

Cloud Computing

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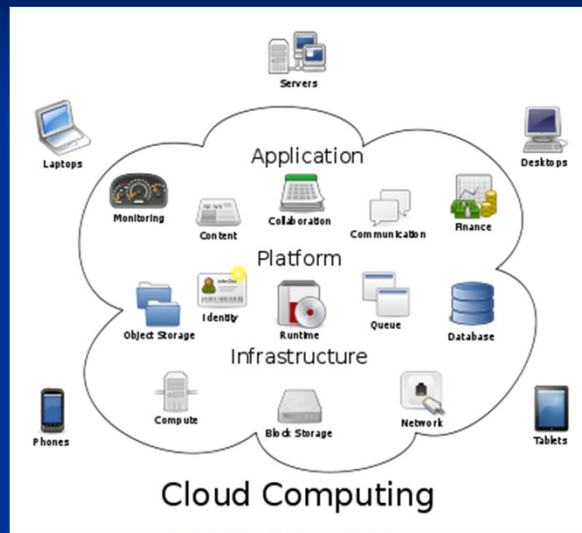
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What is it?

- **Cloud computing** is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. *Source: Wikipedia, 2011*

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What is it?



Who Should we Listen To?

- *“All the cloud is, is computers in a network...Our industry is so bizarre. I mean, they just change a term and they think they are inventing technology.” Larry Ellison CEO Oracle*
- *“Our definition of Cloud Computing is multi-tenant, it’s faster, half the cost, pay as you go, it grows as you grow or shrinks as you shrink. It is extremely efficient.” Mark Benioff CEO Salesforce.com*

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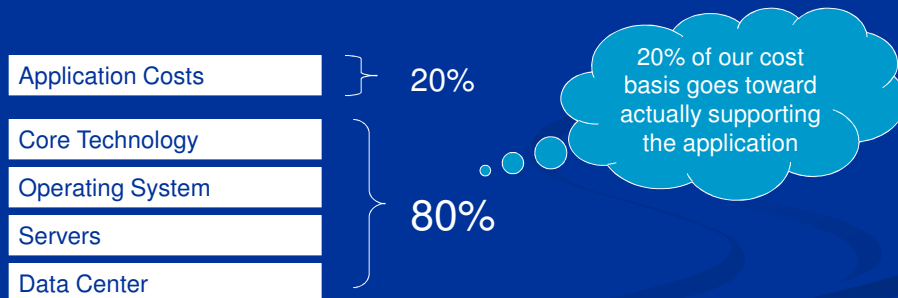
History

- Massive mainframe computers
- Mini computers and personal computers
- Advent of the internet led to web based applications
- Demand for application access via multiple devices using multiple form factors led to rapid growth in cloud computing

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Economics of the Cloud

- Gartner – IT Maintenance accounts for 80% of the cost of traditional infrastructure



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CapEx versus OpEx

- OpEx gives flexibility to terminate costs at will
- Capital purchase means software and hardware fully committed to

	Internal IT	Managed Service	The Cloud
Capital Investment	\$40000	\$0	\$0
Set Up Costs	\$10000	\$5000	\$1000
Monthly Services	\$0	\$4000	\$2400
Monthly Labor	\$3200	\$0	\$1000
Cost over 3 Years	\$149000	\$129000	\$106000
Savings Gained	0%	13%	29%

Source: O'Reilly Media, George Reese

Comparisons

- Cloud providers give transparent pricing based on different usage metrics – storage, bandwidth, etc.
- Pricing is frequently fixed per unit of time. Customers gain certainty over pricing
- In house costs that are hard to account for include direct costs (electricity), indirect costs (infrastructure operations) and overhead to own anything (procurement, accounting personnel – IT MANAGEMENT ATTENTION

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Impact of the Cloud

- **Virtualization** – ability to increase computing efficiency (VMWARE)
- **Democratization of Computing** – bringing enterprise scale infrastructure to small and medium businesses
- **Scalability and speed** – more rapid provisioning of services
- **Commoditization of infrastructure** – enables IT to focus on the strategic aspects of its role

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Infrastructure Provisioning

- Over provision to deal with peak demand causing higher costs per process
- Or
- Under provision that creates impact on service levels
 - Promise of the cloud is JIT provisioning

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Ten Laws *

#1. Utility services cost less even though they cost more. They cost more when used, but cost nothing when they are not. As a consequence, customers save money by replacing fixed infrastructure with clouds when workloads tend to spike. Then, compare peak-to-average ratio to utility premium.

#2. On demand trumps forecasting. Forecasting is often wrong, the ability to up and down scale to meet unpredictable demand spikes allows for revenue and cost optimization

#3. The peak of the sum is never greater than the sum of the peaks. Enterprises deploy capacity to handle peaks. Under this strategy, the total capacity deployed is the sum of these individual peaks. However, since clouds can reallocate resources across many enterprises with different peak periods, a cloud needs to deploy less capacity.

*Source: Joe Weinman – 2008 abridged by Diversity Unlimited in their *Cloudonomics: the Economics of Cloud Computing*

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Ten Laws

#4 Aggregate demand is smoother than individual. Aggregating demand from multiple customers tends to smooth out variation. Therefore, clouds get higher utilization, enabling better economics. (Makes statistical sense...)

#5. Average unit costs are reduced by distributing fixed costs over more units of output. Larger cloud providers can therefore achieve some economies of scale.

#6. Superiority in numbers is the most important factor in the result of a combat. (Clausewitz.) Service providers have the scale to fight rogue attacks.

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Ten Laws

- #7 Space-time is a continuum. Organizations derive competitive advantage from responding to the changing business conditions faster than the competition. With Cloud scalability, for the same cost, a business can accelerate its information processing and decision-making.
- #8. Reduced latency is increasingly essential to modern applications. A Cloud Computing provider is able to provide more nodes, and hence reduced latency, than an enterprise would want to deploy.
- #9. Don't put all your eggs in one basket. The reliability of a system increases with the addition of redundant, geographically dispersed components such as data centers. Cloud computing vendors have the scale and diversity to do so.
- #10. An object at rest tends to stay at rest. A data center is a very large object. Private data centers tend to remain in locations for reasons such as where the company was founded, or where they got a good deal on property. A Cloud service provider can locate green field sites optimally.

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And Finally...

- I will add an 11th law...the one about security in financial services. Your service providers have to meet the same or better stringent standards of security as you do. If you consider cloud applications for member services, insure their security meets all applicable standards. The cost of a breach erases anything good I have said today...

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