

Cloud Computing & Orange

IN'Tech-GRILOG Seminar on Virtualisation & Cloud Computing
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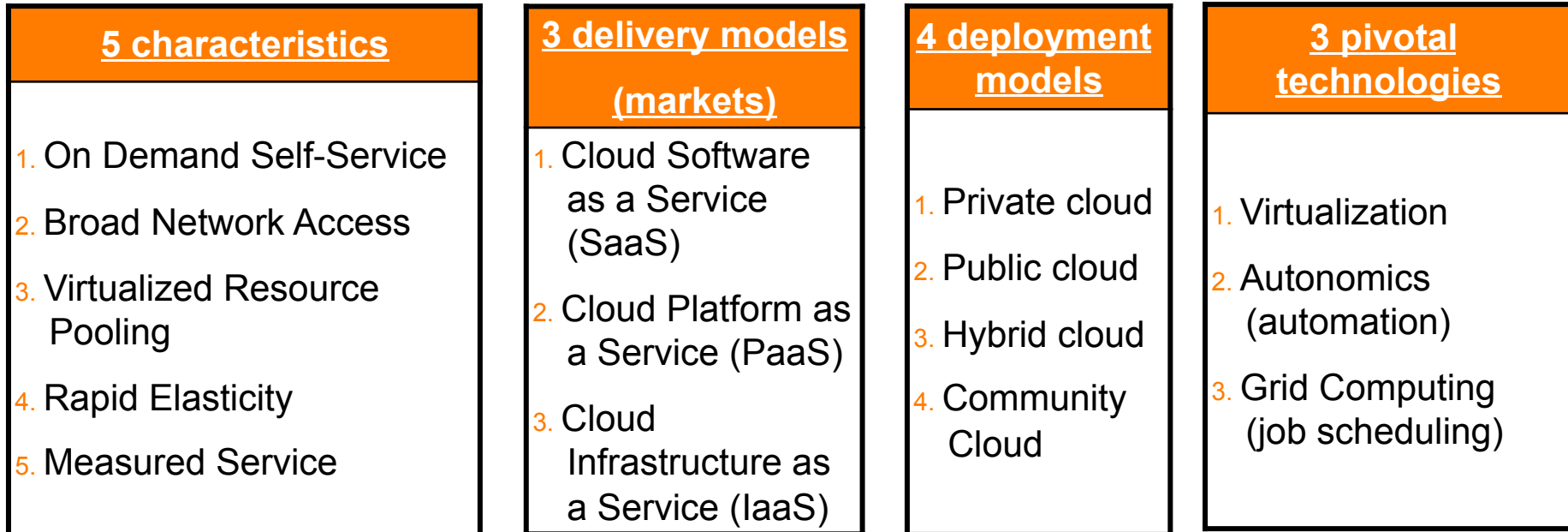


Agenda

- Definitions, Markets & Technologies
- Stakes
 - Telcos' targets, strenghts 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**



