Orbit Feedback Service Unit

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- Architecture model
- Real Time actions
- Network load
- Data synchronisation OFC-OFSU
- Logging
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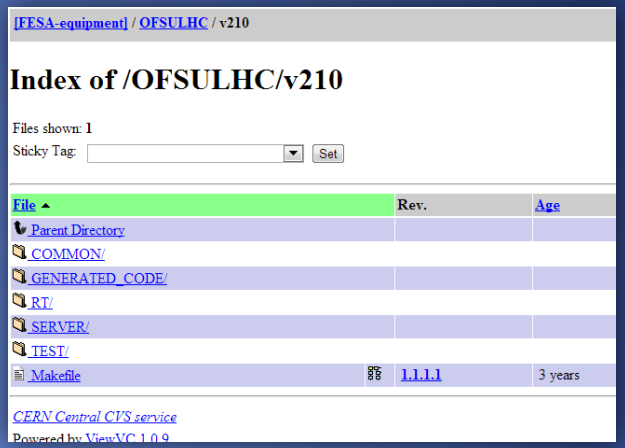
- Objectives for the LS1

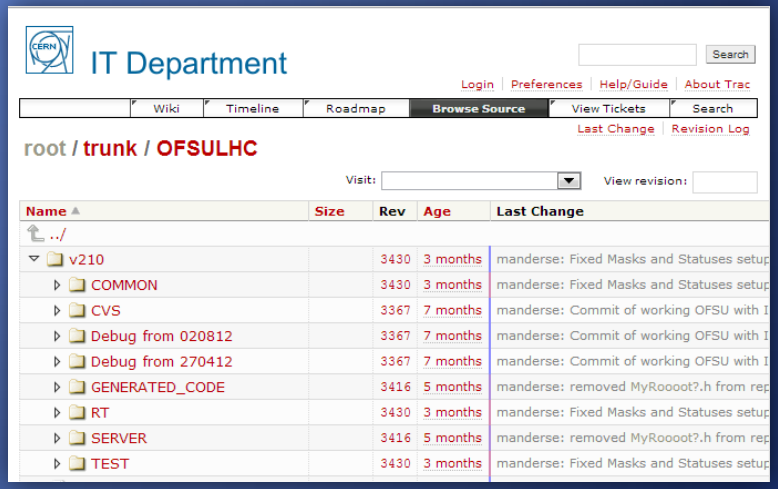
Involvement

- Developed mainly by Gennady Sivatskiy (BE-CO) (2008-2010)
- Maintaining OFSU since summer 2010:
  - Implementing new features (Extensions to existing properties and creation of new ones)
  - Improvenets. Modifying data communication patterns to have homogenious TCP/IP trafic with OFC. Logging management etc.
  - Adressing stability issues : memory leaks, synchronisation issues etc:
    - Improper array deallocation, partioal object deallocation, auto-pointers
    - 3 party libraries (root, cmw-rbac ..)
    - FB shared libraries (twiss optics)

Version control

- Main operational branch in CVS belonging to FESA project.
- Local developer-only SVN branch for changes that are still under testing.





Release docs

- Official releases :
  - 2 official in 2010
  - 8 in 2011
  - 6 in 2012

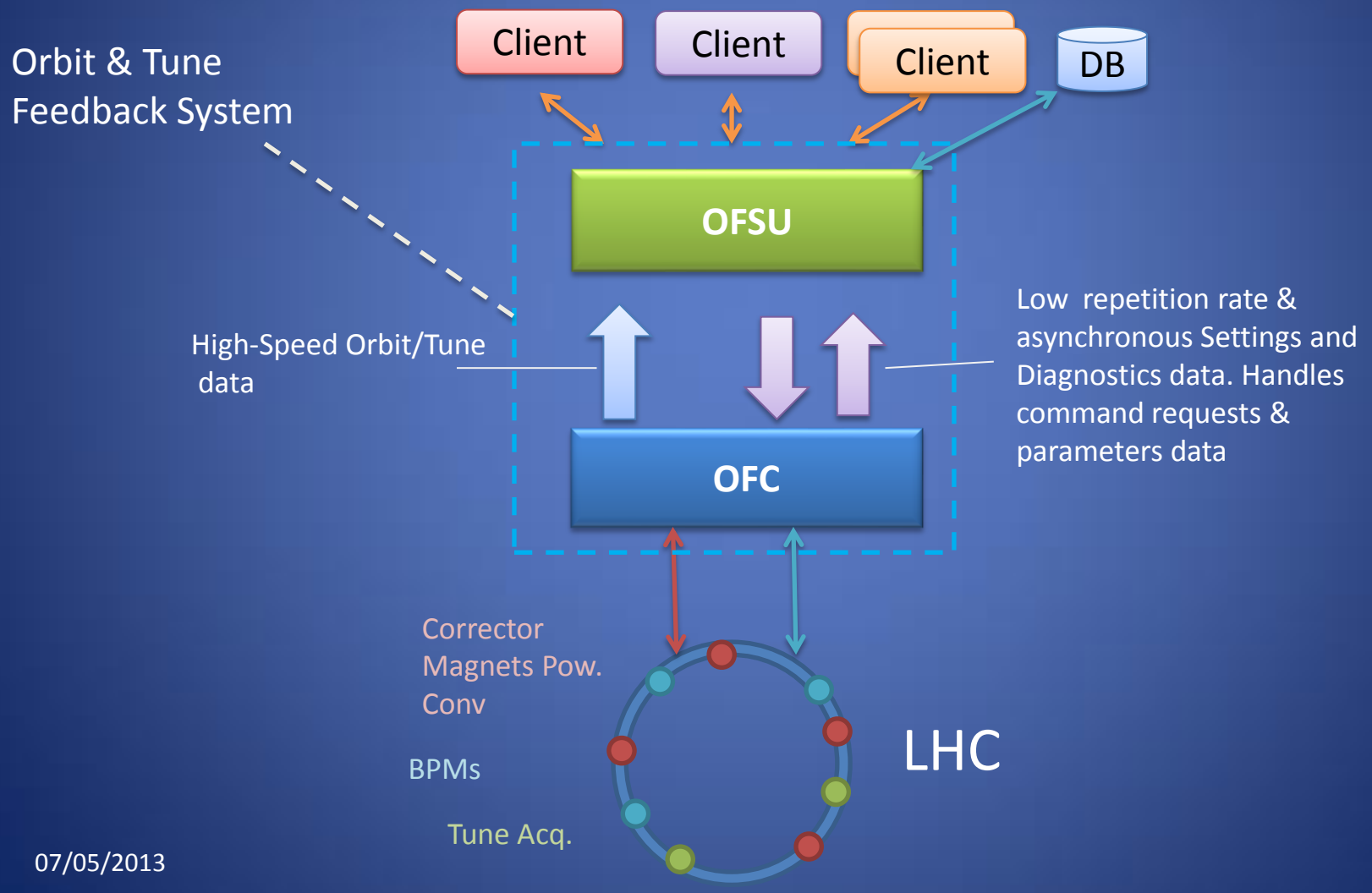
OFSU_Release_20120917.txt	OFSU_Release_20121023.txt
OFSU_Release_20120626.txt	OFSU_Release_20120423.txt
OFSU_Release_20120216.txt	OFSU_Release_20120309.txt
OFSU_Release_20110704.txt	OFSU_Release_20110407.txt
OFSU_Release_20110331.txt	OFSU_Release_20110302.txt
OFSU_Release_20110216.txt	OFSU_Release_20110202.txt
OFSU_Release_20110121.txt	OFSU_Release_20110106.txt
OFSU_Release_20100916.txt	OFSU_Release_20100819.txt

```
Dates:
-------------------------------------------------------------
Current Release Date: 19.09.2012
Previous Release Date: 26.06.2012


Message:
=============================================================


1. Fix: Memory Leak due to faulty included MyRoot.h
-------------------------------------------------------------
MyRoot.h was not previously deleted from FESA SVN, so it
was automatically recovered on Fesa Synchronize and used.
MyRoot is removed from version system and only the one from
twiss optics library is used.

2. Feature
-------------------------------------------------------------
IQC data push is used to send orbit data to the IQC Post Mortem
system 5 seconds after each Beam Injection Timing event is received.
```

OFSU

- OFSU - Orbit Feedback Service Unit. It's a server responsible for the following tasks with respect to Orbit & Tune feedback control at the LHC:
  - Triggering of the specific feedback control related actions based on LHC MTG Timing events or Clinet requests.
  - Orbit & Tune Feedback Settings management (ex. Beam Optics computation used for the beam correctors)
  - Data monitoring access for the Operators to the current orbit, tune and supplementary diganostics data.
  - High level DB intreface

Orbit Feedback overview



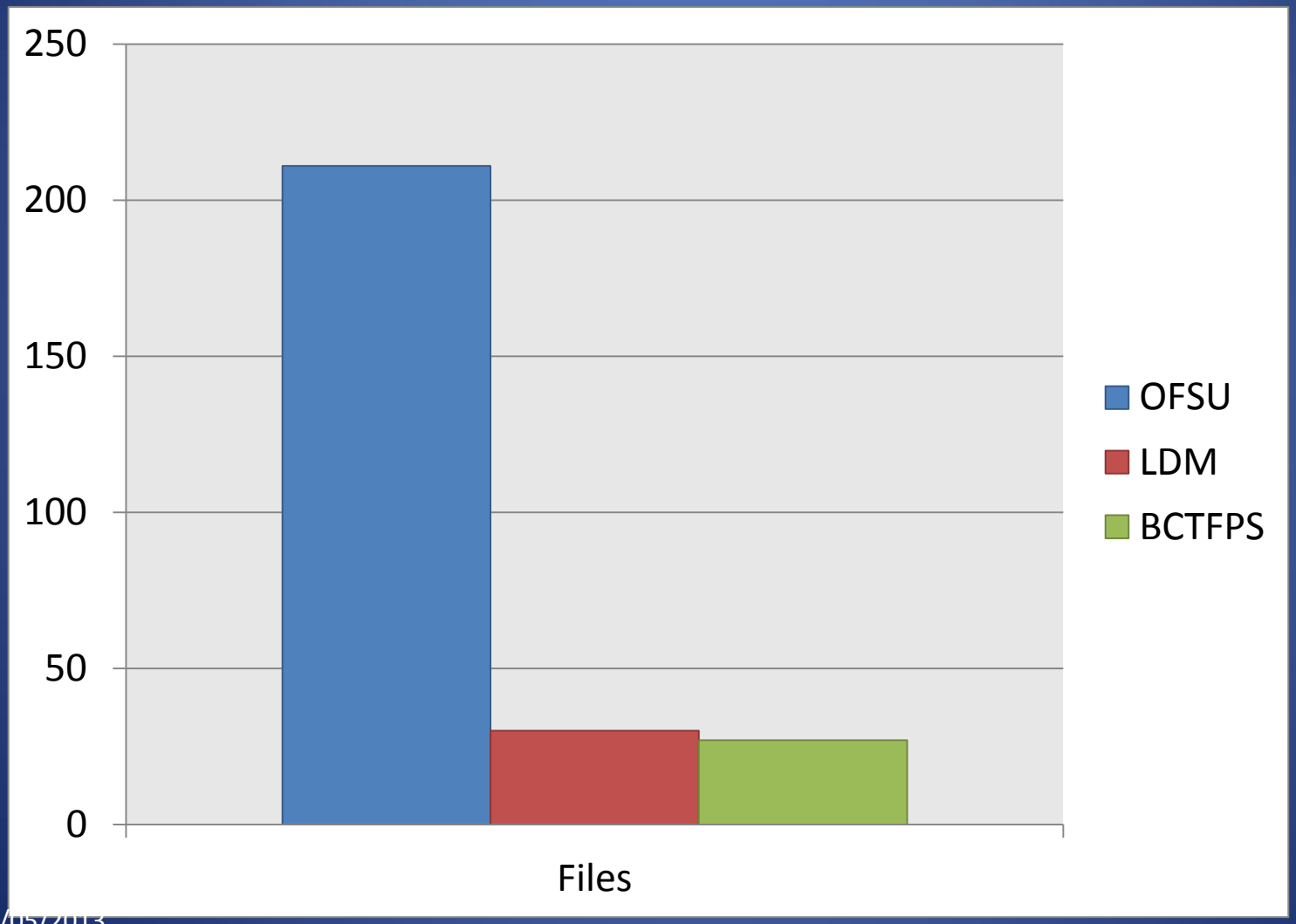
A few keywords

- ‘Talks’ both to OFC and to the ‘outside’
- Multi-client networking
- Data Centric
- Multipurpose
- Largely Asynchronous
- Deals many parameters
- Reliability is mission-critical

Design Aspects

- Based on BE-CO FESA & CMW middleware One of the largest known FESA based implementation.
- Inherits FESA strengths and weaknesses (multi-task execution, flat data structure)
- Largely multithreaded
- Its Real Time actions are synchronized with Machine Timig Events : MTG
- Uses RBAC – Access protection.
- Exists in Operational and Development versions.

Number of Files (.cpp & .h)



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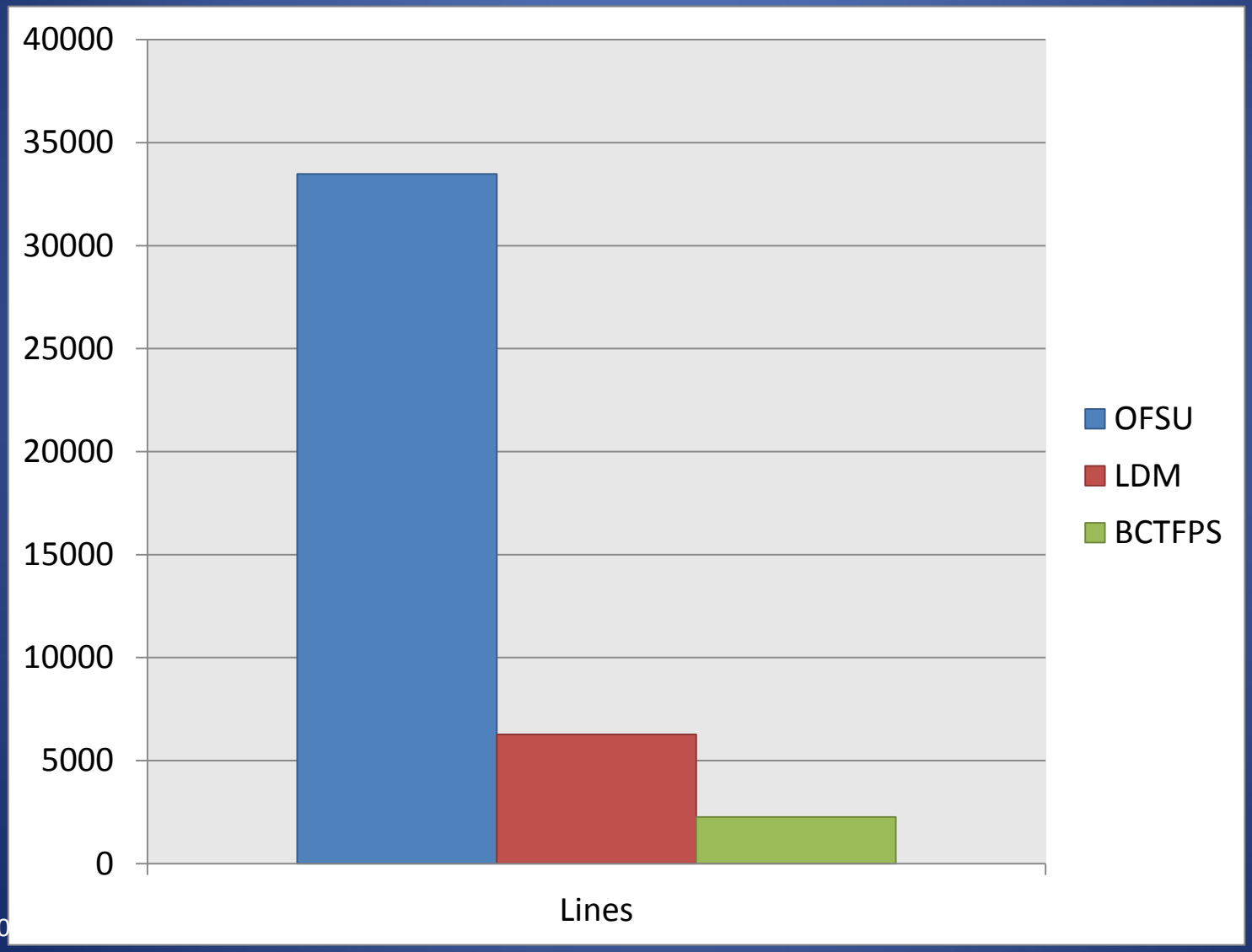

