

ALICE Run3/Run4 Computing Model simulation software

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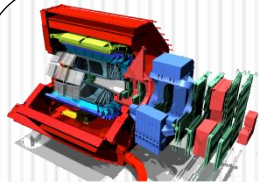
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Outline

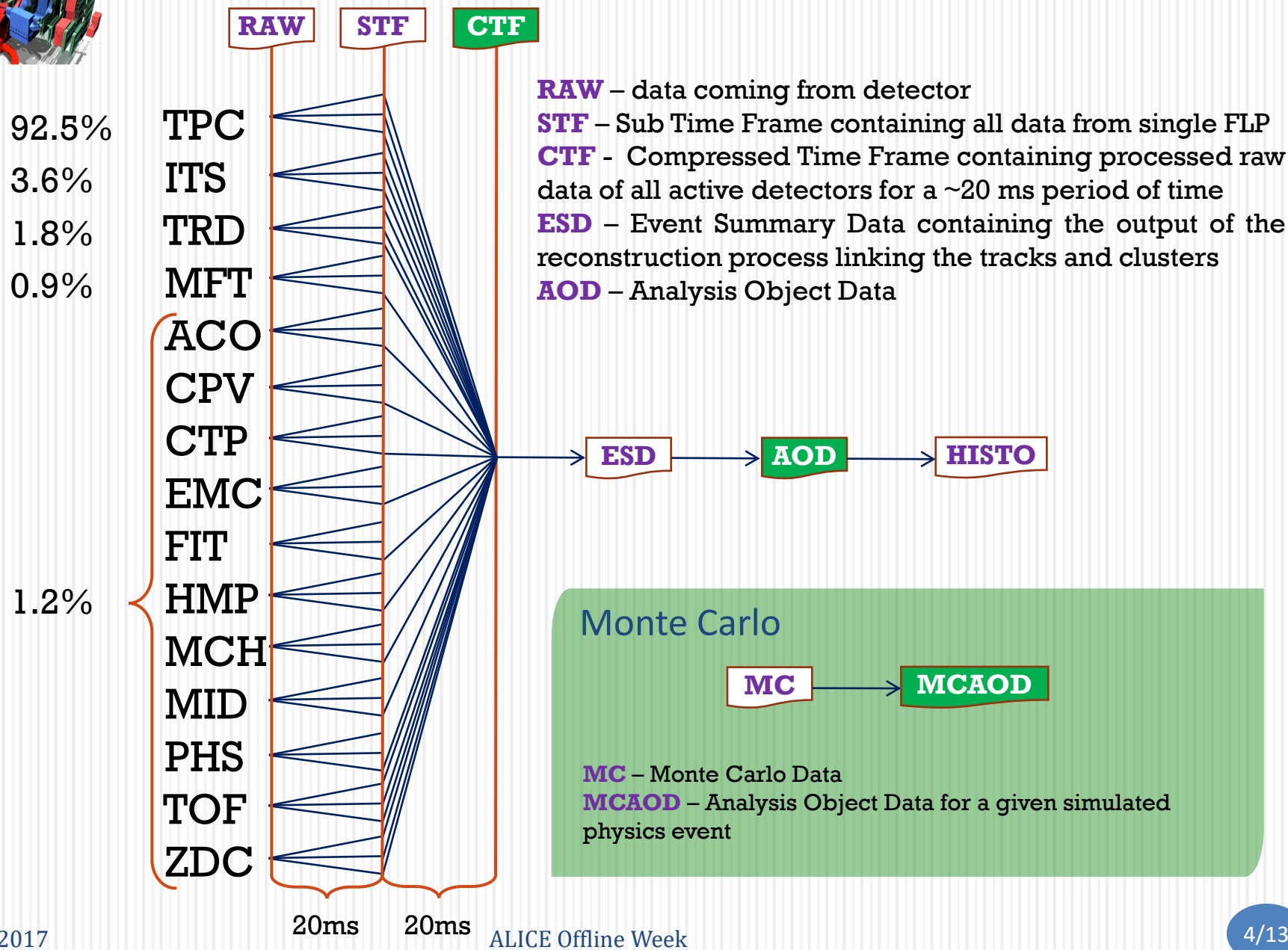
- O2 Computing System upgrade program for ALICE Run3 and Run4
- ALICE Data Types
- ALICE Computing System
- ALICE Computing Model layouts
- ALICE CoMPI simulation software for Computing Model
- Next steps

