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| Zuma Engineering and Research | | Data Center |
| Professional Service Consultants | Service Description | Virtualization Assessment |

Executive Summary

Zuma Engineering and Research is firmly planted in the Green Computing movement by providing independent auditing of Information Technology (IT) data centers to assist with optimizing performance and reducing their environmental impact and overall carbon footprint. Server Virtualization brings the potential to deliver cost effective implementation of disaster recovery (DR), high availability servers (HA) and dramatic savings in terms of server count, power consumption and cooling requirements.

Zuma Engineering and Research will provide experienced professional service consultants to work directly with management and IT professionals to fully understand your business requirements. Once on site, they will perform an evaluation service to reduce your costs, reclaim stranded capacity, reduce energy consumption and increase electrical efficiency. The service consultant will provide a comprehensive report that will identify opportunities for cost savings and make recommendations for changes to maximize efficiency.

**Increase Productivity
Discover Cost Savings
Reduce Carbon Footprint**

IT Assessment Service

- Identification of opportunities for cost savings via server consolidation.
- Unbiased assessment and analysis with a vendor agnostic solution option. We do not sell or manufacture IT products and have no contractual relationships with IT vendors.
- Professional service consultants with design and implementation experience using the latest virtualization solutions.
- Accurate assessment of the factors limiting the achievable efficiency of the data center.
- Cost effective virtual server topology that optimizes system performance to meet your business needs.
- Detailed pre-virtualization vs. post-virtualization comparison.
- Accurate Return On Investment (ROI) projections for server consolidation.
- Assistance with finding Green technology grants, loans and incentives to defray cost of audit and/or server consolidation.

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Statement of Work

Assessment Preparation Questionnaire

The first step in identifying cost and efficiency savings is to acquire actionable data by determining the current system configuration (servers, cooling, floor spacing, etc.).

- Diagram existing infrastructure.
- Catalog existing infrastructure components.
- Identify performance requirements.

Assessment

Measurements and calculations will be performed to generate a hardware utilization report that identifies workload and resource mismatches such as under-utilized or over-utilized servers.

- Identify general data center conditions.
- Baseline data center power and maintenance costs.
Inventory and review the cooling operational characteristics of the infrastructure: air distribution systems, heat rejection systems, pumps, humidifiers, computer room air conditioners/computer room air handlers (CRAC/CRAH).
- Inventory and review the electrical operational characteristics of the infrastructure: utility input, UPS power, distribution units, static and automatic transfer switches.
- Measure power per customer approved power measurement plan.
- Identify and collect utilization data using surveys and existing measurement systems.
- Compute data center efficiencies.
- Identify all design, installation or operating practices of the data center that compromise efficiency (e.g. workload and resource mismatches such as under-utilized or over-utilized servers).

Analysis and Report Generation

Armed with a detailed profile of workloads in the data center and analysis of real-time utilization data we will evaluate virtual solutions with different combinations of hardware and virtual hosts. Tactical solutions that make the existing system efficient will also be evaluated in this step. These include, but are not limited to enabling server processor power saving features; powering down servers when not in use; and removing old systems that provide no useful work. In addition, we will quantify the cost, physical space, and power savings for our customer.

- Determine virtualization architecture that meets requirements.
- Document changes required to modify existing system.
- Identify costs for design, installation and maintenance of virtualized system.
- Determine projected efficiency improvements.
- Perform Return On Investment (ROI) calculations.
- Prepare pre-virtualization vs. post-virtualizations comparison (power, hardware, utilization).
- Provide recommendations for general data center improvement.

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Deliverables

Zuma Engineering and Research will deliver a comprehensive data center assessment report to the customer. The final report can be used as a starting point for a consolidation plan and/or a Total Cost of Ownership (TCO) trade study. The report to the customer includes:

- Detailed system description.
- Amount of electricity consumed by the data center to facilitate apportionment of the total electrical costs.
- Identification of inefficient systems, equipment and processes.
- Detailed recommendations for efficiency improvement.
- Return On Investment (ROI) and cost savings projections for solutions.

Exclusions

The following items are outside the scope of this standard service offering. They can be integrated into a customized Statement of Work (SOW) at the request of the customer. The customer should contact **Zuma Engineering and Research** for more details.

- Direct measurement of voltages above 600 VAC.
- Opening of panels with an arc-flash rating of 600 VAC or higher.
- Installation of temporary or permanent IT, power or cooling monitoring equipment.
- Design of data center beyond the top level architecture recommended.
- Build or manage data center.

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Scope of Responsibility

Zuma Engineering and Research Responsibilities

- Assign a Professional Services Program Manager to administer the assessment process to completion.
- Review the Assessment Preparation Questionnaire to identify customer specific existing conditions and issues within the data center.
- Initiate a meeting to establish project stakeholders and review the assessment process.
- Schedule and perform the assessment of the customer site.
- Provide a written report of the completed field survey to the customer.

Customer Responsibilities

- Complete and return the Assessment Preparation Questionnaire to identify data center issues or problems needing specific, detailed analysis and recommendations.
- Provide physical access to the data center, all infrastructure support areas and electric panels to be surveyed per the measurement requirements list.
- Provide qualified personnel required to access the power systems within the data center and those feeding the data center from outside. Access to data center power systems will include: uninterruptible power supplies; power distribution units; switchgear; service entrance; breaker panels; generator and lighting system.
- Provide qualified personnel required to access the cooling systems within the data center and those feeding the data center from outside. Access to data center cooling systems will include: Computer Room Air Conditioners/Handlers; humidifiers; chiller plant; pumps and cooling towers.
- Provide an electrician to connect metering equipment (if required) and open electrical panels.
- Remove floor panels and provide sub-floor access.
- Notify *Zuma Engineering and Research* of any security clearance, safety or other certification requirements prior to arrival on-site.
- Provide a single point of contact to assist during assessment.

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Project Schedule

Assessment Timeline

- Customer purchase order received by Zuma Engineering and Research.
- Assessment Preparation Questionnaire completed and returned to Zuma Engineering and Research. [Time estimate: 5 days]
- Site assessment scheduled with customer through Zuma Engineering and Research Professional Services office.
- Meet with IT, facility management and a Zuma Engineering and Research representative to coordinate the site visit and review assessment process.
- Zuma Engineering and Research performs the site assessment at the customer location. [Time estimate: minimum 5 days]
- Customer Site Assessment Report completed. [Time estimate: 15 days]

Schedule Performance

- The actual and specific dates will be determined when the service is scheduled through the Zuma Engineering and Research Professional Services office.
- The service will be scheduled as quickly as possible, at the convenience of the customer. Delays in fulfilling the service caused by labor disputes of third parties, customer contracted services, or other unforeseen conditions may affect the schedule.
- Zuma Engineering and Research will not be responsible for delays related to circumstances outside of its control.
- All onsite services performed by Zuma Engineering and Research are executed during the normal business hours of Zuma Engineering and Research. Exceptions are national or provincial holidays. Services performed outside of normal working hours may incur additional charges.

Completion Criteria

Zuma Engineering and Research will have completed its duties when any of the following occurs:

- Zuma Engineering and Research completes all the items described in the Deliverables Section of this SOW.
- This project and SOW are terminated for other reasons, within the Zuma Engineering and Research Customer Agreement. Termination fees may apply.