



ONLINE V2

AN UPGRADED CONTROL-MONITOR SOFTWARE FOR GMRT

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Background:

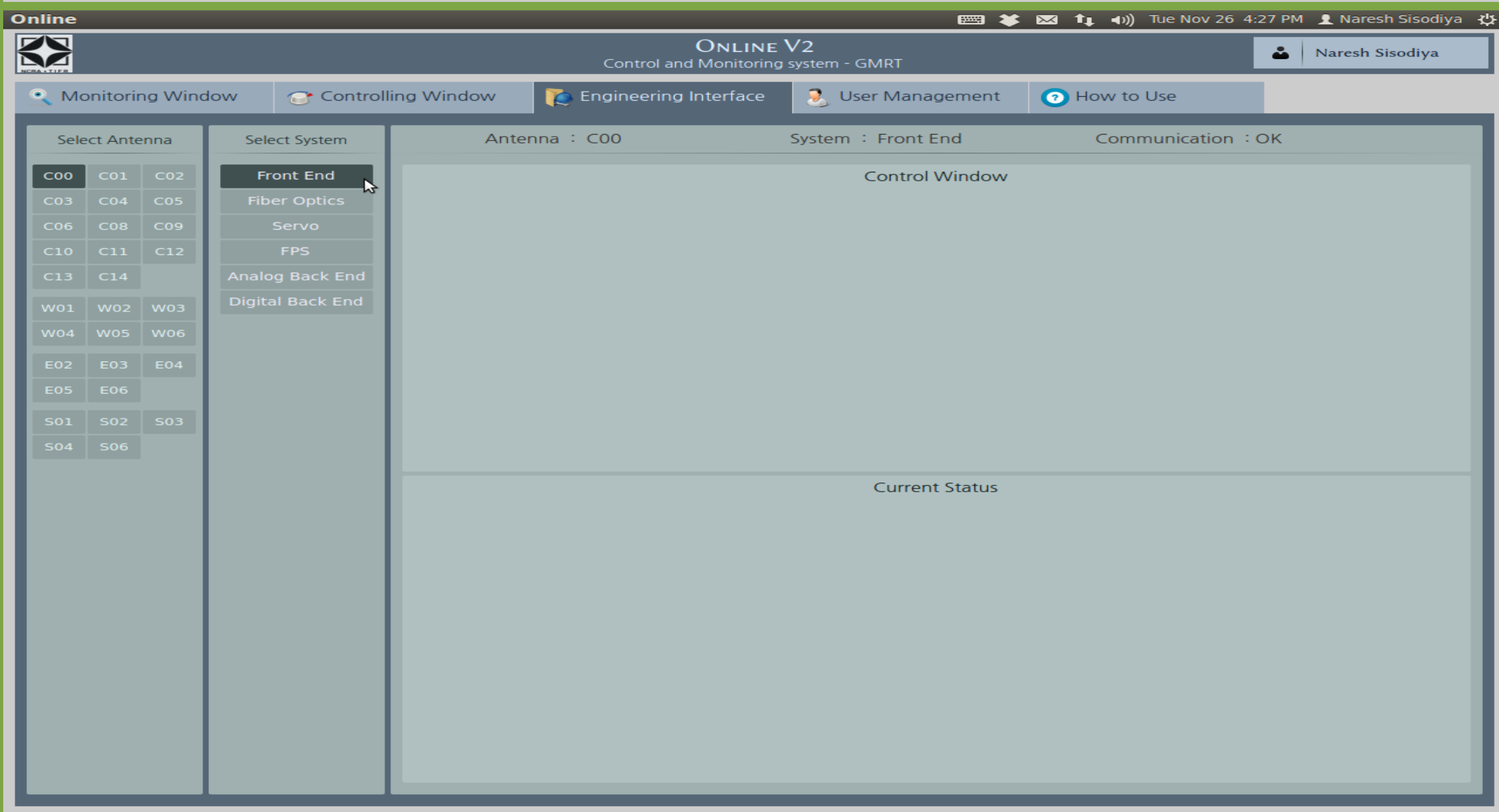
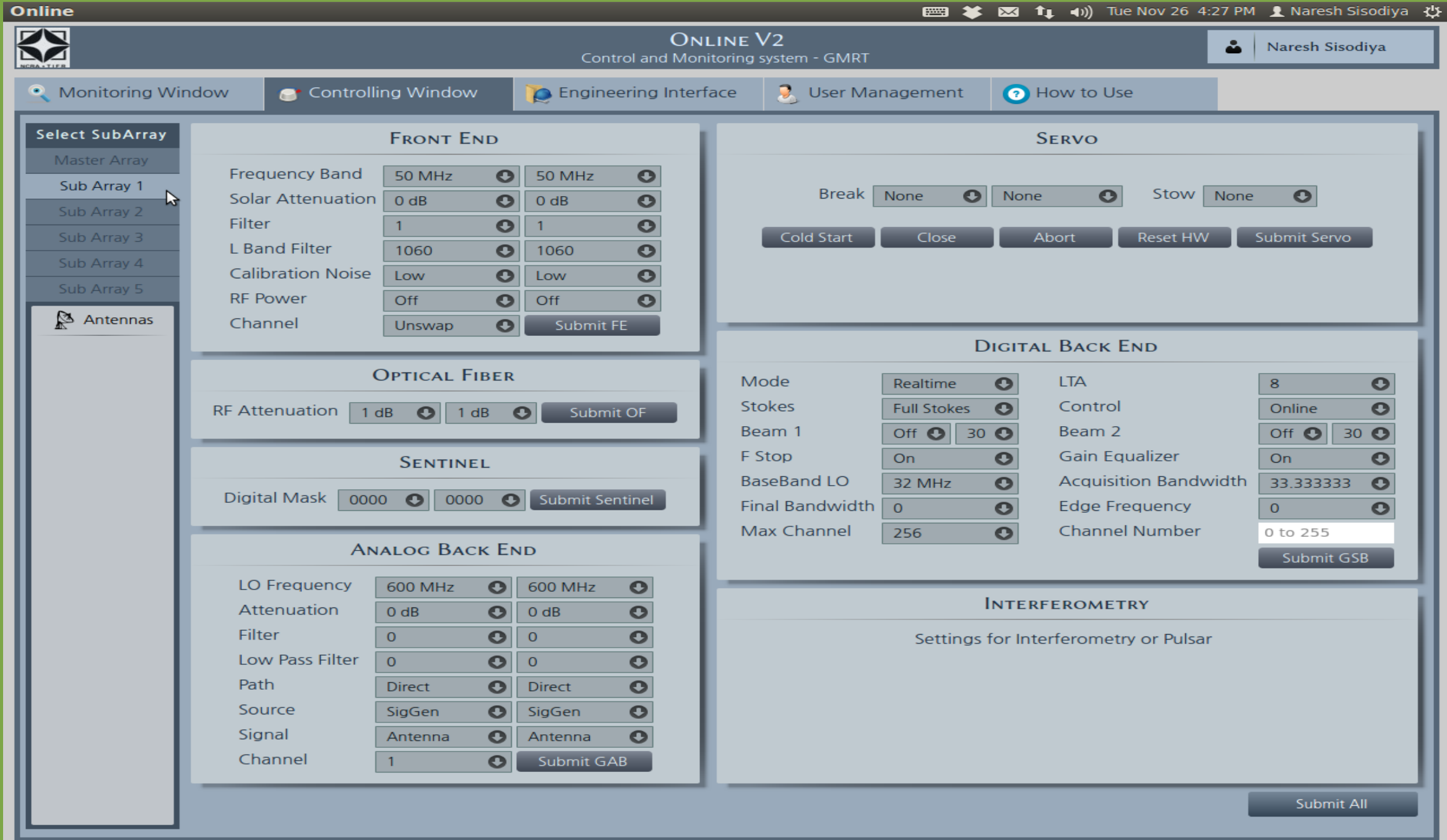
A control and monitor system (CMS) consisting of hardware and software components is responsible for controlling the antennas and the electronics associated with it in addition to monitoring the parameters and the system performance. The CMS at GMRT consisting of monitor and control modules (MCM), antenna base computer (ABC) and command handler (COMH) as the hardware and ONLINE as the software was developed by NCRA. This indigenously developed system has been successfully supporting GMRT observations since late 1990s.