Reasons for Upgrade (as per ALICE TDR-019)

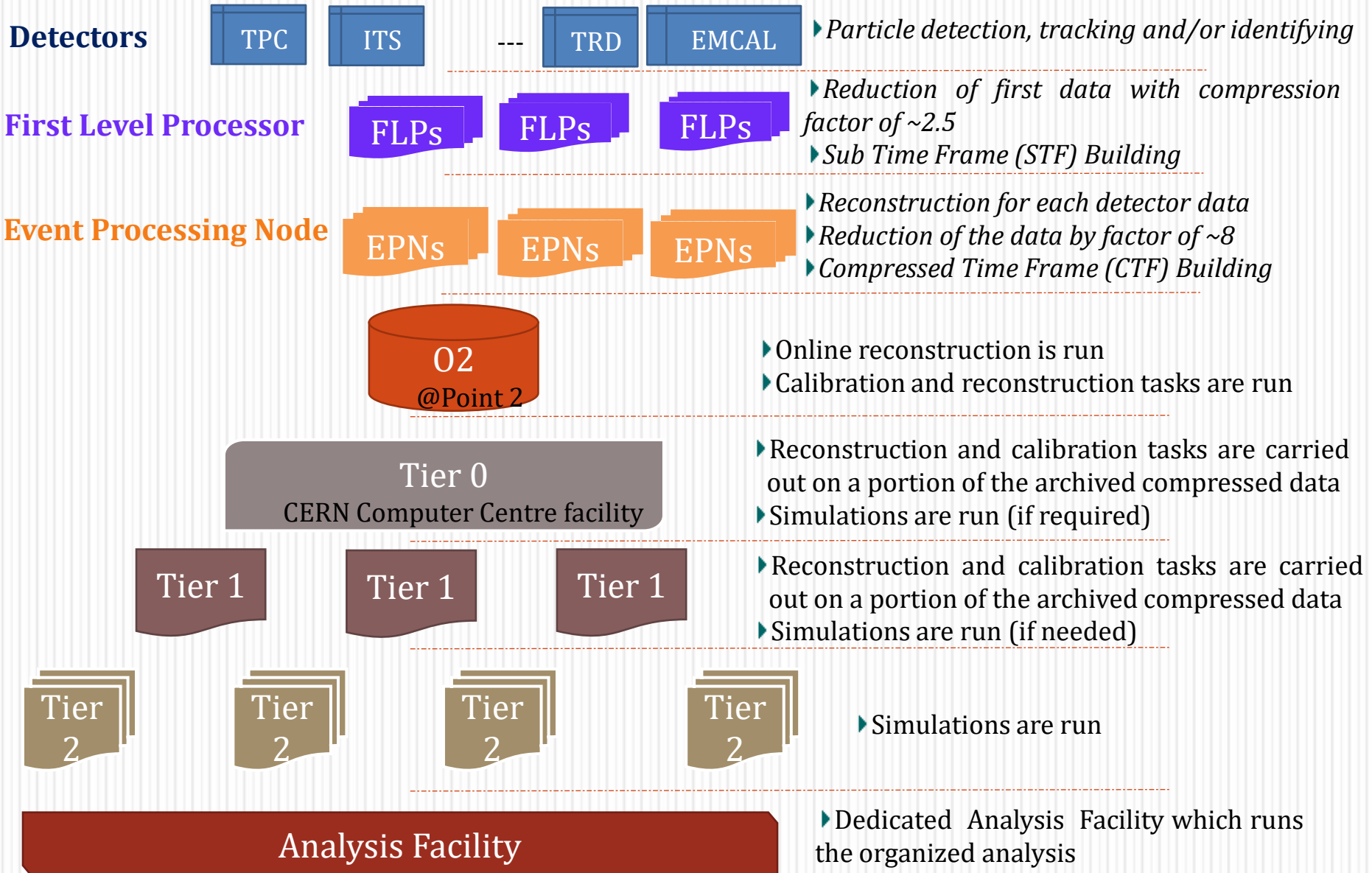
The purpose *ALICE Computing Model* (O2 model) for **Run 3** (2020-2022) and **Run 4** (2025-2027) is to reduce the data volume to the maximum possible extent to minimize the storage cost and requirements of the computing resources needed for data processing while minimizing the impact on physics performance.



