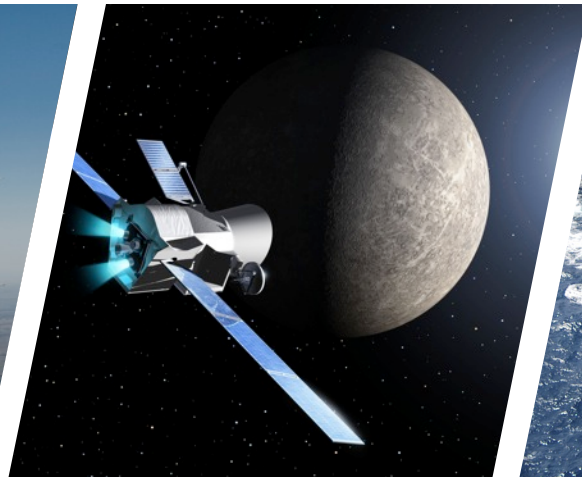




High Performance Instrument & Payload EGSE

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CONTEXT

Complex Instruments & Payloads

- I/PL-EGSE - testing at **subsystem** level
- CCS - testing at **platform** level

I-EGSE can include

- Full TMTC processing of a CCS/MCS **plus**
- Direct electronics interfaces
- Real-time simulation interfaces
- Platform simulation functionality
- Live Science viewing
- “SCOE” interface to CCS

Usually

- Relatively “intricate”, higher performance
- Single user
- Lower budget



EXAMPLE FEATURES & REQUIREMENTS



Database

- Keep separation of subsystems
- Drop/load/continue
- Online contents viewing
- TM simulation

Interfaces

- Protocol Flexibility
- Direct FE Access
- (RT) Simulation
- “SVF mode”

Fast archiving & distribution

- Science data processing
- Visualisation



Spacecraft Platform Simulation

- I-EGSE
- P/L EGSE

end user needs **a lot**
of flexibility

TMTC DATABASE



Instrument and payload primes have to prove that their unit can be operated.

- ding TMTC database in same form as ESA use (MIB)

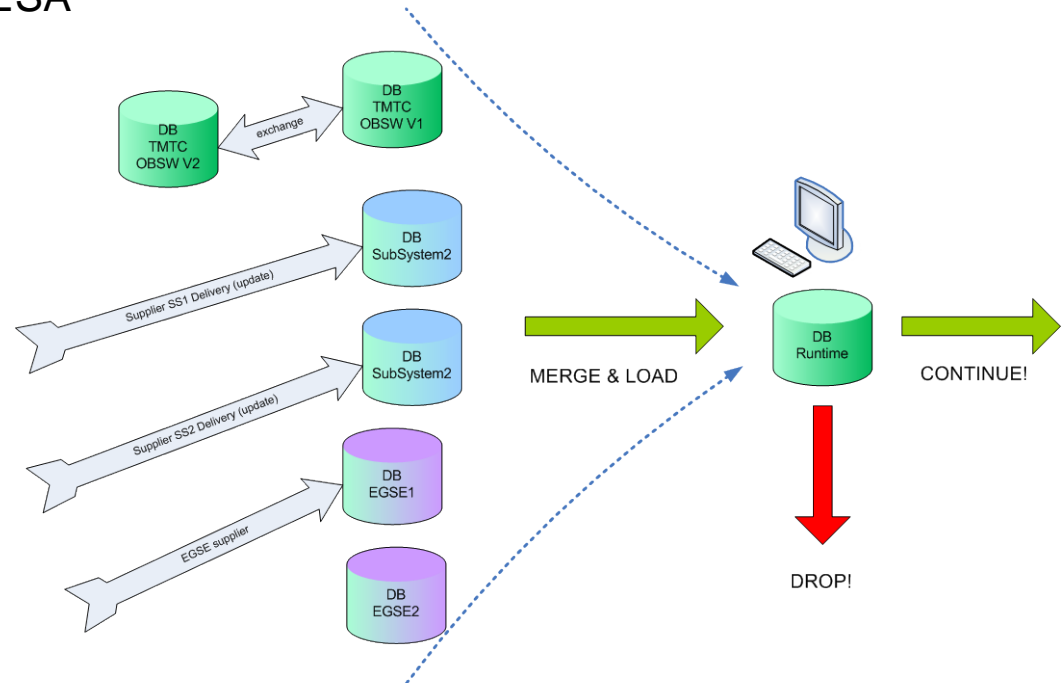
Database partitioned:

Platform,

Payload,

EGSE internal, ...

