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The Importance of Data-Bases in the Process of Knowledge Sharing Inside of an Eco-Bio-Economic Cluster

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ABSTRACT

The term „database" refers to a structured collection of data, used to model aspects of reality in a way that allows useful information to be extracted. In order for the data resource to be well defined and documented, easily administered and interrogated, derives the need to use a proper database management system. A Database Management System (DBMS) is an interface between users and the database and is designed to store data in an organized manner and to provide full software support for the development of databases IT-apps. A DBMS must ensure the minimizing the data processing cost, reduce response time, the IT apps flexibility and, of course the data protection. Within a cluster-type strategic alliance, an important part in the knowledge-sharing process returns to the database, which is organized in distinct areas of interest, using methods set by After Action Review, or SMART, or other methods organized under complex procedures. The Knowledge Economy Index Report represents an independent review of databases in different countries, based on innovation, creativity, increased production / sustainable consumption and exports.

Introduction

An essential step in the process of accumulating knowledge in a cluster-type strategic alliance is carried throughout databases, produced by its members.

In this paper we shall briefly present databases made by students of pre-university education institutions, members of an eco-bio-economic cluster, in the context of voluntary activities held during school holidays.

Among the advantages of using database management systems data, we can include:
Data redundancy control; Data coherence; Data sharing; Database integrity; Increased security; Correct applying of the standards; Scale Economics; The right balance between the conflicting requirements; Improving data accessibility and response capacities.

The Role of DBMS in the Success of Strategic Alliances

Many DBMS provide tools to simplify the development of database-related IT-apps. This results in an increased productivity of the programmer in charge, and a reduced time of programming (with a corresponding reduction in costs). The DBMS cost varies depending of the environment and the functionality offered. For example, a single user DBMS on a single machine can cost around $ 100, while a multiuser, mainframe DBMS, which serves hundreds of users, can be extremely expensive and may even reach 750,000 $.. Regular annual maintenance expenses may be added, which usually represent a percentage of the displayed price.

Additional costs for hardware: DBMS disk storage requirements alongside with the database may require purchasing an additional storage space. And then, in order to obtain the required performance the purchase of a larger computer, perhaps one destined to running the databases management system could be necessary. The procurement of additional hardware elements leads to increased costs.

The conversion cost: the implementing of a new DBMS system and / or of a new hardware configuration, the conversion cost of the existing IT-apps, so that they can work in the new DBMS and new hardware configuration may lead to significantly higher costs than those required by the acquisition of any new hardware [13].

These costs may include training of the staff to use the new systems and the possible hiring of specialized staff to assist in converting and functioning of the system. The high costs value is one of the main reasons why some organizations do not want to give up existing systems and cannot move to most fashionable technology databases.

In the structure of a DBMS we can delineate the following main components: hardware, software, data, procedures and people.

The hardware component is the physical support for the DBMS and can be formed by a single personal computer or a mainframe computer, or even an entire network of computers.
Some DBMS may require some certain type of hardware or operating system, while others could work using a variety of hardware devices and platforms

The software component includes programs forming a DBMS, application programs, the local operating system, and also the network software where the DBMS is used inside a computer network. Application programs are designed not only to manage data to present information in specific terms through an interface application

The Data Component is the most important component of a DBMS environment in terms of the end user, and includes operational data and also, the meta-data. The data acts as a bridge between the human and the machine components. The system's user activity and that of the personnel that manages the database are performed according to documented usage procedures and operation of the system.

These instructions concern the opening and closing of a work session, the use of DBMS features and of the software applications, the DBMS activation and deactivation, data archiving, use of backup copies, the proper handling of hardware and software failures, the database recovery in case of incident, changing and reorganizing of the database.

In the DBMS environment we can identify four distinct types of people involved: the data and database administrators, logical and physical database designers, IT-app programmers and the end users.