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



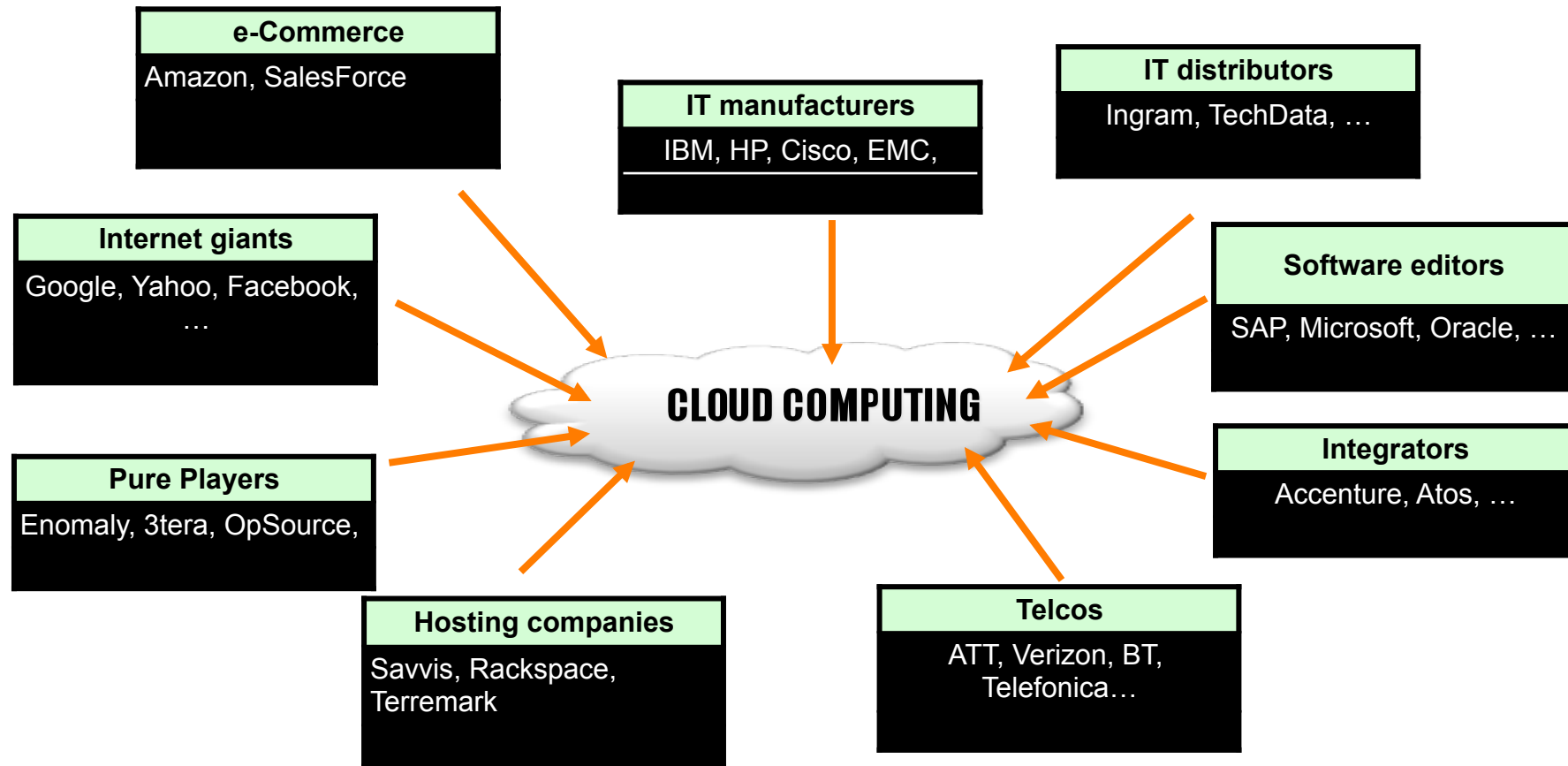
Barriers

- 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 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



