



CLOUD COMPUTING

– It's about the data

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Cloud Computing –

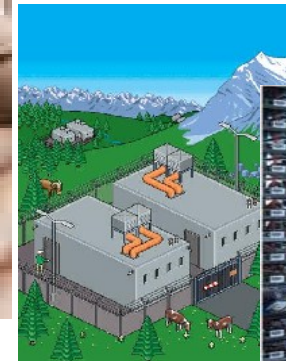
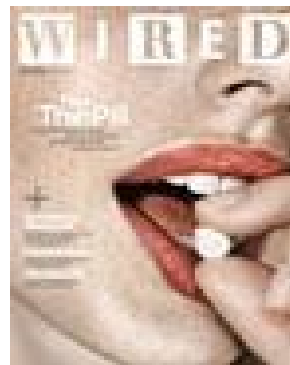
- *it's about nothing new*
- *it changes everything*



Cloud Computing – “... data is mostly resident on servers 'somewhere on the Internet' and the application runs on both the 'cloud servers' and the user's browser.” *Eric Schmidt*

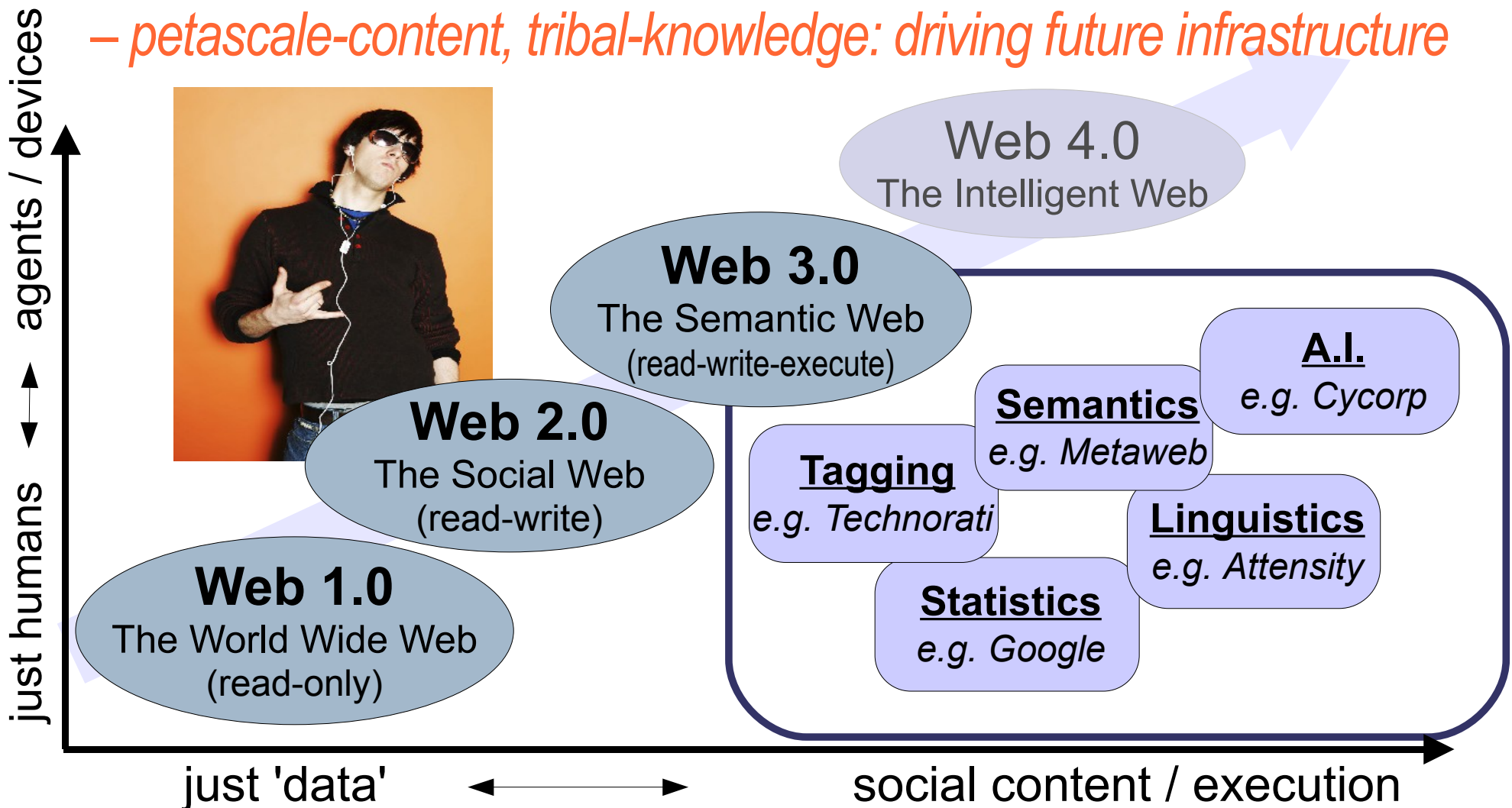
The Information Factories

- **George Gilder**
- *Wired* 14.10 2006
- **The desktop is dead.
Welcome to the Internet cloud...**



