RESEARCH ARTICLE

Computer Laboratory Asset Management System with Analytics

Qiyi Liang[1], Ma.Visitacion Gumabay[2]

[1] Yangjiang Vocational and Technical College, Yangjiang, Guangdong, 529566, China

[2] St.Paul University Philippines, Tuguegarao City, Cagayan, 3500, Philippines

Abstract: With the development of computer information technology, the information revolution permeates every corner of life. Colleges and universities are the frontiers of information development, and their hardware infrastructure construction is relatively perfect. Due to the large number of people in colleges and universities, the computer room and computer training room equipment are also required. Traditional computer asset management methods are inefficient, especially the management of computer laboratory assets, which is not standardized and difficult to manage and count online. Therefore, we need to develop a set of online computer training rooms asset management system, equipment management, assets input, assets, to solve the online query, asset service, asset leasing, fault statistics, maintenance records, etc., at the same time, through the system specification work of the staff of computer room, computer lab asset management more standardized and efficient.

Keywords: Computer Laboratory; Asset Management; Asset Management System; System Design.

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1. Introduction

This topic develops a set of computer laboratory assets online management system, used to standardize the management of computer laboratory assets, in order to improve the efficiency of computer laboratory assets management [1]. School computer laboratory managers can improve working methods and efficiency with the help of the system. School administrative managers can also understand the use of computer equipment assets online through the system, and timely understand the use and operation status of computer laboratory assets [2].

2. Methodology

2.1 Research Design

The system was developed using a rapid prototyping model, a system that can be run, modified, and improved over time.

The rapid prototyping model allows preliminary but not complete analysis and definition of software requirements in the demand analysis stage, and rapid design and development of software system prototype, which shows users all or part of the functions and performance of the software to be developed. Users test and evaluate the prototype and give specific improvement suggestions to enrich and refine the software requirements [3]. Developers modify and improve the software

accordingly, until the user is satisfied with the recognition, software complete implementation and testing, maintenance as shown in Figure 1.

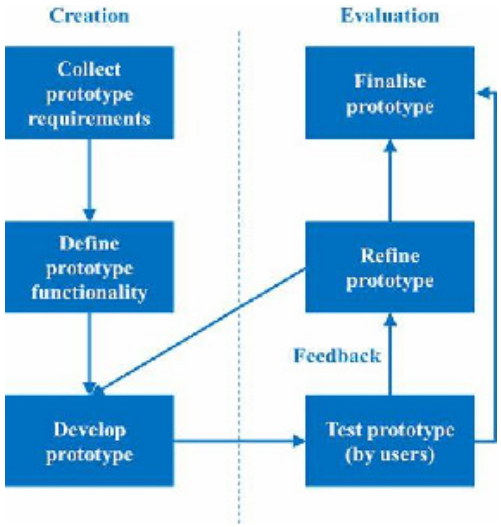

Figure 1. Rapid prototyping flowchart

2.2 System Architecture

The software system is divided into three layers: Data Layer, Business Logic Layer and View Layer.

The three-tier architecture can better support distributed computing environment. Logical layer applications can run on multiple computers, making full use of the computing capabilities of the network. The biggest advantage of the three-tier architecture is its security. Users can only access the data layer through the logical layer, reducing entry points and shielding many dangerous system functions as shown in Figure 2.

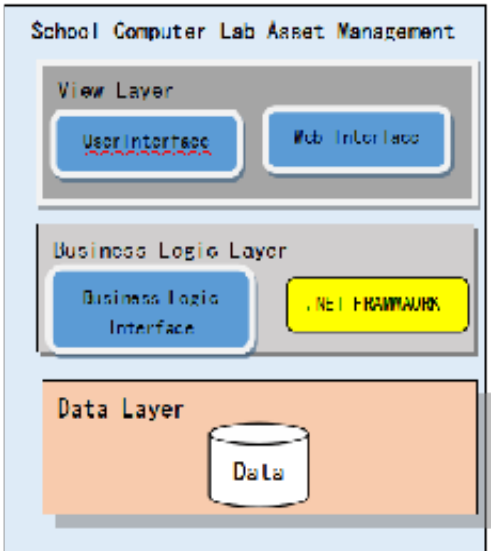

Figure 2. System Architecture

2.2 System function module diagram

The system design was analyzed according to the energy module of the system work, and the overall functional structure of the system was initially defined. Under this structure, the functional modules of the preliminary design of the system are shown in Figure 3.

