Catching the Cloud

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Outline

- Advantage of Cloud Computing
- Open Issues
- Selected HPL Projects

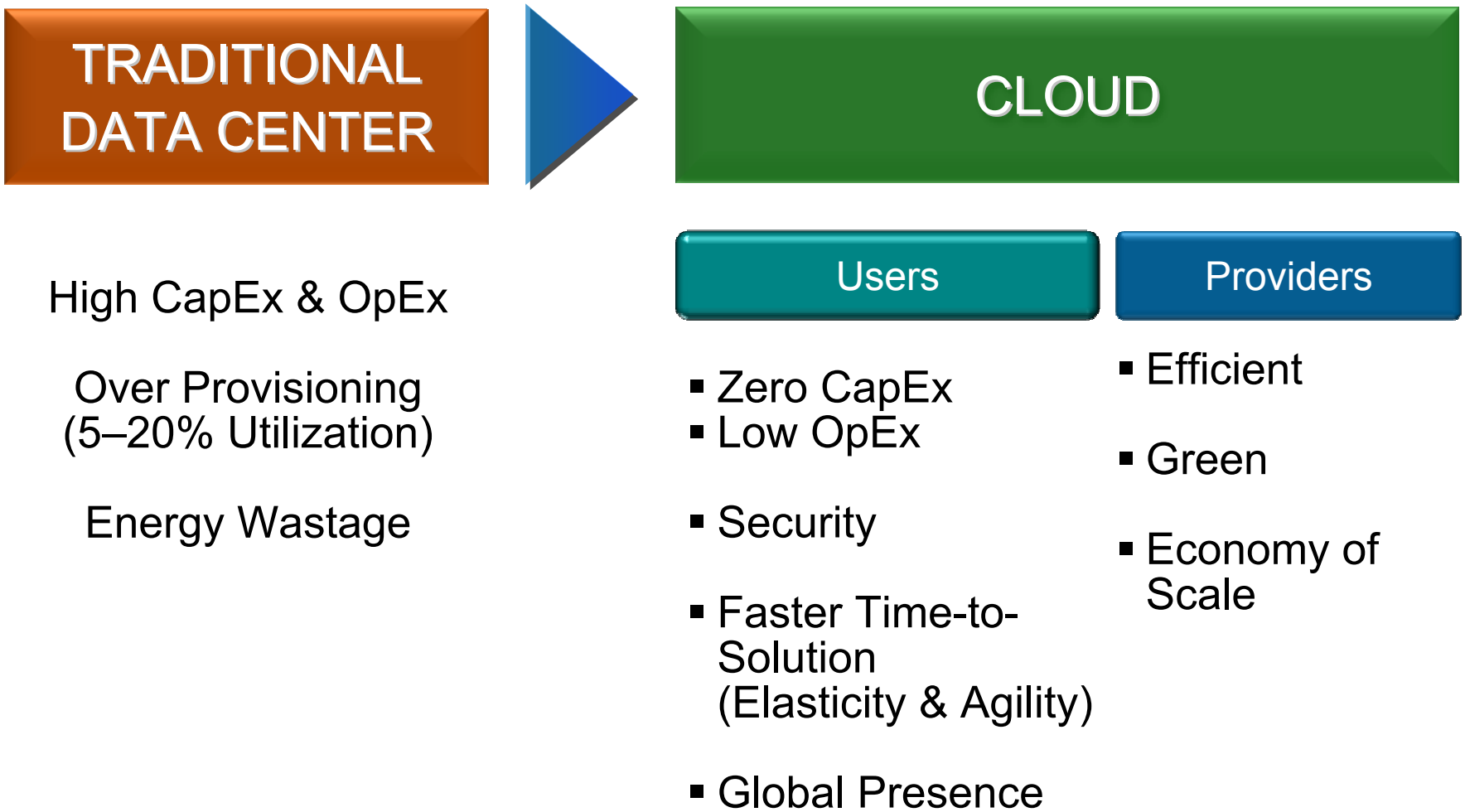
Powered-by-HP clouds

– "4 out of 7 leading cloud providers use the HP Cloud Infrastructures." – Shane Robinson, CTO, HP

– DreamWorks uses the HP Cloud for their movie productions

Powered-by-HP Cloud

Advantages of Cloud Computing



Testimonials

Created a private cloud using HP BladeSystem Matrix to enable fast deployment of application platforms for different R&D needs

Quickly bring to market a complete platform for Infrastructure as a Service based on Matrix, Cloud Service Automation, and the HP Aggregation Platform for SaaS

