

## Research on Manufacturing Resource Service based on CXF Apache framework

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**Abstract.** Service for manufacturing resources, this paper proposes a manufacturing service operation mechanism based on Spring Framework. And this mechanism uses Apache CXF tools, describes the process of service registration, discovery and invocation. This paper analyzes the service problems of human resources, user resources and equipment resources. The architecture of a software platform for manufacturing service deployment and management is presented.

### I. INTRODUCTION (HEADING 1)

(1) CXF framework: Apache CXF is an open source framework for Services, which uses API to build and develop Services. These Services can support multiple protocols, such as SOAP[1], XML/HTTP and CORBA. These Services can run in various transmission protocols such as HTTP, JMS or JBI. CXF not only simplifies the creation of Services[2], but also inherited the tradition of X-Fire, and Spring can be integrated.

(2) Service Oriented Architecture: Service Oriented Architecture (Architecture Service-Oriented, SOA), which was first proposed by Gartner[3] in 1996. SOA has become the most important topic in the field of modern application development by the end of 2002. Currently SOA has become a widely distributed architecture. SOA is the software architecture of the distributed computer system, which using the service oriented approach to loose coupling software services. SOA structure has three basic roles: service delivery, service registration and service requests. Whether if the presentation layer protocol of service provider and service requester is fixed, SOA can be classified as service-oriented architecture (Service Protocol-Oriented Architecture, SPOA) and service-oriented architecture (Service Object-Oriented Architecture, SOOA). The following figure, the technical architecture of the Web service. In Web Service, a service is determined by its name. Services provided by UDDI (Universal Description, Discovery and Integration) to find a service registry. The description of a service is registered in the form of WSDL to the service registry by the name of the service[4], and the service requester needs to know the name of the server in advance. Service requests from registered parties to obtain the services of the service description[5], by constructing a proxy to communicate with the service provider's. The communication protocol needs to be determined by the server provider in advance and is observed by the service requester[6]. Manufacturing Resources. Manufacturing resources into human resources, manufacturing equipment, technical resources and other nine broad categories. The human resources: Human resource is a domain expert with extensive experience in the whole life cycle of the whole manufacturing system. The manufacturing equipment resources: manufacturing equipment resources are abstract resources at the workshop level that has a specific manufacturing capacity, mainly to provide manufacturing services for those who need resources. Technical Resources: a collection of technical resources is cured in the manufacturing process design and manufacturing enterprises, technology, management, marketing and other technical knowledge. the application of system resources: the application of system resources is the whole life cycle of manufacturing systems used in the collection of all the application of resources. Material resources are the raw materials, blanks and finished products that are needed to make some kind of product in the manufacturing system. User information resources to record the basic information of resource providers and users. computing resource. Service resources. Other related resources: does not belong to the above collection of all resources in the resource[7].

## II. SOOA SERVICE MECHANISM

Different methods have been used to carry out a lot of scientific research on manufacturing resource service in the world. There are: Resource service based on WSDL, WSRF of the resources services, Based on the Ontology of the resource services. In order to achieve high efficiency and stable performance of manufacturing resources, In this paper, a series of research on manufacturing resource service is made: the method of manufacturing resource service based on SOOA[8-10].

### A. *Service and System*

In this paper, a new definition of SOOA architecture, which includes service provider, service provider, service agent and interface service, is included in the SOOA architecture.

### B. *Include*

Service registration, discovery and invocation mechanism in SOOA structure are the result of the interaction. Service provider in the structure of the work is to provide services, at the same time, the service interface, access to the address of the service information described and released to the service registration center.

Service addressing is a kind of service with special functions. All service providers need to register in one or several search services. The maximum effect of the service registration center is the direct dependence between the consumer and the provider. In the registration process, the provider needs to publish a service description to its own, While also to send a service agent addressing service.

The service requester is a specific caller service function, service description can be obtained indirectly □ through the service registration center, or from the service provider to directly obtain the service description. The requesting person needs to call the corresponding service interface according to the demand. The request must follow the interface and the address of the service description, so as to realize the interaction between the corresponding services provided by the provider.

The service agent is a kind of lightweight network object, which has no specific service function, but it includes the ability to communicate with the service provider. Service agents need to transfer in the network, is released by the service provider, and storage in the search service.

## III. MANUFACTURING RESOURCE SERVICES

From the above, this paper makes a research on the service of human resources, user resources and manufacturing equipment resources, and puts forward a kind of software package method.

