NectarCAM Processing WP

Dirk HOFFMANN, Julien HOULES
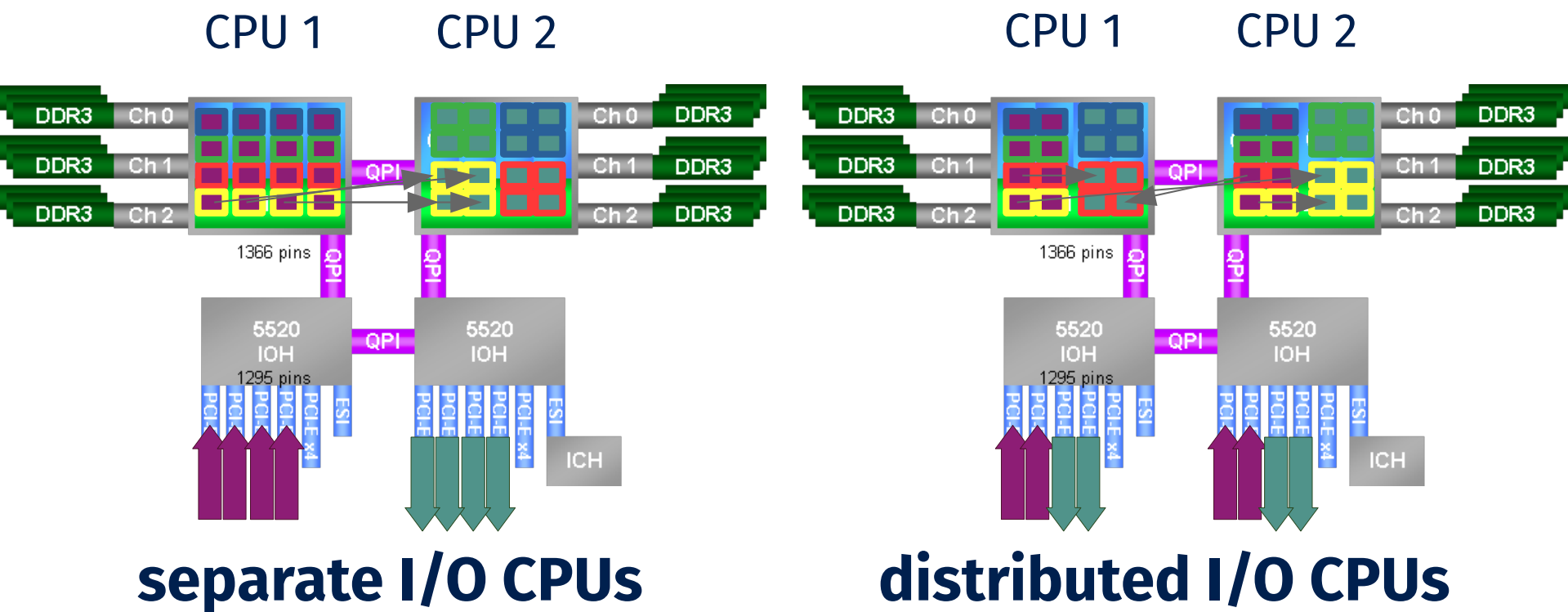*Centre de Physique des Particules de Marseille*

NectarCAM Progress Meeting
April 7th, 2021

Outline

- **Event-Builder**
  - **v4, algorithms**
- **Paperwork**
  - **PAP, CDMR, ICD**
  - **Processing pathfinder**
- **Switches**
- **CDTSd (and code organisation)**

- **Version 3: Reorganisation of inputs**
  simplified schema, neglecting memory transfers

separate I/O CPUs   **distributed I/O CPUs**

Event-Builder

- **Version 3**
  - **Reorganisation of inputs, better performance**
  - **Algorithms:**
    - **Baseline Subtraction** (LST only)
    - **Gain Selection**
    - **Delta-T correction** (DRS4, LST only)
    - **Interleaved pedestals** (NectarCAM only)
    - **Muon conservation (10%)**
- **Version 4**
  - **Trigger-dependent event-handling**

Event-Builder

- **Version 4 deployed and validated on LST**
  - **Some bugs found (and fixed)**
  - **On the way for NectarCAM**

- **Plan to test on T66 at IRFU,**

  then on "full camera" (265 modules),

  no FPI, but attempt to inject pulses

- **Conceptual Design and Manufacturing**
  - **CDMR preparation and RIX answers were quite smooth for our WP.**
  - **Helped also in other WP, namely Trigger&Time.**
  - **7 RIXes for Processing WP, one still open.**
  - **Reviewers acknowledged that some points could not be clarified due to *missing input from CTAO*.**

