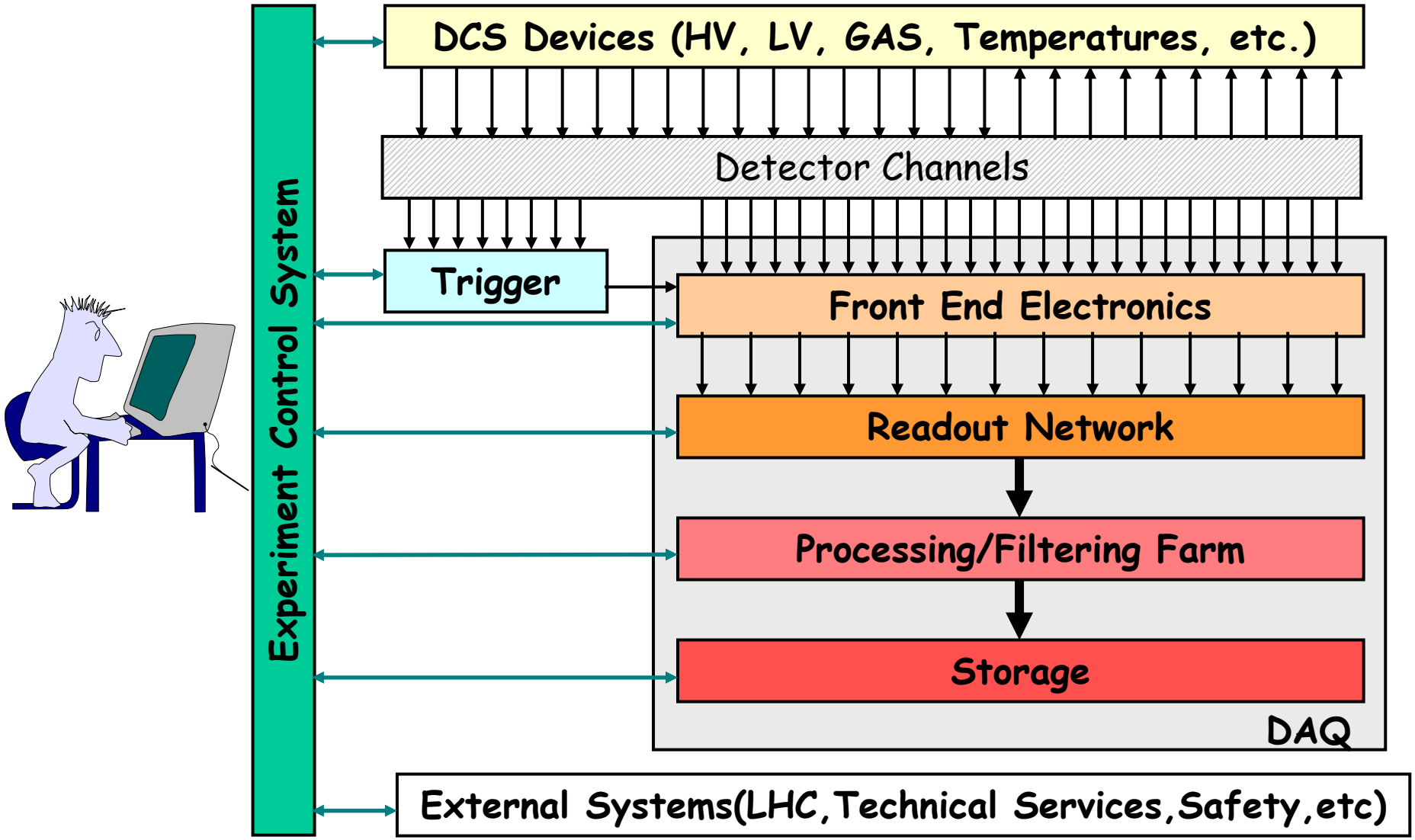
LHCb Online

&

the Conditions DB

Clara Gaspar, March 2005

LHCb Online


DCS Devices (HV, LV, GAS, Temperatures, etc.)
Detector Channels
Trigger
Front End Electronics
Readout Network
Processing/Filtering Farm
Storage
DAQ
Experiment Control System
External Systems(LHC,Technical Services,Safety,etc)