"Consumerization of the computing environment"—Clean- slate approach an internal cloud increased utilization over 75% and reduced deployment from 5 days to 15 minutes

Implement a private cloud with CloudStart based on Converged Infrastructure as a test bed for research on cloud, replacing dedicated clusters for simulations and data analyses

Testimonials

DISA	▪ 4x acquisition time ▪ Self-service, 72 hour SLA ▪ Pay per use ▪ Five/nine availability ▪ Government-grade security
Global Telco	▪ Highly resilient on-demand computing infrastructure ▪ Manage the cost of underutilized resources ▪ High availability, capacity on demand ▪ Transparency for cost management and chargeback
US Bank	▪ Reduce time to market ▪ Cost savings through flexible on-demand environments ▪ Shorten server/environment builds from weeks to days ▪ Cost reduction validation

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But…

Safety?

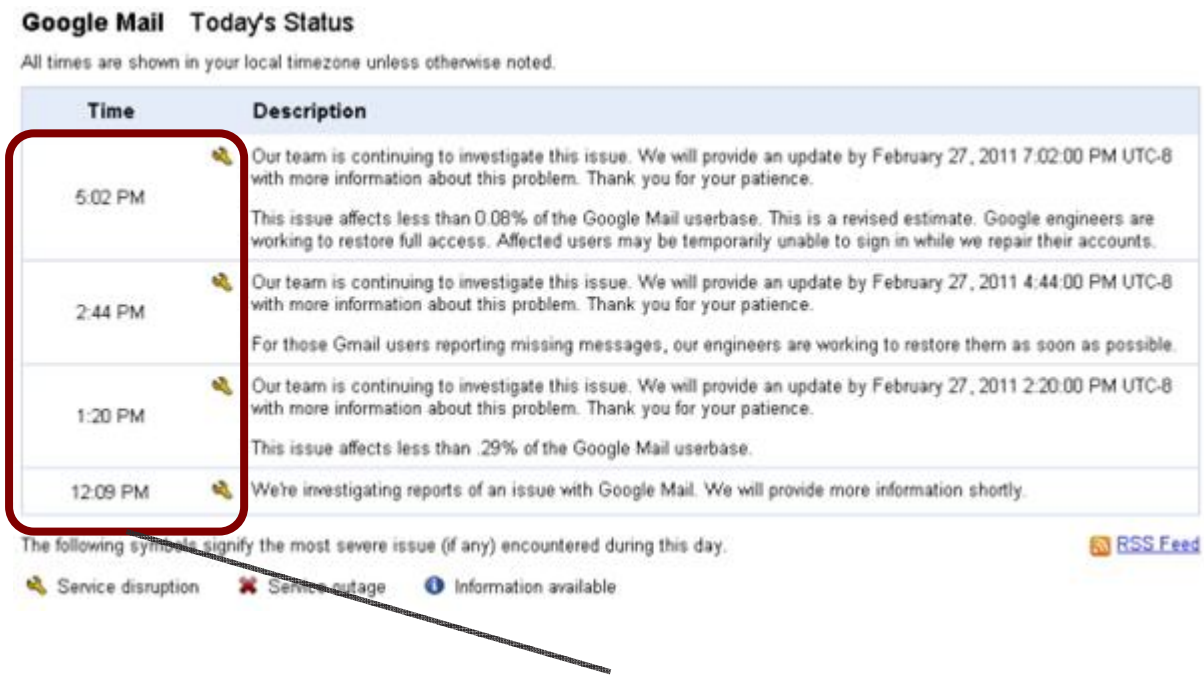
Availability?

Horror Stories: Data Loss

Gmail (2011)

– ‘Accidentally’ resets 150,000 email accounts

http://www.theatlanticwire.com/technology/2011/02/google-accidentally-resets-150-000-gmail-accounts/20949



Google Mail Today's Status

All times are shown in your local timezone unless otherwise noted.

Time	Description
5:02 PM	Our team is continuing to investigate this issue. We will provide an update by February 27, 2011 7:02:00 PM UTC-8 with more information about this problem. Thank you for your patience. This issue affects less than 0.08% of the Google Mail userbase. This is a revised estimate. Google engineers are working to restore full access. Affected users may be temporarily unable to sign in while we repair their accounts.
2:44 PM	Our team is continuing to investigate this issue. We will provide an update by February 27, 2011 4:44:00 PM UTC-8 with more information about this problem. Thank you for your patience. For those Gmail users reporting missing messages, our engineers are working to restore them as soon as possible.
1:20 PM	Our team is continuing to investigate this issue. We will provide an update by February 27, 2011 2:20:00 PM UTC-8 with more information about this problem. Thank you for your patience. This issue affects less than .29% of the Google Mail userbase.
12:09 PM	We're investigating reports of an issue with Google Mail. We will provide more information shortly.

