



ASKAP EPICS development

EPICS Collaboration Meeting Spring 2013

Malte Marquarding | CASS Computing

3rd May 2013

ASTRONOMY AND SPACE SCIENCE

www.csiro.au



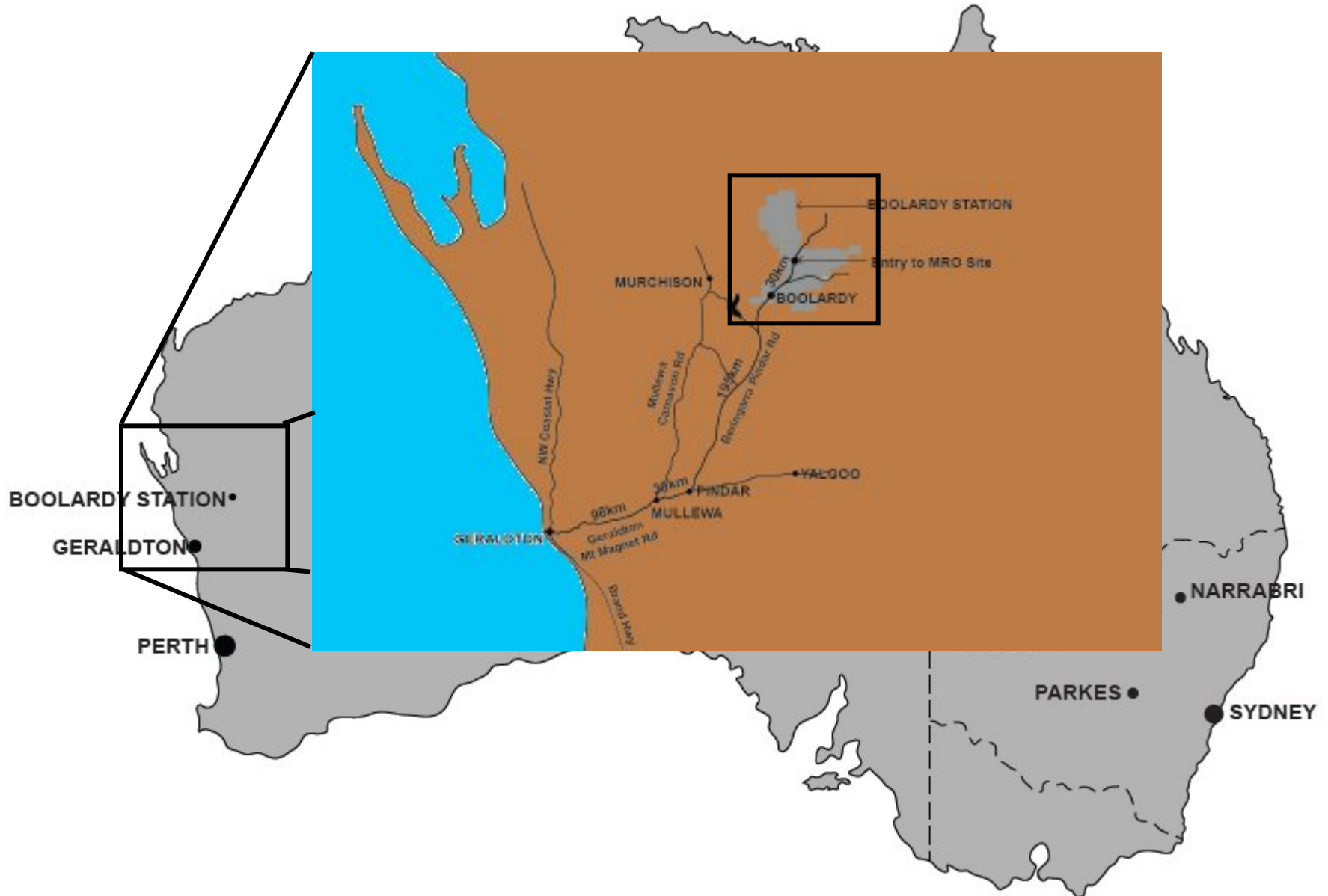
A satellite-style map of Australia showing the continent's terrain and coastline. A white line with a blue circular endpoint points from a text box in the upper right to a specific location in the central-western part of the continent. The text box contains the name of the Murchison Radio-Astronomy Observatory (MRO) and its coordinates.

