

Mobile cloud services as a public utility to all citizens

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Introduction

The adoption rate of mobile devices such as smartphones and tablets by the general public is constantly increasing. Mobile devices are now the platform of choice for browsing the Internet, reading news, playing games or listening to music. Moreover, these devices are equipped with sensors like camera, microphone, GPS, gyroscope, accelerometer and digital compass which facilitate new kind of applications that are context-aware. These mobile applications, as the location-aware ones, adapt their execution to the environmental context, the user context or even the device context. For example, the user location in a foreign city can trigger the display of sites of touristic interest in the proximity. More network interface cards on the device, for telephony, Bluetooth or Wi-Fi create rich communication potential that allow the formation of mobile ad-hoc networks.

Another computer technology that is increasing the user base is referred as cloud computing. Clouds are large computing centres that offer storage, computing power, services and applications on a “pay-as-you-use” basis. They take over all IT administration guaranteeing high levels of availability and allowing the general public and companies to focus on the services/application they want to execute.

The Mobile Cloud

While mobile devices are still scarce in resources and their users demand more complex applications, clouds have un-limited resources ready to be used. The natural convergence of these two technologies led to the mobile cloud. The mobile cloud is the access of cloud services from mobile devices – e.g., storing photos or movies taken by the smartphone in the cloud and then sharing them on all personal devices. This is a new computing model that matches mobility and friendly interfaces of mobile devices with in-excess resources of clouds. One use is to off-load tasks that would take too long to run on the mobile from the mobiles to the cloud for execution. Then, results are returned to the mobiles.

Although very interesting as a computing model, the mobile cloud implementation is not simple. There are significant technical challenges in relation to the latency, bandwidth, consistency, privacy and seamless access to services. There are many industrial and academic projects that currently aim at creating cost-effective mobile clouds.

Applications of the Mobile Cloud

Individual owners of mobile devices can take advantage of the cloud by using its services, in a way similar to accessing web services. However, an interesting aspect that can be exploited in the future is that the mobile cloud can be even more useful to groups of people up to an urban community.

As a scenario, consider thousands of mobile phones that while on the move (with their users) send street noise data sampled by the microphone together with location (GPS) by the Wi-Fi access points to the cloud, at different time of the day. In addition to air pollution data sent by sensor networks, these data can be used to create a map of the city environment quality. The same devices can help determine people movement patterns at different time of the day leading to decisions regarding street/transportation improvements, temporary services offered to pedestrians or drivers, etc. Not only local authorities will benefit of this system, but city inhabitants will use their mobiles to access information (to which they contributed) as a new city utility. They can be incentivised to volunteer their devices by getting free access to the new services.

Another application can be participative democracy where every citizen can be involved in decisions taken in real-time. Indeed, the large computing resources of the cloud can be used to publically present the cases for one or more important decision(s) that affect the community. Then, citizens can vote immediately and the results displayed as the voting progresses. The process is open, secure and provides for simple and direct involvement of citizens in decisions that affect their lives.

Education and health are two major areas that can benefit of the mobile cloud. Indeed, this infrastructure supports instantaneous communication and data sharing among people with different roles. A history lesson for a group of students visiting Rome can be more interesting if they have access through their mobiles to the Rome repository storage(s) hosted by the cloud.

Conclusions

Mobile devices, mobile networks and clouds are much more than exciting new technologies that attract a lot of research and technological development. They become enablers of a large range of new digital applications defined by direct user involvement, real-time reaction and content delivery, setting up temporary communication with peers with similar interests. In some cases, citizens may volunteer their mobile resources for sensing the environment, contributing to the better management of the environment. As a consequence, they will also avail of new urban services as public utilities, similar to water, electricity, etc. The overall goal that can be achieved by using the mobile cloud can be a better life quality of city inhabitants.