The Future of Cloud Computing
And its disruptive affect on enterprises and markets

Vikram Rana T’08
Agenda

- Evolution to SaaS and Cloud Computing
- Current Cloud Computing Market Overview
- Webdesc: Case Study
- Barriers to Adoption
- Future Catalysts
- Recommendations
Evolution to SaaS and Cloud Computing

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What do you mean Cloud Computing?

“A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end-customer applications and billed by consumption.”

<table>
<thead>
<tr>
<th>Segment</th>
<th>Description</th>
<th>Value Prop</th>
<th>Competitors</th>
<th>Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>SaaS</td>
<td>Packaged apps delivered over the Internet</td>
<td>• Lower cost of ownership</td>
<td>• Salesforce.com</td>
<td>• Large enterprises</td>
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<td></td>
<td></td>
<td>• Reduced up-front investment</td>
<td>• Google Apps</td>
<td>• SMBs</td>
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<td></td>
<td></td>
<td></td>
<td>• ZoHo Office</td>
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<tr>
<td>HaaS/Utility</td>
<td>Virtual datacenter (enterprise)</td>
<td>• Lower costs</td>
<td>• Amazon Web Services</td>
<td>• SMBs</td>
</tr>
<tr>
<td>Computing</td>
<td>Virtual hardware (consumers)</td>
<td>• Reduce time-to-market</td>
<td>• Akamai</td>
<td>• Consumers (early adopters)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• 3Tera AppLogic</td>
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<td></td>
<td></td>
<td></td>
<td>• Goowy desktop</td>
<td></td>
</tr>
<tr>
<td>Web Services</td>
<td>APIs delivered over the Internet</td>
<td>• Reduce time-to-market</td>
<td>• Google Maps API</td>
<td>• SMBs</td>
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<tr>
<td></td>
<td></td>
<td>• Increased functionality</td>
<td>• ADP Payroll processing</td>
<td>• Large enterprises</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• USPS</td>
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<tr>
<td>PaaS</td>
<td>Complete development environments</td>
<td>• Similar to HaaS</td>
<td>• Google App Engine</td>
<td>• SMBs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adds integration layer</td>
<td>• Force.com</td>
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Cloud computing is a classic disruptive technology
Cloud computing: access to world-class IT for the low-end enterprise market

<table>
<thead>
<tr>
<th></th>
<th>In-Market Disruption</th>
<th>Application to Cloud Computing</th>
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<tbody>
<tr>
<td><strong>Customers</strong></td>
<td>Overshot customer at low end of existing market</td>
<td>SMBs and start-ups who can’t afford the initial investment in or</td>
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<tr>
<td></td>
<td></td>
<td>complexity of enterprise IT</td>
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<tr>
<td><strong>Technology</strong></td>
<td>Good enough performance at lower prices</td>
<td>• Standardized, virtual H/W prescribed by the cloud vendor</td>
</tr>
<tr>
<td>(product/service/</td>
<td></td>
<td>• High Availability through dynamic infrastructure S/W</td>
</tr>
<tr>
<td>process)</td>
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<tr>
<td><strong>Business Model</strong></td>
<td>Attractive returns at lower prices</td>
<td>• Pay-by-consumption (free in some cases)</td>
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<td></td>
<td></td>
<td>• Flexibility to expand or drop service instantly (no contracts)</td>
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<tr>
<td></td>
<td></td>
<td>• No S/W or H/W installation</td>
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<tr>
<td></td>
<td></td>
<td>• Greatly reduced time to market</td>
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<td><strong>Incumbent Response</strong></td>
<td>Motivated to flee</td>
<td>• Large ERP/CRM and data center providers not serving smaller</td>
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<td></td>
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<td>startups b/c of scale</td>
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</tbody>
</table>
Cloud Computing revenues are mainly SaaS driven

- SaaS revenue is 1.6% of $237B worldwide software market (2006)
- Salesforce.com has 2.1M subscribers, 677M in sub revenues (’07), and over 50% share of on-demand CRM
- Leading utility computing provider AWS has 300K developers, <$50M in revenues

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webdesc: a new breed of start-up powered by the cloud

- Ultramobile **communications** device
  - Real keyboard & large screen
  - Less than 2 lbs
  - Multi-day battery
  - ~$400
- Comes with Firefox, Skype, IM, e-book, MP3, video

- Online virtual computing platform
  - Hardware as a Service
  - Two years prepaid
  - Office + email suite
  - Can install software
  - 10GB storage
  - Can run Windows for more $ (XP or Vista)
How does webdesc work?