ALICE Data Types



ALICE Computing System



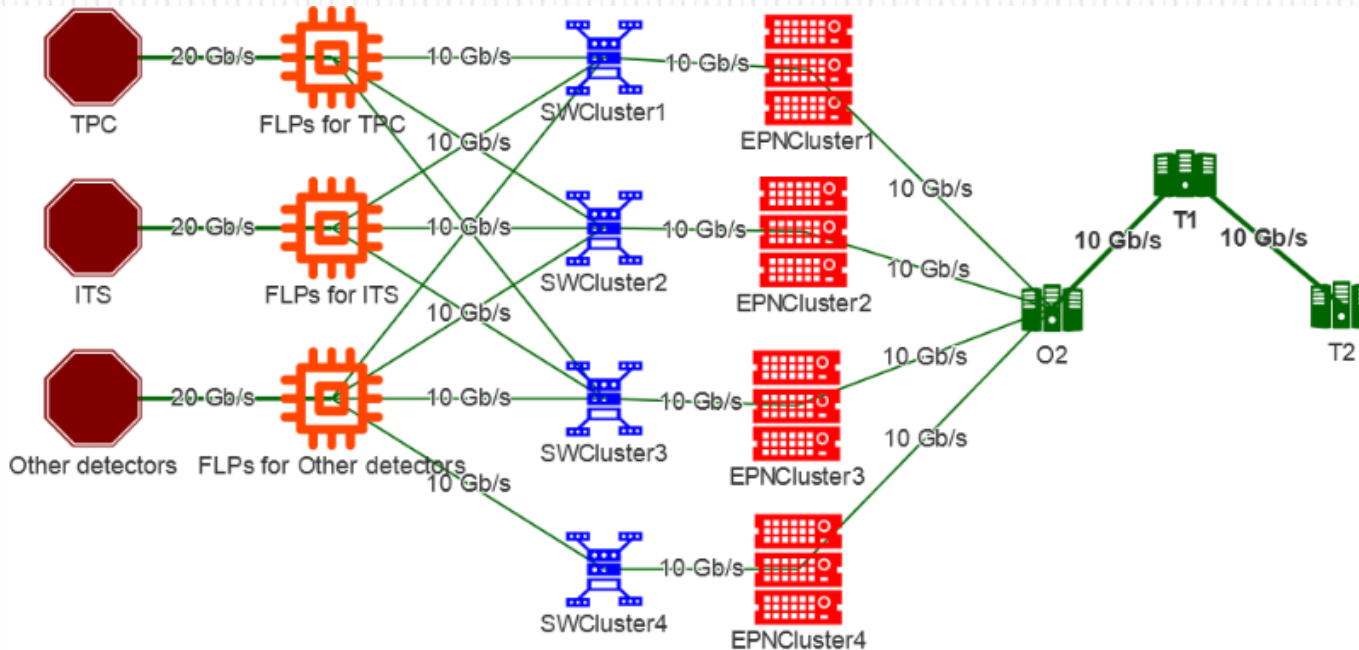