**Murchison Radio-Astronomy
Observatory (MRO)**

S26° 42' 15", E116° 39' 32"

**The Wajarri Yamatji people are the
traditional owners of the land**

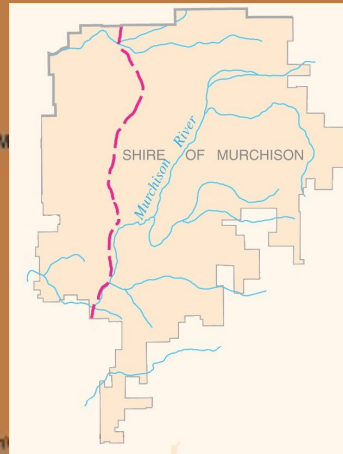
Murchison Radio Observatory



Murchison Radio Observatory

Cities and towns 0

Residents: ≤ 140



Residents:

>16 Million

BOOLARDY STATION •

GERALDTON •

PERTH •

GERALDTON

96km
Geraldton
M. Magnet Rd

NARRABRI •

PARKES •

SYDNEY •

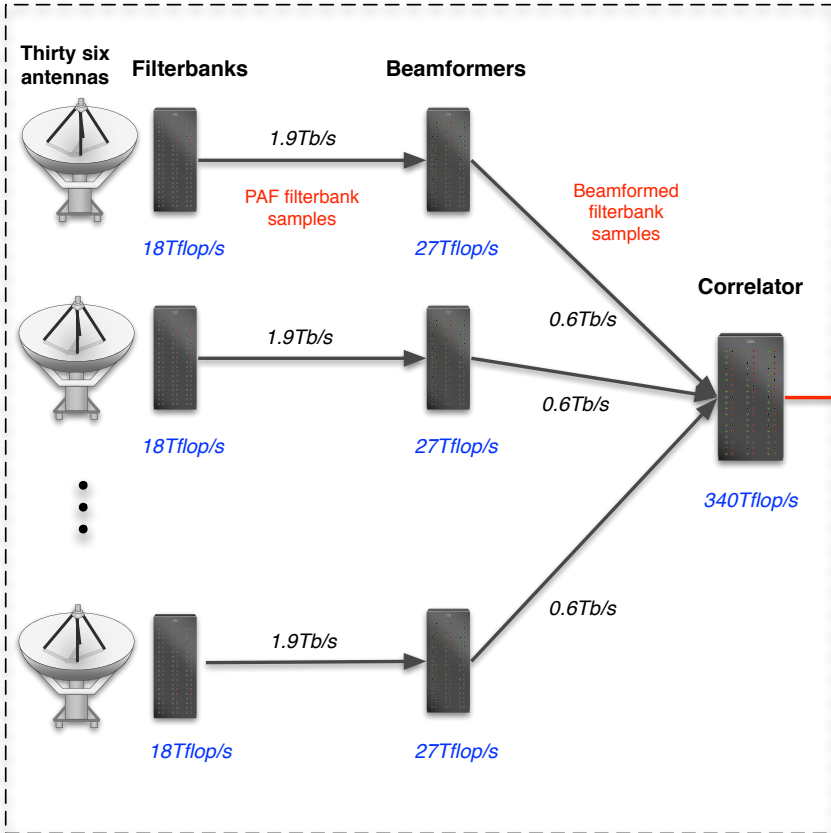
Australian SKA Pathfinder (ASKAP)

