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Methods for constructing complex software systems based on software technology convergence: Web-Service Semantic, Web-Service and Agente, Multi-Agente

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Андатпа. Мақалада ақпараттық-коммуникативтік технологиялар, білім берудің электрондық ресурстары жөніндегі мәселелер күрделі жүйелерді бағдарламалық қамтамасыз етуді құру процессінде қарастырылады. Бағдарламалық жүйелер өзінің даму барысында анағұрлым күрделі деңгейге жетіп қалып отыратындықтан қолданыстағы бағдарламалар құруға пайдаланылып жүрген әдістер мен концепциялар өз нәтижелерін бермей қалып жатады. Әдетте, осындай жағдайларда бағдарлама құрудың жаңа, тың парадигмасы пайда болады да, бағдарлама жасаушылар бірте-бірте жаңа бағытқа көше береді. Процедуралық, модульдық және нақты бір объектіге бағытталған бағдарламалар жасау концепциясы – кешегі күннің еншісі екені белгілі; ал болашақ бағдарламашылар сервистік-бағытталған архитектураларды қолданысқа алуы керек сияқты.

Кілт сөздері: *ақпараттық-коммуникативі технологиялар, объектілі- бағытталған тәсіл, сервисті-бағытталған архитектура, веб-сервис.*

Аннотация. В данной статье рассматриваются вопросы информационно-коммуникационных технологий, образовательных электронных ресурсов в процессе построения программного обеспечения сложной системы. Программные системы по мере развития достигают такого уровня сложности, что существующие подходы и концепции разработки ПО становятся малоэффективными. Как правило, при этом рождается новая парадигма программирования, на которую постепенно переходят все разработчики. Создание концепции процедурного, модульного и объектно-ориентированного программирования - это примеры давнего или недалекого прошлого; будущее же, похоже, за сервисно-ориентированными архитектурами.

Ключевые слова: *информационно-коммуникационные технологии, объектно-ориентированный подход, сервисно-ориентированная архитектура, веб-сервис.*

Abstract. This article discusses the issues of information and communication technologies, educational electronic resources in the process of building complex software systems. Software for the development of the system reach a level of complexity that the existing approaches and concepts of software development are becoming ineffective. As a rule, it is born a new programming paradigm, which are gradually moving all developers. Creating the concept of procedural, modular and object-oriented programming - are examples of long-standing or recent past; the future, it seems, for the service-oriented architecture.

Key Words: *information and communication technologies, object-oriented, service-oriented architecture, web service.*

Creation of system that effectively perform missions, functions or effectively decisive applied tasks can be reached on the basis of various technologies both services, and agents.

In this regard, there is a question as it is necessary to program system on the basis of various languages: the assembler, pascal, Java, and on the basis of various technologies as procedural, modular and object-oriented programming, service, i.e. Web ServiceSemantic, Web Service and agentns.

It is known that the reuse of a program code simplifies development of big information systems. Until recently for this purpose the object-oriented approach (OOA) meaning rigid association of components and application objects in a single whole was traditionally applied. In OOA paradigm from the developer the knowledge of the applied program interface in which the attributes and methods together realizing necessary functionality are integrated is required. But as object systems are usually created on the basis of some programming language (Delphi, C ++, C#, Java, etc.) and the fixed mechanisms of exchange of information between objects and modules of information system, and in OOA all dependences and restrictions remain.

Such approach is convenient not always - in particular, it doesn't allow to react quickly to change of a situation and, for example, to design the modern systems which are guided by the concept "resources on demand". Besides, for modification of object systems quite often it is necessary to rewrite codes of the connected objects and methods. To reduce these restrictions to a minimum just and the SOA technology (ServiceOrientedArchitecture - service-oriented architecture) which is already recognized as many as revolution in technology of programming allows. Analysts are sure that they in process of development of the SOA standards of the company will develop this area, and vendors modernize the products according to its requirements.

