Services Foundation

Msc in Management - Services Science

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Admin Information

- Time and Place
  - Spring 2011
  - Batelle, 301/2
  - Tuesdays: 08h00 - 12h00
- Dokeos
  - https://dokeos.unige.ch/home/courses/4304065CR/
  - Lectures
  - Readings
  - Additional Reading Information

Assessment

- Exam (100%)
  - 3 hours
  - Short Essays
  - Short Exercises

Syllabus

- Introduction to Services and Services Science (1 week)
- Specific Services and Domains (1 week)
  - Web Services, Location-Based Services, Smart Systems, Mobile Services, ...
- Technology for Services (3 weeks)
  - Interaction Modes (Publish / Subscribe)
  - SOA / Mashups / Google Farms / Amazon Cloud
  - Services Composition and Orchestration
- Service Quality (1 week)
  - Characteristics, Classes of Services, QoS Management,
  - Service-Level Agreement (SLA)
- Usage of Services (1 week)
  - Interface for Services
  - Services Accountability
  - Legal Aspects
- Services Strategy, Innovation and Economy (1 week)
- Adaptive Services
  - Context-Aware Services (3 weeks)
  - Autonomous and Self-* Services (3 weeks)

Recommended Reading

- Links given during lectures
- *Location and Personalisation*. D. Ralph, S. Searby (Eds). BT Communications Technology Series 8. IEE London.
- *Integrating Service Level Agreements.* J.J. Lee, R. Ben-Natan, Wiley.
- Additional lectures provided

Lecture 1

- Introduction to Services
  - Definitions
  - SaaS / PaaS / IaaS / Grid
  - Software vs Service
- Services Science

What is a Service?

- Definition ?
- Examples ?
- Characteristics?

Services (economics)

- Services are economic activities offered by one party to another, most commonly employing time-based performances to bring about desired results in recipients themselves or in objects or other assets for which purchasers have responsibility. In exchange for their money, time, and effort, service customers expect to obtain value from access to goods, labor, professional skills, facilities, networks, and systems; but they do not normally take ownership of any of the physical elements involved. LOVELOCK & WIRTZ, "Services Marketing: People, Technology, Strategy," 6/e; (Upper Saddle River NJ: Prentice Hall 2007).

Services (economics)

- A service is a time-perishable, intangible experience performed for a customer acting in the role of a co-producer. FITZSIMMONS & FITZSIMMONS “Service management.” (New York, NY: McGraw-Hill 2003).
- Service [is] the application of specialized competences (knowledge and skills), through deeds, processes, and performances for the benefit of another entity or the entity itself. LUSCH & VARGO, “The Service-Dominant Logic of Marketing.” (Armonk, NY: ME Sharpe. 2006).

Services (economics)

- In economics and marketing, a service is the non-material equivalent of a good. Service provision has been defined as an economic activity that does not result in ownership, and this is what differentiates it from providing physical goods. It is claimed to be a process that creates benefits by facilitating either a change in customers, a change in their physical possessions, or a change in their intangible assets.

- http://en.wikipedia.org/wiki/Service_%28economics%29

Services (economics)

- A type of economic activity that is intangible, is not stored and does not result in ownership. A service is consumed at the point of sale. Services are one of the two key components of economics, the other being goods. Examples of services include the transfer of goods, such as the postal service delivering mail, and the use of expertise or experience, such as a person visiting a doctor.

- http://www.investorwords.com/6664/service.html

Services (economics)

- Intangible products that are not goods (tangible products), such as accounting, banking, cleaning, consultancy, education, insurance, know how, medical treatment, transportation. Sometimes services are difficult to identify because they are closely associated with a good; such as the combination of a diagnosis with the administration of a medicine. No transfer of possession or ownership takes place when services are sold, and they (1) cannot be stored or transported, (2) are instantly perishable, and (3) come into existence at the time they are bought and consumed.

- http://www.businessdictionary.com/definition/services.html

Services (economics)

- Our own definition
  - ...

Services (economics)

- Our own definition
  - Activity, process
  - Expertise (talent, competencies)
  - Intangible
  - Time-perishable, ephemeral
  - Value
  - Consumer is co-producer
  - No ownership

Services Characteristics

- Intangibility - cannot be seen, handled, smelled, etc, no need for storage.
- Perishability - Unsold service time is "lost", that is, it cannot be regained. It is a lost economic opportunity (e.g. Empty airplane seats)
- Lack of transportability - Services must be consumed at the point of "production".
- Heterogeneity - Services are typically modified for each client or each new situation (customised). Mass production of services is very difficult. This can be seen as a problem of inconsistent quality.

Services Characteristics

- Labour intensity - Services usually involve considerable human activity, rather than precisely determined process. Human resource management is important.
- Demand fluctuations - Demand can vary by season, time of day, business cycle, etc.
- Buyer involvement - Most service provision requires a high degree of interaction between client and service provider.
- Lack of possession or ownership – consumer does not “own” the result of the service

- http://www.wordiq.com/definition/Service

Service Delivery

- The service providers (e.g. the people)
- Equipment used to provide the service (e.g. vehicles, cash registers)
- The physical facilities (e.g. buildings, parking, waiting rooms)
- The client
- Other customers at the service delivery location

Examples

- Hairdresser
- Doctor
- Car repair
- Insurance
- ...

Software as a Service (SaaS)

- Software as a service (SaaS), sometimes referred to as "software on demand," is software that is deployed over the internet and/or is deployed to run behind a firewall on a local area network or personal computer. With SaaS, a provider licenses an application to customers as a service on demand, through a subscription, in a "pay-as-you-go" model, or increasingly at no charge.

- Computerized billing, invoicing, human resource management, financials, content management, collaboration, document management, and service desk management.

- http://en.wikipedia.org/wiki/Software_as_a_service

Characteristics

- Network-based access to, and management of, commercially available software
- Activities managed from central locations rather than at each customer's site, enabling customers to access applications remotely via the Web
- Application delivery typically closer to a one-to-many model (single instance, multi-tenant architecture) than to a one-to-one model, including architecture, pricing, partnering, and management characteristics
- Centralized updating, no need for end-users to download patches and upgrades.
- Integration into a larger network of communicating software—either as part of a mashup or a plugin to a platform as a service

SasS - Pricing

- Per-user basis and/or per business basis
- Free, revenue derived from alternate sources such as advertising, or upgrade fees (google, gmail)

SaaS - Architecture

- Ad-hoc/custom: Each customer has a customized version of the hosted application that runs as its own instance on the host's servers.
- Configurable: This adds greater program flexibility through configurable metadata, so many customers use separate instances of the same application code.
- Configurable, multi-tenant-efficient: This adds multi-tenancy to the second level, so a single program instance serves all customers.
- Scalable, configurable, multi-tenant-efficient: Addition of scalability through a multi-tier architecture that supports a load-balanced farm of identical application instances that run on a variable number of servers.

