



**KONGSBERG**  
**MEOS POLAR**

**Integrating processing packages into a  
Direct Broadcast Terminal.**

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This talk presents:

- Methods utilizing freely available software packages
- Combined with a monitoring and control system
- Integrating all units into an autonomous ground station for reception, processing and distribution of data.



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# Free processing packages

- AAPP up to level 1b (AVHRR)
- AAPP (ATOVS)
- IAPP (ATOVS)
- ICI (ATOVS)
- IMAPP (MODIS, AIRS, AMSU, HSB)
- OGP and SeaDAS (SeaWIFS)
- Several MODIS DB packages for level 2 generation



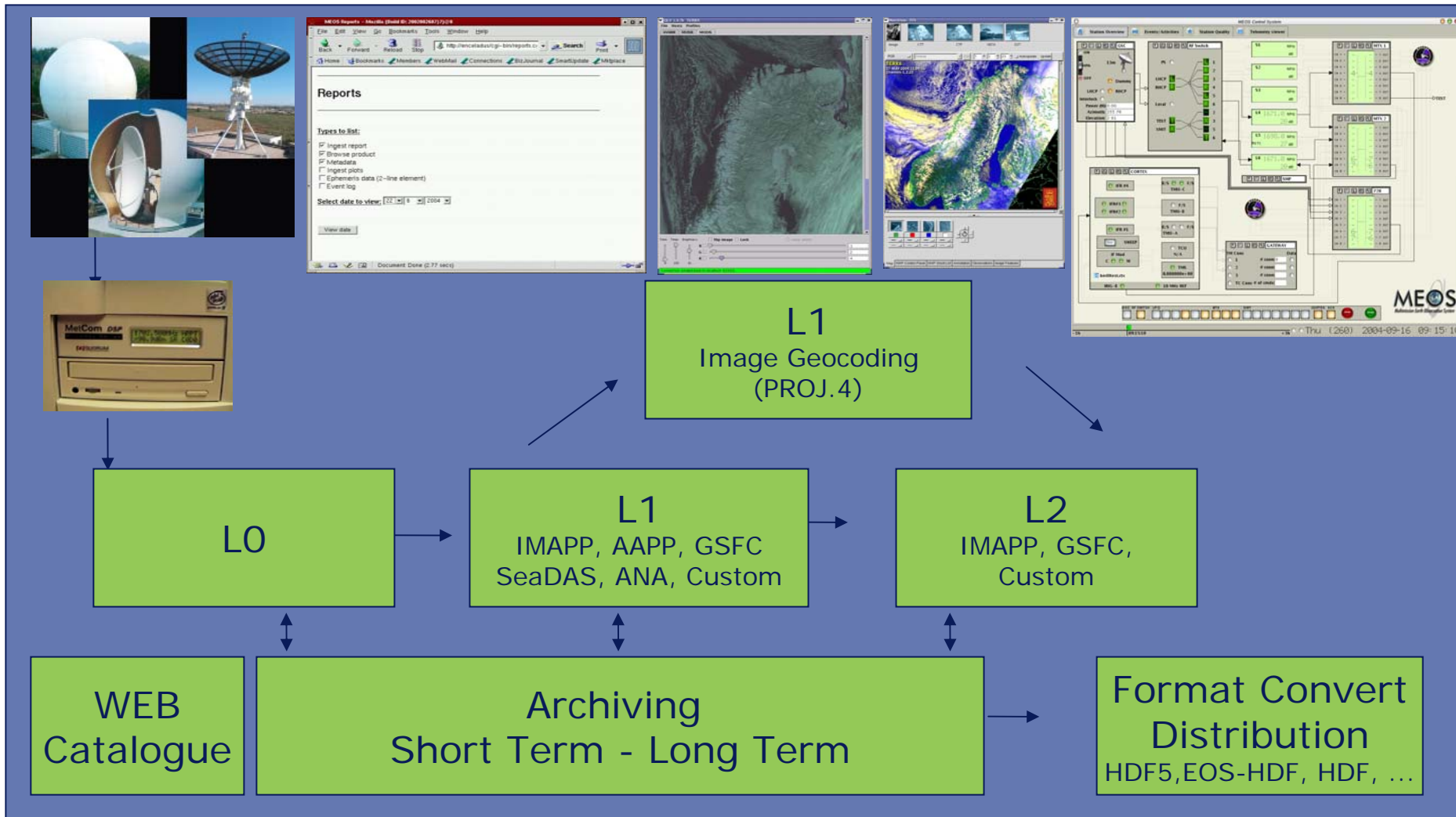
- Rapid on-site processing
- More cost effective systems
- Common calibration
- Promote the cooperation between satellite data users
- Facilitates further research for application specific algorithms



- Often cumbersome operations
- Several independent systems are needed for antenna scheduling and tracking, for data reception, for level 0 processing and for higher level processing.
- Hard to make local adaptations



