Chapter 6
A Mobile Service Platform for Trustworthy E-Learning Service Provisioning

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ABSTRACT
Distant e-learning emerges as one of promising means for people to learn online. Although there is a substantial increase in computer and network performance in recent years, mainly as a result of faster hardware and more sophisticated software, there are still problems in the fields of integrating various resources towards enabling distant e-learning. Further, with the advances of technologies in RFID, sensors, GPS, GPRS, IP networks, and wireless networks, mobile learning is becoming a viable means for teaching and learning. In this book chapter, we develop a service platform for mobile learning with trustworthy service provisioning based on an organic integration of our prior research results in service grid, on demand e-learning, and trusted mobile asset tracking. In this platform, the virtual learning services for students, instructors and course providers are provided leveraging on service grid resource management capabilities on group collaboration, ubiquitous data access, and computing power. Challenges and requirements for mobile learning service platform are discussed. An RFID based e-learning data integration is proposed with integrated service networks for intelligent e-learning information access and delivery.

INTRODUCTION
Over the past few decades, Computer Based Training (CBT) solutions evolve from standalone to web-based package (Web Based Training – WBT) with rich multimedia content. Today, most of the web-based solutions leverage on various load-balancing techniques to increase their performance, availability and reliability. Such techniques suffer from the fact that the solution must be able to handle the load of the estimated maximum number of participants and the system resources must be powered by homogeneous platform (both hardware and software). On the other hand, most of the CBT
and WBT solutions available today advocate “self
learning” (Zemke, R., & Zemke, S. 1995) and
provide limited interactivity and instantaneous
feedback mechanisms that are provided in tra-
ditional teaching environment. The sequencing
of the courseware is pre-built and thus it may
not be applicable for all types of learning. It also
fails to facilitate the learning process by creating
learning community.

Furthermore, multimedia rich courseware
and community portal demand huge data storage
that may growth with time. Flexible data storage
scheme is required to tackle the on-demand stor-
age needs.

The approach of “On-Demand e-Learning”
intends to tackle the problems inherited from the
inefficient use of data resources of existing database
technology and traditional approach in offering
e-learning package (Luo, Z., Fei, Y., & Liang, J.,
2006). The primary objective is to develop virtual
learning service community for all community
participants including students, instructors, and
courseware providers leveraging on Service Grid
technologies (Luo, Z., Zhang, J., & Badia, R. 2005),
for e-learning services development and access,
ubiquitous data access, group collaboration, and
computing resource management.

Furthermore, today’s world has witnessed
the trend of convergence of computing and com-
munication, and integration of sensor and mobile
technologies for enabling a new generation of
e-learning applications in a mobile and pervasive
manner. With mobile applications becoming
more and more attractive, location awareness is
becoming a fundamental requirement in mobile
e-learning solutions offering functions for such
as mobile e-learning asset management to enable
efficient utilization of resources. A key enabling
technology for such location awareness is through
positioning technologies, of which GPS, global
poisoning system, is becoming more and more
popular in outdoor environment. Other enabling
technologies include Radio Frequency Identifi-
cation (RFID), which could be used to uniquely
identify an object. This RFID technology is par-
ticularly helpful in pushing asset management at
an even finer granularity, e.g. from case level to
item level.

Location aware e-learning applications and
services, e.g. track and trace for managing asset,
are especially helpful in identification of the move
paths of the asset and can help identify e-learning
patterns, enabling more efficient e-learning informa-
tion exchange and asset utilization. However,
these features would incur a few problems as
well. The feature, if wrongly used, e.g. by an
un-authorized party, would lead to leakage of
patterns (such as utilization, trend, etc.) about
the e-learning asset under management as well
as individual’s behavior. The rapid technology
advances in business intelligence tools, e.g. data
mining and knowledge discovery has made this
type of threats even more severe. Thus, to protect
the privacy of individuals as well as companies’
trade secret, it is necessary to develop a secure
system for managing the e-learning asset, rais-
ing the bar for obtaining valuable information
to breach the location information integrity for
managing the e-learning participant and asset
(Zhang, T., Luo, Z., et al., 2008).

All of these require for a holistic view on
integrating related technologies, such as position
technologies like GPS, sensing and identification
technologies like RFID, and security technolo-
gies like authentication and authorization. Thus,
we need an integrated service network approach
that supports sharing, accessing and managing e-
learning resources and leverages various position-
ing, sensing and security services that are available
to the network. Through this integrated service
network, information about e-learning participants
and the e-learning asset shall be made available to
the network participants. E-learning participants
and asset tracking then could be developed and
services could be offered to deliver the informa-
tion securely to interesting participants.

In the book chapter, we will present a service
platform for mobile learning with trustworthy...