The data administrator handles the data management, being responsible for conceptual and logical design of the database and database planning, the realization and maintenance of standards, database policies and procedures. Its role is to develop the database in the direct support of the organization's overall goals. It sets out the organization's requirements on data, being responsible for conceptual and logical design of the database, developing the general data model line within the idea of information technology and business progress,

creates standards for data collection, sets the needs and establishes data access protection, ensuring a complete documentation for end users.

The database administrator is responsible for designing, implementing and the physical realization of database security and integrity control, the maintenance of the entire system. He monitors system performance and reorganizes the database, when appropriate, defines security integrity and constraints, and is also responsible for selecting the DBMS and database project implementation, user training and making of backups, must know in detail the used DBMS and operating systems environment. The designer of logical database handles data identification, the relations between them and the constraints on data to be stored in the database. He must have a thorough and complete knowledge of the organization's data and its business rules. The physical database designer takes the logical data pattern and establishes how this will be physically done. This involves transposing the logical data pattern into a set of tables and data integrity constraints; selecting specific storage structures and access methods to ensure getting the best data performances in the database activities; establishment of some necessary designing and data security measures [14]. The physical database designer must know the DBMS's functionality, the advantages and disadvantages in respect of each alternative, corresponding to a particular implementation. Application Programmers are meant to implement application programs which provide the required functionality by end users. In most cases, programmers develop after a documentation realized by system analysts. Application programs contain instructions through which the DBMS performs various database operations such as extraction, insertion, updating and deleting data. End users are "clients" for which the database was designed and implemented and for which the database must be maintained to satisfy their informational needs. After the way the system is being used, end users can be:

Simple users: they usually don't know the DBMS and access the database through simplified application programs, using simple commands or menu options, don't need information on the database or the DBMS used.

Sophisticated users: These types of users are familiar with database structure and DBMS facilities and may use a high-level query language such as SQL to perform the operations necessary to the DBMS. Some of them, depending on their needs, have the skills necessary to write application programs for themselves.

Comparisons between the Main DBMS Types

At present, the market has a very large offer of database management systems, starting from systems that can be used for free (unlicensed or with public license), to high-performance systems, for the use of which buying the licenses is required. The most popular DBMS- type software are:

- **Oracle,** produced by the Oracle Corporation is a very powerful multi-user database management system with implementations on all platforms (Windows, Linux, Unix) that offers both high execution performance and a high degree of protection and data security
- **DB2** is an IBM database management system. This system ensures data integrity, provides enhanced data security, and has a graphical interface for database management. It comes, just like Microsoft SQL Server and Oracle, with the possibility of creating stored procedures, these being some procedures running on the server, providing a higher response speed
- **Microsoft SQL** is the multi-user relational database management system developed by Microsoft for Windows-operating systems.
- **PostgreSQ**L open-source DBMS- type software
- **MySQL open-source DBMS- type software**

MySQL - is the most popular database-server, widely known. It is a rich-feature product that supplies a lot of websites and online applications. The working mode is relatively easy; MySQL developers have access to a massive range of information regarding the database on the Internet. Given the popularity of the product, there are plenty of third-party applications, integrated tools and libraries that make working with the DBMS much easier. Although not

intended to fully implement the complete SQL standard, MySQL offers users great functionality. [11]

MySQL Supported Data Types

TINYINT - a very small integer; SMALLINT - a small integer; MEDIUMINT - a medium-sized integer ; INT or INTEGER - a normal-sized integer; BIGINT - a big-sized integer; FLOAT - a real number; DOUBLE, PRECISION DOUBLE, REAL - a real number(with double precision) ; DECIMAL, NUMERIC - a real decimal number; DATE –date; DATETIME - a date and time combination; TIMESTAMP - time period; TIME - hour, minutes and seconds- time format; YEAR - 2 or 4 digits year (default is 4 digits); CHAR - a fixed-length string of characters; VARCHAR - a variable-length string; TINYBLOB, TINYTEXT - BLOB or TEXT column with a maximum length of 255 characters; BLOB, TEXT - BLOB or TEXT column with a maximum length of 65535 characters; MEDIUMBLOB, MEDIUMTEXT - BLOB or TEXT column with a maximum length of 16777215 characters; LONGBLOB, LONGTEXT - BLOB or TEXT column with a maximum length of 4294967295 characters; ENUM - an enumeration; SET - a set.

