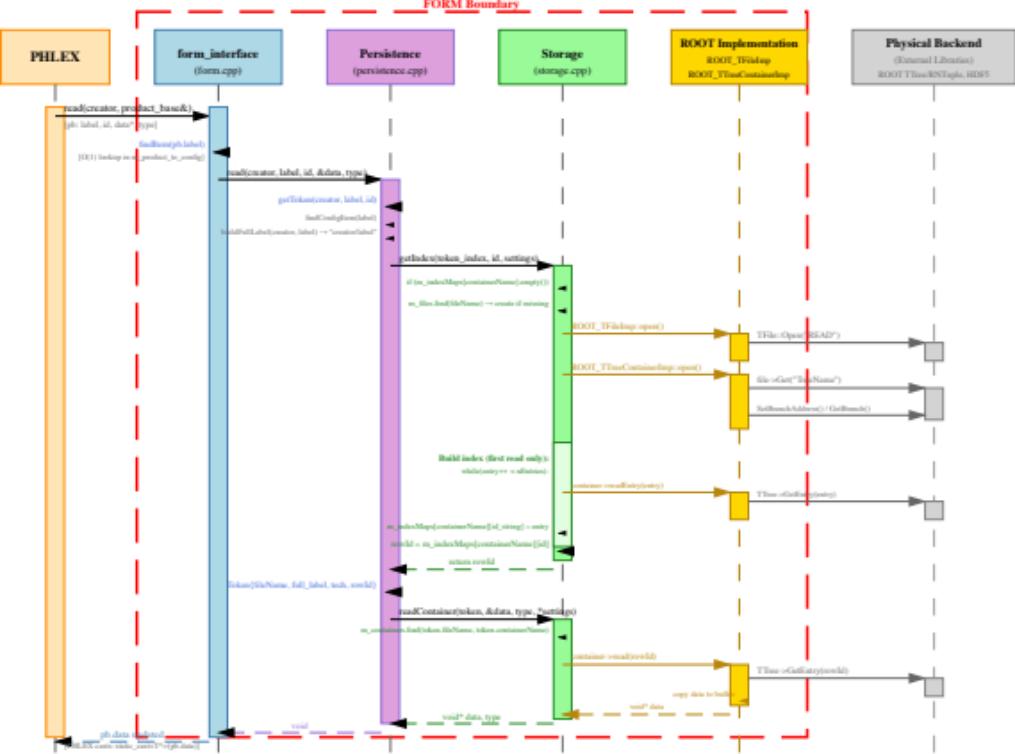


# FORM: Read Operation



## Storage Layer - Read Details:

- `m_file`: Lazy open on first read
- `m_container`: Cached after creation
- `m_indexMap`: containerName[id\_string] = m\_root
- Built once by scanning entry container
- Cached for subsequent reads
- Mode `V` is replicated mode
- Composite key lookup (`fileName, containerName`)
- New memory allocated for each read
- PREFS responsible for delete
- Type string verified during read
- NO LOOP: PHLEX calls read() once per request

## ROOT Implementation Layer (NEW):

- `ROOT_TFileIndex`: Implements `TStorage_File` interface
- Wraps `ROOT_TFile` class
- Manages file opening, mode switching
- `ROOT_TTreeContainer`: Implements `TStorage_Container`
- Wraps `ROOT_TTree` class
- Handles `TBranch`, `TSelfBranchAddress`
- `ROOT_TBranchContainer`: For individual branches
- This layer translates FORM storage calls → ROOT API calls

## Two-Step Index Lookup:

- Step 1: Build index map ("first read only")
  - Read all entries from "containerIndex" container
  - Each entry contains ID string: "`EVNT-00000010001-00000000`"
  - Map `m_indexMap["key_Token/index"]` id\_string = entry\_name
- Step 2: Load event ID
  - Given semantic ID, get physical entry number
  - Use result to read actual data container