# Direct Broadcast Terminal

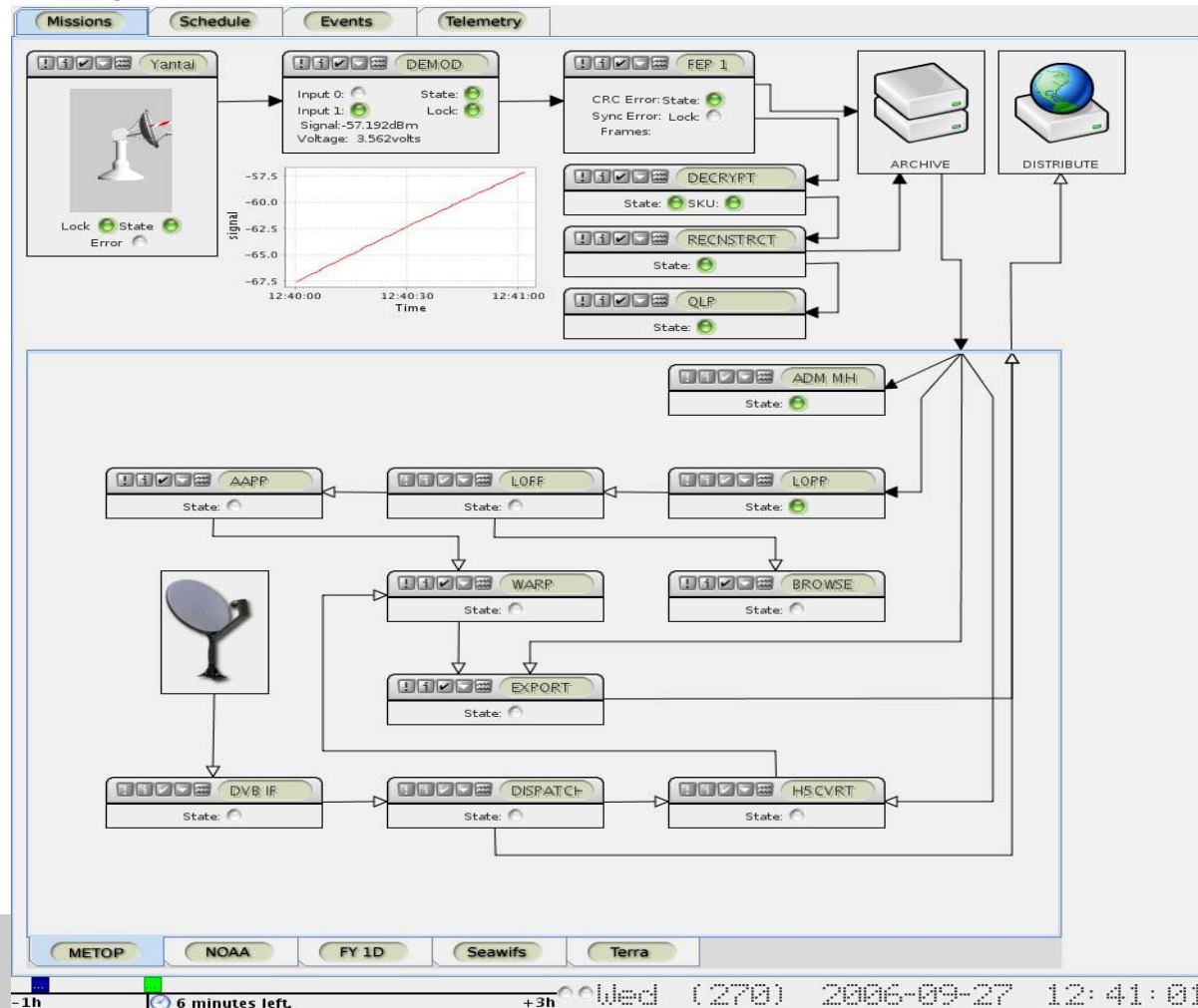




# Station Control System GUI

The GUI visualizes the status of the automatic operation. Some of the key components include:

- Schedule Display
- Activity Display
- Event Log
- Station Overview
- Telemetry Viewer

