The Effelsberg 100m Control system (past, present, future)

ERATec, Florence, 2015, Heiko Hafok

(Past-) Control Systems

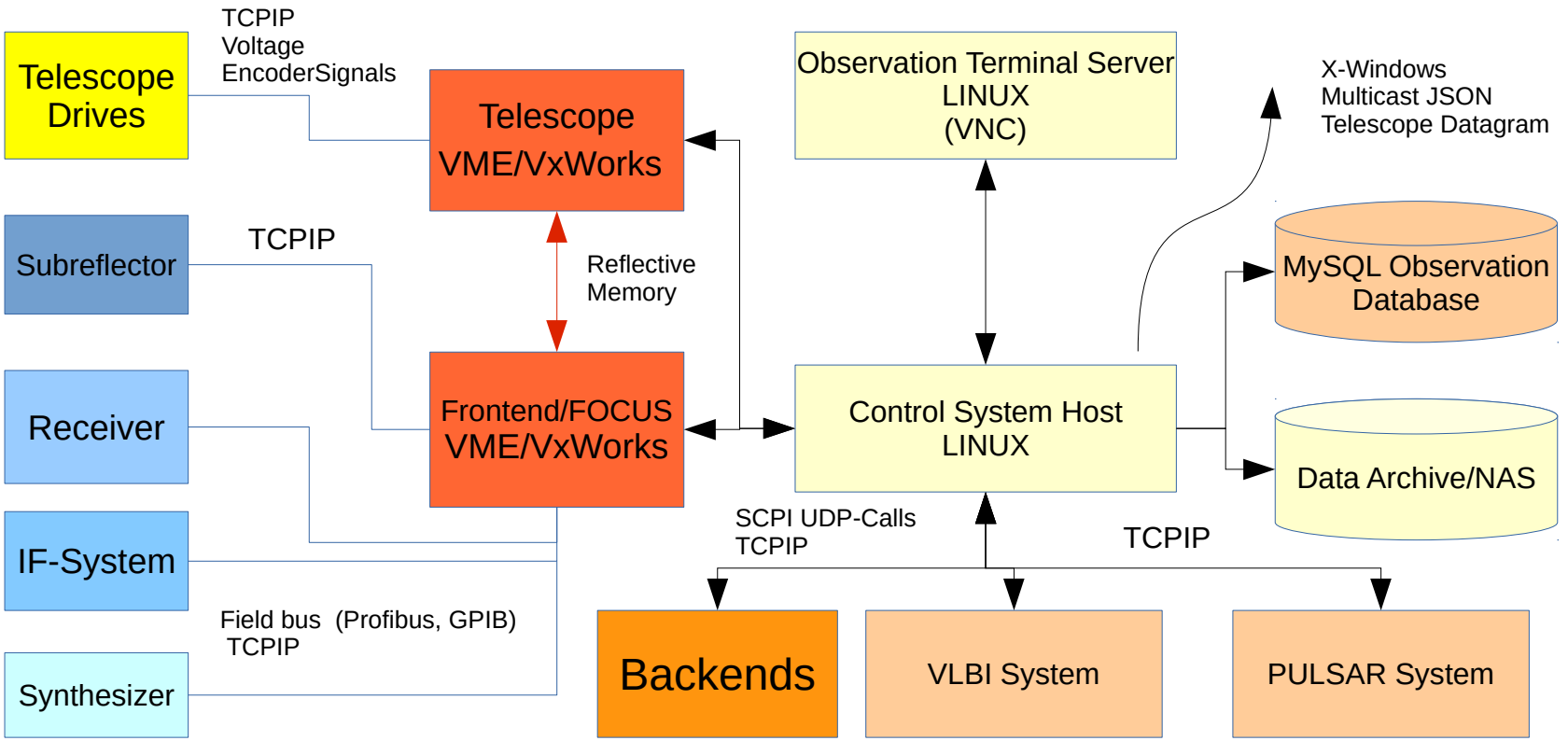
- Ferranti Argus500 Control Computing system (1968/71-1980/2, Stumpff, Schraml)
- Modcomp+CAMAC (1980-1983, Stramm,Neidhöfer)
- VAX+CAMAC (Telescope Control) (1985-2010) (Schraml,Neidhöfer, Jessner)
- VME/VxWorks(5.5)- Linux (2010-present) (Neidhöfer, Müller, Schraml)
- ?????? Linux - (VME/ VxWorks 6.9/RTEMS)

  (Hafok, Winkel, Müller)

Core Features of the Effelsberg System

- Control system must support legacy hardware at the telescope (receiver/IF-control, synthesizer etc., Profi Bus/GPIB)
- APEX SCPI udp command interfaces for backends (contiuuum and FFTS)
- Most standard Coordinate systems are implemented
- Interface for VLBI Field system and Pulsar observing system
- Easy to use GUI to operate telescope (fail-safe for (new) observers)
- Single Dish Raw Data Format for Multi-beam receivers (MBFITS, ->APEX)
- Effelsberg Data Pipeline for spectroscopic data Reduction
- Toolbox - NOD/NOD2 for continuum data reduction