Traditional vs Host-Based Software

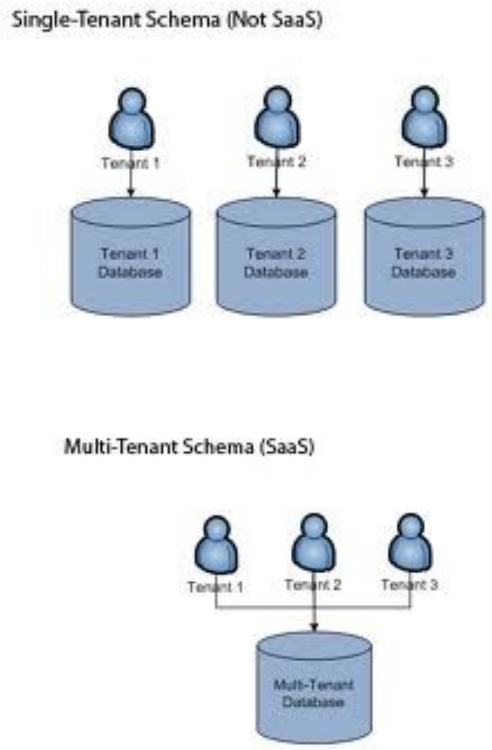
- http://www.oprius.com/articles/whatIsHostedSoftware.html

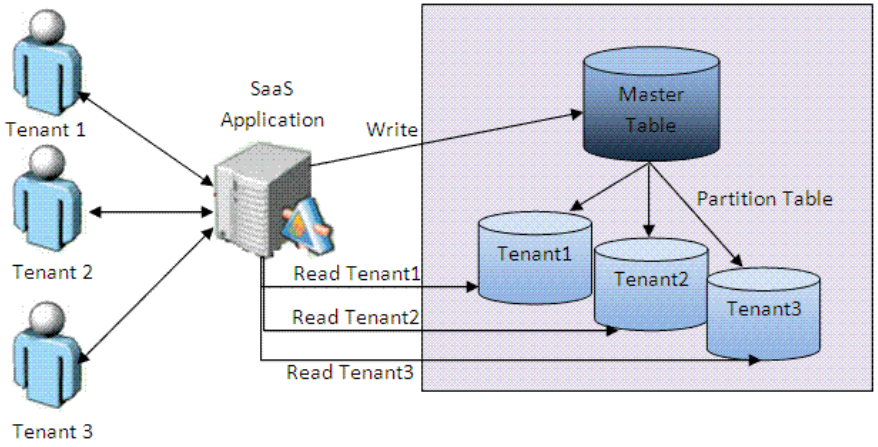
Architectures

- Multi-tenant architectures

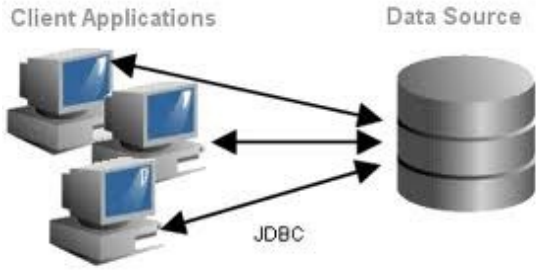
  Multi-tenancy refers to a principle in software architecture where a single instance of the software runs on a server, serving multiple client organizations (tenants).

Single-Tenant vs Multi-Tenant





Two-tier vs Three-tier



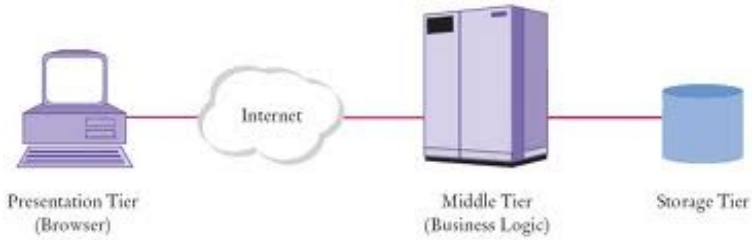
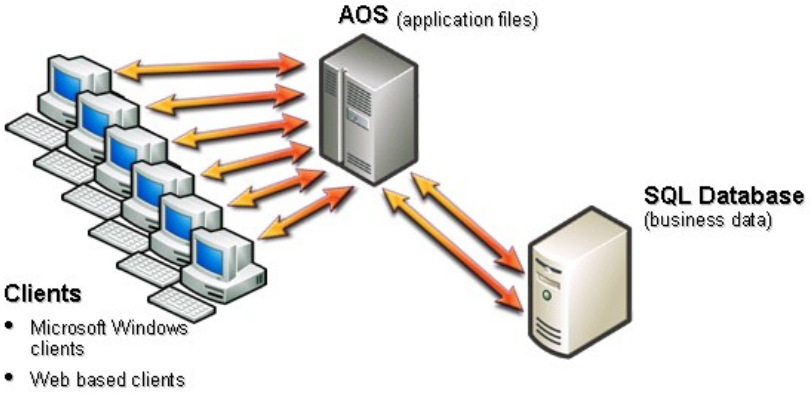
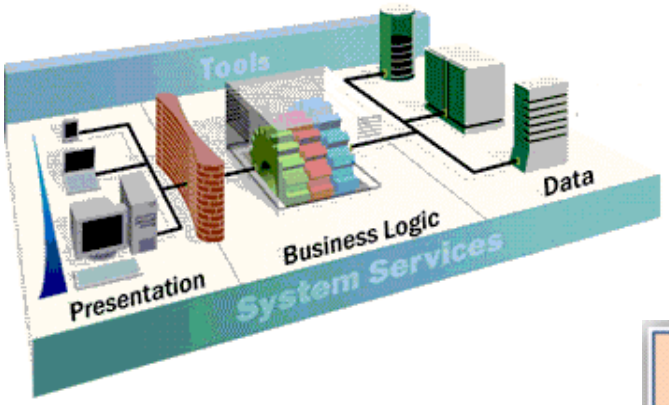
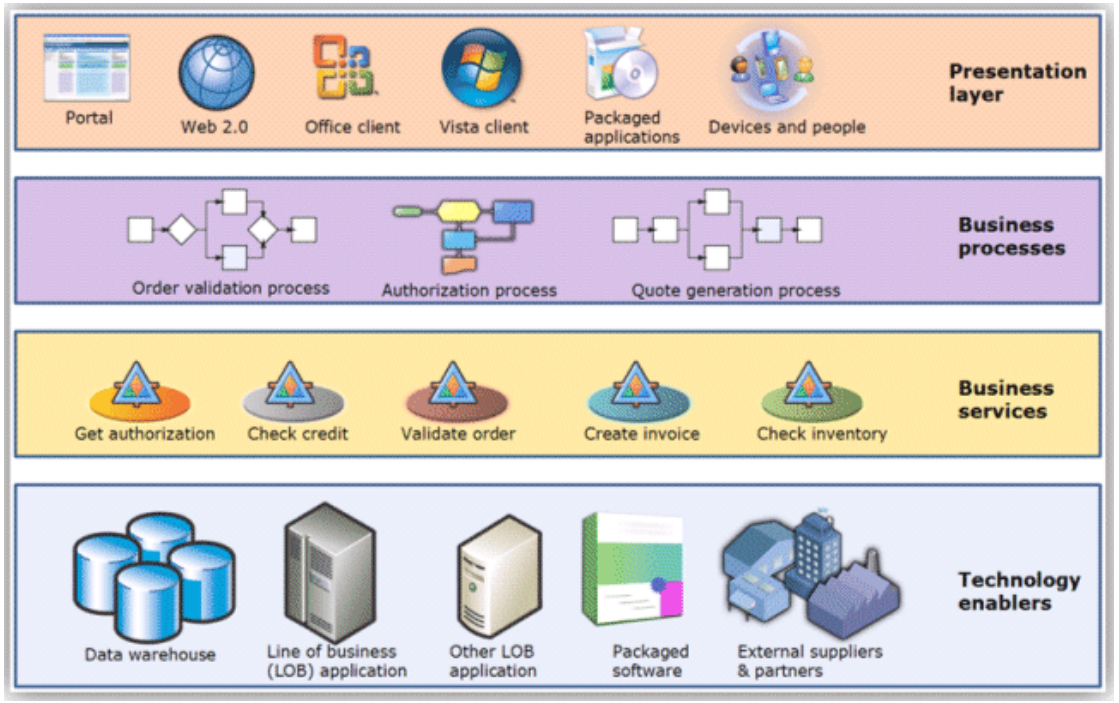