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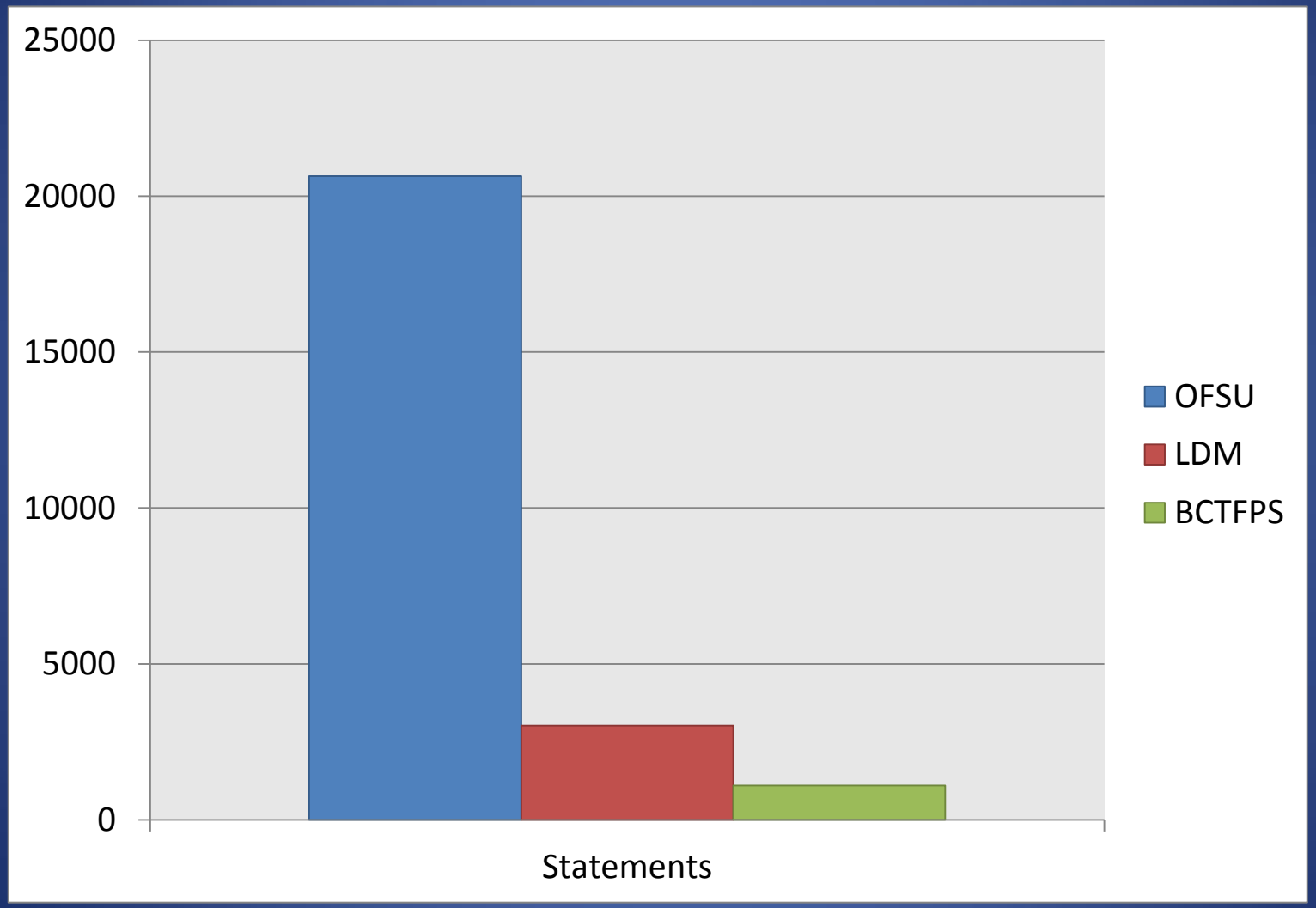
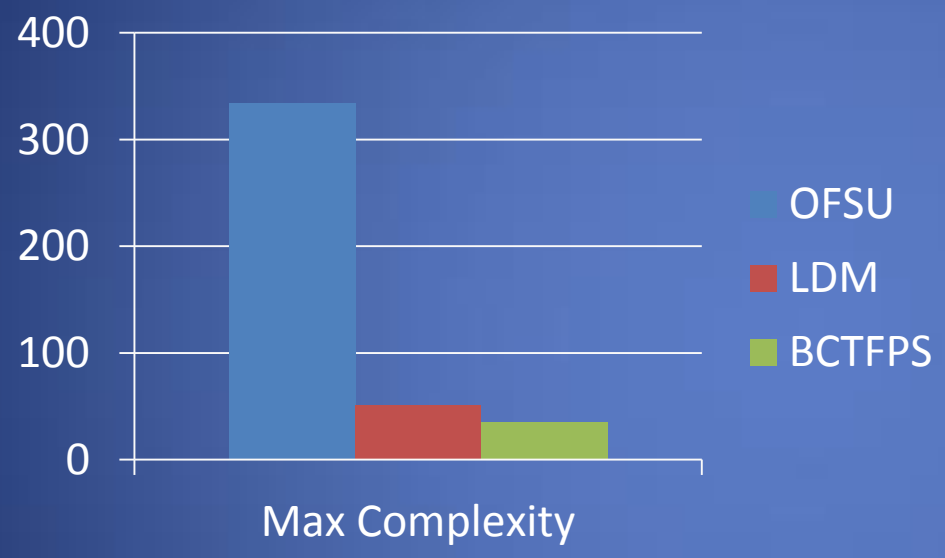
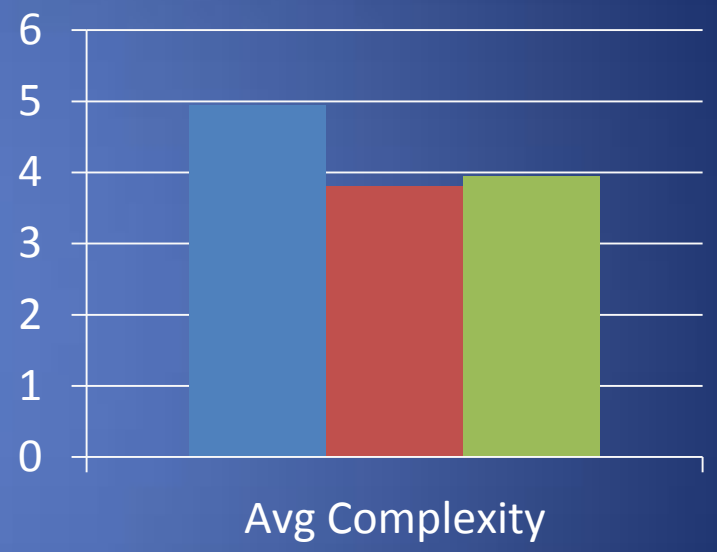
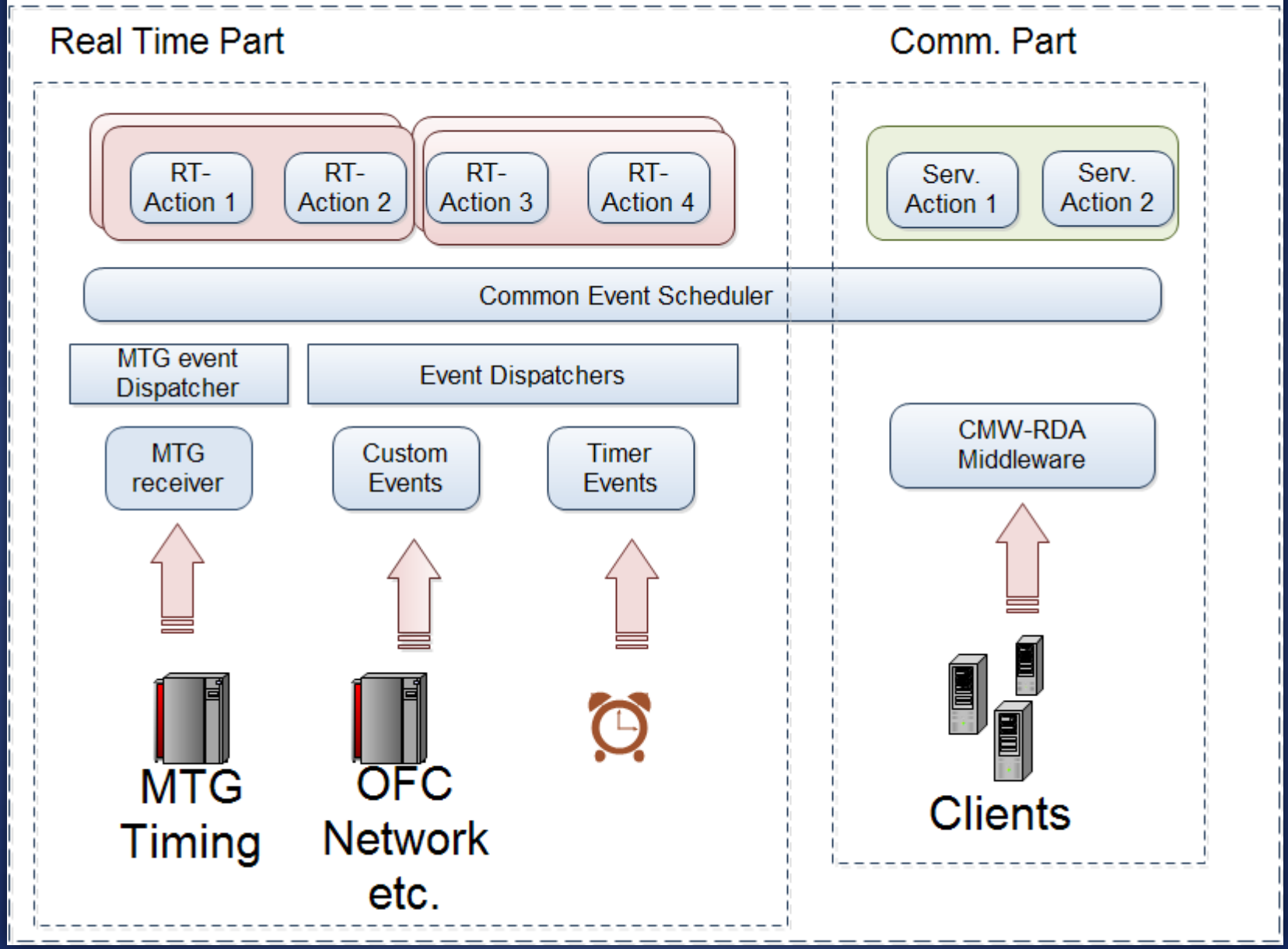