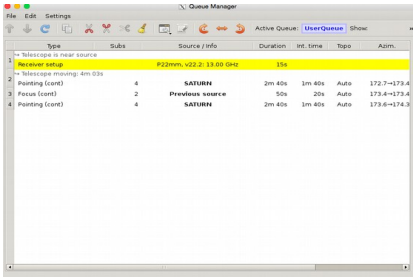
Overview of control system

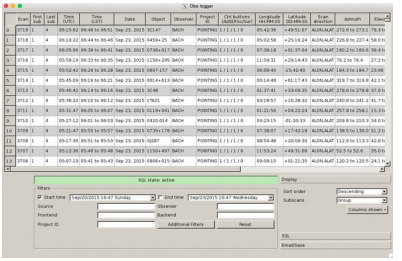


Ongoing/planned Upgrades

- Field Bus Systems are converted to TCPIP (finished Profi-BUS)
- proprietary (binary) communication protocols are converted to standard SCPI calls and JSON datastructures
- Binary UDP Broadcast, FITS-Files → JSON Multicast for telescope (meta-) data transport
- Non Realtime VME Tasks → LINUX
- VME VxWorks 5.5 port to ???? (VxWorks 6.9, RTEMS)

control system (zoomed in)





Telescope
VME/VxWorks
ObservationMaster

QueueManager

ObsInp
Observation Tool

ObsLog

Frontend/FOCUS
VME/VxWorks

Observing Engine
Control.py

Queue (Directory)

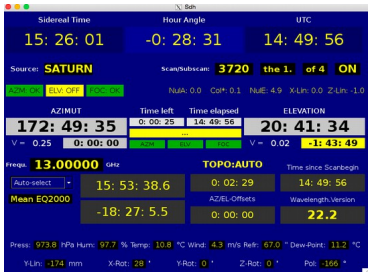
FitsWriter

Data Archive/NAS

MySQL Observation
Database

Instrument Control
Server

ObsLogger

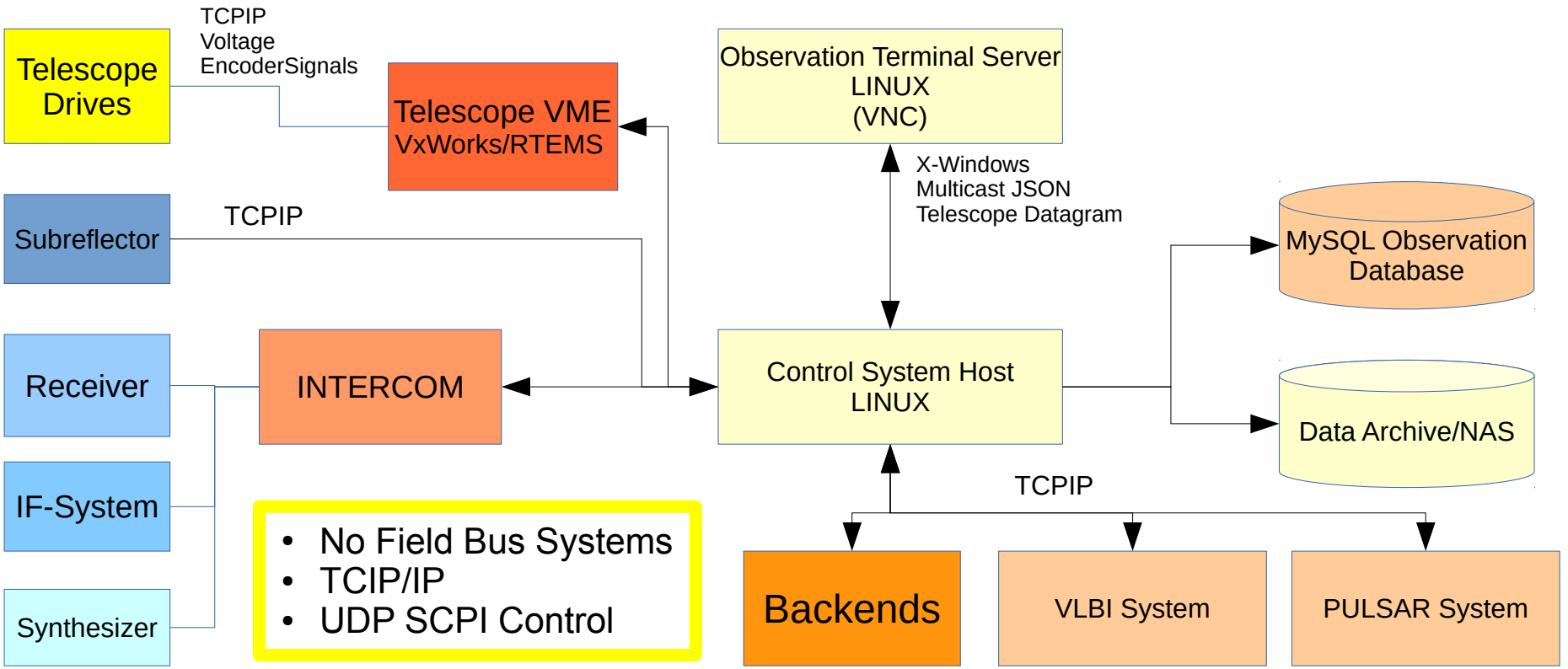


DataCapturer
Multicast+FITS

ObsGUIs

Multicast JSON
Telescope Datagram

Upgrade of the control system



The Future:

- LINUX based control system (debian 7.0/8.0)
- Mostly standard Linux Tools (in future lightweight CORBA middleware ?)
- Successor for FITS (talk-> R. Schaaf) ? (more performance for wide bandwidth receivers)
- RealTime OS for Telescope control loops based on open source RTOS (RTEMS?) .
- RTEMS (Real-Time Executive for Multiprocessor Systems) originates from US Army project for missile control is used currently in a wide field of comercial an scientific projects, (NASA , ESA satellite control, Accelerator Projects, part of EPICS, www.rtems.org)
- steep Learning curve (no final descision yet)