- Different partitions change at different times....
- Need flexibility to replace different partitions
- Needs to be quick to try out & revert changes



TMTC DATABASE



Need to be able to **see & check online** what is currently been loaded.

- Search & filter fields
- Show the original partition

The screenshot shows a window titled "MIB Database Browser #1". It features a table with columns: SOURCE, CCF_CNAME, CCF_DESCR, CCF_DESCR2, CCF_CTYPE, CCF_CRITICAL, and CCF_PKTID. The table contains five rows of data. Below the table is a navigation bar with buttons for CDF, CCF, CPC, PTV, PST, PSV, PVS, PSM, CCA, PAF, PAS, PRV, PRF, CVS, CVE, CVP, and TC. There is also a search box and checkboxes for "Case Sensitive" and "Use as Filter".

SOURCE	CCF_CNAME	CCF_DESCR	CCF_DESCR2	CCF_CTYPE	CCF_CRITICAL	CCF_PKTID
swirDb	XTS00001	SWIR Register R...	Get/Set content...	S	false	XTSRGHDR 0
swirDb	XTS00002	SWIR Register D...	Get/Set content...	S	false	XTSRGHDR 0
uvnDb	XTU00001	UVN Meas Con...	UVN-DEM TC ...	S	false	NONE 0
uvnDb	XTU00002	UVN Temp Con...	UVN-DEM TC T...	S	false	NONE 0
uvnDb	XTU00003	UVN Req TM P...	UVN-DEM TC R...	S	false	NONE 0

Note: MMI does not have to be advanced.

No need to overdesign. Users are smart.

Obvious potential for enhancement

TM SIMULATION



Packets **IN** (CCSDS, PUS)

Data blocks **in** (e.g. 1553 message)

Need to be able to “decommutate” blocks that are not packet

Need flexibility (scriptable) & possibility to visualise TM parameter values locally

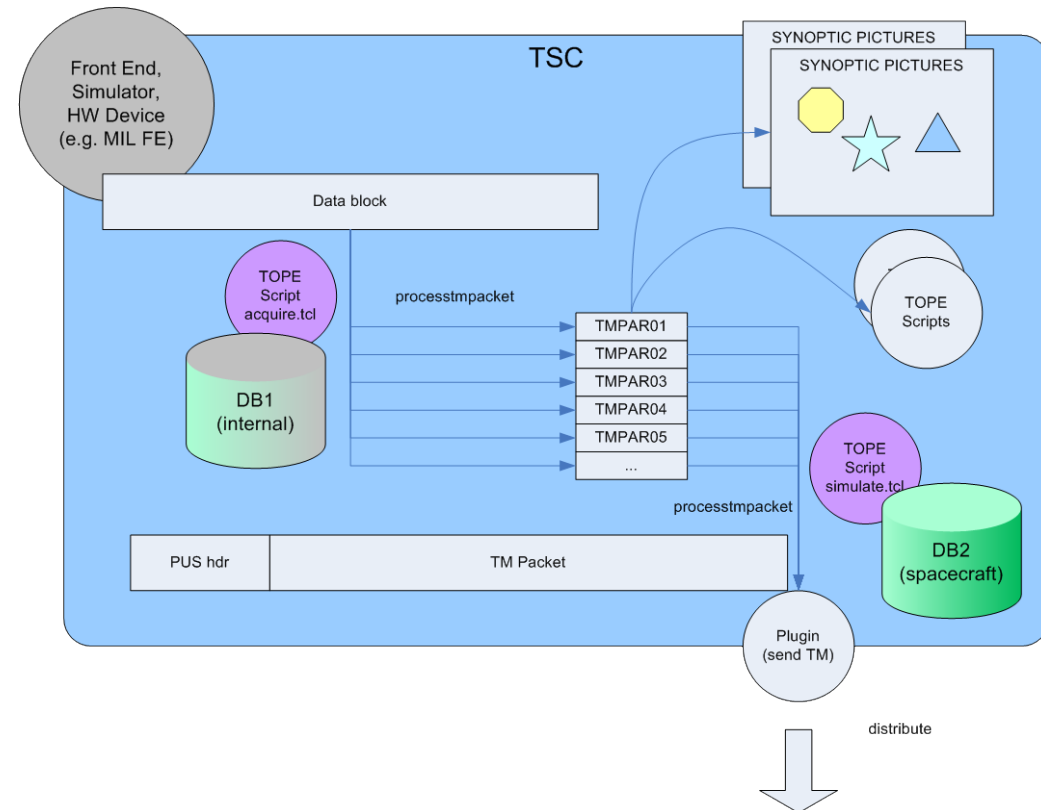
Generate according to DB.