Figure 10 Three-Tier Architecture



Multi-tier architecture

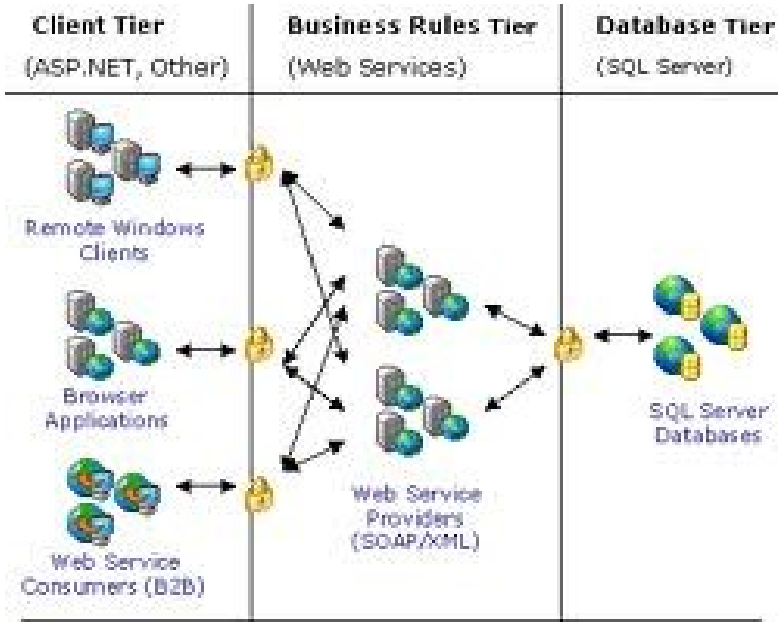


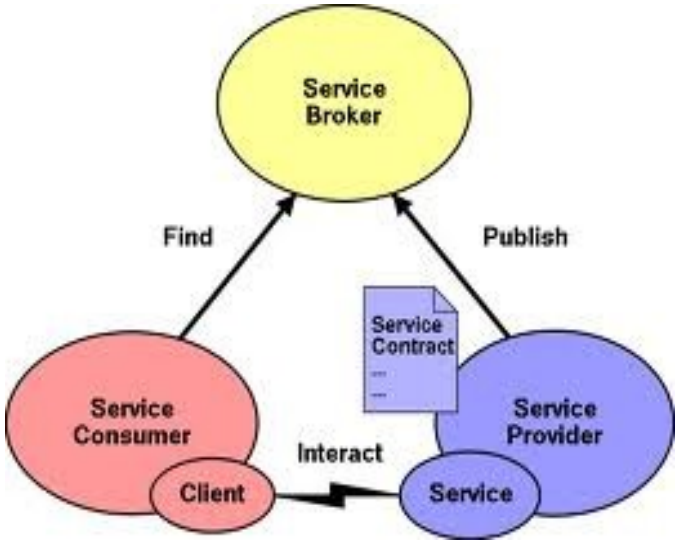


SOA

- Service-Oriented Architecture
- Each software service can act as a service provider, exposing its functionality to other applications via public brokers, and can also act as a service requester, incorporating data and functionality from other services.

SOA


Client Tier
(ASP.NET, Other)
Business Rules Tier
(Web Services)
Database Tier
(SQL Server)
Remote Windows Clients
Browser Applications
Web Service Consumers (B2B)
Web Service Providers (SOAP/XML)
SQL Server Databases


Service Broker
Find
Publish
Service Contract
Service Consumer
Service Provider
Interact
Client
Service

Services Providers

- An application service provider (ASP) is a business that provides computer-based services to customers over a network. Software offered using an SP model is also sometimes called On-demand software or software as a service (SaaS).

- Service Providers (SPs) make software services accessible to the Service Users through Internet-based interfaces.

ASP Types

- A specialist or functional ASP delivers a single application, such as credit card payment processing or timesheet services;
- A vertical market ASP delivers a solution package for a specific customer type, such as a dental practice;
- An enterprise ASP delivers broad spectrum solutions;
- A local ASP delivers small business services within a limited area.
- A volume ASP is a specialist ASP that offers a low cost packaged solution via their own website (PayPal).

