Cloud Computing & Orange

IN’Tech-GRILOG Seminar on Virtualisation & Cloud Computing
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Agenda

- Definitions, Markets & Technologies
- Stakes
  - Telcos’ targets, strengths and challenges in cloud computing
- The Future of Cloud
  - R&D roadblocks and activities
- Conclusion
  - Cloud Computing@Orange & Grenoble
Definition of Cloud Computing

- Technological vision: Cloud computing is a model for enabling on-demand network access to a shared pool of virtualized computing resources (networks, servers, storage, applications, devices/mobiles and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction (self-service model through API or web portals)

- Market vision (XaaS): same + pay-per-use (or pay-as-you-go) billing models

<table>
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<th>5 characteristics</th>
<th>3 delivery models (markets)</th>
<th>4 deployment models</th>
<th>3 pivotal technologies</th>
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<td>1. Cloud Software as a Service (SaaS)</td>
<td>1. Private cloud</td>
<td>1. Virtualization</td>
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Drivers for Users

- **Cost savings**
  - Pay-per-use (pay as you go)
  - Reduced TCO: hardware, software, IT staff

- **Simplicity, Faster Time-to-market**
  - Easy service experimentation before service launch
  - Faster deployment, no need for servers and software to launch a service

- **Flexibility, Scalability**
  - Automatic, transparent scale up and down

- **Improved availability and QoS**
  - Although well-known breakdowns, cloud services have statistically better availability than on site services
Drivers for Hosters or Private Cloud Users

- Consolidation through virtualization and automation allows for:
  - Ease and speed up provisioning drastically
  - Maintain far larger IT infrastructure
  - Reduction of risk of human errors
  - Possibility of better energy management
    - NB: whether large DC are “green” or not is currently subject to discussion…
  - … altogether optimized OPEX/CAPEX
Barriers

- Lack of technical maturity
  - SLA, auto-scaling, performance and availability
  - Applications packaging, deployment, management (patches, updates)
  - Storage
  - Network bandwidth on-demand
  - Security
- Major risks of lock-in due to proprietary solutions only
  - Lack of standards
  - No interoperability
  - No portability (applications, mgt tools)
- Legal Issues
  - Software licences
  - Data location (eg government, health)
- Integration with legacy IT (IS)
- Huge investments in data centers (building, hardware, cooling)
Stakes – Cloud Computing Targets for Orange

- **Support for Information Systems**
  - Network and services provisioning and supervision, customers management, business intelligence, billing…
  - Human Resources, Inventory (network, suppliers), finances…
- **Support for general/mass market services platforms support**
  - Audiovisual, storage, gaming, desktop…
- **Enterprise market: evolution of hosting offers**
  - IaaS, PaaS, SaaS offers
  - for multinational companies, large national accounts,
  - and small and medium enterprises
    - and especially small enterprises that were traditionally difficult to target for the hosting industry
  - for M2M, Health, eGovernment applications
Cloud Computing Players - A Frantic Ecosystem

**e-Commerce**
Amazon, SalesForce

**Internet giants**
Google, Yahoo, Facebook, ...

**IT manufacturers**
IBM, HP, Cisco, EMC,

**IT distributors**
Ingram, TechData, ...

**Software editors**
SAP, Microsoft, Oracle, ...

**Integrators**
Accenture, Atos, ...

**Hosting companies**
Savvis, Rackspace, Terremark

**Telcos**
ATT, Verizon, BT, Telefonica...

**Pure Players**
Enomaly, 3tera, OpSource,
Telcos’ Strengths*

1. Enterprise sales capability (dedicated account teams vs credit cards)
2. Lifecycle service and support (tooling for 24/7 service mgt)
3. Reliable operations at scale (avoid “beta purgatory”)
4. SLAs with financial penalties (SLA mgt, not only financial penalties)
5. Full enterprise solutions portfolio (VPN, VoIP, Teleconference, etc.)
6. Integrated hosting and network services (performance, cost)
7. Vendor independence (market penetration, technological risk)
8. Global footprint (provide services anywhere but locally)
9. Financial stability and market commitment (durability of service providers)
10. Technologies are easier to replicate than relationships and operations (customer relationship vs cutting edge development capability)

Telcos’ Challenges in Cloud Computing

- Huge investments in data centers hardware and software
  - Lack of experience in running “mega data” centers
    - Existing data centers are medium size (tens of thousands servers)
    - No mega data centers in Europe (hundreds of thousands to millions of servers)
  - Lack of “software culture” (w.r.t. technical maturity, lock-in, IS integration)
    - Telcos do not consider themselves as software editors
    - “Buy off-the-shelf” attitude
    - Lack of legitimacy as software editors

