

Application of Simulation and Forecasting Models for Libraries

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ABSTRACT

Increased use of software engineering for model analysis, multimedia technology for usability, explicit support for reuse, metrics for project management and an increased use of natural language facilities will allow tomorrow's end users to create their own application. The library is the most important resource for students and young engineers who wish to develop professional expertise quickly. This paper proposes two models viz., simulation model for Library Budget and CASE centered library-forecasting model. Models represent reality and simulation imitates it. Simulation is the imitation of the operation of a real world process or systems over time. The paper deals about the purpose of simulation, steps in simulation, CASE tools, and CASE centered library model. Forecasting is employed for the projection of these operations and patterns into the future. The CASE centered forecasting model projected in this paper may be used for the development of an application system to show the potential of shared data base applications or as a foundation for a library management reengineering effort.

KEYWORDS: Simulation model Libraries, Forecasting modes – Libraries, CASE Tools

0. INTRODUCTION

The great advances in information storage and digital technology in computer software has greatly enhanced the engineer's ability to model designs. The rapid development of a number of information sources and content creation has led the information centers and libraries to form database, model base and knowledge base decision support systems with the application of new dimensions in software systems, the concept of database models in data dictionaries has interaction with circulation control system, acquisition control system, serial control system etc., in various dimensions. If the software system can accommodate different types of input and output devices and the system can enable users a shared user interface, then such models could serve as the basis for a software model construction for libraries. Purpose of the simulation is to explore various outputs that might be obtained from the real system by subjecting the model to environments that are in some way representative of the situations it is desired to understand. The main objective are the tools and techniques needed to provide the right information to the right reader at the right time.

Librarians have to plan all their operations some time in advance and their decisions take effect at some point in the future. The forecasts are the best estimates of what is going to happen in the future. Michael Armstrong (1986) has defined 'Forecasting' as indicating in advance the extent to which the state of affairs can be anticipated by means of some set of independently selected variables. The term forecasting has been often used in the context of the prediction of the behavior of the same variable(e.g. , tools for accessing information sources of the same subject)

1. SIMULATION MODEL

Simulation can be used to experiment with new designs or policies prior to implementation so as to prepare for any type of situation.

Shannan (1975) has defined simulation as the process of designing a model of a real system and conducting experiments with this model for the purpose either of understanding the behavior of the system or of evaluating various strategies for the operation of the system. Simulation is the manipulation of a model. Simulation enables the likelihood of many decisions on complex situation to be estimated in conditions of uncertainty when chance elements may play an important part.

1.1 Purpose of simulation:

- Simulation models can improve decision quality through their consistency and objectivity. (Chitra and Babai (2000))
- Simulation involves subjecting models (of all types) to various inputs or experimental conditions to observe how they behave, and thus explore how the real world design might behave under similar conditions.
- Simulation can provide a simpler alternative when analytic techniques exist but are very complex to utilize.
- With simulation the configuration of structure of the model can be easily changed to answer "what happens If..? questions.

1.2 Steps in simulation

Chitra Sivakumar and K S Babai (2000) have illustrated the steps in simulation as follows:

Formulate problem and plan the study.

- **Setting of objectives**
- **Collect data and define a model**
- **Construct a computer program and verify**
- **Analyze output data and**
- **Document, present and implement data**

1.3 Simulation model for budget allocation

A Simulation model is suitable for budget allocation. Simulation is the imitation of the operation of a real- world process or systems over time. This model usually takes the form of a set of assumptions concerning the operation of the system. These assumptions are expressed in mathematical, logical, and symbolic relationships between the entities, or objects of interest, of the system. Once developed and validated, a model can be used to investigate a wide variety of ‘what- if’ questions about the real world systems. The state of a system is defined to be the collection of variables necessary to describe the system at any time, relative to the objectives of the system

1.3.1 Software simulation approach: With the software approach, operation of the system under consideration is modeled in digital fashion using general purpose computer. Arrivals are generated as necessary for each of the input channels of the model and the probabilities are ascribed to such items as priority levels for service.

For example budget allocations from different sources describes arrivals at the edge of using different inputs. Provision must be made for modeling of budget operation and acceptance gaps for turning budget.

Software simulation has immediate attraction and while detailed consideration is appropriate for the moment, several points can be made immediately. It models these processes, simulates the basic relationship with each other, and shows the immediate effect of a multitude of decisions made with respect to those processes.