The following symbols signify the most severe issue (if any) encountered during this day. RSS Feed

Service disruption Service outage Information available

7 hours of “Service disruption”

T-Mobile (2009)

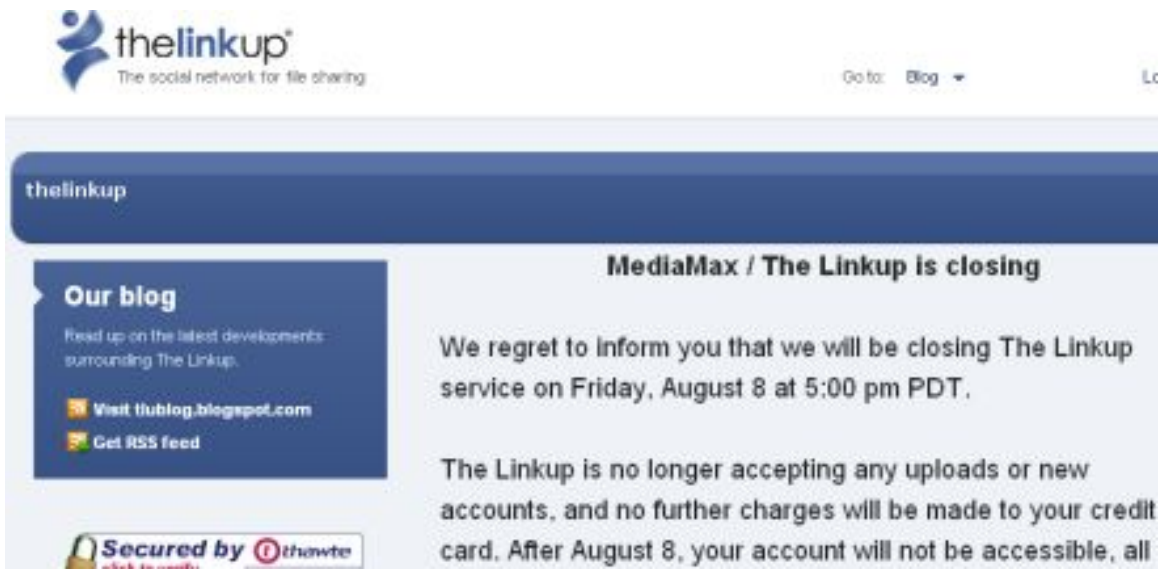
T-Mobile lost the contact, calendar, and other synced information of 1,000,000 users due to a glitch with Windows Mobile servers

http://www.pcworld.com/article/173470/microsoft_redfaced_after_massive_sidekick_data_loss.html

Linkup (2008)

Out of business after losing 45% of client data

http://www.theregister.co.uk/2008/07/11/linkup_mediamax_titsup/



Horror Stories: Availability

Gmail (2009)

Services inaccessible for one day, affecting consumer and businesses accounts worldwide

6th downtime in 8 months

http://www.pcworld.com/article/160153/gmail_outage_marks_sixth_downtime_in_eight_months.html

http://googleblog.blogspot.com/2009/02/current-gmail-outage.html

"There's no official word from Google about the outage yet. As always, I feel uneasy; I rely on Gmail, and any prolonged outage is affecting my work and making me think about Google not being as bulletproof as most people usually think it is." – a user on mashable.com

Microsoft Hotmail (2009)