Packets **OUT** (CCSDS, PUS)

- EITHER rearrangement of the same data according to a different packet layout (e.g. from a different database)
- OR specific values for one packet

⇒ Extremely useful!

⇒ Just need to invert TM processing



RT SIMULATION & SVF MODE

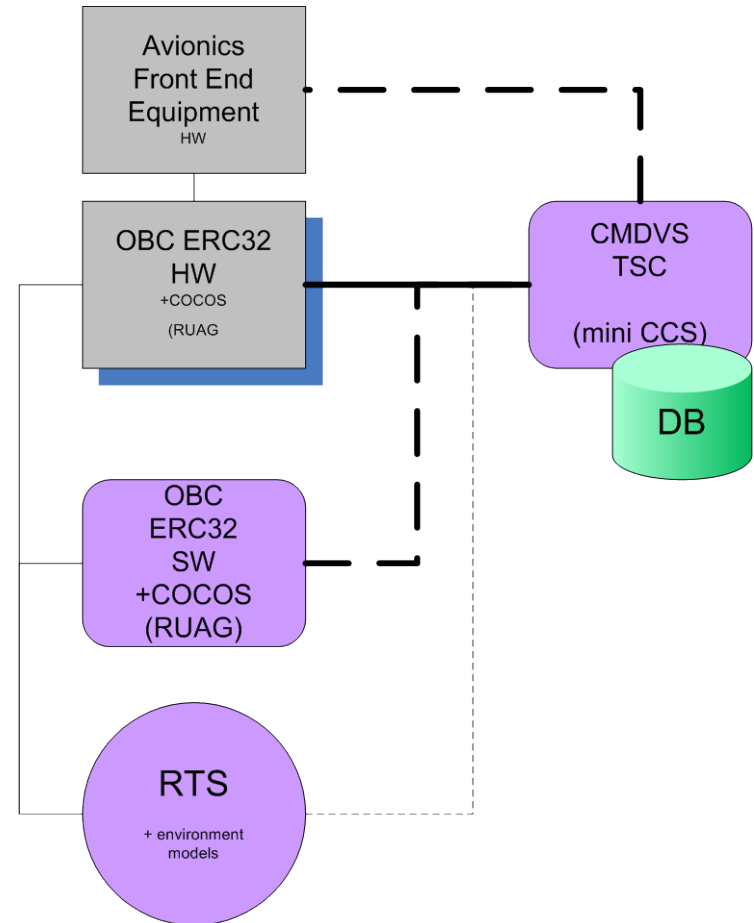


For many “platform simulations” test language scripting is fast enough, and the most flexible solution.

