Design and Implementation of 3-Tier App Development Training System

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3-Tier App 개발 교육시스템 설계와 구현

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Abstract This study in coping with the current trend is to propose the environment for training 3-Tier App development being focused on the system to develop mobile applications where its related developers are scarce. Design and implementation of training system for the development of 3-Tier App in this paper is to realize the environment for software development for colleges as same as that in IT companies. For 3-Tier App development training system, 3 students with 3 computers work as a group. The above-mentioned 3 computers include a computer for development, Gateway server, and DB server together with legacy system. Also, each of the 3 students shall be given roles of the foregoing sections. We have educated 3-Tier App training system as a practical class for 64 students in junior students of computer information major. Through training session, it was confirmed that we can foster the students as custom-made talents who understand company’s development environment. Also, the Comparison of 3-Tier and Stand-alone App Development Training System for 10 distinct description, we know that 3-Tier app development training system was very superior to stand-alone app development training system in the educational effects.

Key Words : 3-Tier Structure, Training System, App Development, Gateway Server, Legacy System

요 약 본 논문에서는 시대적 요구에 적합하도록, 개발인력의 수급이 어려운 모바일 애플리케이션을 개발하는 시스템을 중심으로 3-Tier App 개발 교육환경을 제안하였다. 3-Tier App 개발 교육시스템의 설계와 구현은 대학과 기업의 소프트웨어 개발환경을 동일하게 구성하고 구현하는데 있다. 3-Tier App 개발 교육시스템에 대한 실행환경은 3대의 컴퓨터와 3명이 학생을 그룹으로 하여 실습을 수행하며 개발용 컴퓨터, Gateway 서버, 데이터베이스서버와 레거시 기간계 시스템으로 구성하고 학생은 개발용 컴퓨터와 근무 담당자 담당, Gateway 서버시스템 담당과 데이터베이스서버와 레거시 기간계 시스템 담당자로 역할을 부여한다. IT 전공 대학 3학년, 64명을 학생을 대상으로 3계층 시스템의 실습을 통하여 기업 맞춤형 인재양성의 가능성을 확인하였다. 또한, 시스템 성능에 대한 10개 세부항목 비교 결과, 단독시스템 대비 3계층 시스템의 우수함을 입증하였다.

주제어 : 3계층구조, 교육시스템, 앱 개발, 게이트웨이 서버, 레거시 시스템

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1. Introduction

According to a survey by the World Economic Forum, Estonia (with a population of 1.3 million) ranks second in e-banking, third in e-government, and first in online mobile voting worldwide, and had the most businesses establishments per capita in 2011. Rated as a global IT superpower in a short time, Estonia has already become a benchmark model country in the world’s IT sector. There is a more important reality to be recognized behind the scenes. Estonia’s moves related to IT education is even more drastic. A project named ‘Programming Tiger’ was implemented with children aged 5 and up to be taught the basics of computer coding with the cooperation of public and private sectors. Estonia’s public schools will introduce a curriculum of web and mobile app development in elementary schools[1].

Korea, on the other hand, has nothing to boast about in the software sector, although Korea leads the world for hardware in the smart IT sector. Smart networks and applications are present in the corporate world as well as in national competition for future fusion technology [2]. In smart networks, the combination of hardware and software has a synergic effect, creating smart business power, which continues to be in the spotlight. Hence, a future global IT leader must have integrated technology and marketing power in a two-tiered IT business market [3][4]. It is anticipated that a smart phone-based diversified convergence environment will play a central role in each sector of our society for at least the next decade or two. It is therefore essential to create an educational environment for smart phone-related technologies in university, this study in coping with the current trend is to propose the environment for training 3-Tier App development being focused on the system to develop mobile applications where its related developers are scarce. The structure of this paper is as follows. Section 2 mentions several studies related to this study. Section 3 proposes methods, section 4 illustrates the proposed system analysis, and finally, section 5 draws conclusions and describes future plans.

2. Related Works

Smart phones have gained immense popularity, initiated by the release of Apple’s iPhone all over the world. A new industrial revolution has already started from applying IT technology to the smart phone and wireless Internet in all industries and fields [7]. As part of a core technology education policy to prepare for the rapidly changing mobile education environment must designates excellent educational environment. The development strategy is to establish a leading global education model to lead smart technology related education content and methods in innovative ways and to diffuse the model n
Paradoxically, the environment for software development in college IT labs has not been changed for a long time, whereas the environment for that in IT companies has been continuously and dramatically changed.

One of the biggest differences is the fact that the software development training has been conducted by a single computer in many colleges so far. This kind of development training may have proper effects in a certain area but there are big differences from the point of realistic effectiveness in comparison with that in many commercial companies.