An expanded system using present day technology and other features of the GMRT upgrade is desirable and the hardware work for this was started a few years ago with the development of a new MCM. An upgraded version of ONLINE is currently under development at NCRA and is referred to as OnlineV2. OnlineV2 is Linux based and aims at reducing the RFI footprint at the antenna base by not requiring a separate computer. Instead OnlineV2 focuses on exploiting the power of fast 1 Gbps Ethernet connection and in-built capabilities of the Rabbit processor on the MCM card. OnlineV2 uses and expands the control algorithms developed for ONLINE on a new framework.

The new features of OnlineV2 include :

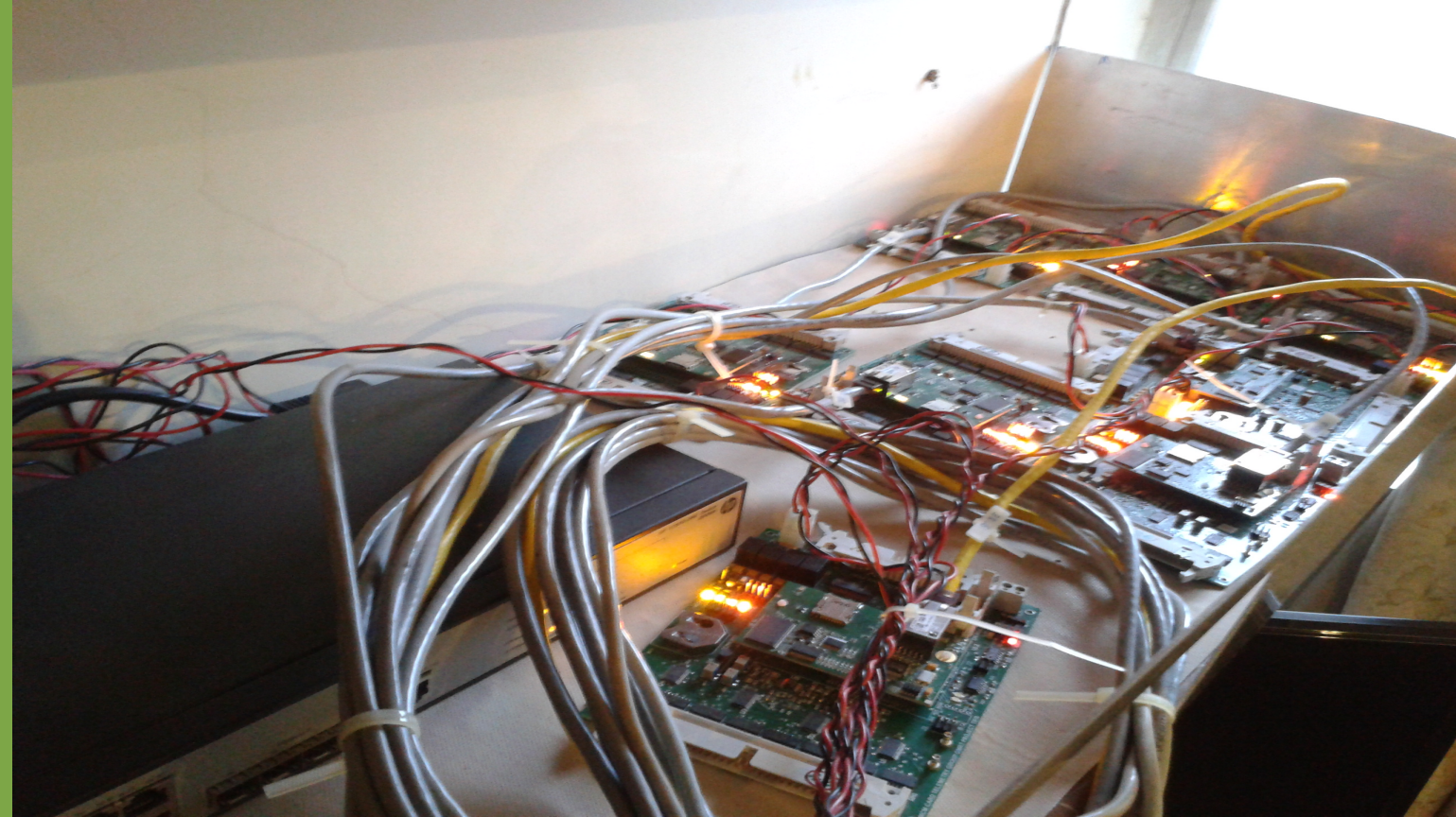