ASP Model - Advantages

- Software integration issues are eliminated from the client site
- Software costs for the application are spread over a number of clients
- Key software systems are kept up to date, available, and managed for performance by experts
- Improved reliability, availability, scalability and security of internal IT systems
- A provider's service level agreement guarantees a certain level of service
- Access to product and technology experts dedicated to available products
- Reduction of internal IT costs

ASP Model - Disadvantages

- The client must generally accept the application as provided since ASPs can only afford a customized solution for the largest clients
- The client may rely on the provider to provide a critical business function, thus limiting their control of that function and instead relying on the provider
- Changes in the ASP market may result in changes in the type or level of service available to clients
- Integration with the client's non-ASP systems may be problematic

SaaS - Examples

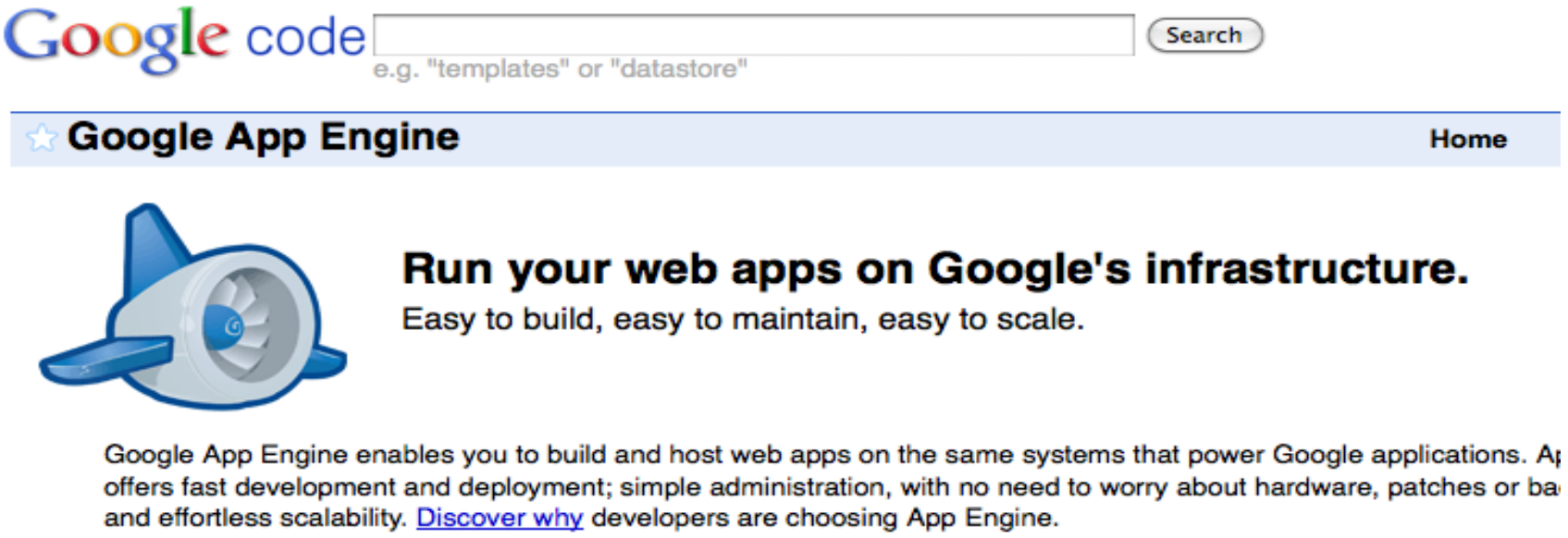
- Web services
- Part of traditional service
  - Monitoring of parcels (post)
- Office applications
- Free
  - Google
  - Social software

Platform as a Service (PaaS)

- Platform as a Service (PaaS) is a way to rent hardware, operating systems, storage and network capacity over the Internet. The service delivery model allows the customer to rent virtualized servers and associated services for running existing applications or developing and testing new ones.
- http://searchcloudcomputing.techtarget.com/sDefinition/0,,sid201_gci1332892,00.html

PaaS - Example

- Google Apps Engine
  - Choice of environment (Java, Python, etc.)
  - http://code.google.com/appengine/



Infrastructure as a Service (IaaS)

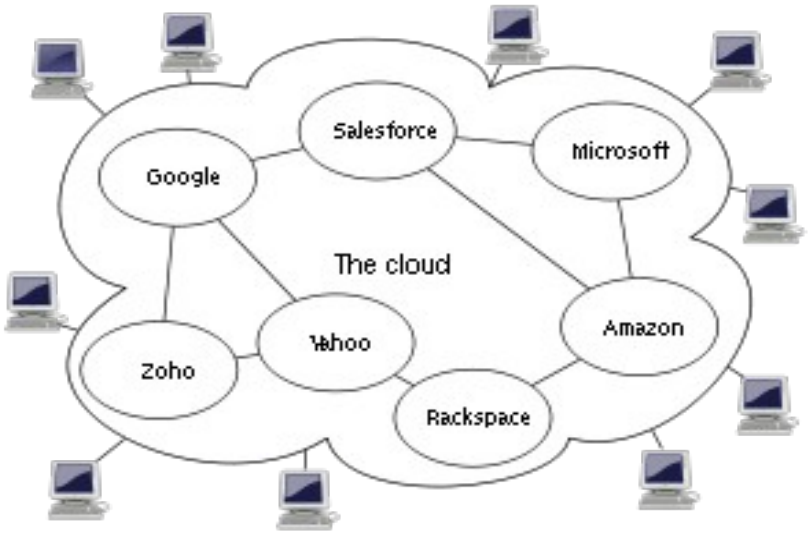
- Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on demand, like the electricity grid.

