Enterprise Management Information System: Design & Architecture

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ABSTRACT
The field of information systems deals with systems for delivering information and communications services in an organization and the activities and management of the information systems function in planning, designing, developing, implementing, and operating the systems and providing services. These systems capture, store, process, and communicate data, information, and knowledge. The systems combine both technical components and human operators and users. The environment is an organization or a combination of organizations. The process of Automation implicitly refers to the use of Information Technology for the development of Information system. Automation of information systems in organizations has been a thrust area since several years now. With the introduction of new technologies and reduction in their cost the affordability of automation of activities in different organizations has grown significantly [1][4].

I. INTRODUCTION

It is observed that like many other organizations several independent Information Systems have emerged over the period of time in enterprise. Thus, integration of all information systems in such situations, so that they interchange information seamlessly and provide the single-system image to users, is very significant [2] [4]. Data warehouse has been conceded as a practical way to collect, process, and represent valuable information to support management decision making [15][18] and has gained significant applications over the past several years [19].

The ISs are studied in 2 aspects: database structure and computer architecture, of which the part of database is presented in this paper. The results of database analysis are used as basis of the design process. In the ISIP, only conceptual design is done, i.e., the logical configuration of database interconnections and technological standards are specified. Then, the managerial information, such as implementation priority and budget, is added to document the final report.

As a result of analysis, all databases share some identical data items, of which information updating requires only batch processing. Thus, database replication and application program interface (API) techniques are specified for integration of databases with identical and different database management systems, respectively. In addition, the data warehouse, in which all significant data for management is collected and stored in the meaningful format, is recommended to be implemented to support management decision-making.

II. METHODOLOGY

The IS integration plan is executed by the IT consultant team enterprise. The team consists of specialists in various areas: project management, information system analysis and design, database design, computer networks, etc. The integration can be accomplished by applying the methodology which has three phases:

Phase 1: Review and analysis. In this step, the existing information systems being under operations and during acquisition processes are investigated [1][2]. The study is conducted in two aspects:

[1] Program and data structures, and 2) computer architecture and networks. For program and data structure analysis, relationships among database tables (files) and between programs and the corresponding database tables are extracted. The database tables are clustered into groups, in which for a particular group the tables have tight relationships with each other and loose relationships with others in another groups. In addition, data items shared among databases of different systems are identified and then classified into various types. For computer architecture analysis, system configurations and network topologies are studied. The study

results are used as basic information in the next phase: conceptual design. The information required in review and analysis phase of IS projects is collected from analysis and design specification documents of the projects.

Phase 2: Conceptual design. The objectives of this step are to conceptually design a configuration of databases and computer networks integration, so that information can be interchanged seamlessly and overall systems have a single-system image to users. The Design is done on the basis of distributed computing architecture. This is because the UNIVERSITY is a large organization and has distributed management strategies, for which centralized processing architecture is improper. In this design, only a logical configuration of database integration, conceptual techniques of database access, and technological standards to be used are specified.

Phase 3: Final report documentation. In this step, the conceptual design specification report in Phase 2 is extended with managerial information such as implementation plan, investment plan, human resources development, IS management organization, etc. to be the final report. Together with the submission of the report in each phase, the conference presenting the findings, designs, and recommendations is organized to ensure the project being executed properly.

III. SYSTEM ANALYSIS

Presently the Enterprises have implemented several computerized information systems to enhance the service quality and efficiency for customers and employees. Such systems range from a transaction-processing system, which supports operational staffs on day-to-day basis jobs, through executive information system, which analyzes and provides valuable information to support the management in decision making. Thus, it is necessary to study all current information systems being operated and information system projects to be implemented in the future. The methodology described is applied by separation of information systems analysis and design into two aspects: 1) program and data structures, and 2) computer architecture and networks. The databases analyzed by investigating the relationships among tables (files) so that they can be clustered into groups. The following describes the results of review and analysis of programs and data structures.

Management information system (MIS Phase I) The MIS Phase I is a transaction processing system that was developed to support day-to-day operations in seven functional areas: fixed asset management, personnel management, accounting, finance, budgetary management, revenue management, and procurement management.Each subsystem gets access only to its own particular groups, not spread through all groups. As an example, the fixed asset management subsystem normally accesses only its own groups: inventory control and asset management.

Personal identification card information system. This system is developed in order to improve the services for the people dealing with records and personal identification cards, the architecture of the system is client/server.

Customer Query and Information System. This system is developed in order to record and maintain complain information and to track the corresponding actions of responsibility units, so that all complaint are responded rapidly and properly. The complaining information system is operated under the identical server and networks of the MIS Phase I. The complaining database has totally n tables with another m tables from the MIS Phase I. Those n tables are clustered into x groups: say complaining data containing 10 tables, Action Data containing 9 tables, and response data containing 4 tables.

Enterprise Information System: University Case Study

Examination System. This system has to be developed in order to support most of the examination related operators. The main functions are: Enrollment preparation of Students, Award Entry, Post Graduate and Under Graduate Result preparation, Printing of Marks Cards, Degree Certificates and Provisional Certificates, etc. The architecture of the system is client/server, of which the operating systems of client terminals and server are MS-Windows and UNIX. The Data entry for awards is mostly carried on UNIX and rest of the Data entry is carried on Windows operating systems. The database management system is specified to be Oracle, SQL and FoxBASE (for UNIX), so that data is shared seamlessly with the Information System. As the results of analysis, the overall 242 dynamic relational tables are clustered into 20 groups. Tables in each group are tightly related to each other internally, while they are weakly tied with others in another groups. This design provides database modification to be done in an easy manner.

[1] **Document image-processing system.** The objectives of this system are to archive and retrieve information in the format of image data, so that proper documents can be searched and retrieved in an effectively manner. The system is mainly used in the photograph mapping, paper evaluation and form mapping of student records. This system has a client/server architecture, of which the server is SQL and Windows platform. The document image-processing system has maintained data in a 2 categories. Text Data in relational database format and image data in image file format.

[2] **Library Information system.** This information system is designed for the Library of the University. The system to be developed to support day-to-day operations of the Library under ministration of UNIVERSITY. The architecture of the system is host-based processing, of which database management system is SOUL. There are totally 65 tables, which are clustered into 12 groups. However, UNIVERSITY has only the license of executable programs. This information system also has access to 8000 National and International Journals. It is recommended to initiate a new project to develop new programs, so that the UNIVERSITY owns source programs and reduces maintenance budget in long terms.

[3] **Executive information system (EIS Phase I).** This is only a part of executive information systems to be developed in for University. EIS Phase I was designed to support management in 4 functional areas: revenue management, budgetary management, personnel management, and asset management.All data is collected and summarized from the database of MIS Phase I. The system is developed by using SQL Express and VB. However, EIS Phase I has not been yet used by management because the database of MIS Phase I is still incomplete.

[4] **Other information systems.** These information systems are currently under either development or acquisition processes as indicated in (2). Then, analysis was accomplished by investigating only the design documents of consultant teams. The followings are found from analysis of those information systems:

each system is client/server architecture, of which the database is centralized in only the database server of each system,
most systems have maintained some data items redundantly with the database of MIS Phase I, there is not any technical specification for interconnecting those databases

IV. CONCLUSIONS

The paper presents the summary details of the MIS setup for enterprise, a part of the information system integration plan of the enterprise. The consultant team has to apply the methodology consisting of three steps: review and analysis of current information systems, conceptual design of database integration, and final report documentation. The plan covers the most significant information system project in the UNIVERSITY. Those information systems are investigated in 2 aspects: database structure and computer system architecture. The results reveal that, for a particular information system, the database can be clustered into several groups..

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