Actually, SOA is just other style of creation of modern systems for the enterprise. It is concentrated on services which are characterized by the loosely coupled distributed architecture and interfaces. Service in this case - it is not something else than the unit of work performed by the service provider to ensure the desired result customer service. It is service, but not object in OOA, thus, it doesn't depend on technology, media and other language resources. The integrating role is undertaken by program agents between service provider and the user of carrying out program agents.

Degree in which various elements of system can reduce some features of architecture of SOA. Interaction of components with use rather small a set of simple interfaces which have only the most general of semantics and are available to all suppliers and consumers. Transmits the message for the limited dictionary through these interfaces. And as only gives the general structure of corporate system and the dictionary, all of semantics and the business logician, specific for prilozheniyaopisyvatsya in these messages directly.

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The corporate information system constructed on SOA consists of a great number of persons available through API. The search engine allows the operator to enter the required function in general for the user from the register of services which is built. Clients who want to solve a specific problem contact service provider via interfaces to carry out necessary actions - this procedure is accurately shown in fig.1: the component A uses the service provided through a component B of the interface 1 and a component B with use of the program interfaces 2-4 provided by establishments of the C, D and E system.

All components of corporate system have to support general "language", the representing message. It isn't difficult to guess that SOA and web services as a rule, are mentioned together.
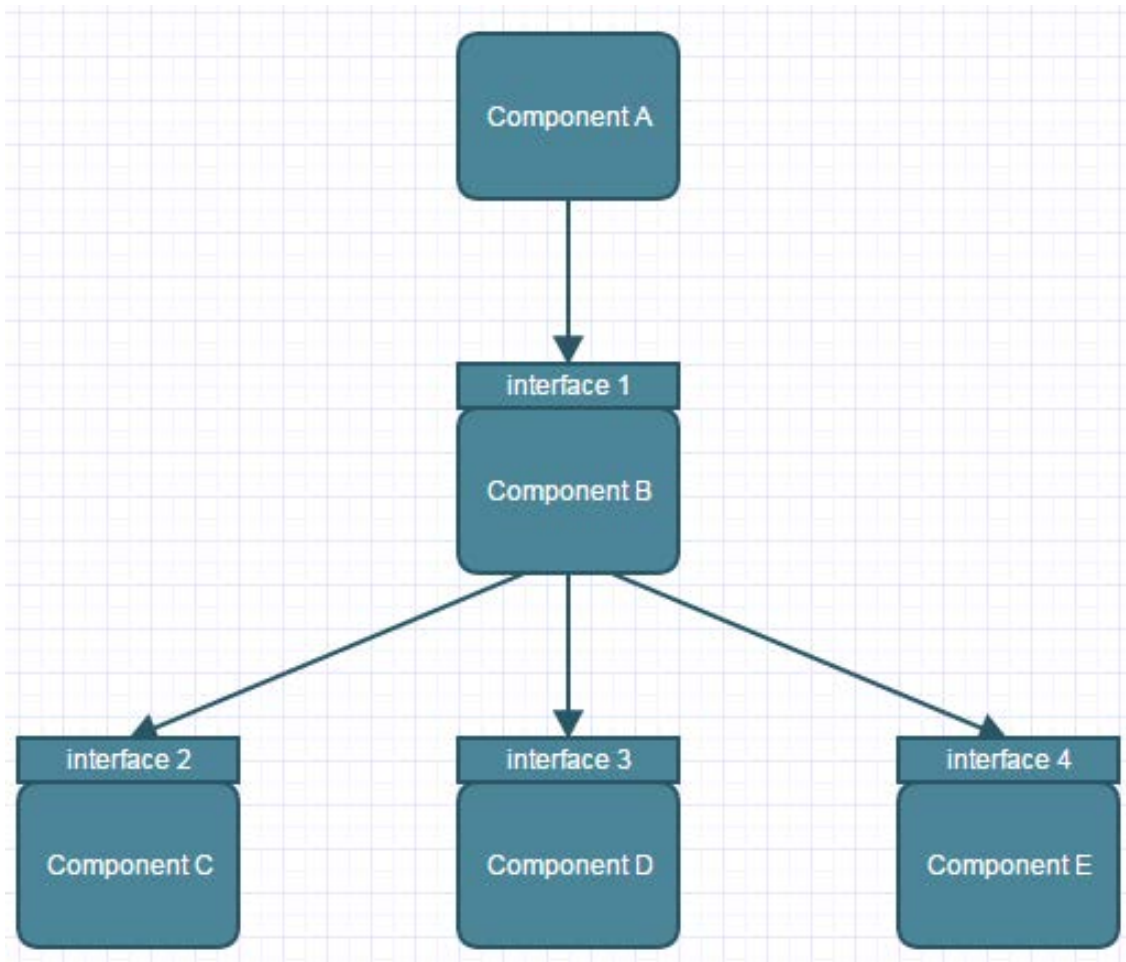

