

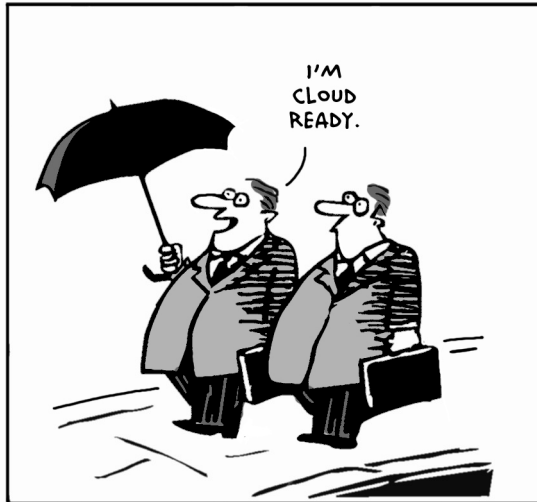
Cloud Computing & Networking Of Information

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 - Layers of Cloud Computing
 - SaaS
 - PaaS
 - IaaS
- 3 Networking of Information
 - NetInf Scenarios
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Common, Location-independent, Online Utility that is available on Demand

Cloud Computing

- Delivery as a service rather than a product.
- Marketing term for technologies providing computation, software, data access and storage services.
- Applications Delivered via Internet.
- Bussiness software and data stored in servers.

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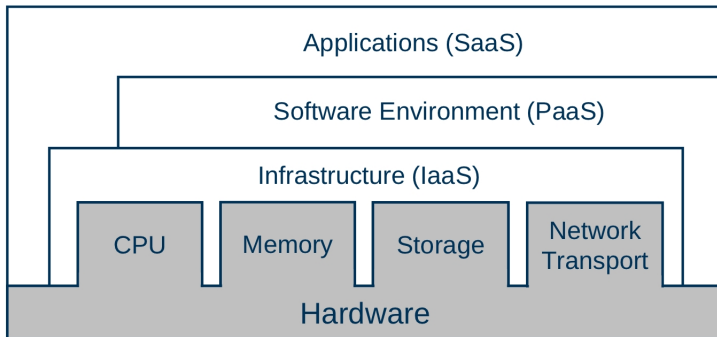
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Layers of Cloud Computing



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- Directly consumed by the customers.
- No need to install and run the software.
- Simplify maintenance and support.
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- Computer infrastructure - platform virtualisation environment
- Raw storage and Networking
- Servers,softwares,Data-center space or Network equipment
- Billing based on utility basis

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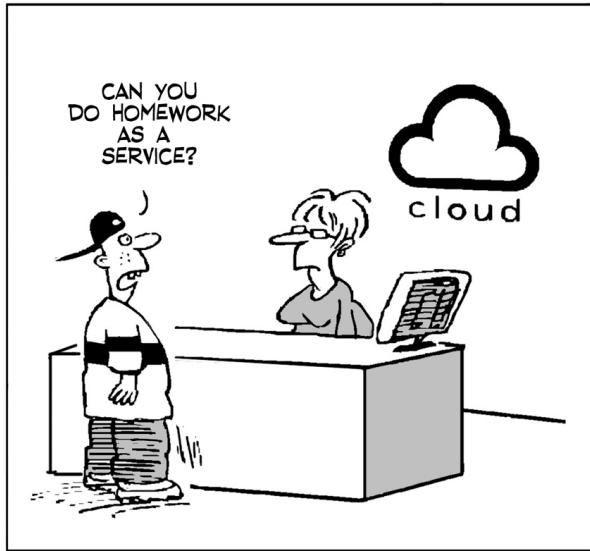
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Networking of Information

- No common persistent naming scheme for information.
 - Information named relative to the box they are located in, URL's resolve to IP-address.
 - Moving Information = Changing it's Name ("404" file not found errors).
- Mobility and multihoming for hosts and networks is problematic due to semantic overload of IP-address.

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Networking of Information (Contd..)

