Report from the **TriDAS** Working Group

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INFN - Sezione di Bologna

Summary of the talk

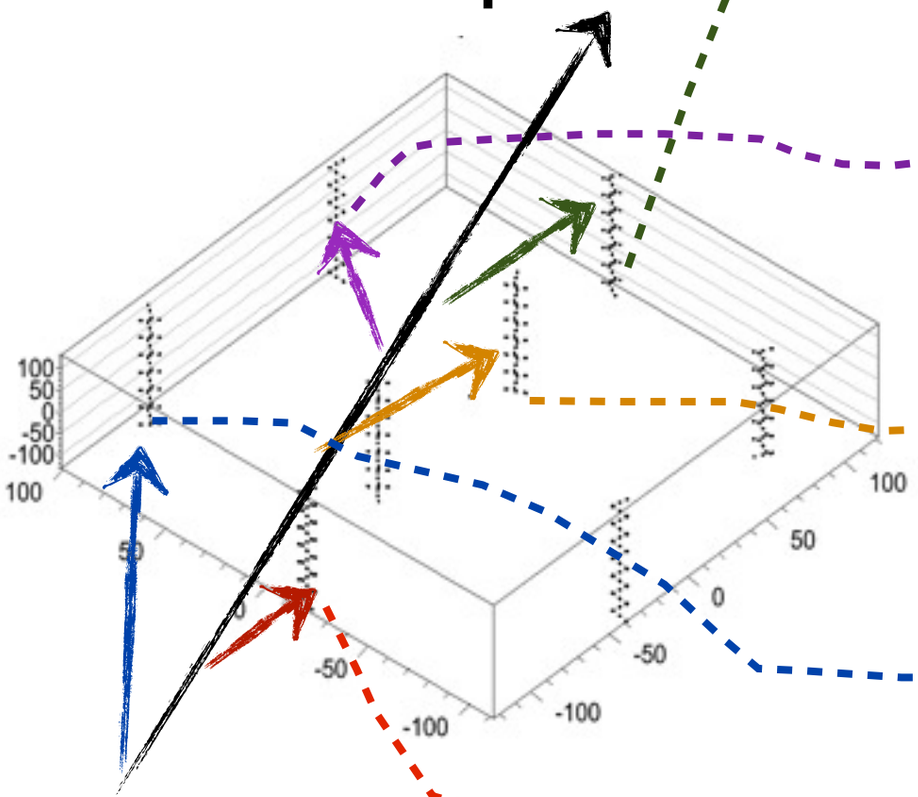
- The refurbished TriDAS crew
- New TriDAS for the 8 Towers: what is kept...
- ... and what is changed!
- tests with the NEMO F2 Tower
- same Trigger process for on && off line
- test-bench in Bologna
- integration Basic-TriDAS-kit

TriDAS crew

Dept.	name	position	% time	topic
Bologna	Tommaso Chiarusi	staff	**100%**	coordination
Bologna	Carmelo Pellegrino	fellowship/Ph.D. student	**100%**	software devel.
Bologna	Andrea Paolucci	staff	20%	system manager
Bologna	Luigi Antonio Fusco	Ph.D student	10%	s/w devel for TCPU - offline
CNAF	Matteo Manzali	fellowship/Ph.D. student	**80%**	software devel.
CNAF	Francesco Giacomini	staff	**>30%**	design and review
CNAF	Stefano Zani	staff	20%	network design
LNS-CNAF	? (competition end on July 10th)	fellowship	**100%**	software devel.
Pisa	Bachir Bohuadef	fellowship	**>30%**	trigger algos
Pisa	Giuseppe Terreni	staff	**>30%**	software devel.

What is kept: the TriDAS modularity (and most of the C++ code)

ΔT event
~ O(1 μs)



ΔT
200 ms

HM_0
HM_1
HM_2
HM_3
HM_4

$TCPU_i$ with TS_i

$TCPU_{i+1}$ with TS_{i+1}

EM

EM: collect from all the TCPUs the selected events

HM: handle subsequent data from a fraction of the detector

TCPU: process data from the full detector for a slice of time (i.e. the *Time Slice*)

TS_{i+1} TS_i time

What is changed 1/3 : use of (more) robust software for some items

context for software compilation, building, and deployment

threads, templates (containers) C++11 and beyond

inter-server/ -process/ -threads communications (will substitute ControlHost)

