Applications and Challenges of Cloud Computing, Networking, and Services

Track B
Human / Computer Interfaces; Hardware and Software

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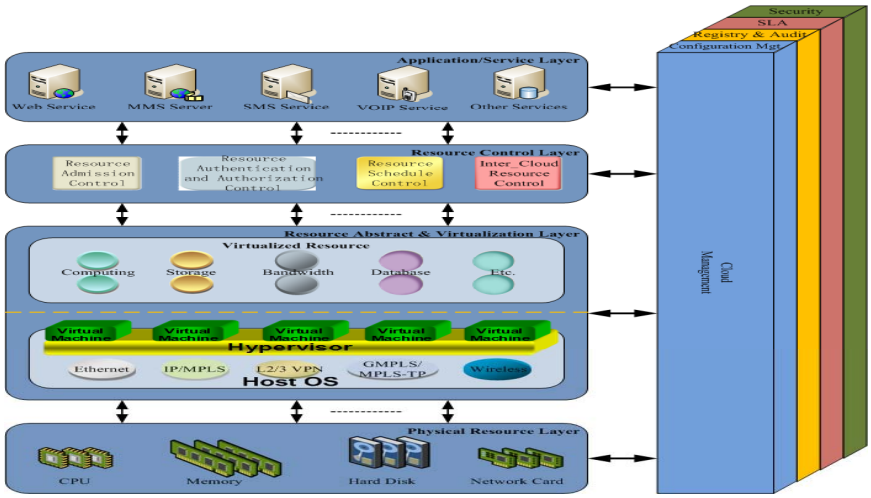
Outline

- What is CCNS?
- What are the Applications?
- Opportunities for
  - Consumers, Equipment manufactures, Service providers, SDOs, Regulators, … … …
- Possible Work Areas
- IETF/IRTF Clouds initiatives
- Q&A, and Open Discussion

What is CCNS?

- Cloud-based systems are conveniently-connected modular blocks of resources
  - Both physical and virtual modularizations of resources are possible
  - For this discussion, the resources include computing (CPU), communications (bandwidth), memory (storage), management, database, software, applications, services, interconnectivity, etc.
  - The objective is to make the resources available ubiquitously for mission-specific applications and services in order to support the ultimate level of privacy/security, scalability and reliability cost-effectively and without the headache of owning and maintaining the infrastructure
- Clouds Discussion Archive:
  - http://www.ietf.org/mail-archive/web/clouds/current/maillist.html
- NIST definition
  - *http://csrc.nist.gov/groups/SNS/cloud-computing/*

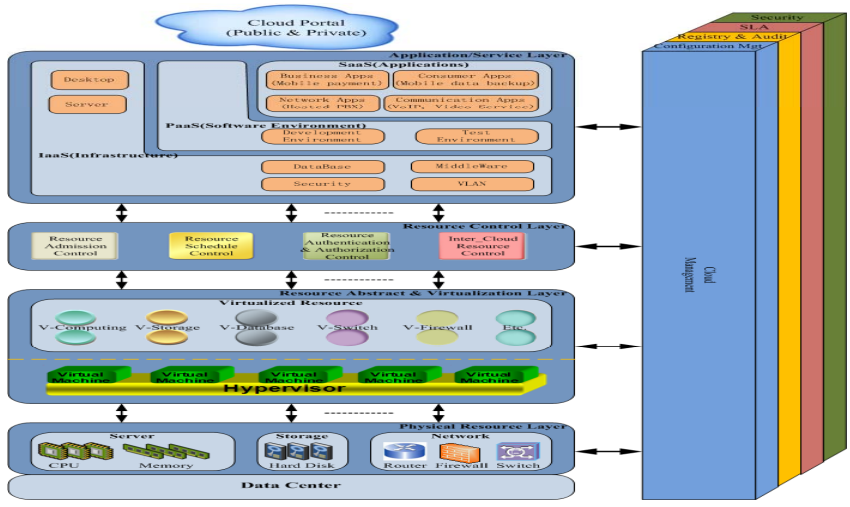
A Cloud Ref. Framework



What are the Applications/Services ?

