

# ECONOMIC ANALYSIS THROUGH DATABASES

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**Abstract.** *The paper will present the possibility to develop information systems based on dynamic web language with interconnected databases. In this paper we want to attempt the way of shifting the information systems that runs on identical platforms to information systems that run from any platforms and from all over the world, creating this way a universal platform that can use theoretically any database. Also in this paper will try to present a model of interconnecting databases based on fractal theory.*

**Keywords:** *information system, database, dynamic language, fractal, information fluxes.*

## 1. Introduction

Not many years ago, processing information was performed manually and transmission was done on paper. The appearance of mechanographic ways for processing information, led to a different manner of approaching information systems.

The invention of electronic computers has led to the idea that a modern information system can only be fully mechanized and automated. This idea was quickly abandoned because not all the management and execution can be standardized, thus remains a series of activities that cannot be driven solely by computer. In this component of the system people are operating information according to their meaning. Such processed information appears on the entry and exit, where people are identified. The primary objective of an information system is provided with maximum information necessary to the management. We can appreciate that, the computerization of information systems is in fact a process of increasing their efficiency and therefore the notice of decision.

The level of computerization of the information system depends strictly on the level of complexity for decision aggregation and potential

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financing in commercial enterprise. Therefore, in order to achieve a permanent system, to be compatible with all platforms on the market but with a reduced share of the level of funding – Web 2.0 technology has allowed the appearance of such systems that run in web browsers on secure systems, allowing a total compatibility between existing platforms at the moment.

This paper will try to present the model of an information system that can be compatible with all platforms on the market and also can work with more than one database at a time. Also we want to introduce a new model of interconnecting databases using fractals.

The model of interconnecting databases that we introduce is based on Benoit Mandelbrot fractal theory that can be used much more efficiently.

Benoit Mandelbrot came up with a method of creating fractals that fit the above description. He based in on simple generator iteration and created base-motif fractals that could model the market. In the February 1999 issue of Scientific American, he published some of his fractal “forgeries” next to real market lines, showing how remarkably similar they were.

The concept of fractals has been spread over all fields of sciences and represents “a rough or fragmented geometric shape that can be split into parts, each of which is (at least approximately) a reduced-size copy of the whole, a property called self-similarity”.

## **2. Information systems**

Today, more than ever, conducting any business, financial or banking, cannot be imagined without a strong support to ensure competitive advantage to other competitors in the market.

For most enterprises and companies an essential aspect is the investment in to a performing information system. The investment should be as small as possible to offers in the same time a reliable and strong system. This has lately led to the emergence of migration to the Internet for the information systems. For this reason more organization and management systems are using Internet technology.

By using the internet and PHP language, which is a dynamic programming language with many possibilities, it can create low-cost reliable and powerful systems for any company.

Such a system, adaptable to any area of business processes and internal organizations can be considered a universally adaptable system of

management and organization. This can create a system called generic AUMPS – Adaptive Management and Production System. AUMPS seeks combining segments of production, marketing, commercial, raw materials administration, human resource management and financial accounting in companies. This AUMPS process is based on creation and use informational fluxes adapting new feeds to existing ones.

AUMPS is a centralized information system based on Web 2.0 technology that combines PHP language with MySQL databases to create a system that doesn't require application of client-server type for data introduction and management. Thus it is enough that users to have computers connected to the Internet and to make appeal to the server address using an Internet browser.

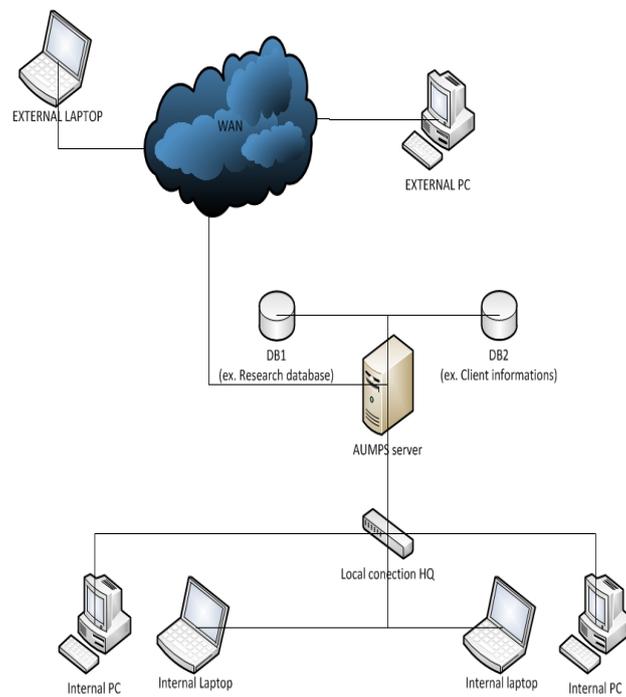
Thanks to the platform he needs to run and also to the universal system needed to access the data, AUMPS reduce the cost of investment in the companies' information system because it uses only a single server with a backup system, only a single license for all terminals connected to it and can also be possible to use the existent computers without making a new investments in new ones.