Figure 1: Architecture of System in the concept of SOA

The architecture of web services also is service-oriented. Moreover, web services are an essence of SOA with two additional restrictions: interfaces are based on Internet protocols (HTTP, FTP, SMTP, TCP), and all messages are described in the XML format.

Detailed descriptions of the standard of web services and the SOA specifications are provided on the websites of consortium W3C and the OASIS organization - we won't spend time for acquaintance to them once again, and we will look how the program systems created in new architecture of SOA function [1].

Practical aspects of service-oriented technology allow to solve problems of scalability, to integrate data transmission networks and voices, to simplify procedures of design and management of networks, and also to create other distributed applications, is transparent interacting with resources of systems by means of applied program interfaces and open standards.

The "New Generation of Systems and Applications for Support of Operating Activities" program (NewGenerationOperationsSystemsandSoftware, NGOSS) - an initiative of the international, independent non-profit organization TeleManagementForum (TM Forum). It provides specialized structure of support of the effective operator, providing to the enterprise the tools necessary for sure expansion of projects of automation.

In decisions on the basis of NGOSS the information and technological concepts and technologies promoting creation of the productive environment of development and more effective management of infrastructure admitted to branches are used.

The NGOSS program represents the tool kit consisting of the structures, specifications and the guidelines coordinated within branch and covering key zones of business and technology. She is intended for integration of business requirements and technical aspects of activity of the operator of telecommunications into uniform architecture, automation of business processes in heterogeneous information and communication environments, creation of the general information infrastructure.

In total the NGOSS elements promote creation of through structure of development, integration and operation of the OSS/BSS systems; the NGOSS elements can be also used as through structure as part of universal methodology for implementation of large-scale projects of development and integration. Along with it, the NGOSS elements are applied separately for the purpose of receiving concrete short-term result.

If to consider NGOSS in the generalized form, one may say, that it consists of four key, interconnected among themselves structures and methodology of the support providing use of these structures:

• Expanded structural model of telecommunication business processes).

• The all-corporate unified data/information model).

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• Technologically neutral architecture.

• Card of telecommunication applications

• Iterative methodology of life cycle of development (Scope, Analyze, Normalize, Rationalize, Rectify, SANRR) [2].

