PIE

Corner stone of Integration

Introduction

Nowadays information technologies and business are so closely connected that it's practically impossible to draw a line between them. New technologies extend business possibilities and business in turn states new requirements to the IT-infrastructure. At the present moment productivity of the company's IT-infrastructure influences its reputation to a considerable extent. The quicker a company can respond to the customer's demands the more efficiently its business develops. Business processes' life cycles should be shorter and the company's internal processes should be optimized for better productivity.

As a rule companies and organizations have information systems built on the basis of the departments. But company's business processes are rarely running within one department or one application program. Hence specialized program means are needed for information interaction of isolated automated systems and separate programs for effective support of distributed business processes.

Application integration goals and tasks have considerably evolved in the recent years. They got ahead from simple integration on data transmission level to complex integration on several levels of systems integration. Within the frameworks of such approach it is necessary to solve integration problems on the level of data received form applications and other sources as well as on the level of interaction of men and machines and straight through business processes. Such integration involves not only company's own automated systems but also external systems of third parties vendors.

In the late 90-s the CMA company developed Processware Integration Environment (PIE) technology on the base of which CMA implements solutions for companies' business processes automation and information systems integration. The PIE technology was developed by CMA on the basis of practical experience as a tool for integration of information systems in banks and financial organization which have:

- a variety of automation means – a lot of heterogeneous specialized applications meant for internal employees' activities automation (back-offices) as well as for customer services automation (front-offices);
- evolutionary development that means engagement of new activities in the automation environment and implementation of new program-informative means alongside with maintenance of legacy systems;

- organizational structure inconstancy resulting in the necessity to adequately and quickly react to new department setups, additional offices opening, mergers and acquisitions of other companies;
- necessity for adjustment to permanent business external environment change, to new requirements from market, customers and regulating authorities.

PIE integration technology has the proven record of implementation in many projects for business processes automation including electronic documents and data flow integration in trading and settlement stock exchange systems, in payment systems for central banks and depositary systems. Permanent enhancements in methodology, program components and documentation based on the practice mentioned above made PIE an independent off the shelf program product, environment for integration of applications that are different in functionality and methods of implementation. PIE can be used in any field of modern business, management and regulation.

The practical experience of CMA customers shows that the PIE integration platform which is highly efficient and easy to operate can become a real alternative to big market vendors offer whose integration tools are as a rule costly and difficult to implement and support.

Conceptually the majority of the integration systems proposed on the market are similar: they claim to use Service Oriented Architecture (SOA); Enterprise Application Integration (EAI) and adapters; information interaction based on message exchange via enterprise service bus (ESB); Event-Driven Architecture (EDA) and Business Process Management (BPM).

From the very beginning PIE had essential technological difference from well-known integration platforms. It had compact high efficient core developed using C++ language that still remains standard for development of highly efficient and reliable applications. Actually PIE has two implementations of the core both are cross platform. One is traditional C++ based implementation as a standalone application server. The other one is a Java based component for Java Application Servers. In the last case PIE besides its own integration facilities gets access to the host application server environment.

Applications integration chaos

Every company using information technologies faces the problem of application integration sooner or later. The bigger the company the more severe the problem is. The problem is especially important in those companies that use heterogeneous applications for different stages of monolithic business process automation.

Companies often solve the problem of application integration at the time they face the necessity to organize information exchange between two application programs. Each time it is necessary to develop data transmission protocols and program data conversion.

In course of time the drawbacks of such approach become evident: while the number of applications being integrated grow the number of interfaces increases in geometric progression (Pic.1). Furthermore a replacement of one of application leads to the necessity for reprogramming of all the interfaces linking the applications together.

Information system construction integrated in such a way is very rigid and every change that may be necessary from functional or technological point of view requires rewriting of a part of program code that implements the interaction interfaces. In course of time the volume of such code increases. It becomes difficult to manage and control inter-program links which results in the situation that may be called "integration chaos".

Use of solutions based on the middleware approach can be of a certain relief. Such program products, e.g. WebSphere MQ by IBM, MSMQ by Microsoft and others decrease the volume of the native code but solve only a part of the problem. The middleware mainly focuses on guaranteed data delivery and messages processing services.

