A More Efficient and Sustainable Data Center

With the use of the Intel® Node Manager, the new Telefônica/Vivo data center achieves greater controlling capacity over its server farm.

Telefônica/Vivo is Brazil’s largest telecommunications company, providing over 91.1 million lines of access, of which 76.1 million alone are in the mobile operation. This makes it the largest market shareholder in the mobile operation industry in the country (29.1%), according to results from the quarterly balance from Q412. The company provides fixed phone services in the state of São Paulo and mobile communication throughout the entire country. In all, Telefônica/Vivo is present in more than 3,700 cities (over 3,100 of those also have access to a 3G network), a number that exceeds that of the totality of cities served by competing operators.

In order to improve service quality as well as its capacity for innovation, a new data center was inaugurated in Santana do Parnaiba (SP) in September 2012, the result of a BRL 400 million investment and occupying 33,600 m² of constructed area in a 70,000 m² plot of land. For an initiative of these proportions, energy consumption is a decisive factor, which led Telefônica/Vivo to adopt Intel Node Manager technology in order to enhance energy consumption management for each server, thus raising the processing capacity within the same area.

The data center will store all of the company’s data as well as information concerning its almost 91.1 million clients, including registrations, contracts, and call information such as caller, receiver and duration of each call. Far from being an ordinary data center, it is adopting the necessary procedures for the acquisition of the Leed Certification, an ecological certification label based on international standards and recognizing the project’s sustainable practices, notably its energy efficiency that is 25% above the world average as well as its rational use of water. The project’s energy efficiency is above world average considering the data center presents a PUE (Power Usage Effectiveness, an international indicator for power consumption) of 1.5, which means that for every Watt of power applied in IT, only 0.5 Watt is used for air conditioning, lighting, etc.

**CHALLENGES**
- Increasing computational density;
- Managing energy consumption generated by the servers;
- Optimizing energy consumption and refrigeration.

**SOLUTION**
- Using Intel® Node Manager embedded in the Intel® Xeon® E5 processors.

**IMPACT**
- Larger processing capacity;
- Reduced energy use;
- Possibility of installing more servers per rack;
- A more granular control was achieved, allowing for the individual control of machines;
- Precise identification of energy and heat peaks.

**Changing the game**
Rogerio Gelamo, technology division manager for Telefônica/Vivo and responsible for the specification, acquisition and implementation of the IT infrastructure, declares that there is a constant search for energy efficiency and sustainability. “For this reason, soon after becoming operational, we began researching the best practices concerning server control and energy dissipation available in the market.”

He points out that initially the data center did not have any tool capable of managing the energy consumption of each individual server.

Gelamo recalls that Telefônica/Vivo and Intel had become partners years ago, creating a direct channel between the two companies that kept them aligned in terms of technological and processing roadmaps. The study and analysis of the Intel Node Manager technology, currently embedded in the Intel® Xeon® E5 processors, emerged from this particular context. “Back then we did not have a tool that could take advantage of this,” he stated.

**Proof of Concept**
In order to test the technology, Telefônica/Vivo decided to implement a proof of concept in partnership with Dell, using the Dell 12G servers with Intel® Xeon® E5 processors that already equipped the data center. Gelamo explains that a sample was isolated from the rest of the environment: one rack holding a set of rack mountable servers and blades (these were varied and with different consumption and energy power characteristics). These servers were followed through a monitoring console set up to work with Intel Node Manager technology. This setup went through a series of simulations involving processing loads and energy. It also passed tests for energy dissipation control, thus establishing a limit for the amount of energy consumed by the server. The Dell team
Using this technology in production, we hope to monitor real consumption rates instead of applying the nominal reference values conveyed by the manufacturers, which contributes to perfect the way we populate the racks in our Data Centers.

The proof of concept was concluded in October 2012 and the rollout of the technology in the remaining Telefônica/Vivo data centers was initiated immediately afterwards.

Benefits

There were reasons for making so many plans involving a recently-tested technology. According to Gelamo, the control test via Intel Node Manager was decisive. “This type of control was considered practically impossible. We were limited to controlling the electric circuits, which can hold dozens of servers each.”

With the adoption of the new technology, the infrastructure sector can now review each of the machines installed in the data center and can even group these machines in the most convenient way for their optimal management. “This increases the granularity of control. Furthermore, it is now possible to explore the limits of electric energy control. This is the tool’s fundamental point of innovation,” says Gelamo.

Moreover, by actively managing energy consumption in individual servers, the use of the Intel Node Manager also increases the processing capacity in each data center. This is due to the fact that the reduction in energy consumption allows the project team to work with a larger number of servers per rack, thus assuring a more optimal use per square meter and increasing the data center’s processing capacity.

About Telefônica/Vivo

Telefônica/Vivo is the largest telecommunications company in Brazil, providing landline phone services in the state of São Paulo and mobile communications to the entire country, offering a complete and converging product portfolio (landline and mobile voice communication, fixed and mobile broadband, ultra broadband – over fiber, TV, data and IT). The company is present in more than 3,700 cities (over 3,100 of those also have access to a 3G network), a number that exceeds that of the totality of cities served by competing operators.

Telefônica/Vivo has been present in Brazil since 1998, and it is the country where the company has the largest number of clients. The main companies are Telefônica Brasil (Telefônica/ Vivo) and Terra (Internet server and portal). The Telefônica Group is one of the largest communication conglomerates in the world; it is present in 24 countries, provides 315.7 million accesses, maintaining an average of 130,250 employees and with revenues of €6.235 billion (2012). The investments expected for Brazil between the years 2011 and 2014 total R$1.243 billion.

About Dell

Dell is currently the market leader that allows for the integral use of the Intel® Node Manager technology in its servers, as well as that which offers the highest maturity level amongst equipment, solutions, and service suppliers. Dell PowerEdge 12G servers are embedded with a customized version of Intel Node Manager, created through the partnership in order to offer Dell clients a series of unique benefits:

• A few of these customizations help specifically in the integration of the Intel Node Manager in both modular and monolithic architectures, thus allowing Dell to transparently embed the Node Manager into the totality of its server portfolio (regardless of being towers, racks or blades), being the only manufacturer to do so.

• Energy subsystems monitoring – the equipment offers the possibility of monitoring component consumption: CPU, memory, I/O modules, storage and ventilation. This is a basic element that allows for the composition of multiple utilization models, permitting as well a more granular and precise consumption analysis in case of charge-back and even a scheduling control for VMs in Hypervisor execution environments.

• Hardware Protection Policies – render compatible performance requests and an effective control of consumption limits, imposing resource allocation and adhering to the output load limits of the energy sources connected to the equipment. This is a basic component for the Dell Extended Power Range functionality and for the PSU Right Size dimensioning strategy.

In order to permit Telefônica/Vivo to fully explore the advantages of this technology, Dell offered specialized resources in order to support Telefônica/Vivo in the on-site Proof of Concept. Besides the configuration of the free Dell OpenManage Power Center tool, the Rack and Blade servers were also set up for performing control output tests and for performance comparison between full consumption and limited consumption, leading to very satisfactory results.

“Our conclusion is that this solution, even when implemented in a small scale, offers us the potential of monitoring energy consumption and temperature dissipation, allows us to control energy use and prepares us for the future: we can limit the overall energy consumption of the equipment at certain critical periods, for example”. Rogerio Gelamo, technology division manager for Telefônica/Vivo.