Another advantage is quick access to all company data from any part of the world without a specialized program type.

We identify the following advantages of the AUMPS system:

1. System requires a single server to run.
2. The operating system on this server can be Unix, Linux or Windows, the system can run on any of the three operating systems without the need for rewriting the code, thus achieving a rapid portability system when the company wants to move from one platform to another.
3. It is not necessary to have any type of specialized software client-server to access the data because access is made directly from your Internet browser.
4. Does not require changing the infrastructure of the company system, the system can run on older course that have a connection to the network or the internet
5. Can run on any mobile device with access to the Internet just using an Internet browser.
6. Management in the system uses the electronic signature.
7. The entire company management can be done directly from the program, without needing writing paper.
8. The system has the option of saving any type of file created in other applications.

9. The system can be changed by a specialist IT who knows PHP language, thus allowing to the end a greater control and the deployment of new features based on modules of a specific area of their own.

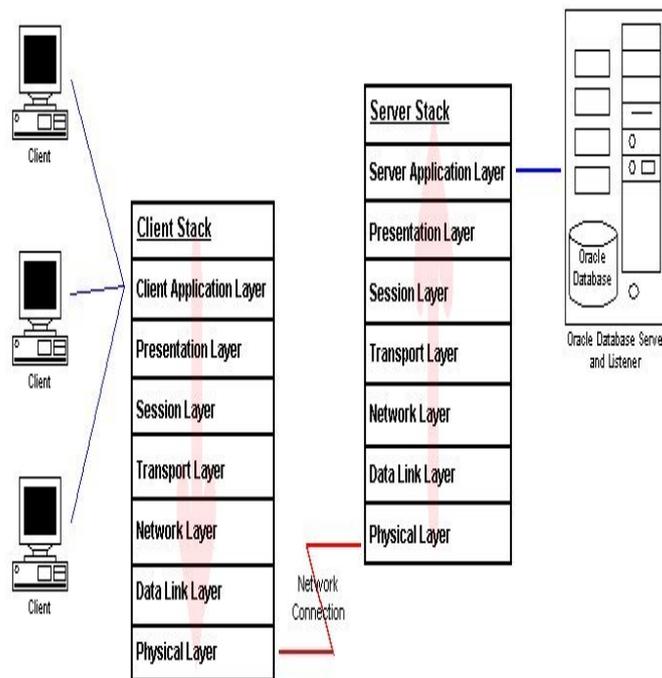


**Figure 1.** Interconnections with the AUMPS system.

### 3. Designing databases

As show in the Figure 1 the AUMPS system can use two databases that are interconnected with the Open Systems Interconnection (OSI).

The open system interconnection model is a product of the open system interconnection effort at the international organization for standardization. It is a way of sub-dividing a communications system into smaller parts called layers. A layer is a collection of conceptually similar functions that provide services to the layer above it and receives services from the layer below it. On each layer an instance provides services to the instances at the layer above and requests service from the layer below (see Fig. 2).



**Figure 2.** The Open Systems Interconnection (OSI) Model.

–Application Layer: The application layer is a first and host layer of the open system interconnection model. The application layer is provision to applications with network access and user service. Two type of application layer, client application layer and server application layer. Both application layers are connected with network connection.

–Presentation Layer: The presentation layer is the second and host layer of the open system interconnection model. The presentation layer formatting between application layer above and session layer below of the open system interconnection. The presentation layer like two task character and data-type conversion and SQL, PL/SQL by processing by OCI on the client node or OCP on the server.

–Session Layer: The session layer is the thread and host layer of the open system interconnection model. The session layer is a communication between database software on client and server nodes.

–Transport Layer: The transport layer is the fourth layer of the open system interconnection model. The transport layer like the reliability and routing.

– Network Layer: The network layer is the fifth and media layer of the open system interconnection model. The network layer is addressing and routing information provision between or within networks.

– Data-Link Layer: The data link layer is the six and media layer of the open system interconnection model. The data link layer creates network session packaging data into frames, synchronization, error checking and data flow control.

– Physical Layer: The physical layer is the last and media layer of the open system interconnection model. The physical layer is the hardware definition, physical, electrical and mechanical link between nodes.

In order to better understanding the implementation model we will use a price fluctuations analysis.

