Cloud Computing

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Cloud Computing
Cloud Computing is often seen from a technical point of view. Some provider also try to use cloud computing as a buzzword to sell available services.
Let’s Start with an Analogy:

Transportation

Cloud Computing is rather complex from the technical point of view, but conceptually pretty easy to understand. Let’s start with an non-technical analogy. Transportation is like ICT a core issue of our societies.
Only 1/8 of the total Energy used in a car arrives at wheels, the rest is „lost“ in the process, e.g. by conversion to heat.
On average, less then 1% of the fuel consumed is used to move the driver. The rest is lost or used to move the (too heavy) car. "This is not very gratifying after a century of devoted engineering effort", Amory Lovins

http://www.ted.com/talks/amory_lovins_on_winning_the_oil_endgame.html

Numbers by Amory Lovins (Winning the Oil Endgame)
Example: Family Mobility Needs

<table>
<thead>
<tr>
<th>Needs</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commute to work and school</td>
<td>Two „small“ cars</td>
</tr>
<tr>
<td>Shopping / City traffic</td>
<td></td>
</tr>
<tr>
<td>Holiday trips</td>
<td>A large car</td>
</tr>
<tr>
<td>Teenagers visiting friends...</td>
<td>Motorcycle</td>
</tr>
<tr>
<td>Transportation of furniture</td>
<td>Truck</td>
</tr>
</tbody>
</table>

How could the „mobility needs“ of an average family with teenagers be fulfilled? For example by using a lot of individual transports. All of them inefficient in themselves. In this case with additional low utilisation and high investment.
Considering the „solution“, a lot of additional infrastructure is needed.
Better Solutions ?
Reduce Ownership!

Car Pooling   Public Transport   Car/Truck Rental

However, to „reduce ownership“ certain conditions have to be met. E.g. public transport has to be accessible, cost–efficient, safe, comfortable... Similar considerations are true for cloud computing.
Photo shows the „Shinkansen“ train in Japan; one of the fastest trains in the world.
From transportation to cloud computing: just change the „variables“
In many datacenters, servers, storage... is not well operated (inefficient), and utilisation is often low. Specialised machines are bought for projects that do not efficiently use them. Commodity services are operated in–house, although outsourcing would be easy. Synergies between projects are not used.
And ICT Efficiency?
Currently, energy consumption of ICT doubles approximately all 5 years; at the same time strong growth in number of servers globally.
The utilisation of mainframe computers in the 70s and 80s was usually between 70–80%; thus mainframes provided relatively efficient IT services by exploiting the available computing power.
In many current datacenters, a lot of IT hardware is hardly used, still consumes resources. However, there are large Differences between specialised and large datacenters like: Google, Strato, Host Europe and the „average“ small company / business datacenter
In many OECD countries Carbon Emissions due to ICT activities have outgrown air traffic emissions! In OECD countries total ICT is responsible for 10% of total energy consumption.
ICT: Asset or Legacy?

ICT has been seen as a major asset for many companies in the last decades. Is the focus changing?
After pouring millions of dollars into in-house data centers, companies may soon find that it’s time to start shutting them down.

IT is shifting from an asset companies own to a service they purchase.

Nicolas G. Carr
„The End of Corporate Computing“
Overcapacity combined with redundant functionality.

Similar trend now in IT: from own services to grid services. Many similar applications in different companies. x-times multiplication of the same. Combined with the fact, that scaling up services is usually not a problem any more.
Cloud Computing, in Depth

Let’s dive deeper into some technical and organisational aspects of cloud computing and discuss potential advantages.
Cloud Computing: Building Blocks

- Virtualisation
- Distribution
- Commodification of IT Services
- Sharing of Resources
- Outsourcing
- Business Plans and Contracts
- Unification of Protocols
- Software as a Service

Photo by bugeaters (flickr)
Each of these Building Blocks is „nice“

Combination makes Cloud Computing

Ideas and concepts come in waves; Early waves often fail due to limitations in certain technologies, because supporting technologies are not available or mature enough, or simply because markets are not yet ready.

Example: "Video on Demand (End of 90s)" --

"YouTube (2005)"
Cloud Computing
is ICT Equivalent to
Power Grid

Simplified: Cloud computing can be seen as the ICT equivalent to power grids for providing
of electricity. E-Grid is used because of standardised interfaces and reliable services. Cloud
Computing could be on the same track.
Cloud Computing: Advantages

- Pay Usage ...
- ... not Peak Load
- Get Rid of Complex IT
- Large-Scale Efficiency

In house ICT services become complexer every year, leading to higher maintenance costs. Also licensing schemes can benefit from outsourcing. Eventually, outsourcing services in the cloud will save money in many use-cases.
Cloud Computing, Examples
Enterprise Services

Salesforce
Platforms

Google AppEngine, Amazon S3, EC2, Paypal, ...
Office & Communication

Google Mail, Amazon S3, EC2, ...
Green IT in the Cloud

- Resource Pooling
- Reduction of Hardware
- Higher Datacenter Efficiency
- Target/Demand oriented Performance

Cloud Computing can be one building block towards a „greener“ and more efficient IT
Particularly legal aspects seem to be a problem for companies in Europe (plus the conservative nature of our enterprises). Many cloud computing providers are not European companies, hence data protection and lack of trust is hindering the inception of cloud services.
Conclusion

- Cloud Computing is not (only) a Buzzword
- Transformation of IT landscape
- ICT Services as Scalable Commodities
- Advantages in many Use-Cases
- Green IT
- But also many unsolved Issues
Dr. Alexander Schatten

Thank’s for the attention, please contact me in case of questions. Looking forward to communicate with you via Twitter too!

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