chmod 777

– *petascale-content, tribal-knowledge: driving future infrastructure*



Web 1-4.0 ala Nova Spivak

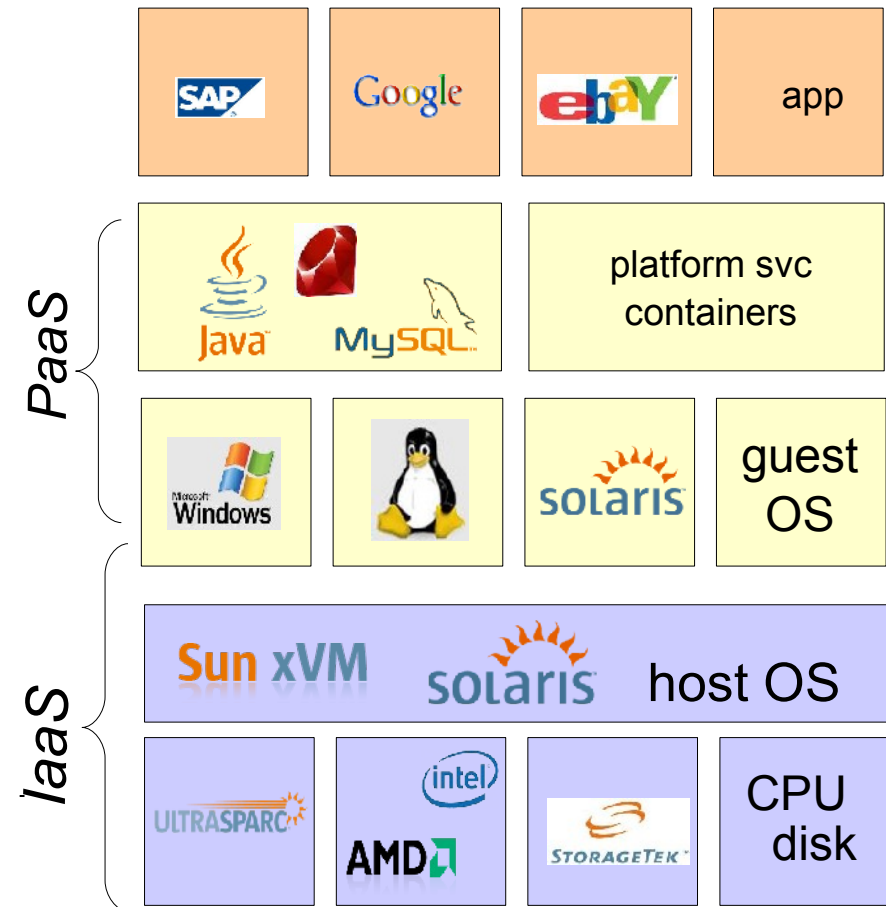
*Internet pop. – 2000=360M, 2008=1.2B, 2010=2B
they won't use PCs, they will be 'programmers'*

'Pay by the Drink' (N. Carr, the Big Switch)

– But how are you going to measure, control, pay?

As in

- **SaaS** – SW as a service
(Salesforce, GoogleApps)
- **PaaS** – Platform as a Service
(Google App Engine)
- **IaaS** – Infrastructure as a Service
(AWS - EC2/S3)



