

ON SOME ASPECT OF WEB SERVICES CHOREOGRAPHY - ITS APPLICATION AND CASE STUDIES

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Abstract

We are living in a world, where we are using Internet for our day to day activities. Starting from e-mails to social networking, education and research, finding jobs or life partners, booking rail or air tickets and going for online shopping, we are using Internet and its services. Some of the services, especially where a transaction or payment is made through Internet, are bit complex in nature in terms of their working. E-commerce based sites work as a team of several sites belonging to different service providers (for example, in case of air ticket booking, the airline site gives the information of flight and booking is done after making a payment using other credit card or banking site). Web service choreography are the services that looks for successful synchronous interaction and communication between different sites so as fulfill the requirement. In this paper, we have discussed on web services choreography, its definition and a brief literature survey on it. This part can also be considered as a review on the topic. The paper follows with applications and examples as a part of case studies. We have further discussed about the few steps that can make the system more stable and fault tolerance. The paper concludes with a general conclusion.

Keywords – web service choreography, intermediate interaction and communication, fault tolerance

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1. INTRODUCTION

The Internet and the websites are going to create a world where physical objects are seamlessly integrated into information networks in order to provide advanced, fast, accurate and intelligent services for human-beings. The number of interconnected websites has taken control of our lifestyle and habits. We are no more interested to stand in queue of booking the train tickets or even we can make shopping without actually going out to market, The Internet and its application has given us information on surveillance, health care, transport, food, and entertainment. The applications of Internet are vast and ranges from controlling smart applications in homes and offices remotely, working with waste management system, traffic controlling, emergency response, intelligent shopping to many more. Even social networking sites are providing number of services like job hunting, online studying, reviewing films other than interaction through video and audio with friends and family members and also [9], [10].

As involved with a huge number of websites, sometime communication between these websites produces large volumes of data. Data fusion and mining present an efficient way to manipulate, integrate, manage and preserve mass data collected from various web portals. However, we specifically focus on the communication between two different web sites and further between more numbers of websites in general. Websites consist of massive data. They are multi-sourced, heterogeneous,

redundant, dynamic and sparse. Hence, establishing a machine controlled communication (on demand) and responding to the request is a difficult and complex job [1],[6].

The interactions or communication among Web Services belong to different websites can be considered as an exchange of messages or information, their components, sequences and in order of transmitting and receiving. This is a challenging problem. These communications may take place among groups of services which, sometime makes up a larger, integrated, complex and composite service, and needs to transverse across organizational web-boundaries for obtaining information and further to process that information. The challenges of Web Services choreography are mainly focused around message exchange and sequencing these messages in time to the appropriate destinations. In order to work with this challenge, the aspects of Web Services must be developed and standardized in an interoperable manner, in a way that each individual service as well collaboration services can be used efficiently. Further, in this paper, we have discussed about set of requirements for Web Services choreography as a part of our literature survey [5].

2. DEFINITION OF WEB SERVICES CHOREOGRAPHY

Web Services Choreography is the complex interactions of services with their users. Any user of a Web Service, automated or otherwise, is known as client of that service. These users may be other Web Services, applications or even a human being. A specific set of interactions maybe related over time to some form of collaboration grouping that is initiated at some source and runs through a set of Web Services and their client (failure of booking ticket using IRCTC site during the heavy traffic in the site). Interaction between the different web sites is a generic term that may encompass the concept of a "business transaction", an "ACID transaction" or even "cohesion" [1], [5].

A choreography description can also be termed as a multi-party contract that discusses about the external observable behaviour occurs during interaction and messages passing, exchanged between a Web Service and its clients [11].

3. APPLICATION AND USAGE OF WEB SERVICES CHOREOGRAPHY

In this part of literature, we have reviewed on the sequence of interactions between a set of cooperating web services, which in turns, promote a common understanding between participants. This understanding make the complex situation, easy to work out [3],[4],[7].