Online Usage of CondDB

- **Two completely independent users:**
  - As Publisher
    - The Experiment Control System
      Writes Online Conditions to the DB
  - As Consumer
    - The Event Filter Farm Algorithms
      Need Conditions for their processing/filtering tasks

Online Conditions Sources

- **DCS**
  - High Voltages, temperatures, pressures, etc.
- **DAQ & L0 Trigger**
  - Pedestals, thresholds, zero suppression parameters, gains, etc.
  - DAQ & Trigger setup parameters
- **EFF (Event Filter Farm)**
  - Pedestals, Thresholds, Gain Calibration, Alignment Constants, etc.
  - Trigger setup parameters
- **External Systems**
  - Accelerator data: energy, luminosity, average bunch currents, etc.

Online Conditions Publisher

- **From the Control System point of view:**
  - Only output
  - Only one interface:
    - from the ECS i.e. PVSS
  - Clients (offline algorithms) determine:
    - Data organization
      - Data format: XML (?)
    - Data update rate
      - Data could be stored in the Cond DB only if it changed by more than X or every hour
      - independently of the PVSS read-out rate.

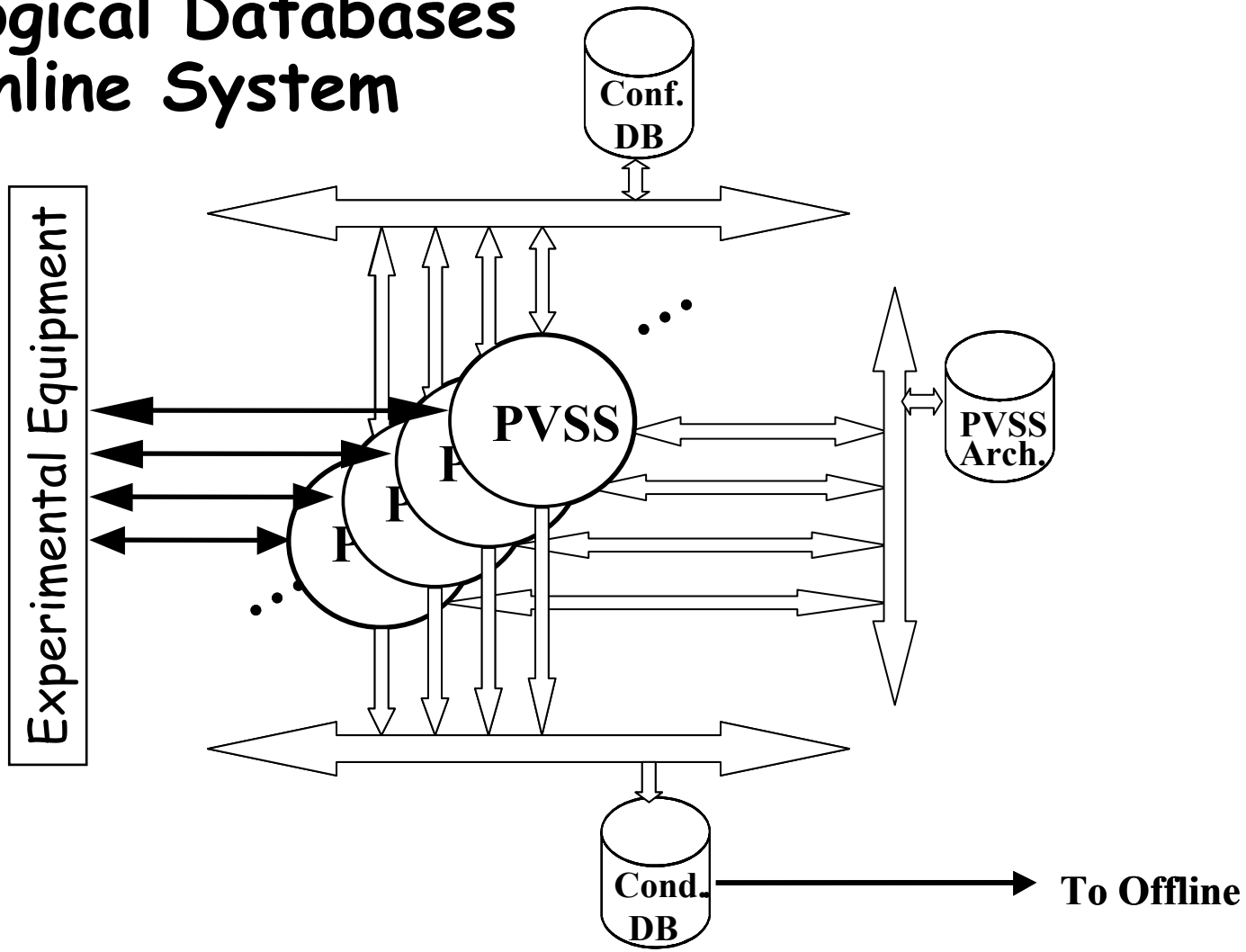
Conditions Data Types

- **Raw Data**
  Values read directly from hardware (ex.: HV readings, Temperatures, raw alignment data, etc.)
  - ➡ No Versions, no Tags
- **Processed Data**
  Results of calculations done on raw data (ex.: calibration constants, alignment, etc.)
  - ➡ Automatic Versioning, User Tags

➡ **All Online data stored as "Raw Data"**

Data Handling Architecture

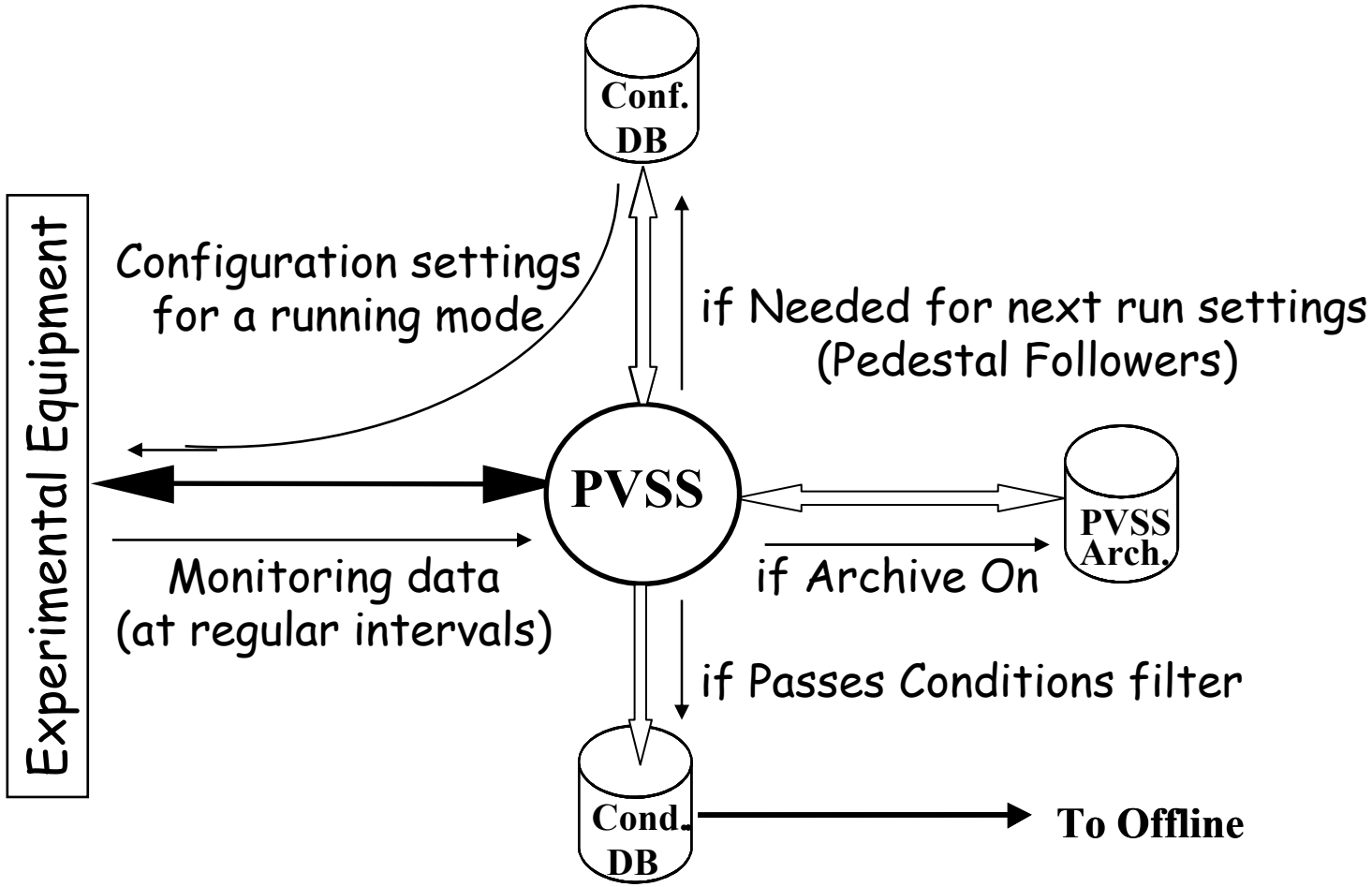
- Three Logical Databases in the Online System