- Sited at the Murchison Radio Observatory, Western Australia
- Observes between 0.7 and 1.8 GHz
- 36 antennas, 12m diameter
- Phased array feed (PAF) detectors
- Started construction July 2006
- Official opening October 2012
- 3 antenna commissioning system
 - ASKAP/BETA
 - Parkes – PAF testing
 - MATES – Test lab

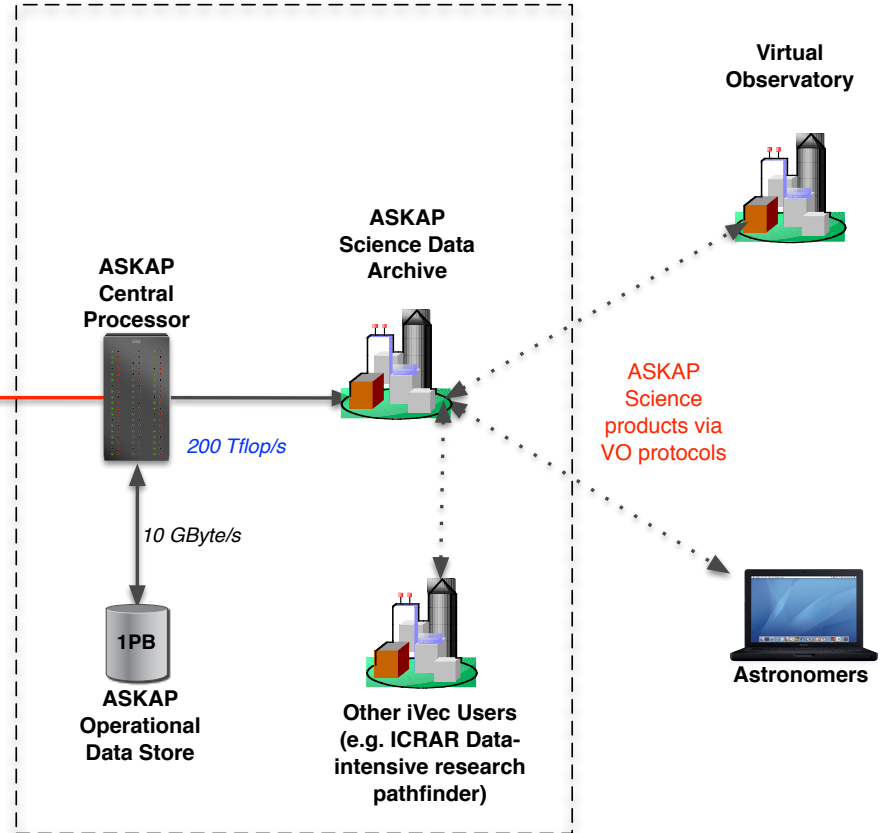


