ATLAS Note

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SR1 upgrade

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Given the complexity and inaccessibility of the Transition Radiation Tracker (TRT) during ATLAS data taking, a replica has been built in an above-ground laboratory environment in SR1 in 2010. As part of TRT TDAQ upgrade, hardware and software in the SR1 test bench was upgraded. Migration from CMT to the CMake building system is partly done. The opportunity for migration of SVN to the Git version control system was investigated.

Contents

Not reviewed, for internal circulation only

1 Introduction

The TRT test bench represents a full TRT TDAQ chain - wedge of the Barrel TRT equipped with front end (FE) electronics and connected to the TRT TDAQ system. It was required to revamp SR1, renovate old components and fix broken parts, make software updates and prepare it for Point 1 repository merge.

This paper is organized as follows.

Section 2 contains details about the SR1 test bench upgrade. The 32 bit to 64 bit migration description, as well as ROD and TTC replacement with firmware update is given in Section 2.1. Transition from CMT to the CMake project builder is described and the SVN to Git migration is investigated in 2.2 and 2.3 respectively. Additional ideas about Git Continuous Integration (Git CI) that can be useful for TRT TDAQ developers after migration is given.

2 SR1 test bench upgrade

SR1 is the TRT test bench that represents a full TRT TDAQ chain - wedge of the Barrel TRT equipped with front end (FE) electronics connected to the TRT TDAQ system. It was contructed for software and hardware tests, as well as for TRT TDAQ team training reasons. Figure 1 shows the TRT TDAQ schema for the SR1 setup. It mirrors the setup for Point 1, but instead of ATLAS Central Trigger Processor (CTP) we are using a CTP emulator (blue circle on the schema). More information about the TRT TDAQ end electronics can be found in [1]. Electronics installed in SR1 is shown in Figures 2(a) and 2(b) for the counting hall and the clean room, correspondingly. Detector components, readout system (Patch Panel boxes with electronics) and cabling are mounted in a Bosch profile frame to provide mobility of the test stand. It is designed keeping in mind a possibility to use the setup at a test beam.

During SR1 upgrade work flow, there was a special partition prepared by the TRT TDAQ experts specially for the SR1 update, which allows to launch TRT TDAQ software on AFS [2].
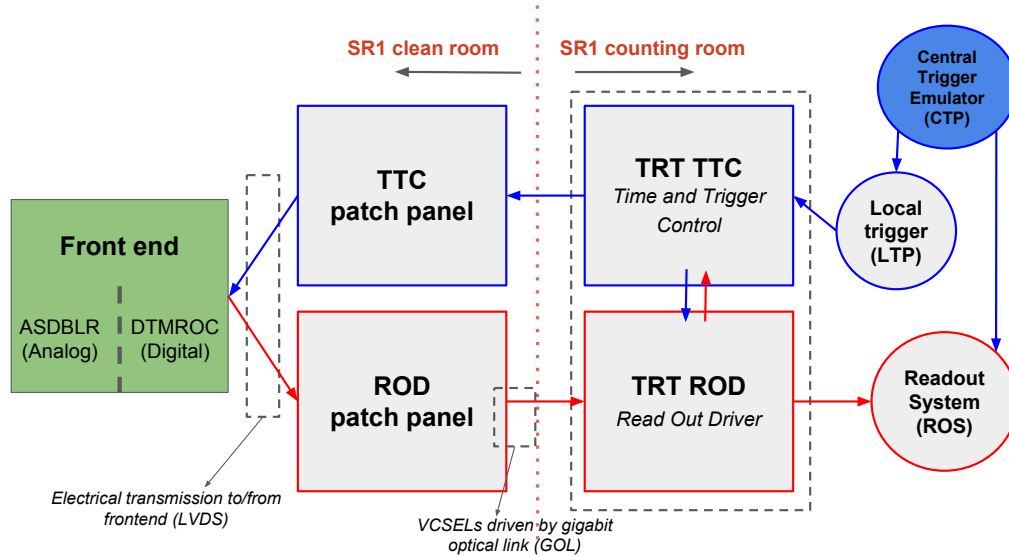

Figure 1: Schematic representation of TRT TDAQ setup in the SR1.

2.1 64 bit hardware and software upgrade

Since the TDAQ package verison TDAQ-06-*, ATLAS TDAQ software doesn't support 32 bit machines. For that reason single board computers (SBC) were required to be replaced with 64 bit machines and software needed to be updated. The SR1 test bench was a platform for testing this project. A new 64-bit Read-Out-System (ROS) 3(a) and a personal computer (PC) for control proposals were installed, both of them are netbooted. A list of old and new device host names in SR1 are given in Table 1.

