

# Mconf: towards a global webconference system

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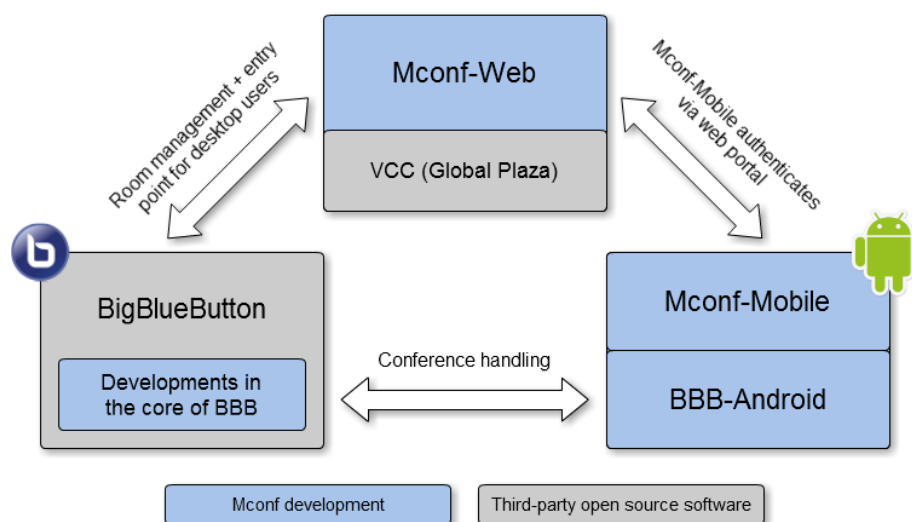
## 1 Keywords

Distributed systems; Virtualization; Videoconference.

## 2 Extended Abstract

This paper presents a proposal for a flexible, distributed, scalable and federated global webconference system, with mobile access. The base for the system is an open source application called “Mconf: Multiconference for interoperable access web and mobile devices” (<https://mconf.org>), which is sponsored by the brazilian NREN (National Research and Education Network), RNP [1].

An in depth view of Mconf system can be seen in the book chapter of Roesler [2]. This abstract presents an overview of the Mconf project and its main building blocks, seen in Figure 1.



**Figure 1: General view of the Mconf project**

The conferencing component of Mconf is BigBlueButton (BBB), an open source web conferencing system developed for distance education and remote meetings. BigBlueButton provides the following features: real-time sharing of voice, video, slides, desktop, and chat. BigBlueButton can also record sessions for later playback. While focused on distance education, its features are similar to commercial web conferencing systems. Since BigBlueButton is open source, the Mconf team has the option to improve the code and contribute those improvements back to the BigBlueButton project.

The scheduling component of Mconf is the web portal (Mconf-Web), a Ruby on Rails application that provides creation of virtual rooms, discussion forums, and event scheduling. Mconf-Web uses a web application called Global Plaza [3] as its basis. Global Plaza is an open source web application designed to enable ad-hoc virtual meetings through an event-based social network. This ad-hoc model fits very well the requirements of Mconf.

The mobile component of Mconf is the Android client, which is compatible to both BBB and web portal. The Android client allows users to fully participate in sharing of audio, video, slides, and chat, and currently some experiments are undergoing to deploy federated mobile authentication.

Two key features in this webconference system are the federated authentication and the scalability. They will be described in the following paragraphs.

Mconf-Web has recently been integrated with a Shibboleth<sup>1</sup> module, providing federated login in the website. Shibboleth is a middleware architecture that allows users of different security domains to employ their secured information to access a federated service.

With Shibboleth, the application 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 that federation. Currently, Mconf-Web is one of the services provided by the Brazilian federation CAFe (Federated Academic Community)<sup>2</sup>, which is part of REFEDS (Research and Education Federations)<sup>3</sup> and potentially may be integrated to eduGAIN<sup>4</sup> in the near future.