The important point is that demand is essentially a stochastic variable because human action can never be predicted perfectly; hence the balance of demand and supply should also be viewed in a probabilistic way. If demand and supply are balanced on average the probability of finding an arbitrarily chosen commodity on the shelves of a store should be 1/2, namely about half of the shelves should be empty. Contrary to this theoretical estimation shelves in any department store or supermarket is nearly always full of commodities. This clearly demonstrates that supply is much in excess in such stores. Excess supply generally holds for most of commodities especially foods in economically advanced countries.

In order to design a correct database for a price fluctuations analytic system we must identified the numerical market model. The model consists of speculative dealers who transact with others simply following the basic rule “buy at a lower price and sell at a higher price”. These two threshold prices are determined at each time step by each dealer taking into account the information of past market price changes. It is shown that even a smallest limit case of three dealers can show chaotic behaviours, implying that the transaction's nonlinear effect is very strong [1]. If we organize this data into a database structures like a table, as below (see Table 1):

**Table 1.**

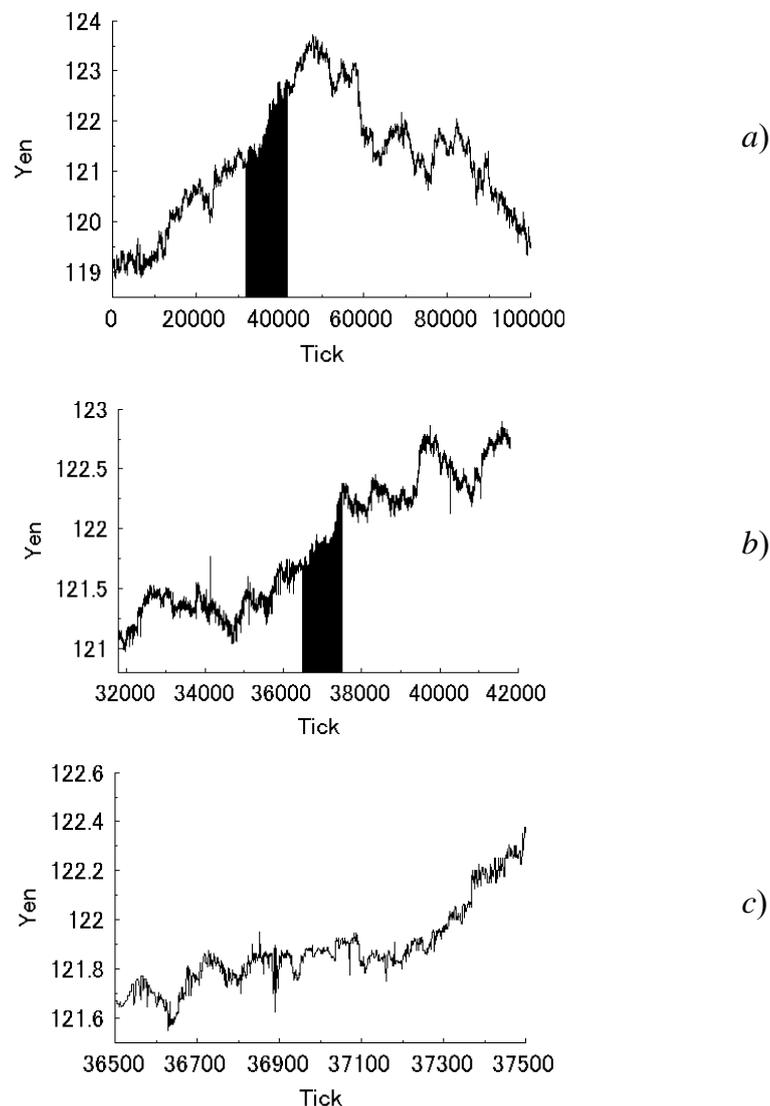
Id price	Buying price	Selling price
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We can obtain in time information that can be manipulating for creating analysis. The model of the table presented can be extended in order to create an analysis based on the formula:

$$C(T) = \frac{\langle \Delta r(T_0 + T) \Delta r(T_0) \rangle - \langle \Delta r(T_0) \rangle^2}{\langle \Delta r(T_0)^2 \rangle - \langle \Delta r(T_0) \rangle^2}. \quad (1)$$

In the paper *Fractal Properties in Economics* written by Hideki Takayasu, Misako Takayasu, Mitsuhiro P. Okazaki, Kouhei Marumo,

Tokiko Shimizu is presented a typical example of yen-dollar rate changes in three different time scales (see Fig. 3). Intuitively this figure demonstrates a fractal property of exchange rates in the time axis measured by ticks, namely, Mandelbrot's classical finding also holds for this contemporary market price fluctuation. The statistics of this fluctuation is very close to random walk; actually it is easy to confirm that the power spectrum of this fluctuation clearly follows an inverse square law that is almost identical to a Brownian motion. The corresponding auto-correlation function for rate fluctuation per tick defined by the equation decay very quickly.