Telcos' Strengths*

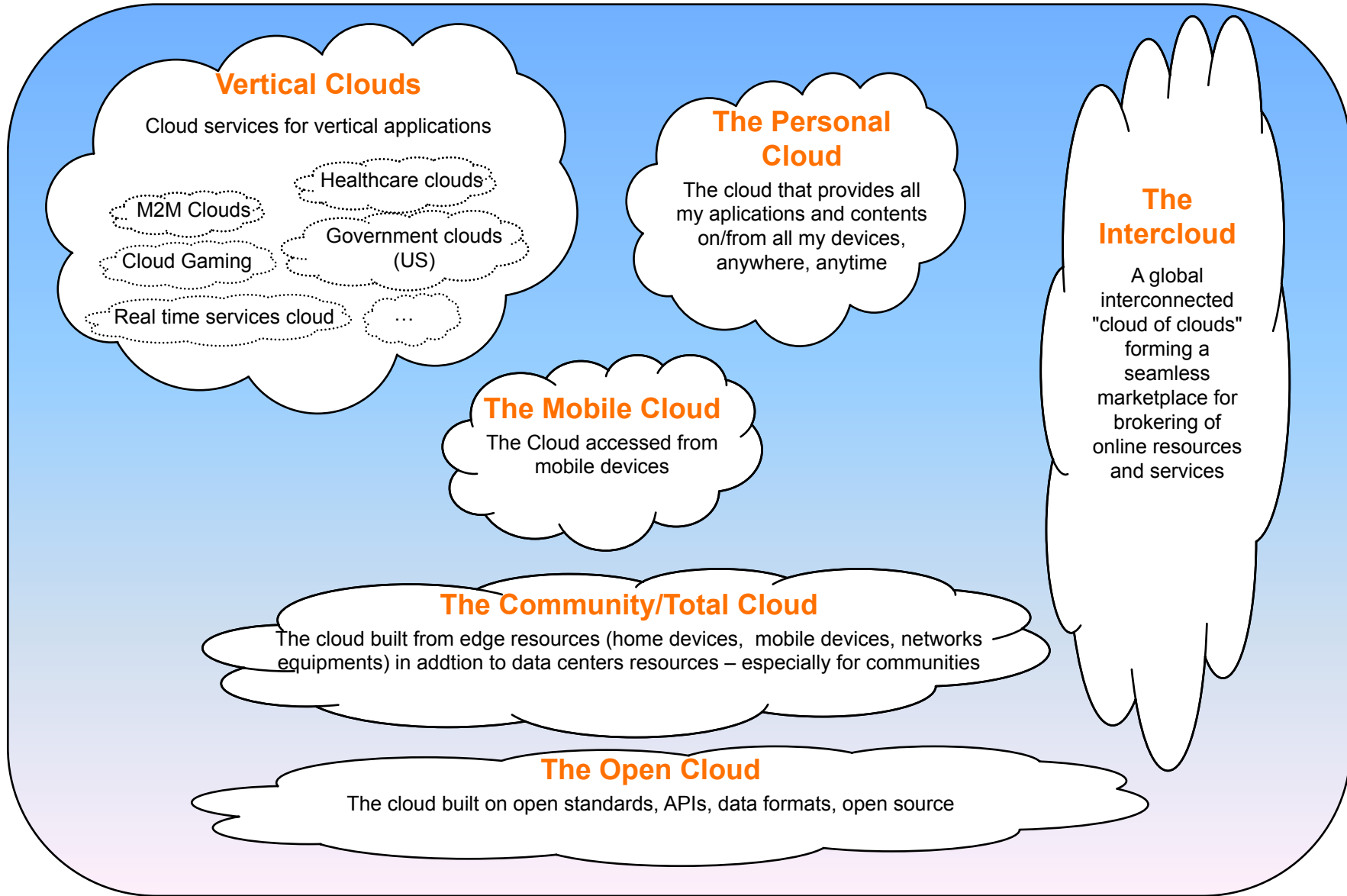
1. Enterprise sales capability (*dedicated account teams vs credit cards*)
2. Lifecycle service and support (*tooling for 24/7 service mgt*)
3. Reliable operations at scale (*avoid "beta purgatory"*)
4. SLAs with financial penalties (*SLA mgt, not only financial penalties*)
5. Full enterprise solutions 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*)

***Source: 10 Reasons Why Telcos Will Dominate Enterprise Cloud Computing.
Joe Weinman, Vice President of Solutions Sales, AT&T, Nov. 2008**