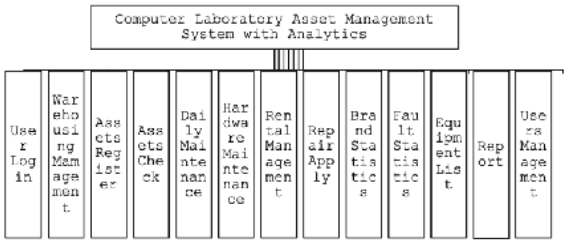

Figure 3. System function module diagram

As regards to the functional module diagram, the system was divided into 13 functional modules, which are mainly classified by function as shown in User Login, Warehousing Mamagement, Assets Registe, Assets Chec, Daily Maintenance, Hardware Maintenance, Rental Management, Repair Apply, Brand Statistics, Equipment List, Report, and Users Management.

3. Results and Discussions

3.1 Current practices of the university in managing computer laboratory assets

At present, in the maintenance management specifically on keeping the book report, the administrator of the department needs to go to the computer laboratory to refer to the book report for monitoring and tracking purposes. In the equipment warranty, oral or telephone call has been their means for communication to attend to concerns on repair purposes. Also, in terms of the asset lease of the computer laboratory, paper version registration application has been adopted, and the applicant needs to conduct legwork approval in multiple departments.

3.2 Problems and challenges encountered by the management in managing the computer laboratory assets of the university

1. Differences exist in the asset management data of the computer laboratory. The whole life cycle of the assets of the computer laboratory includes equipment

procurement, lending, returning, use change, liquidation, damage, statistics, and other links. Manual recording and sorting are incomplete, not unified, and not done on time.

2. The asset supervision mechanism of computer laboratory is not well maintained. Computer laboratory assets get damaged, lost, and abandoned in the process of utilizing them.

3. The asset management of computer laboratory is cumbersome. The workload of asset management in the laboratory is large and the asset management personnel is limited.

3.3 The Developed System

The developed system has been designed to enhance the asset management practices of the computer laboratory in colleges and universities. The said system has a strong adaptability, combined with the actual management activities reasonable allocation, comprehensive use, and possesses a strong management efficiency. The development of the system is divided into two parts such as follows: database design and system implementation.

3.3.1 Database design and analysis

The goal of database application system development is to establish a system data information product that can meet the long-term needs of users. The system has a total of 8 tables consisting of Equip warehousing List, Asset Register List, Assets Check List, Daily Maint List, Hardware Maint List, Rental Maint List, RepairApplication List, and Users Management List. Moreover, the following is a detailed description of the important fields in the system.

Equip Warehousing list. This is the core data table of the system, which records the detailed information of the equipment. The details are shown in Table 1.

Table 1. Equip Warehousing list

Field Name	Description field	Type	Note
EntryDate	Equipment entry date	datetime	No
DeviceName	Device name	varchar(50)	No
Type_config	Device type and configuration	varchar(50)	No
LabNo	Equipment placement laboratory number	int	No
AdminName	Administrator name	varchar(50)	No
Provider	Equipment provider	varchar(50)	No
Contact	Customer service contact information	varchar(50)	No

Rental Maint list This table mainly records rental information, as shown in Table 2.

Table 2. Rental Maint list

Field Name	Description field	Type	Note
DeviceId	Equipment serial number	int	No
DeviceName	Device name	varchar (50)	No
LendingDepartment	Loan department	varchar (50)	No
BorrowingDepartment	Borrowing in department	varchar (50)	No
BorrowTime	Borrowed time	datetime	No
ReturnTime	The return time	datetime	No
Handler	handlers	varchar (50)	No

Repai Application list. This form records the application information of equipment delivery for maintenance, and the details are shown in Table 3.