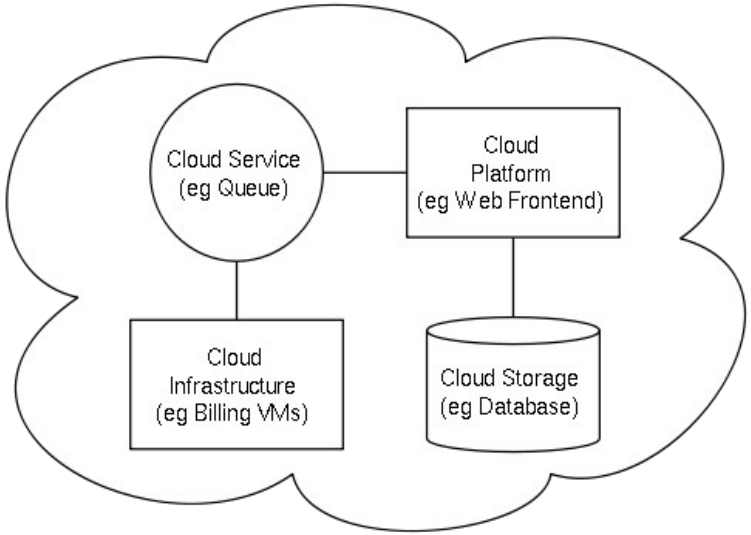
IaaS

- Clouds are a large pool of easily usable and accessible virtualized resources (such as hardware, development platforms and/or services). These resources can be dynamically reconfigured to adjust to a variable load (scale), allowing also for an optimum resource utilization. This pool of resources is typically exploited by a pay-per-use model in which guarantees are offered by the Infrastructure Provider by means of customized SLAs.

- A Break in the Clouds: Towards a Cloud Definition. Luis M. Vaquero et al.
- ccr.sigcomm.org/drupal/files/p50-v39n1l-vaqueroA.pdf

Cloud computing

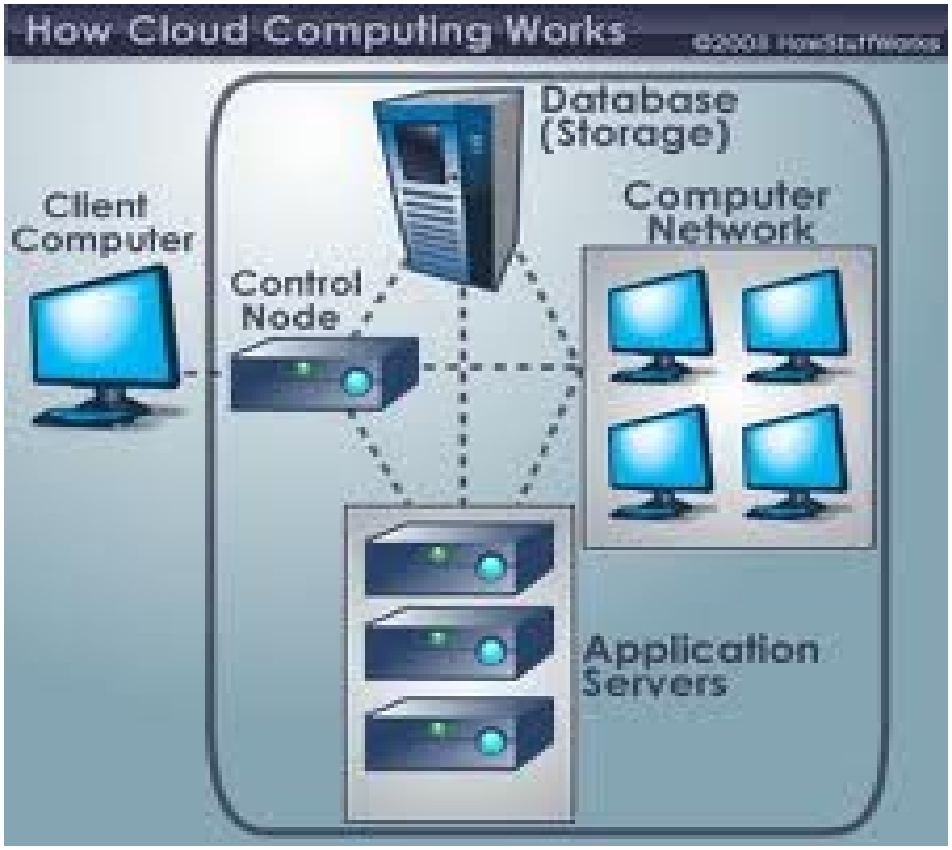




Characteristics

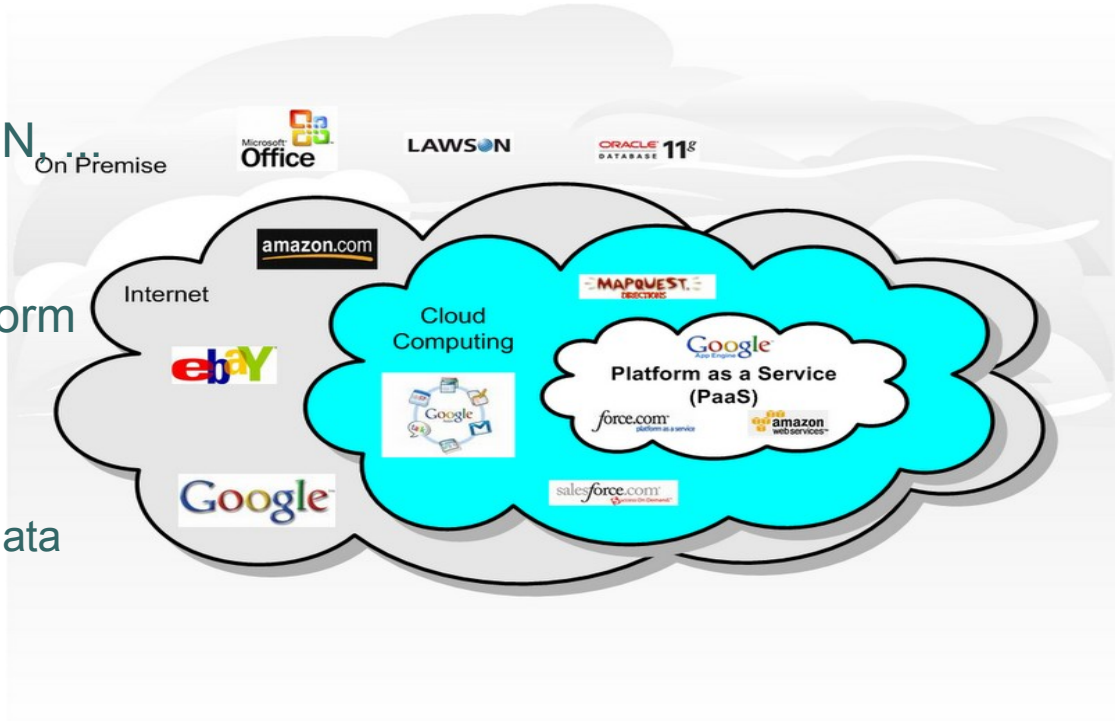
- Agility
- Cost
- Dynamic Scalability
- Reliability
- Security (centralisation of data)
- Virtualisation

