Research on Fusion Application of Mobile Internet and Internet of Things in Digital Campus

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Abstract: Digital campus construction in China has such problems as low digital utilization ratio, unbalanced resources and insufficient maintenance. If the digital campus lacks of insufficient adaptability and flexibility, it is hard to meet the current campus development needs. The emerging of mobile Internet and Internet of things better solves the problems in the digital campus construction, thus improving the security of digital campus. The fusion application of mobile Internet and internet of things in the digital campus is studied in this paper.

With the active promotion and application of “School to School Network” project by Ministry of Education and long-term investment and construction of China’s education information, the information construction of many schools is of a large scale; consequently, the hardware, network infrastructure, software and other conditions are in place and better used in the teaching process. The application of mobile internet technology and internet of things technology leads to the emerging of smart campus, which is a new campus information form. It uses mobile internet, internet of things and other new information technology to integrate the originally scattered and independent information system on the campus into an organic whole with high sensitivity and service ability so as to realize the unified management of various resources and flexibly allocate the resources, thus practically reducing the construction and operation cost of digital campus.

1. Fusion application of internet of things in the digital campus

(I) Interpretation of internet of things

Internet of things technology is a new smart network that carries out information exchange and communication by interconnecting any object and network according to the agreed protocol by radio frequency identification (RFID), infrared sensor, global positioning system and other information sensing device so as to form interconnection, synchronization and information sharing between things, human and computer, which is one of the new technologies that interconnect multiple sensors and network. Internet of things is an information carrier based on internet that can realize interconnection and intercommunication between all the physical objects capable of independent addressing. Internet of things is a complex and diversified systematic technology. According to the information generation,transmission and application principles, internet of things can be divided into four layers: first, perceived identification layer. Perceived identification, as one of the core technologies of internet of things, is an important bond that connects the physical world and information world, mainly including RFID, wireless sensor and other automated information device as well as all kinds of intelligent electronic products to form artificial information. Second, network construction layer, in which the data of perceived identification layer are connected to the internet for the use of upper layer. Nowadays, the wireless networks can conduct network access service at any time. Multi-type wireless network is applicable to different environment and provides more convenient network connection, which is an important infrastructure to realize the connection of things. Third, management service layer. The large-size data should be organized efficiently to provide an intelligent platform for the use of upper layer. The main characteristics is to promote the intelligence by principles of operational research, data mining technology and expert system. Fourth, comprehensive application layer. Internet of things should stress the object or physical world and cover the object tracking, intelligent logistics, intelligent transportation and other aspects.

(II) Fusion application method of internet of things technology in the digital campus construction

Digital campus based on internet of things technology can provide ambient intelligent perception and comprehensive information service platform for students and teachers, use the network information service to enhance the interconnection cooperation in the service fields and provide an interface for exchange and perception between school and outer world. To realize these objectives, it is required to accelerate the leapfrog development of colleges and use cloud computing and virtualization technology to form the campus cloud. The cloud scale is scalable dynamically and the campus cloud can meet the application and user scale development needs. The campus cloud ensures the high liability of data by using the fault tolerance of multiple copies of data and calculating the isomorphic exchange of node. In addition, the campus cloud provides a thin terminal for various information needs. The campus cloud is a sing-type cloud architecture and can be divided into perception and network layer, service layer and application layer to realize the digital campus based on internet of things. The main methods are as follows:

First, strive for device virtualization. Internet of things faces a large number of hardware resources, in which the hardware devices are connected to the exiting campus network. The virtualization of application device resources can realize higher-level resource-based digital campus . The whole process of virtualization is to shield the difference of hardware products and also a precondition of promoting the device and network transparency for users. The virtualization technology, as an important technology of perception layer of digital campus, practically breaks the barrier between different physical structures and converts the physical resources into logically manageable main resources. The hardware resources in the digital campus should be comprehensively integrated into the resource pool so as to realize the dynamic resource allocation and input of human resources.

Second, implement resource monitoring and load management. The resource monitoring is one of the key tasks to ensure the high efficiency of perception layer. In the environment of resource clustering of the perception layer of digital campus, the load of nodes at any moment is uneven. Once the load is greatly different, the resources will be wasted. The data should be of redundant backup to ensure the high reliability of data so as to minimize the probability of data damage and loss.

Third, conduct system deployment, mainly including dynamic deployment and rapid deployment, in which the typical scene of the former one is to enhance the dynamic scalability of perception and network layer, that is, conduct adjustment and configuration in the shortest time according to the change of specific user needs and service state. Another typical scene of dynamic deployment is to recover the system fault and maintain the hardware device. The perception and network layer must migrate the data in running and processing from one node to another node under the scheduling of upper layer. At the same time, to continuously improve the deployment speed of virtual machine, parallel deployment or collaborative deployment and other technologies can be used for rapid deployment.

Fourth, implement resource scheduling and multi-tenancy technology. The resource scheduling refers to the whole process of resource adjustment between different resource users according to certain resource use rules under specific resource environment. The software in the digital campus can be released by SaaS for the use of teachers and students needed. The multi-tenancy technology can make the software and hardware resources better shared and have excellent scalability so as to let every user use the resource as needed.

Fifth, conduct mass data processing and large-scale distributed storage. The mass data processing in the large scientific computation and scientific research practice before needs a mainframe for reasonable data processing, with a high cost. In the process of campus cloud construction, it is based on computing technology and virtualization technology, without independent additional hardware investment, and the scalable computing environment can be realized by dynamic resource scheduling so as to realize mass data processing easily.