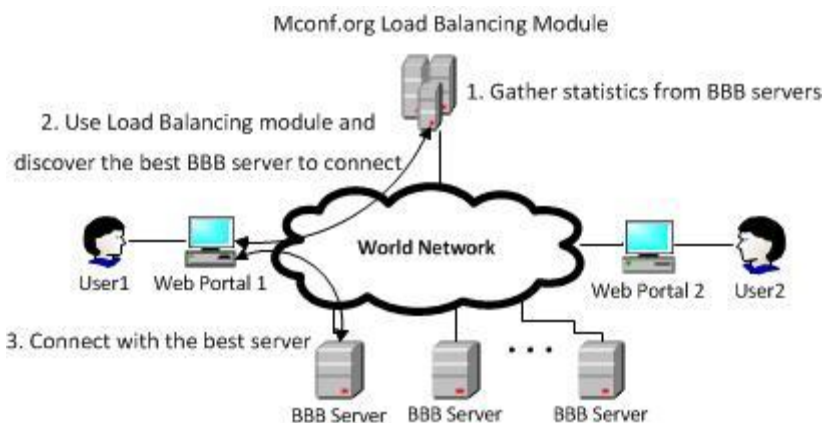
Related to scalability, one BigBlueButton server is designed to support about 25 simultaneous users<sup>5</sup>. To offer such system as a global service, it becomes necessary to define a strategy to scale it. The most straightforward solution is to improve the hardware in which the system is installed, but this is not really scalable, since at some point it will not be possible to improve the hardware and it will become the bottleneck (the system will not scale to 5000 simultaneous video users in different virtual rooms, for example).

For the audio communication, BigBlueButton uses FreeSWITCH<sup>6</sup>, an open source telephony platform that is used as a VoIP server. FreeSWITCH is already scalable, allowing the VoIP service to be spread across multiple FreeSWITCH servers, which would significantly increase the capacity of the web conferencing service since the voice processing is very CPU intensive. However, the other components of BigBlueButton are not yet scalable across multiple servers.

The solution being developed by Mconf includes a monitor module on BigBlueButton that generates statistics including CPU, memory and network consumption. These statistics are accessible through the web portal Load Balancing module. When a user demands the creation of a meeting, the Load Balancing module decides which server is more suitable to this group of people, based on statistics plus geographic location and delay.

Furthermore, it is possible to use this solution in a commercial or private cloud computing infrastructure. Virtual machines of web conferencing servers are enabled or disabled depending on the demand in a given moment, all of them managed automatically by the scalability module in the web portal.

The proposal is to scale Mconf as a global tool in a federated model, as depicted in Figure 2, which shows the Mconf.org Load Balancing module, several BBB servers and the users, which can use their own web portals, i.e., a user in Europe can use a different web portal than a user in Latin America, so, both keep their own characteristics and share all BBB servers. The main interactions are:



**Figure 2: scalability with several servers**

1. **Gathering of statistics:** The Mconf.org Load Balancing module is always gathering statistics from all BBB servers in its domain, knowing the detailed situation of each server. For each BBB

<sup>1</sup> <http://shibboleth.net/>

<sup>2</sup> <http://www.rnp.br/servicos/cafe.html>

<sup>3</sup> <https://refeds.org/resources.html>

<sup>4</sup> <http://www.geant.net/service/edugain/FAQs/Pages/FAQs.aspx>

<sup>5</sup> [http://code.google.com/p/bigbluebutton/wiki/FAQ#How\\_many\\_simultaneous\\_users\\_can\\_BigBlueButton\\_support](http://code.google.com/p/bigbluebutton/wiki/FAQ#How_many_simultaneous_users_can_BigBlueButton_support)

<sup>6</sup> <http://www.freeswitch.org/>

- server the web portal knows the memory usage, CPU load, number of virtual rooms, number of users in each virtual room, scheduled virtual rooms, among others.
2. **Usage of the web portal and discover of the best server to create the meeting:** the user can interact with his/hers own web portal, with or without federated login. 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 BBB 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.
  3. **Connect to the most suitable server:** The Load Balancing module of Mconf.org indicates for the user a virtual room on the server with the best conditions.