May need to host an **emulator**

In some cases a very specific, predictable maximum latency closed loop reaction is required

SVF mode allows the TSC to follow the simulation time (pause, resume, speed up, slow down)

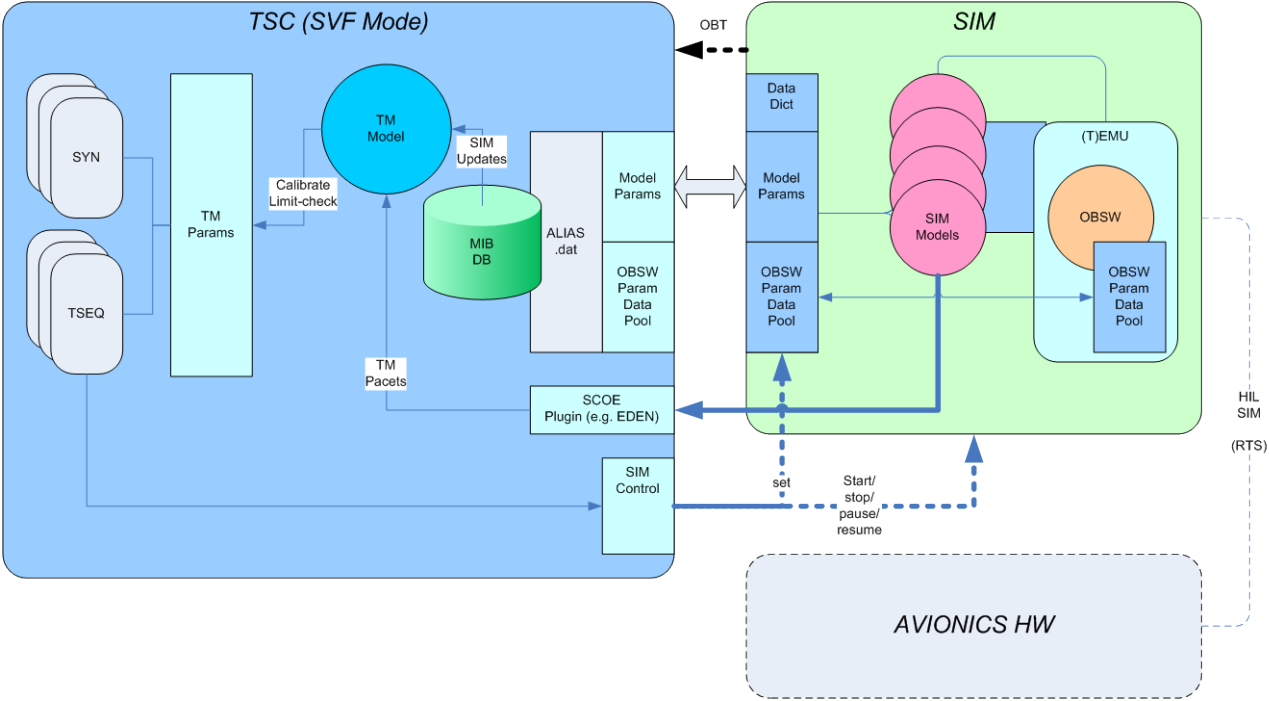


RTS => EUROSIM



e.g.

