EtherIP Driver/Device Support
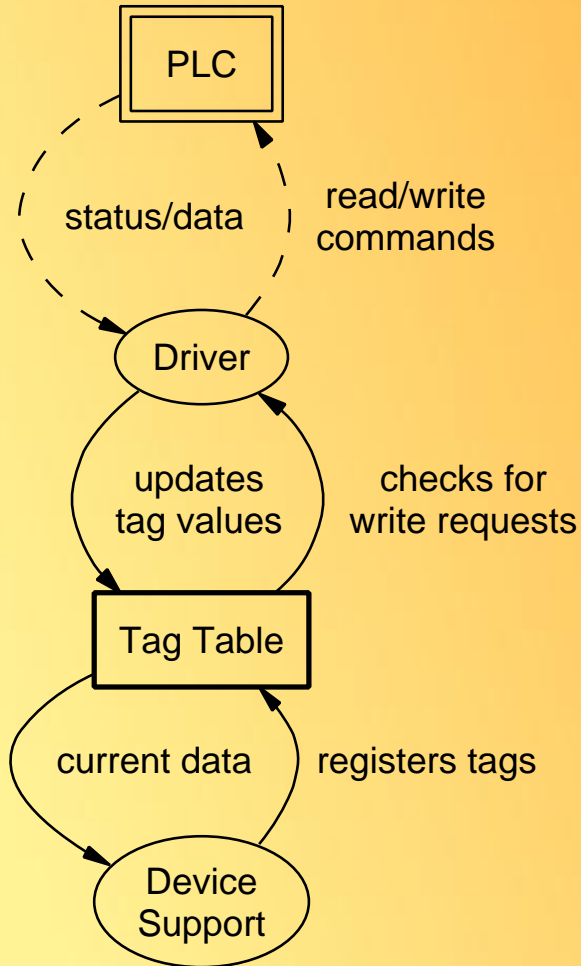
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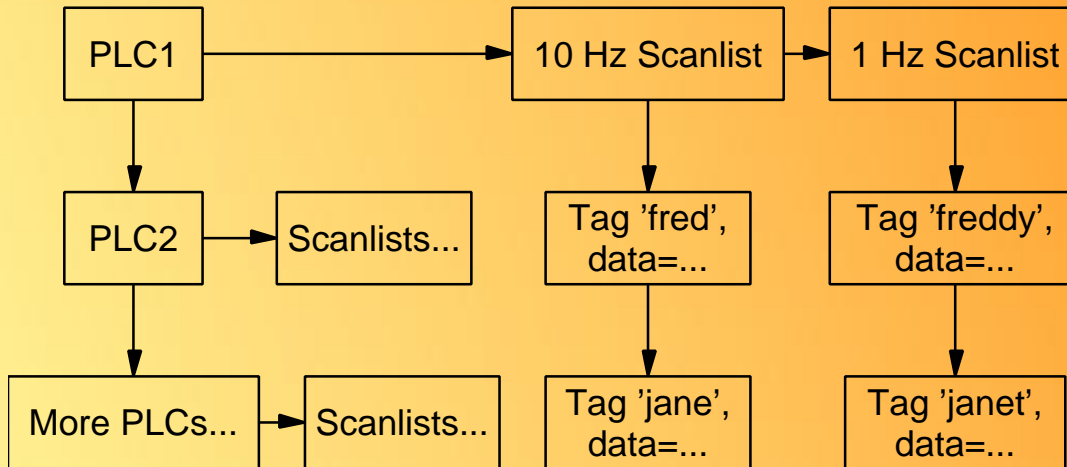
1. EtherIP Driver/Device Support

- Interfaces EPICS IOCs with Allen/Bradley ControlLogix 5000 PLCs

- TCP-based Protocol: ControlNet-over-Ethernet, aka EtherNet/IP (IP="Industrial Protocol") or CIP (Control and Information Protocol)

- Uses CIP extensions specific to ControlLogix 5000

- Runs on vxWorks, RTEMS, Linux, Solaris, Win32 (thanks to Stephanie Allison, SLAC)

2. Driver/Device Interaction

- One driver thread per PLC
- Driver reads unless a tag is marked for 'write', which temporarily switches next cycle to write
- Device Support for AI/AO, BI/BO, MBBx, MBBxDirect, String, Waveform records

3. Tag Table Detail

```
┌──────────┐                          ┌──────────────┐    ┌──────────────┐
│  PLC1    │─────────────────────────▶│ 10 Hz Scanlist│───▶│ 1 Hz Scanlist│
└──────────┘                          └──────────────┘    └──────────────┘
     │                                       │                    │
     ▼                                       ▼                    ▼
┌──────────┐   ┌──────────────┐       ┌──────────────┐    ┌──────────────┐
│  PLC2    │──▶│ Scanlists... │       │ Tag 'fred',  │    │ Tag 'freddy',│
└──────────┘   └──────────────┘       │ data=...     │    │ data=...     │
     │                                 └──────────────┘    └──────────────┘
     ▼                                       │                    │
┌──────────────┐   ┌──────────────┐   ┌──────────────┐    ┌──────────────┐
│ More PLCs... │──▶│ Scanlists... │   │ Tag 'jane',  │    │ Tag 'janet', │
└──────────────┘   └──────────────┘   │ data=...     │    │ data=...     │
                                       └──────────────┘    └──────────────┘
```

- Driver task continually updates tags, their status, per-scanlist and per-PLC last & total scan times

- Quite some code for combining as many reqeuests as possible into one xfer

- Tags can be marked for 'write'

- Device callbacks for 'new value' (SCAN=IO Intr, update ouput recs)

4. Usage 101

- drvEtherIP_define_PLC("PLC-ID", "IP", slot-#)
- drvEtherIP_initialize
- DTYP="EtherIP", INP/OUT="PLC-ID tag_x"
- drvEtherIP_help
- drvEtherIP_report (also via dbior)

5. Specialties

- Runtime strcmp & reparsing of INP/OUT

- Analog record's VAL is used for floating-point tags, otherwise RVAL

- Output records' tags are scanned, causing update & process on change (device support hacks into VAL/RVAL and ten causes the SCAN=Passive records to be processed)

- Special AI records for reading driver statistics (quite crummy to configure)