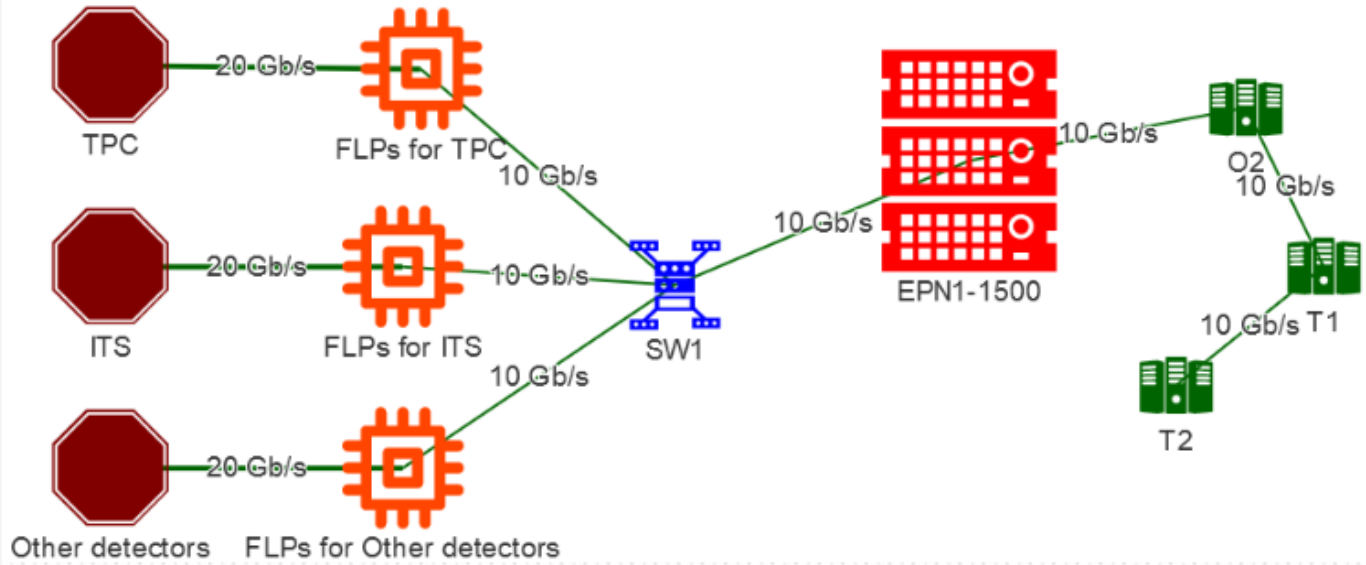
New computing model layouts