ASKAP Data Flow

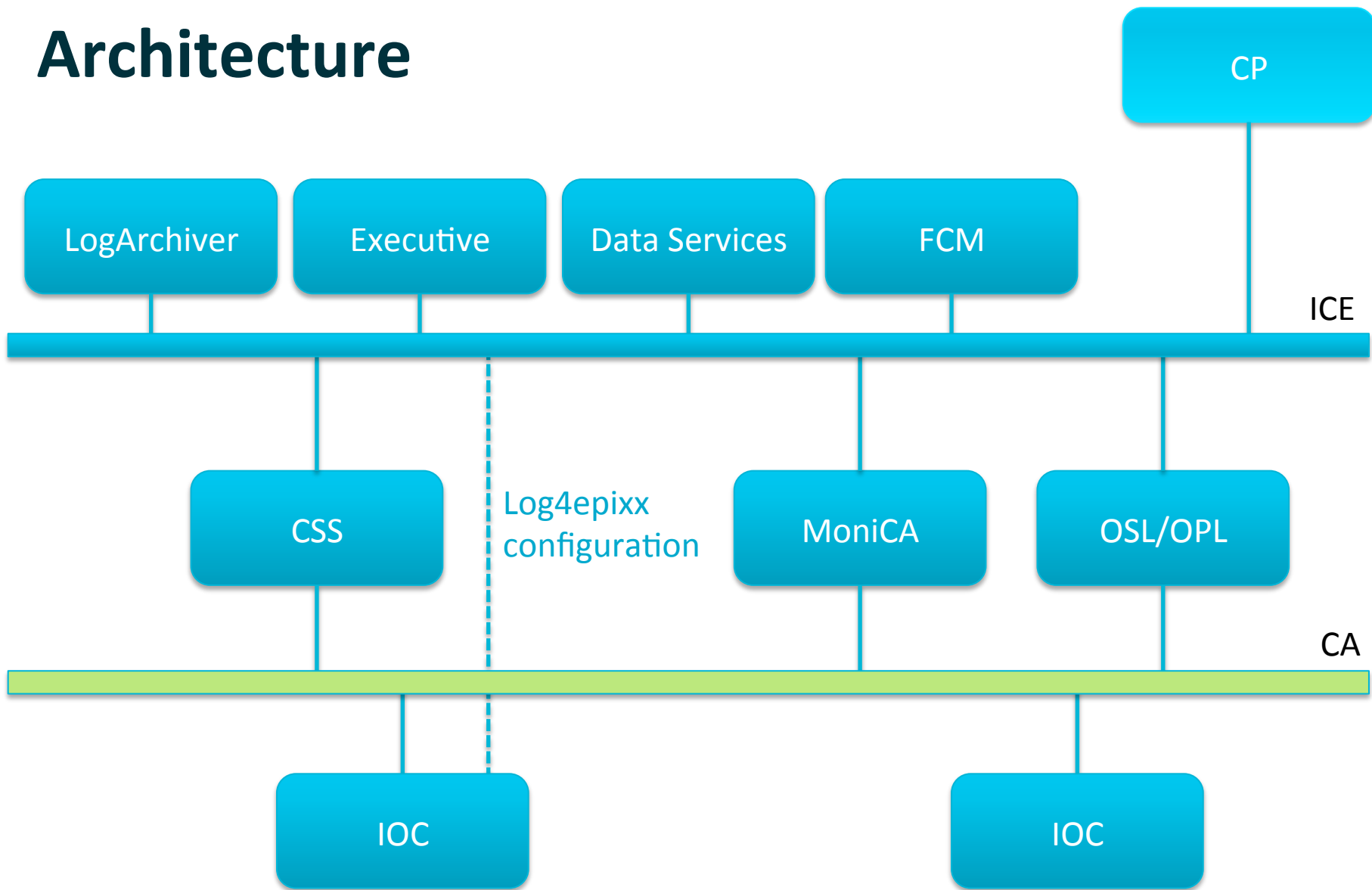
Murchison Radio-astronomy Observatory



Pawsey High Performance Computing Centre for SKA Science

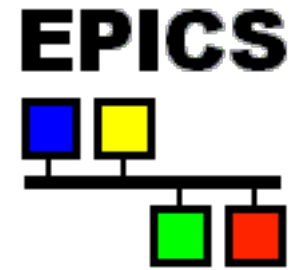


Architecture



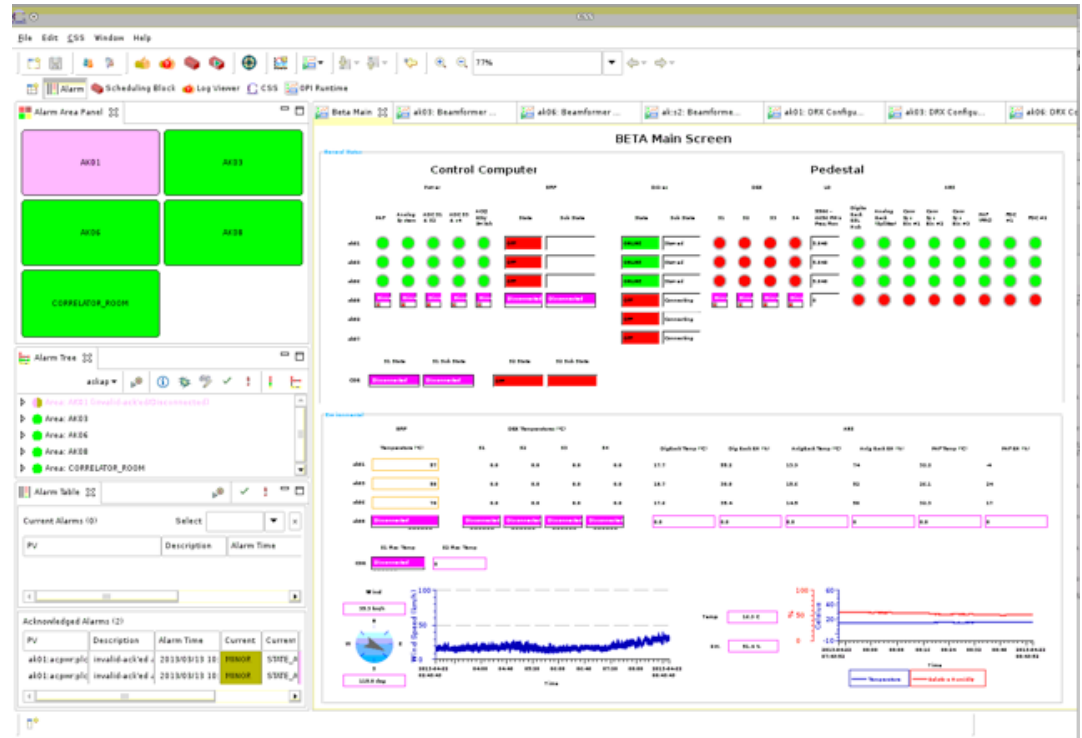
EPICS (3.14.12)

- Development started about 2.5 years ago
- Soft IOCs only, e.g.
 - Drives, digital receiver, analogue systems, bemaformer
 - weather, power, correlatorusing
 - asyn, busy, iocadmin, modbus, sncseq, stream, waveproc
- For current system (3 x Antennas with PAFs):
 - ~ 15 Soft IOCs = 5 IOCs per antenna
 - ~ 30,000 Pvs
- For ASKAP will be around 150 soft IOCs with approx. 500,000 Pvs.



