XML CONSTRUCTS FOR DEVELOPING DYNAMIC APPLICATIONS OR TOWARDS A UNIVERSAL REPRESENTATION OF PARTICLE ACCELERATORS IN XML

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ABSTRACT

A recognized practice in the development of high-level beam dynamics applications is to separate data parameters destined for the configuration of the application from the programming language domain. The contemporary approach is to generate input files that provide the configuration parameters in a structured data format specified by the Extensible Markup Language (XML), enhancing flexibility, and simplifying code maintenance. Furthermore, a careful consideration to the form of XML syntactic constructs i.e. structured elements, attributes, etc., that map well to the various accelerator components, provides a basis for portability of configuration classes and high-level applications. This has been exemplified by the XL application software package which initiated an XML description of the Standard Machine Format (SMF) accelerator object model. We have since adopted and optimized XML-SMF to provide an XML representation of both the Swiss Light Source (SLS) and the SwissFEL 250 MeV Injector Test Facility. We demonstrate how such a common set of XML constructs allows us to deploy the same, example orbit display application at both facilities. Our experience leads us to advocate a Universal Machine Format (UMF) that encompasses an all-inclusive XML vocabulary for the management of particle accelerator information pertaining to beam dynamics applications.

WHY XML?

- Hierarchical data structures, extensible: handles new data in newer input format
- Supported by several categories of APIs: Stream oriented, e.g. SAX; tree-traversal, e.g. DOM, XML data bindings, directly translates XML to language object
- Portable across platforms and languages
- A de facto standard for data exchange and portability
- Widely accepted format in accelerator field: a de facto standard for data exchange and portability
- Applications easily adapted to changes in the accelerator system by simple modification to the configuration file, enhances portability of applications

XML CONFIGURATION

- Accelerator XML extracted from the Device Reference and Epics DBs
- device reference
- XREF
- channelsuite
- XREF

XML-SM (s i a XAL) accelerator.xml

- CAFE configuration file defines a group of DBPM sequence
- CafeNode=DBPM > CAFECollections.xml
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REFERENCES


A UNIVERSAL MACHINE FORMAT

The adoption of XML-SMF has allowed us to write applications that can easily adapt to changes in accelerator topology, an important consideration during the development phase of a facility such as the SwissFEL, and be equally applied to different accelerators at PSI. Our experience further leads us to recognize the benefits of an all-inclusive XML markup language to advance portability of certain standard beam dynamics applications. (For instance, additional accelerator child elements could cater for local variations in definitions of a channel's state; node types may be mapped to customized classes.) This may be realized if communities of interest conspire to use the same XML constructs. Such an XML vocabulary can be shared via a repository containing the appropriate elements of metadata, facilitating disclosure and usage. OpenXAL [8] which extends XML-SMF to other facilities, is a natural home base for discussion, and finalizing on a Universal Machine Format (UMF). Adapting standard machine applications to a particular accelerator may ultimately be reduced to selecting the required software packages and stacking configuration files with the adopted UMF constructs.