MySQL can be easily installed and has the third-party tools, including visuals (eg GUI), that make the database work extremely easy; **facility offered**: MySQL supports a lot of DBMS characteristically SQL features, - either directly or indirectly; **Security**: a lot of security features, some of them quite advanced; **scalability and power**: MySQL can handle a lot of data and may additionally be used " at scale" when needed; **speed**: giving up some standards enables very efficient work, which leads to better speeds. Certain functionalities administered by MySQL (eg, references, transaction auditing, etc.), employs him as less reliable than other RDBMS; **stagnation of the development process**: although MySQL is an open-source product, there are complaints about the development process from the purchase moment. However, it should be noted that there are some completely integrated MySQL databases that come with added value over the standard offered on installing MySQL.

PostgreSQL is the most advanced relational open source database management system that aims mainly to respect the standards and to have the property of being expandable.
PostgreSQL, or Postgres, is trying to adopt the ANSI / ISO SQL standards.

Compared to other RDBMS, PostgreSQL is distinguished by its high demands concerning the object-oriented relational and / or integrated database functionality, such as full support that it provides in the field of reliable transactions, ex. atomicity, consistency, isolation, durability (ACID): **atomicity** (all or nothing) = transaction is atomic, it performs all its activities in a single step, or isn't running them at all; **consistency** (integrity constraints not violated) = transaction must maintain the DB consistency after the execution (the programmer's responsibility to write correct programs); **isolation** (concurrent changes are invisible) = transaction is protected from the effects of concurrent planning from other transactions; **durability** (committed updates are persistent) = the effect of a committed transaction must persist even when a failure in the DBMS. Because of its core technology, Postgres is highly capable to effectively manage multiple tasks. Concurrent tasks are obtained without blocking the reading function, thanks to the implementation of a Multiversion Concurrent Control (MVCC), which also ensures compliance with ACID. PostgreSQL is highly programmable and therefore extendable with custom procedures, which are called "storing procedures." These features can be created to simplify the repeated execution, complex, and often required for a database's operations. Although this database management system hasn't got MySQL's popularity, there are many extremely useful tools and libraries provided by third parties, who, despite their strong and complex database features, are designed to facilitate the work with PostgreSQL.

Data types supported by PostgreSQL

BIGINT: 8-byte integer; Boolean: Boolean logic (true / false); Data: calendar date (year, month, day); INET: IPv4 or IPv6 host address; Full: 4 byte integer; Line: infinite line on a plane
MACADDR: MAC address (Media Access Control) ; Real: 4bytes real number; SMALLINT: 2-byte integer; Timestamp: date and time (no time zone); UUID: unique universal identifier..

Core Functions Insured By the DBMS

To achieve the objectives of database management, these have a number of components that allow performing many operations. Depending on their nature and purpose, activities can be grouped into operations, and these in turn can be grouped by function. Given the complexity of management system, facilities offered, the languages used and the type of database to be managed by the DBMS, identification and delineation of functions is not that obvious. These features exist, though some functions with a character of generality can be deduced from all databases management systems.

