HPDC 2008 Cloud Panel

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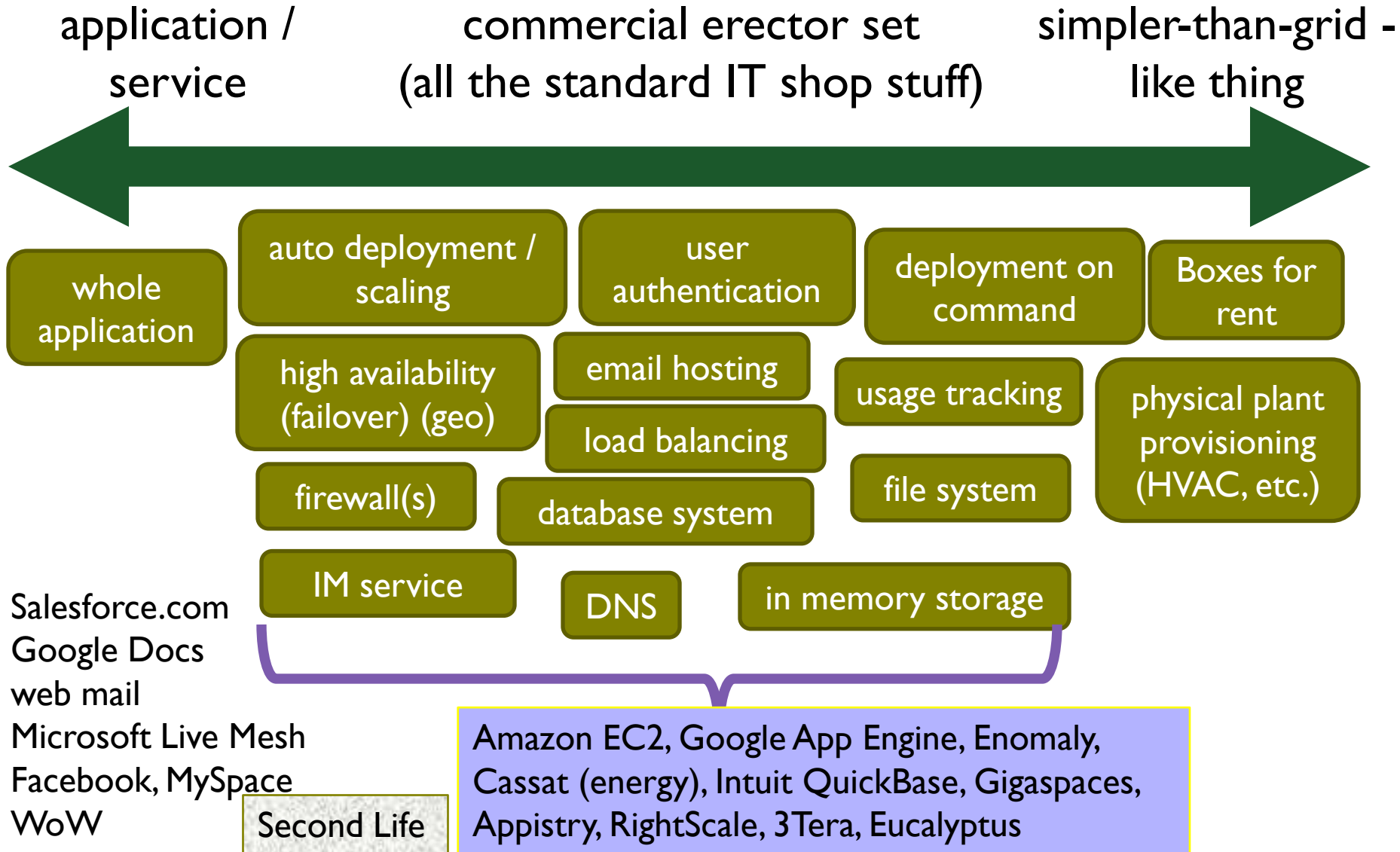
Affiliation: Free at Last!

Obligatory cloud icon

Q1) What is and isn't a cloud?

- Close up, a cloud is a fog. (Ray Nugent)
- The term for grid computing that has nothing to do with academia. (Stu Charleton)
- Cloud computing is hiring someone out on the web to host your computing…
- … where "host" can range across
  - Raw iron
  - Building blocks of varying complexity
    - "standard" commercial infrastructure
  - The whole application

Random gratuitous clipart

Cloud Hosting Spectrum

application / service

commercial erector set
(all the standard IT shop stuff)

simpler-than-grid - like thing

whole application

auto deployment / scaling

user authentication

deployment on command

Boxes for rent

high availability (failover) (geo)

email hosting

usage tracking

physical plant provisioning (HVAC, etc.)

load balancing

firewall(s)

database system

file system

IM service

DNS

in memory storage

Salesforce.com
Google Docs
web mail
Microsoft Live Mesh
Facebook, MySpace
WoW

Second Life

Amazon EC2, Google App Engine, Enomaly, Cassat (energy), Intuit QuickBase, Gigaspaces, Appistry, RightScale, 3Tera, Eucalyptus

Q1b) What isn't a Cloud?