Thus, many official reports suggest that there is a huge gap between the talented people whom IT companies want and the graduates through the foregoing software development program in many colleges.

Materialization of training system for the development of 3-Tier App in this paper is to realize the environment for software development for colleges as same as that in IT companies.

In its composition, it is composed with the following 3 stages: The first stage is based on a computer for development and a device to be realized, the second stage is to prepare a gateway server system that enables compatibility between various mobile devices with different specs and various different operating systems in window based computer, smart phones, and tablet PCs, and lastly the third stage is integration with previous legacy system and various operating environment and technical structure, and integrating DB server with trunk system. In addition, the AppStore server that manages various application programs shall be put into the operating environment.

Therefore, the 3-Tier App development training system is designed to practically experience and improve user’s capability in IT labs of colleges for dealing with integrated server platform at the company level where complicated business activities of multi-concurrent users and massive DB input and output are processed.

3. Materialization of 3-Tier Application Development Training System

3.1 3-Tier Application Development Training System Configuration

As shown in the [Fig. 1], materialization of training system for the development of 3-Tier App shall be designed based on the fundamental assumption that numerous users and various application programs simultaneously request to process massive data.

For IT lab environment for 3-Tier App development training system, 3 students with 3 computers work as a group whereas a single student works with a single computer for development in the conventional environment.

![3-Tier App System Configuration](image)

The above-mentioned 3 computers include a computer for development, Gateway server, and DB server together with trunk system. Also, each of the 3 students shall be given roles of the foregoing sections.

Practical training under this kind of training system, in which creates environment of IT training system of colleges as same as that of actual companies, would cater to train custom-made talented people whom actual companies want.

3.2 Design and Integration of Gateway Server under 3Tier and 2Tier Structure

The practice environment of colleges under the 3Tier
r structure enables users to develop an application program that utilizes common database by composing 3 students with 3 computers as a group.

MS-SQL2008 and MS-SQL2008 Management shall be installed in the server #1, the Gateway server (m-Bizserver) in the server #2, and m-Bizmaker shall be installed in the development PC. Tests can be conducted by using Android based or iOS based smart phones where a network manager, DB manager and app designer work as a group for training. Any database can be used regardless of its version. In the server #1, MS-SQL2008 is serviced and actual data is stored whereas the m-Bizserver installed server #2 plays a role as gateway to connect with the server #1. The development PC accesses m-BizServer of the server #2, then the server #2 accesses the DB server of the server #1 to transfer data. 3-Tier system is to materialize app service by transferring data from a Client or smart phone device via m-Biz Server to database.

In order to develop an app program that utilizes common database by using m-Biz solution, system shall be composed as the Fig. 2. In case when 3Tier structure is not permitted, you can develop an app program that utilizes common database by using 2Tier structure where 2 students with 2 computers as a group. In this case, MS-SQL2008, MS-SQL2008 Management, Gateway server (m-Bizserver) shall be installed in the server #1 whereas m-Bizmaker in the development PC to proceed practices by a network and DB manager, and an app designer as a group. Any database can be used regardless of its version.

In the 2Tier structure, Gateway server (m-BizServer) can be installed by the order as follows: OS installation, MS-SQL 2008 installation, SQL Management installation and configuration, m-Bizmaker installation, Gateway server (m-BizServer) installation and configuration, and lastly connecting an app program with DB server as the Fig. 3.

4. Implementation and Analyses

We have adopted 3-Tier App training system as a practical class for junior students of computer information major, and conducted training for 64 students in 2 different classes. In the beginning, the students had a hard time understanding the new development environment, but completely understood the development system for commercial companies by developing 3-Tier App, identifying data in the database server with different IPs from the development PC after completing system configuration with 1 week to 2 weeks.
## 5. Conclusions

We have educated 3-Tier App training system as a practical class for 64 students in 2 different classes in junior students of computer information major. As a result, the excellent educational effectiveness was confirmed in the Comparison of 3-Tier and Stand-alone app development training system for 10 distinct description.

Currently, the 3-Tier App development training system is under review for being adopted as a regular program of graduate school. Also, the system is being tested on teachers at a specialized high-school as a demonstration purpose. It is believed that this 3-Tier App development training system can be integrated with machine to machine and big data to continuously be as same development environment as actual commercial companies in the future.

Furthermore, the foregoing session provided the students who took the 3-Tier App development training system with opportunity to fully understand complicated and various environment configuration of database server. Especially, the training session, which involves monitoring data transfer among development PC, database server, and trunk system being centered on the Gateway server, execution command, and system command, is believed to foster the students as custom-made talents who understand company’s development environment.

In the near future, this paper will be submitted for consideration as a national policy proposal for computer programming education in college and university. As a follow-up study, the proposed system is planning to spread in all educational institutions.

## REFERENCES


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