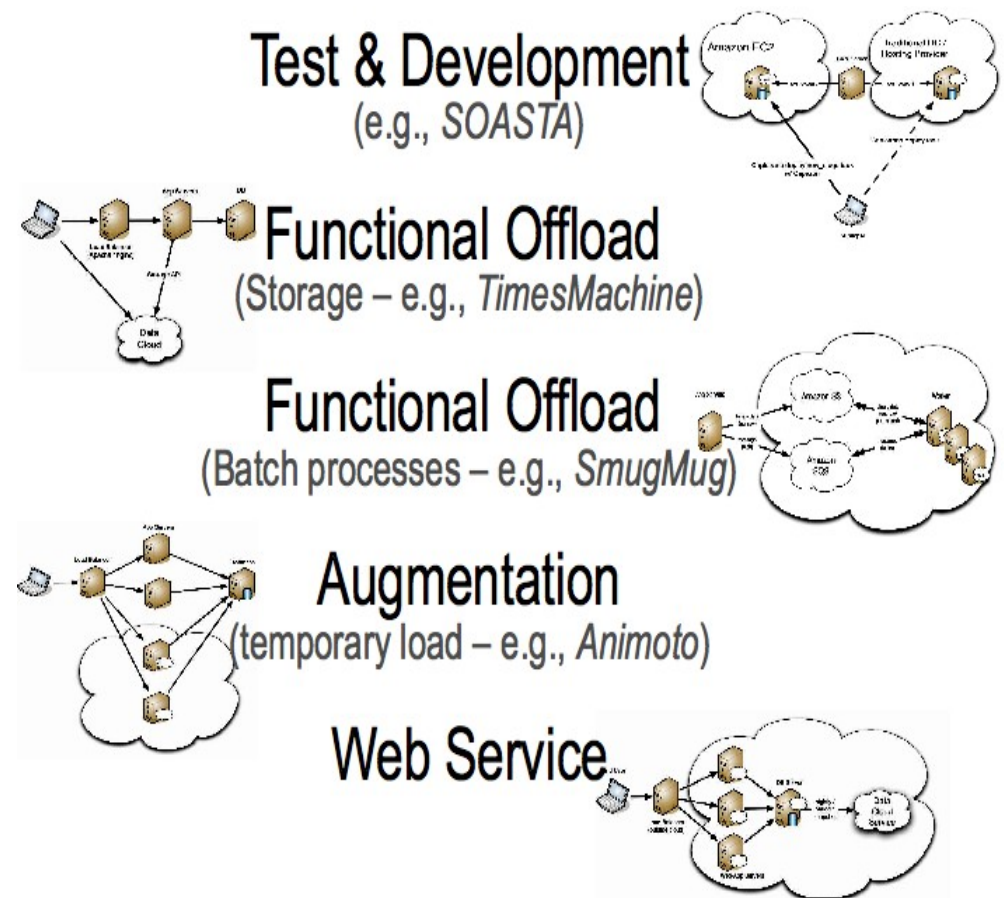
Business models & Use cases

– Set clear, focussed, few priorities

Rent or Build?

- **Use the cloud**,
 - > don't own hardware,
 - > start-ups, development / research projects
- **Leverage the Cloud**
 - > temporary on-demand load
 - > functional off-load
- **Build an 'internal' cloud**
 - > enterprise infrastructure grid (internal 'AWS')
 - > standardized dev env / services (internal 'Google Apps')
- **Be the cloud**
 - > new businesses offering clouds or cloud services

Use How?

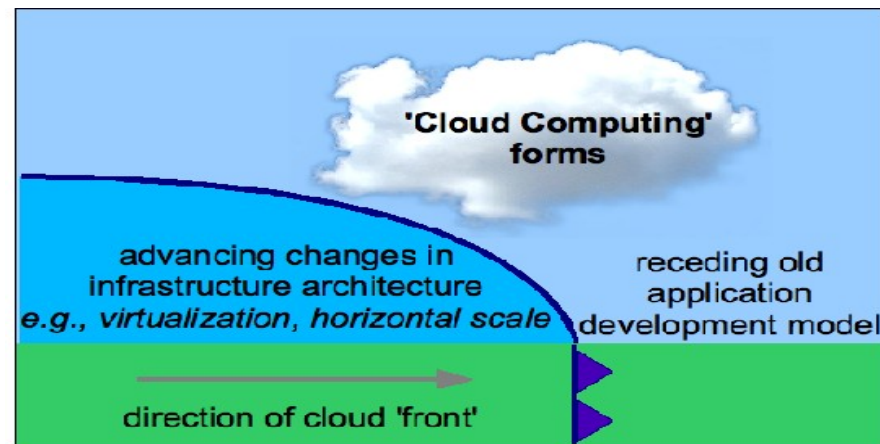


How / Why do clouds form?

– Balancing 'Infrastructure' and 'Platform'

- **Minimize costs –**

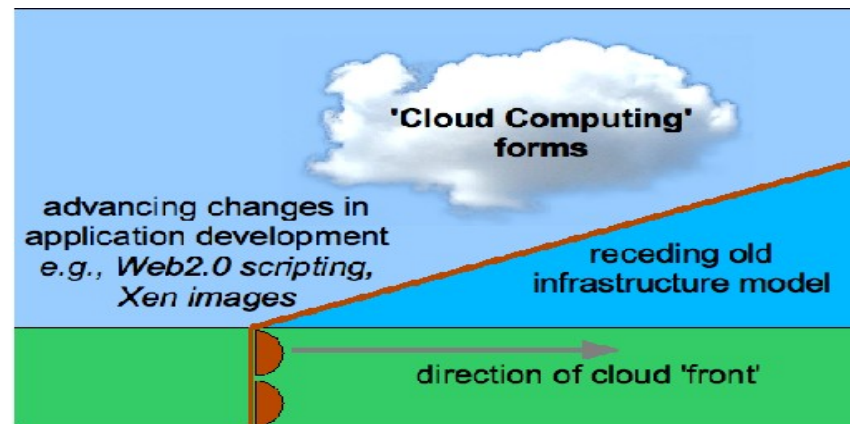
- convert IT costs from capex to opex
- Cloud computing begins as a way to improve infrastructure resource deployment and utilization



Infrastructure 'front' changes application development

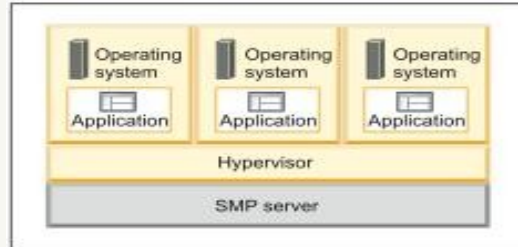
- **Maximize return –**

- IT as a competitive weapon
- Cloud computing begins as a way to transform application development