Service outage, and becomes unavailable to users

http://www.datacenterknowledge.com/archives/2009/03/12/downtime-for-hotmail

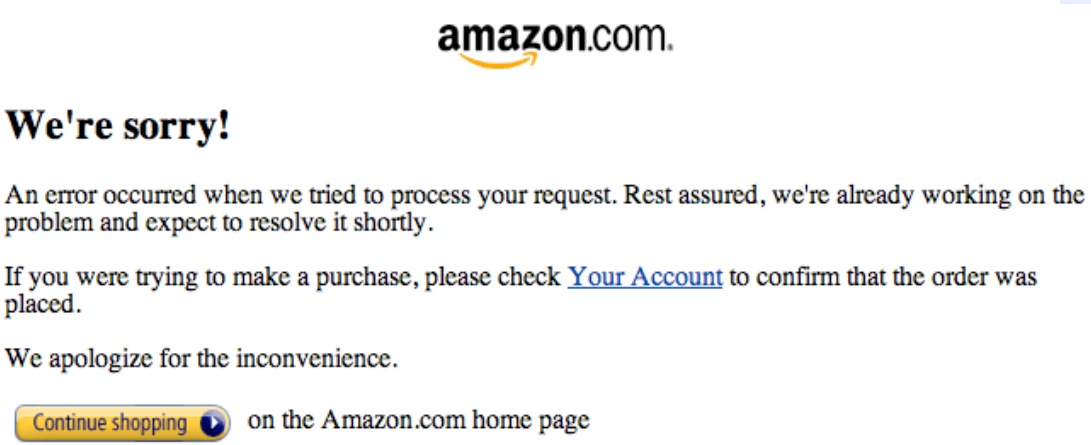
Amazon

Outage due to message corruption during server communications (2008)

http://status.aws.amazon.com/s3-20080720.html

Downtime of EC2

Year	Downtime (Minutes)
2010	180
2008	90
2007	30
2006	60



Open Issues

Checklist

- What happens if my provider is gone (e.g. bankrupt, liquidated, closed by authorities)?
- Who owns the data?
- What contractual rights do I have?
- How do we protect the privacy of sensitive data?

Legal & Contractual Considerations

- Fairness of Contract
  - Current cloud contracts are in favour of the providers
    - E.g., Facebook owns the copyright of ALL pictures in their site.
    - E.g., Gmail is allowed to mine your emails for their advertisements.
  - Legislation unable to fully represent the needs of both customers and providers.
  - Service level agreements

- Impact of jurisdictions
  - E.g., different data protection law in different countries

Consequence of Cloud Mishaps

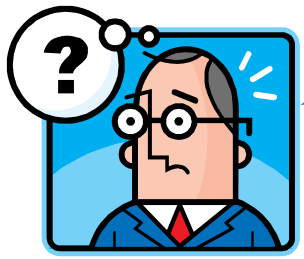
- What is “loss”?
  - Direct Loss – Customer Data
  - Indirect Loss – Profits, Client Trust?
  - What are the compensations?

- Multi-national locations of the cloud
  - Dispute resolutions?
  - Exclusions, Termination of Contracts, Arbitration?