One ROD and one TTC are installed in SR1 (see 3(b)). During upgrade they have been replaced with spare devices with updated firmware versions. Now SR1 is working under ATLAS TDAQ-06-01-01 control and the TRT TDAQ system successfully runs. At the time of writing this document some problems exist; one stack in SR1 is working with one DTMROC unconfigurable, and another stack constantly looses lock with ROD Patch Panels (PP). The probably reason is a broken twisted pair cable between the ROD and

(a) Electronics in the SR1 counting hall
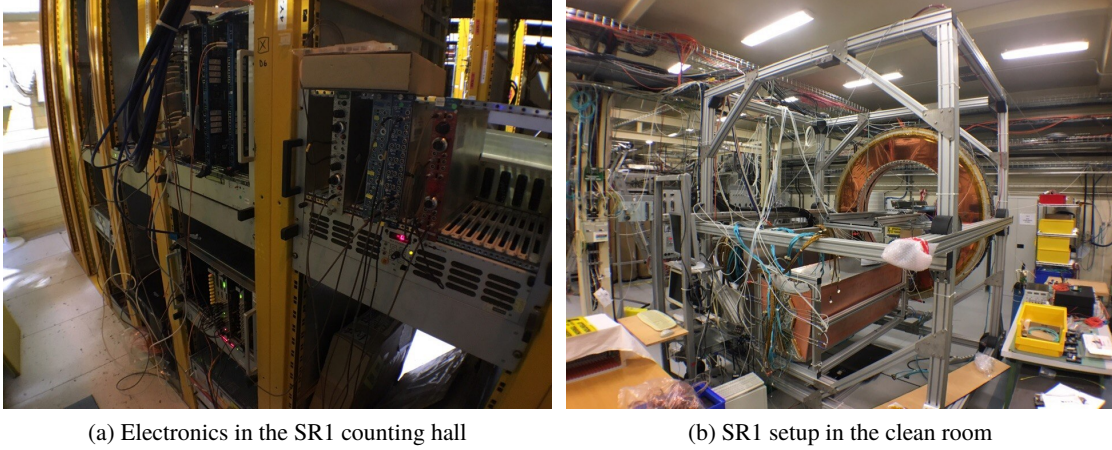

(b) SR1 setup in the clean room

Figure 2: SR1 back-end hardware installed in the counting hall 2(a) and system installed in the clean room.

Table 1: Updated computer hardware and new host names in the SR1

32 bit host	64 bit host
pctrt-tdq-03	–
pctrt-ros-sr1-01	pctrt-ros-01
sbctrt-rcc-sr1-01	sbctrt-rcc-01
sbctrt-ttc-sr1-01	sbctrt-tcc-01

the PP (3(d)). Becouse of it, two spare ethernat cables have been added between SR1 counting and clean room.

2.2 Migration from CMT to CMake

CMT (Configuration Management Tool) written by C.Arnault /LAL is available for many platforms. It handles a package or a collection of packages. CMT has some knowledge about language, compiler, link editor, conditional code; this knowledge can be modified or added to by the user. The negative side of CMT is too complex (too many concepts such as macros, sets, tags, patterns, fragments, actions, projects, packages, etc.), too slow and is missing support of new IDEs (Integrated development environment). On the other side CMake is an extensible open-source system that manages the build process in an operating system and in a compiler-independent manner. Unlike many cross-platform systems, CMake is designed to be used in conjunction with the native build environment. Simple configuration files placed in each source directory (called CMakeLists.txt files) are used to generate standard build files (e.g., makefiles on Unix and projects/workspaces in Windows MSVC) which are used in the usual way. CMake can generate a native build environment that will compile source code, create libraries, generate wrappers and build executables in arbitrary combinations.

ATLAS TDAQ is planning to migrate to the CMake build system around Winter 2016, thus it was necessary to start the CMT to CMake migration for TRT TDAQ software as well. For that reason in the central SVN TRT TDAQ repository a special project folder have been created [3]. After the ATLAS TDAQ Software CMake announcement [4], most of packages in RCD partition are prepared to be built by CMake but there