1.3.2 Event- By- Event simulation: For simulation of this type, emphasis lies on updating the overall situation only on the occurrence of events. Events are associated explicitly with time intervals drawn from some appropriate distribution. In event based simulation it is just the other way around. It deals with time steps of varying length such that there is always exactly one event in every time step. So, the simulation is controlled by the occurrence of “next events”.

For example, in the simulation of a single budget allocation (fig.1). (i.e. budget from one source), the sources of funds for new arrivals will require not merely the simulation of the events themselves but also time intervals to subsequent arrivals. The length of service time, again drawn from a suitable distribution, must be specified in similar fashion.

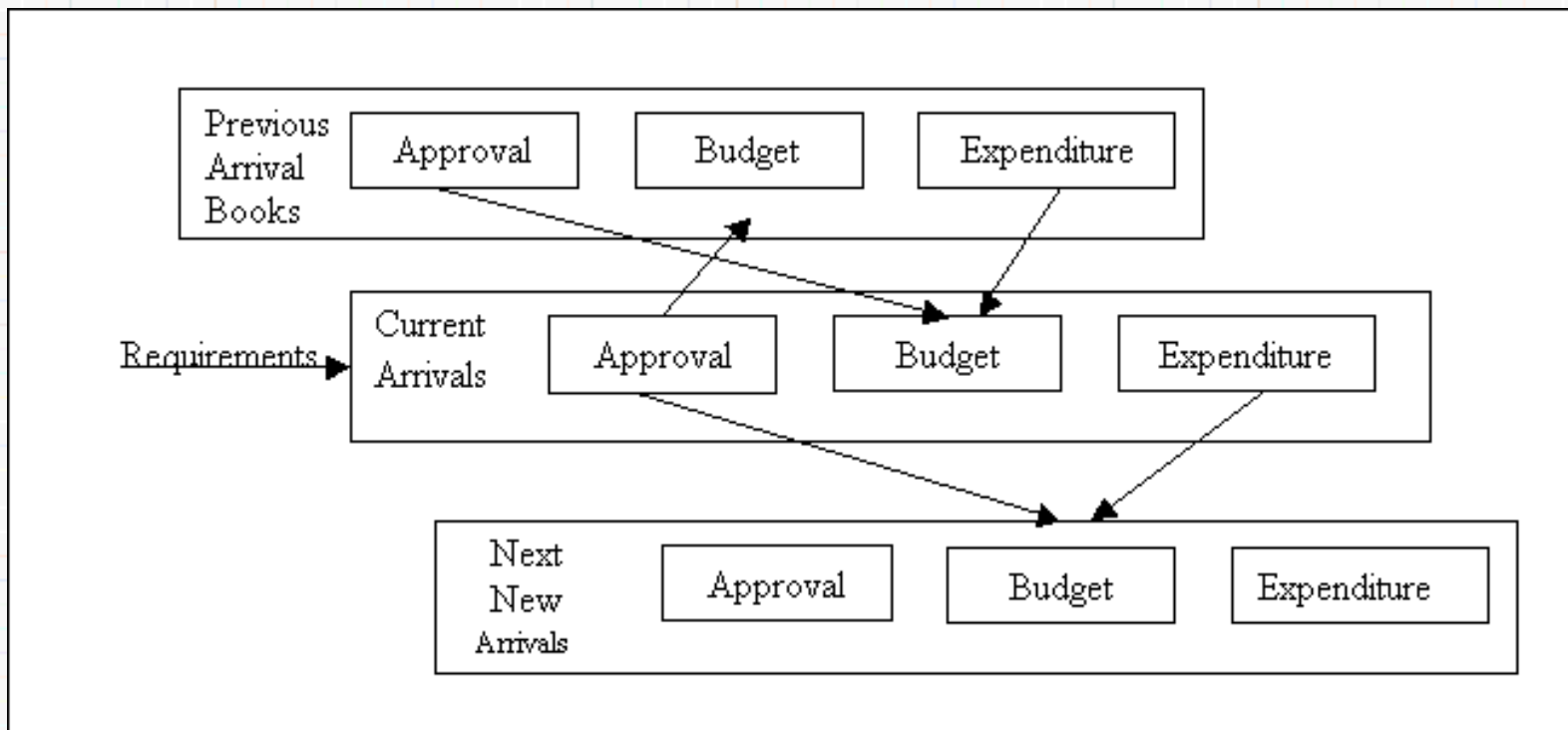


Fig.1 Simulation Model For Budget

Each phase is thus modeled with various input files. Requirements enter the system according to subject-wise, and the expenditure phase is therefore given priority to purchase more demanding books that are in the syllabus. In the approval phase every requirement receives a priority. All requirements have normal priority .i.e. priority 2 is transferred to the approval phase within the current new arrivals. Priority 3 requirements are post-poned to the approval phase of the next release. Priority 1 requirements are moved to the approval phase of the previous new arrival list selection. When a new arrival is initiated in the model an allocation for each sources is created. The arrivals in the budget phase are idle during approval, while waiting for the expenditure phase of the previous release to finish. The personnel that are represented in the simulation model by the requirements, are in reality the same

persons represented by the on- line in the previous arrivals.

During approval, the expenditure of each requirement is estimated. A must list and a wish list is constructed according to the description of the REPEAT process given above. Requirements that enter either of these lists are sent to the approval phase of the next release, where they may or may not be selected for construction.

When the year ends or the deadline for the budget is reached some requirements may be left uncompleted and they are sent to the approval phase of the next year. This also occurs when the book is out of print.

2. FORECASTING MODEL

Forecasting is continuous and is never finishing. All the planning and decisions of Librarians are based on forecast of future conditions. Each piece of data in a library is used to satisfy the users.

2.1 CASE Tools

A principle of CASE is that wherever possible diagrams are used, as an aid to clear thinking. A good CASE tool stores that meaning in a computer processible form. The tool helps build up a design, data model, or other deliverable segment of the development process in such a way that it can be validated and then used in a subsequent development stage.

2.2 CASE can

- Automate many manual task of system development.
- Promote standardization based single methodology.
- Generate a large portion of the documentation for a system, such as data flow diagram, data models, structure charts and other specifications.