The more relevant approach is to place an intermediate link between the applications that not only provides data delivery but also can "understand" the content of incoming messages and generate outgoing messages according to business rules that should be incorporated into this intermediate link.
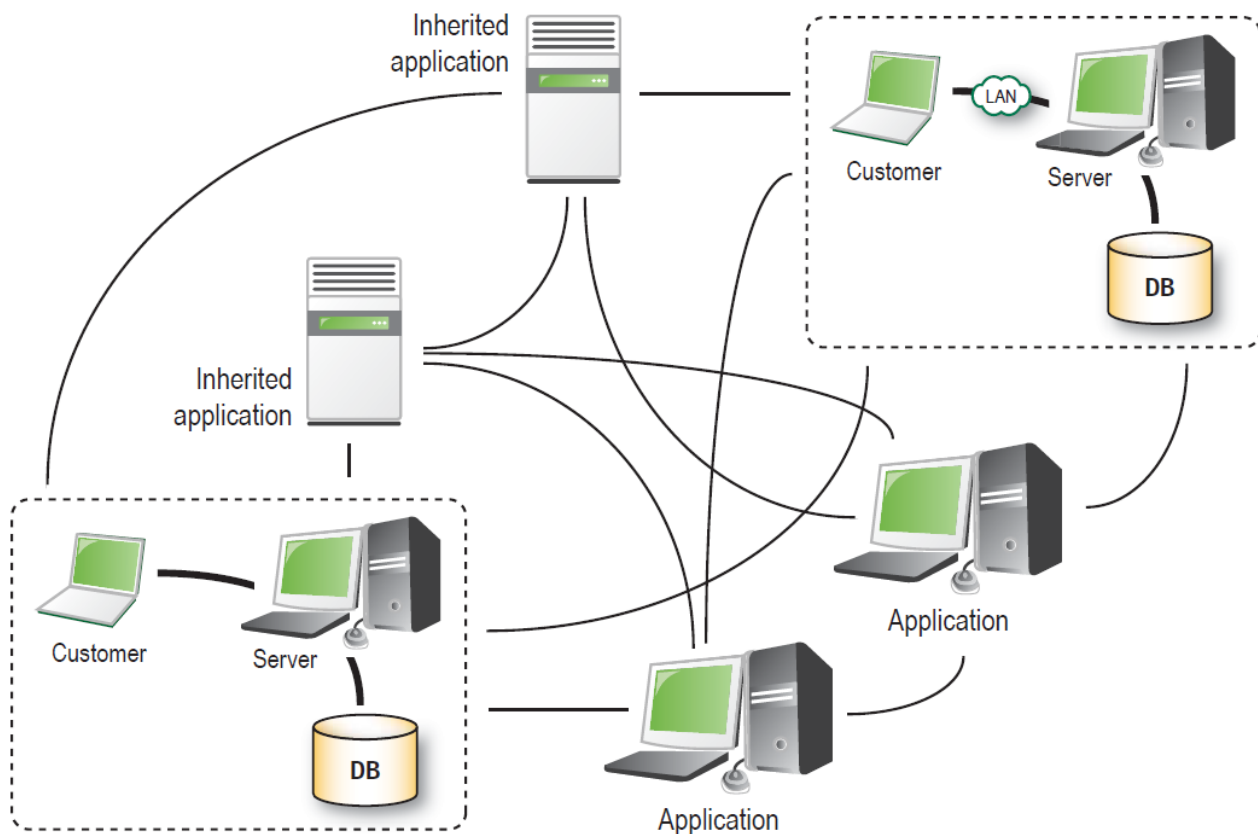
Pic.1. Integration chaos with point-to-point applications integration

Such mode of integration is often called "message broker". A disadvantage of such an approach is that usually message brokers take into consideration only separate stages of business processes without considering such problems as maintenance of business transaction and data integrity linked to the transaction.

The application integration facilities should be somehow informed that a number of successive messages and data conversions are the parts of the same business transaction. The easiest way to solve the problem is to provide those facilities with ability to configure business processes and save their descriptions. In that case all the data conversion operations could be treated as parts of the corresponding business processes. Such an approach to application integration is called process oriented integration.