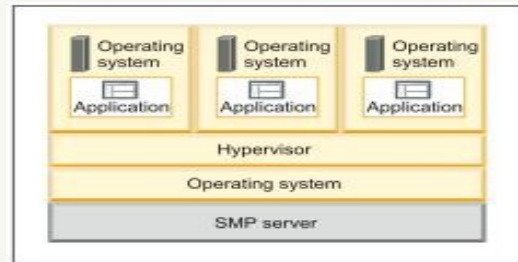
Application development 'front' changes infrastructure

Key Cloud Tech - Virtualization



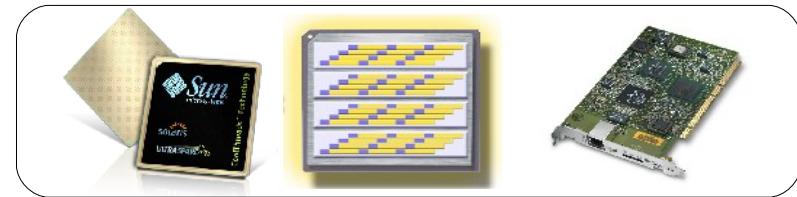
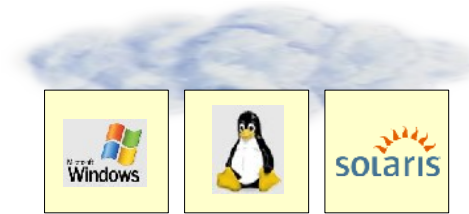
Type 1 Hypervisor

- runs on bare metal
- e.g. VMware ESX, **xVM**



Type 2 hypervisor

- runs inside an OS
- e.g. VMware Server, **Virtual Box**

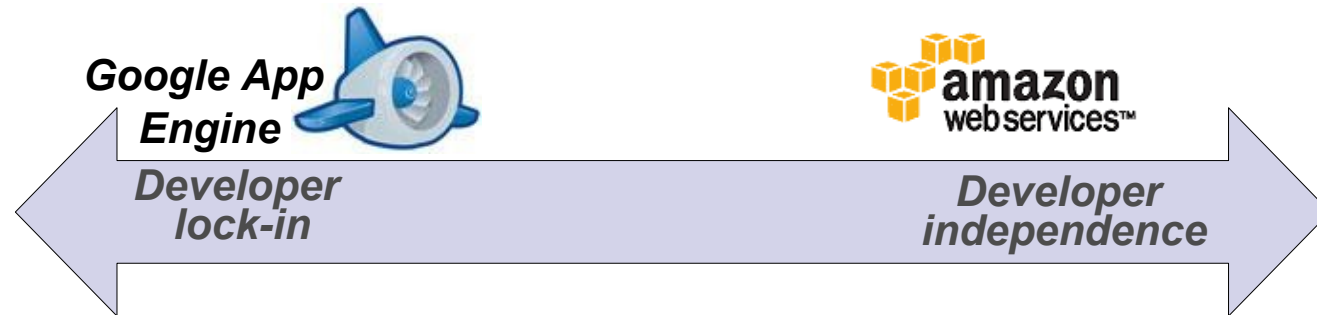


xVM

- a Xen-based type 1 hypervisor
- built in a Solaris container
- providing *unique* capabilities
multi-threaded CPUs,
10GbE links &
QoS control

Cloud Services / Developer Continuum

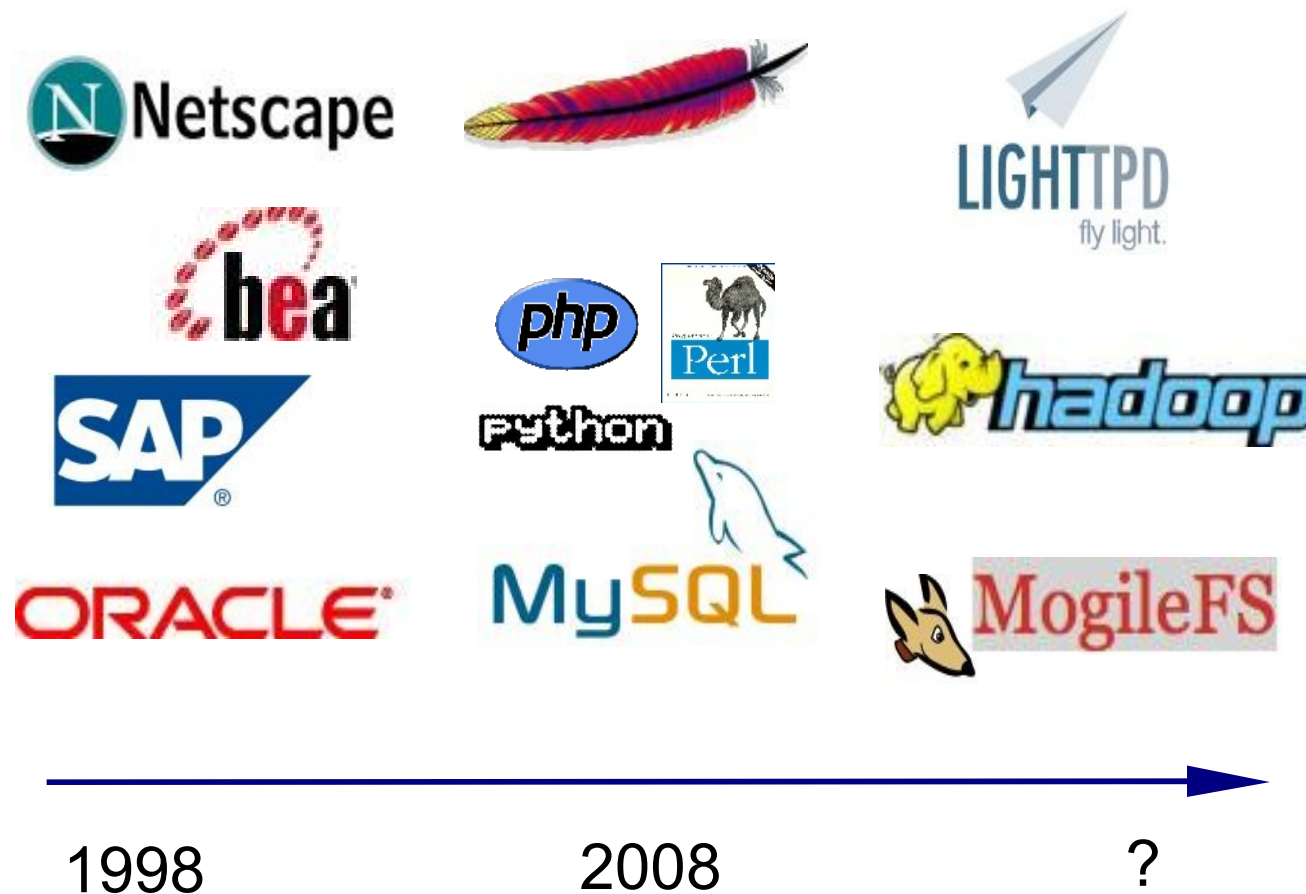
– lock-in vs. choice decisions – generic API ??



