PRESENTATION PROPOSAL for NA-MKM 2004
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Title: Services of the Formal Digital Library (FDL) and Proof Sharing

At the previous NA-MKM in Hamilton, Professor Robert Constable presented the design of a digital library of formal mathematics that Cornell, University of Wyoming, and Caltech are pursuing with support from an ONR MURI grant*. This presentation will briefly review the thrust of this effort, and will describe some of the recent work on services of the prototype formal digital library, or FDL. The two services I wish to cover are accounting mechanisms, and search facilities as they relate to the formal math domain.

Accounting Mechanisms: Dr. Stuart Allen has made significant contributions to our group's effort to provide ways to account for logical dependencies among objects and for bases of factual claims stored in the library. While it is critical to be able to validate the source of some information, or knowledge you are retrieving, we did not want to impose ours or any other notion of validity. In fact in different applications, different levels of confidence may be acceptable. Thus, through a method of attaching "certificates", which will be described for what they mean in our domain, we abstract away the level of confidence and maintain robustness of service.

Search Mechanisms: I have worked with Professor Jon Kleinberg on graph theoretic approaches to search and relevancy and in specializing them to the formal math domain. These search procedures go beyond name or pattern matching and look at structure of proofs, theories, etc.

Proof Sharing: In addition to these two, I also wish to discuss one of the earlier motivations for formal math sharing that I worked on, and that is the connection of two theorem provers: JProver and Nuprl, for the purpose of producing "hybrid" proof systems. As the logics greatly differ from the two systems (first order, and higher order), I will describe how it was that we were able to verify proofs this way. Essentially the JProver result was used as a heuristic proof to find a suitable Nuprl proof to ensure consistency. I bring up this work since I am currently considering further strengthening this heuristic method to reap even more benefit from JProver. JProver is integrated with MetaPRL and Coq as well.

Audience interest will affect my emphasis on these three topics. In forming the presentation, it might be that the latter may be of greatest technical interest to the audience, while the former two are significant for offering tools to logicians, and I hope to receive feedback on the services from the esteemed mathematicians. I will do my best to give the appropriate level of detail in the 10 minutes provided.

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