Information interaction between program components serving the business processes should be based on integration environment providing the following possibilities:

- to set and change if necessary the business processes logic;
- to route messages and data transferred by the applications according to business processes description;

- to monitor documents and data processing statuses;
- to maintain business transactions integrity.

What is PIE and what is not PIE

PIE belongs to the category of application software tools that integrate applications using the business processes and procedures logic and functionality. PIE allows to link different business processes by using different applications on different hardware platforms in such a way that they can function as one unified system.

The integrated applications can differ in nature: self-developed, new, old, inherited, batch, ordered, centralized or distributed. Hence the PIE environment can be used for mainframe applications and databases integration; client and server systems in local and global computer networks (Pic.2).
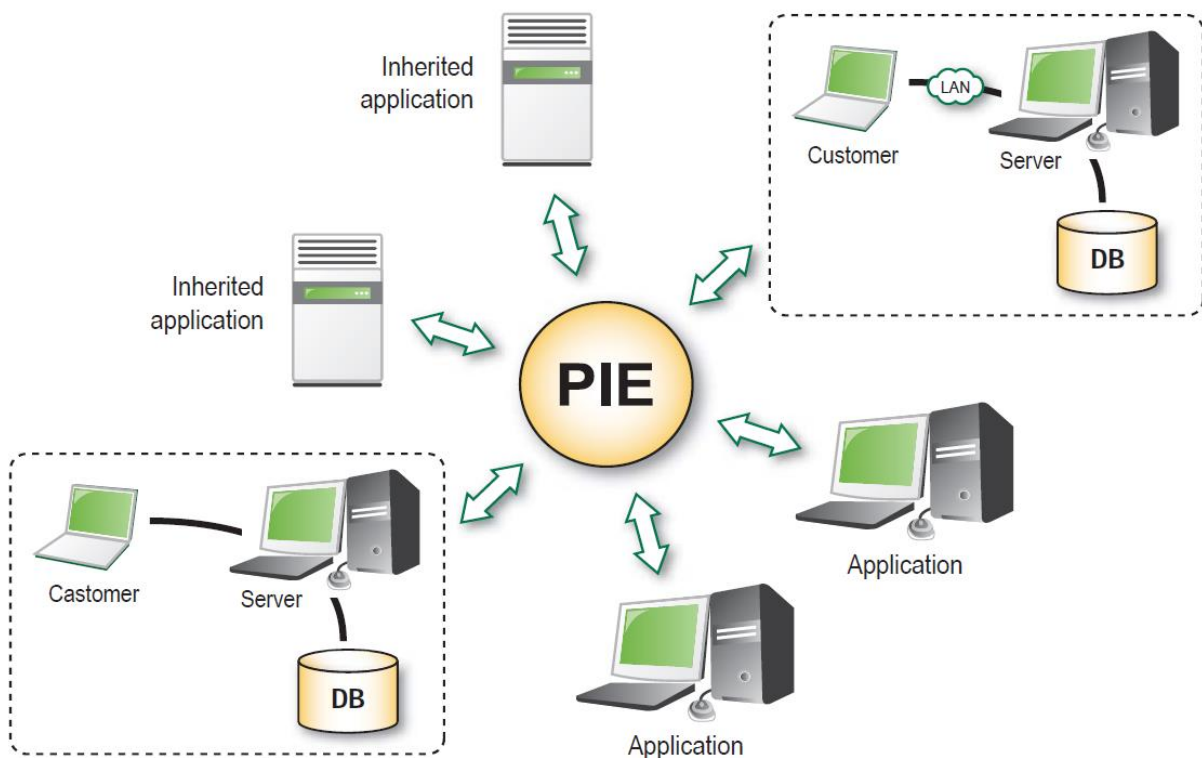
Pic.2. Integration based on PIE

It is important to understand that like any other integration platform PIE is not a particular application system:

- it is not a data warehouse;
- it is not a system of documents and work flow management;
- it is not a system of accounting and accounting records maintenance;
- it is not a system of materials management and logistics;
- it is not a system of process flows management.

PIE is a system development kit that is a set of tools used for building above mentioned systems for different application spheres. It allows effective inter-system interaction and growth of existing systems usage and business processes execution speed by means of "patchwork" automation parts unification and straight through information processing provision.