- (1) Enhanced functionality of control software
- (2) Extensive web-based control data monitoring tools allowing for real time and statistical studies
- (3) Full support for observing in absentia
- (4) Generalized framework to support future expansion
- (5) Customized graphical interfaces for operators, engineers and astronomers
- (6) Fast background monitoring of system parameters

QML BASED ONLINE V2 GUI



NEW MCM CARD

ONLINE V2 LAB TEST SET UP



Methods :

Insistence on using Open Software - LAMP

Software used: C, C++, Dynamic C, Perl, Python, PHP, HTML, Javascript, gnuplot

Database: MySQL

Libraries: XML, Readline, TCP/IP, HTTP

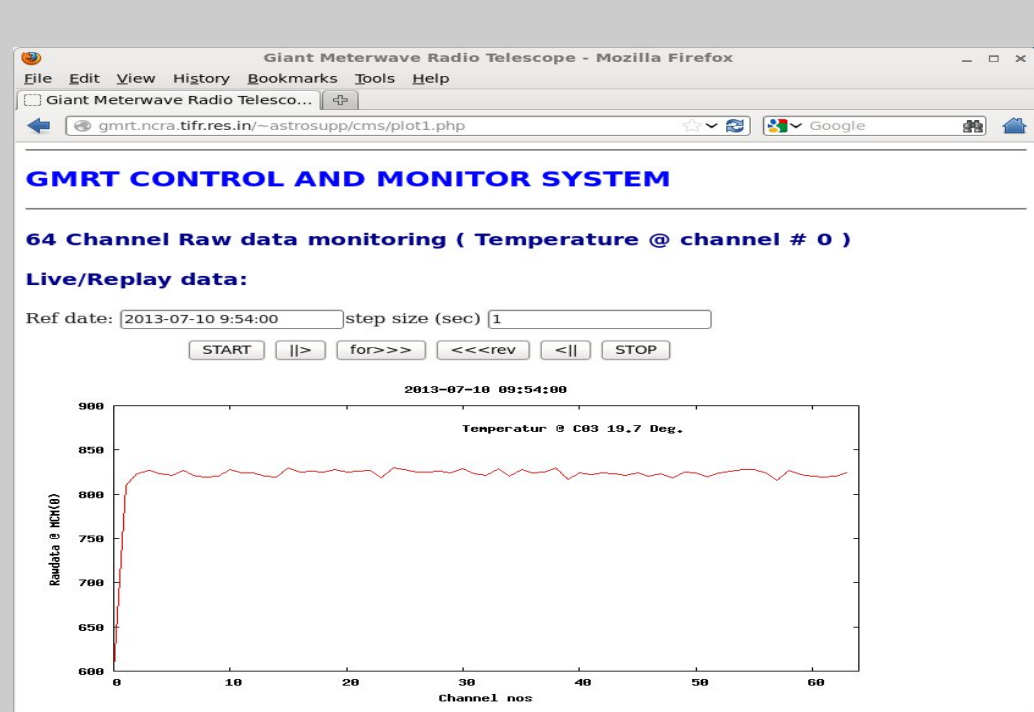
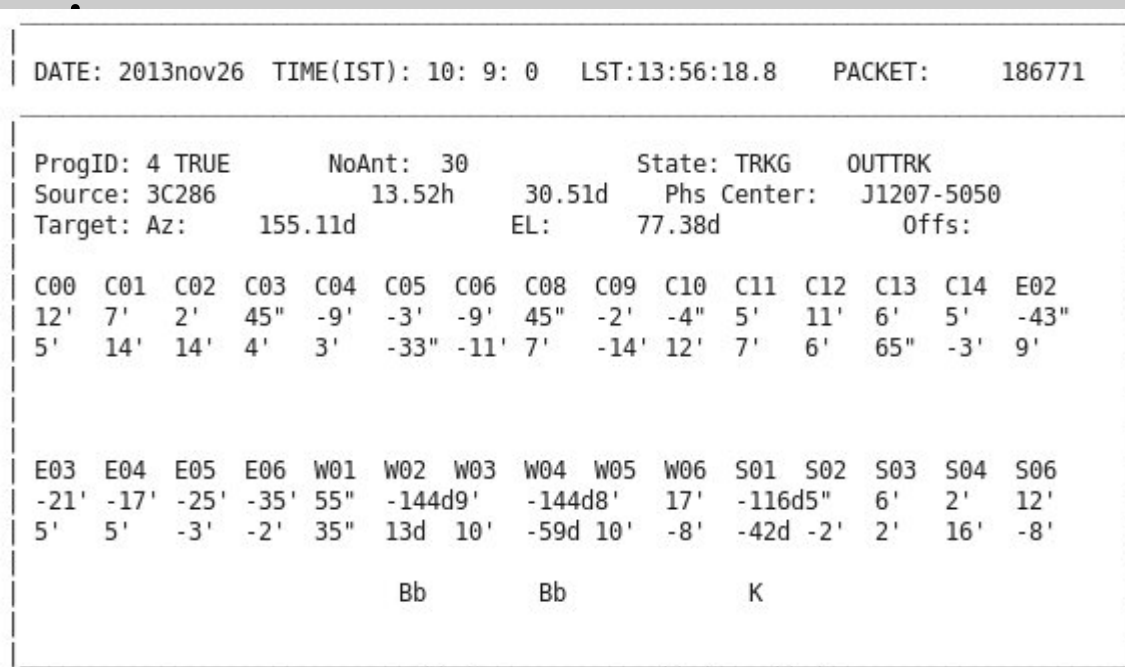
ONLINE V2 :

