Implementing Mconf web conferencing at the South African National Research and Education Network

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Abstract

Mconf web conferencing has been launched successfully as a South African National Research and Education Network (SA NREN) production level service from July 2015. This web conferencing service is an Open Source Multi-conference System funded mainly by the Brazilian National Research and Education Network (NREN), Rede Nacional de Ensino e Pesquisa (RNP). Mconf is a research collaboration tool that is web based and that can also be set up as a room based video conferencing system. It can be used for distance education, remote meetings or broadcasting of events and offers a range of collaboration tools such as a whiteboard, document repositories, collaboration spaces, shared notes and more. The service has been integrated with the South African Federated Identities for Research and Education (SAFIRE) to allow users to be able to access the service quickly and easily using their home institutions credentials. By integrating Mconf web conferencing with SAFIRE, the SA NREN hopes that Mconf will encourage institutions that are not registered to SAFIRE to join the federation.

Keywords

Global Web conferencing Network, Video conference, Web conference, Collaboration, Communication, Federated Identity, Value-added service

Introduction

The need to be able to communicate and collaborate more quickly, easily and effectively with people at different locations has become a necessity in today's Research, Education and Innovation environments. This may be over a large geographical area or from anywhere with the ease of simply being able to join a meeting by clicking on a link while at your laptop.

This paper will be organized as follows:

Section 1: Structure of the SA NREN
Section 2: Selecting a web conferencing tool for the SA NREN
Section 3: Mconf web conferencing and the Global Academic Network
Section 4: Piloting, Implementing at a production level, Marketing and Operating Mconf web conferencing at the SA NREN
Section 5: Integration of Mconf with SAFIRE
Section 6: Current Usage and Next Steps at SA NREN

1. Structure of the SA NREN

The South African National Research and Education Network (SA NREN) is comprised of two organisations:

- SANReN CA (South African National Research Network Competency Area at the Meraka Institute of the Council for Scientific and Industrial Research (CSIR))
  and
- TENET (The Tertiary Education and Research Network of South Africa)

With regards to advanced value-added services at the SA NREN, the SANReN CA is responsible for developing and incubating services selected with TENET, while TENET is responsible for operating these services at a production level. The Mconf web conferencing service is currently operating at a production level on TENET and SANReN CA servers and is in the process of being handed over to be operated and supported permanently by TENET's Service Operations Centre.

2. Selecting a web conferencing tool for the SA NREN

Roesler *et al.* (2012a) explains in detail that "Video conferencing systems can be organized into four groups: Room, Telepresence, Desktop and Web." A web conferencing tool, as the name implies, runs within a web browser by simply entering the hypertext link for a meeting room into a browser address bar. This means that the video conferencing software does not need to be downloaded to your machine to participate in a meeting. By having a browser based interface, web conferencing is also able to take advantage of Web Real-Time Communications (WebRTC) technology. The WebRTC website (2011−2014) describes WebRTC as a free, open project that provides browsers and mobile applications with Real-Time Communications (RTC) capabilities via simple Application Programmable Interfaces (APIs). The project initiative is supported by Google, Mozilla and Opera, amongst others. The WebRTC project's mission is: "To enable rich, high quality, RTC applications to be developed for the browser, mobile platforms, and Internet of Things (IoT) devices, and allow them all to communicate via a common set of protocols" (2011 − 2014: Internet).

According to Roesler *et al.* (2012a), "the advantage for users of a web conferencing systems is the simplicity of deployment" and "interoperability among different operational systems: users may be running Chrome in Linux, Internet Explorer in Windows, Safari in MacOS, and so on, but everyone still has the same experience." For these reasons SANReN CA preferred a web conferencing system to other video conferencing options.

The search for a SA NREN web conferencing service began by looking at similar services that were being used by other NREN's. NRENs with the largest web conferencing deployments were largely American or European based. The criteria for selection of a web conferencing system for the SA NREN were the following: Proven in Use (By trial), Success of other NRENs, Functionality, Maintenance and Support, Ease of Use, Ease to take into production and Cost. Many solutions were explored across the video conferencing groups, such as Adobe connect, Jamvee, Blackboard collaborate, Skype, Google hangouts, Webex, GotoMeeting, Anymeeting, but in the end commercial products were not a viable solution for the SA NREN to implement as cost recovery would be extremely difficult, possibly leading to failure of the value-added service's uptake and success at institutions.

At the time, the commercial web conferencing product, Adobe Connect was the most popular web conferencing collaboration tool in the NREN space. The SANReN CA had an existing trial version of Adobe Connect running for approximately two years. Therefore, another criteria for choosing a new web conferencing system became "Ease of migration of users from Adobe Connect to the new web conferencing system".