Apart from application integration PIE can be a tool for development of new applications from existing program components. Such possibility is proved by multiple PIE projects. In this case components are represented by services that are integrated by means of PIE Studio visual programming.

Conceptual innovations implemented in PIE

PIE is an innovative product based on industry standards and it is opened for development and integration with other automated systems. As a result of more than 15 years development PIE absorbed many ideas and tendencies in the sphere of integrated information systems building. Among important IT industry conceptual innovations implemented in PIE the following are worth mentioning:

Enterprise Application Integration (EAI) on the basis of data adapters;

- Service Oriented Architecture (SOA);
- Enterprise Service Bus (ESB);
- Event-Driven Architecture (EDA);
- Business Process Management (BPM).
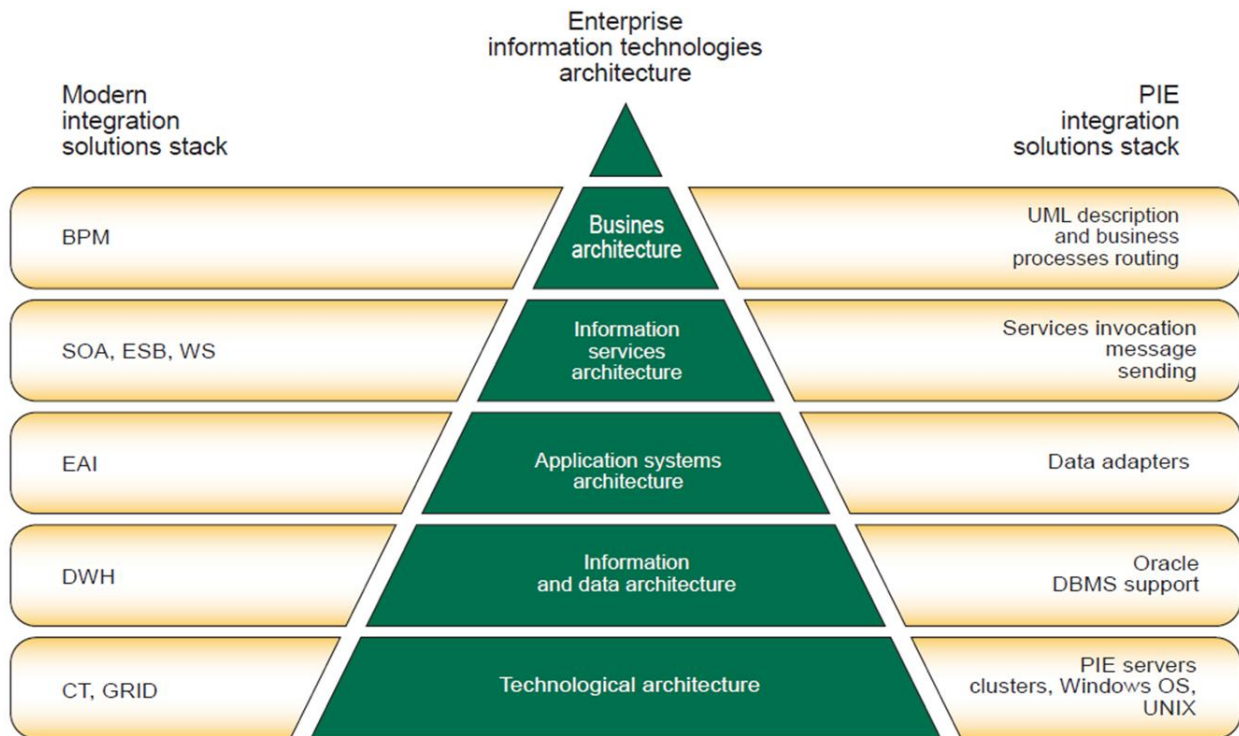
Pic.3. PIE technology means VS complex information systems architecture and modern integration solutions

PIE's place in a company's information-technological structure

Architecture of the company's information technologies is the basis for providing stable work of application systems.

Picture 3 shows the correspondence of PIE to corporate information systems architectural layers, models and methods of their implementation (so called integration solutions stack). It is evident that PIE represents a set of tools that helps to solve tasks practically on all the levels of complex information systems architecture being a linking element between one architectural layer components as well as between different layers.