- Linux
- Absentee observing support
- C, C++
- Desktop GUI for Operator, Engineers
- MCM – Rabbit processor Based Card
- Control data monitoring :
 - Real time : From shared memory
 - Offline : From database
- Web-based interfaces for Astronomer
- Ethernet communication
- Environment – python
- No separate Antenna base computer
- reduction in internal RFI

ONLINE :

- Solaris
- No absentee observing support
- Fortran
- No GUI
- MCM – 8051 microcontroller
- Control data monitoring -
 - Real time – shared memory
 - Offline – log file
- No web-based components
- Serial communication
- Environment - AIPS
- Antenna based computer – 8087 microprocessor

Results :



Antenna Pointing Offsets data

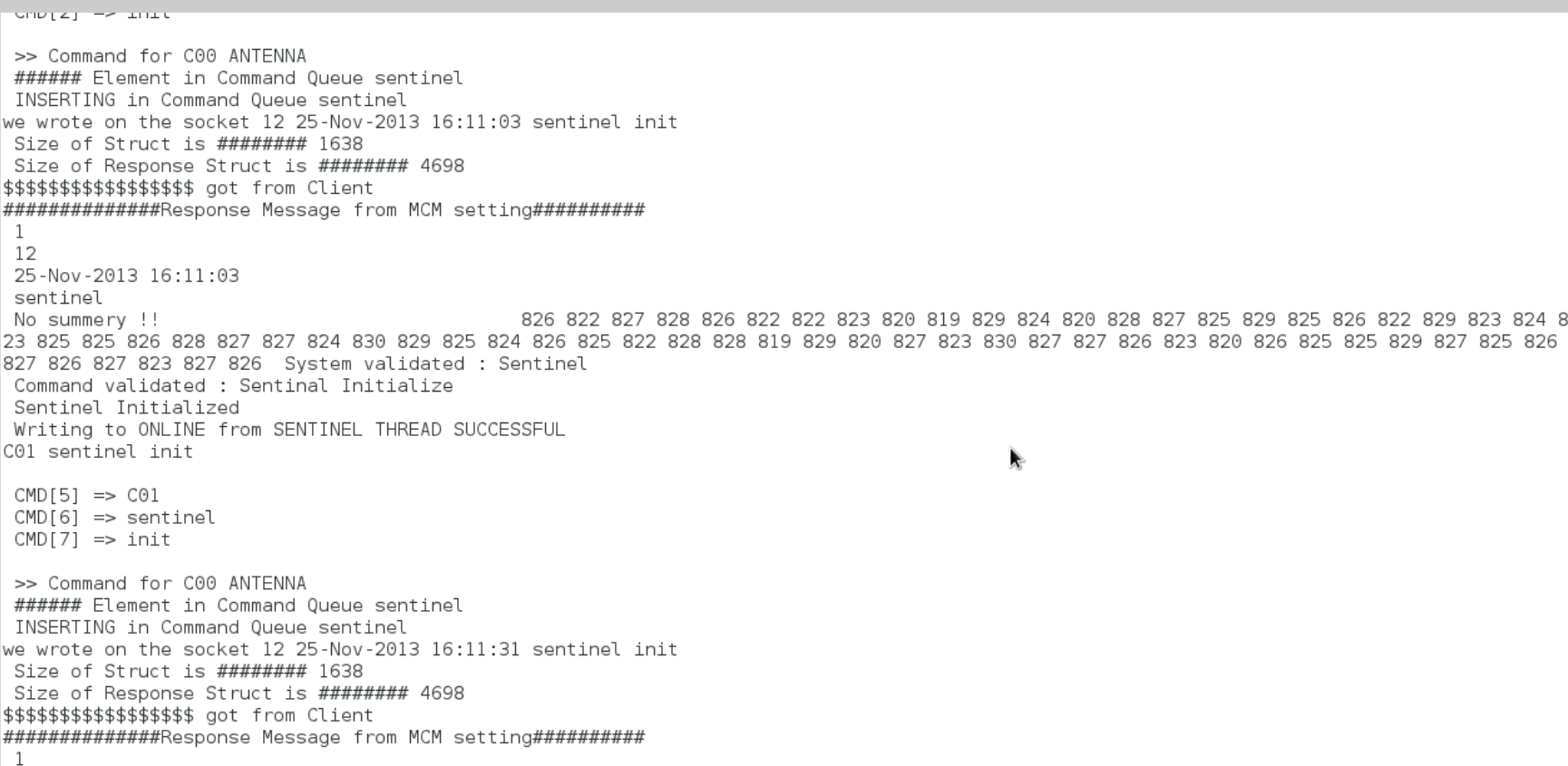
	325	610	1420
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Plots