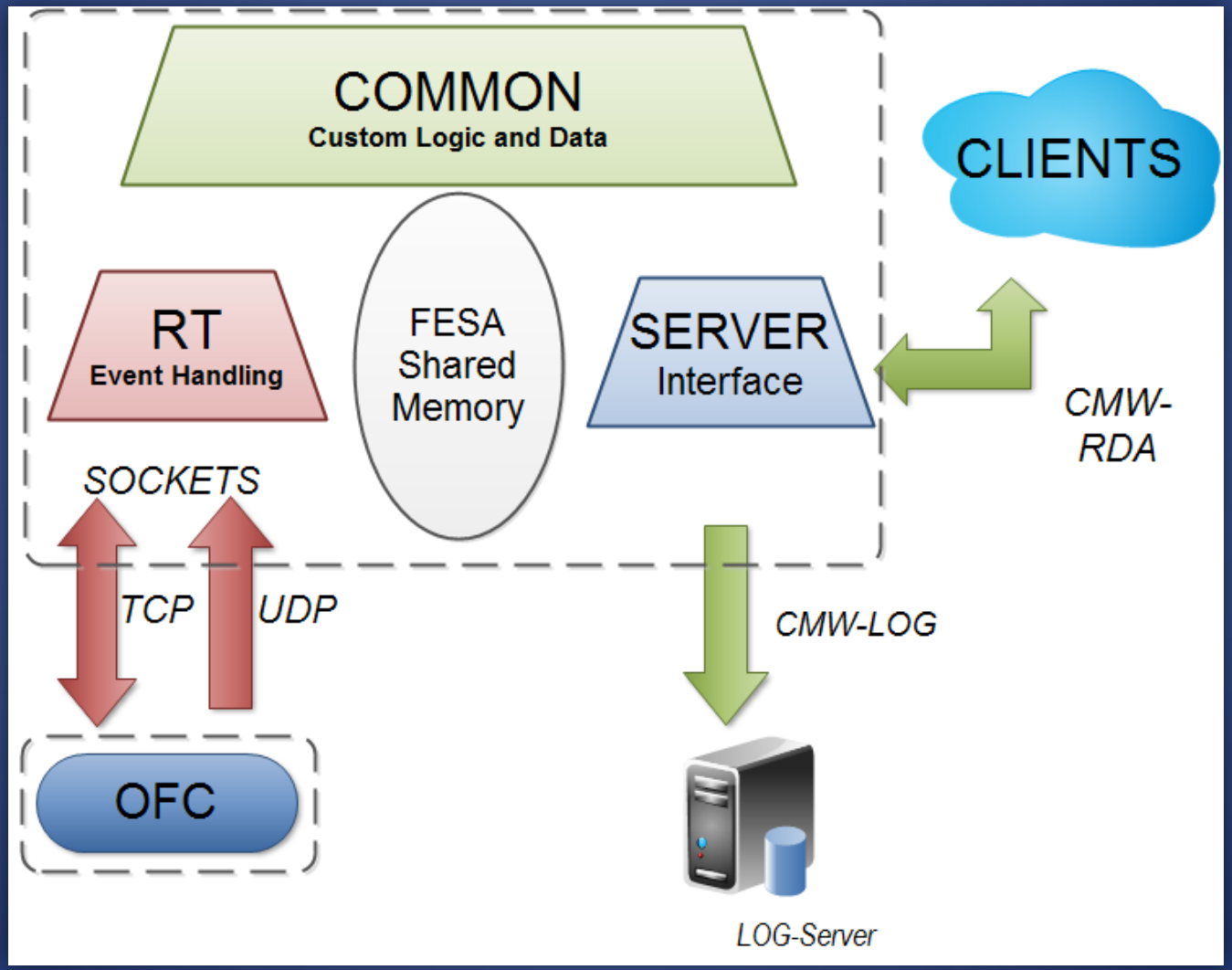
Complexity


400
300
200
100
0
Max Complexity
OFSU
LDM
BCTFPS

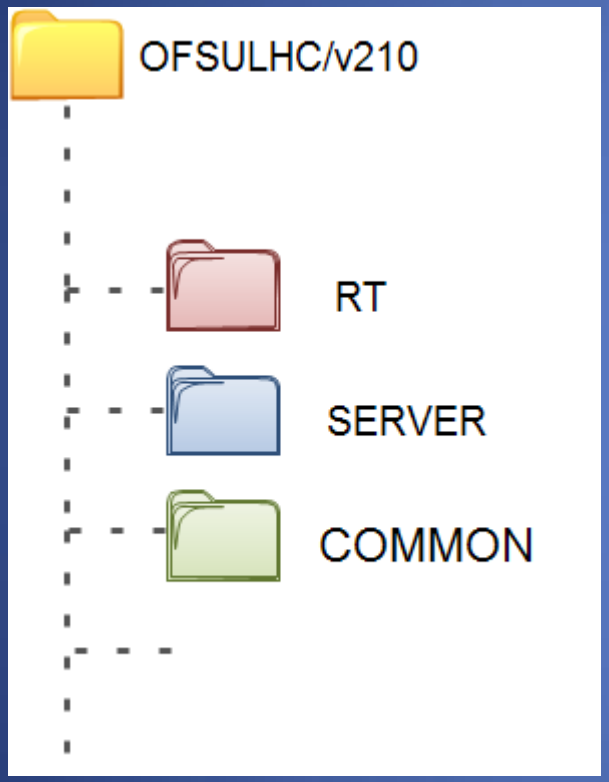

6
5
4
3
2
1
0
Avg Complexity

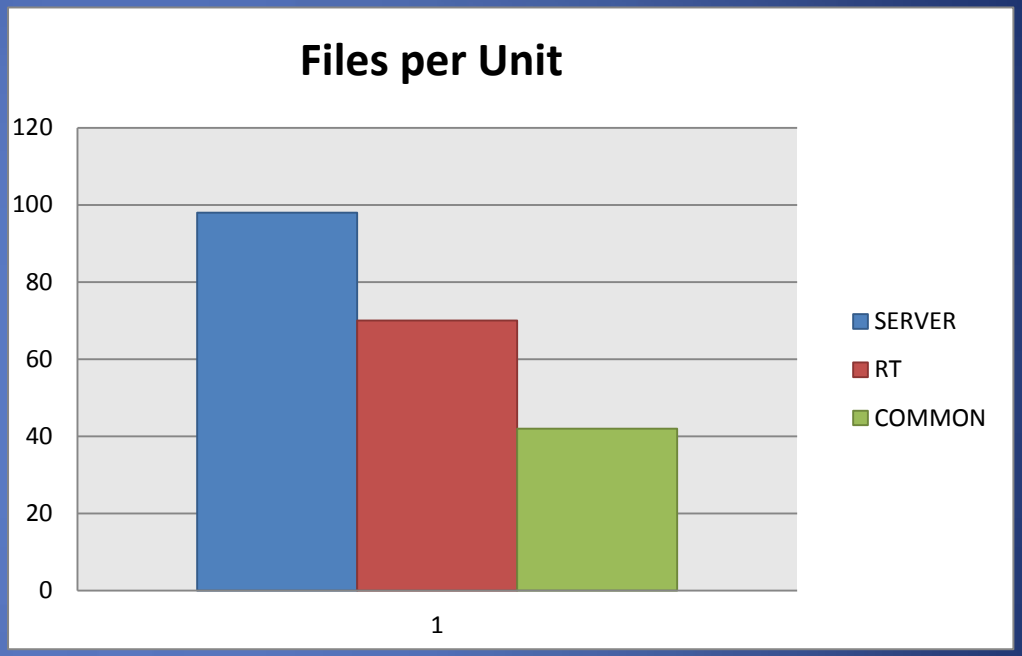

Real Time Part
Comm. Part
RT-Action 1
RT-Action 2
RT-Action 3
RT-Action 4
Serv. Action 1
Serv. Action 2
Common Event Scheduler
MTG event Dispatcher
Event Dispatchers
MTG receiver
Custom Events
Timer Events
CMW-RDA Middleware
MTG Timing
OFC Network etc.
Clients

Architecture



Code distribution





Shared memory

afOFCDown;
afCmdChannelBlocked;
afOFCRestarted;
fOFCHostName;
fOFSUHostName;
fPacketLateThreshold;
ofcCmdTCPSocketTimeout;
fTgm_fillNo;
fTgm_energy;
fTgm_intensityB1;
fTgm_intensityB2;
fTgm_opticsID;
fRawOFCCommand;
fOFCReply;
fStatuses_ofc;
fStatuses_ofcMsg;
fStatuses_bctA;
fStatuses_bctAMsgs;
fStatuses_bctB;
fStatuses_bctBMsgs;
fStatuses_bpmlhcconc;
fStatuses_bpmlhcconcMsgs;
fbState_beenSet;
fOrbitCorrection_fbState;
fEnergyCorrection_energyFBState;
fEnergyCorrection_radialLoopFBState;
fEnergyCorrection_userRFTrim_dp;
fEnergyCorrection_masterSwitchState;
fEnergyCorrection_radialModState;
fEnergyCorrection_radialModAmpl;
fEnergyCorrection_radialModFreq;
bpmMask_beenSet;
fBPMConcentrator_maskOP;
fBPMConcentrator_tempMaskOP;
codMask_beenSet;
fCODConcentrator_mask;
fIntensities_bctSystem;
fBPMSensitivity_switch;
fBPMSensitivity_level;
fSettings_timeStamp;
fEnergyCorrection_userRFTrim;
fCODSender_userCODVectorRad;
fCODSender_userCODVectorAmp;
fFeedForward_ChangeByUser;
fFeedForward_timeStamp;
fExpertSettings_loggingNotificationPeriod;
fExpertSettings_timeStamp;
fROrbit_refMeasurements;
fROrbit_base;
fROrbit_baseFillNo;

fROrbit_baseOrigin;
fROrbit_baseInfo;
fROrbit_baseUploadTime;
fROrbit_scalings;
fROrbit_ReqScalings;
fROrbit_armedScalingsH;
fROrbit_armedScalingsV;
fROrbit_timeConstant;
fROrbit_ArmedTimeConstant;
fROrbit_minScalings;
fROrbit_maxScalings;
fROrbit_bumpsH;
fROrbit_bumpsV;
fROrbit_bumpFillNos;
fROrbit_bumpOrigins;
fROrbit_bumpInfos;
fROrbit_bumpUploadTimes;
fROrbit_bumpStatuses;
fROrbit_baseValidity;
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fROrbit_timeStamp;
fROrbit_BPM_Masks;
fROrbit_refOrbitChanging;
fROrbit_UseMeasuredChangeByUser;
fROrbit_BaseChangeByUser;
fROrbit_ScalingsChangeByUser;
fROrbit_BumpsChangeByUser;
fROrbit_measuredOrbitAsRef;
fROrbit_isArmed;
fOrbitCorrection_alg;
fOrbitCorrection_gemvType;
fOrbitCorrection_flipSign;
fOrbitCorrection_enforceAntiWindup;
fOrbitCorrection_defaultInputGains;
fOrbitCorrection_defaultOutputGains;
fOrbitCorrection_devInputGains;
fOrbitCorrection_devOutputGains;
fOrbitCorrection_fbOutputVectorH;
fOrbitCorrection_fbOutputVectorV;
fOrbitCorrection_maxOrbitDeviation;
fOrbitCorrection_userGainModifierOrbit;
fOrbitCorrection_gainModifierOrbit;
fOrbitCorrection_gainModeOrbit;
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fOrbitCorrection_timeStamp;
fEnergyCorrection_changedByUser;
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fEnergyCorrection_useEnergyOFC;
fEnergyCorrection_energyRefOFC;
fEnergyCorrection_energyRefOFSU;

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fEnergyCorrection_subtractEnergyMismatchState;
fEnergyCorrection_subtractRFMismatchState;
fEnergyCorrection_momentumCompaction;
fEnergyCorrection_RFMismatchValid;
fEnergyCorrection_FrequencyMismatch;
fEnergyCorrection_EnergyValid;
fEnergyCorrection_EnergyMismatch;
fEnergyCorrection_radialLoopBW;
fEnergyCorrection_radialOpenLoopBW;
fEnergyCorrection_timeStamp;
fEnergyCorrection_rfRingCoupling;
fEnergyCorrection_dispersionCorrectionFactorB1;
fEnergyCorrection_dispersionCorrectionFactorB2;
fEnergyCorrection_userGainModifierRadialLoop;
fEnergyCorrection_gainModifierRadialLoop;
fEnergyCorrection_gainModeRadialLoop;
fEnergyCorrection_energyFBBW;
fEnergyCorrection_energyOpenLoopBW;
fEnergyCorrection_userEnergyOffset;
fBPMConcentrator_samplingPeriod;
fBPMConcentrator_singleRMSCut;
fBPMConcentrator_orbitRMSCut;
fBPMConcentrator_freeRunningMode;
fBPMConcentrator_graceTime;
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fBPMConcentrator_maxGraceTime;
fBPMConcentrator_errRateDetThreshold;
fBPMConcentrator_maskBI;
fBPMConcentrator_maskOFC;
fBPMConcentrator_tempMaskOFC;
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fBPMConcentrator_lengthAvgWindowSlow;
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fBPMConcentrator_forcedBIMask;
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fBPMConcentrator_offsets;

fBPMConcentrator_orbitRawModePreference;
fBPMConcentrator_bpmModeOverride;
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fBPMConcentrator_timeStamp;
fBPMConcentrator_changedByUser;
fCODConcentrator_samplingPeriod;
fCODConcentrator_lengthAvgWindowMedium;
fCODConcentrator_lengthAvgWindowSlow;
fCODConcentrator_timeStamp;
fCODSender_enableSendGateway;
fCODSender_calibrations;
fCODSender_clampings;
fCODSender_maxCurrents;
fCODSender_timeStamp;
fOptics_mode;
fOptics_serverDir;
fOptics_dir;
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fOptics_fetchStatusMsgs;
fOptics_nFetchStatusMsgs;
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fOptics_names;
fOptics_ids;
fOptics_origins;
fOptics_dates;
fOptics_times;
fOptics_comments;
fOptics_calcOpticsNo;
fOptics_selectOption;
fOptics_eigenvalueCutRatio;
fOptics_nEigenvaluesCut;
fOptics_performInversionTest;
fOptics_calcHStatus;
fOptics_calcHStatusMsgs;
fOptics_nCalcHStatusMsgs;
fOptics_calcVStatus;
fOptics_calcVStatusMsgs;
fOptics_nCalcVStatusMsgs;
fOptics_calcStatus;
fOptics_calcStatusMsgs;
fOptics_nCalcStatusMsgs;
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fOptics_codMask;
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fOptics_codTwiss_v;
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fOptics_activeRMV;
fOptics_activeRMInvH;
fOptics_activeRMInvV;
fOptics_activeDefaultOpticsType;
fOptics_defaultOpticsIds;
fOptics_loadableOptics;
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fOpticsMagic_autoOpticsUpload;
fOpticsMagic_useMaskStateOnly;
fOpticsMagic_recomputeOpticsDelay;
fOptics_activeOptNameInOFC;
fOpticsMagic_changedByUser;
fOFCMappingsUsed;
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fNBPMCrates;
fBPMNames_h;
fBPMNames_v;
fBPMComments_h;
fBPMComments_v;
fBPMCrateNames;
fBPMToCrateMappings_h;
fBPMToCrateMappings_v;
fNCODs;
fNCODCrates;
fCODNames_h;
fCODNames_v;
fCODCrateNames;
fCODToCrateMappings_h;
fCODToCrateMappings_v;
fSettingsRFMole_LatchingOn;
fSettingsRFMole_LatchingReset;
fSettingsRFMole_LatchingLimit;
fSettingsOFSU_orbitPublishTrigger;
fSettingsOFSU_tcpWatchdogTrigger;
fSettingsOFSU_tcpWatchdogTriggerPeriod;
fSettingsOFSU_logging;
fSettingsOFSU_loggingNotifyMode;
fSettingsOFSU_loggingNotifyPeriod;
fSettingsOFSU_BMODE_Strings;
fSettingsOFSU_BMODE_Periods;

fSettingsOFSU_BMODE_Now;
fSettings_TInterlink_ConsoleIO;
fSettings_TInterlink_IODebugLevel;
fSettings_TInterlink_ActiveMessageIndex;
fSettings_TInterlink_UpTime;
fSettings_TInterlink_NumberCPUs;
fSettings_TInterlink_CPUClockFrequency;
fOrbitAcquired;
fCrateStateAcquired;
fCircuitStrengthAcquired;
fTuneAcquired;
fReconnectedToOFCCmdPort;
fOFCRestarted;
fOFSUJustStarted;
fBPMStatusMaskOFC;
fBPMStatusMaskOP;
fBPMStatusMaskOFSU;
fBPMStatusMaskOFSU_noPacket;
fBPMStatusMaskOFSU_latePacket;
fBPMStatusMaskOFSU_spike;
fBPMStatusMaskOFSU_step;
fBPMStatusMaskOFSU_errorRate;
fCODStatusMaskOFC;
fCODStatusMaskOP;
fCODStatusMaskOFSU;
fCODStatusMaskOFSU_noPacket;
fCODStatusMaskOFSU_latePacket;
fCODStatusMaskOFSU_errorRate;
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fResetEnergyFB_state;
fOrbitAcqTime;
fOrbitAcqTime_prev;
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fCycleTime;
fMOrbitOrigin;
fMOrbitInfo;
fUTCTime_s_mOrbit;
fUTCTime_ms_mOrbit;
fPositions;
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fBPMErrorRates;
fBPMDABTemperatures;
fBPMStatuses;
flQCStatuses;
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fPositionStatistics;
fBPMMask;
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fDeflectionErrors;
fCODErrorRates;
fCODFGCTemperatures;
fCODStatuses;
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fCODCratePayloads3;
fCODCratePayloads4;
fCODCrateStatuses;
fCODCrateMask;
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fIntensities_turnHistory;
fIntensities_bunchHistoryB1;
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fIntensities_bctAcqTime;
fIntensities_bctAcqStamp;
fIntensities_bunchPopulationMask;
fIntensities_bunchBeamThreshold;
fIntensities_avgBeam;
fIntensities_avgBunch;
fIntensities_bestLifetime;
fIntensities_statistics;
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fIntensities_ofsuAcqTime;
fIntensities_bctDeviceNames;
fIntensities_bctPropertyName;
fIntensities_threshold;
fIntensities_lowRatio;
fBPMSensitivity_bpmlhcconcDeviceName;
fBPMSensitivity_bpmlhcconcPropertyName;
fInfo_build;
fInfo_startTime;
fInfo_deviceName;
fResetQQpFB_state;
fQQpSetting_tuneFBStateB1;
fQQpSetting_tuneFBStateB2;
fQQpSetting_chromaFBStateB1;
fQQpSetting_chromaFBStateB2;
fQQpSetting_couplingFBStateB1;
fQQpSetting_couplingFBStateB2;
fQQpSetting_timeStamp;
fQQpMapping_nElements;
fQQpMapping_elementNames;
fQQpMapping_paramNamesB1;
fQQpMapping_paramNamesB2;
fQQpChangeByUser;
fQQpReference_tuneB1;
fQQpReqReference_tuneB1;
fQQpReference_tuneB2;
fQQpReference_armedTuneB1_H;
fQQpReference_armedTuneB1_V;
fQQpReqReference_tuneB2;
fQQpReference_armedTuneB2_H;
fQQpReference_armedTuneB2_V;
fQQpReference_chromaB1;
fQQpReqReference_chromaB1;
fQQpReference_armedChromaB1_H;
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fQQpReference_chromaB2;
fQQpReqReference_chromaB2;
fQQpReference_armedChromaB2_H;
fQQpReference_armedChromaB2_V;
fQQpReference_couplingB1;
fQQpReqReference_couplingB1;
fQQpReference_couplingB2;
fQQpReqReference_couplingB2;
fQQpReference_timeStamp;
fQQpReference_timeConstant;
fQQpReference_armedTimeConstant;
fQQpReference_isArmed;
fQQpCorrection_sendingEnable;
fQQpCorrection_rmB1;
fQQpCorrection_rmB2;