Application integration and SOA approach to development of information systems is not a tribute of fashion. It is daily living needs for all enterprises and companies aiming at enhancement of efficiency of its activities by means of information technologies application. The problem of interaction organization of heterogeneous applications didn't arise today and is unlikely to be solved in the foreseeable future. Tools like PIE are created to solve it. The CMA Company does not only develop PIE and other solutions for modern business automation but also provides its customers with 24x7 technical support no matter in what part of the world they are located.

How PIE helps to solve business and operations management tasks

The role of information technologies in the success of modern business is difficult to overestimate. The business itself is often impossible without automation of the company's internal business processes and its information interaction with partners and controlling and regulating authorities. However not all information technologies are equally useful. It is certainly more practical to spend money only on those software engineering solutions that would contribute to business efficiency growth and would provide return of investments in IT. But how to find in the variety of proposed products and solutions the one that would suit your business? On the one hand the answer is simple but on the other hand it is a complicated thing.

It's evident that you should choose the solutions that really help to solve existing business problems and tasks in a short time at low cost. Nevertheless it is not the only criterion that should be taken into consideration. It's necessary to make sure that:

- the solution corresponds to the current state of technologies development;
- the solution allows to create an information system that could be further upgraded when business conditions or regulation authorities requirements change;
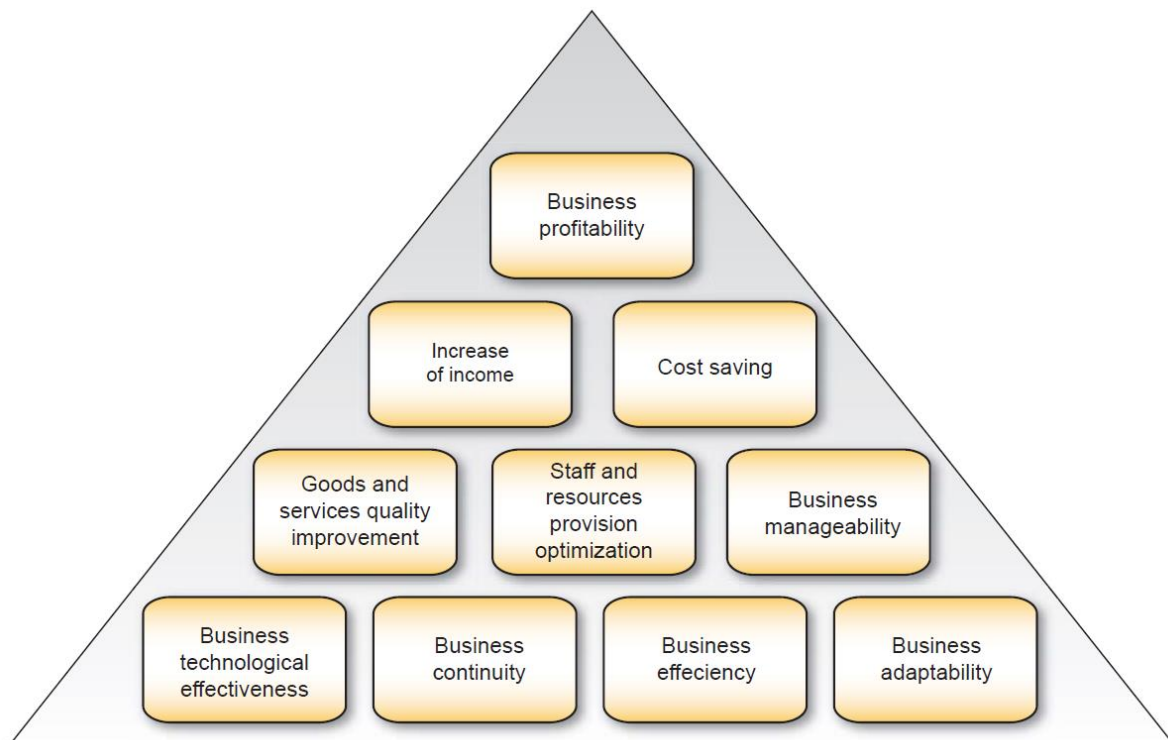
Pic.4. Typical business tasks pyramid

- the solution is provided with the developer's support;
- the solution can be used together with existing systems and, that is the most difficult thing, with new systems;
- the solution is intelligible, easy to understand and use by the current technical staff.