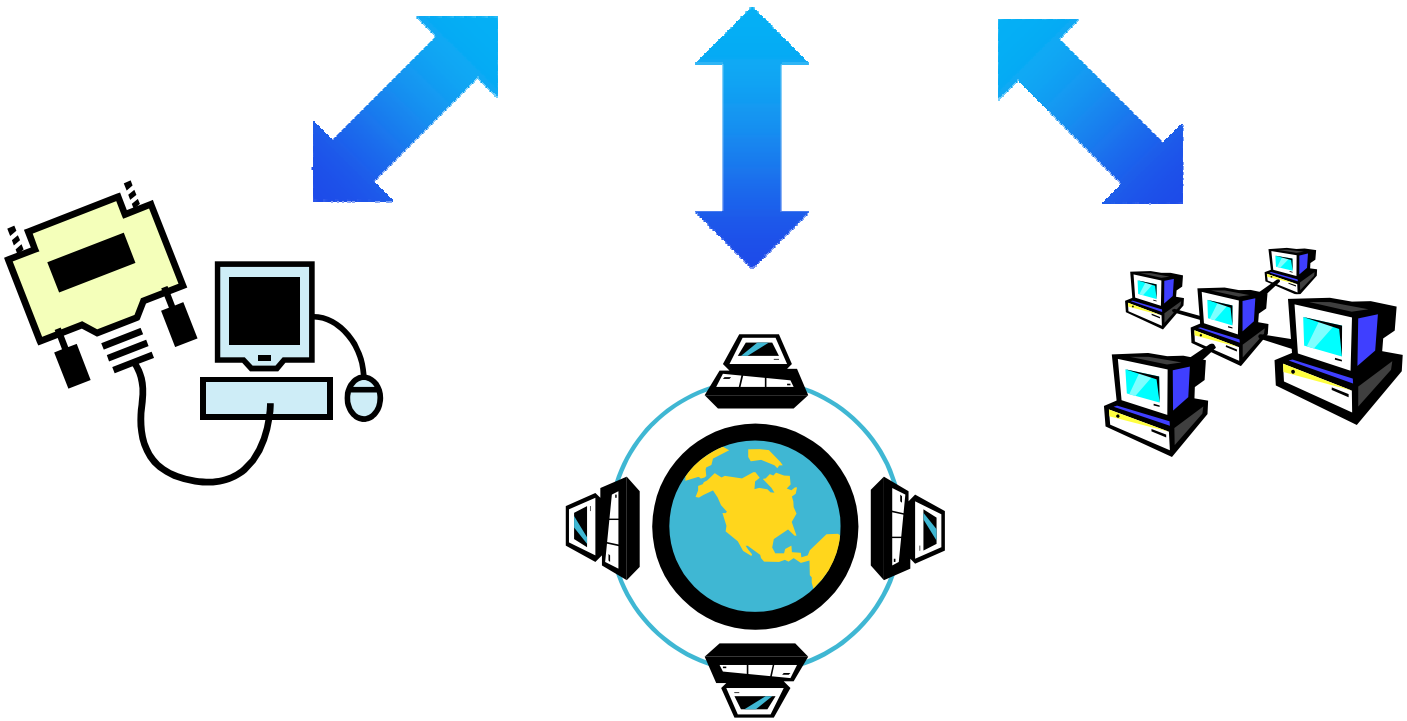
Technical Problems

- Management of multiple cloud provider accounts
- Data storage and analysis
- Mobility to unleash true potential of cloud computing "anytime anywhere"

Cloud Management



- Management?
- Corporate account?
- Policy?



23

Data, Data, and Data

The State of Business Analytics in Financial Services: Examining Current Preparedness for Future Demands

Research report (Sep'10), featuring a survey of financial services professionals

Two-thirds of financial services firms fear their analytics programmers and infrastructures will not be able to handle increasing analytical complexity and data volume

- Ever-increasing data growth
- Siloed data sources
- Network bandwidth
- I/O bottlenecks

Mobility

Rich Functionalities yet Battery Friendly

– Seamlessly offload resource-intensive tasks to cloud

Anytime Anywhere

– Online and offline usability

Productivity & Portability

– Quick delivery & protection of investment through software reuse & SaaS

Other “Concerns”

- Network outages?

- IT staff within the enterprises are fearing for their jobs.

Is Cloud Ready for Primetime?

YES

- Soft issue & technical issues in cloud are real
- HP Labs are actively addressing these issues

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HP on Cloud Computing

Strategy: http://www.youtube.com/watch?v=XnVrpGeKi9s

Selected Projects

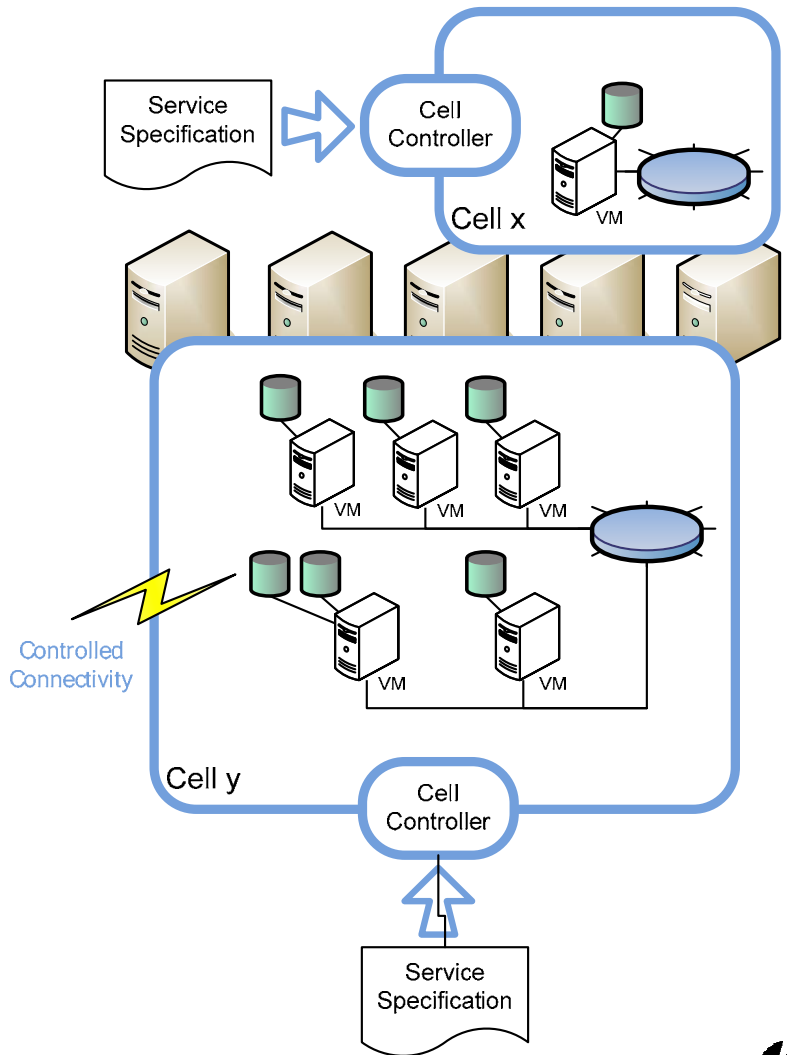
- Cells as a Service
- TrustCloud
- Dashboard
- µCloud