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



Research Activities, Roadblocks & Assets

In red: currently not tackled
In blue: VAS prototype platforms

Pricing/billing models
Interference between control loops
Interference
Stability

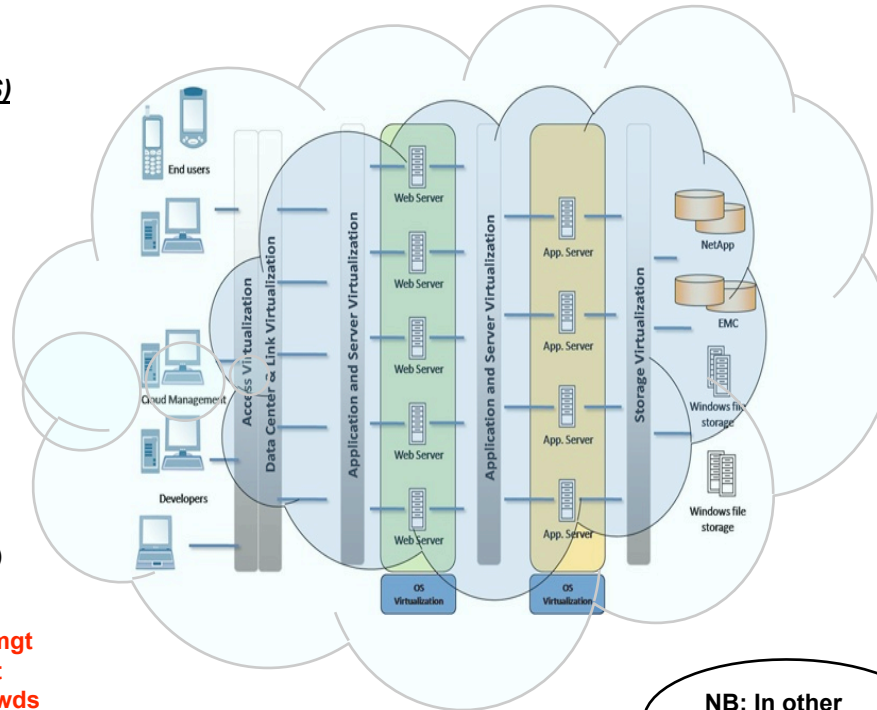
Autonomic Cloud App Servers (PaaS)
(JOnAS/Jasmine)
(Self)Management
in open source app servers
Decision making mechanisms
(rules, constraints, machine learning)
Self-Benchmarking
Application management
(software appliances)

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

Memory mgt
I/O Mgt
Flash Crowds

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

Technical, market (use cases,
business models)
Viability & regulations
"cloud currency"



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

Long term storage
Legal issues/regulations

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.)

Network addresses mgt
Data transfer
Interoperability between
virtual networks

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

VM placement
CPU cadencing
'green algorithmics'

Green IT
ITIL processes
for energy consumption
Optimization...

SaaS
Market Places
Composition tools, mashups...

Security
access control, confidentiality
(cryptography), isolation between
virtual slices...

Software licensing



Research Partners

Grenoble partners

Bull
PeerGreen
INRIA/LIG
UShareSoft
Scalagent

Juniper
Ericsson
HP
Alcatel
INRIA
INT
LIP6/Virtuor

Cloud Networking
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Imperial College
U. Southampton

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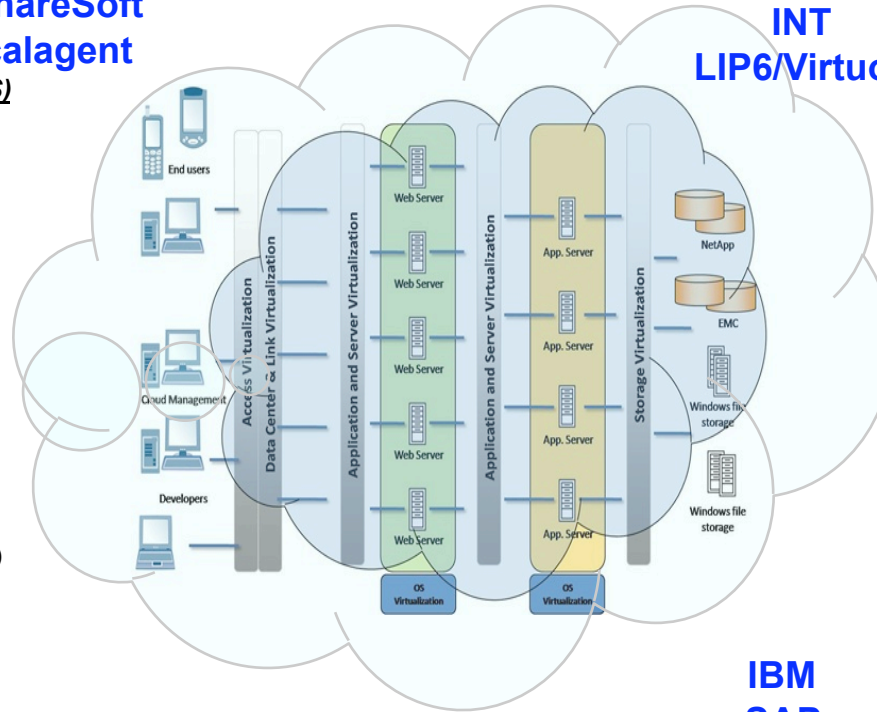
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 (auto-scaling, auto-sharing, self-repair...)
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INRIA
LIP6

