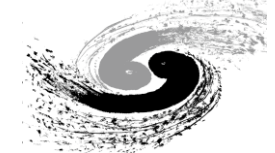


研究生8月考核报告

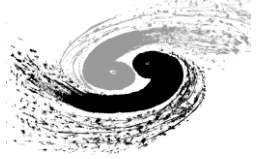
专业: **计算机应用技术**

课题组: **触发与数据获取组**

考核人: **张叙**

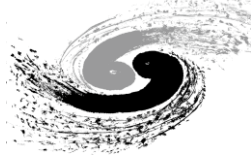


- **JUNO**
 - TT与8inch PMT数据流集成
 - 新波形压缩存储策略的集成
 - 在线数据处理软件的运维
- **CEPC**
 - 面向异构的在线处理框架的开发
 - 在线与离线框架融合研究
- **报告**
 - JUNO commissioning and analysis workshop(北京)
 - 实验粒子物理计算研讨会(西昌)
 - JUNO collaboration meeting(江门)
 - 全国科学计算与信息化会议(长春)

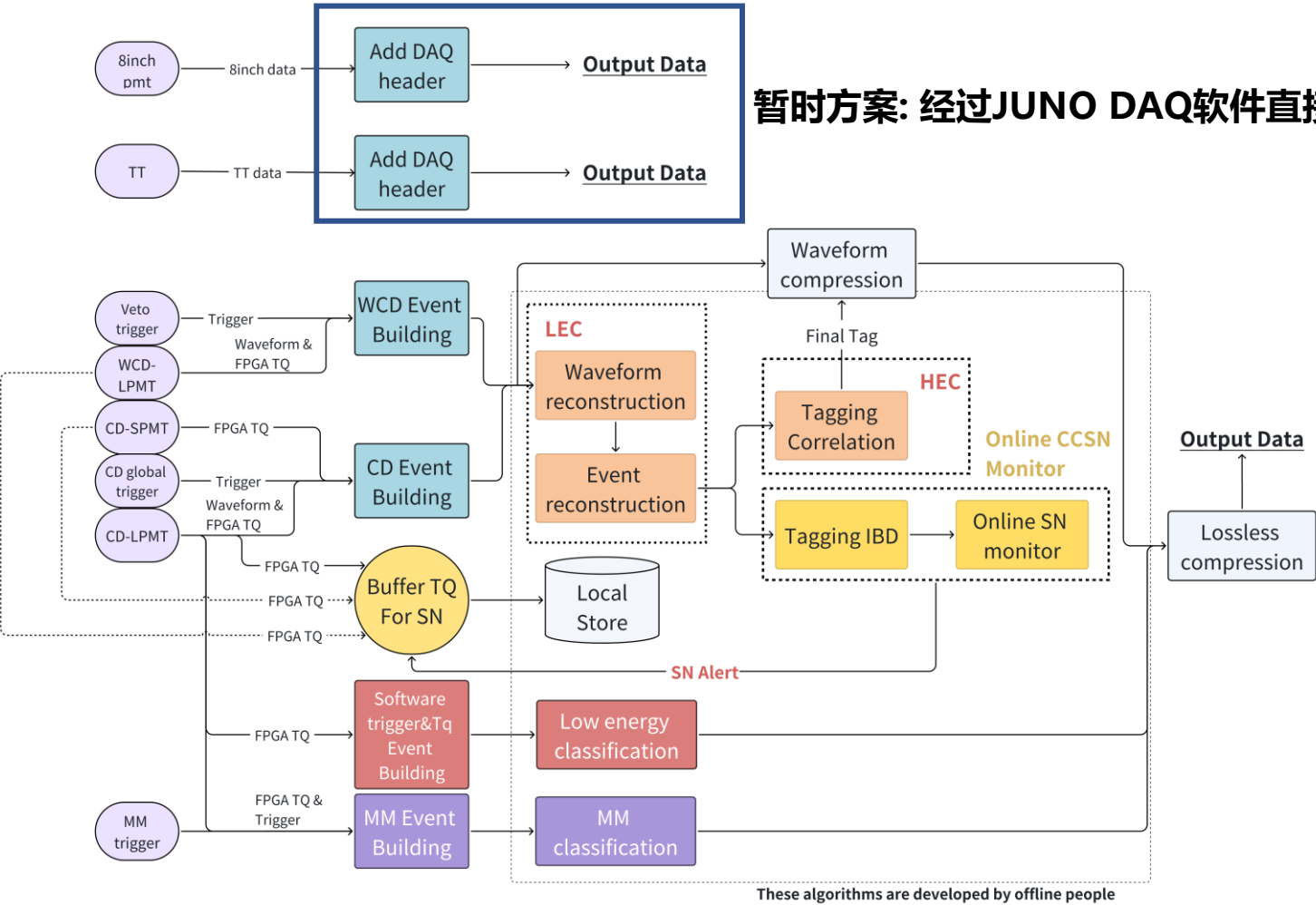


JUNO Part

TT与8inch PMT数据集成



需求:8inch PMT与 Top tracker detector是JUNO全探测器的必要组成部分, 需要集成到JUNO数据流。

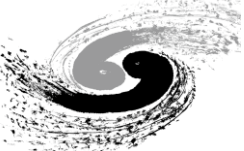


暂时方案: 经过JUNO DAQ软件直接存盘。

```
streams:
- global_trigger_stream:
  - WAVE_CD_LPMT
  - WAVE_WCD_LPMT
- mm_trigger_stream:
  - TQ_MM
- software_stream:
  - TQ_SolftWare
- low_e_stream:
  - Low_E_LPMT
- tt_stream:
  - TT
- eightpmt_stream:
  - VETO_MPMT
```