Any standard browser

Regular clients

Ultramobile/diskless clients

The Internet

3rd party cloud HW server node

3rd party cloud provider

Webdesc platform

Webdesc value added apps
webdesc business model is financially nimble and market responsive

- **Product competitiveness**
  - Better Product?
    - Painless, instant upgrades
    - Instant backup/data security
    - Ubiquitous access/sharing
  - Competing directly?
    - Going after overshot consumers/SMB

- **Company competitiveness**
  - Financial
    - Positive working capital cycle
    - Scale up/down on demand
    - H/W fixed costs become variable costs
  - Marketing
    - Marketing is done online
  - Sales Distribution
    - Low-touch sales/service model for SMB market

- **Barriers**
  - Switching
    - Mainly due to migrating customer data
  - Entry
    - On-demand model means little up-front investment
    - Exit is easy too with few physical assets or long term contracts
  - Exit
    - No IP, must innovate customer experience rapidly
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Cloud computing is still relatively unproven

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<th>Business Model</th>
<th>Technical</th>
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<tbody>
<tr>
<td>• Few referenceable successes</td>
<td>• Technical complexity</td>
</tr>
<tr>
<td>• Concerns over data security</td>
<td>• Less integrated vs. stand-alone platform, reinvent the wheel</td>
</tr>
<tr>
<td>• May not support industry compliance standards</td>
<td>• No geographic locality</td>
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<tr>
<td>• Few large players offering clouds</td>
<td>• Doesn’t support monitoring/management</td>
</tr>
<tr>
<td>• Lack of commercial vendor support</td>
<td>• Instability/lack of SLAs</td>
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Enterprises should begin to experiment with cloud computing in areas of the business where they can afford risk
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Catalysts for Cloud Computing

New Business Models
- Leverage clouds to get to market with new business models
- Generation of Web 2.0 startups “born in the cloud”

Business Catalysts
- Better reliability through service level contracts
- Compliance with enterprise business needs
- Open Standards to reduce lock-in
- Solution to data security issues

Provider Catalysts
- Continued entrance of web giants such as Microsoft
- ISVs conversion of legacy apps to SaaS

Technology Catalysts
- Scale to support massive enterprise applications
- Seamless support for 3rd party applications
- Substitutes for in-house management & monitoring tools
- Hardened Internet
- Commoditization of H/W & bandwidth
Potential opportunities for cloud computing in future IT value chain

Opportunities

- Opportunities for next generation of cloud computing virtualization providers
- Opportunity for computing giants with massive data centers
- Good opportunity for bridge providers and integrated Platform as a Service (PaaS)
- Good opportunity for SaaS systems providers:
  - databases, app servers, and business intelligence

Current Offerings:

- 3tera
- Amazon Web Services
- Google App Engine
- Salesforce.com
- Xen Source
- Elastra
- Force.com
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<th>Drivers/ Competitive Threats</th>
<th>Recommendations</th>
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<td>Large enterprises</td>
<td>Hyper-competitive markets are pushing the business to demand ever faster time to market, reduced entry/exit barriers, while reducing IT costs</td>
<td>• Use clouds for hyper-prototyping and provisioning of applications</td>
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<td></td>
<td>• Roll-out lower risk areas of the business on clouds, e.g. internal Web2.0 apps such as wikis, blogs, virtual worlds as well as external collaboration sites</td>
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<td>• For those with massive internal data centers, consider becoming a cloud</td>
</tr>
<tr>
<td>SMBs</td>
<td>Cloud computing allows SMBs to have world-class enterprise application functionality at affordable price points</td>
<td>• Take advantage of enterprise class SaaS offerings in CRM, HRM, and collaboration</td>
</tr>
<tr>
<td>Start-ups</td>
<td>Most startups in SaaS or Web 2.0 are using clouds</td>
<td>• New entrants should build their infrastructure on clouds from the ground up to gain cost advantages</td>
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<tr>
<td></td>
<td></td>
<td>• Existing companies should consider migrating to remain at par</td>
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## Recommendations for ISVs, Data Center Providers, and Channel Partners

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<th>Recommendations</th>
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<tr>
<td>Data Center Providers</td>
<td>Run the risk of total disruption from data centers in the cloud</td>
<td>• Start thinking about transforming to a cloud through migrating to a virtualized infrastructure platform such as 3Tera’s Applogic</td>
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<td>• Think about adding other value added services on top of clouds such as enterprise tools like Business Intelligence (BI), and databases</td>
</tr>
<tr>
<td>ISVs</td>
<td>Cloud computing allows SMBs to have world-class enterprise application functionality at affordable price points</td>
<td>• Start migrating value-added pieces of applications to the cloud as SaaS offerings</td>
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<tr>
<td></td>
<td></td>
<td>• Manage channel partners to migrate to SaaS</td>
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<td></td>
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<td>• Guard against channel conflicts and saturation</td>
</tr>
<tr>
<td>Mid-market VARs/SIs</td>
<td>Revenue losses due to disruptive nature of Clouds/SaaS on implementation projects</td>
<td>• Develop new skillsets such as business process and change management consulting skills</td>
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<td></td>
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<td>• Adjust to smaller, ratable cash flows</td>
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