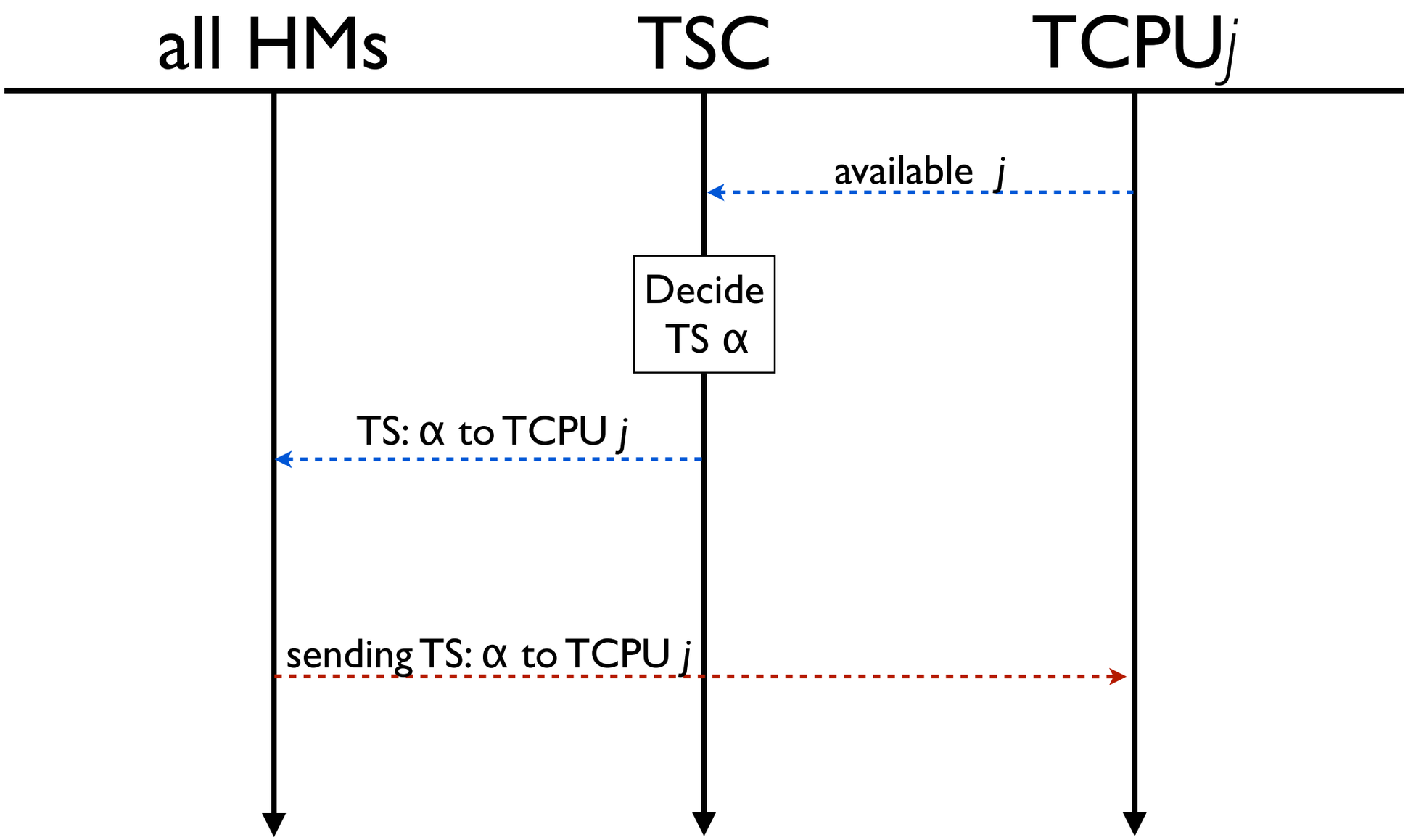
repository/version maintainer (substitute CVS) + web interface (tracker)

