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FORM, a Fine-grained Object Reading/Writing Model for DUNE

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DUNE's current processing framework (art) was branched from the event processing framework of CMS, a collider-physics experiment. Therefore art is built on event-based concepts as its fundamental processing unit. The "event" concept is not always helpful for neutrino experiments, such as DUNE. DUNE uses trigger records that are much larger than collider events (several GB vs. MB). Therefore, to avoid allocating large chunks of memory, DUNE is developing a framework that is able to break apart trigger records into smaller segments for more granular processing, and then stitch those chunks back together into an event.

In order for such an event-processing framework to work it needs to be integrated with input/output infrastructure that allows for fine-grained storage and I/O. FORM (Fine-grained Object Reading/Writing Model), a DUNE project, which intends to explore fine grained I/O and storage framework to store data in finer containers. Data objects need to be partitioned into segments to serve the fine grained processing, and be stored separately at accessible locations. Thus enabling I/O to read/write segmented data objects individually to avoid excessive memory consumption caused by reading large storage objects. The details of data storage and I/O should be encapsulated by the framework and transparent to client code such as algorithms. The persistence framework, FORM, is designed to write and read data in multiple smaller entries/events resulting in improved concurrency.

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