- No consistent representation of information (copy-independant).
 - No consistent ways to keep track of identical copies.
 - Different encodings (eg: mp3,wav) worsen problem.
- Security is host-centric.
 - Mainly based on security channels (Encryption) and trusting servers (Authentication).
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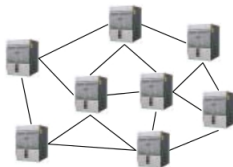
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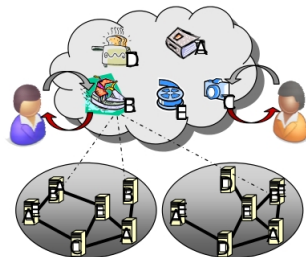
Today's Internet
focuses on
nodes



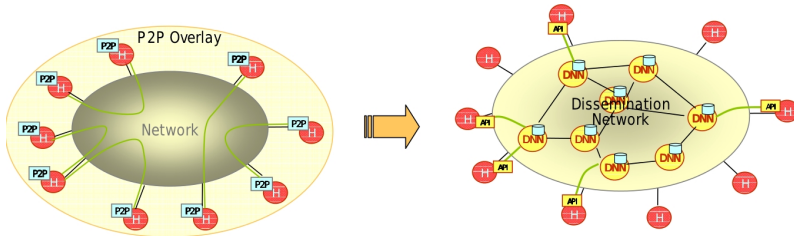
Evolution

In today's Internet,
accessing information is
the dominating use case!

Future
Information-centric Network
focuses on
**information objects and
real world objects**

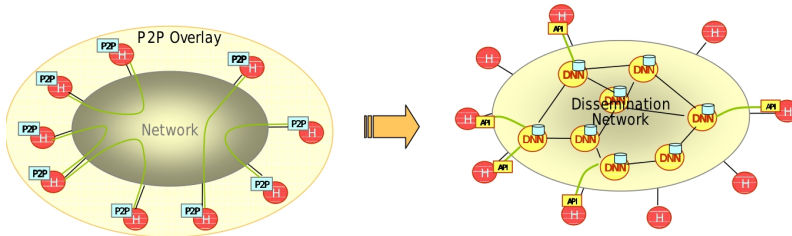


Content Distribution



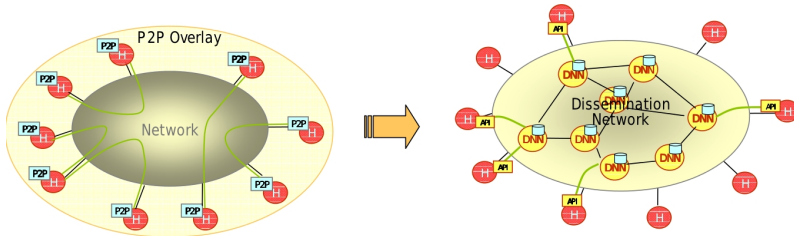
- VideoOnDemand, Live TV, Webpages.
- Caching can be built in from beginning.
- Information can be retrieved from the closest available source.
- Common dissemination infrastructure for all applications, including network support.

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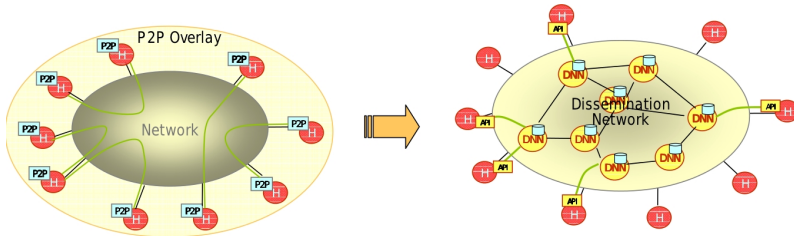
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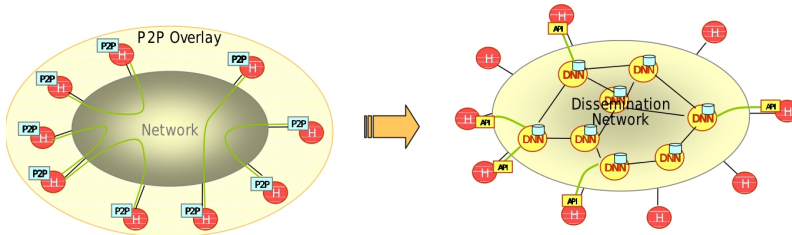
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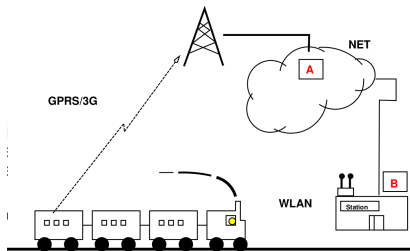
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Augmented Internet Real World Objects.