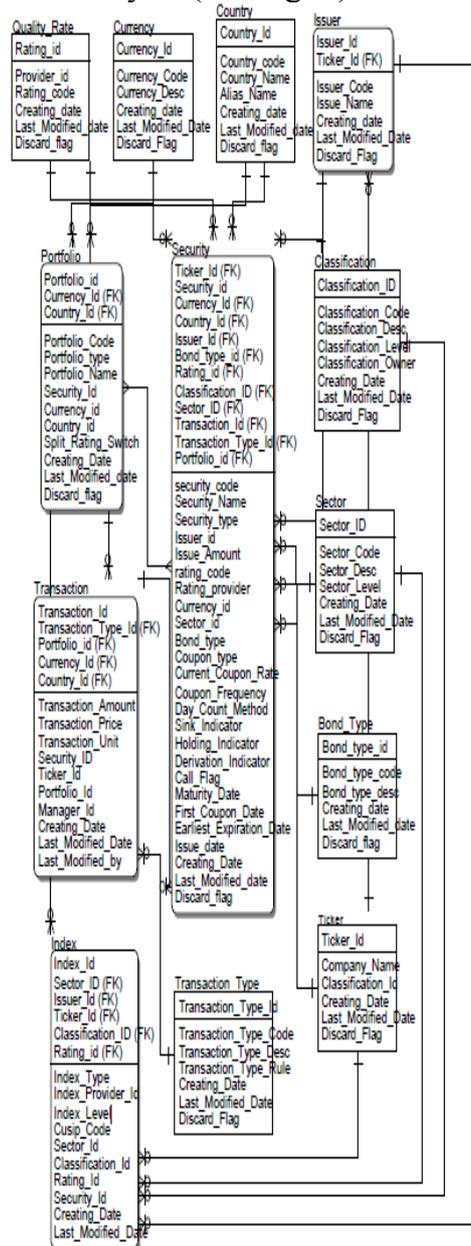
**Figure 3.** Fractal properties in foreign currency exchange rate fluctuations. The dark part of (a) is magnified 10 times in (b), and the dark part in (b) is magnified in (c) [1].

If we extend the table 1 in order to accumulate the information for analysis we obtain Table 2:

**Table 2.**

Id_price	Buying price	Selling price	Transaction Time
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Also we can use the cash-flow model to build the structure of database and for a better analysis (see Fig. 4).



**Figure 4.** Cash-flow model for database design [2].

#### **4. Modular presentation of aumps**

Each module of the main system contained different options. An example is the module Financial/accounting – this function perform financial transactions accounts specific to each company; entries are from all the departments and the output of this module is materialized in the documents specific accounting department (accounting notes, log sales, log purchases, monthly balance, balance sheets etc.). The module is composed of:

a) Customer Accounts – allows the definition of accounts for each client and also generate customers with reports on goods delivered per customer in certain periods of time specified by the user.

b) Accounts suppliers – allows the definition of accounts for each registered supplier arc introduction of payment records with reports on goods and services purchased per supplier in certain periods of time specified by the user.

c) General accounts – under this option the soft generates the following documents: Plan accounts, accounting, financial reports and exchange rates.

d) Budgets – this option allows the user forecast and the budget allocation for the department: subsidiaries. With this feature the manager can follow the dynamics and values recorded each year to highlight the share of spending in each department part in the total expenditure of the company. Through graphs generated by the program, the client company managers will easily identify the amounts required for the function subsystems in subordination.

e) Centre of the income-generating option allows reports for the economic outcome.

f) Cost analysis – this option allows the user forecast short and medium term costs of the cost of the investment to be made, and generate reports on the analysis of the earlier situation.

g) Fixed Assets – accounting for all existing fixed assets or to be purchased. This option also these values by calculating the amortization in each stage of business enterprise and at the same lime reason these costs depending on various factors characteristics of each area of activity.

h) Exchange Rates – carried out the revaluation of assets based on exchange rates.

## 5. Conclusions

The primary objective of this paper work has been highlighting the importance of the dynamic PHP language and MySQL databases in designing and building a universal model for information systems that can be use in any enterprise. As we mentioned in this paper, information, specifically the power of information, is the main competitive advantage of companies on the market.

For years the information system has undergone spectacular transformation. Not long ago, all data and information were transmitted in physical form on paper and all the processes were mentally or at best with Pocket PC. In that period, employee productivity of administrative departments was very low, the required number of employees to cope with a huge volume of work. In that time, information requires a very large storage space and the risk of loss or damaging them was very high.

The information system summarized in this article, not only manages to combine into a universal and easy way the two concepts: that the dynamic web language and databases interconnection, but it manages to bring a new concept – the software can be adapted to any economical activity and can use any multiple database.

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