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PORTAL BASED SYSTEM INTEGRATION – FOUNDATION FOR DECISION SUPPORT

***Abstract.** In time, the integration needs of companies increased. Even though not taken very seriously, integration solutions in general, and portals in particular, slowly become leaders in turning new principles into practical experiences. In the beginning, portals focused on aggregating, organizing, and indexing unstructured data, but modern portals now do much more. Portal software continues to offer one of the few infrastructure frameworks that truly embrace open and flexible computing. A portal is a point of integration, useful to the organization by integrating internal business processes and by offering information to the outside world. We can use portals in decision making in two ways. One way is by enabling managers to access the data they require by using the portal's interface. Another way, which doesn't exclude the first, is by developing a distinct decision support application within the portal which uses scenarios using the data from the integrated systems to help managers make more well-founded actions.*

***Key-Words:** Portals, DSS, integration, dynamic reports*

JEL Classification: P17, P47

1. PROBLEM FORMULATION

The concept of integrating applications it isn't new, and the problem of interconnecting systems arise even before the era of the internet and became more and more popular with the development of the networks, of the Internet, but also of the technologies of storage and transformation of data.

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It's no longer a novelty that integration, in international economy but also in IT, is one of the main means of ensuring, that in a globalize economy, a firm's economic processes are as close as possible to the optimum. A good IT integration can make a big difference in achieving that goal. Going further, using a portal can make a difference in decision taking situations. Such a system can provide by its interface and the systems it integrates (internal operational systems like accounting, back office, front office, deliveries and external third parties systems) to access information and scenarios [4].

In the present, the Romanian private and public institutions do not have very high possibilities for the exchange of data by information systems.

On the international picture there are countries which understood the importance of starting integration with the informational systems and now are having a strategic advantage (for example USA over the European Union and in some cases Japan over USA).

This paper will focus on discussing a solution of integration based on a portal, which should integrate the informatics systems which already exist and which will be offered, as a service, to the wide public. For special users, the system will provide synthesized information and decision making hints.

The technical solutions will be analyzed (choosing the DBMS and also the middleware solution) and also upgrades on the business process level will be advanced.

2. THEORETICAL FOUNDATIONS

The fast development of the IT&C sector and also the increased volume of information which is generated require the development of more integrated and unified information system.

Portal oriented application integration allows one to view a multitude of systems, both internal enterprise systems and external enterprise systems, through a single user interface or application. The use of portals to integrate enterprises has many advantages. The primary one is that there is no need to integrate back-end systems directly between or within enterprises, which eliminates the associated cost or risk. With portals, the user simply connects to each back-end system through a point of integration (user interface, database, application server etc.) which externalizes the information into a common user interface (Web browser) [1].

Such a system must be scalable and must show performance; they must be useful for a great number of users and must integrate the various software products, which are already developed in different developing environments.

Gartner states that "integration not only helps better align IT with the business, but also helps the various parts of the business work with each other better, enabling important business strategies like straight-through processing, improved customer

service through single-view-of-customer portals, business activity monitoring and higher data quality.” [6]

By an operational point of view, the integrated systems have distinct characteristics and share five essential attributes [3]:

- It must assure the technical and functional compatibility;
- The technologies which are involved in the application processes are relative transparent for the users. The integration can be realized at any level of the business processes and with any technologies. The success key consists in the choice of the best technology, which can fulfill the following criteria: utility for the users, technological longevity, adaptability, scalability, fast solution delivery;
- The application systems, the data and the user graphical interface are harmonized and standardized for the users;
- The data have a complete and coherent definition in all the application systems which are using them;
- All the applications are scalable, portable and have multiples functions. By technological point of view, the applications are flexible and can quickly be modified, according to the changes of business processes.

3. THE SOLUTION

Nowadays, when the economy is based more and more on information, it is necessary that the fast and safe access to the data be facilitate by efficient instruments.

The Internet has an important role, which has beginning to increase in front of other traditional technologies for gathering, storing and sending information to the final users.

An information portal can be seen like an Web based, secured, interface, which can offer an unique integration point for the applications and services used by employees, partners, suppliers and clients. The main advantage of the information portal is that it can be easily offered as a service to the wide public.

In order to create a unified interface across multiple applications, a portal must have enough integration capability and be sufficiently application-agnostic so that the requirements of the host application do not impede the integration needs of other applications [2].