% package require eurosim



(SCIENCE) DATA DISTRIBUTION



Need mechanism for “high rate” data distribution & archiving

Typical = SPW, CameraLink

Would be X-band instead of S-band

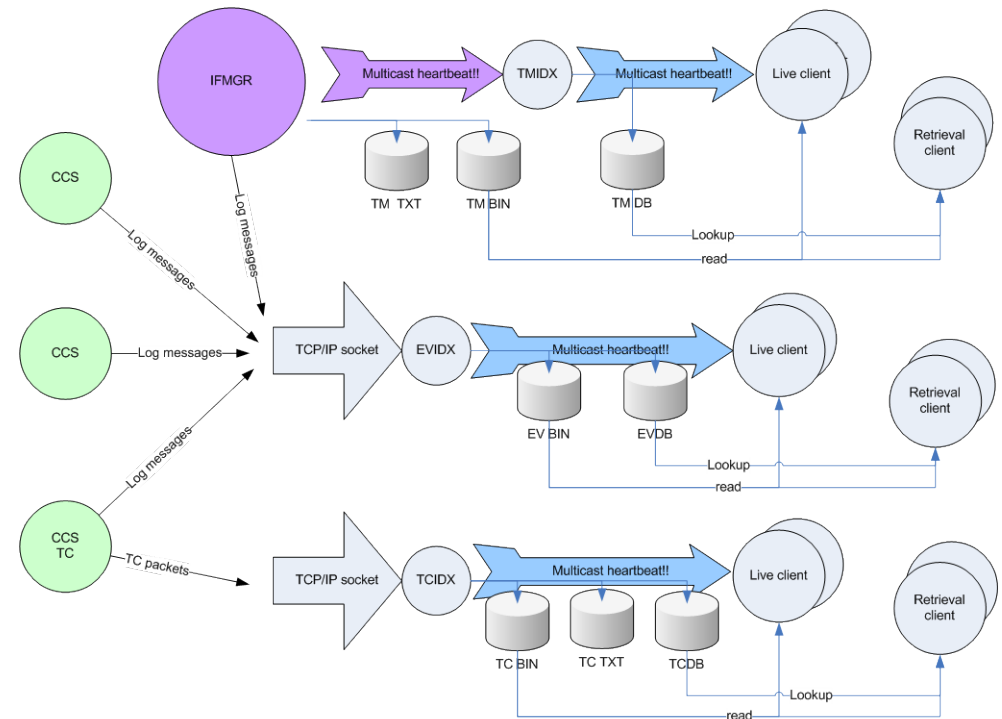
Source can be:

- Electronic Front End
- TSC itself

We use UDP “heartbeats” to announce arrival of new packets in the archive

Archive is just a directory on a disk “somewhere” (configured)

Also used in CCS archiving



QUICK LOOK TOOLS

Used for examining (test) contents of science packets

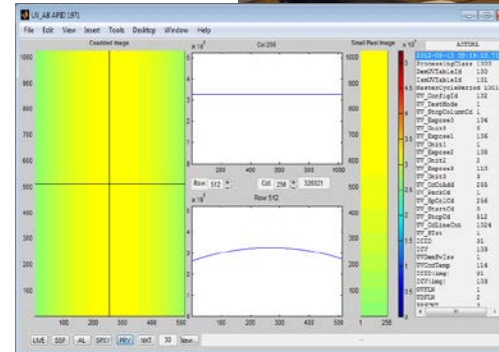
Not a full scientific analysis

- Graphing
- Image Display
- Archive browsing
- Live views

Use MATLAB

- Set up as “heartbeat” client
- Some (limited) TM processing based on MIB, but is not as fast as TSC
- Flexible, end user is often MATLAB expert

Control from TSC via tcIMATLAB



ACTUAL	
2012-08-10 09:19:10.71	
ProcessingClass	1000
DemUVTableId	100
IsmUVTableId	101
MasterCyclePeriod	1001
UV_ConfigId	102
UV_TestMode	1
UV_StopColumnCd	1
UV_Expose0	104
UV_Unit0	0
UV_Expose1	106
UV_Unit1	1
UV_Expose2	108
UV_Unit2	2
UV_Expose3	110
UV_Unit3	3
UV_CdCoAdd	255
UV_PackCd	1
UV_SpColCd	256
UV_StartCd	0
UV_StopCd	512
UV_CdLineCnt	1024
UV_STst	1
ICID	31
ICV	103
UVDemFWIss	1
UVCdTemp	114
ICID(img)	31
ICV(img)	103
OVFLW	1
UDEFW	2
DDCNT	2

SUMMARY



Provides a **flavour** of the kind of flexibility needed at instrument & payload level

Trick is to try to avoid hard coding in project specific way....(enhance scripting language)

- Keeps product generic
- Allows the next project to benefit

Thanks for listening!

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