It was decided to look at similar tools that could be offered to the Research and Education community without having to do cost recovery from users. The options were eventually narrowed down to two open source web conferencing systems: BigBlueButton and Mconf web conferencing.

The most popular open source web conferencing tool known at the time was BigBlueButton. However, the Brazilian NREN, RNP were in a similar position to the SA NREN as they had a large user base of Adobe Connect but were looking for a more cost effective and well supported solution for their region. They therefore provided funding to *Projects in Audio and Video (PRAV)* in Brazil, to build Mconf web conferencing, an Open Source Multi-conference System, built on and around BigBlueButton.

3. **Mconf web conferencing and the Global Academic Network**

Mconf is a research collaboration tool that is web based and that can also be set up as a room based video conferencing system. It can be used to create collaboration spaces for distance education, remote meetings or broadcasting of events and offers a range of collaboration tools, such as:

- Real-time communication with audio and video
- Web conferencing rooms
- Document repositories
- Meeting recordings
- Federated Identity Integration
- Load balancing
- Screen sharing, Whiteboard, Notes, Chat, Presentation
- Ease of scalability
- Usage and capacity monitoring
- Possibility of integration with web applications, such as Moodle and more.

The Mconf system consists of various components: Mconf-Web Portal, Mconf-Live Server, Mconf-Recording Server and a Mobile Application. The SA NREN are operating one Mconf-Web Portal which is the front-end for accessing the web conferencing service, three Mconf-Live Servers which form the back-end of the web conferencing service and one Mconf-Recording server. The Mconf-Live and Mconf-Recording servers contribute toward a Global pool of servers which provides high availability and redundancy and will cater for temporary surges in the number of users from institutions or temporary unavailability of a server. As explained by Roesler *et al.* (2012b), "when the user clicks to open the virtual room, the web portal consults the Load Balancing module and redirects him/her to the most suitable Mconf-Live server, i.e., to the server with the best conditions to serve the conference, that is defined based in several factors, like CPU load, memory and latency" .
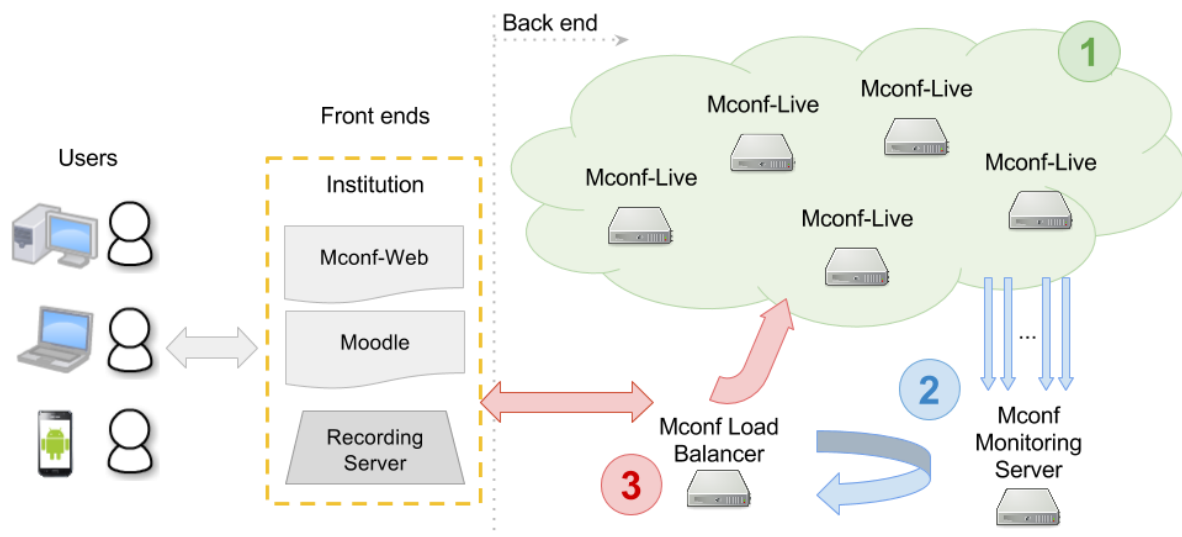
Figure 1: Mconf Global Network Architecture (2015d: Internet)

Figure 1 shows a simplified version of the Mconf Global Network's architecture. It shows how the network is organized and the components that are part of it. At the right side of the image is the network's back-end; this back-end is formed by a group of servers that are the core of the network. The back-end is shared among all institutions that are connected to the network. The elements in the back-end are: (1) the cloud of web conference servers; (2) the monitoring system; and (3) the load balancer.   (2015d: Internet)

According to Roesler *et al.* (2012b), "With this strategy, all NRENs in the world who join the program can unite in an effort to create a global federated web conference service, and this union has the potential to raise a robust, flexible and practical platform, strengthening the communication among the partners".