Paperwork 2: CDMR, to be done

- ## 7 RIXes
  - ### None of them critical

#	Status	Subject	Assignee
42642	Assigned	DD124_LSTMST-ICD-20191206-3.pdf	Montanari Chiara
42457	Assigned	Comments on DD127_LMST-CAM-UM-0361.pdf	~~Houles Julien~~ Dirk
41802	Suspended	DD128_LMST-CAM-LI-0475_DAQ_CIDL: inconsistent document versions in CIDL	Whyborn Nick
42843	Closed	DD126 NectarCAM DAQ and Processing Test Plan	Whyborn Nick
42463	Closed	DD122_MST-CAM-SP-0357-CPPM_Processing_RequirementsSpecifications.pdf	Whyborn Nick
42456	Closed	Comments on DD125_LMST-CAM-TN-0476.pdf	Houles Julien
42455	Closed	Comments on DD123_MST-CAM-TN-0360-CPPM_Processing_ConceptionV1.0-2.pdf	Houles Julien

- ## #42457:
  ## Requires better instructions for a system not yet finalised

Paperwork 2', CDMR items: RAMS

- **RAMS values requested from Ethernet switch manufacturers**
- **Needs more iteration(s)**

- **Stéphane, I did not forget you!**

- **First meeting September 2019**
  - https://indico.cta-observatory.org/event/2397
  - **Minutes available, but no followup?**
- **Second meeting**
  - https://indico.cta-observatory.org/event/2517
- **PAP drafted without further interaction**
  - **Does not fully represent reality**
  - **Need to converge now**

Paperwork 4: ICD

- **Part of CDMR**
  - **ICDs delivered, but updates needed:**
    - **CDTSd**
    - **OPC UA aspects**
- **ACADA Interfaces**
  - **Data Model – proposal converged**
  - **Data Format (including UCTS interactions)**
    - **collected feedback, given in first meeting (orally)**
    - **not clear: how, why, by whom API may change**
    - **next meeting with ACADA: April 15th**

Paperwork 5: Data Storage Pathfinder

- **1** • **Still no hope to obtain on-site data storage from CTOA, when NectarCAM 1 arrives at ORM**
- **2** • **(nor IT infrastruture by the way)**

- **Solution for 1 – "Datastorage pathfinder"**
  - **Now part of CTAO/DATA IKC matrix**
  - **To be submitted to (new) IN2P3 DAS Computing**
- **Solution for 2 – Should start negociation with LST seriously (my opinion), through MST project**

Switches: architecture

- **Old architecture (S60): 6 deep-buffer (DB) switches**
  - **mot on the market any more**

- **New architecture: 6× level-1 + 1× level-2 (DB)**
  - **baseline (2016):**
    6× DELL N1548 + 1× Arista 7280SR
  - **possible improvement**
    6× DELL N1548 + 1× DELL S4248

- **All to be tested with 265 modules (May 2021)**

Switches: provisioning

- **After validation of new architecture and model of level-2 switch,**
  - **provide equipment + (one) spare for MST-N1**

- **After CDMR closure**
  - **order equipment for MST-N 2-5 (all at once)**

- **Present hickup (for MST-N 1):**
  Delivery of IT hardware worldwide is delayed!
  Covid-19 + Suez = currently up to 90 instead of 30 days

- **Fallback:**
  Pillage of CPPM testbench (bad™ substitute)

CDTSd

- **Rewritten architecture for LST (simplified)**
- **State machine through OPCUA removed**
  - **If EVB server open (OBSERVING)
    → connect / OBSERVING state**
  - **If EVB server closed (end of OBSERVING)
    → disconnect / READY state**
- **"dæmonized" (Linux service process)**
  - **standard Linux monitoring and control**
- **Working reliably!**
- **OPC UA to be used for monitoring (tbd)**

Software organisation

- **CDTSd is a mixture of vendor-provided an CTA-specific code.**
- **Managed on SVN (CTA) and git (vendor, APC)**
- **Need to migrate to git(lab).**

- **Will serve as example for migration of**
  - **EVB (+OPC UA server)**
  - **UCTSd (UCTS controller)**

  including continuous integration
- **Not a minor task!**

Summary

- **Event-Builder**
  - **well on the way**
- **Paperwork**
  - **time-consuming and tedious, but within deadline**
- **Switches**
  - **on the critical path!**
- **Code organisation**
  - **"last priority" (unfortunately!)**