CaaS: Cell as a Service

– secure, robust hosting, simple-yet-expressive management of cloud services

– Cell = group of virtual resources
  - Virtual machines, virtual storage volumes, virtual networks

– Key value propositions:
  - Unified specification language
  - Isolation among tenants
  - Dynamic allocation



Motivation For Trust Research

– Trust = Key barrier to widespread uptake of cloud computing services.

88% of potential cloud consumers are worried about who has access to their data, and would like to have more awareness of what "goes on" in the backend physical server

– Source: Fujitsu Research Institute 2010 Survey

– Key paradigm shift: Focus on **systems** → Focus on **data**

– Nature of cloud computing services **reduces** 'trust':

- Transfer of perceived 'control' of computing services
- Fear of loss of data and business sensitive documents
- Lack of transparency
- Fear of unethical personnel or policies within provider

Methods for Increasing Trust

- **Preventive** → Mitigate the occurrence of an action from continuing or taking place at all
  - Examples: Access list governing who may read a file; firewall blocking all but allowable activity

- **Detective** → Used to identify occurrence of a privacy or security risk that goes against the privacy or security policies and procedures
  - Examples: Intrusion detection system; security audit trails, log analysis tools

- Both approaches complement each other!

- HPLS focuses on Detective approaches to increase accountability

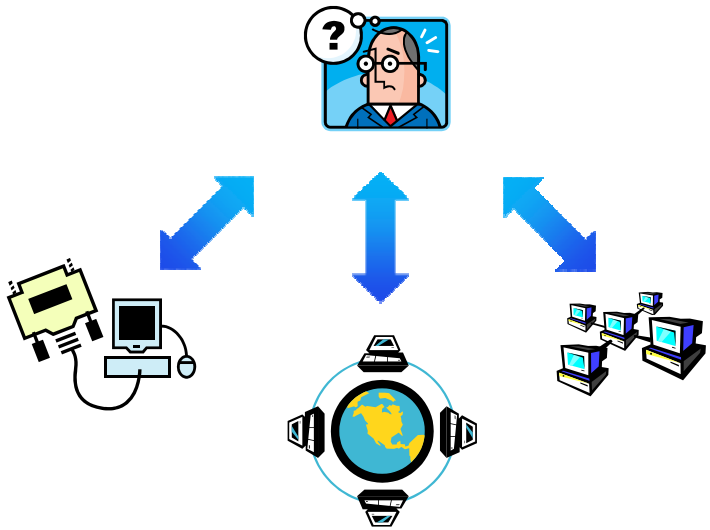
HP Labs: Increasing Trust In the Cloud

- Policy Approaches
  - Legislation (discussed earlier) – Setting the law
  - Regulation – Enforcing the law
  - Reputation management

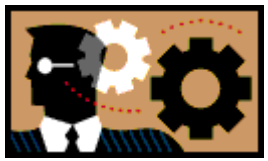
- Technical Approaches
  - Preventive Approaches
  - Detective Approaches

Cloud Dashboard

- One-stop portal
- Corporate account
- Policy management



One-Stop Portal



Portal Admin

Publish

Cloud Provider Settings

Cloud Provider	Security Level	Geographical Coverage	Built-in Load Balancing	
EC2	5	Singapore, Ireland, United States	Yes	
GoGrid	4	United States	Yes	
RackspaceCloud	3	United States	No	

...

CSP	Security Level	Geographical Coverage	Load Balancer Features	Data Store Type	Price	...
AWS						
GoGrid						
RackSpace						
Matrix						
CaaS						
...						