- 工作:**
- 1.增加了处理软件对于TT事例与8inch事例的支持。
 - 2.增加了DAQ解析程序对这两种事例的支持。

新波形压缩存储策略的集成

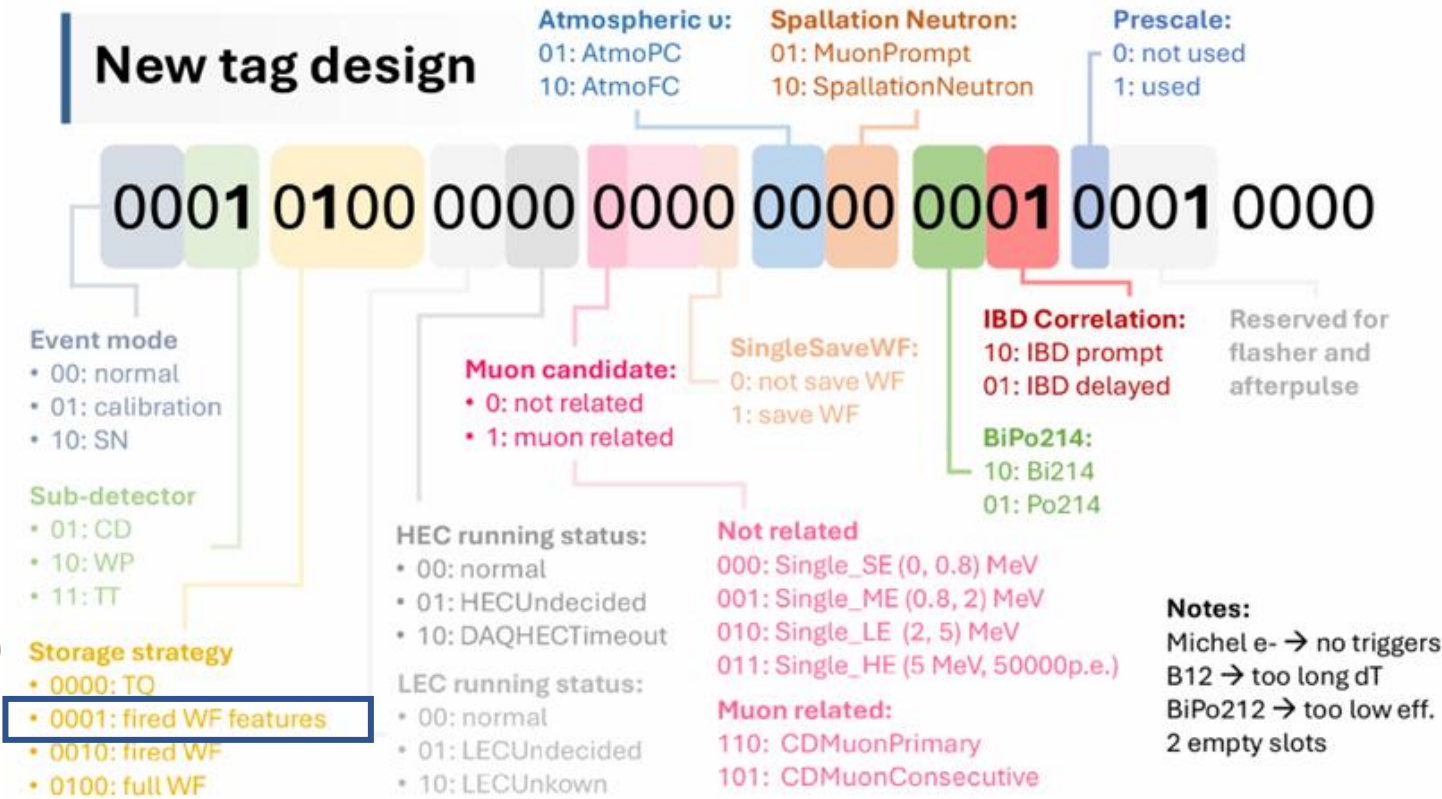


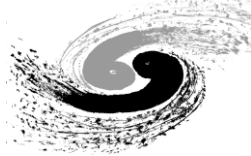
需求: 对于muon事例, 只存储波形特征而不存原始波形能够有效的降低存盘量。

```
uint32_t time_sec =
    tri_ele.second / gSecondeToNano; // second is 64 bit timestamp
uint32_t time_nano = tri_ele.second % gSecondeToNano;
std::vector<write::Event::ElementPtr> elements;
constexpr int kVertexSize      = 2 * 1024 * 1024; // 2MB
constexpr int kReconstructedTqSize = 8 * 1024 * 1024; // 8MB
constexpr int kWFFeatureSize = 8 * 1024 * 1024; // 8MB
auto vertex_buf = std::make_shared<memory::Buffer>(kVertexSize);
auto tq_buf     = std::make_shared<memory::Buffer>(kReconstructedTqSize);
auto wffeature_buf = std::make_shared<memory::Buffer>(kWFFeatureSize);