Cloud architecture

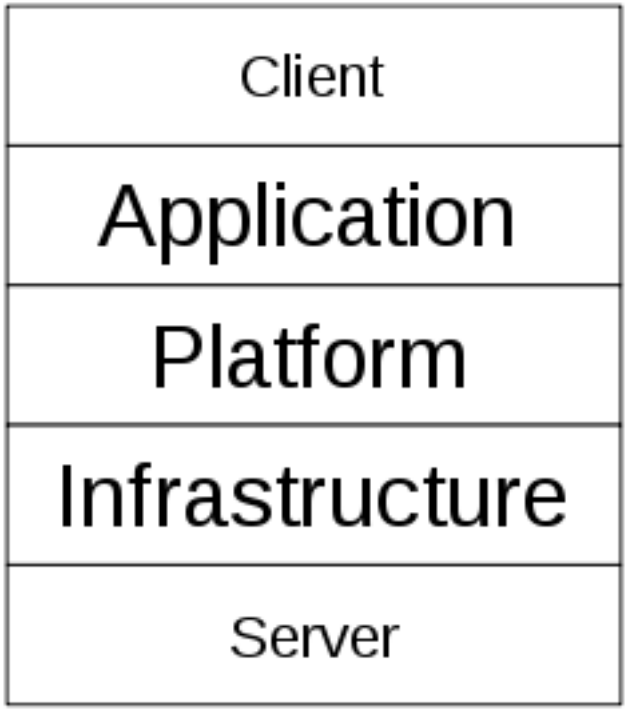


“Cloud” Service Provider

- Microsoft
  - Live meetings, MSN, …
- Salesforce
  - Development platform
- Amazon
  - Provides entreprise software company (data centers, linux)
- Google
  - Data storage, emails, collaborative tools on the web, Apps engine



From SaaS to IaaS



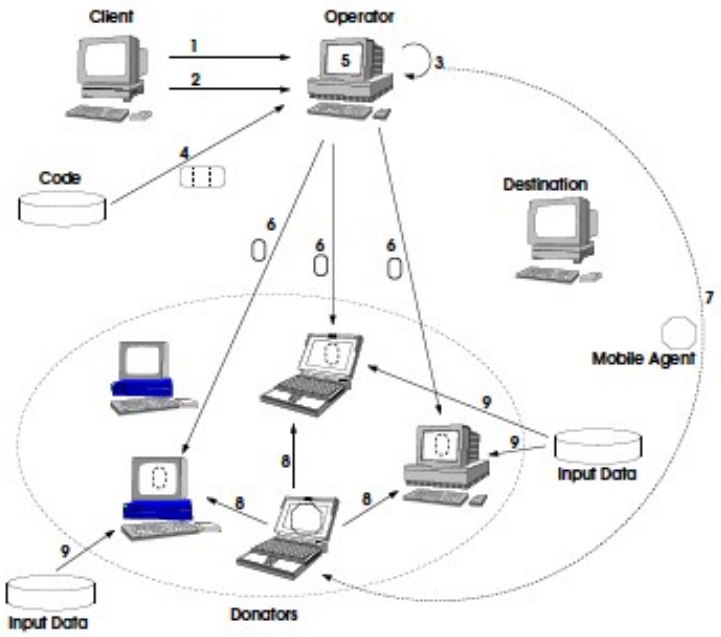
Grid

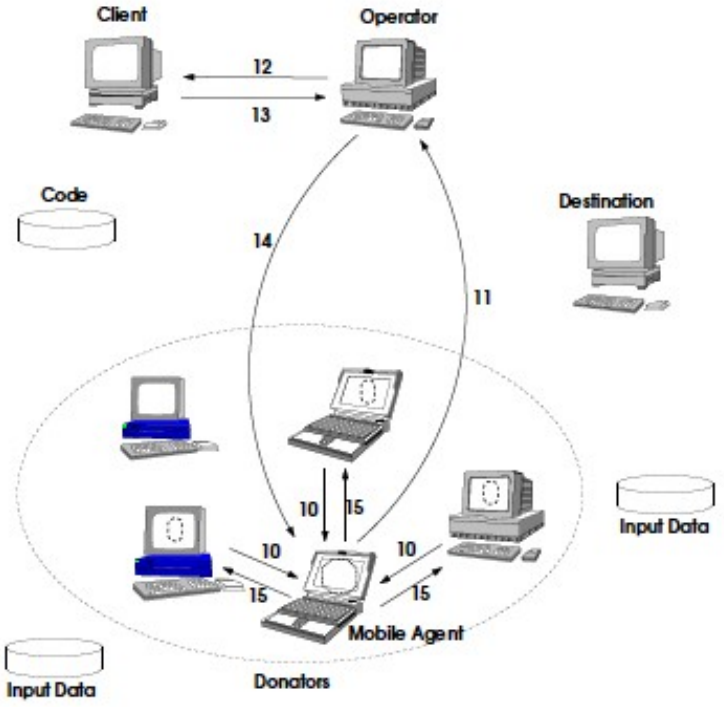
- A system that coordinates resources which are not subject to centralized control, using standard, open, general-purpose protocols and interfaces to deliver nontrivial qualities of service. (Ian Foster)

Characteristics

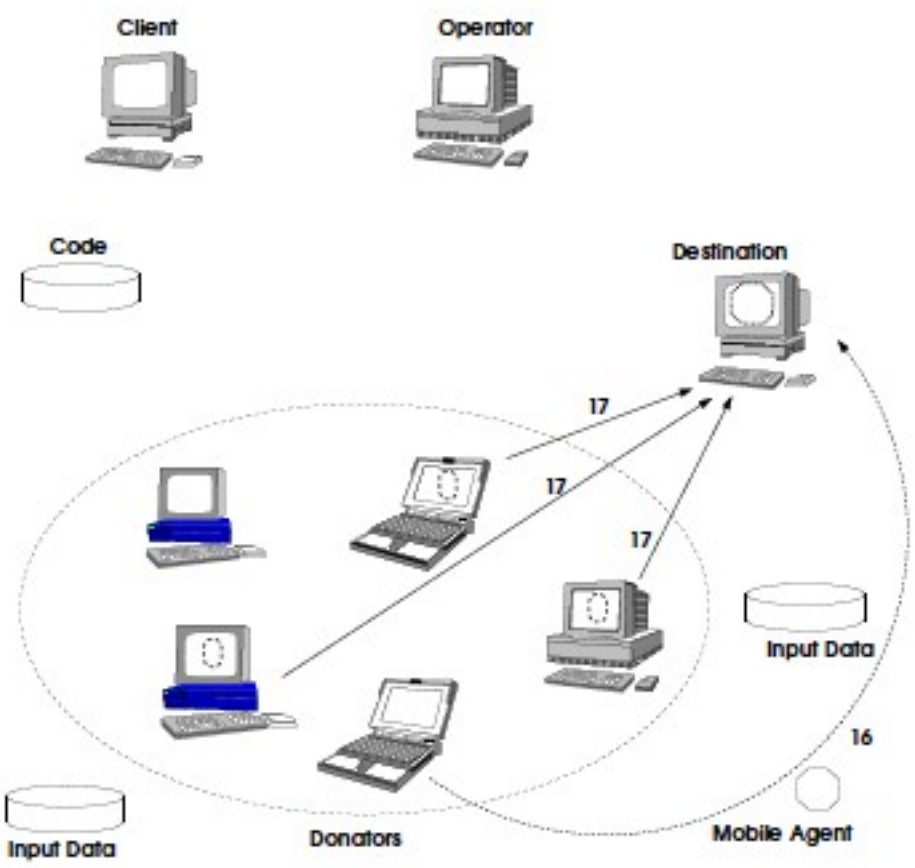
- Collaboration
- Resource sharing
- Booking / attribution of resources