The data description function: allows defining the database structure using data definition language (LDD). Defining data can be done at a logical level, conceptual and physical attributes by describing the database structure attributes, the linkages between the database's entities or the links between the attributes of the same entity, by defining any criteria for data validation, data access methods, or integrity and confidentiality data related issues. The result of this function is saved as a scheme of the database, which is stored in the internal code in a file that enables the display and updates the database structure at any time. After completing the description function, inside of a DBMS, the database entities already exist as files, but do not contain the actual data, only the database scheme. Data manipulation function: it is the most complex function and is performed using data manipulation language (DML). This function realizes the following activities:

- Loading data in the database through various automated operations that contain restrictions of integrity or scheduled operations that provide data validation criteria
- Updating the database, which consists in operations of adding, modifying, deleting records in the database? The operations of adding and amending are only made under authorization, achieved only by ensuring adequate protection of data and using the same validation criteria that were used to data loading activity.
- Data processing is performed by selection operations, ordering, inter-classifying (composition) performed over the database entities, operations which are preparatory activity of the data retrieval. Many of the processing operations are conducted with operators from the data model implemented by DBMS.
- The data retrieval (query) is performed using data visualization operations (on-screen, printing on paper). Output statements can be found on various information technology supports (i.e. Screen, paper, magnetic, optical) and in various forms (lists, reports, graphs, images, sound, and video) [8]. For the activity of data retrieval there are specialized query languages that can be included in LMD or exist as such, languages that have simple and friendly data retrieval facilities, close to the human way of working and thinking (e.g. SQL).

Data manipulation languages can be found in the form of host languages or even their own languages. Those who use host languages are developed to adapt to universal programming languages and combine the power of such a universal language with data retrieval needs (eg Oracle PL-SQL language using). Those with their own language are developed through a specific language that conveys the power of the procedures to retrieve data from a particular type of database (e.g. Visual FoxPro's own language).

The data usage function: is the set of interfaces needed to communicate with the database of all users. To achieve this function, the management of the database should provide various facilities for several categories of the database's users:

- For "free" users, those representing the category of beneficiaries (end users), DBMS software offers non-procedural languages and various query facilities of the database in a simple and interactive form: suggestive options menus, windows, templates in

different forms, Wizard type assistance[5], documentation (help sites, explanatory messages / windows). These users do not need to know the database structure, nor any programming for users with programming skills, who create the structure of the database and perform complex operations on the database; the DBMS gives the description language, data manipulation language and universal language interfaces [6]. In order to achieve the database, DBMS provides specialist and CASE -type elements (Computer Aided Software Engineering), to help in various activities that may interfere IN the design stages of the database.

- For users with database management skills, which play a decisive role in the optimal functioning of the entire system, the DBMS has created a distinct function in this regard.

The function of database management: it is a complex function that can be handled by the database administrator. He has a rich experience in analysis, designing and programming, organizing and administrating of the database. Thus he organizes the database according to a specific methodology, performs conceptual plan of the database, and coordinates the database design.

For all these, DBMS provides a wide range of items such as CASE-type elements and a number of specialized utilities. For operating the database, the administrator is to authorize the data access (creating accounts, passwords, etc.) to restore the database in case of incidents (through journaling, copies), to efficiently use internal and external memory (by organization, or routines optimization), to make a series of statistical analyzes in the database (number of accesses, updates, users, etc.).

For each of these activities DBMS provides various tools and techniques, ensuring protection of the database. For working with the computer network with distributed database, in which data is distributed on network computers and users are of all types, and in large numbers, therefore very complex databases, DBMS has greatly developed components for the administrator (e.g. Oracle RAC - Real Application Clusters).

The use of Databases in the Regional Sustainable Development

Classification of databases used internationally in the integrated smart sustainable development

Latest European socio-economic research in the areas of Knowledge Economy, Welfare, Demography, Sustainable Development and Impact Assessment, highlighted the need for new databases, instruments and indicators. Classification them to the European Commission, is presented as follows:

- Knowledge economy databases, tools and indicators;
- Social databases, labour markets and indicators;
- Demographic and migration databases and statistics;
- Impact assessment, modelling and sustainable development.

The development and the implementation of new databases is a key part of the Socio-economic Sciences and Humanities (SSH) programme.