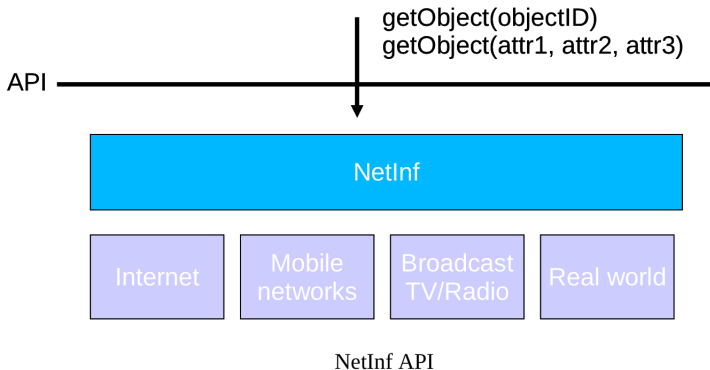
- Linking real world objects in the virtual information world.
- Clicking on and bookmarking real world objects.

Personal mobile scenario



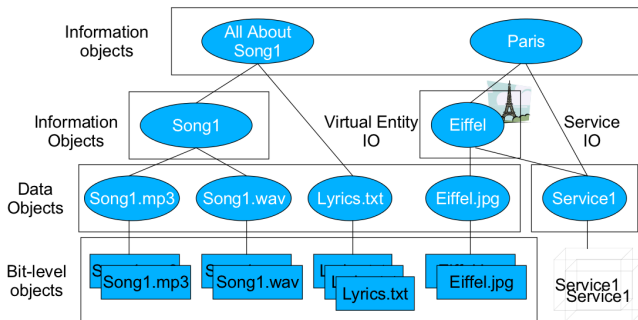
- Retrieving information when connectivity is intermittent, efficiently utilising high-bitrate access when available or using alternative sources.
- Information objects provides natural anchor points for multiaccess and multihoming.

API for locating any type of object



Organize Information Examples of Hierarchies

Organize Information – Examples of IOs and IO Hierarchies



Naming Scheme

Tag	$P = \text{Hash}(\text{PublicKey}_{\text{Owner}})$	$L = \{\text{Hash}(C) \mid \text{String}\}$
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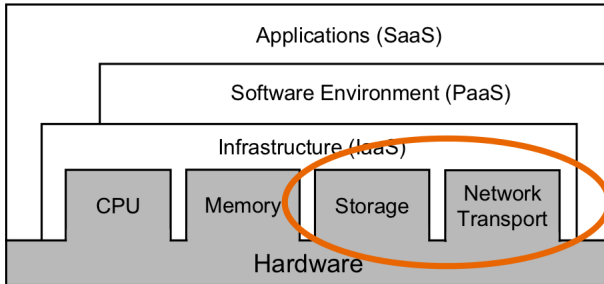
- **Tag** : Defines the format
- **Principal (P)** : Object publisher (optional)
- **Label (L)** : Identifying individual object published by Principal.

What does all that have to do with Cloud Computing ?

NetInf meets Cloud Computing

- Cloud-computing - a resource sharing paradigm
 - E.g, computing power, storage,...
 - Execute software on the web, pay-per-use (SaaS)
 - Platforms for building and hosting services (PaaS)
 - Deployment platforms (IaaS)
 - **Focus on the resource and what's running on top**
- NetInf a networking paradigm / technology
 - Data-oriented networking paradigm
 - **Focus on transporting and accessing data**
- Both very different in nature, but there are common aspects.

NetInf meets Cloud Computing



Challenges in Cloud Computing

- Requires reasonably stable infrastructure
 - E.g. not practical to deploy components in a moving network/home network scenarios.
- Inconsistent security mechanisms
 - Per application.
 - Host-centric (secure the channel, not the information).
- Management can be fairly complex and expensive.
 - Computing
 - Storage
 - Facilities

Summary and Conclusion

- The Cloud Architecture.
 - SaaS, PaaS, IaaS, . . .
- Network architecture based on information-centric paradigm.
 - Naming scheme for objects independent of nodes.
 - Scalable solution for node and network mobility and multihoming.
 - Enable efficient information dissemination
 - A common infrastructure and API for accessing all types of objects.
 - Scalable name to locator resolution for a large number of objects.
 - Designing NetInf to make it largely self-managing

Summary and Conclusion (Contd..)

- Capable of improving the cloud computing infrastructure.
 - Storage
 - Transport
 - Security
 - Directory
 - Integration with network virtualization

References

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Thanks For your **Attention !!**

Time for Discussion.

“A prudent question is one-half of wisdom.” - Francis Bacon