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fQQpCorrection_fbGainsB1;
fQQpCorrection_fbGainsB2;
fQQpCorrection_ffInputB1;
fQQpCorrection_ffInputB2;
fQQpCorrection_timeStamp;
fQQpCorrection_TuneStabilityThreshold;
fQQpCorrection_defaultResponse;
fQQpCorrection_useAvgTunes;
fQQpCorrection_useEigenmodes;
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fTune_acqStamp;
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fTune_info;
fTune_eigenmodeFreq;
fTune_eigenmodeAmpl;
fTune_eigenmodeCrossAmpl;
fTune_eigenmodeSNRatio;
fTune_eigenmodeWidth;
fTune_eigenmodeStability;
fTune_tune;
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fTune_couplingPhase;
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fTune_tuneSearchWindow_max;
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fTune_chromaMethod;
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fTune_modulationStatus;
fTune_sideExciterStatus;
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fTune_sideExciterAmplB2;
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fTune_sideExciterPhaseB2;
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fTune_spectrumB2;
fTune_rawDataB1;
fTune_rawDataB2;
fTune_windowType;
fQQpCircuitStrength_acqStamp;
fQQpCircuitStrength_currentOrigin;
fQQpCircuitStrength_currentInfo;
fQQpCircuitStrength_nElements;
fQQpCircuitStrength_currents;
fQQpCircuitStrength_currentErrors;
fQQpCircuitStrength_refCurrents;
fQQpCircuitStrength_statuses;
fQQpCircuitStrength_selection;
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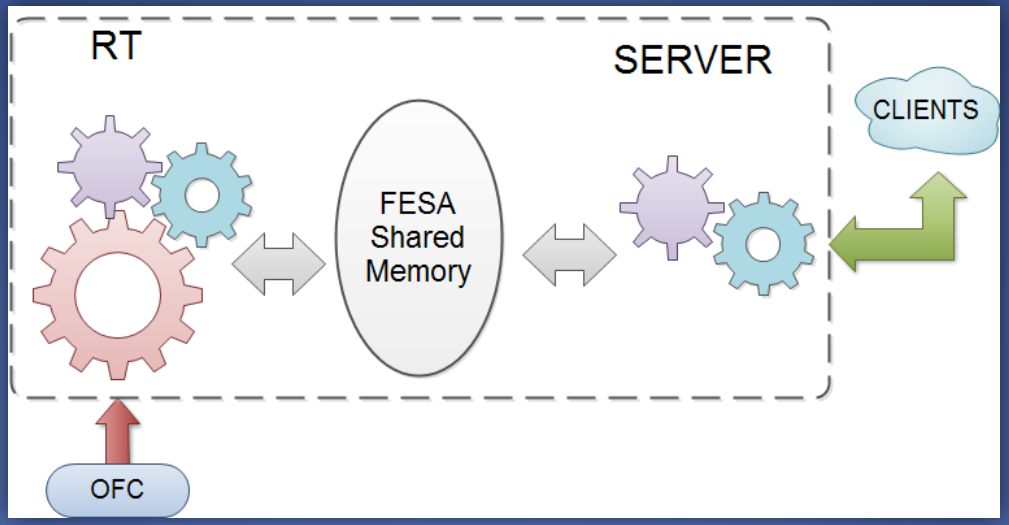
fQQpCircuitStrength_ofcIntegratedStrengthErrors;
fQQpCircuitStrength_ofcDiagnostics;

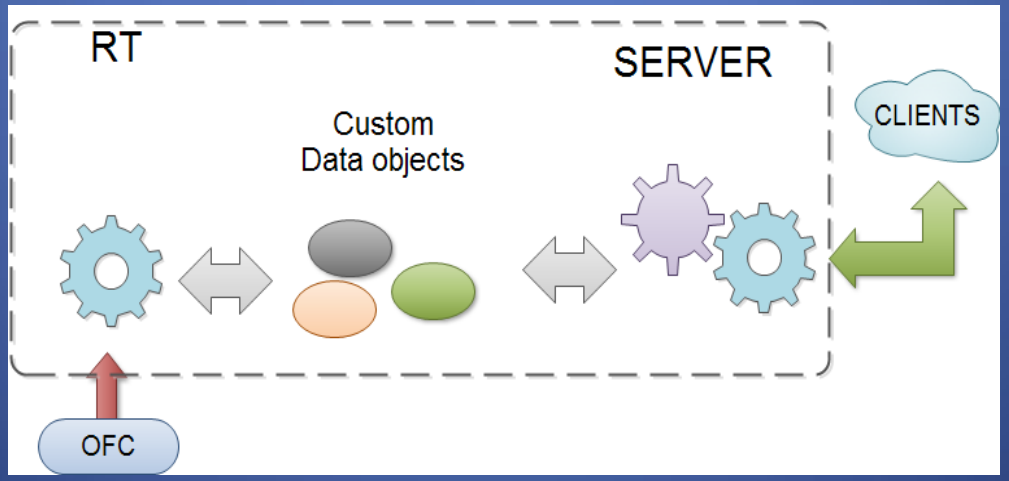
+ Other Data not mapped to Fesa Device fields meta model but to custom made data structures

Cost of being so large

- Easy target for human error
- Data handled programmatically (formatted and reshuffled) to fullfill FESA datatype model.
- Current FESA data storage model is flat = poor encapsulation.
- Yet FESA framework is still a way to organize it!
- Thread safety of the shared memory data is left to developers discipline.

Processing data for short-term storage





27 Real Time routines

UDP workers

BPMSensitivityAcquisition,
CircuitStrengthAcquisition
CrateStateAcquisition
OrbitAcquisition
OrbitRetransmission
TuneAcquisition

Optics related workers

OpticsFetch
PrePostRMComputation
RMComputation
RMHComputation
RMUpload
RMVComputation
OpticsChange

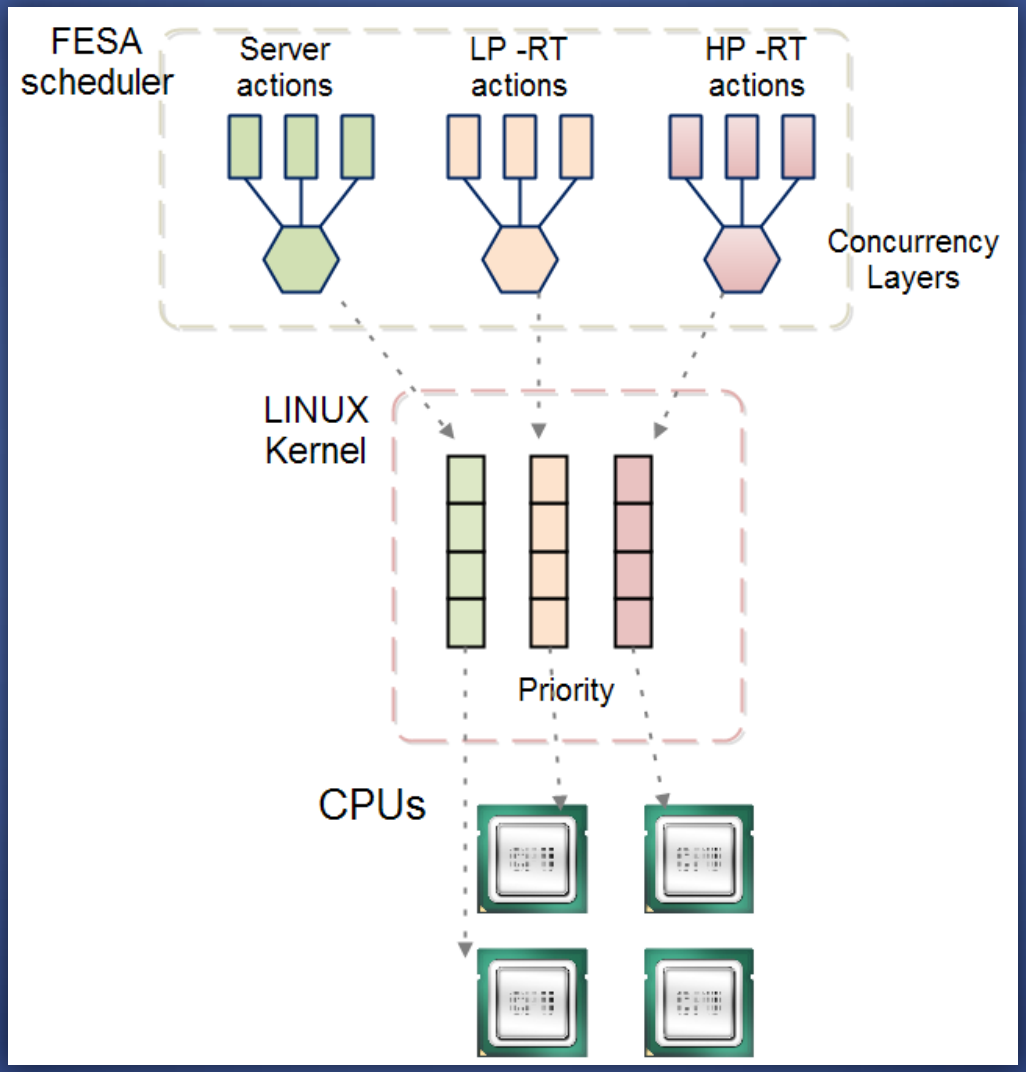
.. Others (MTG synched actions etc.)

ActiveOpticFetch
CopyArmedToRequstedOrbit
CopyArmedToRequstedTune
IQCDataPush
OFCStateRestore
OFCStateSave
OFSULHCRealtime
Publish
SetGetPeriodicTCPData
TCPWatchdog
TgmAcquisition

Custom triggers

……

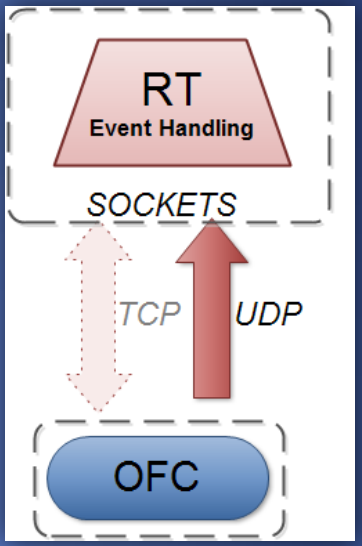
Task scheduling



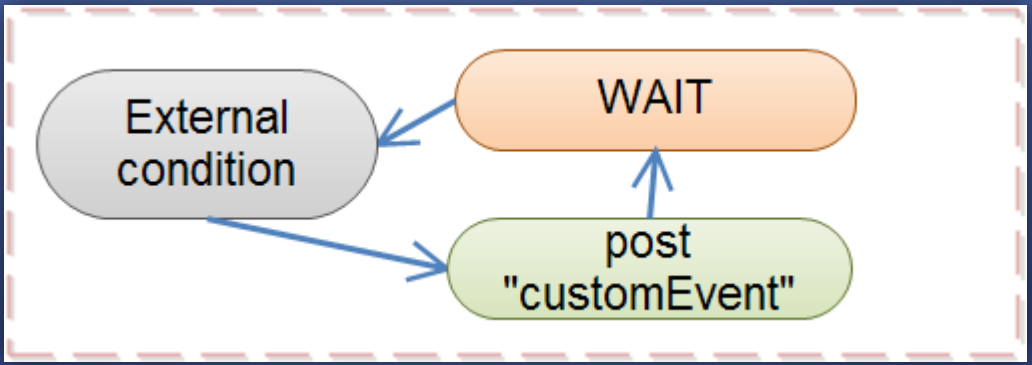
RT – UDP network triggererd

Custom Event Sources

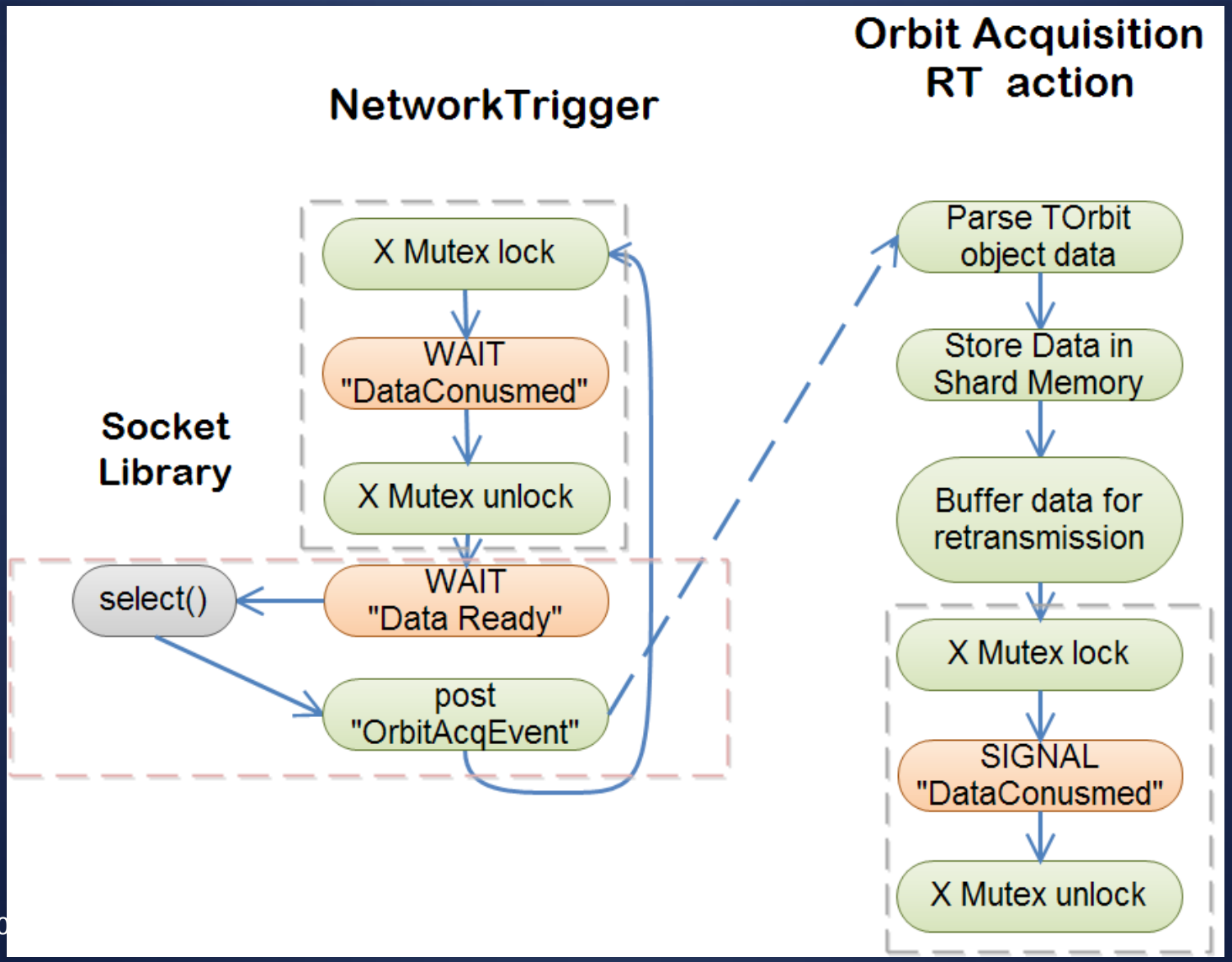
OrbitAcqTrigger
CrateStateAcqTrigger
TuneAcqTrigger
PublishTrigger
OFCStateRestoreTrigger
TCPWatchdogTrigger