The very first step is to promote a common understanding between different web services: who are participating for the interaction and communication. Thus, it accepts and validates a kind conformance automatically. Then the interaction starts between the web services. This in turns increase the robustness and generates code skeleton. Code skeleton are used in the choreography to implement the required external observable behaviour for that Web Service.

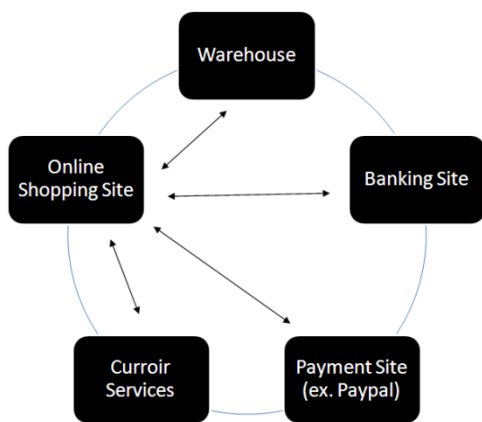


Fig 1 Relationship and interaction between different sites

The above figure roughly demonstrate a choreography description of multi-party contract between a shopping site and a number of other web sites (which includes warehouse, net banking, payment gateway and delivery service) to generate a code skeleton for a web service that can be guaranteed for successful in exchanging and make use of information with that particular shopping web portal.

A choreography services and its description is also used to validate the multi-party observable interactions amongst a collection of Web Services. In our example, a bank site loads a choreography description into the vendor specific tool which informs the bank for any breaches of the choreography services or interactions. Such services, plays an important role during the transaction phases as apart from security measure. A choreography service also includes properties such as lock freedom and leak freedom in the behavioural contract. In this sense the choreography description acts as a model of the behaviour across a number of Web Services which in turn can be subject to static analysis to show whether they are underlying Web Services behave according to the contract and further, the interaction between the Web Services is exhibiting acceptable properties [1],[4].

4. AN EXAMPLE OF WEB SERVICES CHOREOGRAPHY

A travel agent wants to offer to customers the ability to book complete packages that may consist of services offered by various providers. The available services may include: air travel, train travel, bus tickets, hotels, car rental, hotel booking and route planning

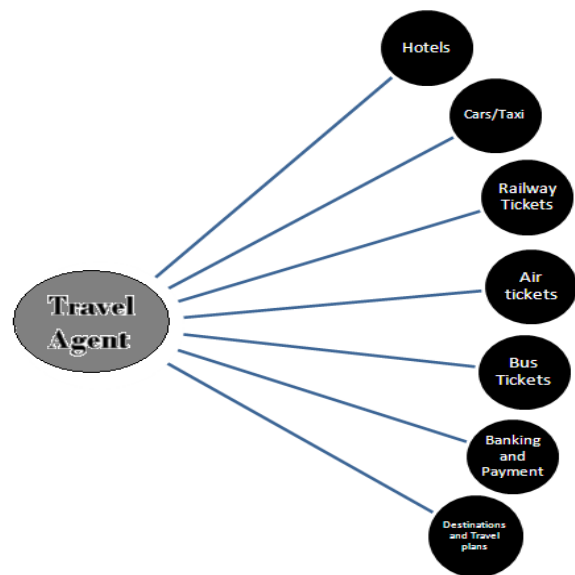


Fig 2 Diagram for associated services for a online tour & travelling site

A consumer or a traveller will always try to get the best combination of services and prices suiting his or her needs. Simultaneously, the travel agent will always try to maximize customer satisfaction and sell the packages. Parallel to these objectives, each service providers will aim to sell as many products as possible. And online banking and Credit card companies guarantee and perform payments for purchased products.

In such scenario, service providers offer Web Services that could be used by the Travel agent to query their offerings and perform various tasks through websites. Simultaneously, the client must have the facility to query or reserve or book any available service [2],[5],[8].

The basic steps of the interaction and communications are listed in the following points in sequence.