Architecture



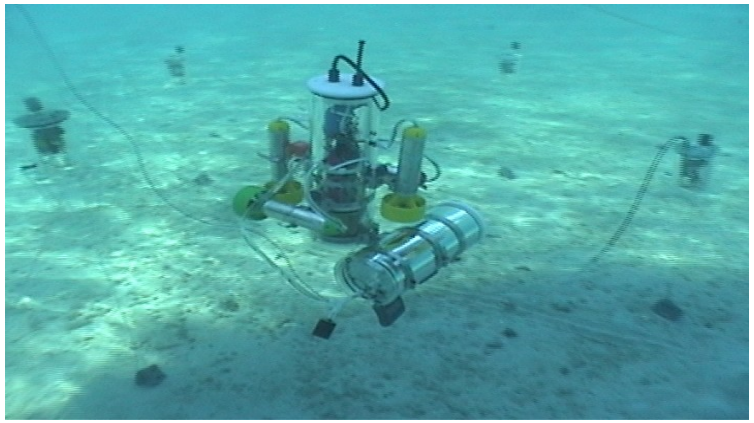


Architecture



Pervasive Services

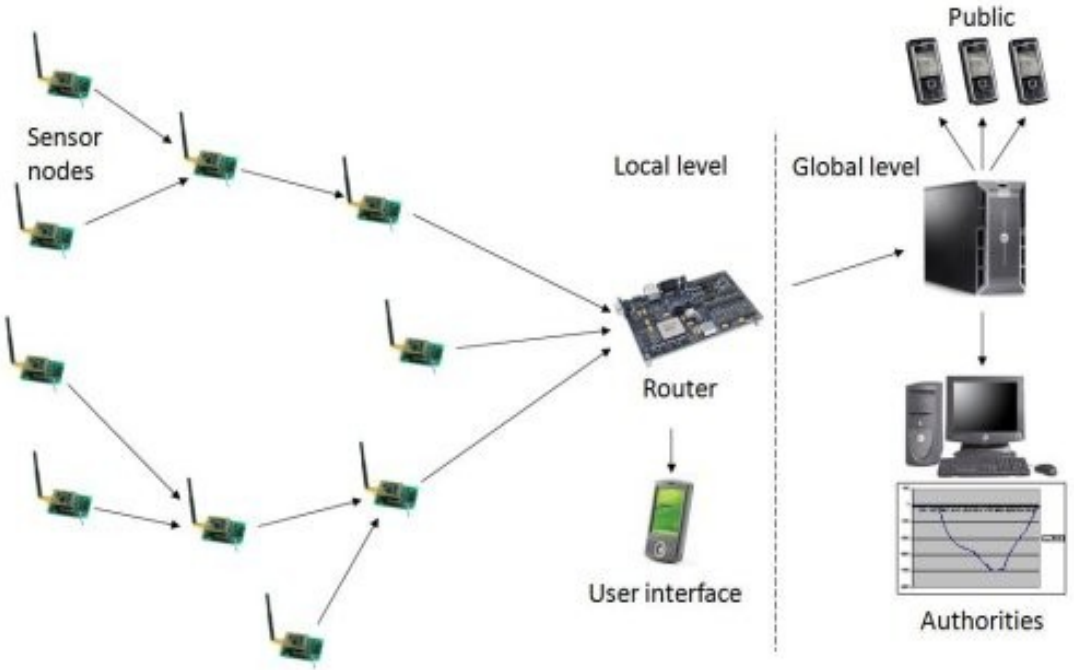
- Smart houses
- Ambient intelligence
- Ubiquitous computing
- Sensor networks
- Mobile services