Layout is the combination of FLPs, EPNs and other resources, definition of their roles, as well as the network topology by which these resources are connected.

**3 possible layouts of the new computing model
are proposed in ALICE TDR.**

⊕ Layout 1

All the FLPs and EPNs are connected to a single large switching network with all ports having the same bandwidth sufficient for the nodes with the highest needs

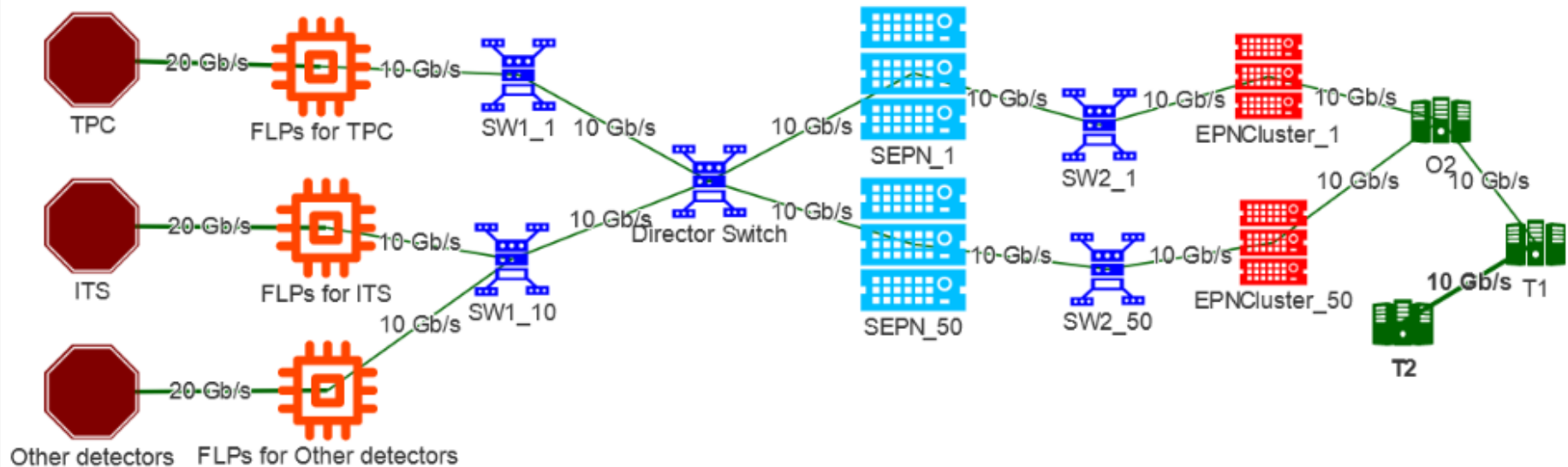


⊕ Layout 2

Each FLP is connected to each of the subfarms. This layout reduces the network cost by splitting the total data traffic into four

✦ Layout 3

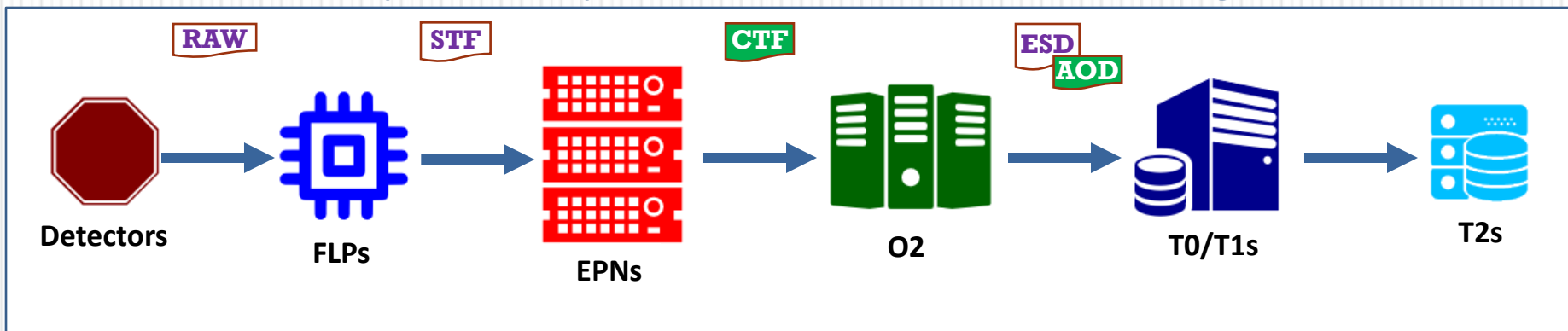
- Splitting the fan-in and fan-out functions into two separate layers of the network.
- The fan-in function is performed by a standard switch or a combination of switches with aim to minimize the number of high-speed links used to perform the assembly of Time Frames