	Google App Engine	Sun Project Caroline	AWS EC2 – AMIs
Compute Model	<i>HTTP Request Handler</i>	<i>Process</i>	<i>Linux OS Instance</i>
Service Creation Language	<i>Python (no native code)</i>	<i>Java, Ruby, PHP, Perl, Python, (no native code)</i>	<i>any (including native code)</i>
Storage: Files	<i>local read-only</i>	<i>network ZFS local tempFS</i>	<i>S3, network block storage, local tempFS</i>
Storage: DB	<i>BigTable</i>	<i>PostgreSQL</i>	<i>SimpleDB</i>
Network	<i>Hidden</i>	<i>Private Network</i>	<i>Shared Network</i>
Net. Protocols	<i>HTTP/S, SMTP</i>	<i>TCP, UDP</i>	<i>TCP, UDP</i>
Internet Connectivity	<i>Hidden</i>	<i>NAT (static & dynamic) VPN, direct L4 & L7 Load Bal.</i>	<i>NAT (static)</i>
DNS	<i>static</i>	<i>dynamic</i>	<i>fixed</i>

What's running in the Cloud?

– A shifting development model

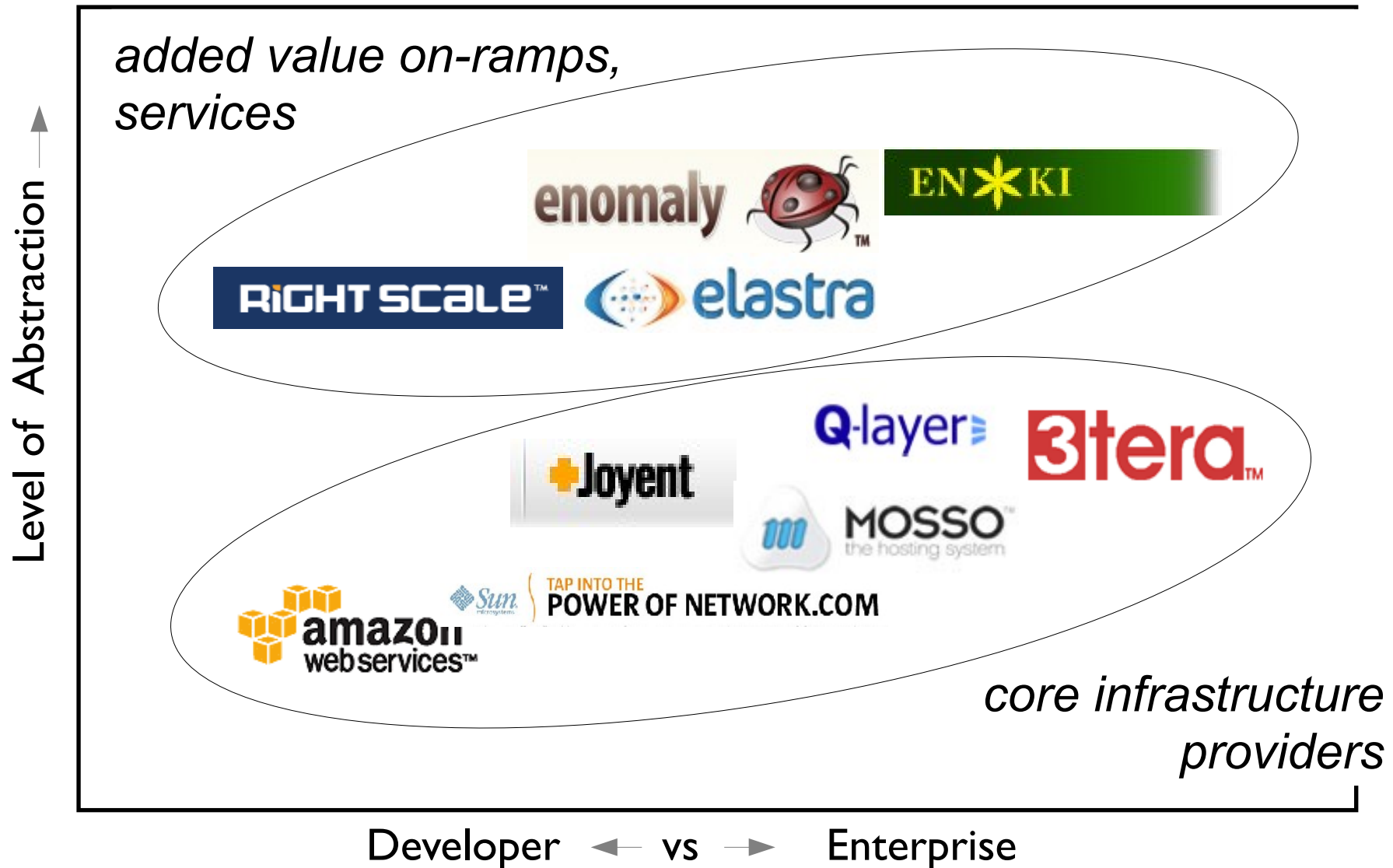


but which do I write to?