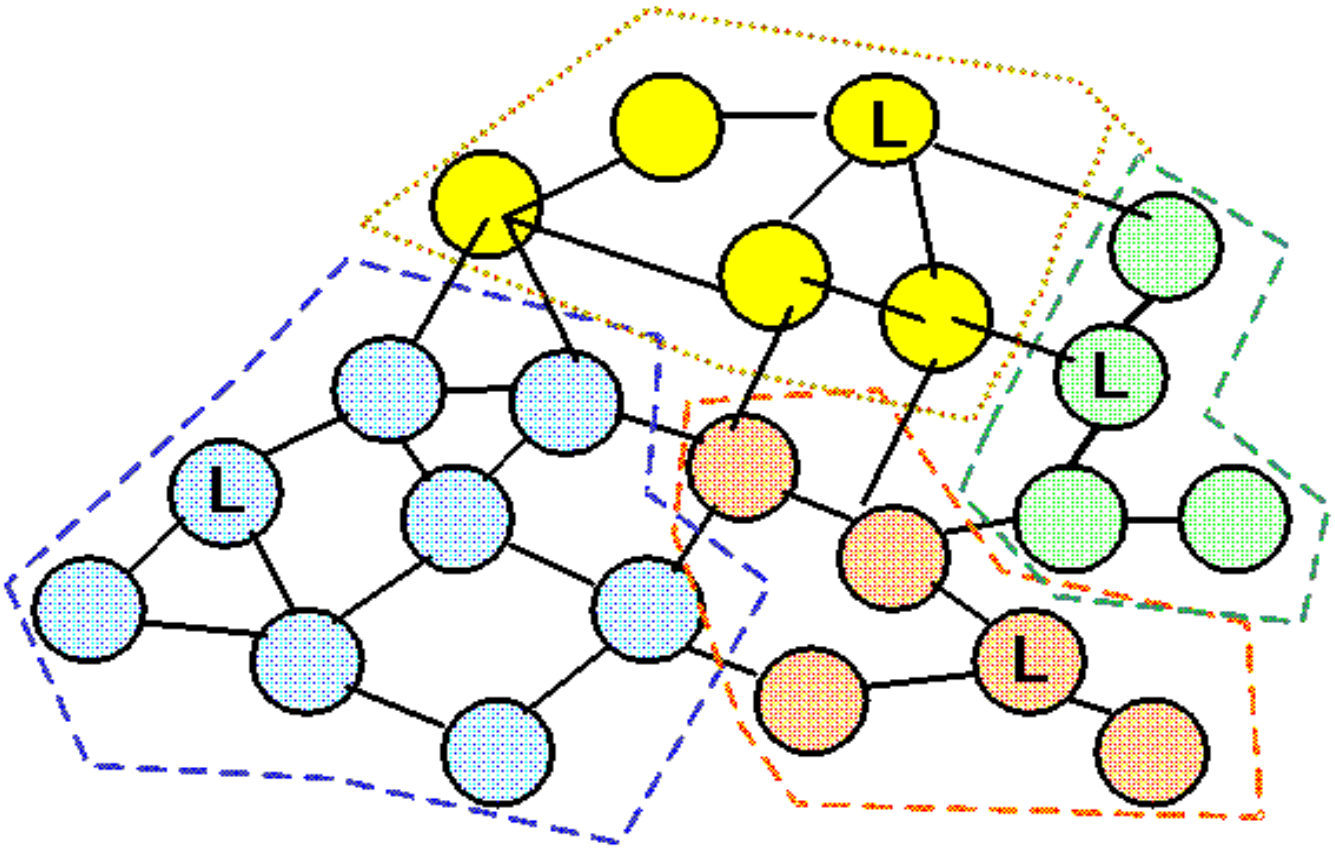
Characteristics

- Dynamic environment
- Uncertainty
- Decentralised
- Local Information
- Autonomous

Architectures - Sensor

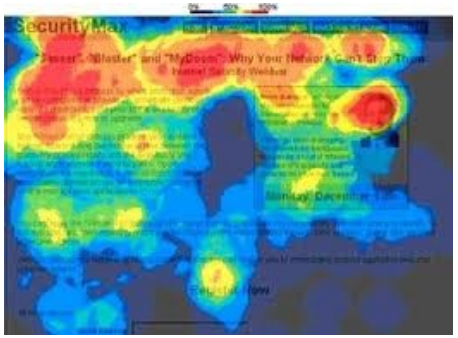


Architectures - MANET

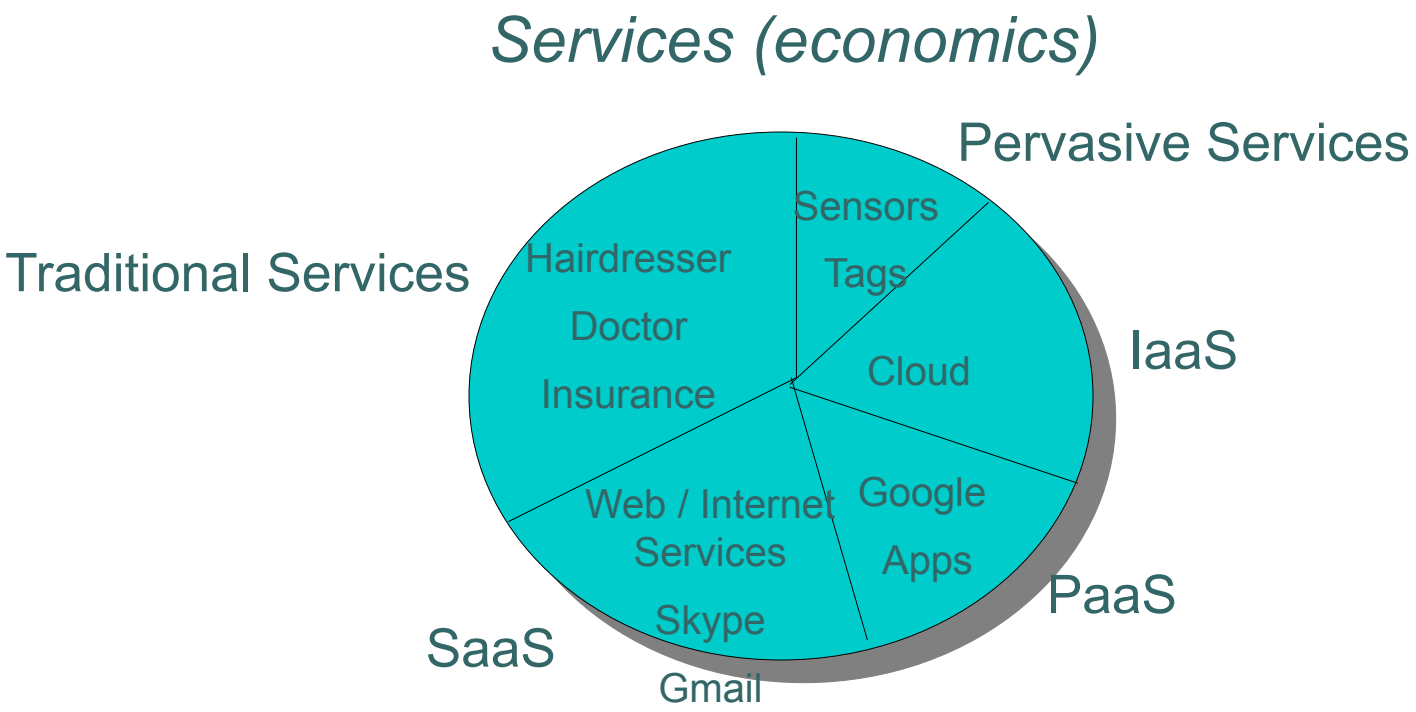


Pervasive services providers

- Foxytag (http://www.foxytag.com)
- SenseWeb
- SenseMap, HeatMaps
- http://research.microsoft.com/en-us/projects/senseweb/



Summary


Services (economics)
Pervasive Services
Traditional Services
Sensors
Tags
Hairdresser
Doctor
Insurance
Cloud
IaaS
Web / Internet Services
Google Apps
Skype
Gmail
PaaS
SaaS