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The ATLAS Fast Tracker Processing Units - input and output data preparation

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The ATLAS Fast Tracker is a hardware processor built to reconstruct tracks at a rate of up to 100 kHz and provide them to the high level trigger system. The Fast Tracker will allow the trigger to utilize tracking information from the entire detector at an earlier event selection stage than ever before, allowing for more efficient event rejection. The connection of the system from to the detector read-outs and to the high level trigger computing farms are made through custom boards implementing Advanced Telecommunications Computing Technologies standard. The input is processed by the Input Mezzanines and Data Formatter boards, designed to receive and sort the data coming from the Pixel and Semi-conductor Tracker. The Fast Tracker to Level-2 Interface Card connects the system to the computing farm. The Input Mezzanines are 128 boards, performing clustering, placed on the 32 Data Formatter mother boards that sort the information into 64 logical regions required by the downstream processing units. This necessitates the sharing of data between different data formatters at high bandwidth with low latency over the full-mesh backplane of the host shelf. Each data formatter board contains a custom micro-controller designed to manage the combined system, and provide the ability to download firmware on each field programmable gate array over Ethernet.In the FLIC system, each board receives 8 optical links with a bandwidth of 1 Gbps, re-formats the data to the ATLAS standard record format, performs the conversion from local to global module identifier, and sends the event records out to the High Level Trigger at 2 Gbps with a latency of O(10) microseconds.The Input Mezzanine and Data Formatter system is the first component of the Fast Tracker to be installed and commissioned. Since the start of the installation in December 2015, several boards have already been integrated into ATLAS, successfully taking data during proton-proton and heavy ion collisions. This poster discusses the current status of the installation, as well as the ongoing commissioning of the data flow while running with the ATLAS detector. Included in this talk is the status of the hardware, firmware and software of each of the systems and their microcontroller. The Run Control software required for integration of the system into the ATLAS detector is also discussed.

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