IV. EXPERIMENTS AND RESULTS

In order to make valid overall performance judgments, our evaluations based on quantification are not only focus on providing a comprehensive representation of UnaCloud IaaS, even more, the understanding of the inevitable dependencies between measurements.

We use a small and fixed suite of measurements to make comparisons simple and human comprehension feasible, we use as metrics: performance (timestamps with system utilization) taken from HPL benchmark, and resource consumption data taken from IOzone.

If the synthetic workload captures the right characteristics, the behavior of the synthetic workload and the real application will be similar.

1. Parameter Tuning

Parameters used and respective values, type of physical and virtual machines.

1. Experimental methodology

Several test were made to measure system performance under different scenarios. One set of tests aims to compare the performance and impact of each hypervisor over the Cloud User. A second set of test measures the impact of physical machine users over the virtual machine tasks.

To measure the degradation of performance perceived by UnaCloud users we ran the Iozone and HPL over a test infrastructure composed by 4 physical machines. Over this PMs we install 3 clusters: a cluster over the PMs, another running over VMware Workstation VMs, and finally one running over VirtualBox VMs. Each cluster has Debian 6 as SO and was configured to run the tests.

Finally a set of tests were made to determine the impact of real end users over the tasks running on opportunistic VMs. To do this, we set clusters of 10, 20 and 40 VMs that ran HPL and IOzone benchmarks over UnaCloud production environment. Several tests were ran, ensuring that each possible scenario was cover.

1. Results

In this section we present the results for each set of tests. The results are presented for processing and storage intensive tasks.

* 1. Baseline Performance Comparison: A test infrastructure was setup to make a baseline comparison of each hypervisor performance. It was made on a test infrastructure, due to the administrative impositions to do it over the UnaCloud production environment. The results are show on figure X. The results shows a high impact on perceived performance, showing that for HPL tasks, in is recommendable to use physical machines and not to virtualize.
  2. Cloud User Impact: Finally, a set of tests were made to determine the impact of end-user activities on virtual clusters running over UnaCloud. To do so, we ran several tests that measures the platform performance under real scenarios. The executions were made over two weeks, on each execution we measure the amount of end-users using the underlying physical infrastructure.

Result are show on figure X. As can be seen, the impact of Users % (the amount of physical machines with user over the total of virtual machines on the cluster) doesn´t affect the cluster performance. Each point measures the performance for one test, the variability on test with the same User % can be explained taking into account that we don´t present averaged values, due to the difficulty on getting representative samples for each user %.

This results also shows that, when the cluster size increases, it is more difficult to get a high Users %. This is because the periods of high usage on computer labs are short in comparison with benchmark execution times.

1. Summary