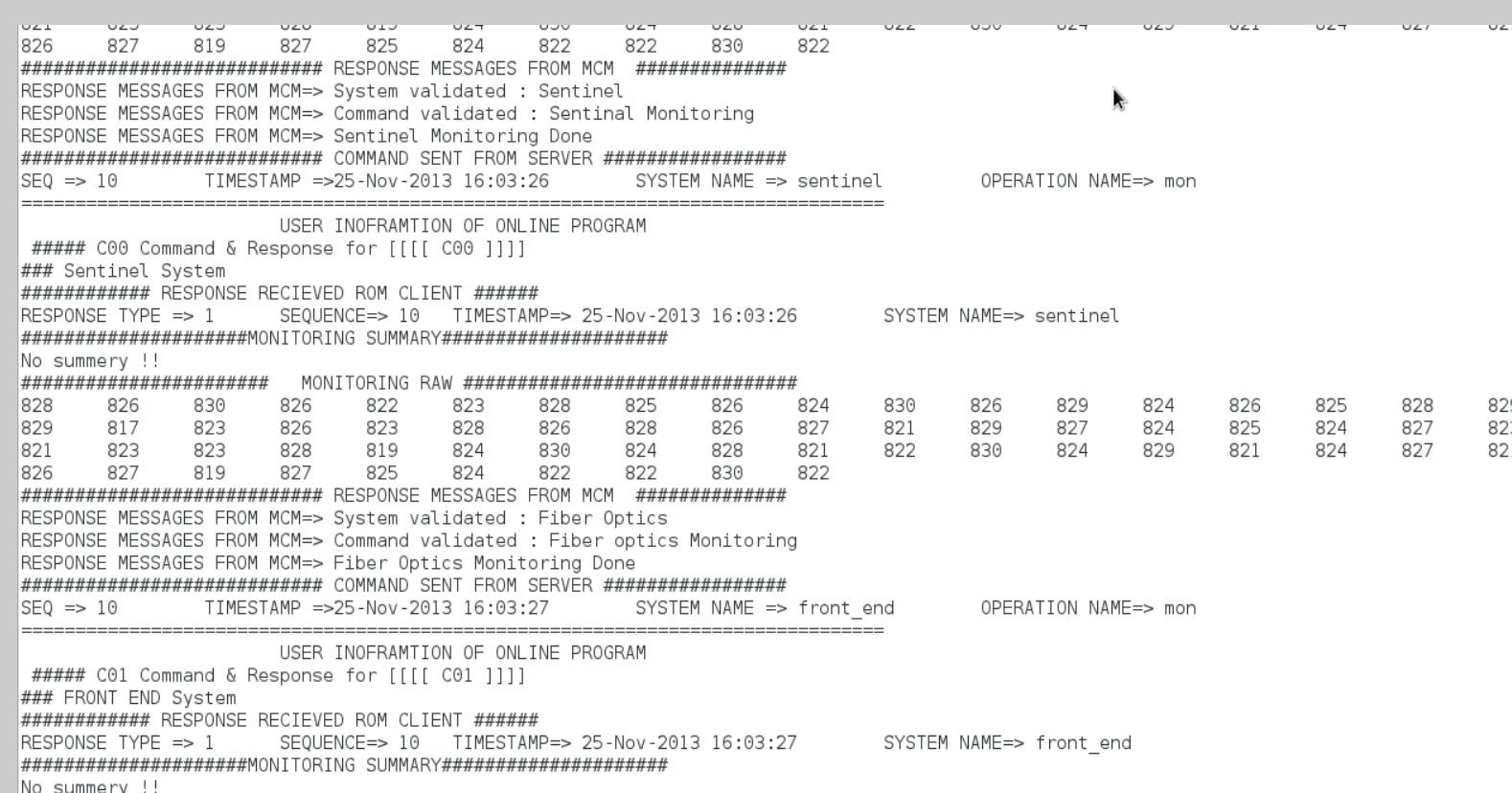
Start Date.....(x1) 01 October 2010
End Date.....(x2) 26 November 2013
Offset arc min(y1)-60
Offset arc min(y2)60
Pointing Axis.....Azimuth
Pointing Frequency 1420+610+325
Antenna list.....C00,C01,C02,C03,C04,C05
Plot