(a) New 64 bit ROS computer

(b) RCC crate

(c) TTC crate
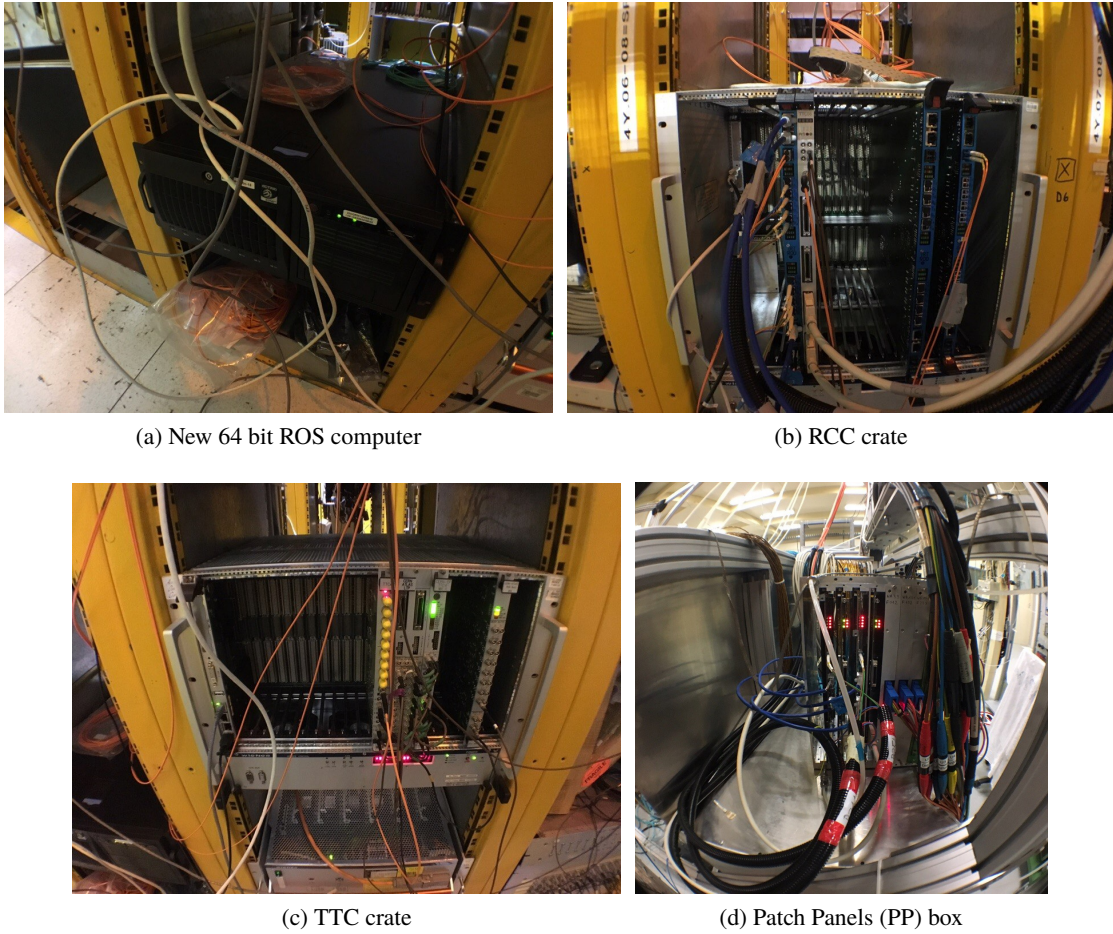
(d) Patch Panels (PP) box

Figure 3: Updated hardware in the SR1 counting hall: new 64 bit ROS (a), RCC (b) and TTC (c) crates with new 64 bit SBC computers. Right bottom figure (d) shows ROD/TTC Patch Panel box in the clean room.

are still some issues. The current migration status can be found on the TWiki page [5]. Migration is going to be finished during Winter technical stop.

2.3 Migration from SVN to Git

Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency. Git is easy to learn and has a tiny footprint with fast performance. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like cheap local branching, convenient staging areas, and multiple workflows.

As well as for CMake, the TRT TDAQ team is planning to switch to the Git version control system at the end of this year. The migration procedure is already tested and Git will be implemented as soon as SR1 and Point 1 TDAQ partitions are merged. Generally most of the packages in RCD folder are independent from eacj other. Thus there are idea to set new flat RCD partition hierarchy during CMake migration instead of current tree structure. When it will be done, we can start SVN to Git migration to keep all

development history for each file. Central Git repository will be setting up using CERN GitLab service [6].

GitLab allows to implement GitLab CI (Continuous Integration) in the TRT TDAQ developers workflow. GitLab CI is a web application with an API that stores its state in a database. It manages projects/builds and provides a nice user interface, besides all the features of GitLab. After, a GitLab runner will be prepared (is an application which processes builds), it can be deployed separately and works with GitLab CI through an API. In order to run tests, at least one GitLab instance and one GitLab Runner is required. A GitLab runner can be installed in the SR1 test bench and/or at a Point 1 build machine.

3 Conclusion

TRT SR1 test bench is going to be renovated and be fully operational. 32 bit SBCs have been replaced with new 64 bit computers. CMT to Cmake migration is partly done. SVN to Git migration in investigated. During the technical stop at the end of this year, a full transition will be done and SR1 partition software will merged with software from Point 1. While the TRT detector is out of operation, the migrations fo CMT to CMake and SVN to Git will be completely done.

References

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