Cloud Dashboard: Corporate account

ABC Company

USERS

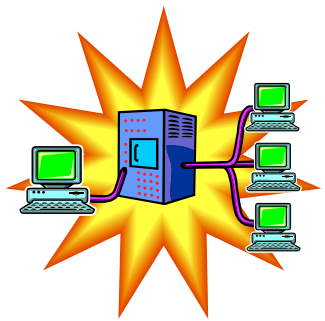
ROLES

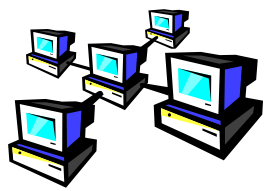
Cloud Resources

Corporate Admin

Alpha Project Team

Finance Department



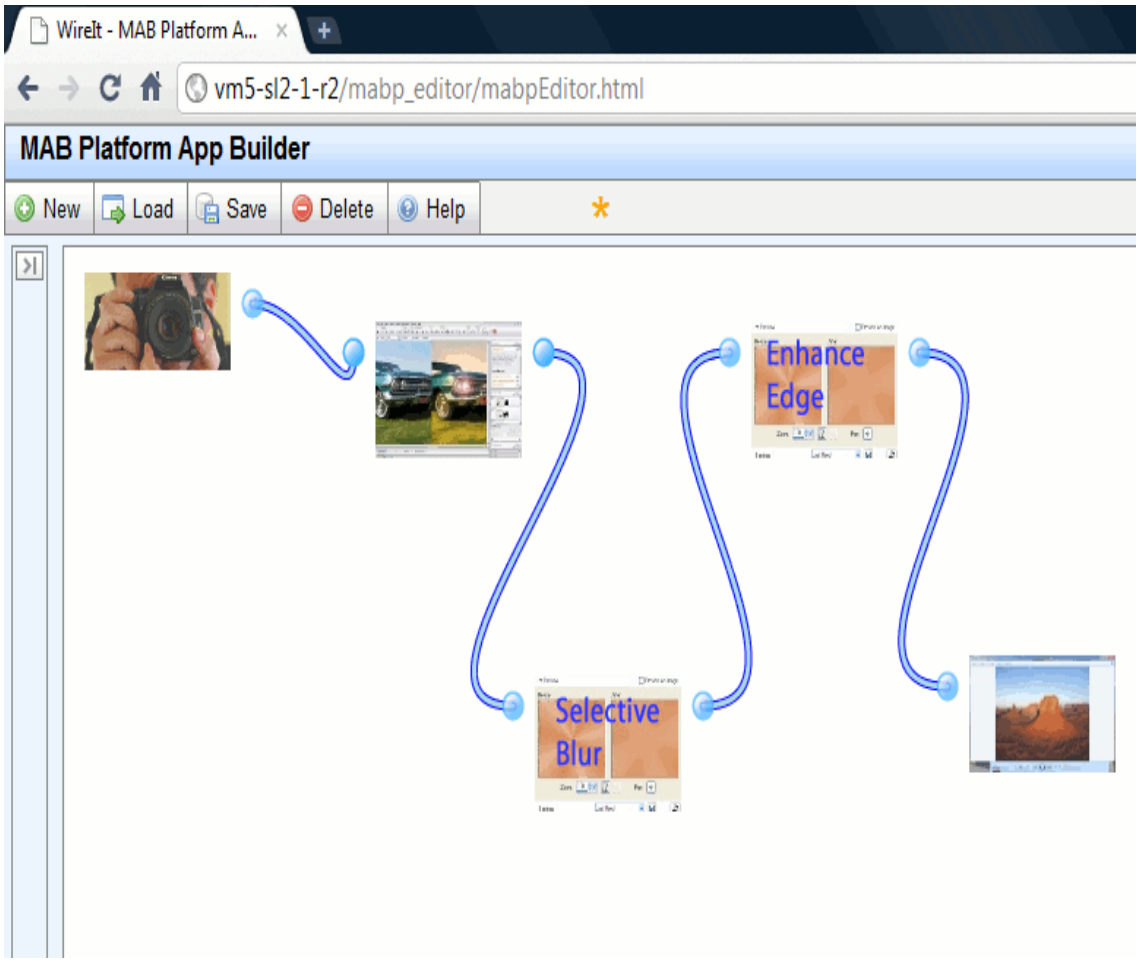


Cloud Dashboard

Policy Engine

Geography-based requirements
Security level requirements
Service level requirements
Government regulations
Corporate policies