Custom Trigger Mechanism



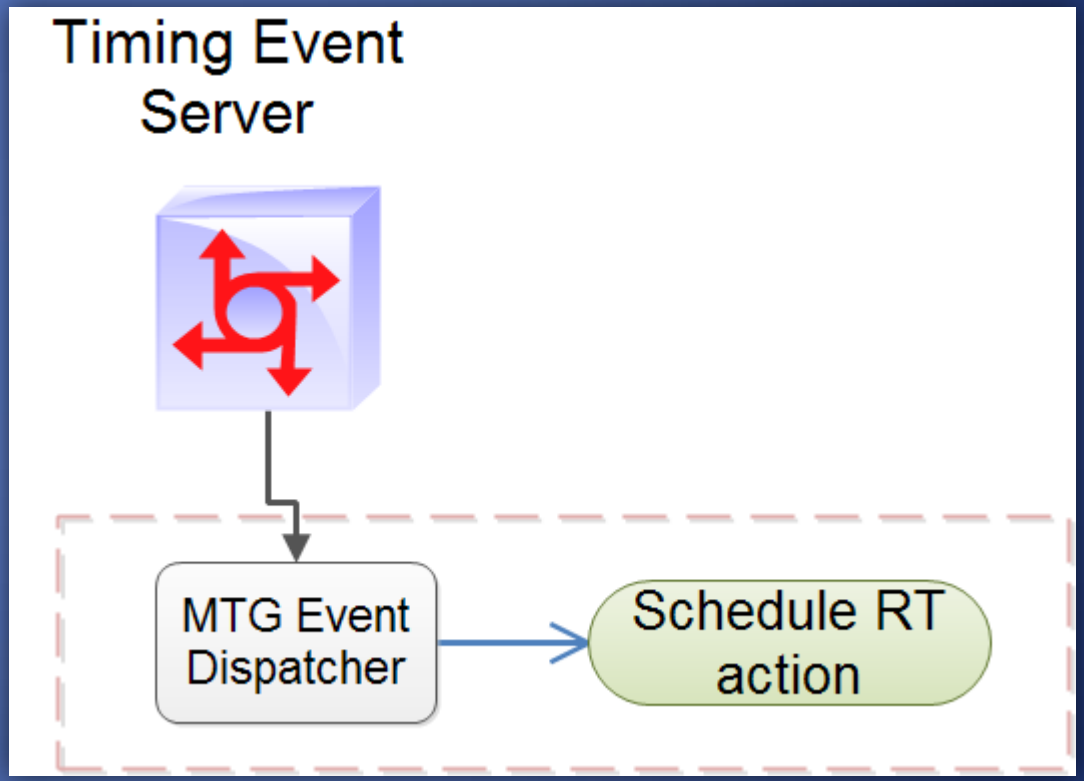
Example


Orbit Acquisition
RT action
NetworkTrigger
X Mutex lock
WAIT
"DataConusmed"
X Mutex unlock
Socket
Library
select()
WAIT
"Data Ready"
post
"OrbitAcqEvent"
Parse TOrbit
object data
Store Data in
Shard Memory
Buffer data for
retransmission
X Mutex lock
SIGNAL
"DataConusmed"
X Mutex unlock

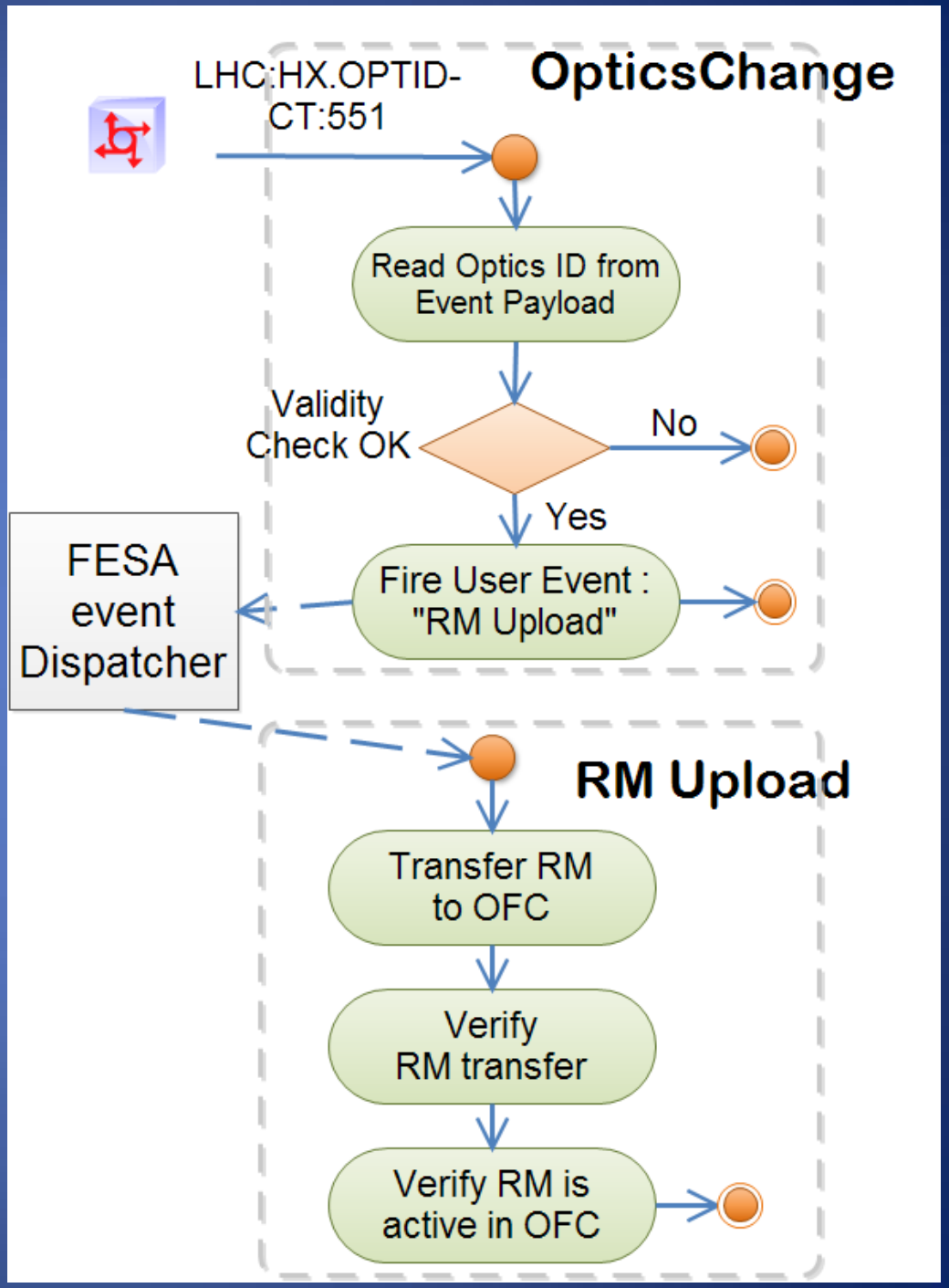
RT – MTG/User/Timer

MTG mapped events

LoadRefQQpEvent
LoadRefOrbitEvent
TgmReadyEvent
BeamInjectionEvent
OpticsChangeEvent

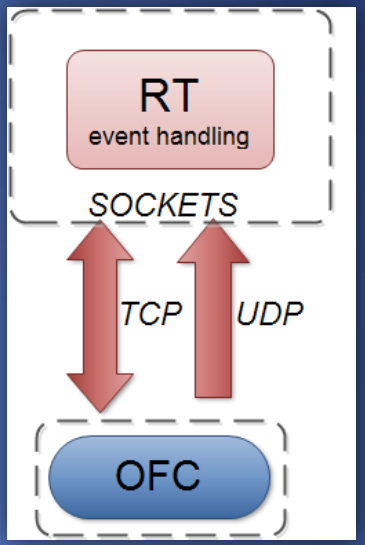


Example


LHC:HX.OPTID-CT:551
OpticsChange
Read Optics ID from Event Payload
Validity Check OK
No
Yes
Fire User Event : "RM Upload"
FESA event Dispatcher
RM Upload
Transfer RM to OFC
Verify RM transfer
Verify RM is active in OFC

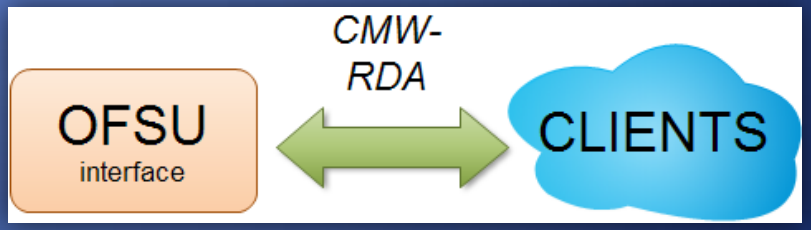
Network bandwidth

- Total data rate over eth1: 140Mbit/s
- Synchronous data (Orbit, Tune, CrateState, BPMSensitivity..) through UDP : 93% = 130Mbit/s
- Settings Synchronisation over TCP: 7% =10Mbit/s



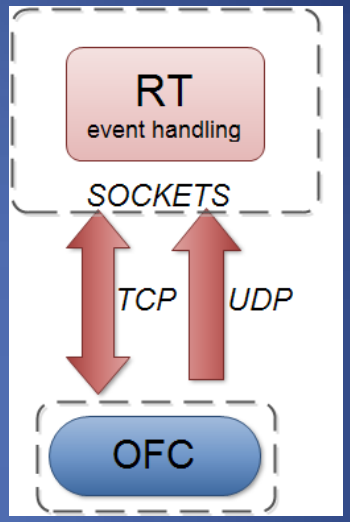
- CMW-RDA :log over eth0 with 8 clients :

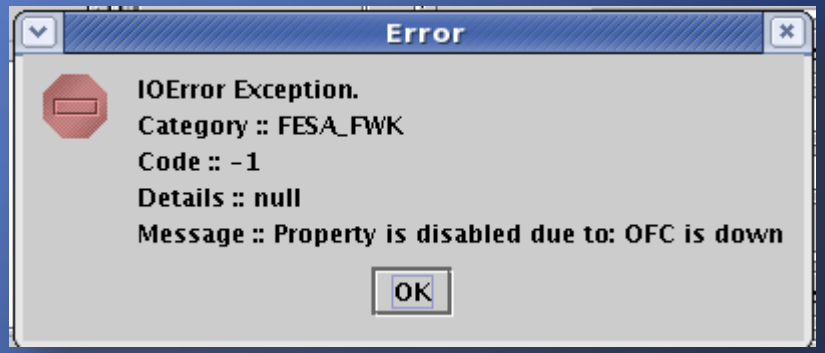
  8-7 Kbit/s



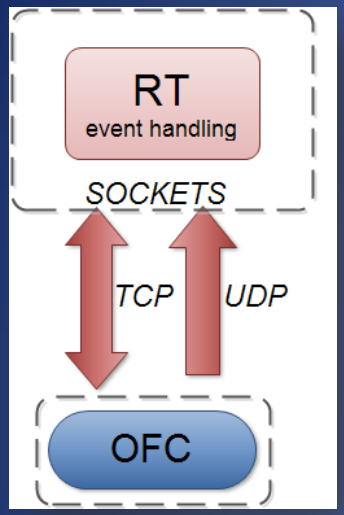
TCP Watchdog

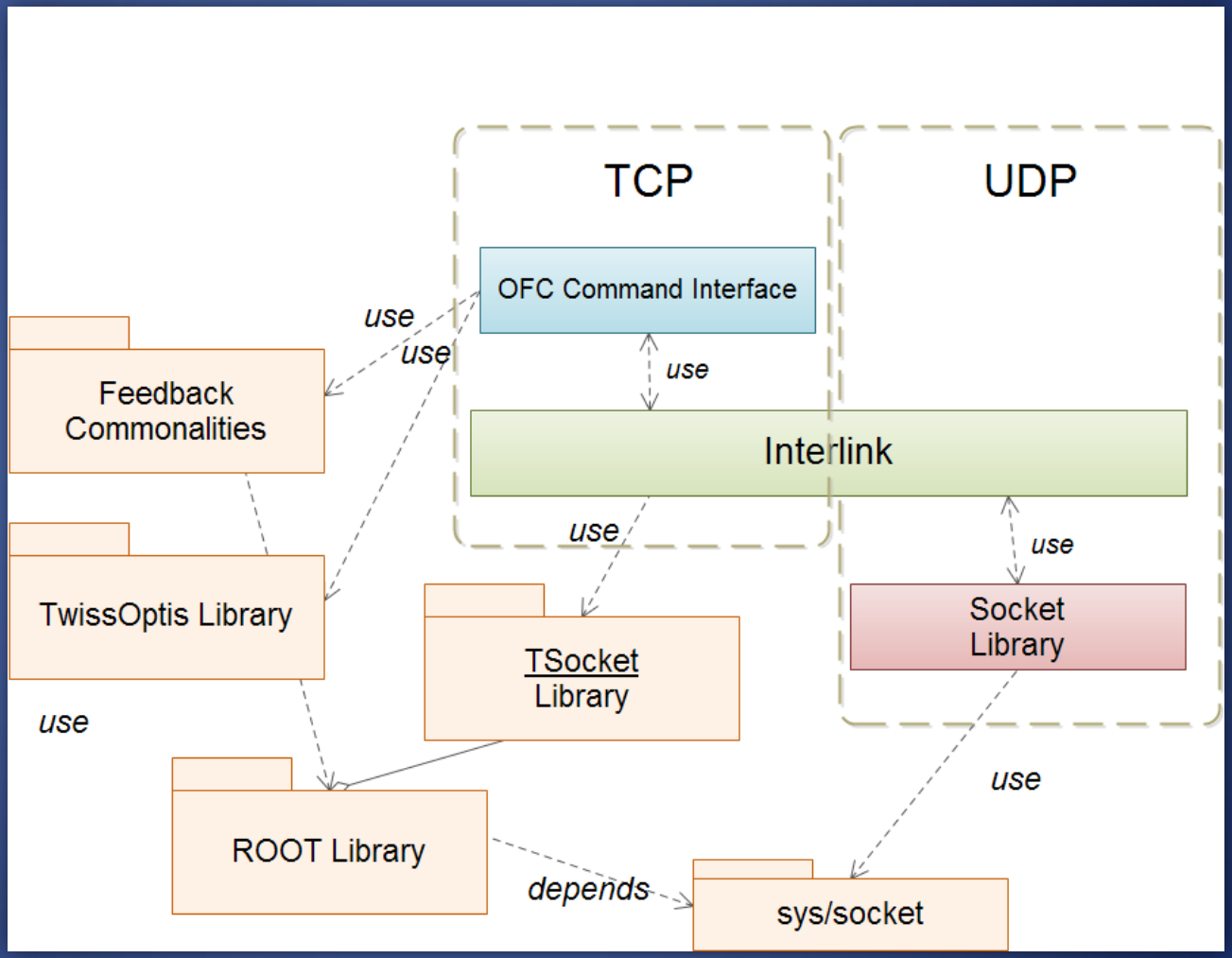
- Periodic TCP Server Connection Check
- Status of the TCP socket is inspected
- Connection is down certain SERVER actions become disabled