2. Fusion application of mobile Internet in the digital campus

(I) Interpretation of mobile internet

Mobile internet is the product of the fusion of mobile and internet, which is a multiplication, rather than a simple addition. Mobile internet does not only have such advantages as whenever and wherever possible, portable and mobile, but also have the sharing, openness and interaction of traditional network, which is a upgrade of two advantages after fusion. The core of mobile internet is to make the application of internet “people”-centered. Compared with the traditional network, the mobile internet has the following characteristics: first, portable. The information communication and acquisition efficiency is higher than PC. Mobile internet device can be 24-hour online and portable, which is more than the online time of PC. The user can obtain the news or open an application by surfing the internet at any time. Second, light. The basic calling function of mobile device can solve most of the communication problems of modern people and can also solve them by voice communication. Third, private. As the mobile internet terminal is exclusive for individual, so a large number of high-sensitive private data can be stored, such as personal address book, person photos and mobile payment client. In addition to personal special permit, these private information of mobile users cannot be known by others. Fourth, intelligent perception. The mobile device is equipped with a large number of sensing device, which can locate at any time, acquire the nearby image, voice and other information and even have auditory, visual, olfactory, tactile and other senses. Fifth, individualized. Individuation refers to the high correlation with the user. The device, communication network and application in the mobile internet should be people-centered and have high correlation with the user. The individuation of terminal is mainly manifested in the binding between mobile device and user and the presentation ability of individuation is strong. At the same time, the individuation is also manifested in the accurate reflection and extraction ability of user needs and behavior information by mobile network and fusion with the internet application technology and electronic map to conduct more intuitive display.

(II) Fusion application method of mobile internet technology in the digital campus construction

According to the statistics, China’s mobile internet users are young and the young people below 30 years old account for 60% of the overall mobile users. These users can quickly accept the new things and are interested in the high-performance configuration of smart phone and richness of application software, thus becoming the main body of mobile internet application. In this age group, college and secondary school students are one of the most active user groups in the mobile internet application. The application of mobile internet in the digital campus includes teaching, management, life, entertainment and other aspects. The basic method is as follows:

First, create the public service support platform. This platform is the software foundation and strong background of mobile internet application and also the fertile soil for the landing, rooting and rapid development of mobile internet. The fertile soil is construed as “cloud” by IT catchword. To build an unified public service support platform, the originally scattered information platform should be integrated first to form an unified authentication platform. As to the traditional information service or modern mobile internet services, teachers and students can access to and use it with an account. At the same time, the unified campus card server should be formed to realize the unified identification and payment. Of course, the unified data center should be built to realize the sharing service.

Second, implement mobile teaching. It mainly refers to the provision of comprehensive mobile services integrating teaching programme, teaching arrangement and teaching activity for teachers so as to create more convenient and high-efficient teaching context for teachers. The mobile teaching does not include course arrangement, course note, weekly arrangement and other application services, but also include synchronous classroom, synchronous exercise and other auxiliary application. The courseware prepared by the teacher should not only consider the traditional teaching needs, but also consider the features of mobile internet application. The mobile application courseware prepared by the teacher should be short, exquisite, interactive and applicable to the fragmented time. The teacher can store the courseware in the “cloud” of platform, so the learners

can learn at any time if they have will and time. The above-mentioned courseware is produced by specialized software and tools and then uploaded to the “cloud” of school service support platform uniformly. It must be the important knowledge resource of the school after long-term accumulation.

Third, implement mobile learning. It focuses on learning, rather than teaching, in which the students are initiative. We need paper books if learning and have to carry a lot of books if we review the lessons. After using the mobile internet, we can learn at any time and at any place by using smart phone or intelligent terminal. Therefore, the teaching emphasis is converted into learning emphasis and the passive infusion is converted into active acquisition. For learning by mobile internet platform, it is also required to encourage the students to look up information comprehensively and systematically by mobile internet and actively get rid of the constraints of traditional concept to make a bold innovation.

Fourth, conduct mobile office. Mobile office is to work by mobile internet terminal so as to be convenient for teachers and students, improve the working efficiency and improve the resource configuration. By using the mobile office system, the school administrator and teachers can work at any time by mobile phone and other mobile terminal so as to improve the working efficiency. The main body served by mobile office is the school leaders, departments and administrative officers of faculties. After using mobile office, people can sign, approve and review documents at any time and at any place whether in the workplace or outside or on a business trip, thus greatly saving the office cost and communication cost.

Fifth, create mobile campus. It mainly refers to the school mobile portal and various applications convenient for the life of teachers and students, such as campus weibo, lecture inquiry, mobile sign-in and score inquiry to make teachers and students know the latest news of the school without going out.

3. Conclusion

In conclusion, the modern digital campus based on mobile internet and internet of things technology can comprehensively realize the interconnection and intercommunication between people and objects at the school, in which the mass information forms new information after fusion by new technology platform to provide a new intelligent platform for teachers and students. This provides a new concept and method for school teaching, provides guarantees for the teachers’ and students’ better use of the resources of network technology, creates a new virtual campus and learning environment, realizes the real-time sharing of regional data and makes the resources of the school used more reasonably so as to promote the digital campus construction.

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