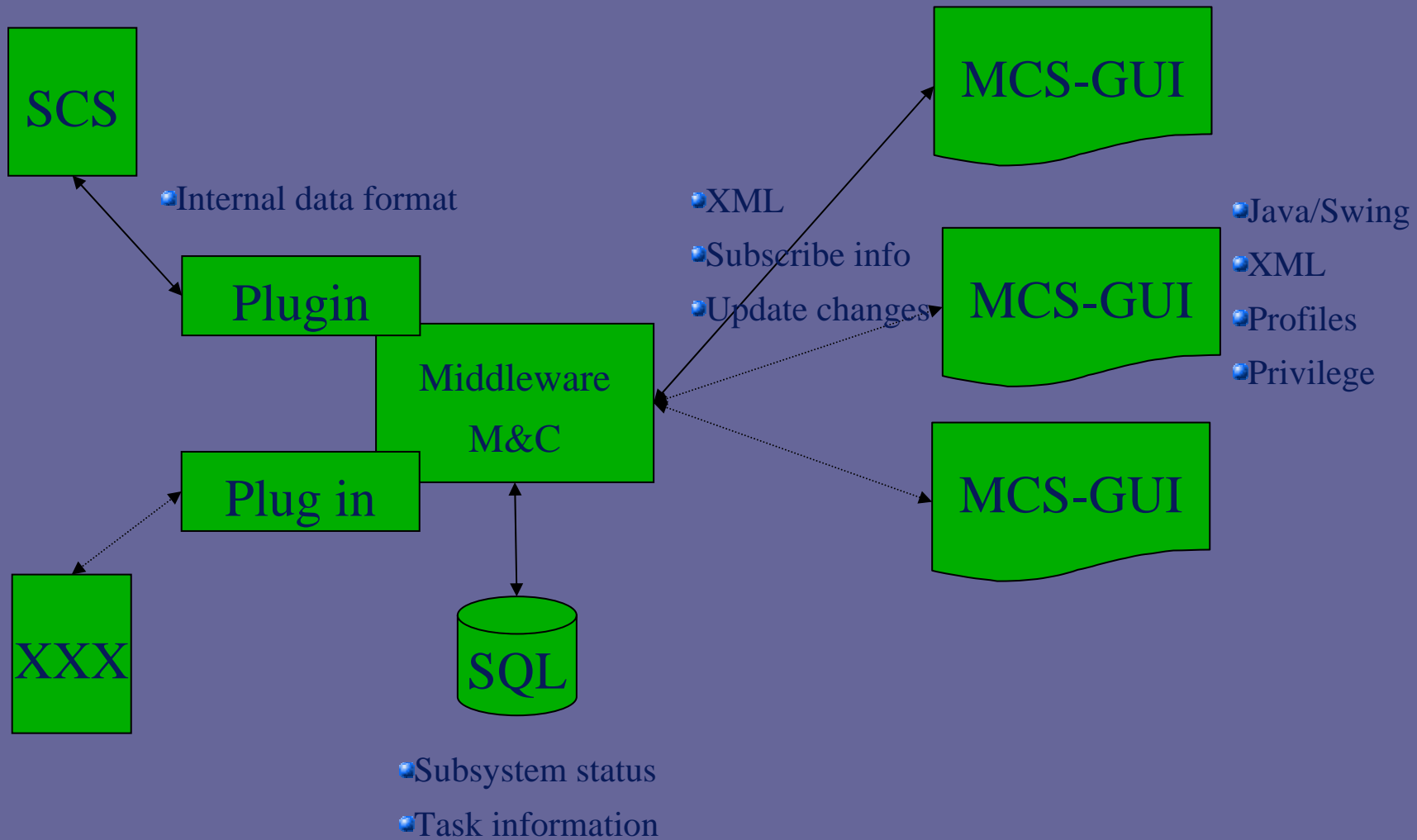




# Internal data flow



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# Internal data flow



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## Interface script

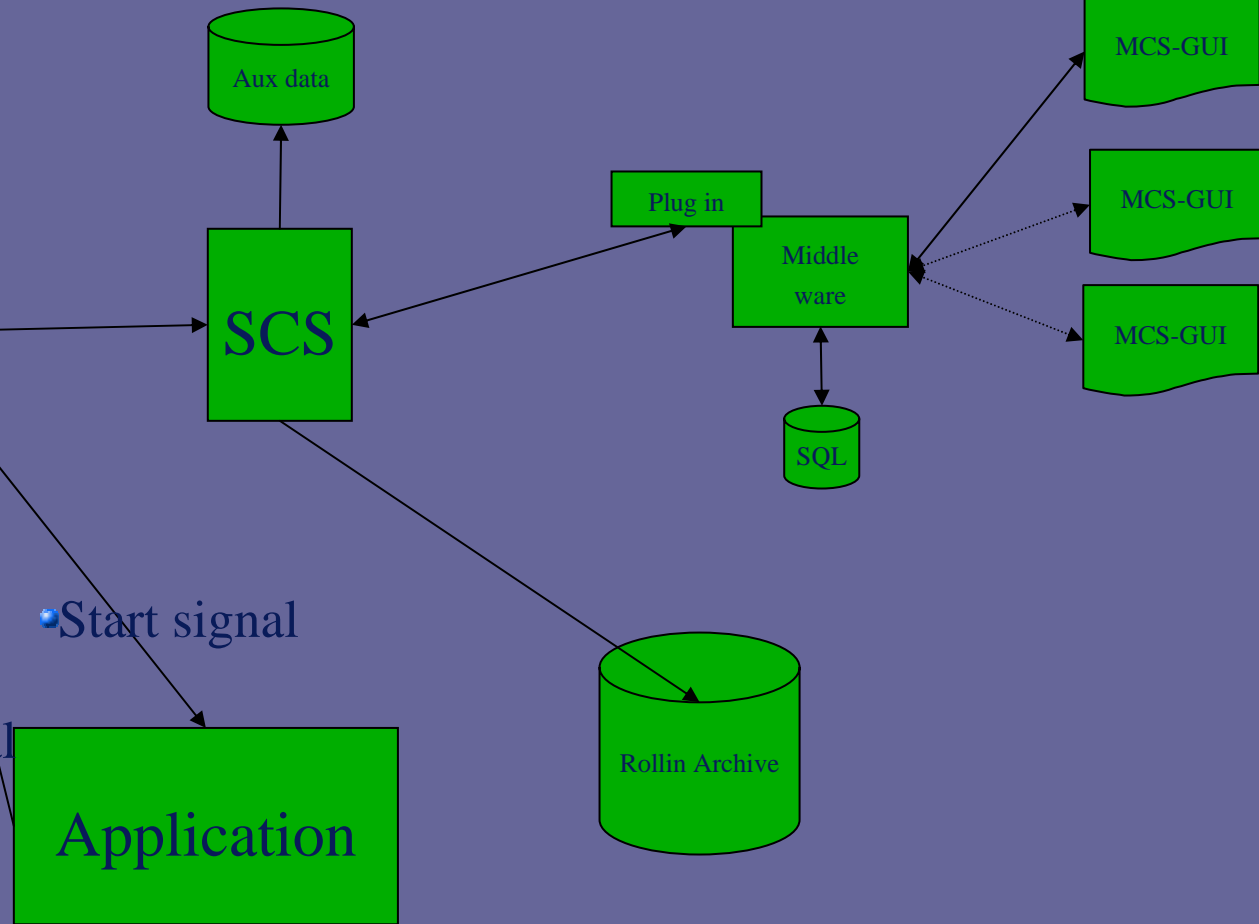
- Start application
- Deliver parameters
- Handles output