OFC – OFSU link SW



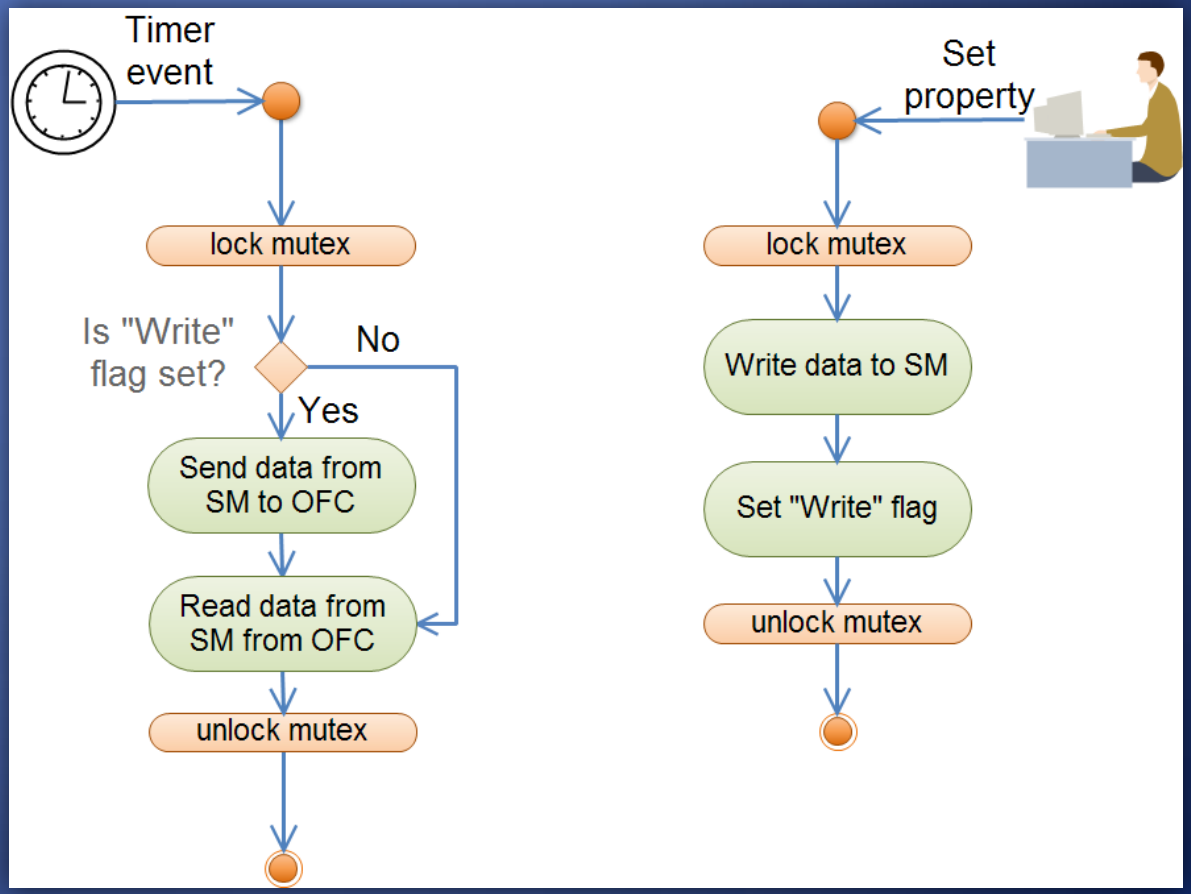


OFC -OFSU data synch

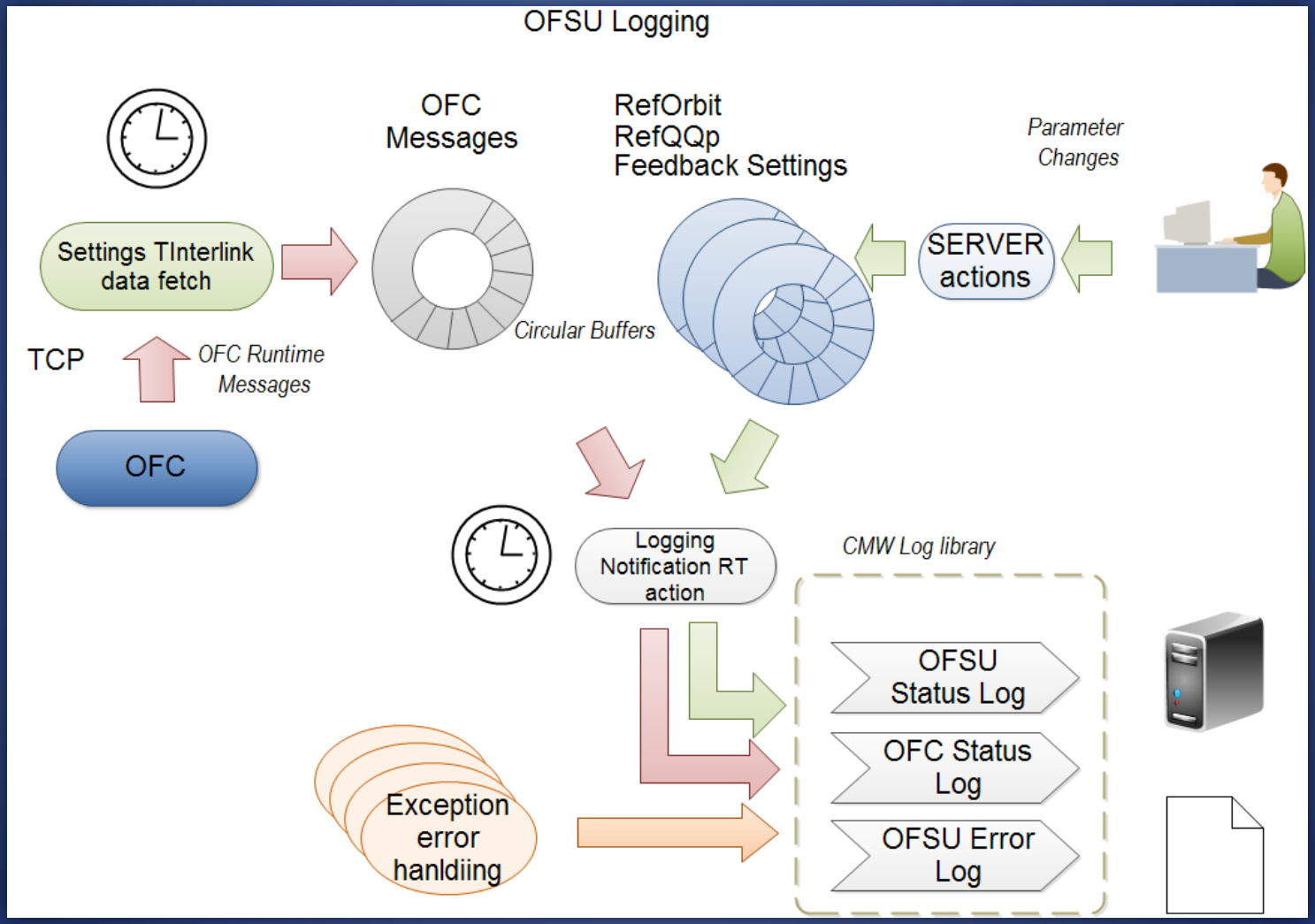
- 137 parameters have to be in synch between OFC and OFSU.

Synched parameter categories

Energy correction
QQpCorrection
SettingsTInterlink
RefQQPData
Settings
SettingsOrbit
ReOrbit_scalings
RefOrbit_bumps (V-H)

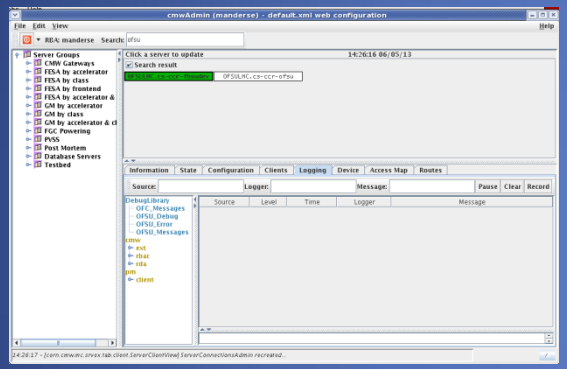


Logging

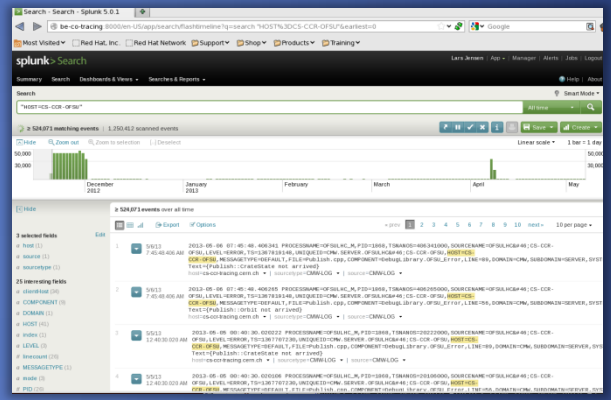

OFSU Logging
OFC Messages
RefOrbit
RefQQp
Feedback Settings
Parameter Changes
Settings TInterlink data fetch
SERVER actions
Circular Buffers
TCP
OFC Runtime Messages
OFC
Logging Notification RT action
CMW Log library
OFSU Status Log
OFC Status Log
OFSU Error Log
Exception error hanldiing

