Zoltan as presented by Karen Devine

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Abstract

Zoltan is a dynamic load balancing system for clusters developed by the national labs discrete algorithms and math department.

Karen Devine presented a brief overview of the Zoltan system and some of the problems that developers face when trying to adapt their applications to a parallel execution environment. Some of the key features are the ability for Zoltan to manage data passing as well as an incremental model for distributing the computation. These features directly address important issues: single processors assuming large portions of the computation, and avoiding congestion of the network and computational resources when redistribution is needed.

After hearing the whole presentation, I could not help but think to myself: aren't all of these features just crutches for under-skilled programmers? Perhaps my minimal experience with parallel programming has made me over critical of the problem that these systems face. I can see how Zoltan would be useful as a first attack at the problem, but it seems to me that this system should really be used solely as a rapid prototyping platform. By properly managing communication and computation on a parallel system you can improve performance by orders of magnitude. Karen Devine hinted at some real world comparisons between Zoltan assisted systems and the hand crafted systems, claiming that Zoltan "vastly improved performance". Without hard data, and good test cases this is a meaningless statement. I would bet that given a well optimized pro-

gram, and the same program running through Zoltan, that the Zoltan assisted program would quickly be outpaced.

The one area that Zoltan might seem applicable is in the area of complex adaptive systems, or other systems that can repeatedly drastically change their "behavior" over the course of a given run. I would argue that deformation and several of the other processes she offered as "choice problems" for Zoltan are not this kind of problem. It would seem to me that the deformation would proceed in a very monotone type behavior, that is we would not expect drastic changes in the simulation behavior. These applications OBVIOUSLY need load balancing, but a system like Zoltan seems like overkill.

In conclusion, while Karen Devine's presentation was brief, the system seems to hold potential in several areas. I would like to see more concrete comparisons, as well as a slightly more in depth coverage of the problems this software is designed to solve. I did not feel convinced this system was necessary for some of the applications she listed, but I am sure she could convince me if she provided more data.

References

[1] Zoltan Homepage. Sandia National Labs (2004).
http://www.cs.sandia.gov/Zoltan/