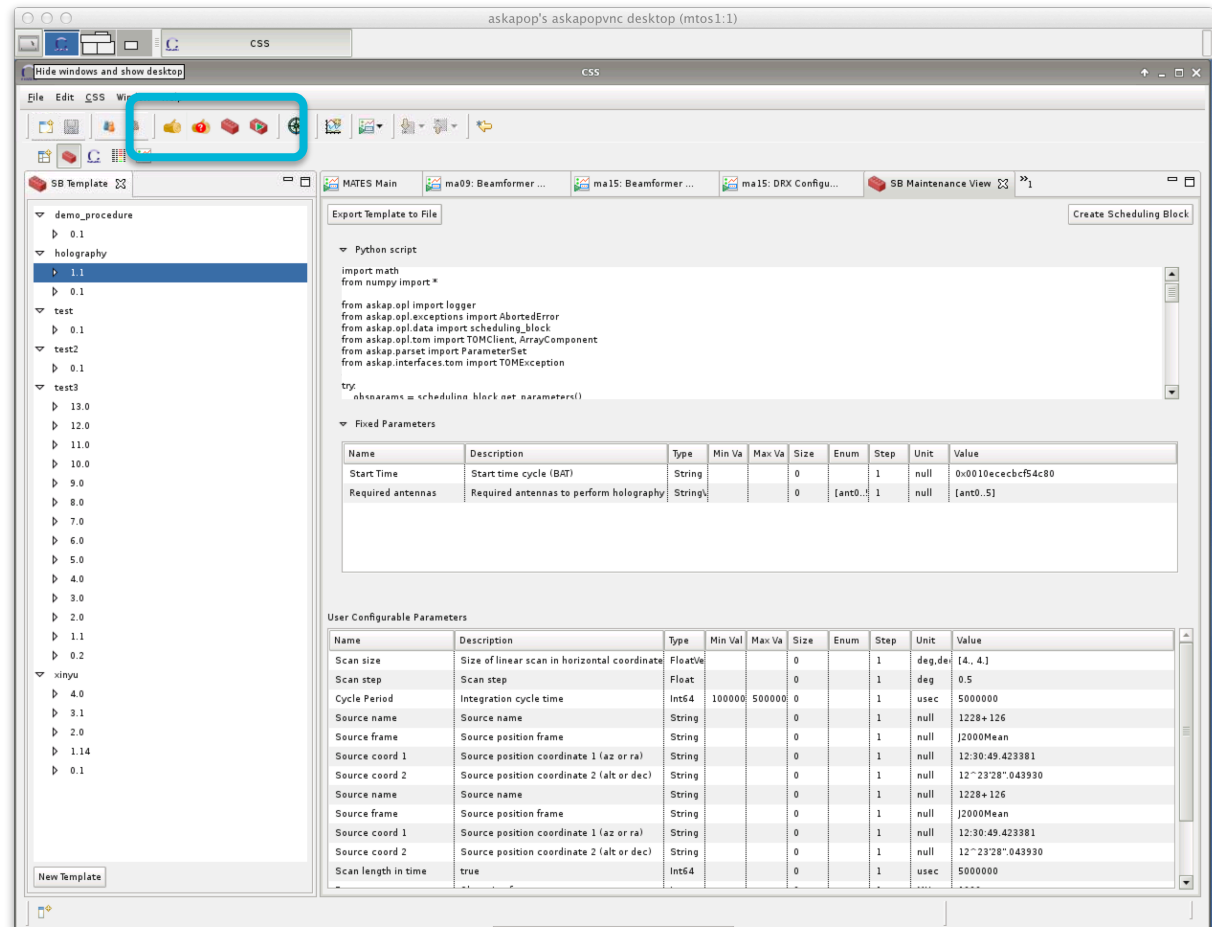
CSS

- Boy
 - ~ 150 screens/widgets
- BEAST
 - Configuration by commissioning/operations team
- own product
- Three configurations
 - BETA (ASKAP subset)
 - PTF (Parkes Test Facility)
 - MATES (test lab)



Extensions – CSS

- Ice access
- Displays in SWT



Extensions – log4epicxx

- Support module to use log4cxx for IOC logging
- On-the-fly logger configuration
- separates IOC application logging from core EPICS logging
- good performance
- Log4j config
 - CSS logger connection

The screenshot shows the OPI Editor interface. The top window is titled "logtest:logging: Logging Config" and displays a configuration table for various loggers. The bottom window is titled "Log4j-Viewer" and shows a log output table.

Logger	Level	Level Value
root	DEBUG	6
epics.log4epicxx.init		0
epics.log4epicxx.subroutines		0
mysite.logTest.asubs		0

