - More than a year
 - No serious problem observed
 - Quite stable
- How about real-time performance?
 - Satisfactory enough, so far
 - Kernel 2.6 with preemption feature enabled
 - Feasibility study for further improvement is under progress

Discussions

- Do we still need ordinary PLC's CPUs?
 - Yes, because we need to ask companies to program embedded controllers of their products, such as power supplies
- Is it true?
 - Can't we ask them to use EPICS for the controllers?
 - F3RP61 makes EPICS more "company friendly"
- How about interlock systems?
 - Can we use F3RP61-based IOC to interlock devices?

Conclusions

- A new type of IOC was developed based on F3RP61
- EPICS on F3RP61 has adopted for power supply control, stepping motor control, data acquisition and so forth
- Operational experience has proved the stability of EPICS on F3RP61
- Development and maintenance of application software has become significantly quicker and easier
- F3RP61 made EPICS more accessible to companies