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Scope

- Basic awareness of key ideas
- For more, search EPICS documentation, e.g. 2015 APS EPICS Training, https://epics.anl.gov/docs/APS2015.php

 2015-01-26 Introduction to Asyn Mark Rivers, GeoSoilEnviroCARS
 2015-01-26 asynPortDriver C++ Class Mark Rivers, GeoSoilEnviroCARS
 2015-01-26 AsynPortDriver Tutorial Mark Rivers, GeoSoilEnviroCARS
 2015-01-27 AsynPortDriver Tutorial Code
 2015-01-27 AsynPortDriver: Lab Handout Mark Rivers, GeoSoilEnviroCARS



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Motivation for asyn



"Dispatcher" is often required between plain "read()/write()" in driver and record-specific device support

- "Dispatchers" ended up being similar but incompatible
- Much effort duplicated but different sets of features

asyn: Helper for writing device support

Writing robust, non-blocking device support is hard.

- For string-based protocol, use 'stream' device
- Otherwise, consider using 'asyn'





Vocabulary: Port

- Communication path ("bus") with unique name.
- One or many devices can be connected.
- May have addresses to identify individual devices.
- May be blocking or non-blocking.
- Is configured in IOC "st.cmd" startup script

drvAsynSerialPortConfigure "COM2", "/dev/sttyS1"
drvAsynIPPortConfigure "fooServer", "192.168.0.10:40000"
vxi11Configure "LanGpib1", "192.168.0.1", 1, 1000, "hpib"
myDeviceDriverConfigure "portname", parameters



Example: Demo "Port Driver"

examples/18_asynDemoApp/src: asynDemo.cpp

'Port' driver that creates a sawtooth-type ramp

- 'RANGE' to define upper limit
- 'VALUE' for the value
- Thread that keeps updating the value



Example: Asyn Database & IOC

examples/18_asynDemoApp/Db/asynDemo.db

Records that use 'DTYP: asyn*' to read/write port parameters

examples/iocBoot/ioc_asynDemo

st.cmd to start IOC Check 'asynReport 10'



Example: Display

examples/18_asynDemoApp/opi/main.bob

Change range



"Debug" via asynRecord Set all trace flags, Redirect to trace file

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Exercise: Add "DELAY" parameter

- 1. In asynDemo.cpp, add a new parameter. Use it to control the epicsThreadSleep(...)
- 2. Add new record to asynDemo.db
- 3. (Re-)start asynDemo IOC
- 4. Add new record to screen
- 5. Check different values, including smaller than 0.1 seconds



Vocabulary: Interface

- API for a class of ports.
 - common, message based, register based, ...
- Defines table of driver functions ("methods")
- Does not implement driver methods.
- Every port has one or many interfaces.
- Clients talk to interfaces, not to drivers.
 pasynCommon->connect()
 pasynOctet->write()



Vocabulary: Driver

- Software to handle one type of ports.
- Implements one or many interfaces.
 - Provides method tables for interfaces.
 - Has internal knowledge about specific port hardware.
- Does not handle any specific device type!
- Examples:
 - serial bus, VXI-11, Green Springs IP488, ...
- Configure function in startup script connects driver to port.



Vocabulary: asynUser

- Identifies the client.
- Each client needs one asynUser.
- From asynDriver's point of view, asynUser is the client.
- "Handle" to ports and everything else inside asynDriver.



Vocabulary: asynManager

- Core of asynDriver.
- Creates threads for blocking ports.
- Registers and finds ports and interfaces.
- Schedules access to ports.
- There is exactly one global instance: pasynManager
- Clients ask asynManager for services

pasynManager->connectDevice(pasynUser, "portname", address)
pasynManager->findInterface(pasynUser, interfaceType, ...)
pasynManager->queueRequest(pasynUser, priority, timeout)

• Drivers inform asynManager about any important things.

Control Flow: 'Synchronous' for fast devices

All code runs in application thread



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Control Flow: 'Asynchronous' for slow devices



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There is much more

- Trace options to debug processing
- Support for serial ports, TCP, UDP, GPIB, Vxi11 (GPIB over Ethernet), USB Test-and-Measurement





- Many EPICS device support modules now use asyn
 - Motors, area detector, stream
- To interface new devices, consider asyn