• Progress

• Status

• Termination signal

• Start signal

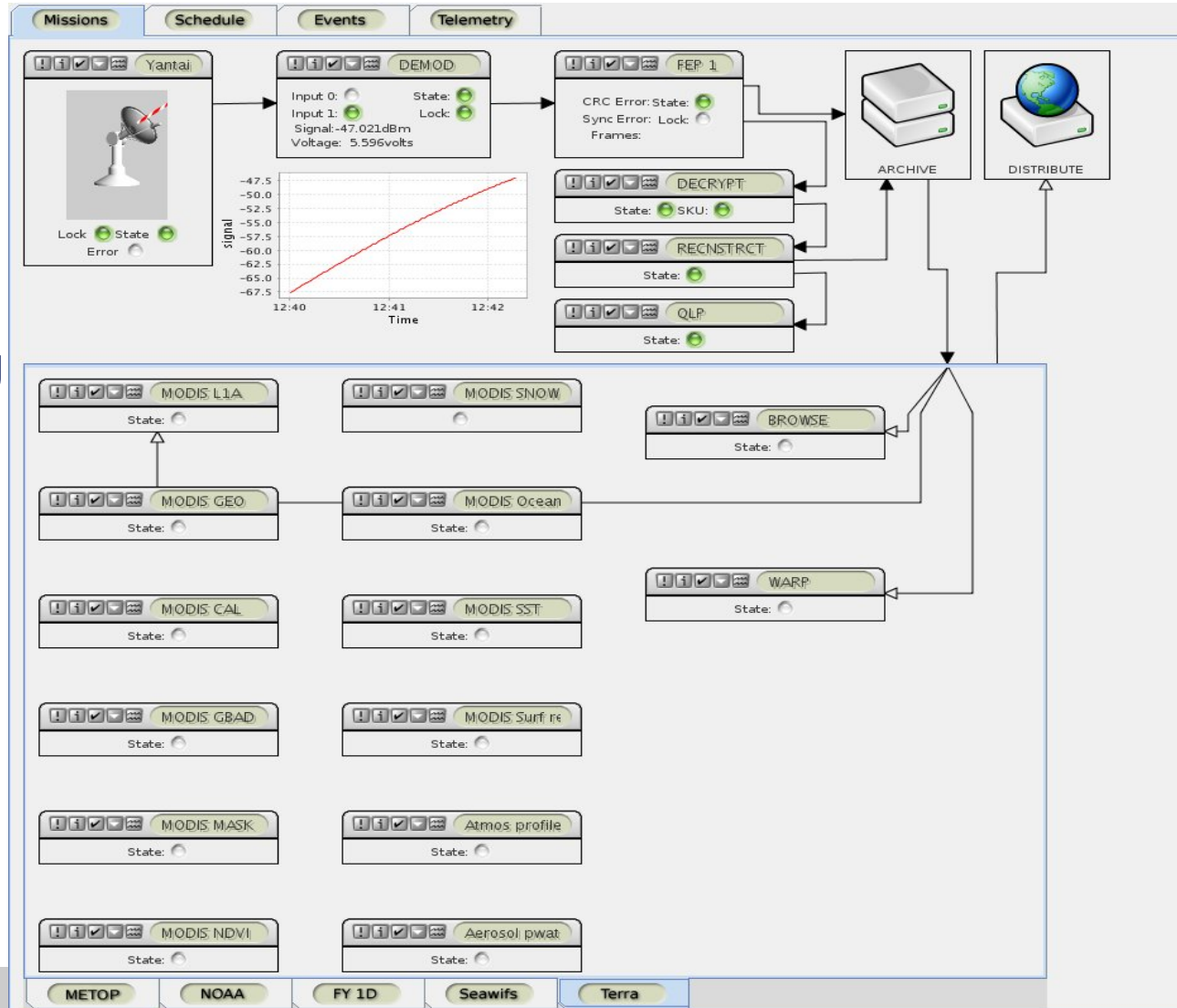


# GUI interface MODIS



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- Each process is represented by a subsystem box
- Individual executed
- Part of a processing chain.