Online Database Contents

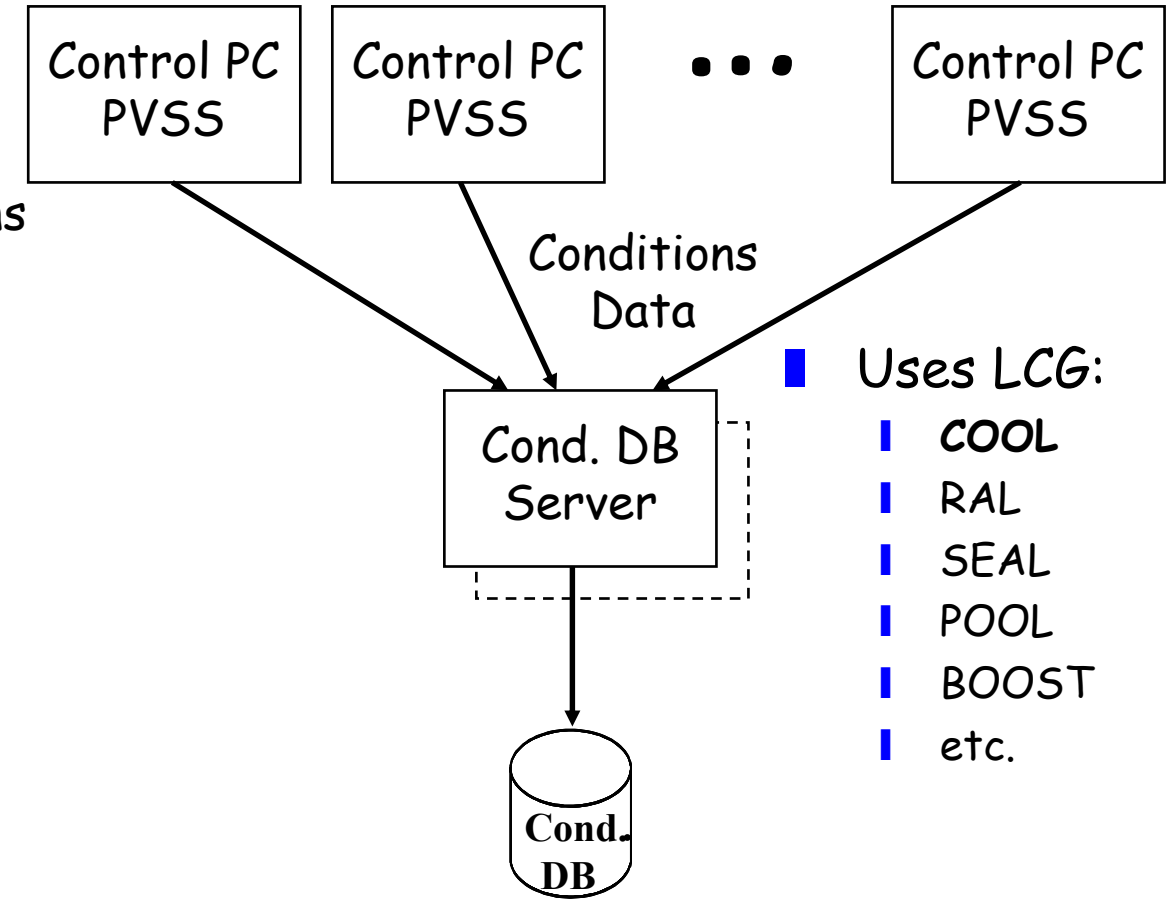
- Configuration DB contains:
  - All data needed to configure the HW (or SW) for the various running modes
    - Ex.: HV V0 Settings, Pedestal settings, trigger settings, etc.
- PVSS Archive contains:
  - All monitoring data read from HW for monitoring and debugging of the Online System
    - Ex.: HV Vmon Readings, pedestal readings, etc.
- Conditions DB contains:
  - A subset of the monitoring data read from HW if it is needed for Offline processing
    - Ex.: HV Vmon Readings if changed by more than n Volts
  - Some configuration data once it has been used
    - Ex.: Trigger settings used by a particular run