PDF	TXT	OND	DATE	TIME	SOURCE	RF1	RF2	Fringe	Fringe
pdf	txt	ond	24Nov2013	0804	1331+305	591	591	30	30
pdf	txt	ond	24Nov2013	0712	3C286	591	591	30	30
pdf	txt	ond	22Nov2013	1542	1459+716	1846	1846	6	6
pdf	txt	ond	23Nov2013	1637	1459+716	591	591	25	26
pdf	txt	ond	20Nov2013	0605	3C286	1371	1371	29	29
pdf	txt	ond	19Nov2013	1756	3C48	306	306	30	30
pdf	txt	ond	18Nov2013	1859	3C48	1261	1261	30	30
pdf	txt	ond	18Nov2013	0922	3C286	1409	1409	30	30
pdf	txt	ond	17Nov2013	2324	3C48	1409	1409	30	30
pdf	txt	ond	16Nov2013	1105	3C286	1280	1280	29	29
pdf	txt	ond	15Nov2013	2038	3C48	1410	1410	29	29
pdf	txt	ond	15Nov2013	1945	3C48	1410	1410	25	24
pdf	txt	ond	15Nov2013	1850	3C48	1371	1371	29	29
pdf	txt	ond	15Nov2013	0917	3C286	1411	1411	29	29
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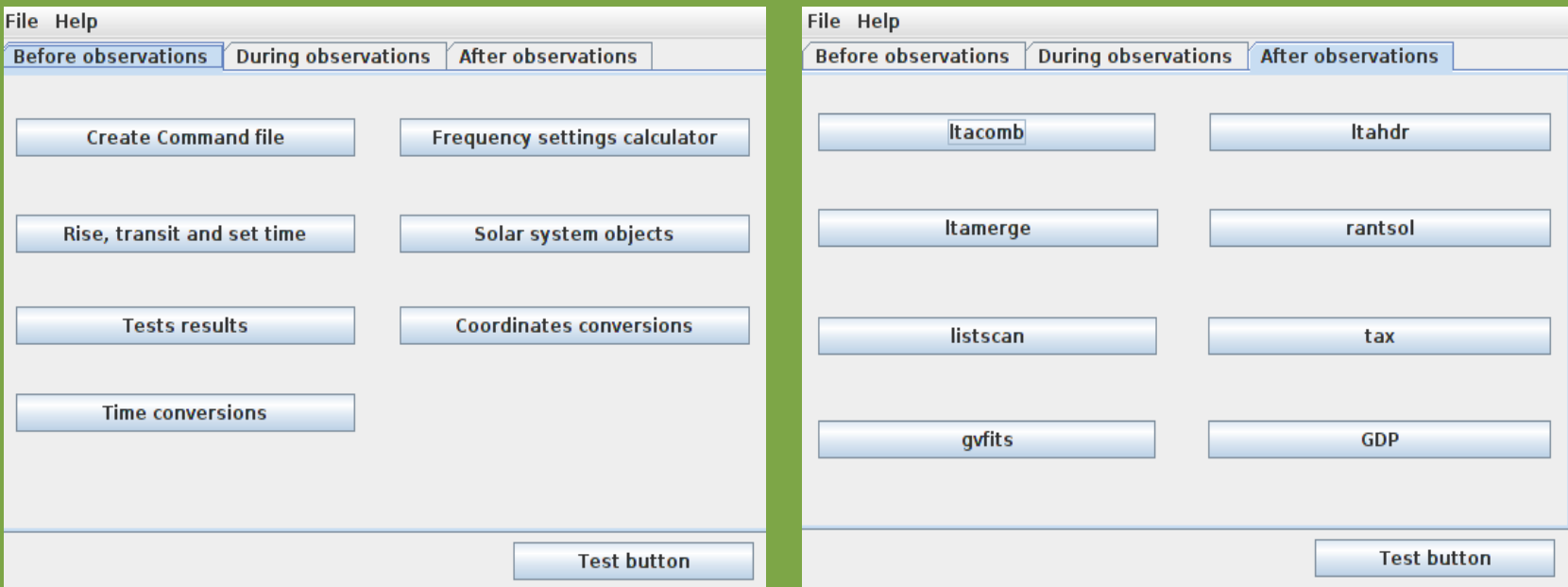
ONLINE V2 COMMAND TERMINAL