std::memset(vertex_buf->addr(), 0, vertex_buf->max_size());
std::memset(tq_buf->addr(), 0, tq_buf->max_size());
std::memset(wffeature_buf->addr(), 0, kWFFeatureSize);
```

工作:

- 1.基于算法的返回结果存储波形特征量(离线人员开发)
- 2.增加了DAQ解析程序对这波形特征量数据的支持





OEC版本(在线算法): v4.x -> v6.x

<input type="checkbox"/>	oec_config	v6.3.0.daq_SqmlcGt25p7p2IBDFullTag0	2025-08-28 22:18:26
<input type="checkbox"/>	oec_config	v6.3.0.daq_gt25p7p2IBDFullTag0	2025-08-28 12:59:52
<input type="checkbox"/>	oec_config	v6.3.0.daq_gt25p7p2IBDFull	2025-08-28 12:47:28
<input type="checkbox"/>	oec_config	v6.2.0.daq_gt25p7p2IBDFull	2025-08-25 18:51:46
<input type="checkbox"/>	oec_config	v6.2.0.daq_gt25p7p2IBDFiredOp2	2025-08-25 18:41:40
<input type="checkbox"/>	oec_config	v6.2.0.daq_gt25p7p2LaserOp3FiredWF	2025-08-25 17:02:35

.....