The development of new databases (needed throughout the economy as a whole), started from a set of questions, as well as After Action Review and SMART knowledge sharing methods, each based on a set of 6 (six) questions.[1]

The main questions addressed by the European project are: What are the features of European firms that successfully compete in international markets? To what extent do they contribute to productivity and employment? Does access to foreign market enhance firm performance through a learning process? Why are some countries more successful in international trade and foreign direct investment (FDI)? What are the policies that can improve a nation's foreign trade performance? Does integration within the Single Market foster productivity improvements? Has the euro led to a wider participation of firms in crossborder business? What policies can promote the participation of other European firms

that are currently excluded from international markets? What are the gains and the adjustments involved in reducing barriers to trade and (FDI)? What policies can best maximise gains and smooth adjustments?[7]

The Knowledge Economy Index Report is a collection of relevant databases (at international level) which reveals the upward trend of the knowledge- based economy and the recommendations / measures to be taken in this respect, until 2030.

Carrying out a specific methodology

The clustering phenomenon, analyzed in the context of using and sharing of databases, refers to some servers' ability to simultaneously connect to a particular database (in the case, belonging to a eco-bio-economic cluster).

The first step in the methodology process consists in determining the composition of the eco-bio-economic cluster, depending on its objectives and the SWOT analysis results at county level, focused on a total of ten strategic action areas: Urban And Rural Development; Transport infrastructure and public services; Environment and Energy; Economic development (agricultural and industrial); Education for sustainable development; Main social issues concerning demography; Key issues on health insurance; The main social problems at the county level; Culture, sport and youth; Travel and tourism.

The methodology of calculating the volume and efficiency of the knowledge gained within the member organizations of a cluster, involves first identifying existing systems within a company, using Table 1.

Table 1: Identification of existing systems at organizational level

Nr. crt.	Systems' name	Observations
1	**Marketing systems**	They relate specific marketing processes with internal and external organizational environment, thereby linking the organization with the rest of the world [15]
2	**Community patent and trademark systems**	According to Art. 1, paragraph (2) of Regulation EC 40/1994, "Community trade mark has a unitary character. It has the same effect throughout the Community: it shall not be registered, transferred or surrendered, nor subject of a decision revoking the holder's rights or of invalidity and its use may be prohibited only in the Union, in its ensemble "[16]
3	**Business management software systems (ERP)**	The purpose of the software system is to shape static and dynamic aspects of the economic reality more accurately, which requires perfectly suited analysis and design,for both objects and processes.[3]
4	**Production systems**	The design of production systems is based on the concept of optimality which involves that operation of the system takes place under conditions extremizării (minimization or maximization), a function of economic efficiency, for example, minimizing production cost and maximizing profits [4]
5	**Surveillance / alarm systems**	Wireless alarm systems, surveillance systems and video recording equipment, fire detecting equipment, DVRs (Digital Video Recorder), IP cameras, access control systems- time attendance , video intercoms.
6	**Automation systems**	For swing gates, linear gates and barriers
7	**Database Systems**	The database represents one or more collections of data (data sets held by some criteria) in interdependence with descriptions of the data and the relationships between them. Database management system (DBMS) is a software system that enables the definition, development and maintenance of

Nr. crt.	Systems' name	Observations
		databases and controlled access to them.[9]
8	**Copying / computing / communications systems**	Copiers, phones, computers etc.
9	**Operating systems**	It is an organized collection of programs that manage computer resources and achieves an interface between user and computer.[12]
10	**Storage systems**	It can be metallic or non-metallic shelving systems for warehouses, offices, archives, workshops and stores
11	**Heating systems**	It may be unconventional, solar, electric, gas, wood etc.
12	**Location / tracking Systems (*LBS* – Location Based Services & *GPS* – Global Positioning System)**	Permit the construction of geolocation services
13	**Lifting systems**	Mechanical and hydraulic jacks, cable or wire rope winches, hoists, manual and electric lifting strap systems etc.
14	**Transportation systems**	Sustainable transport is a "complex system" to ensure mobility for future generations through social ecological and economic levers through which mankind can develop sustainable transport sector. Transport services are intangible in nature, because their quality can not be determined only by the quality of the technical base (vehicles, infrastructure, vehicle comfort) and the performance effects (comfortable ride without risk, short time etc.)[2]
15	**Specific site organization Systems**	Closure systems / panels / profiles / roof / building / formwork; Infrastructure Systems
16	**Climate control systems**	Air Purifiers, professional systems, ventilation, climate control, removing cigarette smoke, breezair - industrial cooling, air curtains, dehumidifiers, air conditioning etc.