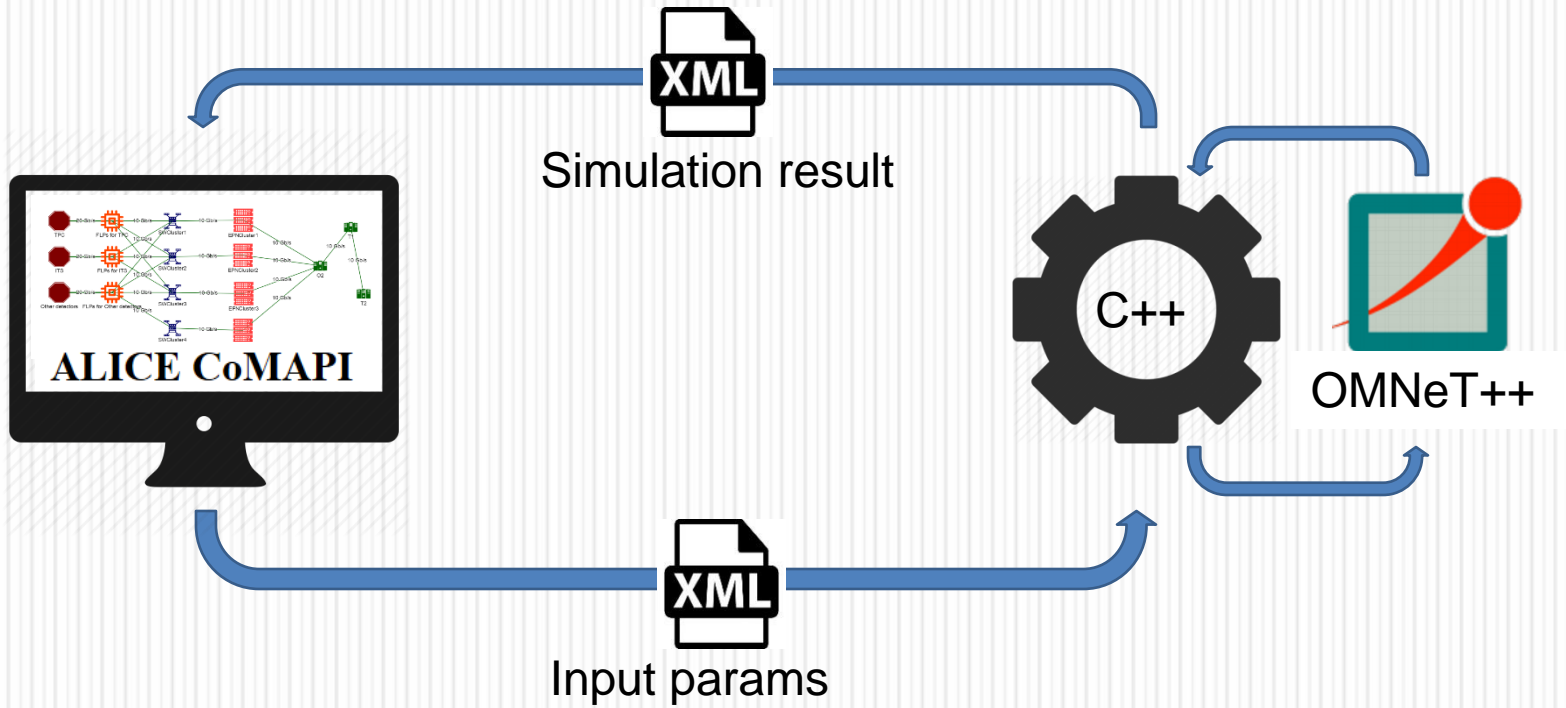
ALICE CoMAPI - ALICE Computing Model simulation software (under development)

The software is to perform discrete-event simulations of ALICE data taking process for certain period of time for a given computing model layout with the aim to estimate the usage of ALICE resources required to process and store the data during Run 3 and 4.

Resources required to process and store data during Run3/Run4.



