

# Report generation for workflow in process items

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## ABSTRACT :

Product Lifecycle Management (PLM) is the strategic approach for managing the whole lifecycle data of a product starting from its concept generation, business analyzes, product design, solution architecture and technical implementation, to the successful entrance to the market, service, maintenance and product improvement. Today companies are discovering that they can more flexibly perform their business processes with less IT intervention if they use service oriented architecture (SOA) as the technological foundation for their digital product design and development environment. Siemens PLM Software has developed a SOA infrastructure for Teamcenter. Teamcenter Application's SOA services provide an open, high-performance, Coarse-grained interface to the Teamcenter system's Business Logic Server. These services enable to access Teamcenter driven capabilities and integrate them with existing business processes and to create customized, task-specific programs to meet business needs. This can be used for facilitating product lifecycle management (PLM) and supporting the PLM-driven business processes adopted by its customer base. This paper outlines the use of SOA technology with the help of JAVA programming to create a utility that identifies the items which are stuck in workflows.

## Keywords:

Teamcenter, PLM, customization, SOA, JAVA.

## INTRODUCTION

As a system administrator, Workflow Designer is used to design workflow process templates that incorporate your company's business practices and procedures into process templates. End users use the templates to initiate workflow processes in My Teamcenter and Workflow Viewer. Workflow stems from the concept that all work goes through one or more processes to accomplish an objective. Workflow is the automation of these business processes. Using

workflow, documents, information, and tasks are passed between participants during the completion of a particular process. In case of multi site collaboration various sites shares data with each other using server, each site should have to know which items are stuck there in workflows. For finding out such items an utility has to be made. To create such utility SOA can be very useful as it uses services to connect to the Teamcenter. Hence SOA could be used to manipulate the Teamcenter data without opening the Teamcenter UI.

The main reason to adapt a PLM system in an industry is to smoothen flow of design, manufacturing or other useful data with different sites or locations. So to share that data we use a module here in Teamcenter called multisite collaboration. The multisite collaboration is used to exchange data between different sites or servers. While extracting data from one server to another server using multisite collaboration, an error is encountered because of those items which are processed in workflow, the identification of such items in Teamcenter is addressed with the help of SOA approach for Teamcenter customization.

## NEED OF CUSTOMIZATION

The standard installation of Teamcenter is a powerful application that helps to manage our product data over its lifetime. The applications of Teamcenter are widely spread from automotive, aerospace industries to electronics, pharmaceutical and fashion designing industries. Part of Teamcenter power is its adaptability to each company's work processes and user interface preferences. Another powerful Teamcenter tool is the ability to integrate data from other applications. We can customize Teamcenter so it meets any company's product life cycle management needs and their users' working preferences.

## WAYS OF TEAMCENTER CUSTOMIZATION

Teamcenter can be customized by both the ways either on Client side or server side to deliver integration solution using the Teamcenter published API's and different available toolkits.

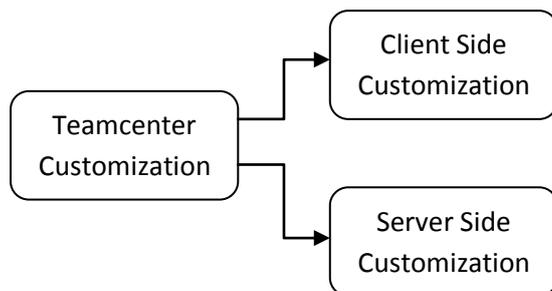


Fig 1 Customization Types

### Client Side Customization :

The client side Customization can be thought of as a customizing or changing the Teamcenter application user interface to add the useful commands for the user or administrator. The client side customization can be performed by using programming languages like Java etc. and available API's in Teamcenter Application. The client side customization can be used for adding new object in Teamcenter, such as Menu, Menu Item, and Toolbars on client side. Also it includes the customization of Teamcenter Functionalities like custom form creation and adding new POM classes etc. as per the client organizations requirement.

### Server Side Customization:

Server side Customization can be thought of as customizing the Teamcenter application from the server side without involving into portal side. The server is being customized using Teamcenter API (Application program interface) such as ITK calls (Integration Toolkit using C /C++), and Service Oriented Architecture Customization (i.e. SOA).

