What Is The Best Way To Design A Service That Hosts Web Sites?

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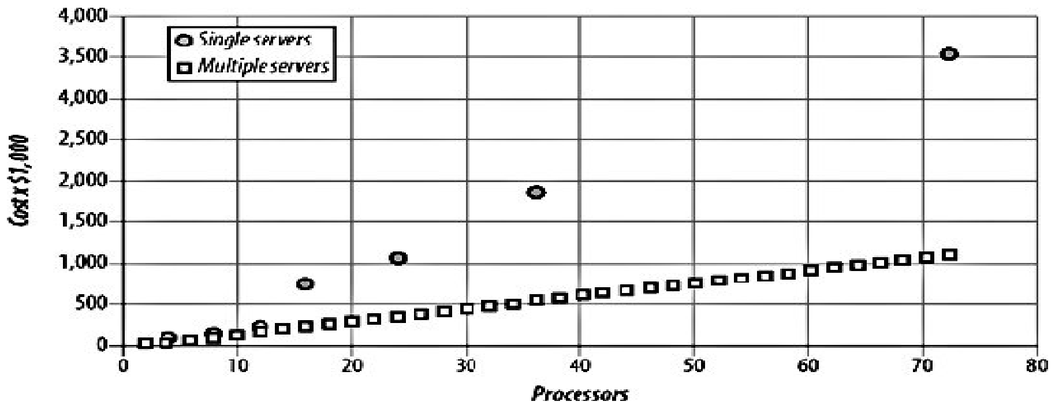
Introduction The primary goal of this project is to develop a service that will allow a customer to create a website, quickly and easily, without having to worry about the technical issues in such an undertaking such as installing or configuring the servers required. The service is to be designed with scalability and security in mind. The project research focused on three specific areas - the industry consensus on the requirements for a web-based application, the best architecture paradigm for a project of this nature and the best virtualisation solution for this project.

Industry Consensus On Web Application design

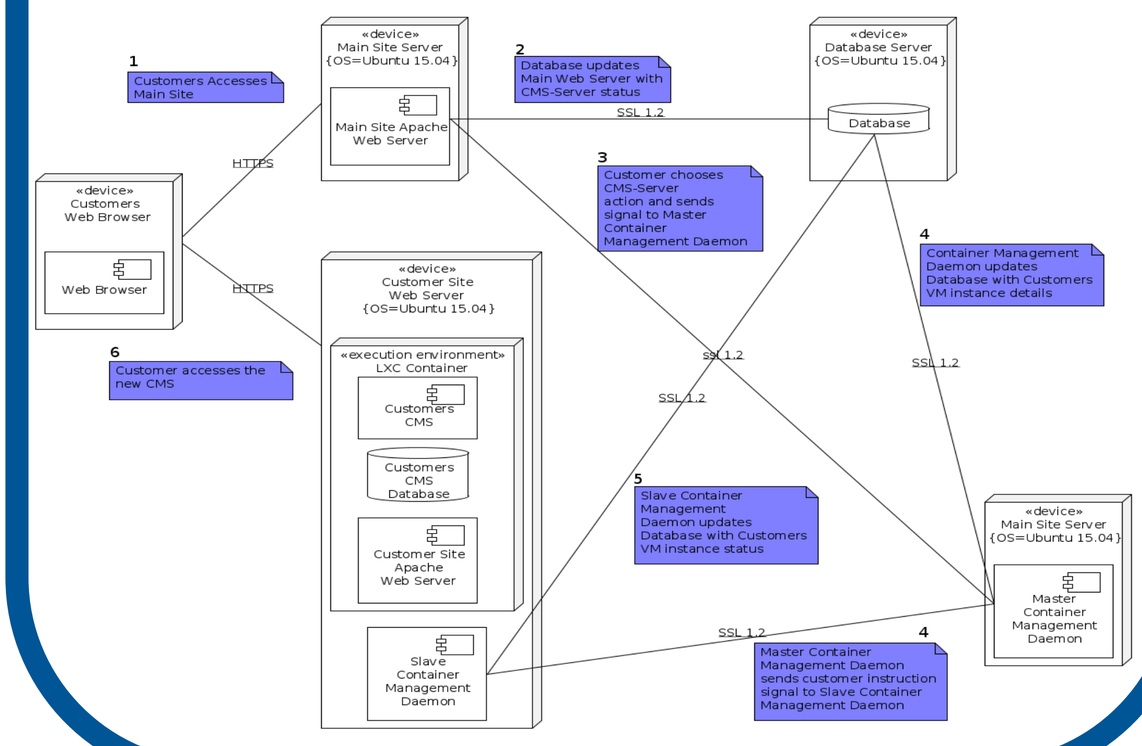
Availability: This is the uptime of a service. **Cost**: Total Cost of Ownership. **Reliability**: This is the accuracy of the data. **Performance**: This is an end-user metric and is subjective to each user. **Manageability**: Refers to how easy or difficult the service is to run. **Real Time Data Replication**: Ensures that all data stores contain the same data-sets. **Regular Automated Data Backup**: Ensures that the service can be recovered in the case of the failure of one or more elements providing the service. **Redundancy**: A design that prevents failure of service in the event of a single components failure. **Scalability**: This is the ability of a service to change its capacity to deal with changes in demand. **Security**: Essential that the security and privacy of the customer's data are considered in all web application architectures for both practical and ethical reasons.

Scalability

Cost of Horizontal Scaling versus Vertical Scaling (1)



Service Oriented Architecture



Virtualisation

Hypervisor Comparison 2015

Feature	XenServer 6.5	MS Hyper-V Server 2008 R2	MS Hyper-V Server 2012 R2	VMware Vsphere 6.0	RHEV 3.5 (KVM)
Cores/ Host*	160	320	320	480	160
RAM/ Host*	1 TB	4TB	4TB	12TB	4TB
CPUs/ VM*	32 (Linux) 16 (Windows)	64	64	128	160
RAM/ VM*	192GB	64GB	1TB	4TB	4TB
VM Disk*	2TB	64TB	64TB	62TB	Not Available
VM Live Migration	Yes	Yes	Yes	Yes	Yes
VM Density*	650 (Linux) 500 (Windows)	1024	1024	1024	Unlimited
Cost	Yes	Yes	Yes	Yes	Yes

Virtualization Benchmarks

HPC Benchmarking by IEEE and Canonical(2)

Several benchmarking experiments have been run comparing LXC and other virtualisation techniques including traditional hypervisor solutions. Studies by Hwang et al. (3), Beserra et al. (4) and Walters et al. (5) have consistently shown that LXC is on a par with other virtualisation technologies, often better and in some worse but overall on par.

In density, latency and start up LXC outperforms all Hypervisors

- LXC achieves 14.5 times greater VM density than KVM
- LXC launches instances 94% faster than KVM
- LXC provides 57% less latency than KVM

Conclusions

- A horizontally scaled architecture is the only way to meet all requirements of web hosting service
- Virtualisation is a necessity when building a horizontal architecture
- LXC matches or out-performs all other virtualisation technologies
- SOA allows for the greatest long term flexibility, despite extra initial difficulties in design stage

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