After identifying existing systems within the organization, according to Table 1, it is imperative to identify processes involving these systems, interactions and connections of which are generating knowledge, according to Table 2.[10]

Table 2: Identification of knowledge generating processes

Nr. Crt.	Identification of knowledge generating processes
1	Schooling of the staff for the proper use the systems. Example: Using relational DBMS, client-server architecture etc.
2	Exploitation of the systems. Example: Exploiting of databases through a system of programs.
3	Systems Maintenance. Examples: The maintenance of the database is secured only by its administrator. The "database maintenance" button of the Nexus ERP provides the following operations: database defragmentation, reindexing, defragmenting indexes and updating statistics.
4	Adapting to specific conditions. Example: Adapting databases to certain additional conditions (subject to certain restrictions).
5	Systems interconditionality in complex processes. Examples: A database is an ensemble of data collections that are interdependent,alongside with the descriptions of the data and the links between them.The system database (SBD) is is an ensemble of interconditioned set of elements that contribute to the making and exploitation of databases applications.

6	Implementation of the "4R" (recovery, reuse, refurbishment, recycling) at the end of the systems' lifecycle. Example: ECOTIC - collective organization for waste management; EEE (Electric and Electronic Equipment), IT and Communications (Collective Organisation for IT&C WEEE Management).

The role of pre-university education institutions in the implementation of specific databases

Considering the specific of the strategic alliance – a "Five for All" eco-bio-economic cluster - only educational pre-university establishments with eco-bio-economic activities or related to it, which is in the interest, are of the cluster will be recruited, according to Table No. 3 [10]

Table 3: Pre-university learning institutions

Unit type	Profile / preparatory field	Professional qualification
Technological High School	Services / Economy	Economic activities technician
		Trade activities Technician
		Public Administration Technician
	Natural Resources and Environment Protection / Food Industry	Food industry technician
	Natural Resources and Environment Protection/ Environment Protection	Ecology and Environmental Quality Technician
	Natural Resources and Environment Protection/Agriculture	Horticulturalist Technician
Technological Agricultural High School	Natural Resources and Environment Protection/ Food Industry	Food Products Quality Control Technician
	Technical / Mechanical	Agricultural Mechanic
		Car Mechanic
		Transport Technician
	Natural Resources and Environment Protection	Veterinary Technician
		Agro-Mountain Technician
		Technician in agriculture
Post secondary school	Trading	Assistant Manager

From the time of admission in an educational institutions, each student will be involved in a team of knowledge accumulation and sharing, specific to the study. The team's work will be permanent, functioning differently, depending on context: courses, internships, visiting various organizations, vacation (relatives, friends, etc., that have activities with eco-bio-economic character). Students will be under the effect of voluntary agreements concluded through the school with various firms in the cluster. At the end of high school, they will receive certificates and recommendations that will be useful in the the hiring process.

Creating of databases

Because 80% of the students of these schools live or have relatives in rural areas, they will be involved in the creating of databases that will be later used in the implementation of regional sustainable development strategies through a eco-bio-economic cluster.