- (i) The clients interact with the travel agent and request the travel agent to provide information on various interested tour packages and services.
- (ii) Information related to prices and availability matching as the client requests is returned to the client. The client, after receiving the required information, performs one of the following actions:
- (iii) The client can refine their request for information, by browsing into detail

OR

The client continue, selecting more services options from the provider

OR

The client may reserve services based on the response,

OR

The client may quit the interaction with the travel agent.

- (iv) When a client or customer makes a reservation, the travel agent then checks the availability of the requested services with each service provider.

EITHER BY LOOKING INTO:

All the services are available, in which case they are reserved.

OR

For those services that are not available, the client is informed.

Thus, providing the client alternative options for those services.

OR

Client is advised to restart the search by going back to step (i).

- (v) Go back to step (ii).
- (vi) For every relevant reserved service, the travel agent takes a financial deposit as a security for the reservation. A credit card or online banking facility is used to make this financial transaction.
- (vii) The client is then issued a reservation number or a unique reference number to confirm the transaction.
- (viii) Between the reservation time and the final date for confirmation, the client may modify the reservation.

Modifications may include cancellation of some services or the addition of extra services. For any modification or change in plan, a client is expected to fully pay for those relevant services that require full payment prior to confirmation.

4.1 Requirements for the Example of Web Services Choreography

1. The online services must have facilitate for cancellation of orders and exception handling.
2. It should have callbacks process to be able to express asynchronous interactions such as credit checking in a credit card company or cash limit in an online banking system or availability of reservation in an airline or train.
3. The web service should have hierarchical composition to be able to reuse established choreographies such as that used by a credit card company or banking sector.
4. The web service should have a reference passing to enable the taxi or car hire company to interact with the credit card company or banking sector on behalf of the user.
5. The web service should have the facility of demarcate transactional boundaries in order to define the collaboration boundaries in order to provide guidance on the underlying and available infrastructure required to implement the collaboration.
6. The web service should have variable timeouts to model different interactions that have different time-to-live or real time sessions. For instance, each carrier may impose a different limitation on the lifetime of a pending reservation.
7. The web service should able to express concurrent paths in order to check availability of services at multiple service providers' end.

5. TWO DIFFERENT VARIATIONS ON THE USE CASE

5.1 First Variation

The travel agency might use a choreography definition internally as a documented model for its entire reservation booking process portal. The choreography definition language must support a multi-party global view of the reservation

choreography, depicting the communication amongst the travel agent and all its various service providers. Further, the definition language needs to support the comments to the various elements of choreography, in order to fully describe the behaviour of the global choreography in the portal. Further, the travel agent might encourage new service providers to join its "tour-&-travel network" by providing them with a choreography description outlining their technical and non-technical responsibilities. The choreography definition language must support the construction of a new model and allow choreographies to refer one another, thus providing complete portal with available information and intermediate communication. So as tourist and clients will get a satisfaction of services, these include booking, scheduling and planning for the tour.

5.2 Second Variation

Some time, the portal is requires protection against out-of-sequence messaging, a choreography participant can utilise a choreography definition and provides runtime validation of message typing and sequencing. Thus, messages during its arrive are checked for appropriate sequencing and for error, an exception is issued [2],[5],[8].

In some other cases, there will be system or infrastructure errors. Assuming a situation where the banking site fails during purchasing of rail ticket using irctc portal. It happens that the party that had failed are not immediately re-contactable. Depending on the urgency and importance of such services offered by the parties, some form of recovery or correction or fault tolerance is very much essential. This failure can be cope up with a situation where the system will have to wait for the crashed parties to become active again, and to replay the messages back to them from some pre-defined checkpoint.

6. CONCLUSIONS

Web service choreography are the services that looks for successful synchronous interaction and communication between different sites so as fulfill the requirement. This paper, had discussed about web services choreography, its definition and a brief literature survey on it. The paper follows with applications and examples as a part of case studies. The basic steps of the interaction and communications have been listed in the paper. We have further discussed about the few steps that can make the system more stable and fault tolerance.

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