Architectural unit of service is the component which can support one or several contracts. Within technologically neutral architecture of NGOSS the term "service" designates the functionality of a component available at use of contracts (fig. 2).
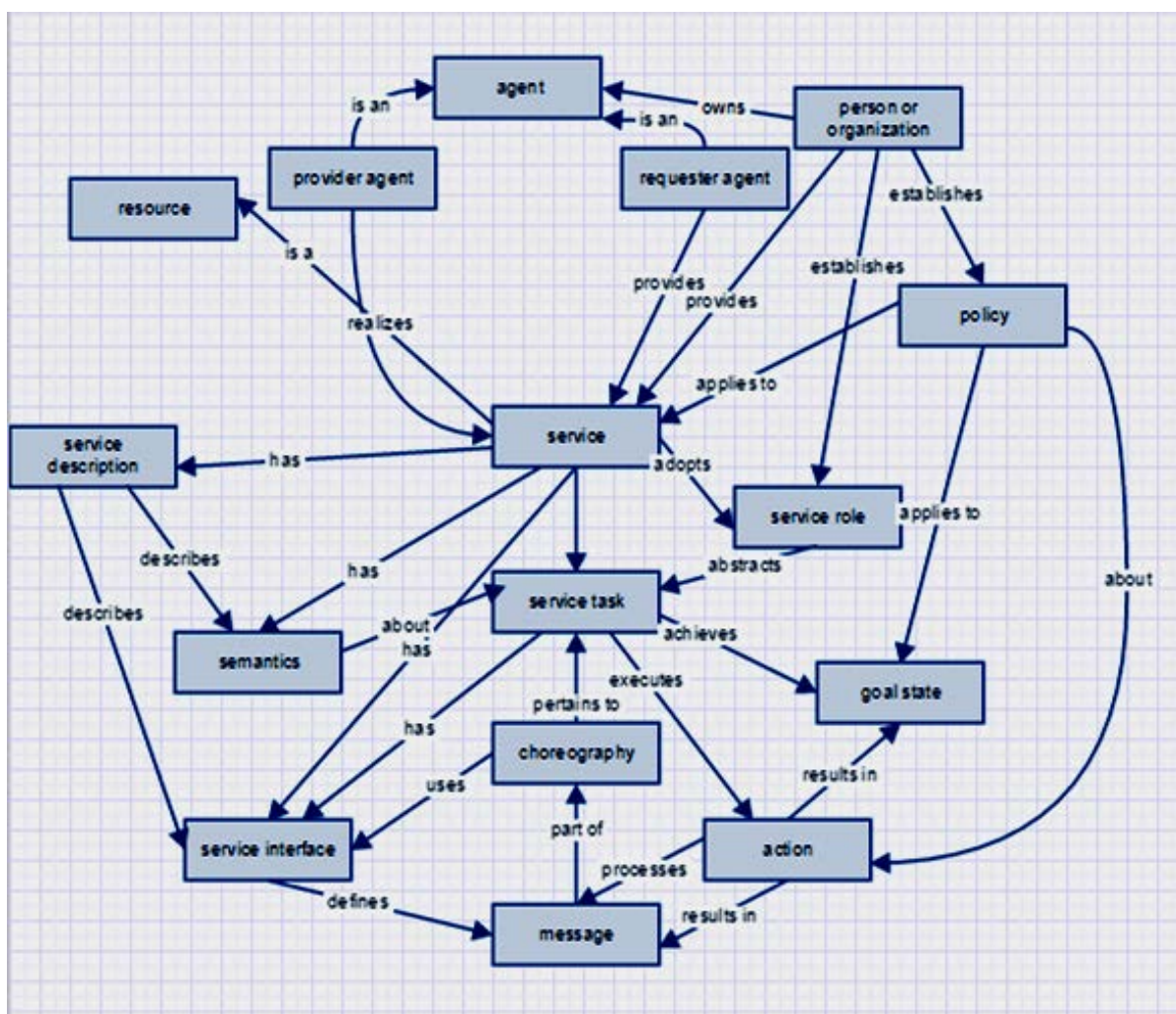

Figure 2: Architectural service unit

The concept of uniform representation and storage of information for her use in various business processes is one of the fundamental principles of NGOSS. SLA (ServiceLayerAgreement - the agreement on level of service), the information about clients, network topology, etc. can be examples

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of such information. Access to data is provided by means of services which interfaces are specified by information contracts (informationservicescontracts) [3].

Introduction of the NGOSS program opens prospect of creation of information infrastructure from the standardized applications which, in turn, allow to bring quickly new services to the market and also to withdraw quickly from circulation in process of obsolescence and replacement with new. (All this in coordination with other components of technology - business processes, structure of data, a network and other elements of telecommunication infrastructure).

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