µCloud

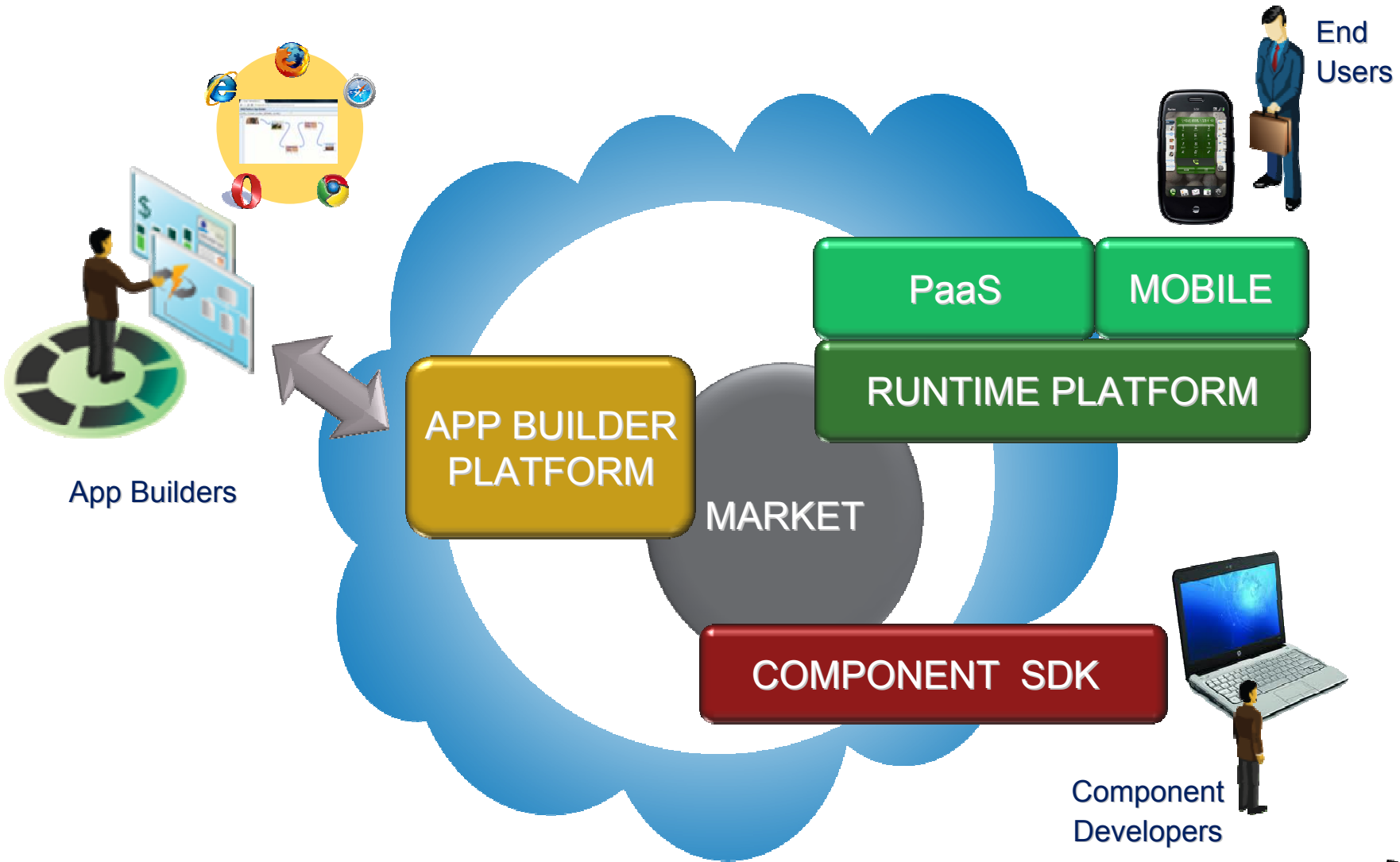


Development of cloud-enabled mobile app:

–Simple to Assemble

–D.I.Y.

µCloud Architecture



Other Cloud Initiatives

– Everybody on http://www.youtube.com/watch?v=7gegmlRn4ck

– CloudPrint http://www.youtube.com/watch?v=PIRP0wSIGp0

– Cloud Drive http://www.youtube.com/watch?v=jeJaj4yF6BE

– Mobile Thin Clients http://www.youtube.com/user/hpcomputers#p/u/0/nbNRAjOW1KM

Thank You!