The important elements, which become critical for the performance of the application once the volume of work rises and the applications are opened to the public, are: security, scalability and uptime.

As an integration method, the portal oriented has the following advantages [3]:

- It is a non-invasive approach, the integrated applications or systems communicate through a unified Web interface;
- It is much faster to implement than real-time information exchange with back-end systems;
- The technology is a mature one, there are various examples from which we can learn.

The disadvantages are:

- The information does not run in real time and it requires human intervention for this to take place;
- The information must be abstracted through another solution by adding a new level, for example by using an application server;
- There must be taken in consideration the system's security, especially if the portal is visible on the internet and not only on the Internet.

The release of an informatics system or of a single informatics application can be made at the expense of funds and time with the design, developing and implementing. When building an integrated system, we are hoping that the all-around cost of the business decreases. So, it is interesting to verify if these expenses are or aren't justified by economical point of view, so that the system or the application is efficient.

In wide meaning, by economic efficiency we understand the report between the useful effect (the obtained result) and the effort (the expenses) which was made for obtaining this effect, in the conditions of using the electronic technique.

The efficiency of an application can be easily found by a simple calculation of the efficiency indicators, which shows how the release of a new application within the framework of the system can modify the capital or other elements with economical importance, which the beneficiary can follow.

An integrated information system should represent the best solution for any firm or group of firms or institutions. Even if adopting many disparate applications for various business activities can represent a good solution on short term, this can generate big problems in connection with the information fragmentation and with the later development of the system. Also, the solution chose for integrating can make a difference: we can use a portal, we can use simple data-integration or we can use a service oriented approach [5].

One of the most important aspects which we must take into account is the security of the integrated system. The system must assure the security and the safety conditions, which are stipulated by the standards, by allowing the evaluation and the reduction of the risks.

Therefore, just using the standards is not enough. Also, one recommends the execution of a whole of methods of safety against the attacks. Within the integrated systems must be included some security methods, as shown in Table 1.

Table 1

Security methods which will be implement

Security methods	Description	Implementation examples
Authentication	Identifying the staff which requests the services	User and password Certificates WS-Security IP address
Authorization	Ensuring that the user who asks for a service, has the proper privilege of access	Management access products WS-Security Access control through IP addresses
Encryption	Ensuring the data transmission confidentiality	SSL XML Encryption
Messages validation	Verifying the formatting method for the sent messages	Validation schemas Formatting standards
Virtualization	The possibility of hiding back-end applications (the individual applications of the public institutions) and publishing only certain services through URL.	URL masking Services aggregation
Verifying the content	Filtering the messages content	XPATH
Monitoring and notification	Monitoring in real time the integrated system Receiving notifications if an error occurs	SNMP Management systems
Audit	Files containing the logging actions made by users	Gramm-Leach Nliley Sarbanss-Oxley
Non-repudiation	Assuming the actions made by each user	Digital signature XML-Signature
Protection for the attacks	Protecting the Web interfaces for attacks, messages blockages, routing	XSLT SNMP Management systems

Through portal oriented application integration (POAI), all the participating systems are integrated into a Web browser, even if the applications are not directly unified.

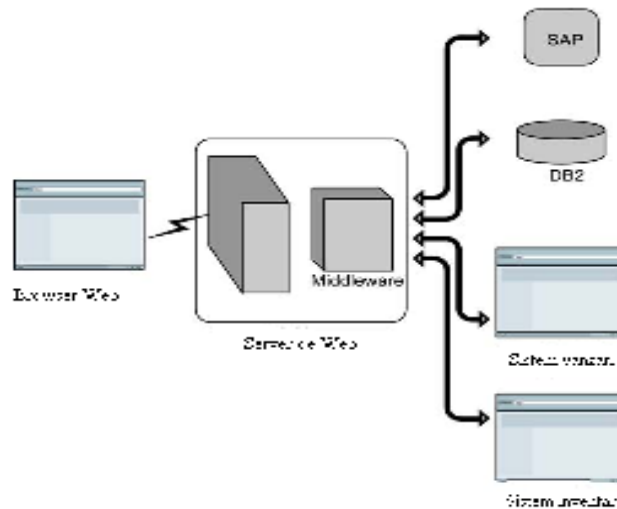


Figure 1 – Portal based integration
Source: David Linthicum, 2003 [3]

While other types of application integration are oriented to the information exchange in real time, this integration type is centered on putting all the information from companies systems into an application with a unique interface. In figure 2 we propose a integration process, from the existing systems to decision enabled solution.

