Workshop Description: The RCE Platform Technology (RPT) is a framework for the development and deployment of large-scale Data Acquisition Systems (DAQ). RPT has, as its fundamental premise, that application-specific, arbitrarily-sized DAQ systems may be constructed through derivation from a small number of generic, reusable building blocks. For the RPT, these blocks are the **RCE** (Reconfigurable Cluster Element), a low-power, generic, computational element employing System On Chip (SOC) technology; the **CI** (Cluster Interconnect), a small-footprint, multi-port, 10-Gigabit Ethernet switch used to inter-connect RCEs, and **ATCA**, a PICMG developed packaging standard, which acts as the physical substrate for both RCE and CI.

The RPT framework provides, in addition to its hardware infrastructure, a host based, cross-development, software development kit (SDK), with which users can write application-specific software to deploy to the RCE. With its extensibility, modular design and range of deployment topologies, RPT is a flexible solution to many data acquisition problems.

Participants in the RPT Workshop will be introduced to the framework: its design, its toolchain for development and deployment, and its SDK. The morning session is lecture-based, though with hardware in the classroom for demonstration by the presenters. The afternoon session is hands-on, with participants able to proceed through a series of development exercises, starting with a "Hello world" exercise, which demonstrates the programmer's development cycle and ending with an exercise which demonstrates the plugin interface and employs the 10-Gigabit Ethernet interlink between RCEs.

Assumptions and Prerequisites: Participants are assumed to have experience developing hardware and embedded software for real-time data acquisition systems, familiarity with Linux, programming experience with either C or C++, and basic knowledge of networking principles. No familiarity with ATCA or firmware (VHDL) development are assumed.

Participants will connect to demonstration host machines during the morning and afternoon sessions, and should therefore bring their own laptop with local WiFi connectivity.

Workshop Agenda: The workshop includes the following talks and hands-on activities.

Morning session: Introduction to RPT (system architecture, hardware design, overview of cross-development environment); RPT Hardware (description of the RCE and Cluster On Board (COB), principles of ATCA with in-class hardware demonstration); RPT Development Toolchain (access to and installation of development tools, basic usage of tools to configure networking and retrieve health and status information from RCEs and ATCA shelves); RPT Networking (RPT tools for networking and shelf configuration, interconnectivity and recommended network topologies); RPT SDK (cross-development concepts, development and deployment cycle, components of an RPT application, sharable images and usage of Symbol/Value Tables (SVTs) for configuration and installation).

Afternoon session: Hardware hands-on (components of and handling of COB boards, COB setup, features of ATCA shelf); SDK hands-on (Developing "Hello world!" for the RCE;

developing a DSL application; developing a "toy" UDP interface using an RCE's Ethernet plug-in).