continuous integration, test runner, static analysis, package compiler

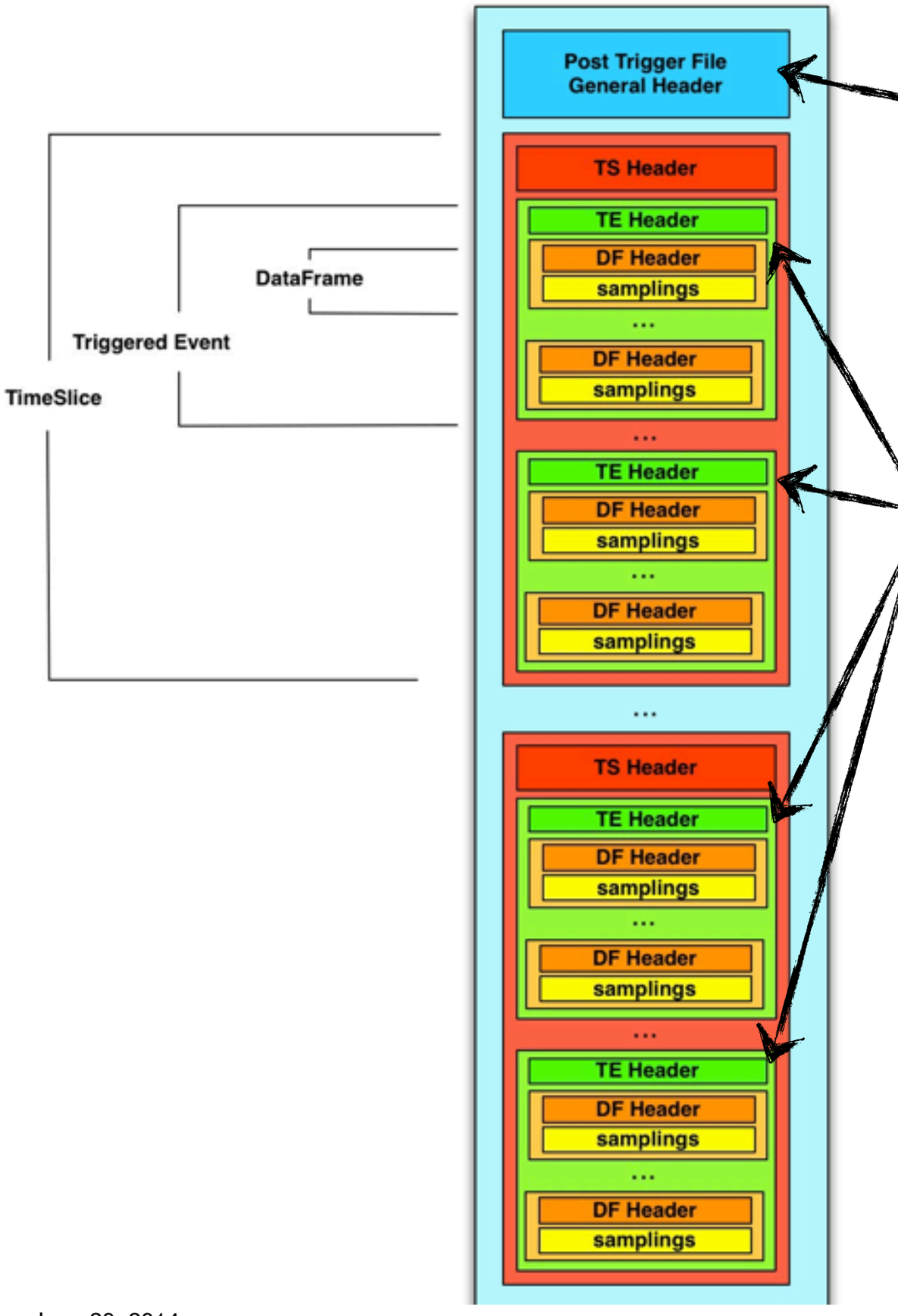
See Matteo's poster @ CCR 2014 (prize for best poster!!!)

http://wiki.infn.it/_media/cn/csn2/km3/km3_ccr_poster_2014_05_27_matteo.pdf

What is changed 2/3 : TSC as Supervisor (renamed as TriDAS Supervising Center) && DB Interface



What is changed 3/3 : New Post-Trigger Format, some additiona info



1. Added a detailed list of all the trigger algos (identified by a DB number)

2. No more wrap info: we have absolute time

After the TriggeredEvent (TE) header and *before* the raw-data excerpt, there will be a list with the hits contributing to the trigger (with a trigger seed mask)

This imply a maximum overhead of ~ 10% if (unlikely) all the hits of an event contribute to the trigger.