With this strategy, all NRENs in the world who join the program can unite in an effort to create a global federated webconference service, and this union has the potential to raise a robust, flexible and practical platform, strengthening the communication among the partners.

In order to grow rapidly the number of BBB servers, institutions who want to participate should install at least one server, and the Mconf Web portal should have the intelligence to include this server in the list, gathering statistics from it.

At each time interval the generated statistics can show the usage for each partner, and if the system needs more servers, the partners with higher usage would provide more resources, e.g. more BBB servers. That is very easy and has low cost.

Mconf was recently chosen as the platform for webconference services in Clara Network<sup>1</sup> (Cooperación Latino Americana de Redes Avanzadas), and the Latin American service is scheduled to be ready for test in the end of 2012. This paper extends the same idea for a global service.

All the source code of the Mconf project is available under open source licenses in <https://github.com/mconf>. The main links are:

- Mconf version of BigBlueButton: <https://github.com/mconf/bigbluebutton>
- Mconf-Mobile (and BBB-Android): <https://github.com/mconf/mconf-mobile>
  - Mconf-Mobile and BBB-Android are available on the Android Market.
- Mconf-Web: <https://github.com/mconf/mconf-web>

The project documentation and updates are available in the Google Code wiki in <http://code.google.com/p/mconf/wiki/Home>. The main subjects are related to the Mconf installation, Mconf-Mobile, Mconf-Web and the customizations of BigBlueButton. There is also a virtual machine with the entire environment already installed.

There is also a demo server available at <https://mconf.org>, that currently has about 100 communities and 250 users worldwide.

### 3 References

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### 4 Vitae

**Valter Roesler** has Bachelor's degree in Electrical Engineering (1988), Master degree (1993) and PhD degree (2003) in Computer Science. Today he is a professor at Federal University of Rio Grande do Sul, Brazil. He has experience in Computer Networks, Multimedia, Digital TV, Video Encoding and Network Transmission. He coordinates the PRAV laboratory (Projects in Audio and Video) – [www.inf.ufrgs.br/prav](http://www.inf.ufrgs.br/prav), with about 30 researchers and projects related to Remote Education and E-Health, in traditional computers and mobile devices. He is the coordinator of the Mconf project.

**Leonardo Crauss Daronco** has a Bachelor's degree in Computer Science from the Federal University of Santa Maria (UFSM), Brazil (2007), and a Master's degree in Computer Science from the Federal University of Rio Grande do Sul (UFRGS), Brazil (2009). Currently he is a researcher and developer in

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<sup>1</sup> <http://www.redclara.net>

the Mconf project at the PRAV laboratory at UFRGS. He has experience in Multimedia, Video Encoding, Software Development, and Web Development.

**Felipe Cecagno** has a Bachelor's degree in Computer Science (2010). Since 2008 he works at PRAV Laboratory (Projects in Audio and Video) as junior researcher and developer on many projects related to Multimedia and Distance Education. He is Mconf-Mobile project team leader, and he is part of the BigBlueButton development core team.

**André Marins** is graduated in Computer Engineering at Pontifícia Universidade Católica do Rio de Janeiro – PUC-Rio (1996), with MBA in Executive Management at IBMEC Business School (2001). MSc in Computer Science from PUC-Rio (2008). IT Manager at Cadê (internet catalog acquired by Yahoo) (1996-1999). IT Manager and Director at Starmedia (1999-2002). IT Consultant at Vogal (2003-2006). IT researcher at TecGraf, PUC-Rio (2007). R&D project manager at RNP since 2008.

**Fred Dixon** holds a Bachelor of Mathematics from the University of Waterloo (1992). He has worked in the technology industry for over twenty five years as both a developer and manager, having been CEO of Databeacon Software (1995-2000), OpenLava Software Inc. (2000-2004), and Blindside Networks (2008 to present). Since 2008, Fred has been one of the core developers of BigBlueButton, an open source web conferencing system for distance education.