Applications of Grid Processing

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Abstract

When the reality of a country is rapidly changed by simply introducing of with new principles or policies, unpredictable negative effects may appear. The main cause of such unpredictable negative effects is that all the sub-systems participating to the creation of economic value interconnect and generate effects upon the others. If such effects are not estimated then the economy of a state will suffer negative influences.

The solution to avoid unpredictable effects upon the society is to create a grid network aimed to register predefined interconnections and identify possible interferences that may appear between the economic and social sub-systems that create value. Grid processing is the solution for optimising the implementation of new policies during the process of harmonisation to the European Union standards.

Keywords

Economic systems and sub-systems, interconnection between sub-systems, grid network, grid processing and applications.

Introduction

The most difficult part in harmonising the legislation is in reality the harmonisation of principles. Basic law principles are difficult to be changed as they are grounded on years of tradition and collective culture of a people. It is not difficult to assess the same rate of tax, but is extremely difficult to introduce a legislative system coming from the experience and culture of other countries. Theories like children protection, non-violence in family, which mainly affects the social system are so difficult to put in practice, due to the fact that the new principles do not match with the real administrative system.

Mainly, the power of impact of a legislative measure over population and companies depends on the sub-system it belongs. Before going further with our analyse, we need to explain briefly what a sub-system is: "the mechanism of creating and maintaining value cannot be set unless the following three main systems participate to it: microeconomics, macroeconomics, world-economics and cosmo-economics". Further, we may consider that the areas where economic leverages may be used represent in fact sub-systems of the main four systems mentioned above.

Each measure, each principle, either legislative or administrative, represent in fact a leverage tool belonging to a sub-system participating to the creation of value. What is of our interest now in this article, is especially the economic value, whose meanings are found around the money concept (in the pure form or convertible assets in money). Undoubtfully,

transformations in the economic and respectively finance sub-systems propagate further transformations of the social, cultural, and other sub-systems.

Following this approach, we may consider that the economy in full may be transmitted directive lines by putting in practice leverage tools in one or more sub-systems participating to the creation of the economic value. For instance, there is a tax sub-system, a legal sub-system, a monetary sub-system and a foreign-exchange sub-system, each of them governed by an authority. Thus, the tax authorities, bank authorities, the authorities dealing with foreign exchange rules, the authorities dealing with legal registration of companies and traders are all governing an economic sub-system to which transformations may be brought in order to obtain further impacts in the economy.

How IT grid may improve fiscal reforms

In the last years, a way in which the economy of East-European countries has been "coordinated" was by implementing fiscal measures. Fiscal reforms may be the base of deeper changes, or they may be the result of another reform. We are used with the first category of reforms, when a new package of tax laws is enforceable as principal leverage tool in the economy. There are also cases of the second type of chronological order, when the tax changes are mere results of other important reforms.

We shall detail here below the interferences between the reforms of the fiscal sub-system and the IT procedures and mechanisms, and how the fiscal changes are based on and need IT reforms. Improvement of tax collection is a desiderate on which the UE countries focused a long time ago. In the East-European countries, this is a current objective and in strictly dependence, the mechanism of evidence of each taxpayer is subject to modernisation. We were talking above about the fiscal record that now is needed by each investor, foreign or domestic, when formalising its investment in Romania by registering a company. In theory, the fiscal record may be obtained from any tax office in the country, because it is assumed that proper IT evidence stays at base of this process.

In order to be efficient, and really contribute to the selection of new investors, the IT evidence needed for issuing fiscal record must be linked and mixed with the IT database containing data regarding taxpayers, their taxes due and taxes collected. It is reasonably compulsory that the tax returns and the balance sheets submitted by taxpayers be combined with the evidence regarding the tax precedents, tax litigations and tax offence. Separate databases could lead to errors, and thus the new mechanism of requesting clean fiscal records to the new investors would be no valuable.

A reform in an economic sub-system may generate value only if ancillary reforms are made. A solution to avoid lack of value of the new changes in the tax collection and investment selection process would be the use by the tax sub-system of a grid processing in order to cumulate and consolidate at the national level accounting and tax information regarding each taxpayer registered in the country.

What is the grid processing and how its application could lead to more value of the fiscal reforms in the East-European countries? First of all, a grid network is a collection of machines that contribute any combination of resources as a whole. This is why we consider that the grid computing is a new level in the evolution of distributed computing. Individual computing systems are joined together into a virtual single powerful computer by sharing various resources like processor cycles, memory, storage capacity, equipments and so on.

Imagine the tax authorities, the Central Banks of the East-European countries having available such IT systems. It would be more easy to produce consolidate accounts of the country. The statistical country reports would not need half of year to be prepared for the previous year.

A virtual grid computer offers a very high processing speed but at a lower cost than a parallel system because the grid network uses existing but under-utilised resources. Grid computing is able to increase the resource usage efficiency because it could be obtained a better balance of resource utilization. Even in finance area there are a lot of reasons to write grid-enabled application or to transform existing programs to run concurrently on a grid network: the resource balancing effect by using under-utilised resources, absorption of the unexpected activity peaks by the idle machines from the network, huge computing power obtained by the use of the grid, the use of already existing computers connected into a network.