The new Post-Trigger format will be published on our Wiki as soon as it will be implemented

Test with the NEMO F2 Tower

Since April, we made several tests of the new TriDAS (released after a major revision) with the Nemo F2 Tower.

The purpose was to verify the consistency of the new processes with respect to the "Classic" ones.

The tests were generally succesfull:

- Hit Manager ..... ok
- TriggerCPU ..... ok
- Event Manager ..... under completion

Switch to the new Raw data format

Absolute time !!!

Struttura del Data frame.

- 1 DWORD (32 bit) Header.1: Sync & ID
- 1 DWORD (32 bit) Header.2: Time
- 1 DWORD (32 bit) Header.3: Time
- 1 DWORD (32 bit) Header.4: Hit Info
- N DWORD (32 bit) Dati: Samples

Formato Header.1:

- (31:16) Sync Bytes
- (15:9) ID Torre (0-127)
- (8:4) ID Piano (0-31)
- (3:0) ID PMT (0-15)

Formato Header.2:

- (31:0) Tempo assoluto GPS(47:16)

Formato Header.3:

- (31:16) Tempo assoluto GPS(15:0)
- (15:00) Tempo relativo in unità di 5 ns

Formato Header.4:

- (31) Flag Compressione (1 se il DF e'compresso)
- (30) Flag Frammentazione (1 se l'evento é frammentato)
- (29:8) Carica (compressa/non compressa) associata a questo Data Frame. La carica é la somma di tutti i campionamenti
- (7) FEM FIFO Full
- (6) Non usato
- (5:0) nSamples. Questo campo rappresenta il numero di campioni nelle DWORD che seguono l'header; il numero di DWORD è funzione della flag di compressione e può essere calcolato come segue:
  - Flag Compr. = 0 -> nDword = ceil(nSamples/4);
  - Flag Compr. = 1 -> nDword = ceil(nSamples/2);

Formato Dati (compressi):

- (31:24) Campionamento 1 (espresso in canali dell'ADC)
- (23:16) Campionamento 2 (espresso in canali dell'ADC)
- (15:08) Campionamento 3 (espresso in canali dell'ADC)
- (07:00) Campionamento 4 (espresso in canali dell'ADC)

Formato Dati (non compressi)

- (31:16) Campionamento 1 (espresso in canali dell'ADC)
- (15:00) Campionamento 0 (espresso in canali dell'ADC)

Bit range	Campo	Formato	Range
47 – 40	Anni	BCD	0 - 99
39 – 30	Giorni	BCD	0 - 365
29 – 13	Secondi	Straight Binary	0 - 85399
12 – 0	Frame Counter (125 us)	Straight Binary	0 - 7999

New "FCMServer" simulator under completion (G. Terreni)

TriDAS modified accordingly (M. Manzali e C. Pellegrino)

Ameli (spring '14)

Use of the TriDAS for Offline Trigger application

(not simulation nor reproduction: it is the very online trigger applied to MC events)

NEMO F2

Simulations

MuPage

km3*

GenBkg

FemSim**

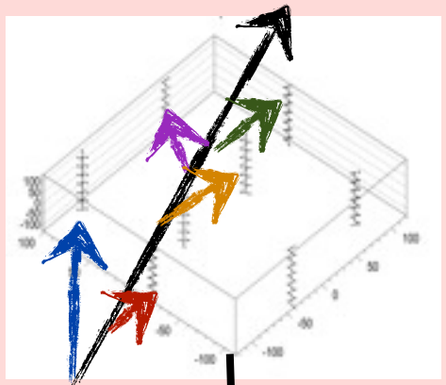
TriggerSim On-Line***

TriggerSim Off-Line

SelectionPois

reco

Mother Nature



TriDAS

PT Data

HitDeco2

KM3-Italia

Simulations

MuPage

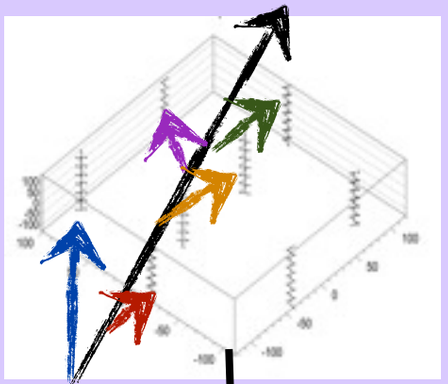
km3*

GenBkg

FemSim**

TriDAS

Mother Nature



TriDAS

PT Data

HitDeco2

TriggerSim Off-Line

SelectionPois

reco

Antares

Our codes

Trigger Simulation/Validation Task Force

Objective: define a strategy to validate the proposed trigger algorithms producing figure of merits (efficiency, purity etc.).