- Positioning/differentiators from other players
  - Networks, geographical footprint, proximity, reliability, trust

- Priorities and roadmap
  - which usages/services for which clients?
The Future of Cloud

**The Community/Total Cloud**
The cloud built from edge resources (home devices, mobile devices, networks equipments) in addition to data centers resources – especially for communities

**The Open Cloud**
The cloud built on open standards, APIs, data formats, open source

**The Mobile Cloud**
The Cloud accessed from mobile devices

**The Personal Cloud**
The cloud that provides all my applications and contents on/from all my devices, anywhere, anytime

**The Vertical Clouds**
Cloud services for vertical applications
- Healthcare clouds
- Government clouds (US)
- Cloud Gaming
- M2M Clouds
- Real time services cloud

**The Intercloud**
A global interconnected "cloud of clouds" forming a seamless marketplace for brokering of online resources and services
Research Activities, Roadblocks & Assets

**Compute Cloud (IaaS)**
(Orange Open Cloud)
SLA-directed multi-constraint self-management
(auto-scaling, auto-sharing, self-repair…)
Open APIs, standards, open source

**Autonomic Cloud App Servers (PaaS)**
(JOnaS/Jasmine)
(Self)Management in open source app servers
Decision making mechanisms
(rules, constraints, machine learning)
Self-Benchmarking
Application management
/software appliances/

**Cloud Networking**
Networks in cloud (VPN++)
Full-Network Virtualization:
Open APIs
Routers & links virtualization
Resource allocation to virtual slices
Virtual Network Appliances
(firewalls, load balancers, etc.)

**Storage Cloud**
(My Personal Storage Cloud)
Data Location/placement
in data centers/edge devices/network equipment
Replication
Sharing

**Mobile Cloud**
E2E Architecture
(balance data/services on devices
versus in network/data centers)
Device Virtualization
Network Impacts

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**Network addresses mgmt**
Data transfer
Interoperability between virtual networks

**Edge/Total/Community/Inter Cloud**
Cloud Interoperability
Cloud Brokering
Market mechanisms (leasing)

**Technical, market (use cases, business models)
Viability & regulations “cloud currency”**

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Research Partners

Bull
PeerGreen
INRIA/LIG
USHareSoft
Scalagent

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(My Personal Storage Cloud)
Data Location/placement in data centers/edge devices/network equipements
Replication
Sharing

**Juniper**
**Ericsson**
**HP**
**Alcatel**
**INRIA**
**INT**
**LIP6/Virtuor**

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**Imperial College**
**U. Southampton**

**Mobile Cloud**
E2E Architecture
(balance data/services on devices versus in network/data centers)
Device Virtualization
Network Impacts

**Green IT**
ITIL processes for energy consumption optimization

**Saas**
Market Places
Composition tools, mashups

**Security**
access control, confidentiality (cryptography)

**Software licensing**

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Conclusion

- Cloud Computing is a hot topic and top priority for Orange…
  - Communication, resource mobilization, governance
- … but still many roadblocks and questions
  - On market positioning, technologies (“make or buy”), investments

- Orange Labs “beliefs”
  - Open Cloud: partnerships, open source
  - Network virtualization for on-demand network + compute/storage resources
  - Cloud Computing ≠ Data Center
    - Surge cloud, community cloud, personal cloud, village phone…

"The Future of Cloud Computing: an army of monkeys?
I don't care if my cloud computing architecture is powered by a grid, a mainframe, my neighbour's desktop or an army of monkeys, so long as it's fast, cheap and secure” S. Johnston, Sept 2008

"Le Cloud Computing est dans notre ADN”. B. Dalibard, OBS
Cloud Computing, Orange & Grenoble  
(Thematical framework Orange Labs-PILSI CRI)

- **Current DC-based vision**
  - Grenoble GreenDC (Bull, HP, STM, CEA, INRIA…) and Open source testbed (OW2)
  - …as a support for PaaS, health, eGov applications

- **Emerging vision: DC + edge cloud for intelligent home and city**
  - …as a support for studies on the Internet of Things, M2M, intelligent building… and cloud interconnection

- **Future vision: Single-Chip Cloud Computer (INTEL)**
  - “the SCC is a microcosm of cloud datacenter. Each core can run a separate OS and software stack and act like an individual compute node that communicates with other compute nodes over a packet-based network” (INTEL)