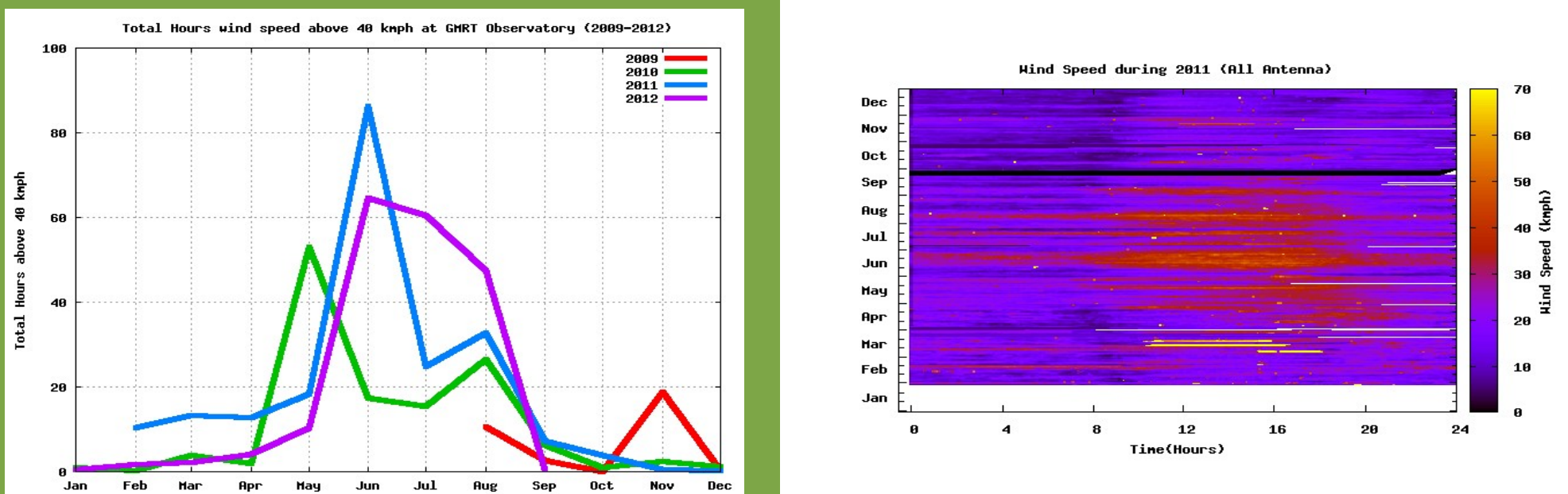
ONLINE V2 SHARED MEMORY DISPLAY



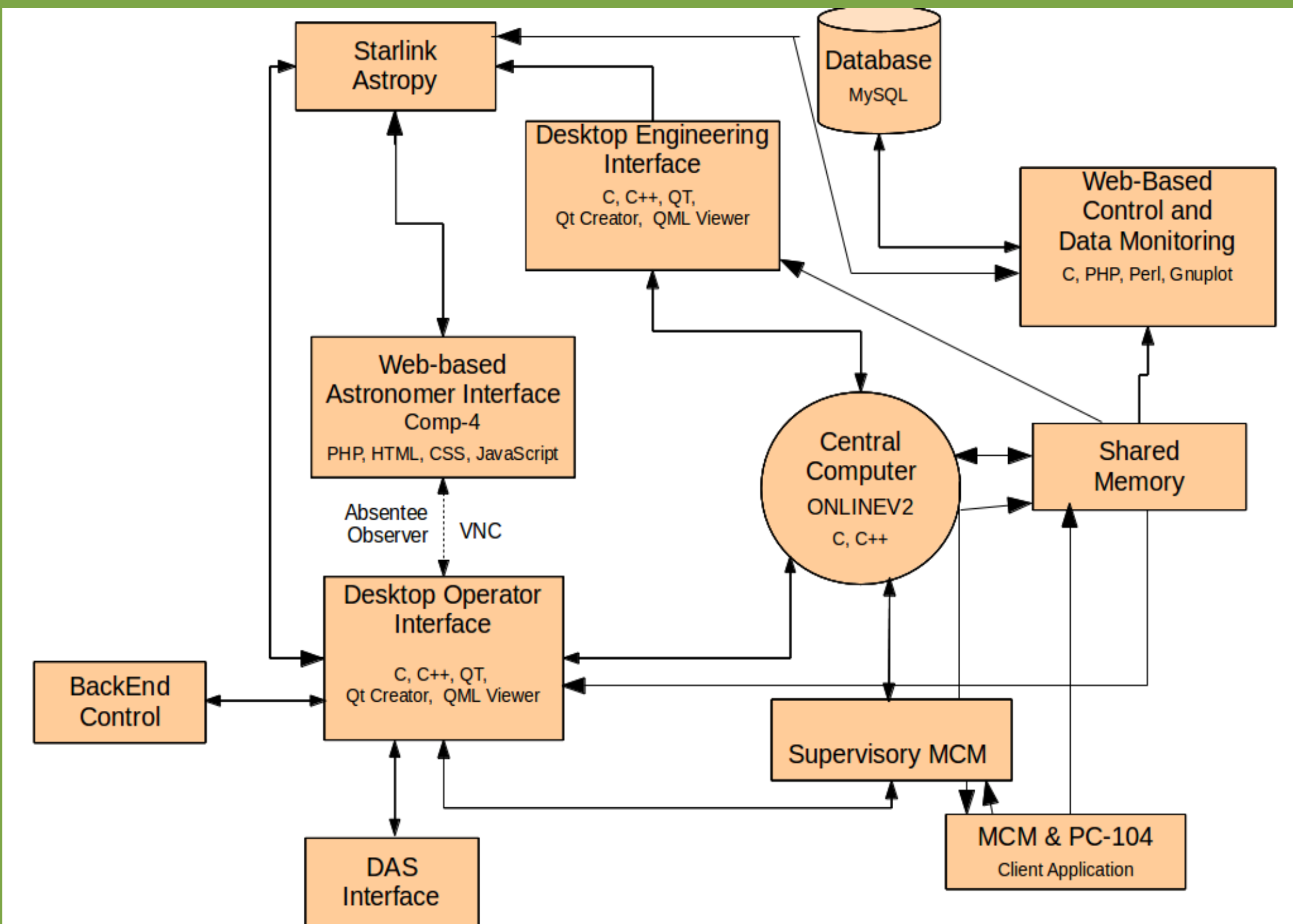
WEB BASED TUNE SETTING



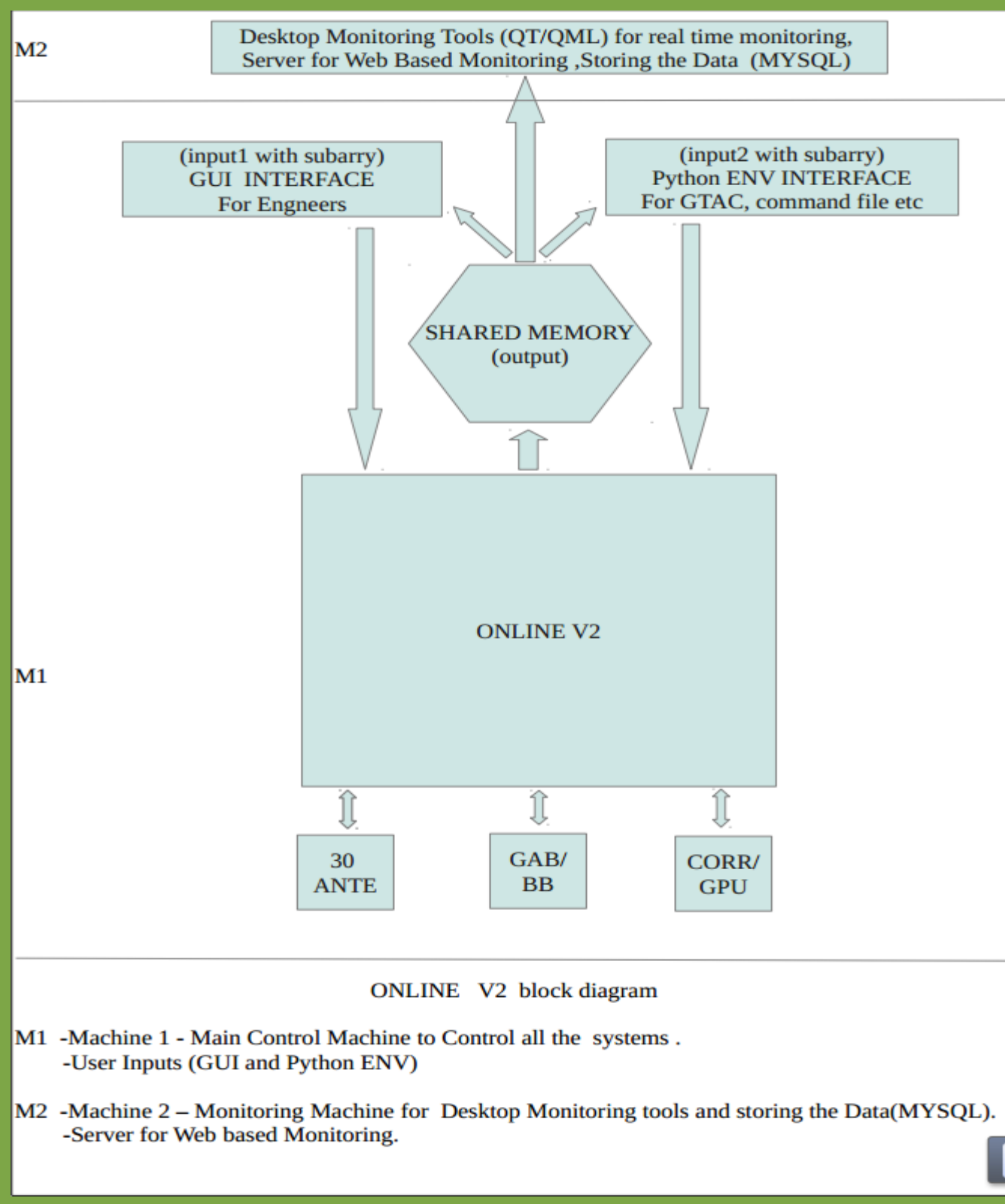
WEB BASED MONITORING



ARCHITECTURAL BLOCK DIAGRAM OF ONLINE V2



ENVIRONMENT INTERFACING WITH ONLINE_V2



Status :

- Communication between MCM ↔ ONLINE V2 ↔ GUI tested and working for 3 antenna setup.
- Database for monitoring data – web-based interface
- 0.5 Sec background monitoring of System parameters.
- Antenna shell temperature at C03 logged in database from shared memory using ONLINEV2.
- GUI for operators and engineers - v1
- Multi-threading implemented for many to one communication.
- Three-antenna system with 4 MCM each - test setup
- GUI for operators and engineers - v1

In Progress :

- Environment between user interface and ONLINEV2
- Higher cadence of background monitoring
- GUIs
- Astronomical libraries - Starlink/Astropy
- Astronomer's interface and observing in absentia

Time Line :

- Project start: October 2012
- Prototype Demonstration: April 2014
- Final Version: October 2014

Important Milestones :

- GUI -> OnlineV2 -> MCM setup : Control and Monitoring tested
- Communication protocols based on TCP/IP developed for OnlineV2 -> MCM
- Real time control data monitoring : logging in MySQL database and web display of temperature in C03 using new MCM
- 500 mili Second background continuous monitoring of control parameters enabled
- Subarray control implemented in OnlineV2
- Internal discussion forum using Vanilla

Acknowledgement :

We thank A. Pramesh Rao for valuable discussions and R. Balasubramanian for his help with the development of the new MCM card.