Dataflow Example



ECS CondDB Architecture

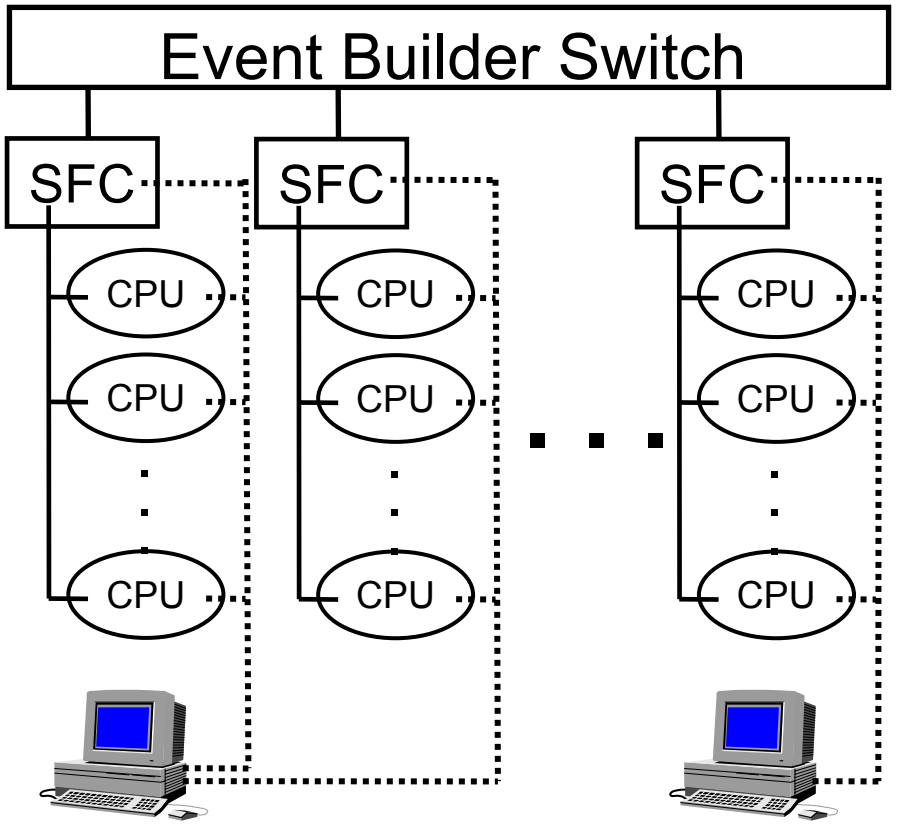
- Define filters in PVSS:
  (per device type/device)
  - Archive
  - Condition:
    - filter expressions



- Uses LCG:
  - **COOL**
  - RAL
  - SEAL
  - POOL
  - BOOST
  - etc.