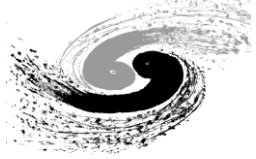
<input type="checkbox"/>	name	version	time
<input type="checkbox"/>	oec_config	v4.2.0.dtPlot	2025-04-18 14:18:21
<input type="checkbox"/>	oec_config	v4.2.0.BiPoZplot	2025-04-15 15:41:27
<input type="checkbox"/>	oec_config	v4.2.0.eventPrescale	2025-04-14 18:02:23
<input type="checkbox"/>	oec_config	v4.2.0.WFtag	2025-04-14 14:56:17
<input type="checkbox"/>	oec_config	v4.1.0.HECTools	2025-04-10 19:35:29
<input type="checkbox"/>	oec_config	v4.0.0.SNupdate	2025-04-08 21:20:10
<input type="checkbox"/>	oec_config	v4.0.0.normal	2025-04-07 15:35:39

DAQ数据格式: v2.2.0 -> v2.5.0

2025.03.27	Zhang Xu, Fang wenxing	Update OEC Evt format, Add LowE event tag.	2.2.0
2025.08.03	Zhang Xu, Shi Yuan	Update 8inch event format	2.3.0
2025.08.12	Zhang Xu	Add some explain about tt test data format	2.3.0
2025.08.15	Zhang Xu, Fang wenxing	Add some explain about OEC reco. T/Q and OEC waveform feature data format	2.4.0
2025.08.21	Zhang Xu, Fang wenxing	Update OEC reco. T/Q data format with channel flag added	2.5.0

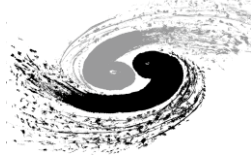
软件debug与调整:

1. 软件触发打包逻辑问题。
2. 内存越界问题。
3. 析构顺序导致的指针悬空。
4. 软件性能研究。



CEPC Part

面向异构的在线处理框架的开发



需求: 针对CEPC需要开发适配更高算力的异构在线处理(CPU + GPU)框架。

进展: 完成了初始设计与demo版本的开发。

参考:
JUNO在线框架
LHCb异构在线框架

online-computing-platform		
main	online-computing-platform /	
add new devicetype in func1.cu zhangxu00@ihep.ac.cn authored 5 days ago		
		46f97a90
Name	Last commit	Last update
algs	add new devicetype in func1.cu	5 days ago
algs_only_cpu	init version	2 weeks ago
buffer	using global marco, finish run	1 month ago
device_interface	add new devicetype in func1.cu	5 days ago
device_manager	a temp version, add device scheduler a...	2 weeks ago
external	use spdlog instead of quicklog, finish c...	1 month ago
funcpool	init version	2 weeks ago
log	using global marco, finish run	1 month ago
main	add three pattern	1 week ago
memory	init version	2 weeks ago
protected_queue/protected_...	use spdlog instead of quicklog, finish c...	1 month ago
scheduler	a temp version, add device scheduler a...	2 weeks ago
type	can run with demo cpu algorithm	1 month ago
worker	a temp version, add device scheduler a...	2 weeks ago
.clang-format	first version	2 months ago

cepc-online-computing-platform

Search docs

USERGUIDE:

Introduction

Framework

Algorithm

Build Project

Run project

Add New Algorithm

Add New Stream

Evnet build

Data format

Configuration

DEVELOPERGUIDE:

Developer Essentials

Add new buffer

Add New Device

Add New Protocol

cepc-online-computing-platform

View page source

Welcome to the CEPC Online Computing Platform documentation!

This Online Computing Platform serves as a framework for online algorithm development and execution for CEPC. It is also an part of the Radar (A kind of online processing framework) v3.0.