Table 3. RepaiApplication list

Field Name	Description field	Type	Note
LabNumber	Lab number	int	No
FaultyEquip	Faulty equipment	varchar (50)	No
FaultySym	Equipment failure symptoms	varchar (50)	No
FaultyCause	Equipment failure causes	varchar (50)	No
Maintence	Send out for maintenance	varchar (50)	No
Result	Treatment results	varchar (50)	No

3.3.2 System implementation

The functions of the computer laboratory asset management system are shown in the above system design, and are designed according to 13 functional modules. The implementation effects of the important functions of the system are as follows:

Warehouse management implementation. The system administrator can add, delete, modify, and query the storage device information, including the device name,

asset number, manager, supplier, contact person, storage time, and configuration type. The realization effect is shown in Figure 4.

Figure 4. Warehousing management

Rental management implementation, registered users view equipment resources, put forward applications for renting equipment.The realization effect is shown in Figure 5.

Figure 5. Rental management

Repair Apply implementation, the equipment will be damaged after using for a period. If there are no spare parts in stock, it is necessary to send them out for maintenance, and the maintenance of the equipment needs to be recorded in detail.The realization effect is shown in Figure 6.

Figure 6. Repair apply management

3.5.3 Fault statistics implementation

Working process: Click the button of "Fault Statistics" to display the proportion of faults in each year. The statistical data is updated in real time from the module of "Hardware Maintenance". The implementation is shown in Figure 7.

Figure 7. Fault statistics management

3.3.4 Equipment List implementation

Working process: Click "Equipment List" button and select query computer laboratory number to display the asset list of each computer laboratory.The implementation is shown in Figure 8.

Figure 8. Equipment List

3.3.5 User Management implementation

Functions include: User management and user registration.The implementation is shown in Figure 9.

Figure 9. Users management

3.3.6 Extent of compliance of the developed system with respect to ISO 25010 software quality standards

Table 4. Summary table on the assessment of IT experts on the extent of compliance of the developed

system to ISO 25010 Software Quality Standards.

Criteria	Weighted Mean	Descriptive Interpretation
Functional Suitability	4.23	Very Great Extent
Performance Efficiency	4.30	Very Great Extent
Compatibility	4.65	Very Great Extent
Usability	4.38	Very Great Extent
Reliability	4.30	Very Great Extent
Security	4.42	Very Great Extent
Maintainability	4.38	Very Great Extent
Portability	4.43	Very Great Extent
Overall Mean	4.39	Very Great Extent

Table 4 presents the assessment summary on the extent of compliance of the developed system to ISO 25010 Software Quality Standards

It can be seen from the table that the mean assessments in all criteria are characterized as "Very Great Extent". Also, the overall weighted mean of 4.39 implies that the developed dynamic alumni analytics and mining system has generally complied with the ISO 25010 Software Quality Standards requirement in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability as assessed by the IT experts to a "Very Great Extent". This means that IT experts found the system to be usable, perform its perceived functions, and (met their needs) performance of software processes are in place.

3.3.7 Added features that can be done to enhance the developed system

There must be periodic reports (report for equipment acquisition, report for repaired equipment or devices, report for monitoring, report for status check, etc.) to be generated to come up with weekly, monthly, or as to date reports. Also, there must be a provision for a simple inventory of computers, devices, and equipment per computer laboratory.

4. Conclusion

Based on the results of this study, the following conclusions were drawn.The computer laboratory asset management designed in this paper is particularly timely and vital for it addresses the problems and issues encountered by the users. It is designed to manage the resources in the laboratory for easy monitoring of the status of the hardware, software, storage devices and other equipment endorsed to the computer laboratory department.

Moreover, the development of the system improves the ability of computer laboratory asset managers to efficiently manage laboratory equipment, updates the concept of equipment management workers, speeds up the process of equipment management information and network, and realizes the standardization, and scientific management of laboratory assets.

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