An Event-Based Functionality Integration Framework

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Abstract— **This paper presents an event based functionality integration framework to approach the issue of service personalization and service mashups. In contrast to existing data integration approaches, the proposed framework addresses the mashup issue from a new perspective by extracting and reasoning the context through user generated event, while recommending and aggregating the contextual services dynamically in response to the user's functional requirements. An event hierarchy is proposed to retrieve contextual information and analyze underlying functionalities. The three layer system framework, service recommendation logic, and the functionality integration are also presented.**

Keywords-context; event; mashup; service integration; service recommendation

I. INTRODUCTION

The future internet is envisioned as an open garden for services. Most services are created for a specific domain and their functionalities are usually limited, there is an increasing demand for composing individual and heterogeneous services into more complex or new services to meet user's needs. Since different users have unique purposes and preferences, there is no single design pattern can be applied to satisfy all users' requirements. One promising solution is user generated service (UGS) [1], which aims to enlarge user personalization through their "DiY" manner. The ultimate goal of UGS is to allow non-expert users to be engaged in this innovative practice. During this process, perceived usefulness and perceived ease-of-use are the primary factors to consider since they have a direct and positive impact on users to accept and use any technology [2].

Our aim is to design a "useful" and "easy-of-use" consumer mashups system for the ordinary people to manage their services. Followed by a literature review of overall studies on end-user's perspective on service mashups, this paper presents an event-based functionality integration framework, to firstly acquire the context information through user generated event, followed by the recommendation and aggregation of precisely relevant contextual services. Compare to the existing composition approaches, our main contributions are three-fold:

Firstly, the proposed framework strong emphasis on functionality integration rather than data integration, in which services can communicate with daily events, in order to make the usefulness of our system apparent to users.

Secondly, the proposed framework presents a high level of abstraction to end-users, as it targets the relatively less program-savvy population. Users can visually select services from the recommended pool of services by a simple click of button, without having to worry about programming like visual data flow diagrams.

Thirdly, the proposed framework is context-oriented in the sense that the service recommendation logic is performed taking into account the overall parameters of the event details to analyze related services, i.e. the user plays a more active role in the context acquisition through event creation.

The remainder of the paper is organized as follows. In Section II, related work and existing approaches for service mashups are briefly discussed. Section III presents an overview of the proposed framework. Section IV concludes the paper.

II. RELATED WORK AND MOTIVATION

Mashups are developed for various purposes, which can be generally classified into two groups: "Horizontal Mashup" and "Vertical Mashup". Horizontal mashup [3][4] can be seen as the process of forming more powerful services by grouping sets of typically similar or complementing services to aggregate their outputs, in which there is no interaction between service modules, but the customizable front-end offers more value to the users to solve a particular task. Vertical Mashup [5][6], on the other hand, is considered as the formation of a complex service through orchestrating outputs from some services in to the inputs of other services, where service modules are connected together, and the parameters are passed between the modules to get a new enhanced service.

The developments in the market have proposed to direct users to do their own horizontal and vertical mashups. However, for non-expert end users, such processes are still considered quite intricate or discouraging. The vertical mashup systems [7] are far from being popularized among the ordinary users due to the complexity of understanding data flows between the services, while the horizontal mashup systems [8-10] mainly focus on increasing the service database for increased system functionality, which is not necessarily providing a better solution and quality of experience for the user. Apart from rich functionalities, it becomes particularly important to have in the system, a fairly simple and comprehendible means of user-system interaction.

III. Proposed System Framework

This section presents a brief overview of the proposed system framework and its functionalities. Figure 1 depicts the principal components and the interactions between them. Service integration is done in the presentation layer. A user uses device to enter details for an event like meeting, art exhibition etc, and then the user input data and user identity are passed to the logic layer, where the data is processed, and reasoning is performed. Resources are looked up from the bottom layer, which is a layer for aggregation of resources.

A. Knowledge Layer

The bottom layer of the stack consists of three local databases: user database (user id, user profile, and user history), event hierarchy database and resource database (content, data or application functionality).

B. Logic Layer

The logic layer extracts resources from the knowledge layer according to three rules: event hierarchy, user profile and user history. In our approach, we follow the same definition of calendar event elements: event theme, occurrence place, occurrence time and involved people, which can be expressed as WHAT, WHERE, WHEN and WHO. Each element (attribute) of the event is related to the user's goal, which is further associated with the functional description of the event to retrieve relevant services. WHAT defines the user's main objective, which is associated with the event category; WHERE is associated with location and presence service; WHEN is functionally related to the time based service and notification service; and finally, WHO defines whether the event is a personal or a social event, which is associated with personalized service, communication and social service.

C. Presentation Layer

After the user generated events by entering the details of the event attributes, the related services are pooled and sent to the presentation layer, as service recommendation to the user. Of the recommended services, the user selects the services of interest. The selection of services sends a trigger to the logic layer to record the selection for that user, and update it to the knowledge layer. The aggregation of several services will allow end users to create a mashups application. The integration is done in a visually intuitive manner, without skills being required for programming.

IV. Conclusion

In this paper, we have presented an event-based functionality integration framework. The contributions of event hierarchy, context association and functionality integration have been illustrated respectively.
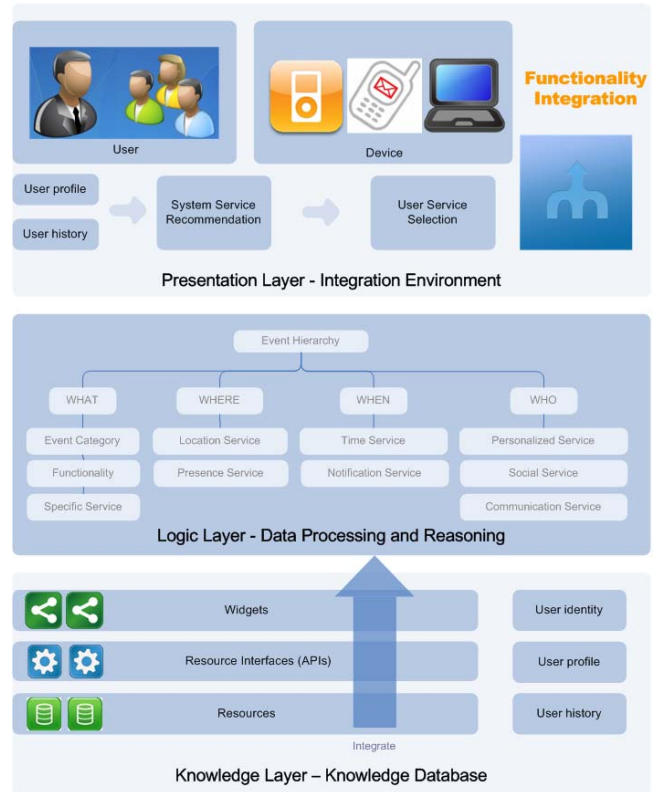
Figure 1. Proposed system framework.

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