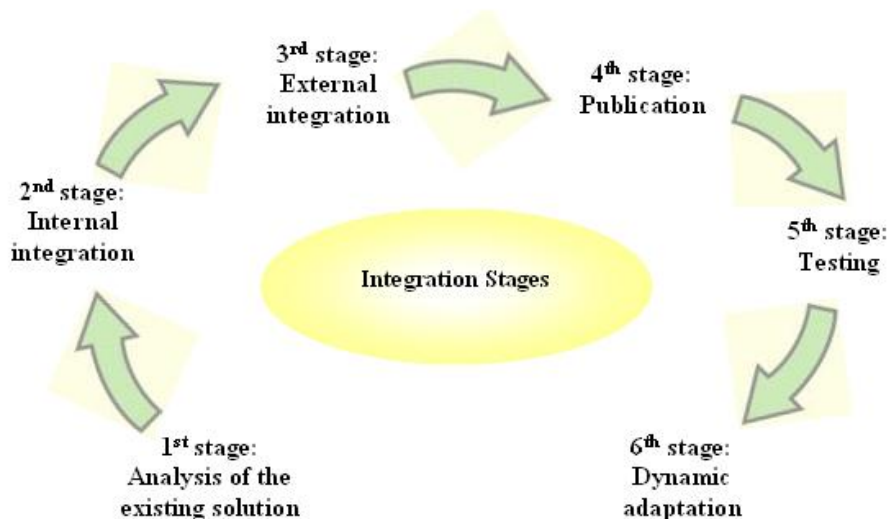


Figure 2 – Integration process

Portal Based System Integration – Foundation for Decision Support

Steps in developing a portal:

- The understanding of the problem domain;
- Analyzing the significance of data and processes;
- Identifying the interfaces that have to be developed;
- Identifying the required data transformation scenarios;
- Choosing the technical solution;
- Applying the solution;
- Prototype testing;
- Performance testing;
- Maintenance procedures development.

Both companies and citizens have the need to access information from the public sector by the means of the Internet. This is the reason that a Web application is suggested for offering on-line access to the information.

Using a portal we can connect to an application which allows the user to trade on the Bucharest Stock Exchange and on Sibiu Financial and Commodities Exchange.

This solution uses an Oracle Forms 10g application for collecting data, and a portal built using Oracle Application Server (OAS) that will integrate all applications.

After the validation of the username and password the user of the application is able to access the portal area and to receive integrated information over the stock exchange market.

VM101007									
Shares portofolio at date 15.01.2008									
Portfolio	Symbol	Qty	Average price	Market Price	Buy price	Market price	Portofolio change	Portofolio change (%)	
Past trades	BIO	1.000	0,4523	0,5200	452,25	520,00	67,75	14,880	
Buy/sell order's status	BRD	10	17,0850	22,9000	170,85	229,00	58,15	34,036	
Transfer order's status	OLT	1.000	0,3920	1,1100	391,95	1.110,00	718,05	183,197	
Valori mobiliare de primit	TEL	130	40,6012	34,0000	5.278,16	4.420,00	-858,16	-16,259	
	TLV	1.204	0,1158	0,8300	139,40	999,32	859,92	616,671	
New Order									
Change Order									
Cancel Order									
Analiza Tehnica									
Cash in/out									
Update profile									
Real time quotes	Issuer's Name			Total RON	6.432,62	7.278,32	845,70	13,147	
Plata Futures	BIOFARM BUCURESTI			Total EUR	1.830,05	2.070,65	240,6		
Alerts	Enter date		Trading Value			Available			
Accounts list	Date	15.01.2008	6 months	10.645,00	% Fee	RON	106,33		
Change password		Submit	Current month	0,00	1,00	EUR	30,00		
		Preview report							

Figure 3 - Share Portfolio at a past date

Source: Author

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Using synthesized information, for example the intraday evolution of prices and stocks, and the latest news a manager can not only make investment decision but also to get a global view of the threats and opportunities for its firm.