# GUI interface Telemetry



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- Viewing telemetry information from individual applications.
- Numerical or graphical representation.

The screenshot displays the 'Telemetry' tab of a software interface. On the left, a tree view shows a hierarchy of applications under 'MEOS\_POLAR', with 'YANTAI\_ANT\_IF' selected. The main area is divided into a parameter configuration table and a data table. The parameter table has columns for 'Parameter', 'View', and 'Plot'. The data table shows columns for 'Time', 'MEOS\_POLAR DEMOD\_QUORUM voltage', and 'MEOS\_POLAR YANTAI\_ANT duration'. A graph on the right shows 'Azimuth' vs 'Time' for satellite MO1 orbit 16811, with a red line showing a sharp increase in azimuth around 11:52:30.

Parameter	View	Plot
state	<input type="checkbox"/>	<input type="checkbox"/>
startTime	<input type="checkbox"/>	<input type="checkbox"/>
duration	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Azimuth	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Elevation	<input type="checkbox"/>	<input type="checkbox"/>
antState	<input type="checkbox"/>	<input type="checkbox"/>
antFault	<input type="checkbox"/>	<input type="checkbox"/>

Time	MEOS_POLAR DEMOD_QUORUM voltage	MEOS_POLAR YANTAI_ANT duration
2006-09-27T11:49:26.445	0.000volts	0 sec
2006-09-27T11:49:26.479	0.000volts	0 sec
2006-09-27T11:49:26.920	0.000volts	0 sec
2006-09-27T11:49:27.031	0.000volts	0 sec
2006-09-27T11:49:27.051	0.000volts	0 sec
2006-09-27T11:49:27.480	0.000volts	0 sec
2006-09-27T11:49:28.614	0.000volts	0 sec
2006-09-27T11:49:28.616	0.000volts	2 sec
2006-09-27T11:49:30.695	0.000volts	4 sec
2006-09-27T11:49:32.691	0.000volts	6 sec
2006-09-27T11:49:34.693	0.000volts	8 sec
2006-09-27T11:49:36.692	0.000volts	10 sec
2006-09-27T11:49:38.693	0.000volts	12 sec
2006-09-27T11:49:40.689	0.000volts	12 sec
2006-09-27T11:49:40.691	0.000volts	14 sec
2006-09-27T11:49:41.690	0.768volts	14 sec
2006-09-27T11:49:42.690	0.804volts	14 sec
2006-09-27T11:49:42.692	0.804volts	16 sec
2006-09-27T11:49:43.690	0.841volts	16 sec
2006-09-27T11:49:44.691	0.877volts	16 sec
2006-09-27T11:49:44.693	0.877volts	18 sec
2006-09-27T11:49:45.690	0.913volts	18 sec
2006-09-27T11:49:46.689	0.950volts	18 sec
2006-09-27T11:49:46.692	0.950volts	20 sec
2006-09-27T11:49:47.690	0.986volts	20 sec

Graph for satellite MO1 orbit 16811

Y-axis: Azimuth (0 to 375)  
X-axis: Time (11:49 to 11:57)