PIE integration solution not only complies with these requirements but also contributes to development of systems with the preset characteristics.

As a matter of practice none of the big or growing companies could avoid the "zoo" of information systems and applied technologies. Apparently it should be admitted that this is a standard and even inevitable event, a unique law of information technologies development according to which within one organization there exist legacy applications alongside with new ones. Moreover new applications also become old ones in the course of time and give place to other modern systems with similar functions or are accompanied with new "islands" of automation.

PIE allows to link all those systems within existing and new business processes being of great help in the resolving of main business tasks aimed at increasing of its profitability.

Picture 4 represents a pyramid of business tasks that PIE helps to solve offering wide opportunities to overcome difficulties arising on the lower foundational layer of the pyramid that in its turn makes the tasks of the upper layers more efficient:

- Business profitability can be raised by increasing a profit from goods and services sale combined with corresponding expenses reduction.
- Quality improvement and product expansion of goods and services with competitive advantages is the basis for new customers attraction and sales volume increase. You can achieve this by using PIE for reduction of business processes execution time and consolidation of data related to client servicing and production of goods. It allows to provide services and goods of better quality that is a precondition for new customers attraction and/or price escalation.
- Optimization of staffing and resources' provision of business processes. By implementing PIE business processes efficiency can be increased and that allows optimizing the company's staff and other resources expenses cost-efficiently.
- Business manageability. Due to straight through automation and data integration on the basis of PIE becomes more available up-to-date and correct information about business situation which is managed on timely basis.
- Business processes technological effectiveness; and standardization: process oriented approach to business automation used in PIE contributes to structuration, optimization and enhancement of efficiency of business procedures and operations.

- Business continuity: straight through automation of business processes and data processing (STP) without breaks in data flows with minimum level of manual work can be achieved due to PIE.
- Business operational efficiency; due to straight through information processing speed of execution of business operations automated with the help of PIE would increase essentially.
- Business adaptability: information systems integrated into unified system on the base of PIE increase considerably companies' ability to change quickly its business processes in the context of reorganization, introduction of new products and services to the market or change of regulating authorities requirements.

Integration solutions on the basis of PIE aim at enhancement of business efficiency.

How PIE allows solving the tasks on information technologies

Information technologies should serve the interests of business and contribute to its growth and efficiency. But everybody knows how difficult it can be to think about the sublime when every day you have to face new problems. Fortunately the tasks that should solve IT managers are alike:

- patchwork automation;
- technological "zoo";
- uninterrupted systems operation providing ;
- replacement of legacy and implementation of new systems;
- IT up-to-date maintenance in conditions of lack of staff and budget.

The proverb says "Good things come in small packages". It can be a good description of PIE. Any program product intended for applications integration contributes to solve the listed tasks directly or indirectly. PIE is not an exception but it has a number of advantages that distinguish it from other integration platforms:

- it's a business class cost effective price solution
- it embodies modern technological achievements and standards
- it increases the level of business processes automation on the information straight through processing principles
- it integrates the company's systems into one information space notwithstanding technological differences
- it facilitates overcoming of patchwork automation by organizing systems information interaction.

How PIE helps developers and IT administrators

It won't be an exaggeration to say that PIE is a daydream for corporate developers. PIE has a transparent architecture comprehensible to any professional and provides great possibilities for integration of applications of any level of difficulty and functionality. PIE is based on industry standards that helps to create integrated systems open for new components addition in future.

PIE has some distinctive features that are attractable for professional developers:

- the employment of SOA and ESB;
- possibility to choose services realization means (direct API methods activation, XML-messages sending, web-services);

- graphical presentation of business processes on UML language for description of external subsystems interaction and independently programmed tasks and components;
- C++ and JavaScript languages usage for programming of internal components and tasks;
- free choice of programming languages for programming of external components and services;
- PIE applications cross-platform server.

The advantages for software developers and systems administrators are not restricted to the listed items. Description of other attractive possibilities can be found further. But the best way to understand PIE is to use it.