For a proposal of various trigger algorithms, please refer to my presentation at Coll. Meeting in November.
(https://agenda.infn.it/getFile.py/access?contribId=14&sessionId=2&resId=0&materialId=slides&confId=7015)

At present: ScanDir algo implemented (see internal note)
(http://wiki.infn.it/_media/cn/csn2/km3/tcpu_performances.pdf)

Involved people

TriDAS WG Annarita Carla, Rosa e Piera

Additional help is more than welcomed!

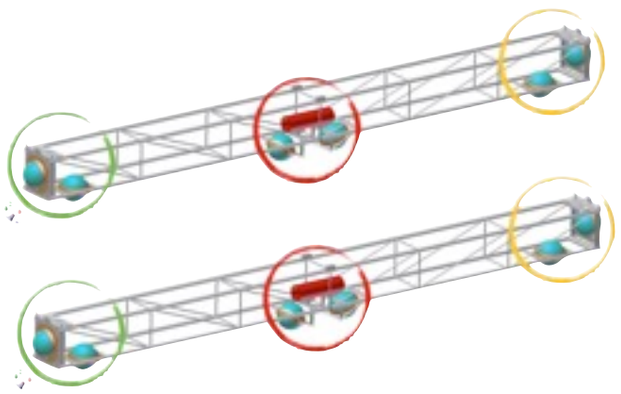
Problems with TriDAS and Trigger_C++ for NEMO F2 Tower

TriDAS: events selected with Qtrig ==0, being Qtrig the Charge over threshold trigger seed. BIAS: it acts as a low energy "filter"

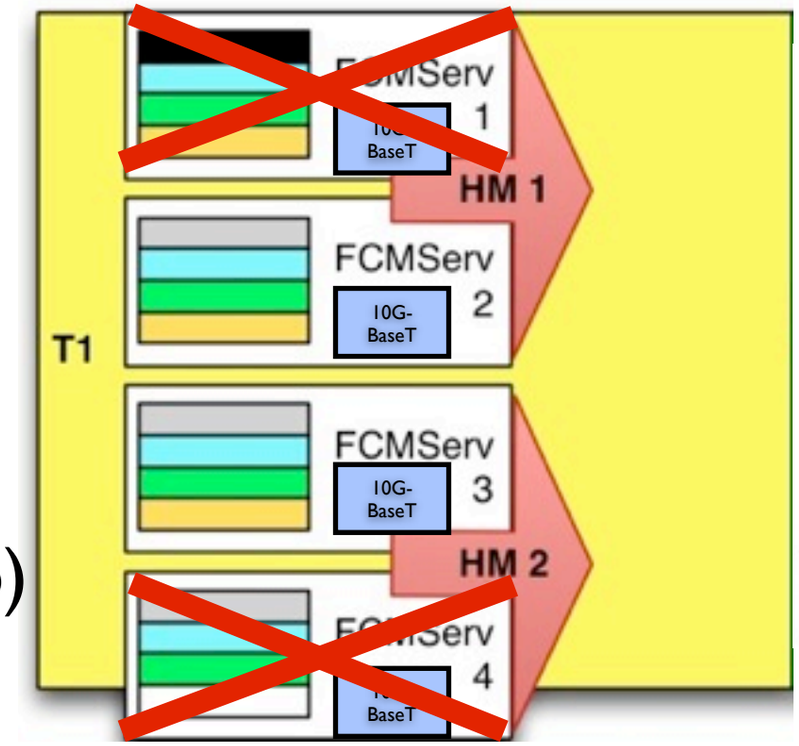
Trigger_C++: not conformal Floor Coincidenc of offline with respect to TriDAS

These are errors, unfortunately found and fixed with large (too much) delay because of the enormous effort for deciding and organizing the purchases for the Shore-station of KM3NeT-Italy (8 Towers).