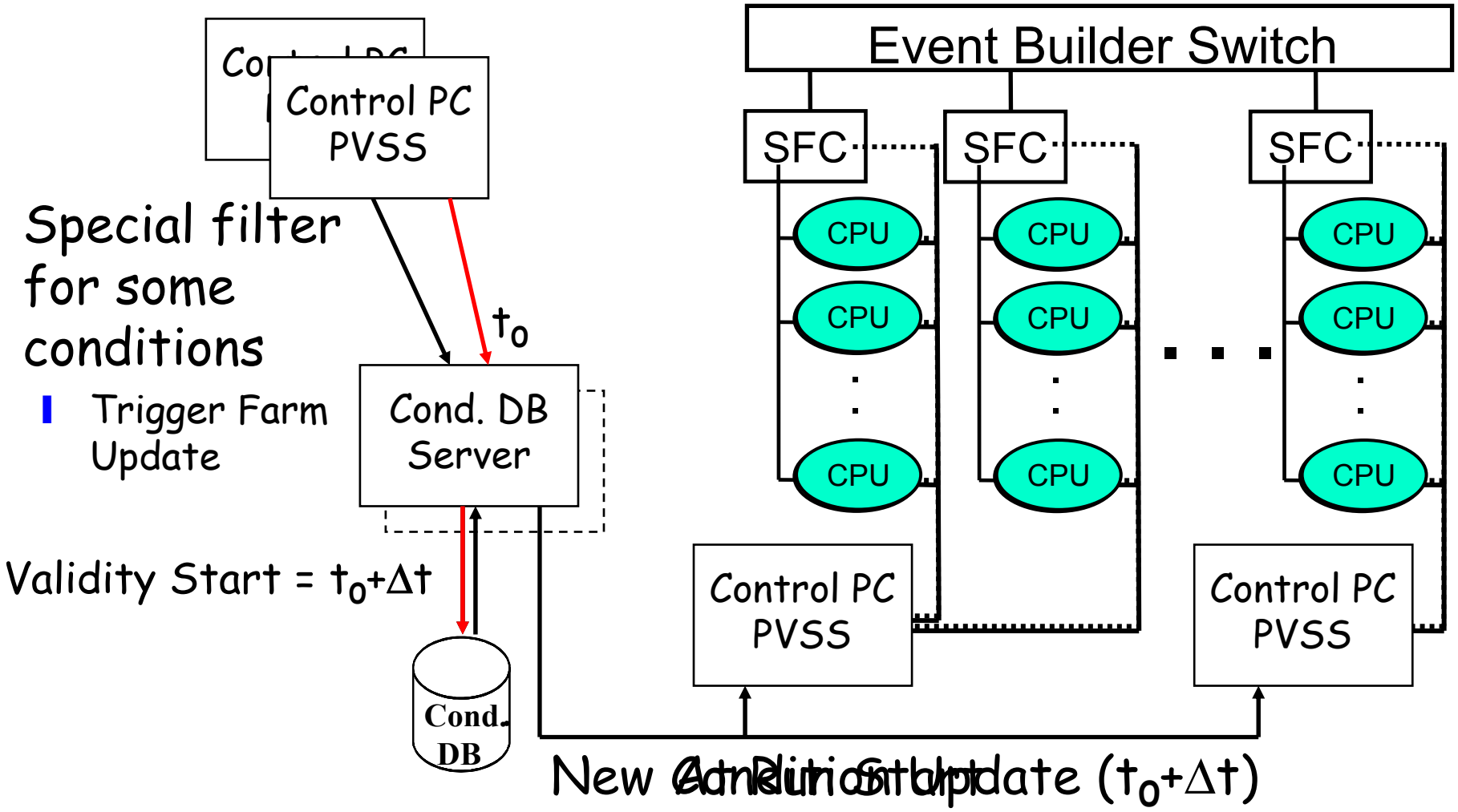
Event Filter Farm & CondDB

- **CPUs run "Offline" Algorithms Online:**
  - Within Gaudi FW (interfaced to PVSS)
  - Need Conditions:
    - The Control PCs will get a snapshot of the CondDB (at Start of Run) and distribute to CPUs
    - A few well-chosen Conditions can be updated while running