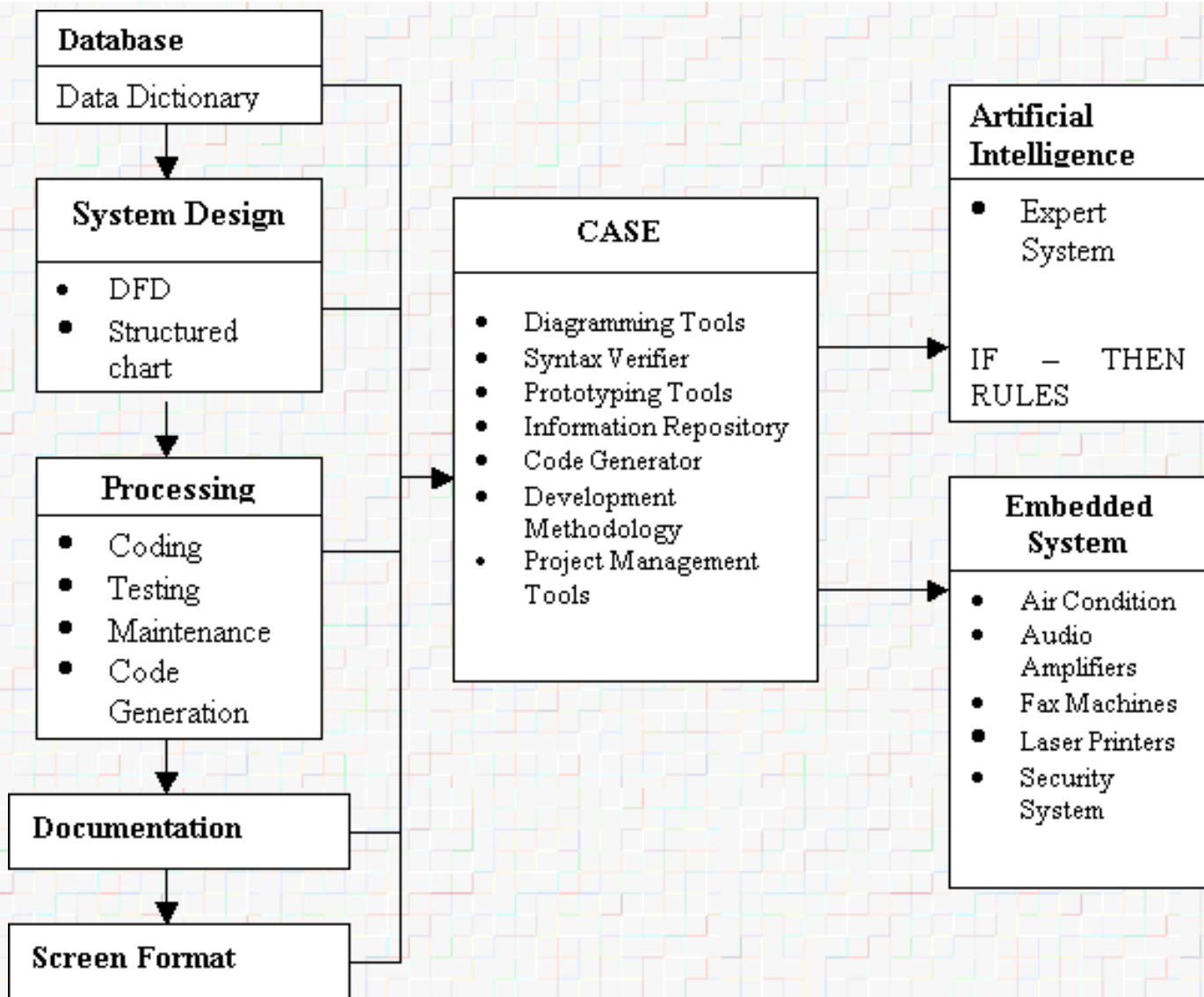


Fig.2 Case Centered Forecasting Model

CASE Tools allow a CASE centered forecasting model (Fig.2) to be built and complex systems are sub divided into pieces which uses the CASE centered forecasting model. Many CASE diagrams show objects and association among objects. The objects are drawn as boxes on a diagram and the association are drawn as lines connecting the boxes.

In current systems, users do not know which node has the information being searched. An artificial intelligence front end will aid the users in this search and back end tools takes care of coding, testing, code generation etc.,

Once a document is retrieved, links in the document will allow retrieval of associated documents. In separate window for OPAC (On Line Public Access Catalogue) is displayed which illustrates advanced searches.

CASE Centered Forecasting model is composed of the following sub system:

- **Database**
- **System design**
- **Processing**
- **Documentation**
- **Artificial Intelligence**
- **Embedded System**
- **Screen Format**

This module is designed for all types of library transactions for acquisition , circulation, serials etc.,When Web based embedded systems and digital audio embedded systems are operated for the LIS search the requirements are fully met without delay.

2.3 Exact Library CASE Retrieval

Whose purpose is to identify library assets that satisfy the submitted query with respect to every aspect.

The experience led to highlight future works such as adoption of forecasting model for embedded technology. The technology can be adopted to asses the library input variables for monitoring their applications. The Library organizational aspects can be integrated with large number of embedded systems such as:

- **Air conditioners**
- **Audio amplifiers**
- **Fax machines**
- **Laser printers**
- **Security systems**

A large number of embedded systems offer some form of display device to convey information to the user.

3. CONCLUSION

In general, CASE tools improve the quality of the system development process and the organization can quickly identify changes and adapt new environment with the user. As technology increases the opportunities, CASE gives the capability to get the right information to the right people at the right time. It also gives them tools for processing it. When that capability exists the library management structure adopt the latest technologies about who needs what information and who should be making what types of decisions. Many different aspects of library network have to be integrated for new areas of sharing information. In the future, knowledge bases will be a vital asset. Expertise built CASE tools becomes steadily more refined, so any user can do the retrieval of all stored knowledge easily, efficiently and fully. The data network of CASE Centered Forecasting model will act as the nervous system of library and information centers attached to the server act as its nerve endings.

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REFERENCES

1. B.Scholz- Reiter E.Stickel, Business Process Modelling, Springer-Verlag, pp 319,320, 1996.
2. Chitra Sivakumar and K S Babai, Management of information Services,Tata McGraw –Hill Publishing Company Limited, New Delhi, pp 164 to180 ,2000.
3. James Martin, Information Engineering,Prentice Hall, New Jersey, 1989, pp 29-55

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