Viewing of logged data

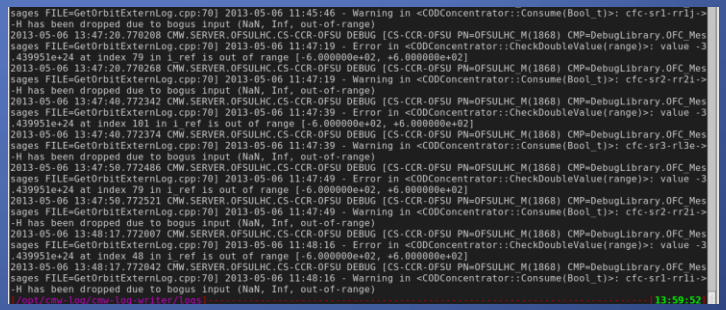
CMW Admin tool



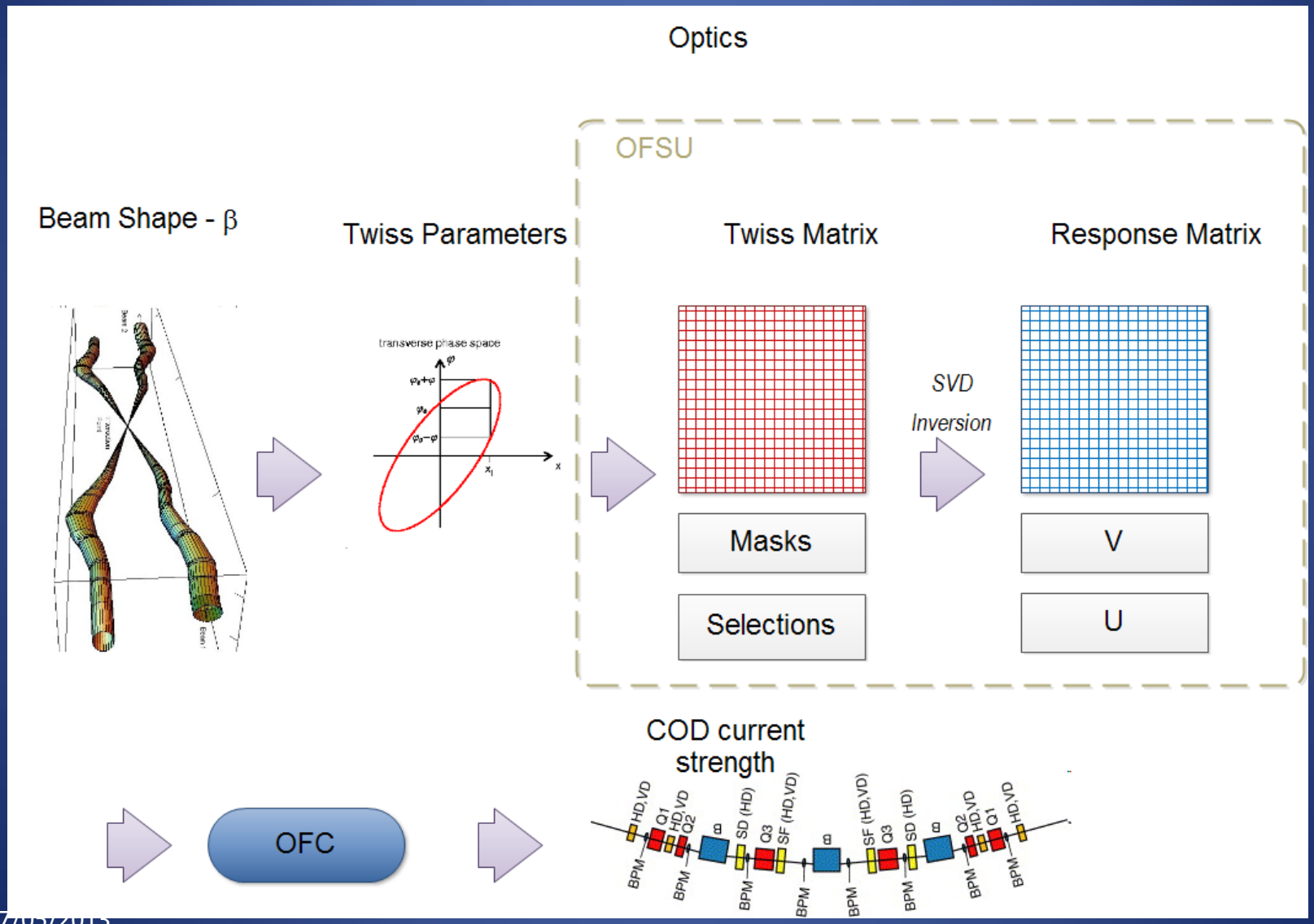
Splunk



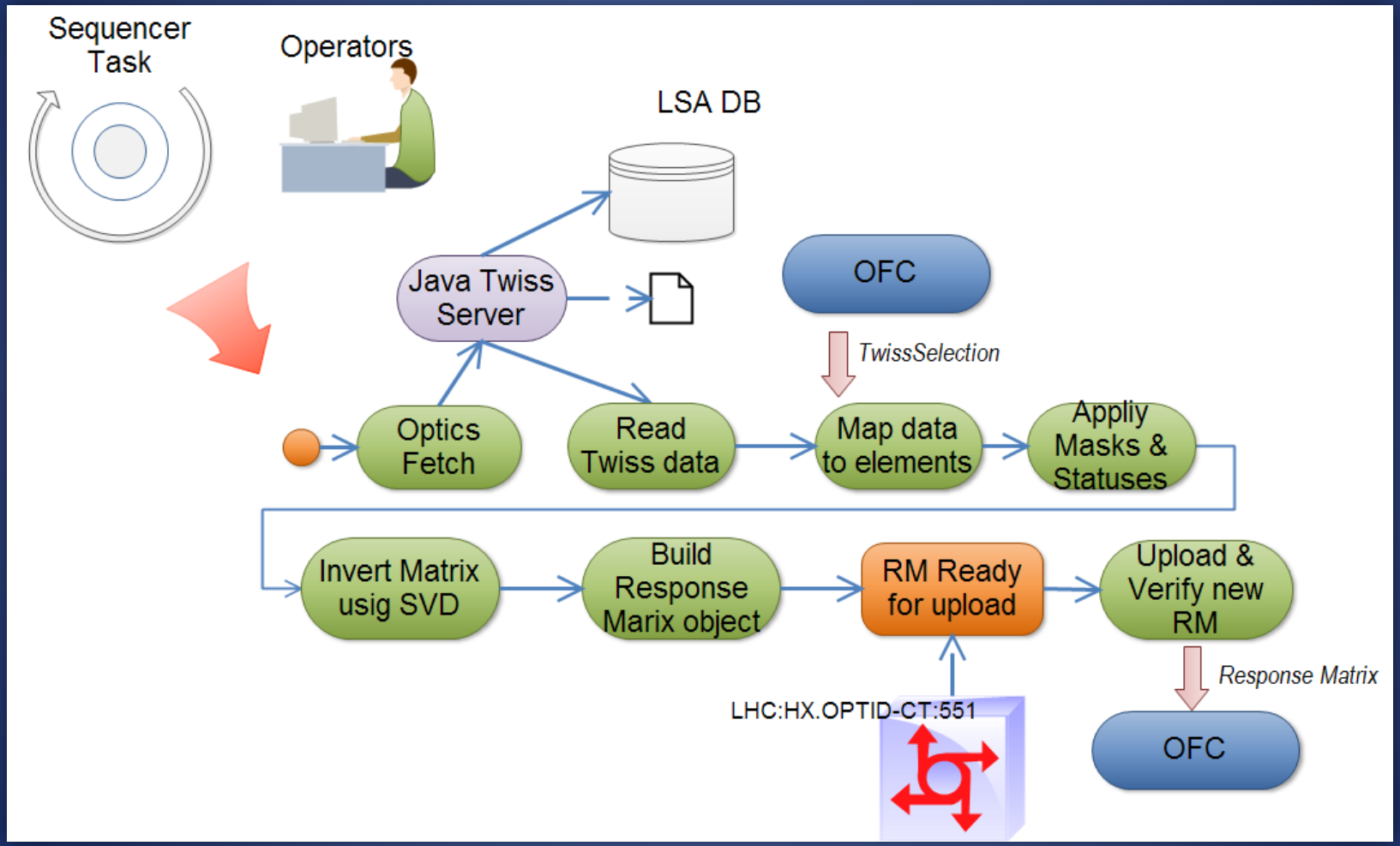
CMW log files



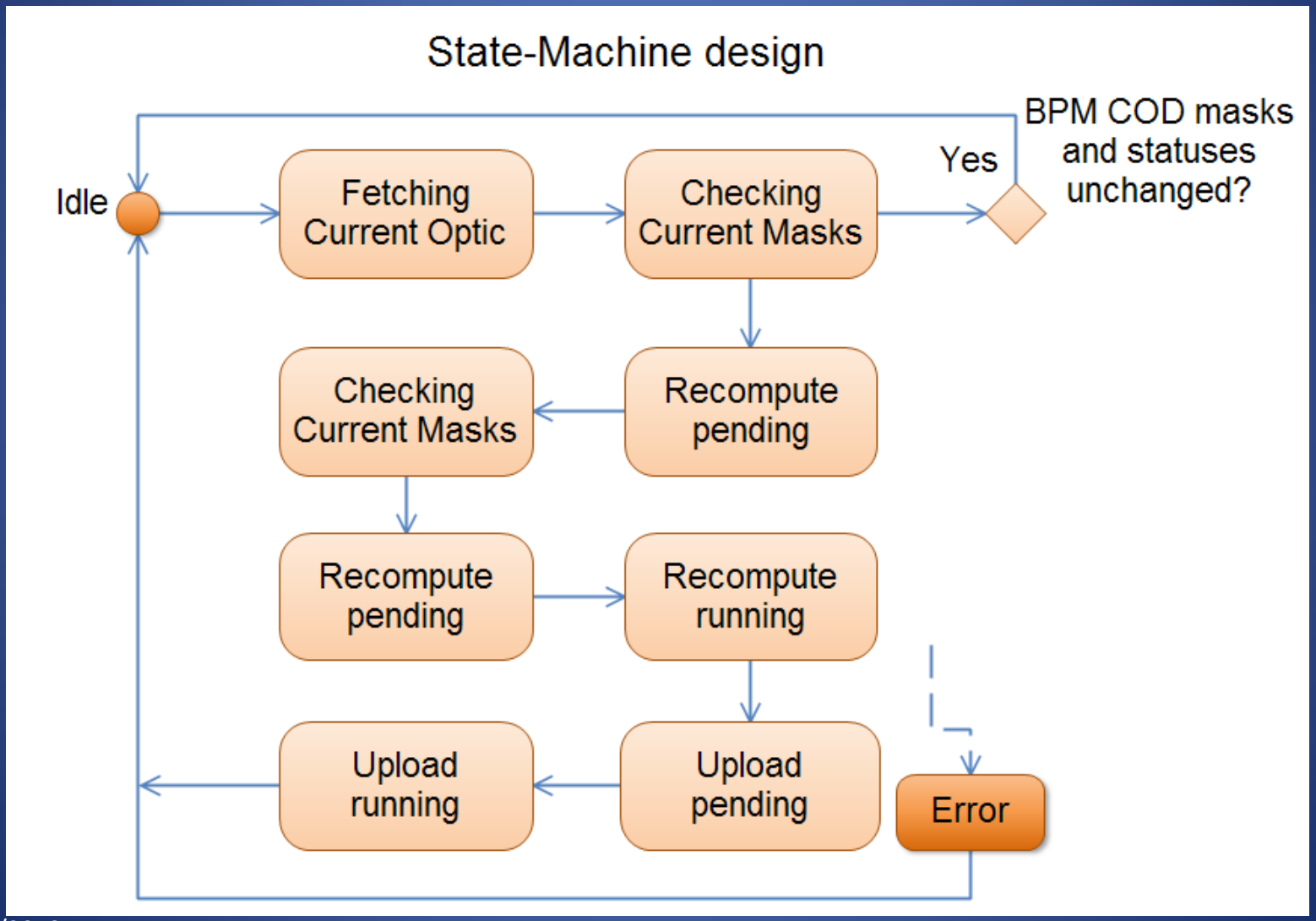
Optics


Optics
OFSU
Beam Shape - β
Twiss Parameters
Twiss Matrix
Response Matrix
transverse phase space
SVD
Inversion
Masks
Selections
V
U
OFC
COD current strength
BPM
HD,VD
Q1
Q2
SD (HD)
Q3
SF (HD,VD)

Optics computation

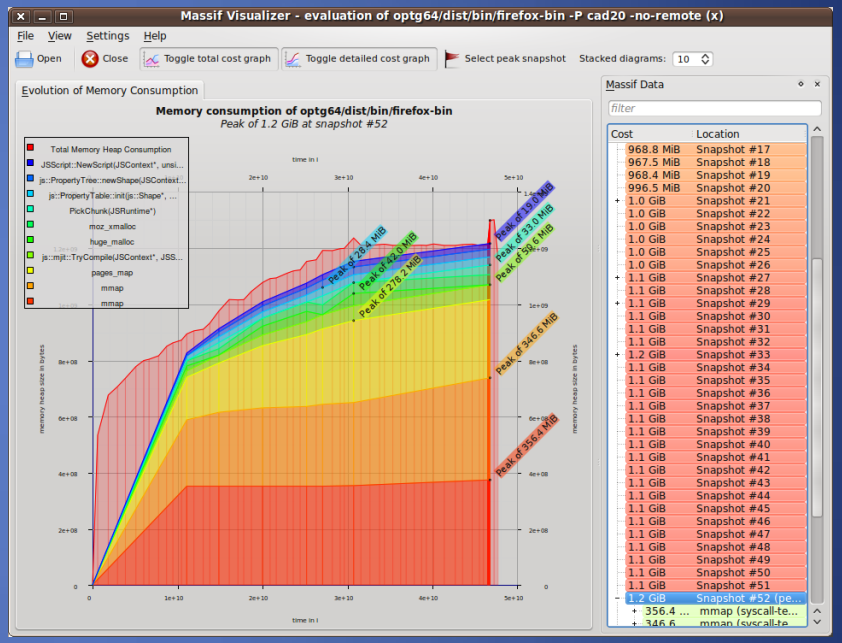


Optics recomputation



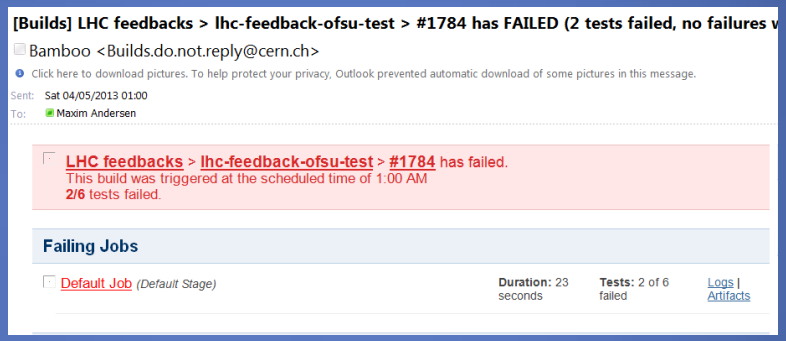
Problems of the past

- 2010-2012 Memory leaks/corruption (errors in the code)
- Both in OFSU own codebase and external libraries
- Synchronisation issues
- Fesa Server interface buffer overrun (mem. corruption related)



Testing

- Bamboo – build server testing:



2013-2014 objectives

- Test-validate Optics Recomputation feature
- Implement Long term raw orbit logging
- Extend scope of error and status logging
- Introduction to Fesa III
- Code correctness analysis with '*Coverity*' tool BE-CO-MW
- Dynamically allocated structures are vulnerable in exception conditions – need to be equipped with *auto-pointers*

Q & A

OFSU Failure overview (last weekend)

OFSU Saturday 13/10/12						
	7:42*	7:49	9:13	11:03-11:07	11:35	17:43
OP Reboot	✓	✓	✓	✓	✓	
Automatic Reboot (Crash)						✗

OFSU Sunday 14/10/12					
	1:28	1:49	4:46	5:34	10:20*
OP Reboot				✓	✓
Automatic Reboot (Crash)	✗	✗	✗		

✓ **Partial Failure** requiring active restart by OP.

✗ **Complete Failure** (actomatic restart). Results in loss of Optics Functions and Ref Orbit. Critical during RAMP and SQUEEZE => Beam Dump. (CORE dump is produced, so easier to debug)

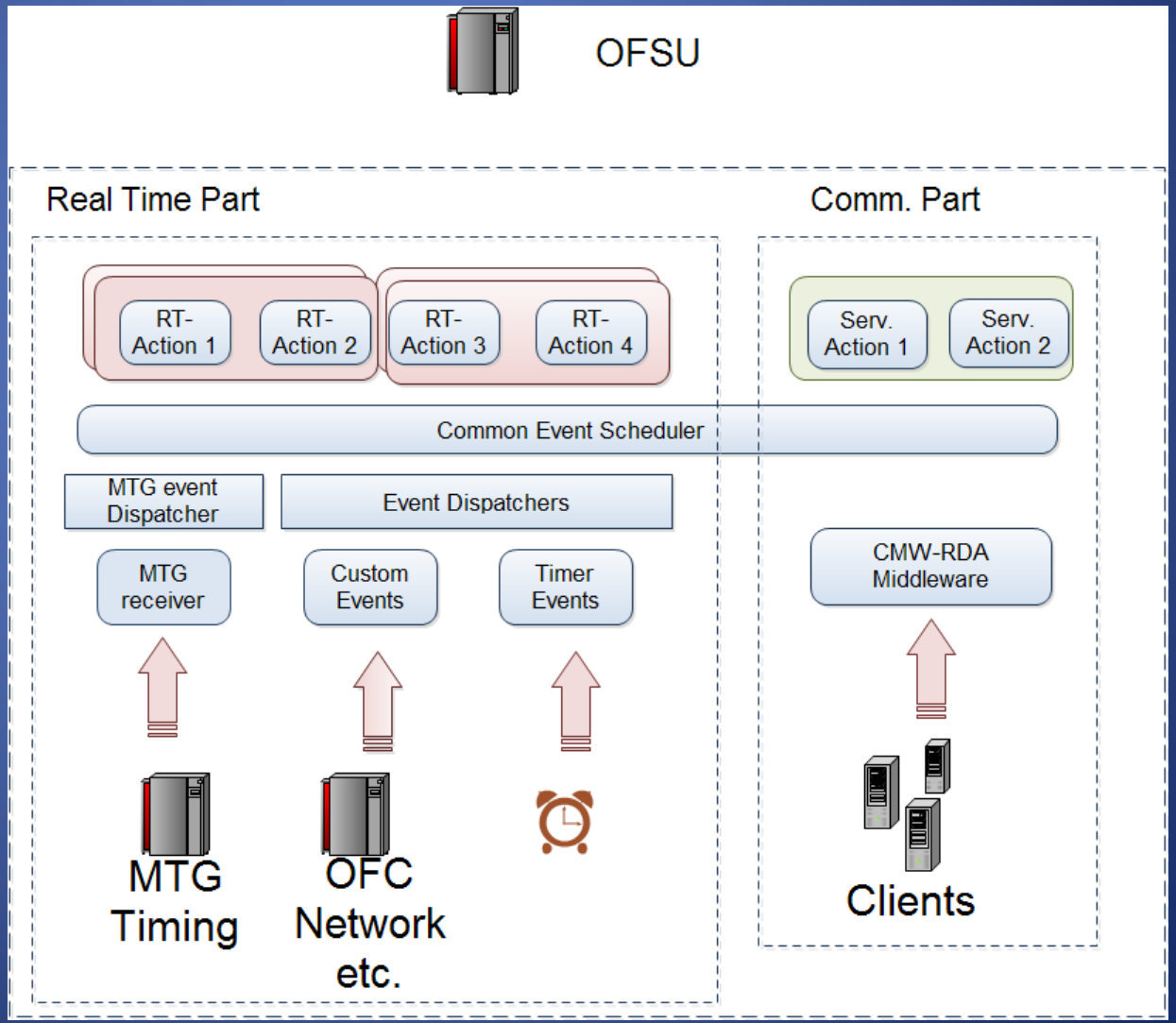
Partial Failure

- The system becomes **partially** broken:

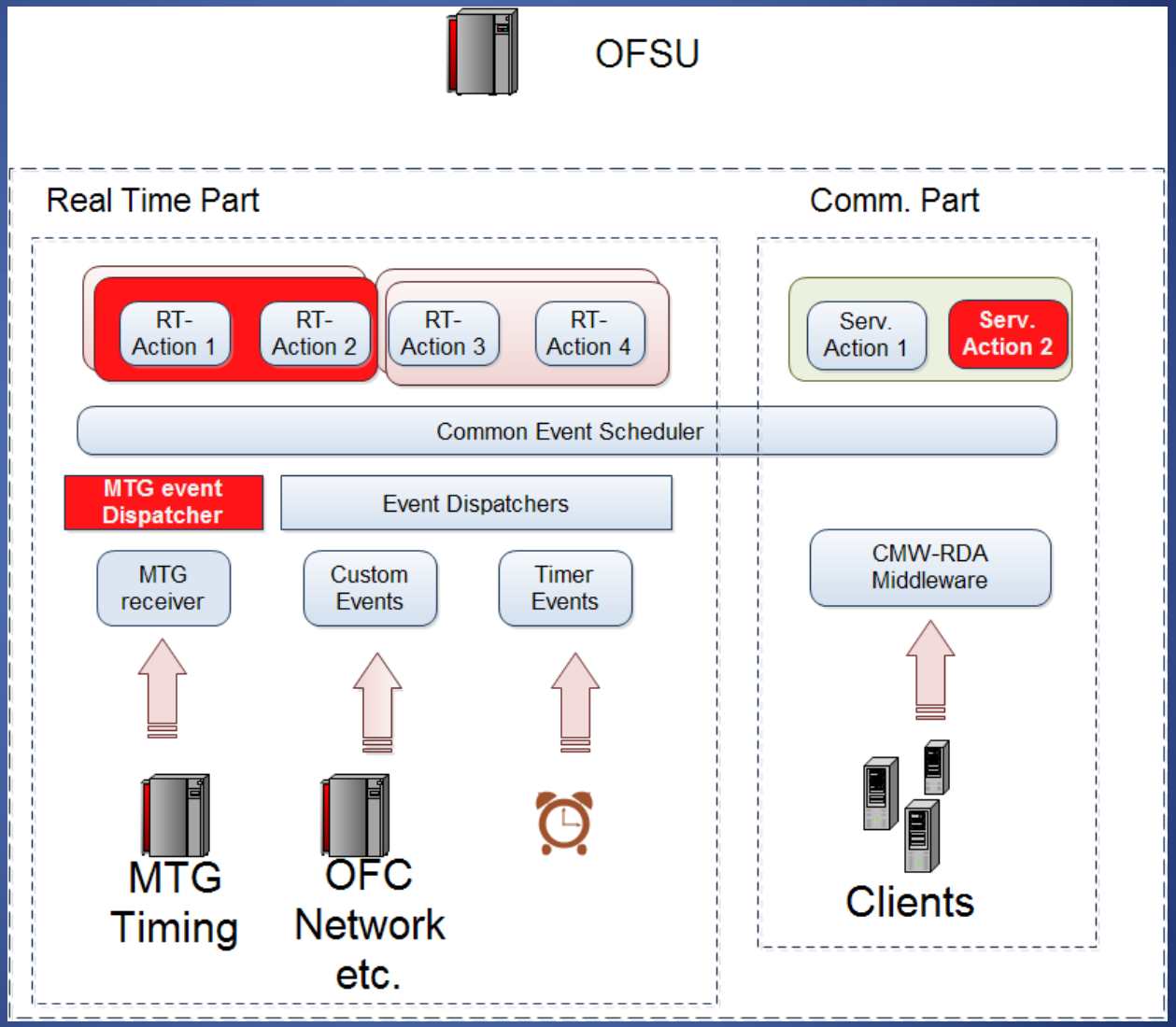
MTG data is not refreshed (BMODE, ENERGY..)

- MTG triggered RT actions are no longer executed
- Most of the time (but not always) accesses to select few or (all) Properties are not working.
- At the same time other Properties like Tune and Orbit may continue to be published in a normal way.