The scheduler is responsible for sending a job to a given computer to be executed. The job may consist of a simple registration number of a taxpayer, or even financial statements of a company. Complex jobs may represent cumulated figures at the level of an industry. In the simplest case, the scheduler may assign jobs in a round-robin fashion. Other schedulers may implement priority systems and may use the queuing theory results to make better task assignments. Unfortunately, optimal scheduling is still a difficult mathematics problem.
In order to run on a grid network, an application has to be divided into independent parts to be executed in parallel on the machines from the grid. Dependencies prevent jobs to be executed in parallel. Every such a part has to be scheduled on an idle computer nearest to the data required in order to decrease the network traffic. The result of all jobs must be collected in order to assemble the final answer of the application. Another use of a grid network is to divide the data space into distinct independent sets. This would be very efficient for statistical focused computation. Every individual computer from the grid network available in the territory, at the level of various authorities, will run the same application but on different data. In such a case, the scheduler will assign a new and not yet processed data set to an idle computer.

In terms of the queuing theory, a grid network could be considered like a single centre model where the service demands are scheduled on the individual computers. There is a single queue of jobs for all processors from the virtual system. The priority systems are implemented by using several different queues, each with a different priority. A job taken from the highest priority queue is scheduled every time when a grid machine becomes available. The level of priority may be established depending on the authority or area it comes from. For example information or jobs from the Governor of the central Bank or the ministers would have the highest priority. The way the priority is given that the fiscal and legal data processed would be appropriate to be subject of an audit of the IT system.

Security is also a very important factor in planning and maintaining a grid system. Any grid network has some management components used to keep track of the available and not available resources. These information are used by the scheduler in order decide where grid jobs have to be assigned. The legislation of the East-European countries is subject to deeply changes in terms of legal framework for assuring security of information. And it is crucial for the information regarding taxpayers to be most secured.

It is obvious that not each application is suitable for running in parallel because some applications just cannot be executed concurrently. For others, it can take a large amount of work to modify them to run in parallel. The aggregation of statistical information needed for

country statistical report is an example when the parallel processing may be successfully applied, generating significant time reducing and increasing of accuracy.

The use of grid processing in the evidence of the tax authorities would lead to more accurate data obtained in a shorter time. The accounting, tax and legal information regarding a company and which are intended to be accessed, processed, and further used, are shared in more distinct sets. Each individual computer available at the local tax office will enter as participant in the grid network and will process and impressive number of information, obtaining sets of results which will be communicated to a central node where they will be stored. Usually, this central node is the server of the Ministry of Finance, where the central tax authorities have full access. After the results of the processed data are transmitted to the server in order to be stored, by using the grid processing network, the local computer will process other sets of information and will deliver other sets of results. The server located at the Ministry of Finance is in charge with the aggregation of intermediary results and is the provider of the final results.

The final results have as base data provided from different areas and different locations in the country, and by using the grid processing mechanism, such final national information can be easily accessed by a wide number of users located at the local tax authorities.

Thus, the finance reform does not necessary mean a simple change of the tax rates, but also the change of the management of the tax collection and taxpayers evidence. The information available to the tax authorities are in an ongoing increase, and a good management of them can have only positive results, of bringing transparency of the economic process in general and speed the transactions having the tax authorities as participating party. This would be a favourable improvement of the investments climate, in general.

In the East-European countries the tax measures are rapidly changing. The permanence is a concept rarely put in practice. The changes of fiscal policy are usually important, affecting the whole finance system and the investors need to adapt to these various changes. Under such circumstances, the management of information of any kind regarding the activity of investors becomes very important, the information gathered represent a statistic proof of the effects of the economic and finance reforms.

Fiscal measures and grid applications
How can be grid processing used in order to identify areas where appear contradictions between different policies adopted by different levels or structures of authority? Grid processing may be used not only at very practical applications. It may also be used at the level where the policies are created. The authorities of a state may implement a conceptual grid, which would link all the state structures involved in the decisional process. Specialists should identify areas that may possibly be impacted by a certain decision or legislative package. By using the data available on the grid network specialists would have access to all other policy decisions to be implemented by other structures of the state. It would be their obligation to interpret if there is any risk of negative effect as result of the implementation of an economic policy.

Nowadays, when the entire legislation of the East-European countries seems to be changed, by receiving western influences, we draw your attention on a simple example showing again the existence of unpredictable or simply unpredicted impact. The environment legislation is subject to significant changes in the East-European countries. In Romania for

instance, very strict rules have been introduced recently, which basically requires companies selling packaged products either to create a system of recovery and recycling of the packaging sold with products, over a certain minimum level given by the law, or to pay huge amounts of taxes destined to a Environment Special Fund. Although in the last years there have been many discussions about the need that the environment be protected the packaging recycled, and even a legislative packages in force, and although everybody agree the common sense of these measures, an unpredictable effect resulted. The companies were not prepared to recover and recycle the packaging, and no recovery system can be created in a month. Such measures take time.

All these inconvenient would be avoided if the reforms would be viewed and treated interdisciplinary, if the sub-systems participating to the creation of value, for instance economic value would cooperate. Sometimes a sub-system is the prime wheel in a reform, but other times it may suffer changes as inner effect of a reform in another sub-system. In a century of computers, we should not forgot that the role of IT innovations, and we gave as example the use of IT grid, should be considered and used. Otherwise, unpredictable effects will no cease to appear.

The theoretic interconnections between economic sub-systems would be introduced by human beings and updated continuously. On these standard interconnections identified, specific forms should be developed in order that the grid processing automatically identify areas of risk of negative effects that may appear. Where conflicts between sub-systems are identified, every party involved should care, meet each other and discuss reconciliation steps to be taken.

The grid network may harmonise the decisions take at different levels of authority and would prevent the society for bearing negative effects caused by negative effects upon a sub-system generated by the decisions and policies taken by other sub-system. IT innovation should be aimed not only to create efficiency at the level of companies generators of profits, but it also may contribute to the wealth of the modern society.

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