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Subject Area	Software
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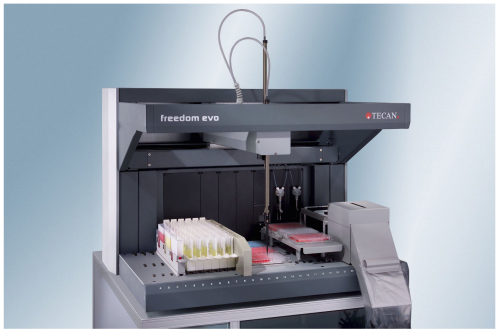
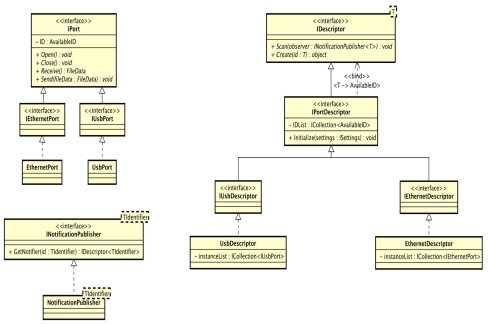
TeControl Ethernet

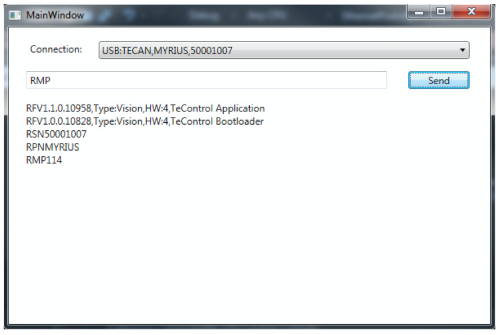
Implementation of Ethernet capabilities in TeControl communication software



Tecan Freedom EVO®, controlled over TeControl software



High-level class diagram with the relevant classes



Prototype test tool with responses from a connected instrument

Introduction: Our project partner Tecan is a leader in the development, production and distribution of advanced automation and detection solutions for the world's leading life science laboratories. The Tecan instruments are controlled by an in-house developed Framework called CID-Base. Today, the CID-Base Framework, which is running on a dedicated PC, communicates via USB with the instrument. The communication via USB has the following drawbacks and limitations: Error-prone: The connection is not always very stable Limited distance: The maximum length of an USB cable is 5 meters; this means that the control PC always have to be next to the instrument Limited connectivity: Only one instrument can be connected per port The solution to get rid of all these drawbacks and limitations is Ethernet. An Ethernet connection is less error-prone (with TCP), has no distance limitations and can communicate with every instrument in the network. The goal of this project is to extend the CID-Base Framework with Ethernet capabilities to take advantage of the listed points above.

Approach/Technologies: We divided the realization of this project, into two main phases. The first phase was the conceptual phase with the following main tasks: Analyze the existing code to understand how the software exactly works. Create architectural diagrams based on the analysis for a better high-level- overview of the relevant parts of the software Extend the diagrams with Ethernet relevant parts With the results of the first phase we had detailed specifications as basis for the second phase. The implementation phase mainly consisted of the following tasks: Refactor the existing USB classes and interfaces to fit the new architecture. Create and implement new Ethernet classes Implement a simple prototype tool to test the communication on a low layer without the overhead of the whole application Write Unit tests for every newly implemented class

Result: The TeControl driver-layer has full Ethernet support now. All tests with our prototype tool were successful and we were also able to perform basic actions on a connected Tecan instrument. The next follow-up project will adapt the application-layer to take benefit of the newly integrated Ethernet capabilities.