If you have any question or suggestion, please contact ZhangXu(zhangxu00@ihep.ac.cn).

UserGuide:

Introduction

Framework

Algorithm

VTX

ITK

TPC

OTK

ECAL

Build Project

Single Mode

Online Mode

Run project

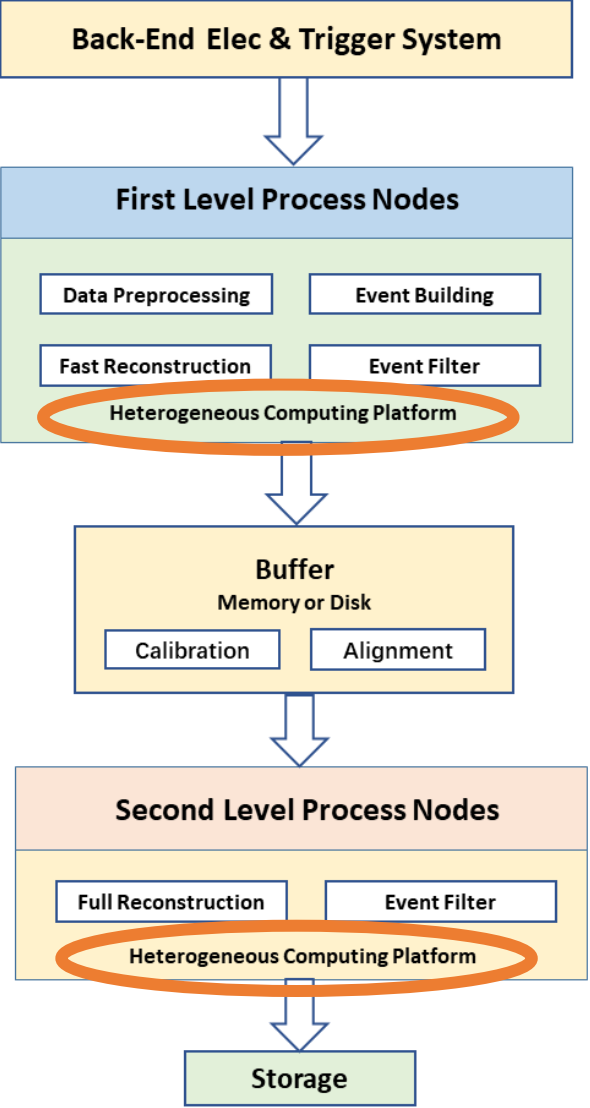
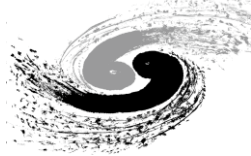
Add New Algorithm

A Simple Example

An Advanced Case

Suggestions

面向异构的在线处理框架的开发



异构调度器:

- 有数据依赖关系的算法将会被优先调度到相同的异构设备上。
- 框架**支持**将同一算法调度在不同的异构设备上以最大化异构资源的利用率。
需要用户提供在不同异构设备上的算法

兼容性:

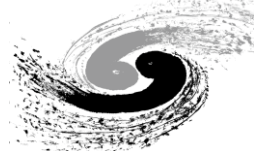
- 以下是框架目前以及未来要支持的设备与协议等。

Type	Supported	To be supported
Buffer	Disk	Shared Memory • Memory Buffer
Protocol	TCP	RDMA
Compute	CPU • GPU	FPGA
Memory	CPU • GPU	FPGA

开发友好:

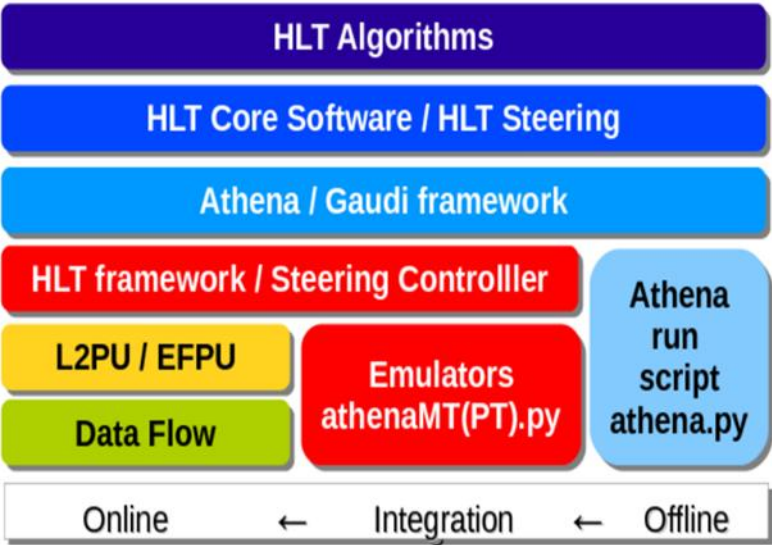
- 用户不需要关心其他算法运行的异构设备。
- 使用统一的内存管理器去管理异构内存。

在线与离线框架融合研究



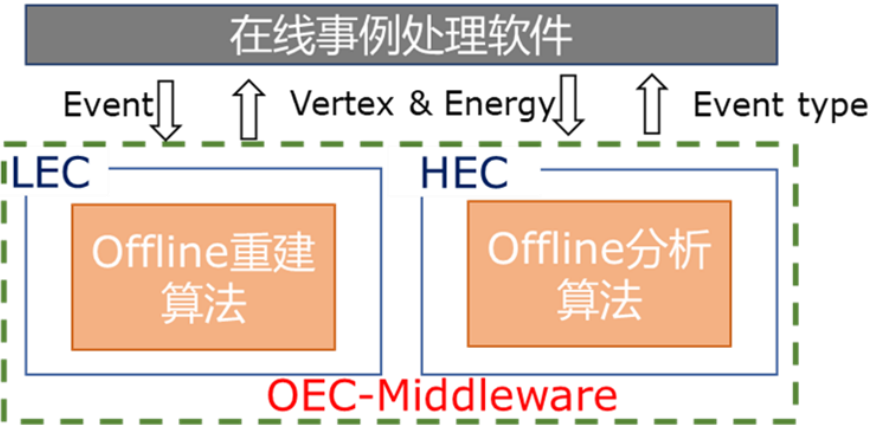
需求: 部分在线算法来源于离线，需要特定设计才能完成在线框架与离线框架的配合。

ATALAS HLT软件设计

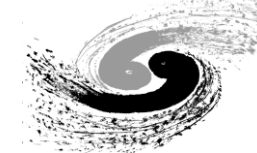


```
Gaudi-v37r2 Gaudi-v37r2
CEPCSW CEPCSW
k4FWCore-master k4FWCore-master
CEPC_glliu CEPC_glliu
podio-self podio-self
podio-v00-17-01 podio-v00-17-01
x86_64-el9-gcc11-opt x86_64-el9-gcc11...
EDM4hep-00-10 EDM4hep-00-10
x86_64-el9-gcc11-opt x86_64-el9-gcc11...
105.0.0 105.0.0
```

JUNO在线离线交互



工作: 学习与理解CEPC离线软件与相关服务的源码。



JUNO commissioning and analysis workshop

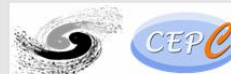
Status of the DAQ system.

Xu Zhang
(IHEP)
On behalf of the TDAQ GROUP

2025/6/16

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实验粒子物理计算研讨会(西昌)



CEPC在线数据处理框架进展

报告人：张叙

JUNO collaboration meeting

OEC & Monitor part of DAQ system.

Xu Zhang
(IHEP)
On behalf of the TDAQ GROUP

2025/7/27

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全国科学计算与信息化会议

JUNO在线数据处理软件

报告人: 张叙(IHEP)
代表: JUNO DAQ GROUP

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