Level	Date	Category	Line	NDC	Message
	2013-05-02 20:08:33.077	epics.log4epicxx.init	104		logging configured with /home/user/src/epics/iocs/logtest/iocBoot/ioclogTest/ioc_log_cfg
	2013-05-02 20:08:33.108	mysite.logTest.asubs	30		Record logtest:aSubExample called myASubInit(0x890cce8)
	2013-05-02 20:08:33.108	mysite.logTest.asubs	16		Record logtest:SubExample called mySubInit(0x88c20b0)
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	70	rec.logtest:lo	getting loggers, 4 loggers available
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	91	rec.logtest:lo	logger 0: root, level DEBUG (6)
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	91	rec.logtest:lo	logger 1: epics.log4epicxx.init, level (0)
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	91	rec.logtest:lo	logger 2: epics.log4epicxx.subroutines, level (0)
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	91	rec.logtest:lo	logger 3: mysite.logTest.asubs, level (0)
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	106	rec.logtest:lo	setting log levels...
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	126	rec.logtest:lo	setting logger epics.log4epicxx.init to level undefined
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	126	rec.logtest:lo	setting logger epics.log4epicxx.subroutines to level undefined
	2013-05-02 20:08:33.61	epics.log4epicxx.subrou	126	rec.logtest:lo	setting logger mysite.logTest.asubs to level undefined
	2013-05-02 20:08:33.611	mysite.logTest.asubs	38		Record logtest:aSubExample called myASubProcess(0x890cce8)
	2013-05-02 20:08:33.611	mysite.logTest.asubs	39		val = 0.0
	2013-05-02 20:08:34.11	mysite.logTest.asubs	38		Record logtest:aSubExample called myASubProcess(0x890cce8)
	2013-05-02 20:08:34.11	mysite.logTest.asubs	39		val = 1.0
	2013-05-02 20:08:35.11	mysite.logTest.asubs	38		Record logtest:aSubExample called myASubProcess(0x890cce8)

```
log4j.appender.CSS=org.apache.log4j.net.SocketAppender
log4j.appender.CSS.remoteHost=localhost
log4j.appender.CSS.port=4445
log4j.appender.CSS.locationInfo=true
```

Extensions – log4epicxx

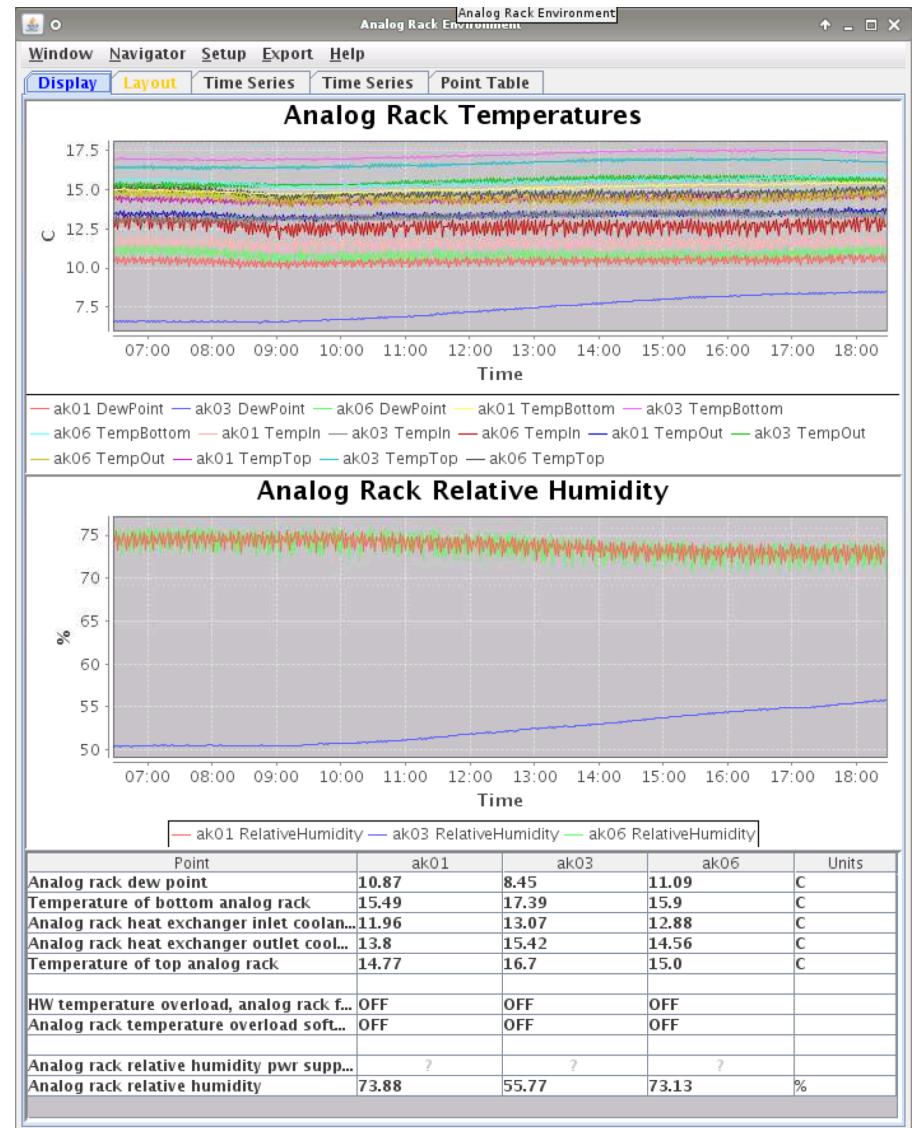
- How to
 - Install log4cxx
 - set L4CPP in configure/RELEASE to point to you log4cxx installation
 - make
 - add module to your IOCs Makefile
 - add the log4epicxx EPICS records to your DB Makefile's DB_INSTALLS
 - add epicxx_log_init() call and env variables to your *st.cmd* file
 - Add CREATE_LOGGER definitions to the source files
 - use LOG_<LEVEL> macros for logging
- In asyn replace asynPrintf or errlogPrintf
- Py-epics control script