Timeline: Wed (27th) 2006-09-27 12:46:13

# GUI interface Event log



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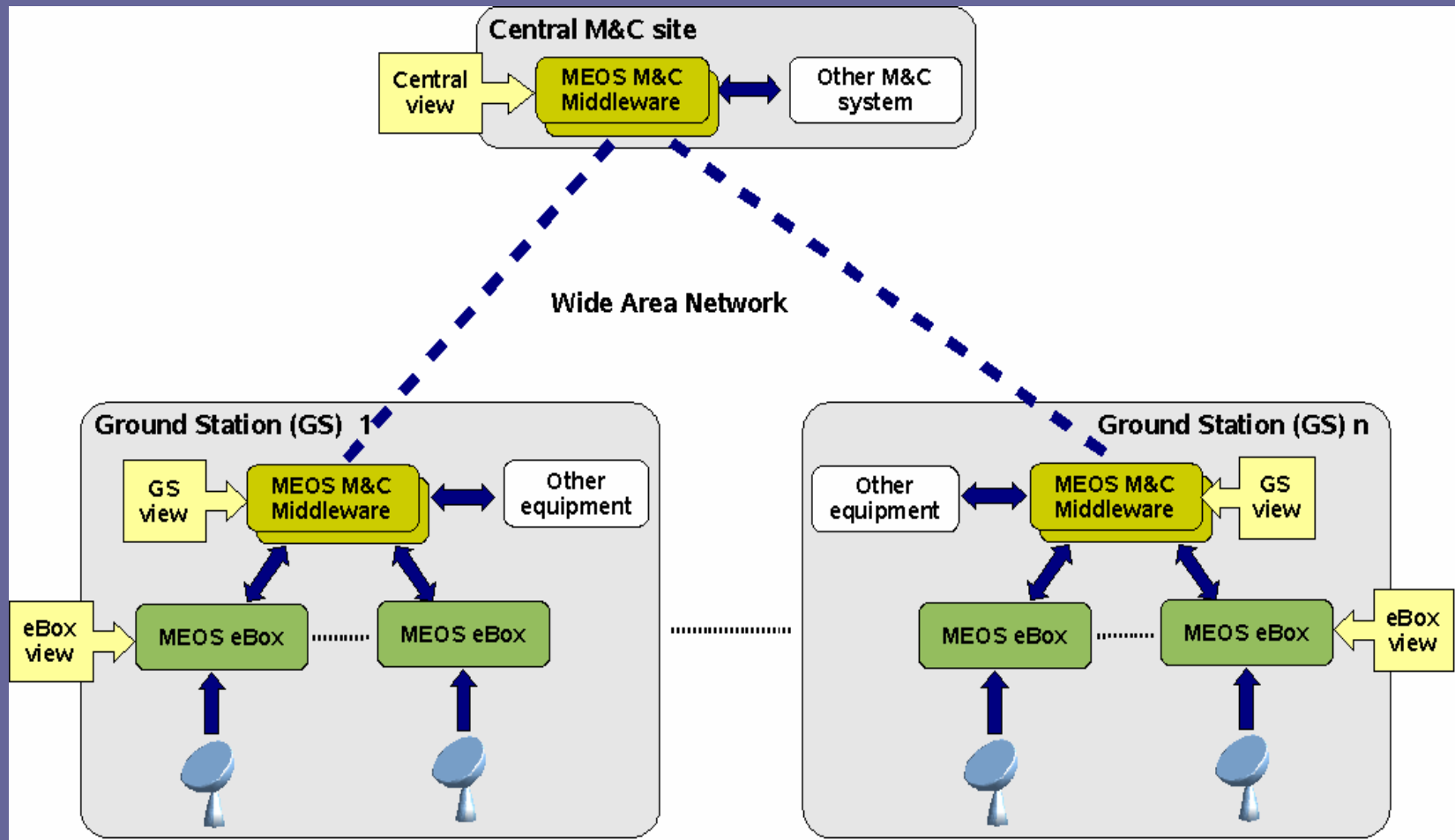
- Monitor events from the SCS
- Detailed information from each processing unit.

Missions Schedule Events Telemetry						
Time			Filter			
Interval: From now on			Active <input checked="" type="checkbox"/>		Name <untitled>	
From: 2006-09-27 12:37:59			Refresh			
To: 2006-09-27 12:43:07			Add Remove Refresh Edit			
Type	Satellite	Orbit	Time	From	Text	
i	N/A	N/A	2006-09-27 12:38:24	MEOS_POLAR.sched_...	Updated system variable 'MAX_TIME_DA...	
i	MO1	16816	2006-09-27 12:38:24	MEOS_POLAR.sched_...	Added delayed instruction MP_27-SEP...	
i	MO1	16816	2006-09-27 12:39:19	MEOS_POLAR.sched_...	Forwarded instruction for execution MP_...	
i	N/A	N/A	2006-09-27 12:39:19	MEOS_POLAR.metop_...	License for feature 15004 (ADM_MSG_H...	
i	MO1	16816	2006-09-27 12:39:19	MEOS_POLAR.qlp	Command accepted	
i	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Command accepted	
i	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Command accepted	
i	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Command accepted	
i	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Command accepted	
i	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Accepted new connection, #1	
i	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Accepted new connection, #2	
x	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Unable to find suitable "auxdata. Proce...	
i	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Only realtime output from subsystem	
x	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Failed to initialize LOFF library	
x	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Child: Giving Up	
i	MO1	16816	2006-09-27 12:39:20	MEOS_POLAR.metop_...	Processing failed Total 0	
i	N/A	N/A	2006-09-27 12:39:24	MEOS_POLAR.yantai_...	License for feature 12215 (YANTAI_ANT...	
i	N/A	N/A	2006-09-27 12:39:24	MEOS_POLAR.quoru_...	License for feature 14030 (DEMODO) is v...	
i	MO1	16816	2006-09-27 12:39:25	MEOS_POLAR.quoru_...	Command accepted	
i	MO1	16816	2006-09-27 12:39:25	MEOS_POLAR.fep_2	Command accepted	
i	MO1	16816	2006-09-27 12:39:25	MEOS_POLAR.yantai_...	Command accepted	
i	MO1	16816	2006-09-27 12:39:25	MEOS_POLAR.fep_1	Command accepted	
i	MO1	16816	2006-09-27 12:39:25	MEOS_POLAR.fep_2	Child - lock_mem: 0 assigned_cpu: -1	
i	MO1	16816	2006-09-27 12:39:25	MEOS_POLAR.fep_2	No output from subsystem	
i	MO1	16816	2006-09-27 12:39:25	MEOS_POLAR.fep_1	Child - lock_mem: 0 assigned_cpu: -1	
i	MO1	16816	2006-09-27 12:39:25	MEOS_POLAR.yantai_...	No output from subsystem	
i	N/A	N/A	2006-09-27 12:39:25	MEOS_POLAR.metop_...	License for feature 14062 (METOP_DEC...	
i	MO1	16816	2006-09-27 12:39:26	MEOS_POLAR.metop_...	Command accepted	
i	MO1	16816	2006-09-27 12:39:26	MEOS_POLAR.metop_...	No output from subsystem	
★	MO1	16816	2006-09-27 12:39:26	MEOS_POLAR.metop_...	< <file:/lun0/rawdata/METOP/event/HR...	
i	MO1	16816	2006-09-27 12:39:26	MEOS_POLAR.qlp	New QLV connection accepted	
i	MO1	16816	2006-09-27 12:39:26	MEOS_POLAR.fep_2	Accepted new connection, #1	
i	MO1	16816	2006-09-27 12:39:26	MEOS_POLAR.metop_...	No output to common file from subsystem.	
i	MO1	16816	2006-09-27 12:39:26	MEOS_POLAR.metop_...	Accepted new connection, #1	
★	MO1	16816	2006-09-27 12:40:28	MEOS_POLAR.metop_...	< <file:/lun0/rawdata/METOP/event//H...	
i	MO1	16816	2006-09-27 12:40:57	MEOS_POLAR.metop_...	TBUS 0-12h changed	
★	MO1	16816	2006-09-27 12:40:57	MEOS_POLAR.metop_...	< <file:/lun0/rawdata/METOP/event//H...	