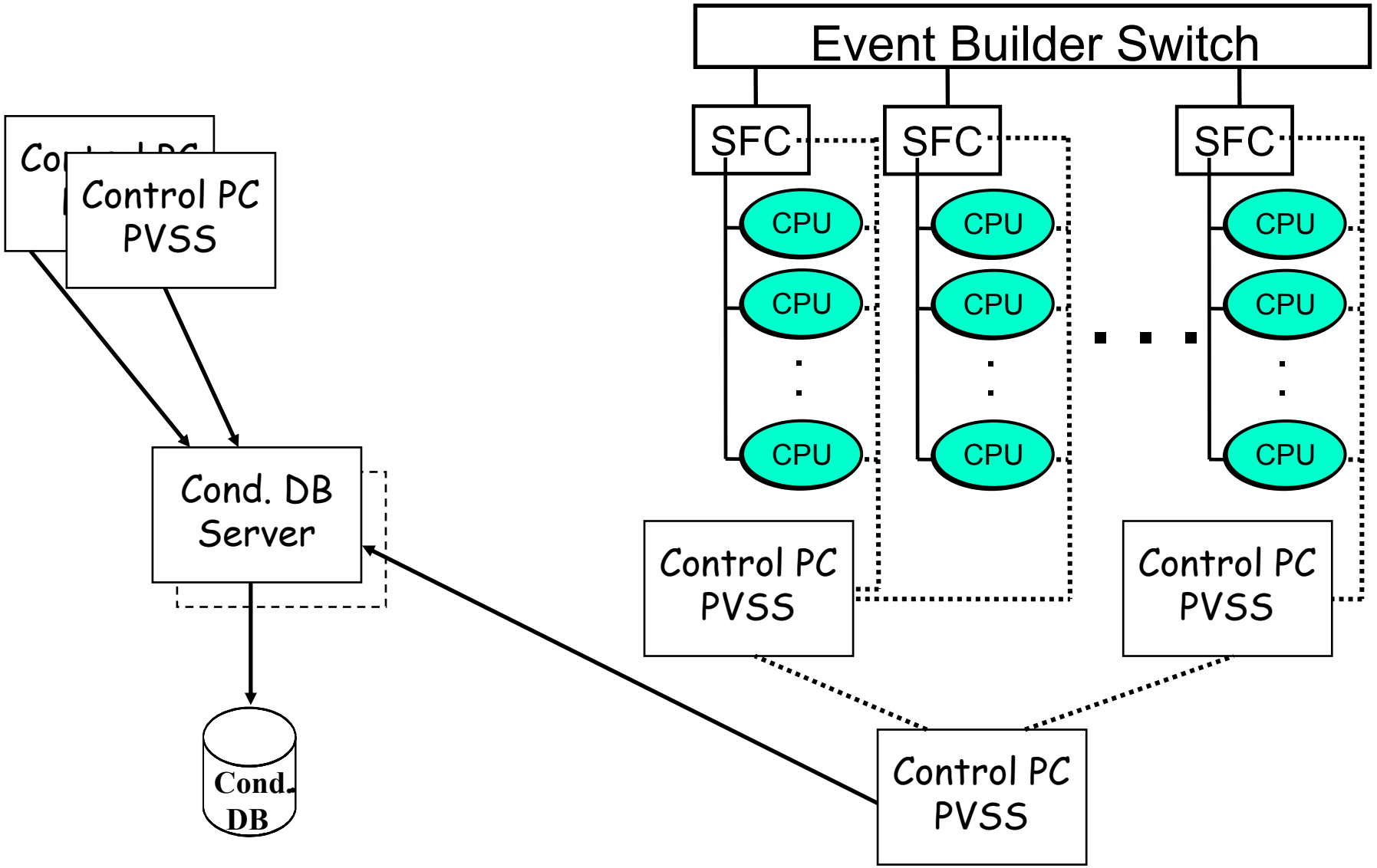


Dataflow Example

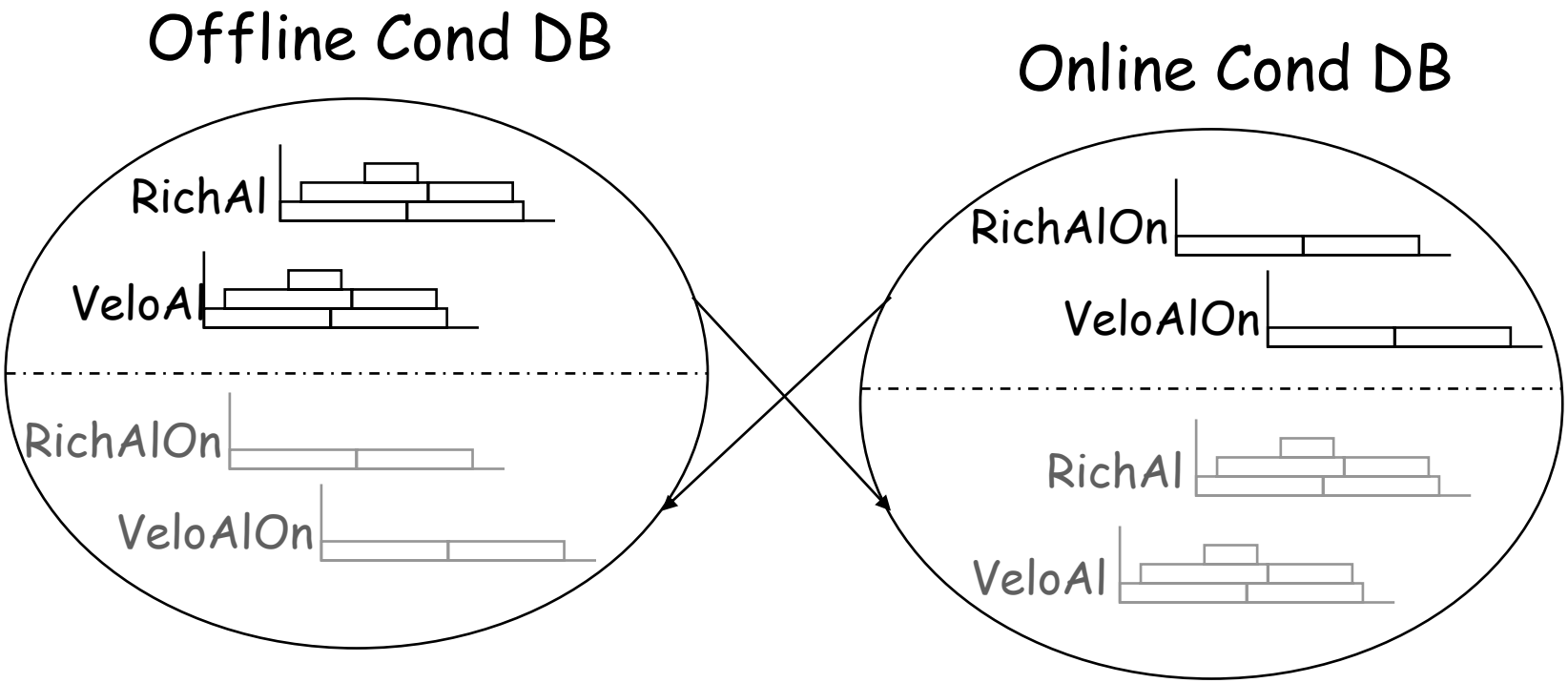
- Special filter for some conditions
  - Trigger Farm Update



Ex: The VeLo Alignment



Online/Offline Synch



- Synchronized by Oracle Tools