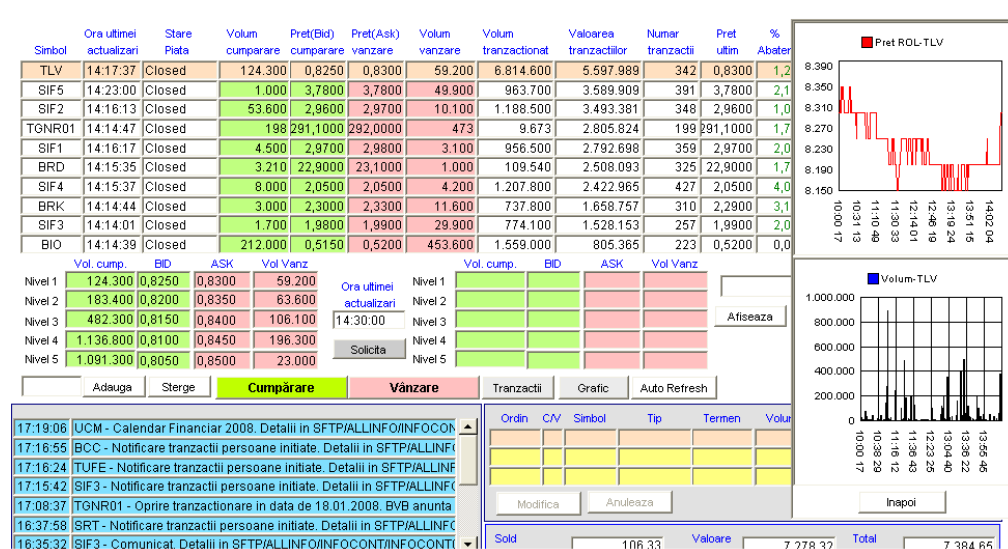


Figure 4 - Integrated information for spot market: online quotes, graphs, news

Source: Author

By using the data in figure 4 a manager can take decision based on today's spot market information. By using the information in figure 6, he sees the prediction the market was making at different points in time. For example, for the Erste Bank future contract with the maturity date December 2008, at 18.09.2008 the close price was 146,8 RON.

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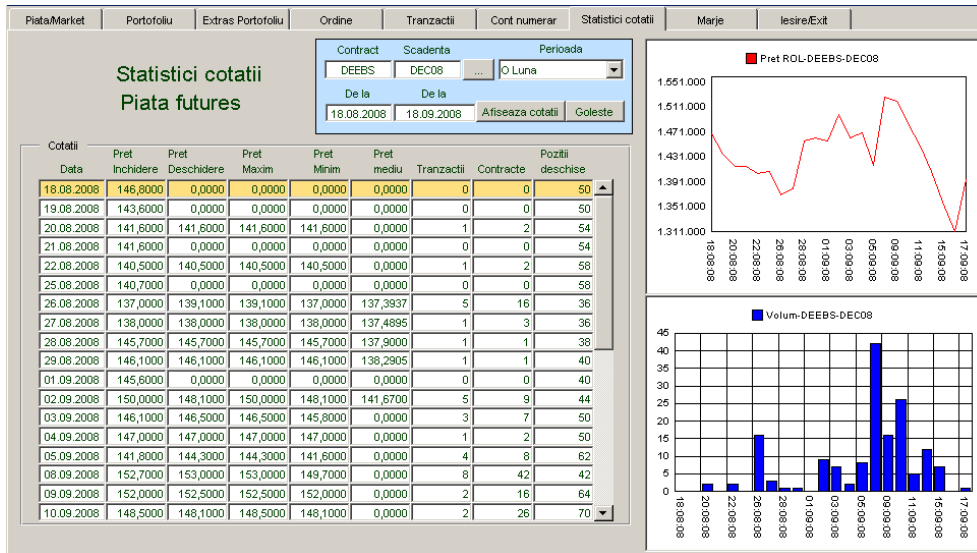


Figure 5 – Statistics for the forward market

Source: Author

Having the necessary market reports available in the portal, can also make a difference in taking decisions.



Figure 6: Market reports

Source: Author

4. DISCUSSION ON THE SOLUTION

The core of the solution is an Oracle 10g Database chosen for its performance in large and very large databases. A portal solution built using Oracle Application Server and Database offers great performance even when many users are connected at the same time, as shown in Figure 7.

