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SAVOIR: Coordination of Collaboration as a Service

[Extended Abstract]

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ABSTRACT

The openness and extensibility of of today's Internet protocols and standards have opened up many new possibilities to enhance the collaboration experience. The scope of collaboration is too complex to expect that a single vendor will be able to provide all the pieces. It is important to allow modules and heterogenous resources to be gathered from multiple sources and plugged into a shared framework. There is a demand for an open, extensible, modular framework: a collaboration platform rather than a single application. Built on the concept of Software as a Service (SaaS), SAVOIR(Service-oriented Virtual Organization Infrastructure and Resources) is aiming to provide Coordination of Collaboration as a Service(CCaaS) that can support provisioning, scheduling,interaction of different resources, and provide a single entry point to bring collaborators and resources into collaboration sessions.

Categories and Subject Descriptors

H.4 [**Information Systems Applications**]: Miscellaneous; D.2.13 [**Reusable Software**]: Reuse models; C.2.4 [**Distributed Systems**]: Distributed Applications

Keywords

Virtual Organization, resource management, coordination, open collaborative system, SOA

1. INTRODUCTION

Many people are now working with remote collaborators under the notion of Virtual Organization (VO) - the flexible, secure, coordinated resource sharing among dynamic collections of individuals, institutions, and resources [1]. Forming a VO is a means to help addressing critical resource, personnel, and logistics issues, and to accomplish some common goals that are unlikely to be achievable by any collaborator individually. Typically each VO shares a pool of shared resources that may include software applications, hardware, data collections, computational power, storage, network connectivity, and even specialized applications for for dynamically reconfiguring infrastucture such as the network or computational infrastructure for ad hoc, very high data communication need. This includes cloud computing and reconfiguring optical networks [4]. It is a huge challenge to bring these geographically distributed expertise into effective collaboration sessions, in which a wide variety of resources, such as conferencing tools, domain specific applications, datasets, and documents are easily accessible. It is not hard for most people to visualize the required coordination effort, which can span from human-to-human, human-to-device, device-to-data, application-to-application, to device-to-network, and organization-to-organization - let alone human factors concerns. Can these coordination effort be generalized as a service, in which the service can support different VOs in different domains, and share a different set of resources? Our demo system, SAVOIR - Service-oriented Virtual Organization Infrastructure and Resources - is aiming to create an open platform to provide Coordination of Collaboration as a Service (CCaaS).

As the requirements, collaboration domains, members of the the VOs, resources are ever-changing, it is impossible to build one closed system and be able to capture every aspect of collaboration for different types of VOs. It is important to allow new VOs to be defined on demand, and the resources to be gathered from multiple sources and be plugged into an open framework. SAVOIR is built on the Service-oriented Architecture and utilizes the open Internet protocols and standards such as HTTP, REST, SOAP, and WSDL to provide resource, user, and session coordinations with the emphasis on its openness, extensibility, and customizability. We will demonstrate how SAVOIR can support two very different VOs, one for distributed architectural design, and other one is for health training. The following section will highlight the approaches taken to build such a service.

2. EXAMPLE SCENARIOS

To help understand what kinds of collaboration sessions SAVOIR is designed to deal with, we illustration two scenarios. First, imagine a large scale urban redevelopment project involving a number of collaborative stakeholders such as architects, urban designers and planners, landscape architects, artists, lighting designers, engineers, heritage conservationists, stone masons, developers, financiers, city officials, and the general public. These diverse parties are unlikely to be located in the same place. But they have to work together