Basic Internal structure



- Affected by **PARTIAL** failure



Failure Assessment methods

- Fesa Profiling
- FESA Logger
- Tracing logs
- CMW logs
- GDB Debugger insertion in a running server
- Core dump analysis

Nature of the partial failure

- Highly Unpredictable & and difficult to reproduce occured only once on the *development* server.
- Comes in bursts, multiple during the weekend but no problems since Monday 10:31, without any change from our side.
- Stress tests on DEV do not provoke it.
- Attempts to reproduce have been made earlier this year:
  - Impementing and running slow consuming Fesa Clients. Failed to reporduce errors.
  - Fesa Team: Deployed a simulation server with same MTG Timing behaviour in hope to detect same errors. Not succeeded in reproducing errors.
- Very little evidence showing what exactly fails and why it fails

Progress:

- Memory leak eliminated (faulty file inclusion) deployed Sept 19.
- RBAC Authentication (CMW team) fix
- Just week ago, memory corruption error (in Circular buffer)has been fixed.
- The last error explains full system failures marked with . SW redeployment will remove those.
- It is possible that the **partial** failures nd crashes are related.

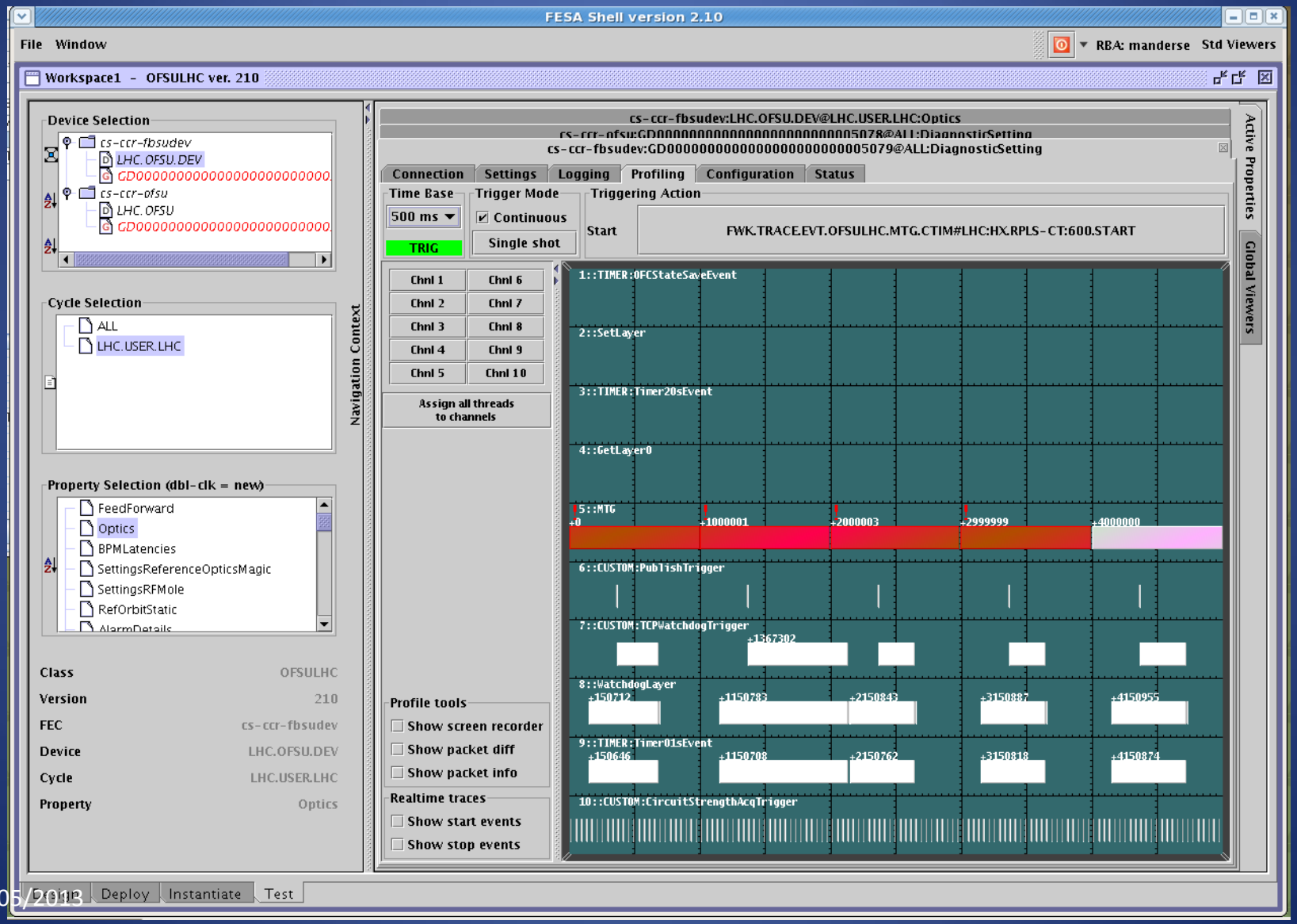
Tools used

- Valgrind
- Massif
- Post crash core analysis
- Fesa Diagnostics
- CMW admin

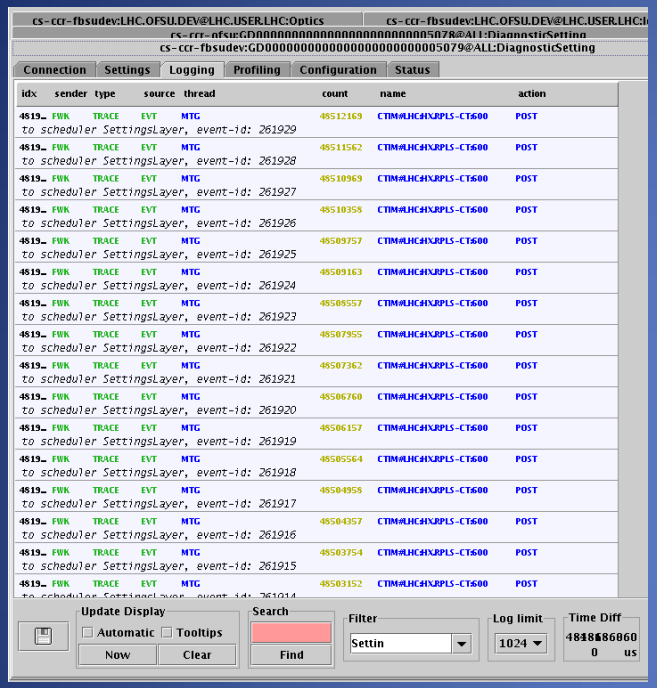
To do next:

- Redeploy operational OFSU with latest fixes:
  - Critical system, needs validation
  - Stress has been ongoing on DEV
  - Redeployement on PRO will require validation:
  - A: 1 dry run through cycle without beam
  - B: 1 test ramp with a probe.
- Continue attempts to artifically recreate/provoke the probmem.
- In partial failure diagnostics has given a few hints: A measure will be implemented to remove potential vulnerability.
- Long Term: Inquire about debugging tools that could help this problem. (Intel compiler and tools) BE-CO group collaboration.

Diagnostics:FESA profiling



Diagnostics: FESA Logging



event-id: 86013

3823… FWK TRACE EVT MTG 38345169 CTIM#LHC#XRPLS-CT&00 START
event-id: 86013

3823… FWK TRACE EVT MTG 38344700 CTIM#LHC#XRPLS-CT&00 STOP
event-id: 86012

3823… FWK TRACE EVT MTG 38344697 CTIM#LHC#XRPLS-CT&00 START
event-id: 86012

Diagnostics:FESA Logging

```
4819_ FWK    TRACE    EVT    MTG                    48506157   CTIM#LHC#HX.RPLS-CT&00    POST
to scheduler SettingsLayer, event-id: 261919
4819_ FWK    TRACE    EVT    MTG                    48505564   CTIM#LHC#HX.RPLS-CT&00    POST
to scheduler SettingsLayer, event-id: 261918
4819_ FWK    TRACE    EVT    MTG                    48504958   CTIM#LHC#HX.RPLS-CT&00    POST
to scheduler SettingsLayer, event-id: 261917
4819_ FWK    TRACE    EVT    MTG                    48504357   CTIM#LHC#HX.RPLS-CT&00    POST
to scheduler SettingsLayer, event-id: 261916
```

Diagnostics: Debugger injection

```
Thread 47 (Thread 0xa8ffab90 (LWP 22926)):
#0  0xb7f2e410 in __kernel_vsyscall ()
#1  0x44178de3 in __lll_lock_wait_private () from /lib/libc.so.6
#2  0x440f3306 in _L_lock_51 () from /lib/libc.so.6
#3  0x440f3203 in fwrite () from /lib/libc.so.6
#4  0x44533146 in ?? () from /usr/lib/libstdc++.so.6

#5  0x44535fac in std::basic_ostream<char, std::char_traits<char> >& std::operator<< <std::char_traits<char> >(std::basic_ostream<char,
std::char_traits<char> >&, char const*) () from /usr/lib/libstdc++.so.6

#6  0x0831db11 in OFSULHC::SUDebugger::traceEnter (this=0xa0c8520, debugClassName=Traceback (most recent call last):
File "/usr/share/gdb/python/libstdcxx/v6/printers.py", line 469, in to_string
return self.val['_M_dataplus']['_M_p'].string (encoding, length = len)
KeyboardInterrupt: Quit
, debugFunctionName=Traceback (most recent call last):
File "/usr/share/gdb/python/libstdcxx/v6/printers.py", line 469, in to_string
return self.val['_M_dataplus']['_M_p'].string (encoding, length = len)
KeyboardInterrupt: Quit
) at SUDebugger.cpp:201

#7  0x083fb0a2 in OFSULHC::OpticsChange::execute (this=0xa3b3140, rtEvent=0xa491cd8) at OpticsChange.cpp:29
#8  0x083dc35c in RTAction<RTEvent, OFSULHC::OFSULHCGlobalStore, OFSULHC::OFSULHCDevice>::execute (this=0xa3b3140,
pEv=0xa491cd8)
at /acc/local/L865/fesa/2.10.5/include/fesa/RTAction.h:35
#9  0x08481a34 in RTScheduler::schedule (this=0xa8bcdd0, pEvent=0xa491cd8) at RTScheduler.cpp:210
```

Diagnostics:Logs monitoring

manderse@cs-ccr-abbi4/acc/dsc/lhc/cs-ccr-ofsu/bin

File Edit View Terminal Tabs Help

manderse@cs-ccr-abbi4~ | manderse@cs-ccr-abbi4~ | manderse@cs-ccr-abbi4~ | manderse@cs-ccr-abbi4/acc/dsc/lhc/cs-...

```
Oct 14 02:36:14 cs-ccr-ofsu daemon.info<30> dhclient:  DHCPACK from 172.18.202.71 (xid=0x4c88bab7)
Oct 14 02:36:14 cs-ccr-ofsu daemon.info<30> dhclient:  bound to 172.18.203.153 -- renewal in 21349 seconds.
Oct 14 02:38:18 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated mount request from cs-ccr-ofsu.cern.ch:775 for /data/vol30/local/slc5 (/data
)
Oct 14 02:38:18 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated mount request from cs-ccr-ofsu.cern.ch:778 for /data/vol30/local (/data)
Oct 14 02:43:45 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated unmount request from cs-ccr-ofsu.cern.ch:888 for /data/vol30/local (/data)
Oct 14 02:43:45 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated unmount request from cs-ccr-ofsu.cern.ch:891 for /data/vol30/local/slc5 (/da
ta)
-bash-4.1$
-bash-4.1$
-bash-4.1$
-bash-4.1$
-bash-4.1$
-bash-4.1$
-bash-4.1$ zgrep -i "cs-ccr-ofsu" messages-20121015.gz
Oct 14 04:02:06 cs-ccr-ofsu local1.info<142> lcm[11109]:  LCM version 0.6 started by root at: Sun Oct 14 04:02:06 2012
Oct 14 04:02:06 cs-ccr-ofsu local1.info<142> lcm[11109]:  Running daily
Oct 14 04:02:06 cs-ccr-ofsu local1.notice<141> lcm[11109]:  no components selected (in /etc/lcm.conf or on command line)
Oct 14 04:22:01 cs-ccr-ofsu local1.info<142> lcm[13469]:  LCM version 0.6 started by root at: Sun Oct 14 04:22:01 2012
Oct 14 04:22:01 cs-ccr-ofsu local1.info<142> lcm[13469]:  Running weekly
Oct 14 04:22:01 cs-ccr-ofsu local1.notice<141> lcm[13469]:  no components selected (in /etc/lcm.conf or on command line)
Oct 14 04:46:21 cs-ccr-ofsu user.emerg<8> OFSULHC_M[9619]:  FWK|ERROR|Critical signal received: #11/SIGSEGV: OFSULHC, RT process has been aborted!
Oct 14 04:46:43 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated mount request from cs-ccr-ofsu.cern.ch:793 for /data/vol30/local/slc5 (/data
)
Oct 14 04:46:43 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated mount request from cs-ccr-ofsu.cern.ch:796 for /data/vol30/local (/data)
Oct 14 04:46:44 cs-ccr-felhc daemon.notice<29> rpc.mountd[2519]:  authenticated mount request from cs-ccr-ofsu.cern.ch:799 for /data/dsclhc/lhc (/data/
dsclhc)
Oct 14 04:46:44 cs-ccr-nfs2 daemon.notice<29> mountd[6684]:  authenticated mount request from cs-ccr-ofsu.cern.ch:809 for /data/vol1 (/data)
Oct 14 04:52:30 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated unmount request from cs-ccr-ofsu.cern.ch:905 for /data/vol30/local (/data)
Oct 14 04:52:30 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated unmount request from cs-ccr-ofsu.cern.ch:908 for /data/vol30/local/slc5 (/da
ta)
Oct 14 04:52:30 cs-ccr-felhc daemon.notice<29> rpc.mountd[2519]:  authenticated unmount request from cs-ccr-ofsu.cern.ch:912 for /data/dsclhc/lhc (/dat
a/dsclhc)
Oct 14 04:52:48 cs-ccr-nfs2 daemon.notice<29> mountd[6684]:  authenticated unmount request from cs-ccr-ofsu.cern.ch:919 for /data/vol1 (/data)
Oct 14 05:06:07 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated mount request from cs-ccr-ofsu.cern.ch:621 for /data/vol30/local/slc5 (/data
)
Oct 14 05:06:07 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated mount request from cs-ccr-ofsu.cern.ch:624 for /data/vol30/local (/data)
Oct 14 05:06:56 cs-ccr-ofsu user.warning<12> OFSULHC_M[26478]:  USR|ERROR|Response matrix 1876 (A60C60A300_0.00889L300_0.00875_2012), plane 0, uploaded
 NOT OK
Oct 14 05:06:56 cs-ccr-ofsu user.warning<12> OFSULHC_M[26478]:  USR|ERROR|Response matrix 1876 (A60C60A300_0.00889L300_0.00875_2012), plane 1, uploaded
 NOT OK
Oct 14 05:07:20 cs-ccr-ofsu user.warning<12> OFSULHC_M[26478]:  USR|ERROR|Response matrix 1876 (A60C60A300_0.00889L300_0.00875_2012), plane 0, uploaded
 NOT OK
Oct 14 05:07:20 cs-ccr-ofsu user.warning<12> OFSULHC_M[26478]:  USR|ERROR|Response matrix 1876 (A60C60A300_0.00889L300_0.00875_2012), plane 1, uploaded
 NOT OK
Oct 14 05:11:15 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated unmount request from cs-ccr-ofsu.cern.ch:802 for /data/vol30/local (/data)
Oct 14 05:11:15 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated unmount request from cs-ccr-ofsu.cern.ch:805 for /data/vol30/local/slc5 (/da
ta)
Oct 14 05:22:19 cs-ccr-nfs1 daemon.notice<29> mountd[6724]:  authenticated mount request from cs-ccr-ofsu.cern.ch:1013 for /data/vol30/local/slc5 (/dat
```