Fork me:

<https://github.com/ATNF/log4epicxx>

Extensions – MoniCA

- Archiver used at other ATNF telescopes
- CA aware
- Archive PVs
- Policy per PV configuration
- CSS extension to query MoniCA
 - org.csstudio.archive.reader
 - DataBrowser



Extensions – sphinx

- Sphinx directive
- pv autodoc
- Use comments in db
- Cross referencing

Drives ASKAP Records

drivesAskapGeneral.template

\$(prefix)\$(antid)drives:log:setRootLoggerLevel

- Configuration record
- This record is used to set the log level for root logger. If value is 0, then use the level from config file. For example when IOC is Online and not stowed then automatically set the root logger in DEBUG
- Values are 'unset' = 0, off = 1, fatal = 2, error = 3, warn = 4, info = 5, debug = 6, trace = 7

```
record(longin, "$(prefix)$(antid)drives:log:setRootLoggerLevel" ) {  
  field(PINI, "YES")  
  field(VAL, "0")  
  field(FLNK, "$(prefix)$(antid)drives:log:subSetRootLoggerLevel")  
}
```

\$(prefix)\$(antid)drives:log:subSetRootLoggerLevel

```
record(aSub, "$(prefix)$(antid)drives:log:subSetRootLoggerLevel" ) {  
  field(DESC, "aSub to set root logger level")  
  field(SNAM, "logging_set_root_level")  
  field(INPA, "$(prefix)$(antid)drives:log:setRootLoggerLevel NPP")  
  field(FTA, "ULONG")  
  field(NOA, "1")  
  field(FLNK, "$(prefix)$(antid)drives:log:update")  
}
```

\$(prefix)\$(antid)drives:cmd:drvcommand

```
record(waveform, "$(prefix)$(antid)drives:cmd:drvcommand" ) {  
  field(DESC, "Raw command string")  
  field(FLNK, "$(prefix)$(antid)drives:cmd:drvreply")  
  field(NELM, "512")  
  field(FTVL, "CHAR")  
}
```

Thank you

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Development

- Flexible design to cater for engineering commissioning and operations. Develop in OSL by domain experts then move to shared library.