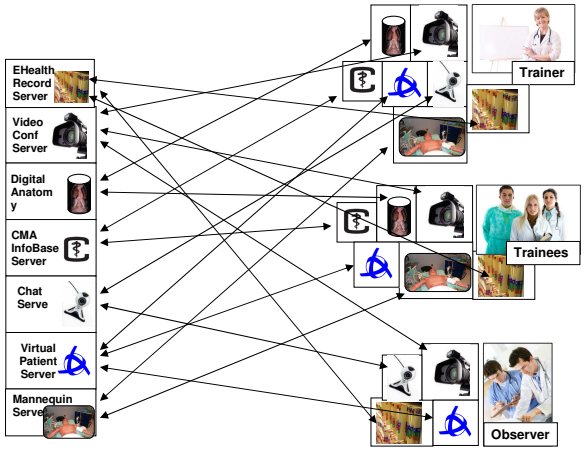

Figure 1: Connecting Different Resources in a Training Session

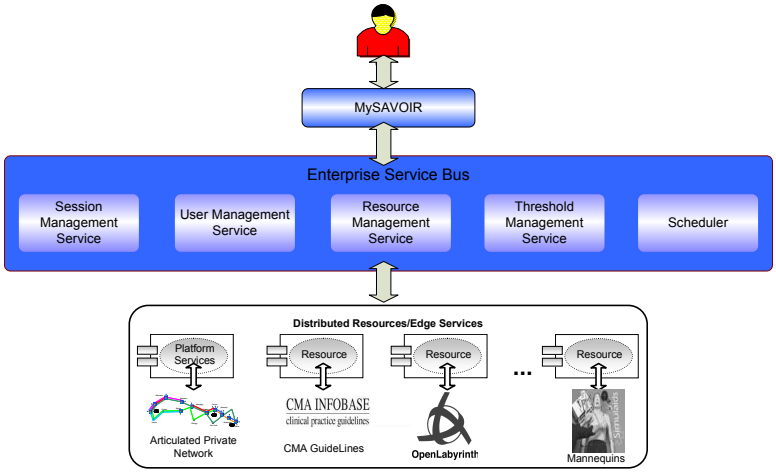

Figure 2: Connecting Different Resources in a Training Session

as a team to acquire digital contents on and off site, create, manipulate, and deploy across networks in immersive environments, output to print, or visualize to displays [3]. In this case, the coordination service needs to bring the visualization clusters, rendering farms, media repositories, HD videoconferencing applications into the participatory design session and hiding most of the logistics of provisioning and interacting with these resources.

In the second scenario, suppose two doctors are in training. They are discussing a case under the observation of the instructor and the rest of the class. They are using a number of tools that allow them to investigate the patient's symptoms, find the root causes, look up the recommended procedure, test that procedure on both a mannequin and a virtual patient simulator, and to observe that the procedure's effect put the patient in a state of high blood pressure, which means that something may not have been done correctly. The instructor can then review the case and go over what the doctors have done wrong to the other students in class. Now imagine the participants are in different locations. The instructor is in one city, the two doctors are in another city, and the rest of the class are perhaps in a different location. Furthermore some of the tools that are being used are from the internet, such as the Remote Stereo Viewer for 3D anatomy and the online searchable medical guidelines. Figure 1 shows the connections required without even outlining the coordination effort.

The first scenario was implemented by Eucalyptus [2], the precursor of SAVOIR. It was specifically designed for participatory designs for architects; but SAVOIR evolves from the previous project by making all the components more generic, with the intent to support CCaaS for any given domain.

3. DESIGN HIGHLIGHTS

In order to deliver CCaaS, SAVOIR is designed to use open standards with the maximum flexibility for one to customize the services to be used in a VO. SAVOIR manages the interactions through several core management services: the user manager, the session manager, the resource manager and the threshold manager. We use the term *edge service* to refer to any of the interactive devices, services and resources that are not part of the core of SAVOIR. These devices are wrapped as web services and thus made available to SAVOIR. We employed an enterprise service bus to host the management services, and all the edge services are also connected to the bus as different endpoints. The bus also routes messages based on rules that are governed by the threshold manager, which consists of a forward chaining rule engine loaded with rules specific to a given collaboration session. When the state of one of the resources or users changes in a way that signals an important event, like the worsening of the vital signs of a patient, then other events are triggered to provide an appropriate response.Figure 2 illustrates the main components in SAVOIR.

A collaborator using the SAVOIR CCaaS service can interact with another collaborator(s) and edge services via the web based client called MySAVOIR, where each edge service is represented as a widget. In the case where some edge service require some local applications to be executed, we use a 2-way bridge to communicate with the user's system tray for any events of interest.

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