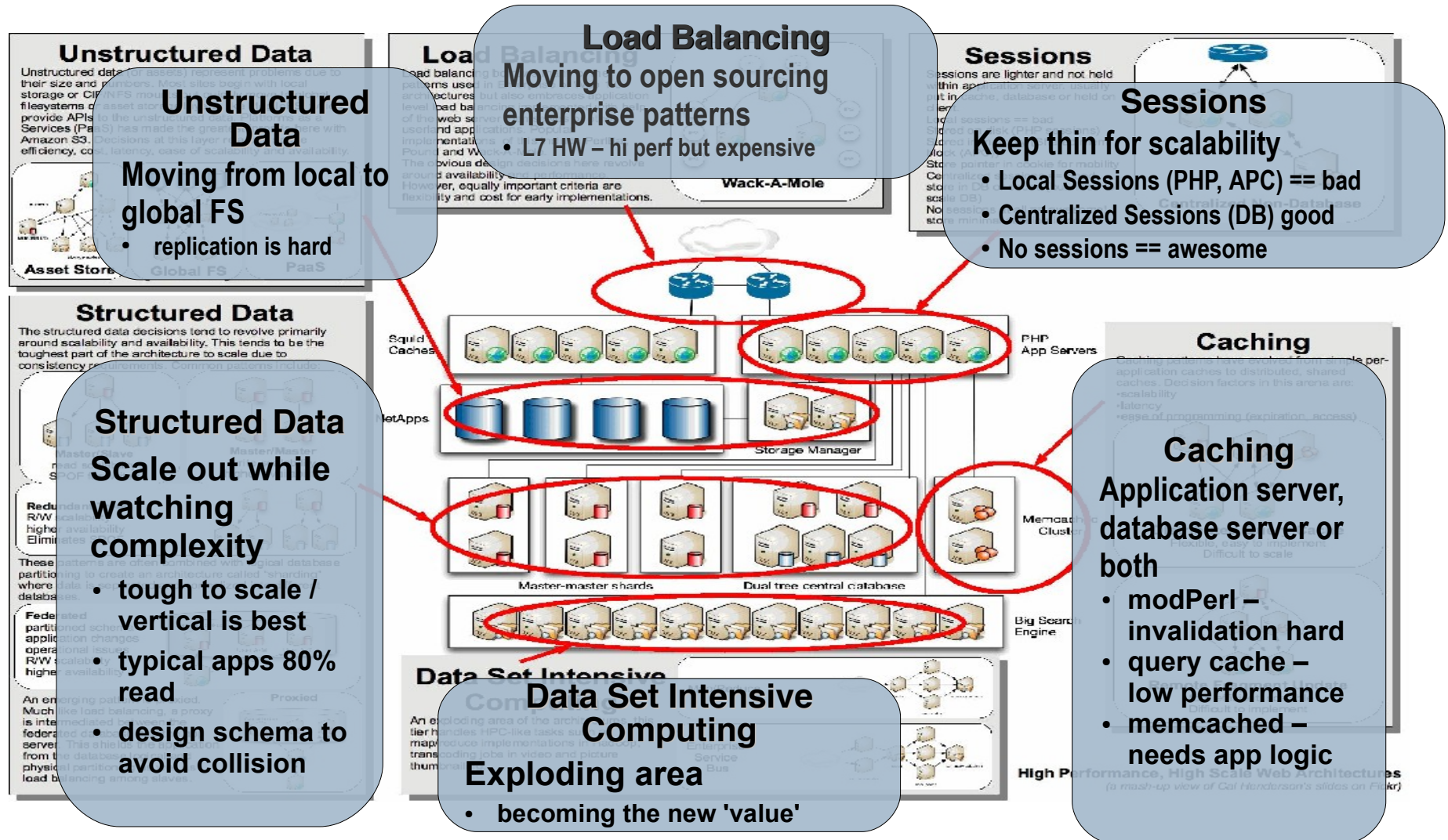
Cloud Space Ecosystem

– it's about the partners & services



Super-scale Cloud Architectures

- It's about 'components' & patterns

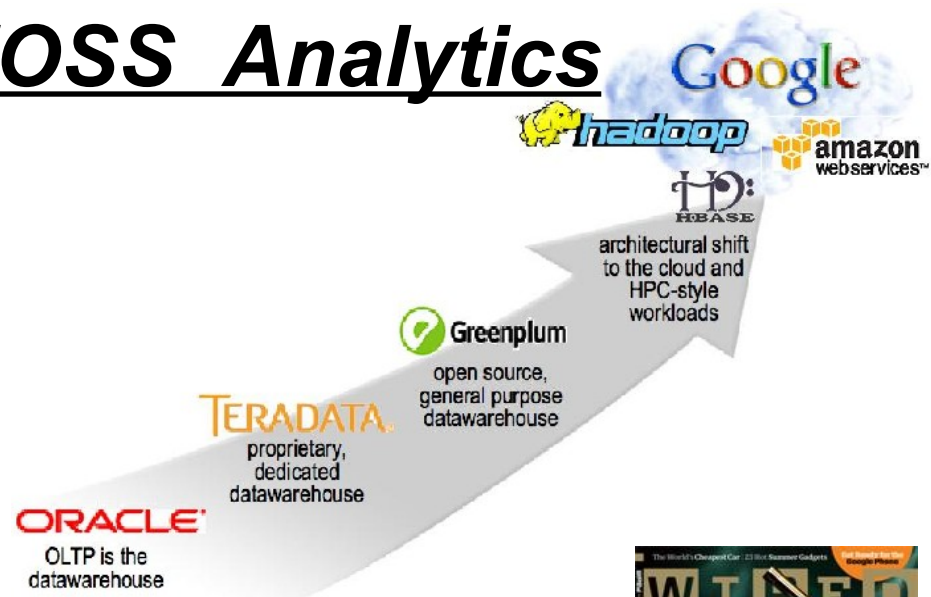


Derived from Cal Henderson's 'Building Scalable Web Sites'

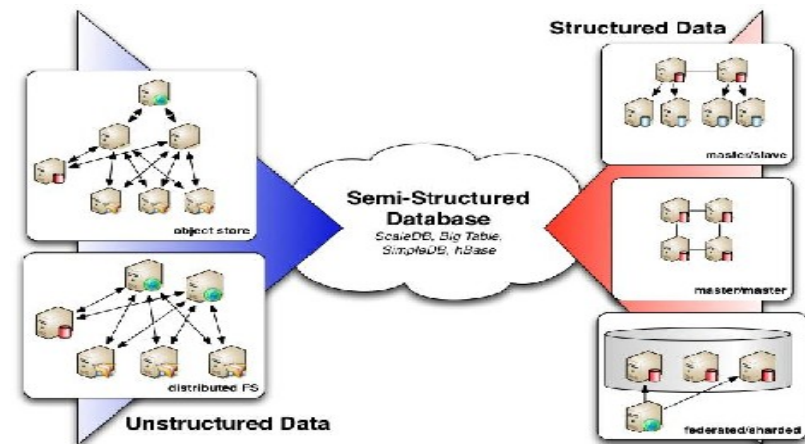
What's New / Next ?

– Data Intensive Computing

FOSS Analytics

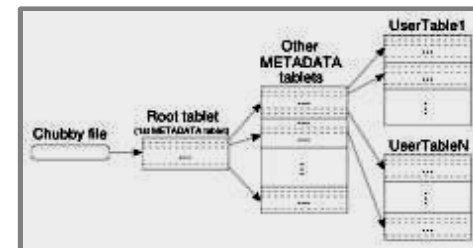


Semi Structured 'Data'



The End of Science

- **Chris Anderson**
- *Wired* 16.07 2008
- The quest for knowledge now begins with massive amounts of data.



the Data 'Tsunami'

– *ingest, archive, distributed, fast, open..... MORE*

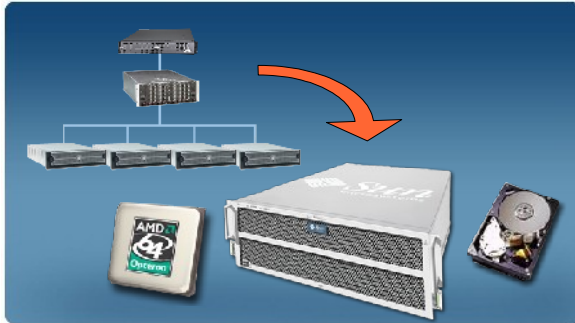
- 281 exabytes
- 45GB /person
- 10X growth in 5 years
- 50% thrown away
- excess 'halo' effect
 - 1.1 MB email to 4 people
= 51.5 MB



Data From IDC 'Digital Universe'

Refactoring Storage as a Service

– Critical for Data Intensive computing ?