### A. *Human Resources*

Human resource is a field expert with extensive experience in the whole life cycle of the whole manufacturing system. They can provide expert consultation, expert diagnosis and other services for resource users. According to the knowledge structure of manufacturing system, human resources can be divided into design experts, process experts, technical experts, management experts and so on. In the manufacturing resource service if domain experts are not online or at the workshop or resting, can according to the service, through the demand analysis gives a reasonable solution to solve the problem of the expert.

### B. *User Information Resources*

The user information resource record resource providers and users of some basic information, such as user identity, permissions and access to resources of historical records, it was later found that the resource assessment, and provide the basis for scheduling.

### C. *Manufacturing Equipment Resources*

The manufacturing equipment resource in the workshop is abstract resource with specific manufacturing capability. It mainly provides the processing manufacturing service for the resource requirement. According to the function of manufacturing equipment resources will be further refined for processing machine tools, cutting tools, measuring tools and tooling and other processing and manufacturing resources.

There are strong control package, weak control package and virtual package. The following sequence of instructions:

- (1) the strong control package is refers to the software tool control instruction is mainly in the service provider hand. The service provider only needs to provide the external service interface with a higher level of abstraction to the outside, and provide the service with limited flexibility.
- (2) the weak control package is the main control of the software tool is the service needs. Service providers to provide a large number of fine grain smaller services, service needs through the service interface, the transmission of relatively complex logical space to achieve the corresponding functions. Generally speaking, more mature large software has a high openness, so in this case can use the weak control package.
- (3) virtualization package is to highlight virtualization, refers to the use of virtualization technology to create a service provider. In the virtual package mode, the service provider itself is a virtual machine, while the service agent is a virtual machine remote control client. Virtual machines need to communicate with remote clients through a particular control mode.

#### **IV. MANUFACTURING SERVICE DEPLOYMENT**

As shown above, based on the SOOA mechanism of the service deployment is completed, the service needs of the initial call registration center service. In the deployment of the service, the host service is composed of 3 server clusters, host service management of many manufacturing services. The manufacturing resource management server package and deploy the service through the host server, and the host service is to publish and register the service through the search service, at the same time, the service host submits the service call interface in the interface service. Resource management services and search services are the service information stored in the database server.

#### **V. CONSTRUCTION AND REALIZATION OF EXPERIMENT**

##### **A. Build Web Service**

CXF = Celtix + XFire, CXF started calling Apache Celtixfire, and later changed its name to CXF Apache. CXF inherited the essence of Celtix and X-Fire two open source projects, which provides support for JAX-WS comprehensive. And it offers a variety of Binding, Data Binding, Transport and various Format supported. According to the actual needs of the project, the priority code (Code First) or WSDL (WSDL First) first release and use easily Web implementation of Services. The characteristics of CXF is: flexible deployment lightweight containers: Deploy Services in Tomcat or Spring-based containers; JBI integration: such as Service Mix, JBI, Open ESB or Petals, the container it is deployed as a service engine; SCA integration: can be deployed in the SCA container like Tuscany; Integrated J2EE: can be deployed server Services in J2EE application, such as: Geronimo, JOnAS, J-Boss, Web-Sphere Application Server and WebLogic Application and Server Jetty and Tomcat Java client-server independently.

##### **B. Experimental Environment**

The first set a new Dynamic Web Project in My Eclipse and to test whether the environment can be released after the Build code and web page to the Tomcat test environment to run; The second build a SOAP Web Service based on CXF and Spring

(1) Create Service Web related classes: This type Web Service SOA (service architecture), which is provided with a remote RPC interface. First of all, there is an interface to provide real service, in the server, That to have the interface in the server to achieve.

(2) Mapping the Service in the configuration file. Create a Restful Web Service based on CXF and Spring

Testing tools: the methods of Native access, using HTTP Client in Java NIO .

CXF Web Client interface: CXF provides access to all interfaces of the Web Service.

Spring RestTemplate: access through the RestTemplate related library on the client side using the spring.

#### **VI. CONCLUSION**

In this paper, according to the related requirements of manufacturing resource service, the title use Apache CXF tool to build the service cluster in the cluster. This paper describes the process of service registration, discovery and invocation through the application of manufacturing service

operation mechanism. At the same time, the paper analyzes the software package and service of different kinds of manufacturing resources, such as human resources, user resources and manufacturing equipment resources, The architecture of the software platform for the deployment and management of manufacturing services is optimized. The composition, function and dependence of each component of the platform are analyzed. In the future research will be gradually resolved in the virtual package, software tools, the existing technical problems.

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