➤ A chipmunk.

➤ Two things often confused with cloud:
  ➢ Software as a Service (SaaS)
    ➤ A way to provide the infrastructure
  ➢ Virtualization (as in VMWare)
    ➤ A technique to use in deployment

➤ These can be used to implement cloud hosting, but aren't themselves cloud computing.

➤ "Pigpen Cloud" is a homonym.
  ➢ Could be implemented using cloud computing.

Q2) What are implications of Clouds for Enterprise Data Centers?

➤ Cheaper, more responsive, less expensive.

  $\Rightarrow$ downsizing

  $\Rightarrow$ in some cases, displacement of whole shop

➤ A result: Clouds will be resisted.

➤ Fortunately (?) many legacy mission-critical applications strongly resist assimilation.

More random gratuitous clipart

Q3) If TeraGrid evolves to PetaCloud, how would it look?

- As long as grid is tailored to HPC, it's unlikely to become a cloud.
  - Except, of course, for marketing / funding buzzword purposes.

- Ways clouds differ from grids:
  - Significant commercial infrastructure: databases, etc.
  - Throughput / "transactional" workloads
    - "automatic" horizontal scaling
  - Non-optimal client code is OK
    - Scripting languages, sandboxes, ….

Yet more random gratuitous clipart

Q4) What are research issues for Clouds?

- All issues for commercial computing apply to clouds. E.g.,
  - Improved management
    - Ease / simplicity of use, meaningful performance monitoring, deployment, updating, …
    - Everything you do with a computer *except* what you bought it for.
  - Scaling of all provided components.
  - Geographical HA / failover.
  - Interoperability and standards (maybe).
  - Specialization to particular workloads
    - Clouds with accelerators and the software to use and manage them?
      - FP, database, crypto, Java, XML, …

you get the idea

Q5) Can one (or who could) "trust" clouds?

There are limits, but we already do.

- Inside the firewall: home-grown clouds, e.g., email
  - (customers invented clouds) (like clusters)
- Outside the firewall: often outsource data (auditing)
  - No intrinsic reason cloud vendors less adept or concerned about privacy/security than clients.

- However:
  - There is certainly a trust hurdle to cross
    - Vendors must earn our trust before we take data out of our mattresses
  - Legal implications for personal privacy may limit use outside the firewall.
  - Geopolitical issues may limit physical cloud locations.
  - Some data will **never** be allowed to reside outside firewalls.

This getting boring now

Q6) Will Cloud Interoperability be Important; if so at what Interface(s) will it be provided?

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➤ Interoperability between different cloud implementations – business as usual.

  ➢ SOA, WSS, etc.

➤ Portability of apps between different cloud implementations; cloud computing standards

  ➢ Would be nice.

  ➢ About as likely & feasible as portability between OSs, databases, … possible. Takes work.

  ➢ Vendors always like walled gardens and are unlikely to cooperate much.

The Whole Enchilada as a Service

- Bill Gates at Microsoft Tech ·Ed 6/08:
  - "everything we do at the server level" and "have a service that mirrors that exactly."
  - "hosted in our cloud … geo-distributed automatically…. many millions of servers."
- Heard from Google CTO several years ago:
  - We want to do *all* the programming for **everybody**.

They've got you and me, brother, <clap> in their hands…

Q7) What is the Killer App for Clouds? #2: Virtual Worlds

- Major uptake expected.
  - Training, marketing, meetings, conferences, geographically dispersed teams, recruiting, demonstrations, etc.

- Serious infrastructure requirements
  - Nonstop world simulation, transactional persistent storage, etc.
  - IT shops mostly clueless

- Opening for external vendor (cloud) support
  - … but then again, commercial cloud vendors are mostly clueless too.

Virtual World Uptake

- 80% Internet user participate by 2011 (Gartner)
- >1B users in 10 years (Strategy Analytics)
- Congressional testimony 4/08:
  - 22-33% CAGR in the number of virtual worlds last year,
  - $1.02B VC investment 10/07-08.
  - 420,000/week actively *visiting* Second Life
- China CRD: 100 sq km site (former steel mill) converting to house virtual worlds able to support billions of avatars simultaneously.

CRD

Logo of the China Recreation District

Thank you for listening!