# Tree of M&C Middleware



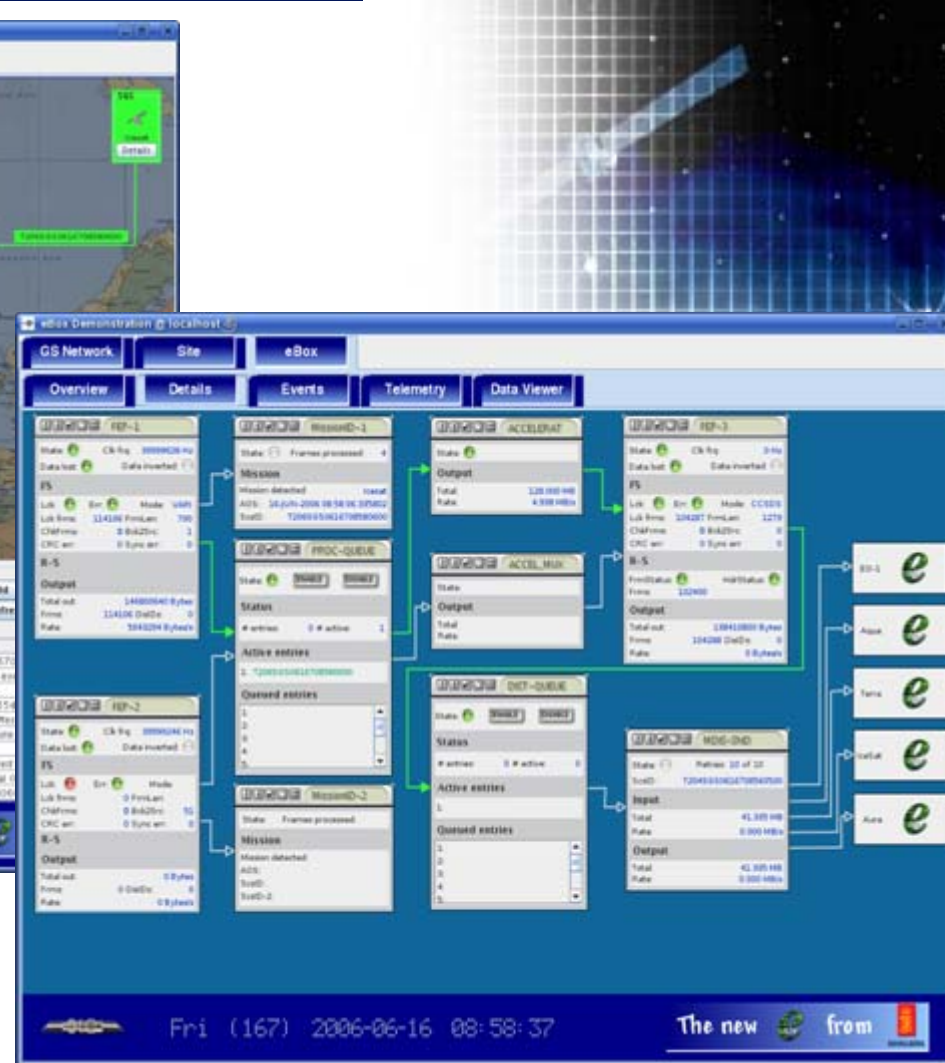
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# MEOS M&C Middleware – Example GUIs



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# MEOS M&C Middleware – Example GUIs

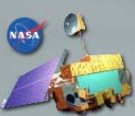


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**MISSION** State Sync

Detected mission



**Terra**

CLOCK: 149995374 Hz  
BACK TO SEARCH: 42  
ERRORS: 0  
GOOD FRAMES: 44848  
AOS: 2006-245 14:54:06.776  
SCS ID: T042SGS0624514540600