The databases fields will be established based on questionnaires that will address the following issues: soil quality (rocky, sandy, groundwater level, etc.); specific elements of different areas, depending on the geographical tupe (plains, hills, mountains, etc.); cultivated plants and plant biomass collection possibilitiesl; fruit trees grown (by acclimation, yield); elements regarding traditional hand-crafting industry and its growth opportunities

(craftsmen, traditional products, etc.); livestock and animal biomass collection possibilities; existence of deforested areas, which should be reforested; problems with landslides; identifying individuals who want to achieve various forms of association; the main forms of pollution identified; existing forms of agritourism and proposals for its development; methods / techniques used in specific fields of work (fruit growing, vegetable growing, viticulture etc.); proposals for the organization of agricultural, cultural meetings, etc.

Another category of databases will refer to the possibility/ impossibility of community involvement in the the development of student exchange, internally (with students from other counties) and internationally.

Annually, will be carried out students' competitions in which the most beautiful pictures made by them will be awarded (landscapes, animals, farming / household, costumes etc.). Databases made on this occasion will be used for the development of cultural, tourist, educational sites, etc., as well as making prints (thus, also contributing to the self-financing of schools). Databases made will be submitted for verification and processing by the "Center for successful knowledge transfer" (KTC), which works in collaboration with the "Centre of Excellence in Entrepreneurship" (AEC) and "Pilot Center For Cooperation And Development Eco-Bio-Economy "(PC), entities that form the core of the cluster (C-C), which will establish and implement future strategies of sustainable development at regional and national level, according to figure 1.

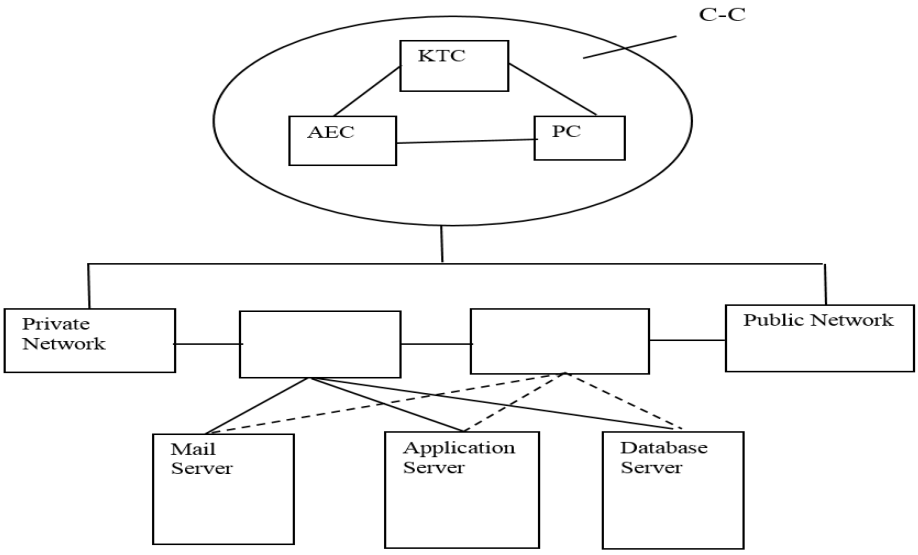

Figure 1: The transfer of databases to / from the core of a cluster

Conclusions

In the context of implementing cluster-type strategic alliances, urgently needed for regional development (in an attempt to alleviate the economic crisis), a new concept has emerged: database clustering, based on the idea that a cluster has at least two servers. In the present paper, since this is an eco-bio-economic cluster implemented at county level, we analyzed databases only made by one category of entities, members of the cluster: educational pre-university establishments whose educational offerings include subjects that match cluster and labor market needs at county level. In a first phase, databases are part of a public network (students, teachers, high school), towards becoming the property of the cluster (belonging to a private network). Cluster management will decide for what purpose and to which entities (individuals and businesses) the databases will be shared. Using and sharing specific databases, depending on the cluster configuration allows users to accommodate both a particular architecture and to the possibility of implementing an effective database management. Combined with the use of Internet service, Web-based Databases IT-apps will lead to the virtual development of the cluster's activities.

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