WIB Software Update

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Overview

- Added simple C routines to read onboard i2c temp/voltage chips
    - Can start to build CCM/SC functionality from these
    - Added it to (non-simulation?) "firmware" repository for now
        - https://github.com/DUNE-DAQ/dune-wib-firmware/blob/master/sw/src/sensors.cc
    - Should we just make this a linux/software repository (?)
- Prototyping a way for WIB will communicate with CCM/SC/etc
    - ProtoDUNE use very simple UDP register R/W protocol
        - Could be written entirely in firmware
        - Requires the system that talks to the WIB to be very familiar with WIB registers
    - We have a full linux system (and TCP)
        - Should run software on WIB that performs well defined actions
        - Can implement upstream's requested functionality as specific actions
        - Can also have low level register R/W as an action

Underlying communication protocol

- ZeroMQ is a solid choice (already being used by DAQ)
  - Provides a robust messaging API that can use TCP/IP transport
  - Address can be set from crate backplane as in ProtoDUNE
  - DAQ could talk directly to WIB with minimal intermediary glue
- With software on WIB, could implement more complicated tasks
  - Simple example: "GetStatus" message returns monitoring information payload
  - Provide an API for upstream systems to use (with ZeroMQ)
- ZeroMQ sends binary messages (format agnostic -> need to define format)
  - Proposal: define messages with Protocol Buffers (Google)
  - Generates message parsing code (for many languages) from simple specification
    - No futzing with C structs compiling differently on different systems

Next Steps

- Assuming WIB code should be C(++) but could all be python
- Sketch out Protocol Buffer base format for WIB messages
  - Start with simple monitoring
  - Can add message types as needed
  - https://github.com/DUNE-DAQ/dune-wib-firmware/blob/master/sw/src/wib.proto
- Create simple ZeroMQ server and test client
  - https://github.com/DUNE-DAQ/dune-wib-firmware/blob/master/sw/src/wib_server.cxx
  - https://github.com/DUNE-DAQ/dune-wib-firmware/blob/master/sw/src/get_status.cxx
- Try out remote monitoring the WIB