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

INRIA
ActiveEon
FluidOps



IBM
SAP
SUN

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

Green IT
 ITIL processes
 for energy consumption optimization

SaaS
 Market Places
 Composition tools, mashups

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 access control, confidentiality
 (cryptography)

Software licensing



Conclusion

"Le Cloud Computing est dans notre ADN". B. Dalibard, OBS

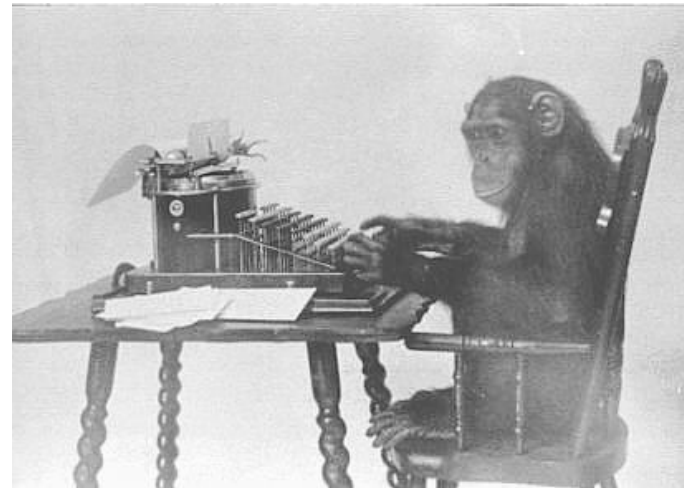
- Cloud Computing is a hot topic and top priority for Orange...
 - Communication, resource mobilization, governance
- ... but still many roadblocks and questions
 - On market positioning, technologies ("make or buy"), investments

- 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



Cloud Computing, Orange & Grenoble

(Thematical framework Orange Labs-PILSI CRI)

- Current DC-based vision

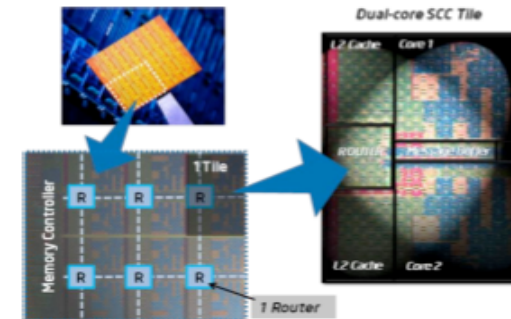
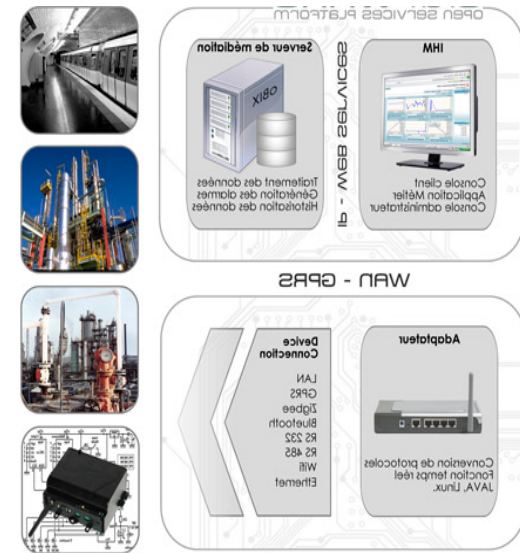
- Grenoble GreenDC (Bull, HP, STM, CEA, INRIA...) and Open source testbed (OW2)
- ...as a support for PaaS, health, eGov applications

- 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)



Anatomy of the Single-chip Cloud Computer