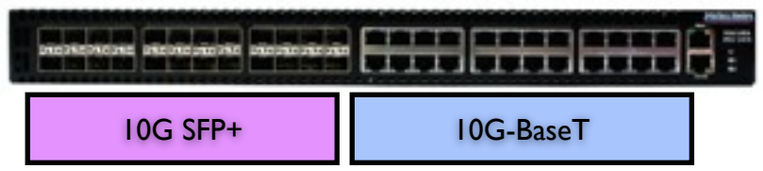
Test Bench in Bologna/Integrazione



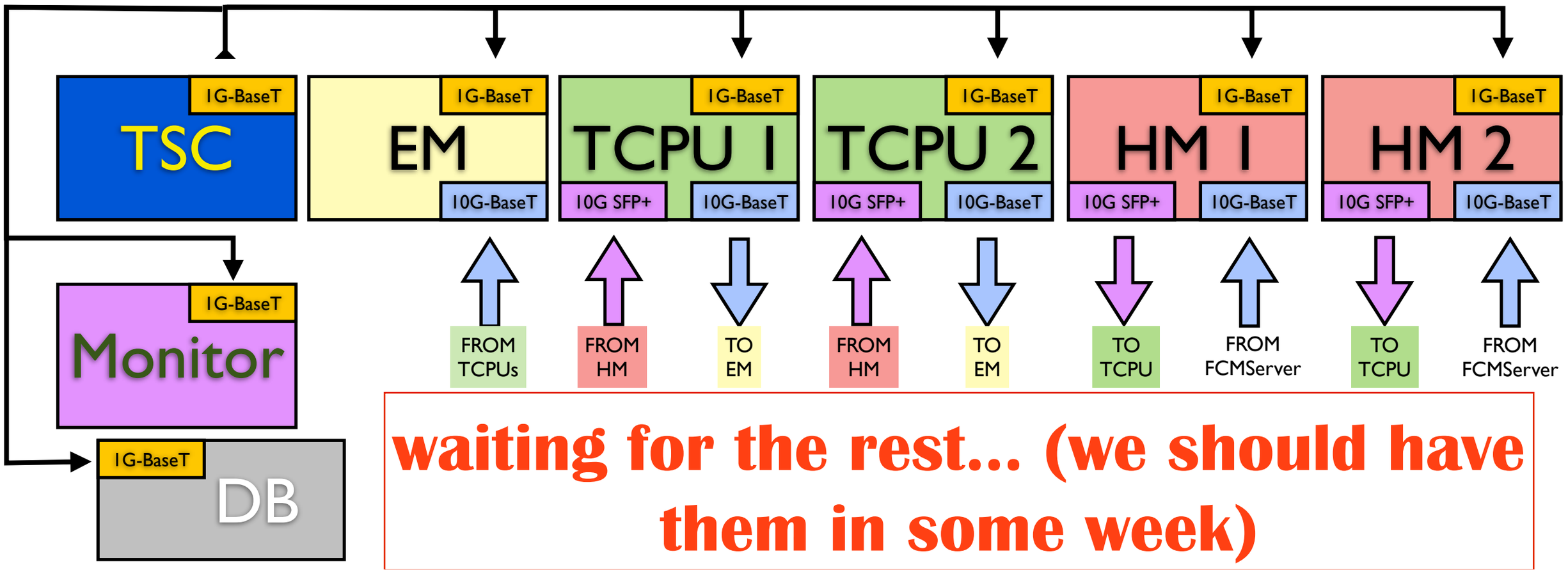
2 FCMServers+ 2 Terasic



Already in Bo



8-12 FEM
2-4 FCM
2 FCMServer (to Rome Group)
1 TwinSquare (2HM+2TCPU)



waiting for the rest… (we should have them in some week)

Basic-TriDAS-kit

1. **Basic TriDAS for Integration site**: the Basic-TriDAS-kit offers services (it is not validate in the integration site: that is done at the Bologna Test-Bench)
    a) dump rawdata;
    b) file-post trigger L1 (SC/FC, charge overthershold trigger seed)
    c) online monitoring of the sensible observable (customizing *for any need*...)

2. **IMPORTANT**: the Basic-TriDAS-kit must be tested @ Bologna test bench. Some of the machine must be send from the LNS. Unfortunately we got delays because the already purchased servers had wrong NICs (error of the vendor). Replacement in ongoing.

3. **Planning**: **to be confirmed (depending when we receive the servers).**

4. **Requests**:
    a) Each integration expert tell if TriDAS is useful or useless for his/her test.
    b) External access layout (VPN, VNC)