The Global Academic Network is monitored and supported by *Mconf Tecnologia,* a company that is currently providing free support for institutions who want to join the Global Academic Network and commercial support for additional requirements as and if needed. The founders of *Mconf Tecnologia* were involved in the initial development of Mconf, funded mainly by the Brazilian NREN, RNP and are still actively involved in ongoing developments. Figure 2 shows the location of the Global Mconf web conferencing servers that form part of the Global Academic Network monitored by Mconf Tecnologia.

Figure 2: Location of the Global Mconf web conferencing servers (2015c: Internet)

4. Piloting, Implementing at a production level, Marketing and Operating Mconf web conferencing at the SA NREN

The SANReN CA set up a trial of Mconf web conferencing in 2014, alongside the Adobe Connect trial that was in place for the SA NREN users to test. A few meetings were held with the SA NREN community to test the Mconf system. The system worked well for the most part, but initially there were issues experienced with achieving consistently good audio quality.

During this time, the Mconf team were hard at work with a new version of Mconf-Live (version 0.6.2). After implementing this new version in early 2015, which made use of the WebRTC technology, the audio problems were resolved. Mconf Tecnologia also released a new version of Mconf-Web (version 8.1) which showed a great improvement over the previous version (version 8.0). It was on this version that integration with SAFIRE was tested.

Around March 2015, after testing the service thoroughly, the SANReN CA began handover of the service to TENET who setup the Mconf system in a production environment. TENET did this by increasing the number of Mconf-Live Servers, installing a Mconf-Live Recording server, integrating the new web portal with SAFIRE and creating support structures around the service.

The Mconf web conferencing collaboration service was officially launched as a production level service in July 2015 at two successful Mconf web conferencing launch events. The events took place at the CSIR International Convention Centre (ICC) in Pretoria, on Wednesday 22nd July 2015, and at Cape Peninsula University of Technology (CPUT), Bellville campus on Thursday 23rd July 2015. The events were conducted using the SA NREN's Mconf web conferencing installation which enabled speakers from the Mconf Tecnologia team in Porto Alegre, Brazil to listen in and present at the sessions, demonstrating

the power of the web conferencing application. *Mconf Tecnologia* is currently assisting the SA NREN to support the service.

The Mconf Mobile Application is still in development therefore this component of the system was not launched as a production service as yet.

5. **Integration of Mconf with SAFIRE**

A feature of Mconf that is very appealing to the SA NREN is that "Mconf-Web is able to obtain user identity from any identity provider that follows the Shibboleth architecture with few configurations, providing access to any user that is registered in this federation" (Roesler *et al.*, 2012a).

Mammen (2013) discussed the creation of a pilot identity federation in South Africa at the UbuntuNet Alliance annual conference in 2013. Two years later, the identity federation of South Africa is now running as a production service. However, the South African Federated Identities for Research and Education (SAFIRE) currently has only four of the 24 universities registered to the SAFIRE federation and only one of the many Research Councils in South Africa registered.

SAFIRE is now operating at a production level but it is a challenge to give Research and Education institutions an incentive to join the federation without having many services available on the federation. Offering Mconf as a federated service hopes to encourage institutions to join SAFIRE by showing them how easy it is to gain access to advanced value-added services, like Mconf, using their home credentials i.e. Username and password.

It is currently not compulsory to register to SAFIRE to access the Mconf web conferencing service but it is planned that it will become compulsory in the future, so that only federated institutions will have access to value-added services offered by the SA NREN.

Mammen (2013) describes a federated solution to identity management as "a trust framework between SPs and IdPs to allow the user credentials from Identity Providers (IdPs) to be used at Service Providers (SPs)", where IdPs are the Research and Education institutions authentication databases and SPs are the services provided by the SA NREN. Effectively, "when an IdP joins the federation, they will have access to all services within the federation with the ease of mind that the services will not abuse their user's credentials."