ALICE CoMAPI structure




CoMAPI web interface components and functionality

It is:

1. Fast and lightweight
2. User-friendly
3. Open source and modular

Its components



 **jQuery** - fast, small, and feature-rich JavaScript library

 **vis.js** - JS library for visualization to display networks and networks consisting of nodes and edges

 **jsPDF** - HTML5 client solution for generating PDFs.

Gives possibility to:

1. Define experiment specific (Detectors, FLPs, EPNs, SEPNs, etc) and/or custom resource types.
2. Graphically visualize the computing model components and their interconnections
3. Automatically create and visualize the 3 layouts of computing models proposed in ALICE O2 TDR.
4. Save and Restore created models
5. Export models in XML/JSON format and export graphics in PDF format.

Detectors

detectorName	NreadoutLink	detectorDataRate	timeFrameRate	Connections
TPC	1	50	50	
ITS	1	50	50	
Other detectors	1	50	50	

FLPs

FLP name	NFLP	FLPcompression	singleFLPoutingRate
FLPs for TPC	160	2.5	10
FLPs for ITS	25	2.5	10
FLPs for Other detectors	65	2.5	10

Switching networks

Sw. net. name	NswitchingNetwork	NPortsIN	NPortsOUT
SW1_1	1	25	8
SW1_10	1	25	8
Director Switch	1	50	50
SW2_1	1	1	30
SW2_50	1	1	30

SEPNs

SEPN name	NSEPN	SEPNincomingBw	SEPNoutgoingBw	NcoresRequired	NCpuPerNode	NCorePerCPU	SEPNcompression
SEPN_1	1	40	10	64	2	32	8
SEPN_50	1	40	10	64	2	32	8

EPNs

EPN name	NEPN	EPNincomingBw	minimumActiveEPN	NcoresRequired	NCpuPerNode	NCorePerCPU	EPNcompression
EPNCluster_1	30	10	100	64	2	32	8
EPNCluster_50	30	10	100	64	2	32	8

Other Resource

Site Name	Quantity	CPU resources			Datarate			Has SE	Storage Resources				Tape resources					
		nSlots	Capacity	HEPSPEC06	In	Out	Agg		Stream	Name	Capacity	DatarateIn	DatarateOut	Has Tape	Name	Capacity	DatarateIn	DatarateOut
O2	1	200	CTF	815	10	10	10	10	SE nsh	GB	10	10						

Connections

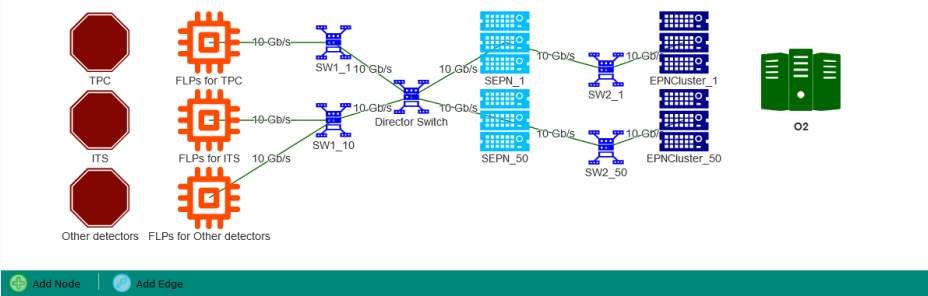
FLPs for TPC to FLPs for ITS

FLPs for TPC → SW1_1 ✖ | FLPs for ITS → SW1_10 ✖ | FLPs for Other detectors → SW1_10 ✖ | SW1_1 → Director Switch ✖

SW1_10 → Director Switch ✖ | Director Switch → SEPN_1 ✖ | Director Switch → SEPN_50 ✖ | SEPN_1 → SW2_1 ✖

SEPN_50 → SW2_50 ✖ | SW2_1 → EPNCluster_1 ✖ | SW2_50 → EPNCluster_50 ✖

Layout 3 |



CoMAPI web interface

<http://famos.cern.ch/comapi/>

Compatible with Firefox/Chrome

Next steps

- Develop the second part of CoMAPI software, which actually will perform aforementioned discrete-event simulations of ALICE Run3/Run4 computing model.
- Any other suggestions are very welcome 😊

Thanks