IoT: Cloud Services

Why (not) move IoT services to the Cloud?

IoT Requirements	Cloud Challenges
Highly **dynamic** resource demands	Support for application **elasticity**
Real-time needs	**Quality of service** assurance
Expected exponential growth of **demand**	Cloud infrastructure **scalability**
Availability of aplications	Cloud **reliability**
Data **protection** and user **privacy**	Cloud **privacy** and **security**
Efficient **power comsuption** of applications	Efficient **energy** resource management
Execution of the applications near to **end users**	Cloud **federation**
Access to an **open**, **interoperable** cloud ecosystem	Cloud **interoperability** and **portability**

Challenges in Cloud Computing to Enable IoT

What are the benefits of moving IoT apps to the Cloud?

- Cloud computing enables IoT applications, which are system infrastructure dependent, to be infrastructure-less.
- By using the Cloud infrastructure on “pay as used and on demand”, we can save in capital and operational investment!
- IoT devices can:
  - Put their data on the platform instead of on their own own servers.
  - Push some of the computation to the Cloud by having the apps run on the cloud
  - Data manipulation and app can exist in the same environment simplifying the communication (intra-cloud)

Leveraging Public Cloud providers

- The use of the cloud provides a number of opportunities:
  - It enables services to be used without any understanding of their infrastructure.
- Cloud just provides an API
- Cloud computing works using economies of scale:
  - It potentially lowers the outlay expense for start up companies, as they would no longer need to buy their own software or servers.
  - Cost would be by on-demand pricing.
  - Vendors and Service providers claim costs by establishing an ongoing revenue stream.
- Data and services are stored remotely but accessible from “anywhere”.

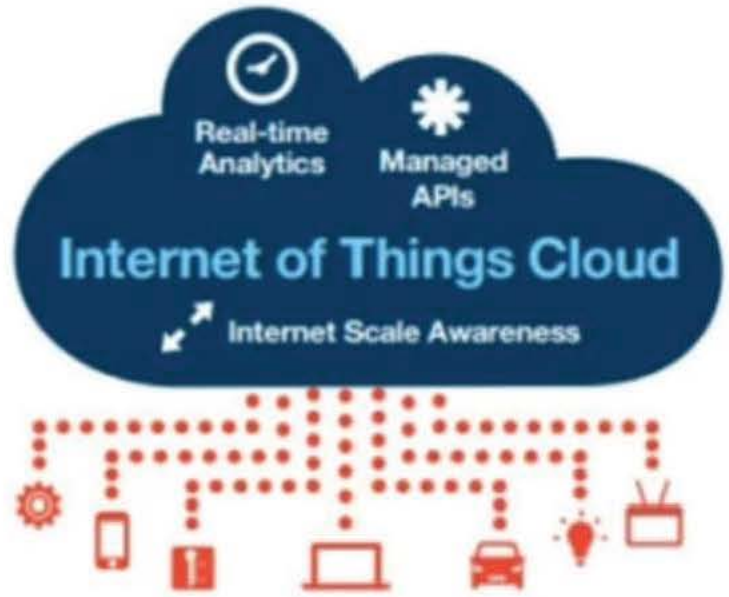
Lowering Cost

- You do not need a high-powered and high-priced computer to run cloud computing's web-based applications.
- Since applications run in the cloud, not on the a local server, your server does not need the processing power or hard disk space demanded by traditional desktop software.
- When you are using web-based applications, your server can be less expensive, with a smaller hard disk, less memory, more efficient processor...
- In fact, your server does not need software programs to be loaded and no document files need to be saved.

Lowering Cost

- You do not need a high-powered and high-priced computer to run cloud computing's web-based applications.
- Since applications run in the cloud, not on the a local server, your server does not need the processing power or hard disk space demanded by traditional desktop software.
- When you are using web-based applications, your server can be less expensive, with a smaller hard disk, less memory, more efficient processor...
- In fact, your server does not need software programs to be loaded and no document files need to be saved.

Improved Performance



- With few large programs hogging your computer's memory, you will see better performance from your servers.
  - You may actually not need servers at all :)
- Computers in a cloud computing system boot and run faster because they have fewer programs and processes loaded into memory…

Reduced Software Costs

- Instead of purchasing expensive software applications, you can get most of what you need for free-ish!
  - most cloud computing applications today, such as the Google Docs suite.
- better than paying for similar commercial software
  - which alone may be justification for switching to cloud applications.

Instant Software Updates

- Instant software updates:
  - Another advantage to cloud computing is that you are no longer faced with choosing between obsolete software and high upgrade costs.
  - When the application is web-based, updates happen automatically
    - available the next time you log into the cloud.
  - When you access a web-based application, you get the latest version
    - without needing to pay for or download an upgrade.

IoT Interoperability

- Device independence.
  - You are no longer tethered to a single computer or network.
  - Changes to computers, applications and documents follow you through the cloud.
  - Move to a portable device, and your applications and documents are still available.