## SERVICE ORIENTED ARCHITECTURE (SOA)

Service oriented architecture is a system design pattern that emphasizes some attributes such as:

- Appropriate functional granularity appropriate to the task at hand
- Separation of the interface definition from its implementation
- Support for the concept of service providers and service consumers who are distinct from each other
- Standards-driven compliance Service-oriented architectures also reflect a specific:
- Software framework
- Set of policies
- Set of best and accepted practices

The Teamcenter SOA architecture helps achieving following objectives:

### 1) Contract-based interfaces

SOA promotes the use of abstract interfaces independent of underlying business logic implementations. These interfaces represent a contract between clients and the business applications. As long as the client makes a proper request for a service, the server honors it and returns a response in the format specified in the contract. The SOA contract helps to uncouple client and server development activities and allows them to evolve independently so long as the contract remains intact.

### 2) Coarse-grained interfaces

SOA interfaces also tend to be coarse-grained, in the sense that they ideally represent a complete business transaction. The client makes a request for some type of work to be done; the server executes the full operation without any intervening conversation with the client, and then sends back a fully-complete response to the client. This results in fewer remote calls to API and brings about a nonchatty interface.

### 3) Single entry point to business logic

After a service is exposed through SOA, it is immediately available to all clients. Because the service is contract-based, the server logic does not require knowledge about the client requesting the service, which allows new client technologies to be adopted without changing the service or invalidating other clients using the service.

In the field of software development, service-oriented architecture provides methods for systems development and integration. This enables to package the system functionalities and business processes into interoperable services. SOA also describes IT infrastructure which allows different applications to exchange data with one another as they participate in

business processes. Service-orientation aims at a loose coupling of services with operating systems, programming languages and other technologies which underlie applications. A service oriented architecture (SOA) is defined as a group of services that communicate with each other. An example is shown in figure1 describing a service oriented model. The process of communication involves either simple data-passing or two or more services coordinating some activity.

## APPROACH FOR CREATION OF UTILITY

The regular and simple approach to find out the items which are stuck in workflows is to query all the items and see for every item if it has status for any particular workflow.

To automate this task following approach could be used

- Connection with application such as Teamcenter using connection service
- Login to Teamcenter by providing privileged user credentials
- Fetch all the OOTB queries using query services
- Search for the queries which could return the objects stuck in workflows. If such query is not available then create custom one with required attributes
- Run the query using execute query services, and generate report based on the results we get, which can be utilized further for different purposes.
- Generated report contains items which are stuck in processes and their properties such as workflow process template name, responsible party, owning user, etc.

A user interface can be created using JAVA Swing which is different than Teamcenter's user interface. It is connected to the Teamcenter database through services over the http or iiop protocols. Through this interface it is possible to run the utility for generating the list of items which are stuck in workflow.

## SERVICES USED FOR CREATION OF ABOVE TASK

Teamcenter's SOA provides different services which can be directly used to customize the desired task and/or to create our own service.

Following services could be used for creation of above mentioned task:

- SavedQueryService -It finds out the available services on the server
- savedQueries -it finds out the available queries on that services

- executeSavedQueries-it executes a particular query of choice
- ExecuteSavedQueriesResponse-It stores the response created by the queries
- DataManagementService-This service is used for creating the business objects in the database.

## SERVICES USED FOR CONNECTION WITH TEAMCENTER:

- I. **com.teamcenter.clientx.Session** : This service is used for creating session
- II. **com.teamcenter.soa.client.Connection** : Single instance of the Connection object that is shared through out the application. This Connection object is needed whenever a Service stub is instantiated.
- III. **com.teamcenter.clientx.AppXCredentialManager** : The CredentialManager is used by the Teamcenter Services framework to get the user's credentials when challenged by the server. This can occur after a period of inactivity and the server has timed-out the user's session, at which time the client application will need to re-authenticate. The framework will call one of the getCredentials methods (depending on circumstances) and will send the SessionService.login service request. Upon successful completion of the login service request.
- IV. **com.teamcenter.clientx.Session.Session(String host)** : Create an instance of the Session with a connection to the specified server. Add implementations of the ExceptionHandler, PartialErrorListener, ChangeListener, and DeleteListeners.
- V. **Connection**  
**com.teamcenter.clientx.Session.getConnection():**  
Get the single Connection object for the application  
**Returns:** connection

## CONCLUSION:

The product lifecycle management integrates the huge data generated in the industry with the business processes and hence works towards retention of knowledge base. As the processes become more and more complex, the data needs to be streamlined and made as simple as possible. The workflows constitute a major part in PLM implementations. To make these workflows more efficient and less complex the data flowing through these workflows need to be filtered properly. The utility as described in above paragraphs



helps to find out the status and position of such items in workflows with their responsible parties.

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