- Utilize the rapidly interconnect-able resources from Cloud to provision, create, deliver, and maintain an End-to-End Service
  - Use the service only when you Need it
  - Pay only for the time duration and type of use of service (costs for resources used)
- Examples
  - Mobile backup (of data) over cloud (MBOC) service
  - CRM, Storage (including DaaS) over Cloud
  - Compute as a service (CaaS), Apps/Software as a service (SaaS), Platform/hardware as a service (PaaS/HaaS), Infrastructure as a Service (Iaas)
  - Apps Hosting and Development over Cloud
  - Telephony and Rich Communications over Cloud
  - Soft-Real-Time Services over Cloud: IM, Email, etc. communications over cloud
  - Embedded Inter-Cloud Communications
  - Cloud-based value-added services
  - Seamless evolution of vertical services over cloud
  - Cloud-based reliable communications (control of focused overloads/disasters)
  - ::: :::: ::::

Instantiating a Service/Application



CCNS Opportunities…

➔***Network providers*** need to make networking resources readily available in order to satisfy the requirements based on instantaneous demands. Equipment and operations/provisioning software makers can help achieve these goals

- ➔Network/System Integration and Operations (OSS/BSS) can use rapid repurposing of resources
- ➔Micro- and Macro-level polices may dictate which services get access to what resources

➔***Communications Service provider*** need to offer services to both real and virtual endpoints where resources from one or more clouds can be used for same sessions and for siblings (and children) of the sessions

➔***Computing*** resources providers can trade (buy and sell) CPU capacity

➔***Equipment manufacturers*** need to make sure that modular and virtual instances of server, CPU and memory resources can be made available to the consumers of apps and services

CCNS Opportunities… (../2)

➔***Content Providers*** need to make sure that instances of the contents can be distributed and made available through cloud (reduces costs, shared storage)

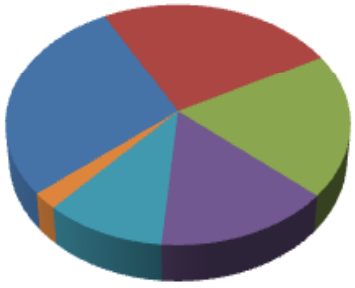
➔ ***Storage and Database Service provider*** need to offer for example, secure/private storage, translation and routing resources as cloud services for utilization by endpoints/wholesalers

➔***Consumers*** will have more choices (privacy, trustworthiness, QoE matter!)

➔ ***Regulators*** may need to (re) define the rules for appraising risks/liabilities

➔ ::::::::::::

What are your main concerns about using cloud storage services?



Note: Multiple responses allowed
Base: 179 respondents not using cloud storage services
Data: *InformationWeek Analytics/Network Computing* 2010

Possible Work Areas in Clouds

- ➔ API (both client and server sides) for enabling/disabling Services
  - Public, Private, and Hybrid (toolkit approach) APIs
- ➔ Virtualization (of any and all resources) and Hosting
  - Virtualization of Applications, Services, and Databases
  - Distributed Inter-Domain File Systems, Distributed Scheduling & Control (registry and clearing-house based approach) of resources
- ➔ Protocols, VPN/Address Extension, and Interoperability
  - Adaptive Protocols for Generic Cloud Services
  - Inter-Domain Service-Specific Adaptive Protocols

Possible Work Areas in Clouds (…/2)

➔ Soft and Hard security
- Processes/Mechanisms and Practices (Regulations)

➔ Risk-tolerance, Resiliency, and SLA (End-to-End)
- Mean time to failure/recovery for Components and Apps/Services

IETF/IRTF Clouds initiatives

- Contribute to the Clouds discussion
  - Join the mailing list by sending a 'subscribe' message to clouds@ietf.org
- Review the slides from Clouds bar BoFs (during IETF-77&78 meetings)
  - http://trac.tools.ietf.org/area/app/trac/wiki/Clouds
- Plan to attend and bring in your thoughts to the Clouds mtg. during IETF-79 (7-12Nov.2010) in Beijing
  - 11 AM to ~ 1 PM on Sunday-07Nov.-2010
- Support the discussion with IRTF Chair re. forming the CloudRG (Cloud Research Group)

Q & A, and Open Discussion

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MANY THANKS FOR YOUR KIND ATTENTION!