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RESEARCH NOTE CLOUD COMPUTING: IT IS EASY BEING GREEN

THE BOTTOM LINE

Cloud computing uses 91 percent less energy than traditional on-premise applications. Nucleus evaluated Salesforce.com's customer base and found that cloud computing drives more than just significant financial savings: the effective sharing of resources also generates a substantial green benefit. In the case of Salesforce.com, its customers saved the energy equivalent of 11 barrels of oil every hour.

Many companies have adopted cloud computing as a means to reduce capital investments and leverage a multitenant shared computing environment for lower overall costs. Cloud vendors can likely get better deals on large hardware purchases, optimize their applications for a cloud environment, and perform load balancing so customers have access to the computing power they need when they need it. With shared resources, there is less waste than in a traditional deployment.

Nucleus has seen that an increasing number of organizations are looking at the human and green impact of their technology decisions as part of the business case. The question for these decision makers is how to make the most effective financial decision while also supporting green initiatives. To explore this strategy, Nucleus undertook an investigation to compare on-premise computing to cloud computing to assess the energy savings associated with the cloud model.

To accomplish this, Nucleus analyzed Salesforce.com's customer base. Nucleus chose Salesforce.com because of its size, its global reach, and its willingness to share detailed data about its data center operations.

SALESFORCE.COM CUSTOMERS

To measure the green impact of cloud computing, Nucleus first had to estimate the number of servers Salesforce.com's customers would need to support their applications if they were running them on premise. To do this, Nucleus reviewed its library of published Salesforce.com customer case studies and conducted 25 additional interviews with current Salesforce.com customers to calculate a baseline estimate for the on-premise user-to-server ratio for small, medium, and large customers. Nucleus included only production and backup servers in its customer estimates (not servers needed for development, testing, or staging). Most customers were running more than just sales force automation (SFA) or service components; in fact, many were supporting multiple custom applications and sites,

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Customer Relationship
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so we analyzed how many servers they would need to support a similar application footprint in an on-premise environment.

Nucleus also gathered typical server configurations from these organizations for small, medium, and large companies and calculated the average power draw for each company's size profile. Small companies tended to use more moderately priced devices with lower power draws, while larger companies had a higher user-to-server ratio with more substantial, often rack-based, systems with higher power draws. It is interesting to note that the estimated number of servers was less than the total number of Salesforce.com customers. Intuitively one would expect at least one server per customer, but in some cases customers said they would have collocated the applications on another server with other applications. This effectively drove a conservative measure of the estimated power draw for the total customer base.

Given the user-per-server ratio by customer size and the average power draw per server by customer size, the total number of servers could be estimated by knowing the total number of customers in the Salesforce.com customer base and their breakdown by size. Although Salesforce.com does not publicly comment on its breakdown of customers by company size, it shared this company-confidential information with Nucleus so these calculations could be completed accurately.

Nucleus found Salesforce.com customers experience a 91 percent energy savings by using the Salesforce.com cloud instead of on-premise application servers.

Nucleus did not include the cost of power on the user side for network routers, switches, and other devices since it is likely those devices would already be in use to support other activities. This approach also ensured a conservative estimate of the total power required on the customer side.

SALESFORCE.COM

To quantify Salesforce.com's energy consumption, Nucleus was provided a complete listing of the thousands of devices used to support Salesforce.com's customers' activities in all of its data centers. Every device in use was reviewed by Nucleus and the power draw of each device was calculated. This list included all production devices including routers, switches, backup tape drives, security and firewall devices, and servers. This provided a complete estimate of the total power draw across all the Salesforce.com global server sites.

For both estimates, the actual power draw was calculated by reviewing hardware manufacturers' configuration tools and specification sheets to determine actual wattage drawn while in use. Nucleus assumed that, in both cases, servers were in the active state rather than sleep or suspended state.

Nucleus did not include the indirect energy impacts associated with running a data center on either the user side or the Salesforce.com side, such as heating and cooling costs, green materials, length of workers' commute, and mode of transportation to work. These were not included to isolate the comparison to strictly the savings associated with servers in the cloud versus on premise. This allows the green savings estimate to be used as a baseline factor in a cloud versus on-premise business case.

CONCLUSION

In assessing the energy footprint of on premise computing versus cloud computing, Nucleus found the actual green benefit from a cloud model to be significant. Previous Nucleus reports have shown the financial benefits of the shared cloud model, so it was not unreasonable to assume some green benefit. What is surprising is the magnitude of the green benefit and the effects a 91 percent savings in energy consumption can have in reducing CO2 emissions.

For CFOs, the most green decisions are not always the most financially defensible ones. For organizations with a green IT mission, simply moving to cloud computing provides both a financial return and a tangible environmental benefit. For current Salesforce.com customers, estimating the number of servers they would need to support their Salesforce.com activity and calculating the associated power draw and multiplying by .91 gives them a close approximation of the actual green benefit they have already delivered by moving to the cloud.