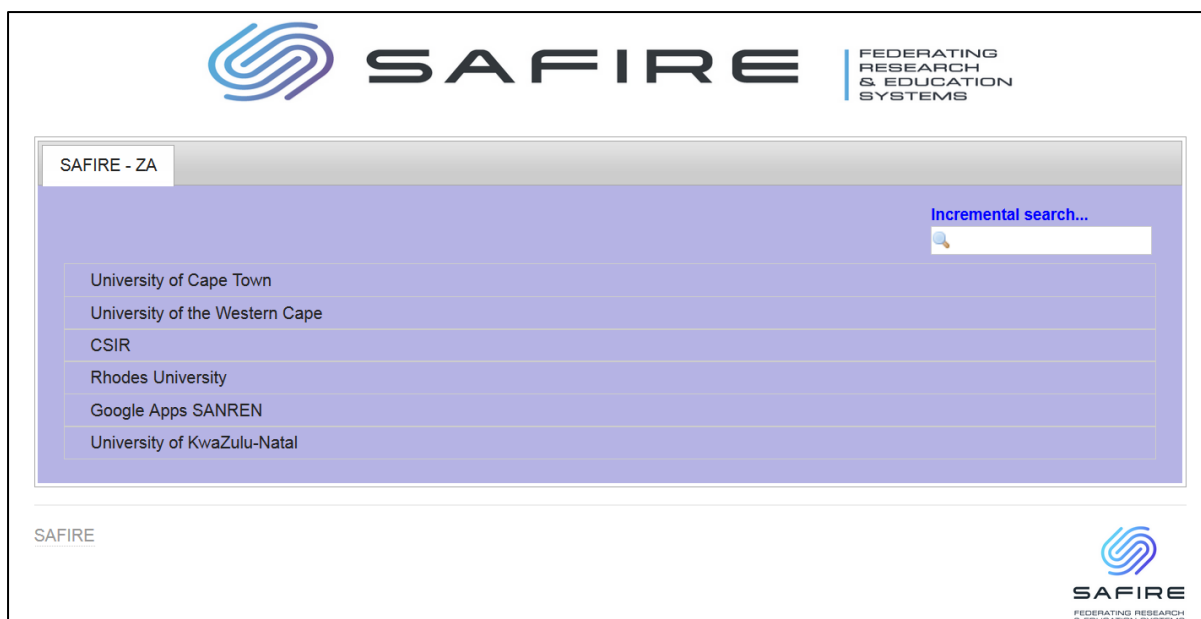Figure 3 shows a screenshot of the SAFIRE discovery service.

Figure 3: Screenshot of the SAFIRE discovery service (2015e: Internet)

6. Current Usage and Next Steps at SA NREN

At the time that this article was written, i.e. on 9th November 2015, there were 137 users registered on the SA NREN instance of Mconf.

Initial uptake of the web conferencing service has been slow with a few key users making use of the service on a regular basis. On follow up with the users who have registered on the service, most users indicated that they are still testing the service but that they have had mostly good experiences using Mconf thus far. Current use cases of Mconf are for Teaching and Learning, National projects and General meetings. For example, meeting spaces have been created under the following project names: Technology Innovation Seed Fund Team, iThemba Laboratory for Accelerator-Based Sciences, Coastal Systems Advanced Mathematical Modelling, H3ABioNet Data Management Taskforce, Directorate of Teaching and Learning, to name a few.

The SA NREN will continue to promote Mconf web conferencing to the South African Research and Education community to increase the use of the service, as many potential users are still to be informed of its availability. They are also assisting the Mconf development team by reporting any problems experienced with Mconf, developing documentation for the system and spreading the message of Mconf to other institutions and NRENs. The SANReN CA is currently exploring possible development opportunities to present to the Mconf team.

7. Open Invitation to academic institutions to join the network

The SA NREN has found Mconf to be of excellent technical quality, low cost, easy to setup and with good support available. Mconf web conferencing could help other NRENs, specifically African NRENs, who want to provide advanced value-added services with a low implementation cost to their Research and Education communities.

Roesler *et al.* (2013) makes an open invitation which the SA NREN would like to reiterate:

"Mconf Global Network is open to any academic institution that wishes to participate, and creates a possibility for global resource sharing that is unique in the web conferencing and video conferencing world. The greatest beauty of the system is that it is a real win-win situation for everyone involved, and the network gets stronger when grown. One institution does not have to worry about a temporary failure in the server or a traffic surge, because there are other servers supporting the system as a whole."

8. How to get started

NRENs or institutions can get started by doing the following (2015a, c, d and f: Internet):

- Test out Mconf at http://mconf.org/
- Read about the Mconf Global Academic Network at http://mconf.org/about/mconf-network/
- Read the documentation on how to join the Mconf Global Network is available at https://github.com/mconf/wiki/wiki/Mconf-Network#how-to-join-the-network
- Read the documentation on how to install the Mconf web portal to access these web conferencing service at https://github.com/mconf/mconf-web/wiki/Deployment
- Learn more about SA NREN instance on the Mconf SA blog at https://mconfsa.wordpress.com/

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Biography

Kasandra Isaac is a Senior Engineer at the South African National Research Network Competency Area (SANReN CA) at the Council for Scientific and Industrial Research (CSIR). She has been involved mainly with the web conferencing value-added service, but has also had exposure to other value-added services such as Federated Identity Management and DNS secondary and also supports other NREN initiatives. Kasandra has a BSc Electronics Engineering degree from the University of KwaZulu Natal (UKZN). She has an Honours Degree in Technology Management from the University of Pretoria (UP) and is currently pursuing her Master in Technology Management.

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