General Purpose Storage 'Servers'

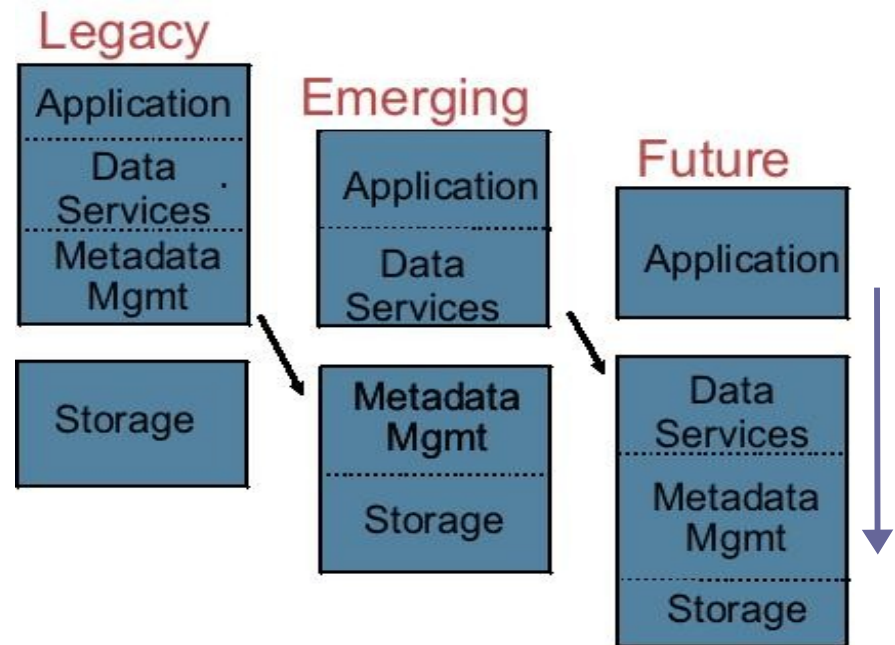
- Combine server with disk & networking
- Specialized software enables general purpose systems designs to provide high performance data services

Sun's Open Storage Platform direction

- **Sun Fire X4500/4540 – Thumper/Thor**
2 dual-core Opteron, 64GB, 48 hot-plug SATA drives, 48TB in 4 RU



- **Sun Storage 7000 Unified Storage System**
Hybrid ready architecture
High performance analytics



data functionality
moves to the infrastructure

Three Product Units

- What's our 'Cloud' strategy?
- *The Network is the Computer*

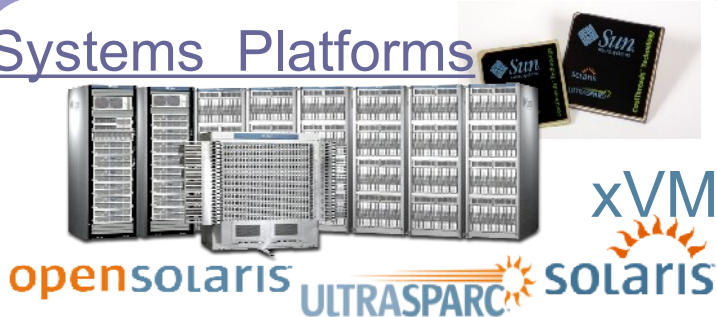
Cloud Computing & Developer Platforms



Application Platform Software

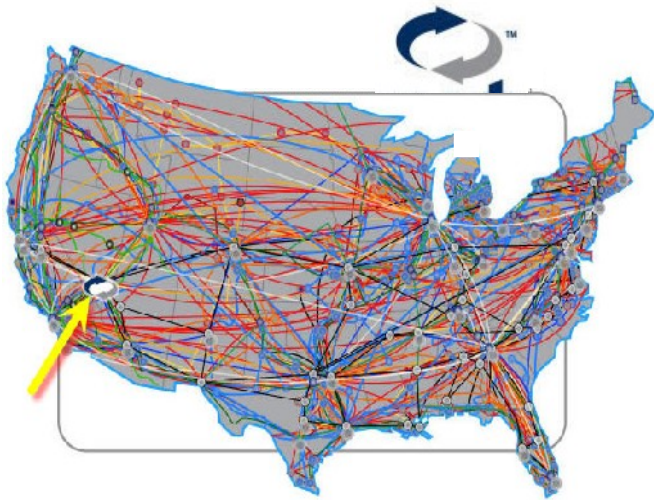


Systems Platforms



- Develop cloud-enabling technologies & services
- Help customers build & operate clouds
 - > for own use or as a service
- Operate a public cloud service
 - > start with IaaS & move up
- Drive open standards and communities

Which is the “cloud computer”?





**THANK
YOU**