Distributed Virtual Computing

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Abstract-

One of the biggest challenges in today's enterprise and campus computing environment is creating ways to utilize un-used computing power from idle machines and re purpose that computing power for other general purpose applications else-where on the network. Our design team has sought out a way to make this idea possible through the use of a general purpose commodity computing grid. Over the course of this semester, we have developed plans and formulated a way to use a technology called ScaleMP that allows us to realize this possibility. For the remainder of this report we are going to explain what our progress has been this semester in regards to creating a concept and gathering the resources to start working on the implementation of this design in the following semester.

I.   Introduction

back to this original concept to see if something closer could be feasible.

II.   Background

This project has been around for a few years now, previously different attempts were made to look into the possibility of using grid computing from resource nodes to utilize idle CPU and Memory usage. The previous projects have only fell short due to the lack of technology and available information on this goal. Much of the previous projects were job based, meaning that the volunteer grid cluster was designed around jobs that would be designed for the computational use of the grid architecture. This is different than what was originally planned. The original concept called for a general purpose computing platform, which any common application could run. Since the technology wasn't that mature at the time, we switch paths

III.   Semester Progress Timeline

Our group started by creating the proposal for our mission statement and decided what our goals were with realistic expectations or take away from the project. We set these in mind as we continued our exploration of tools to put together to satisfy our expectations from this cluster. We contacted ScaleMP and they gave us a preliminary meeting to just discuss who we were and what kind of goals we wanted for our project. With this in mind, we looked to see what other newer solutions in the realm of cloud and virtual computing could satisfy something similar to a grid, that deploys desktops and the applications from a cluster to the thin or thick clients on the network. Over the course of the week we looked into Desktop as a Service

(DaaS) and what vendors support this. Citrix and VMWare both support virtualizing the desktop, and we found that ScaleMP can host a KVM platform which is the basis for this DaaS service. We wanted to have clustering capabilities of ScaleMP with the virtualization elasticity of KVM or some other hypervisor on top on Red Hat Enterprise Linux as our basis. We were still waiting on contacting ScaleMP to see how flexible their platform really is and if it can at least accommodate most of our needs. Furthermore, Professor Hembroff came to us to see what hardware we may want. We sent out an email containing desired hardware at the moment, at this point it was too early to see what hardware we needed, we figured at the least if we were going to go forth with ScaleMP, we would require Infiniband equipment to create the necessary grid. For our meeting, we decided to hold off on other research until we contact ScaleMP and talk to them about some of the questions we outlined in our meetings. We wanted to ask the solutions architect about what costumers have done with ScaleMP in a virtualized environment with KVM solutions and using it as a desktop cloud service. Compared to the meeting previously, we wanted to create a list of questions and determine its capabilities as a grid product and make sure we know ScaleMP is a plausible product for our project.

No DVC project has ever been the same, but for us we felt that given these technologies and if they worked together we could make it as close to the original goal as possible. As we looked further, although it was still too early to tell, if we couldn't build on ScaleMP or some other technology we might have to revise our project mission statement and proposal. Later that week, two of our members met with representatives from ScaleMP to discuss the capabilities of their product and how it could benefit our project. We learned that while ScaleMP has no history of testing their product on a cluster of desktop computers, there is no reason it should not work to some degree. There is a free version of

ScaleMP that we can request, which would provide us with the ability to cluster 8 nodes together and host a small number of VMs on that cluster. However, a clustered setup would require an Infiniband network to support the amount of network traffic generated by the cluster. At the end of the week, we met in the Senior Design lab to try and get our cube more organized, and determine what connections go where. We completely reworked the wiring in the cube, and reconfigured the router so our workstations could actually connect to the Internet. The following week we acquired two big iron servers for our design project, these were HP commodity servers that are very powerful, we decided to rack the DL785 on the bottom of our half-rack, and began to configure the server to make sure it worked properly. Initially, the server complained of a critical error that prevented it from fully POSTing, with little indication to its cause. After trying additional power supplies and splitting power between circuits, we began testing different configurations of blade arrangements. We finally discovered that while it eventually was allowed to POST, it wasn't recognizing all the CPUs or all the RAM it had available. Eventually, for no discernable reason, all eight blades became fully functional, recognizing all 32 cores and 64GB of RAM. Our next step was to replace the current operating system (Windows Server, from its days with Amway) with our own installation or a hypervisor, and begin small-scale testing of ScaleMP. Over the course of this particular period we decided why not try to put ESXi on the server and see what it can do, we installed ESXi and decided in the meantime to see if there are any SMP capabilities in VSphere that could allow us to pool CPU and memory resources like what ScaleMP could allow. We decided to use a smaller HP server as our management node and spool up VM's to see if we could configure the pooling and provisioning or physical resources like SCALEMP does. Our main focus at that time was to get a feel of vCenter to deploy some machines on the ESXi bare metal platform.

Since we have a very powerful server we decided to spin up several VM's and look into see if we could configure SMP capabilities. Secondly, vSphere (formerly) VMWare Infrastructure III supports intelligent SMP for the aggregation of resources on the Server node. Although this isn't CPU scavenging, it is a way to utilize all resources. On a smaller scale, we could deploy ESXi on OEM desktops and have labs that can utilize some VM's with this proof of concept. Then again, this is just another after thought. This is similar to deploying a very small vCloud platform. As of now, were just trying to see what we can do with this. Ryan suggested nesting ScaleMP's vSMP on multiple virtual machines and trying to see if it can recognize a virtual cluster on top of the ESXi platform to do the intensive SMP capabilities it is known for. This week, we decided to sit back and do some more research on moving forward without working with the hardware. We sort of took off with the VMWare idea with little research and decided that without more research between VMWare and ScaleMP, we might end up in a dead end track if we put too much time into blind configuration. Over the course of this following week we decided it would be a good idea to start working on the course website, this is essential for documentation, group information, collaboration, and a gateway for vendors if we decided to find hardware to get for our team. It essentially acts as a validity factor for our project. From here this week we are going to try to get a hold of some vendors and explain exactly what we are trying to do so we can follow up with possibly free Infiniband hardware. If we can put in a little effort and not have to pay for it, it would be awesome.We also plan on going over our presentation and tidying up the slides and rehearsing the presentation further. This will get us geared up for next week for our second presentation run through. Overall, with progress we are making pretty good time and just waiting on getting things ironed out with the hardware before we can jump into things. If we can't acquire it, we could look at shifting tracks, but as of now there is absolutely no reason to. Spent a few hours this week sending out proposals to get manufacturers or vendors to possibly donate equipment. Crafted a good email to see if they would give any input.Anyways, two days before Thanksgiving I got an email from the VP of marketing at Mellanox saying "Hey, what do you need for your project?" I then replied on Saturday following Thanksgiving giving him recommendations from ScaleMP's website on HCA's and the

interconnects needed.So far no word back (holidays I presume) But that is where it is at, we may have something here for some hardware.Monday 12/1/14: We plan to go over or edit the presentation during the meeting and then get it ready for the presentation on Tuesday 12/2/14After this week if we can keep talking to the Mellanox VP, and get the go ahead and ship the hardware we can work on planning the configuration of the project on our hardware. Possibly get a jumpstart over break to start initial documentation of the project, and start researching configuration options for a base setup.

IV.   Next Steps

Taking away the effort we have done