Status Config Cmd

**MISSION** State Sync

Detected mission



**BOXX**

CLOCK: 3555154 Hz  
BACK TO SEARCH: 1401  
ERRORS: 0  
GOOD FRAMES: 0  
AOS:  
SCS ID:

Status Config Cmd

**PROCESSING** State

Mean rate: 4797863 Bytes/s  
Active: 1 Queue length: 3586  
Uncorrectable errors:

T204SGS0623909300200
T206SGS0623909320200
T042SGS0623909340300
T154SGS0623909360200
T204SGS0623909400200
T206SGS0623909420200
T042SGS0623909440200
T154SGS0623909460200
T204SGS0623909500100
T206SGS0623909520100

Enable Disable

Status Config Cmd

**DISTRIBUTION** State

Mean rate: 0.000 MB/s  
Active: 1 Queue length: 2287

T042SGS0623421040400
T154SGS0623421060400
T204SGS0623421100400
T206SGS0623421120400
T154SGS0623421160500
T204SGS0623421200400
T206SGS0623421220500
T042SGS0623421240400
T154SGS0623421260500

Enable Disable

Status Config Cmd

Mon (247) 2006-09-04 10:28:04



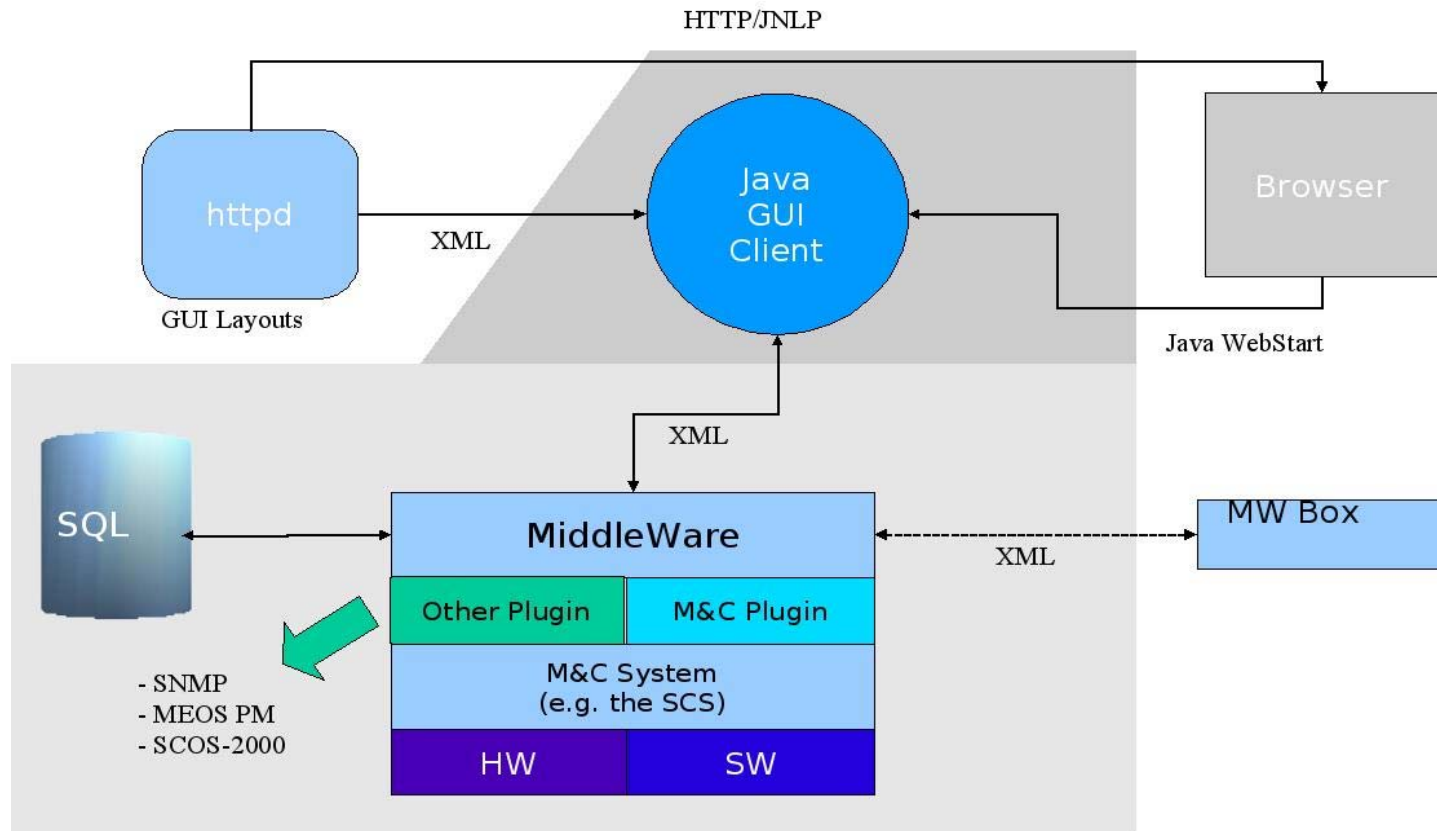
Mon (247) 2006-09-04 10:30:05



# GUI WebStart



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The end



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