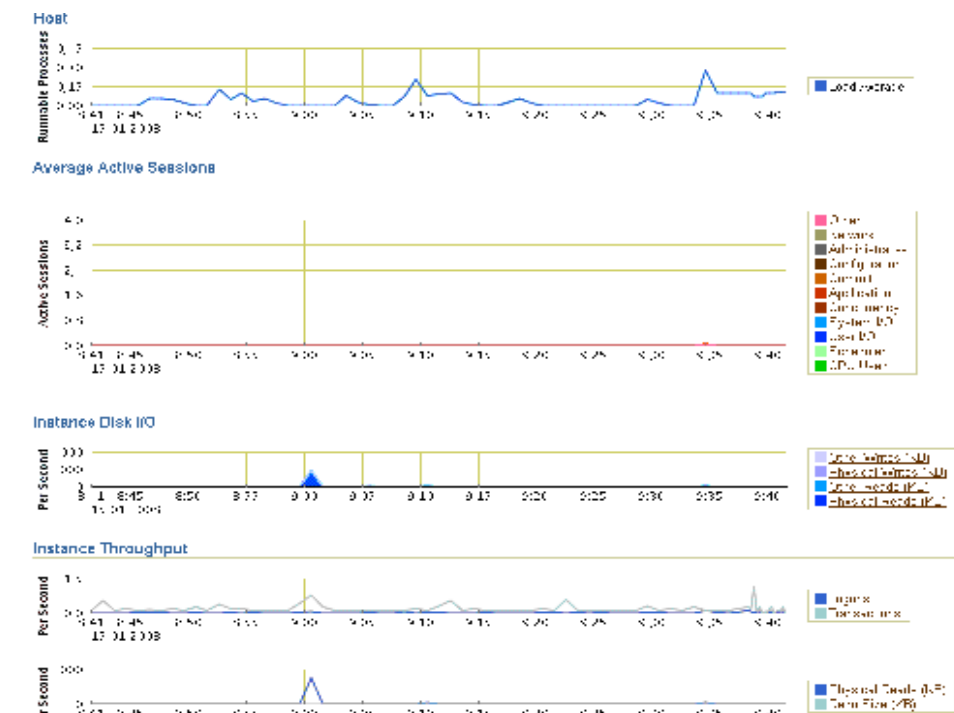


Figure 7 - Database load

Source: Author

We can analyze the impact of implementing a portal based trading solution at a brokerage house. We can compare the 2005 period when there was no platform implemented to the 2006 period when a prototype was implemented and the 2007 period when a integrated application was in used. This application integrated the internal processes (front office, back office, accounting and trading) between them and with the Bucharest Stock Exchange system (Arena). In 2007 the market was at its peek which helped this increased figures. In 2008 the recession began. Even if more clients were drawn, many of the existing clients didn't trade anymore because they didn't want to sell and mark the loss, and they hoped for the market to climb. This translated into low commissions for the firm.

Table 2

Platform integration impact in a brokerage firm

	Jan-Apr 2005	Jan-Apr 2006	Jan-Apr 2007	Jan-Apr 2008
New clients	31	124	135	20
Total clients	295	510	720	740
Number of executed orders	2937	6372	15988	13470
Total order value ($\sum price_i * quant_i$)	80,174,149 RON	266,238,160 RON	331,050,790	290,118,540 RON
Commission from clients	531,590.289 0 RON	1,218,502.69 RON	1,199,805	1,240,014 RON
Integrating costs		117,000 RON	20,000 RON	20,000 RON

Source: Author

Table 3

Total trading value at the BSE

BSE+ Rasdaq	2005	2006	2007	2008
Jan	945,412,804	1,318,746,756	1,264,581,427	1,026,234,495
Feb	1,132,010,979	1,062,460,827	1,287,178,067	659,760,897
Mar	711,783,162	919,106,149	1,471,023,106	637,294,940
Apr	437,732,523	373,965,010	1,104,811,312	561,111,043
Total	3,226,939,467	3,674,278,742	5,127,593,912	2,884,401,375

Source: BSE

From 2005 to 2007 we can see a 13.86% increase in the total traded value on the BSE. In the case of the brokerage firm, the increase was of 312%. The number of clients increased and the existing ones traded more, so the commissions were 125% greater. The costs of the platform are about 80.000 Ron/year. The licenses cost about 50.000 RON.

5. CONCLUSIONS

The IT&C represents the new engine of the economic and social development of the actual society. Nowadays, we talk about e-economy, e-government and e-administration, and our country makes its first steps in this direction.

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Consequently, it is necessary that the private and public sector aligns with the new standards and puts to the citizens disposal.

Both the citizens and the enterprises have the interest to easily access the information from the public sector through the Internet. For private firms, implementing integrated systems can bring immediately profit like in the discussed case, or long time image gains.

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