

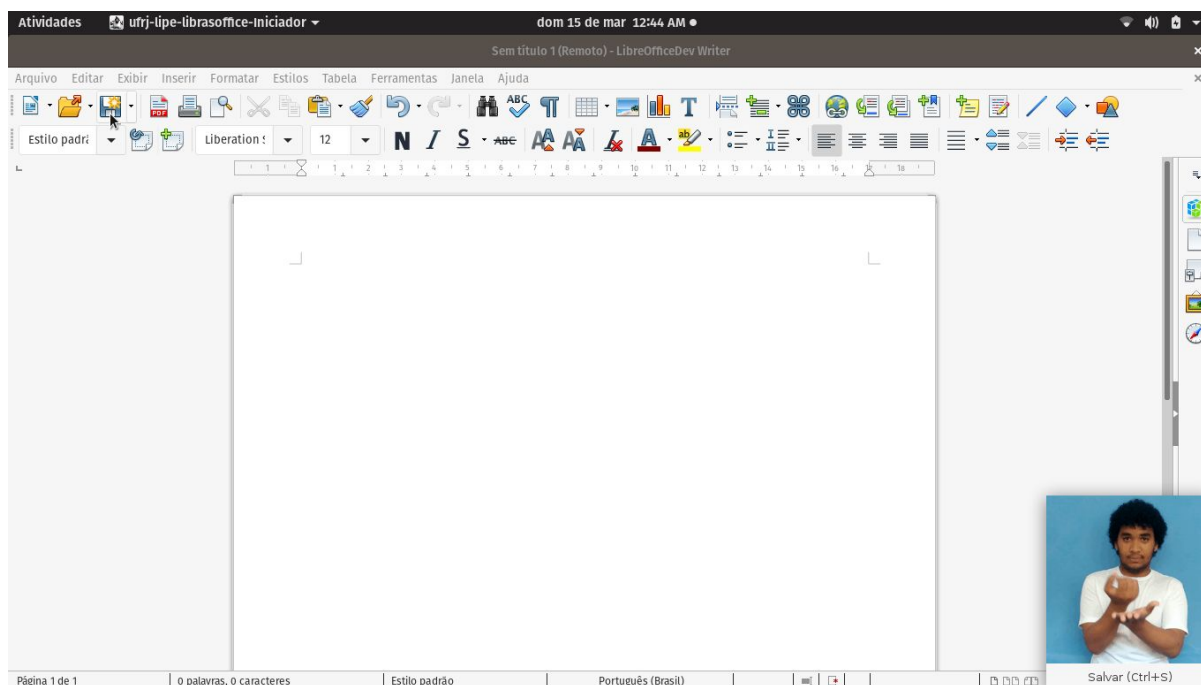
The LIBRASOffice project, a fork of LibreOffice with adaptations that promote autonomy for deaf people in its use, was created based on a specific demand brought by deaf technical-administrative employees at the Federal University of Rio de Janeiro (UFRJ), who had difficulties involving office activities on a computer, related to culture and language. It is currently maintained by the Informatics and Society Laboratory (LabIS) - UFRJ.

The project started to be developed together with the deaf community in the capital of Rio de Janeiro and currently has the direct collaboration of approximately 500 deaf people who identified with the situation and 5000 researchers/people connected with it.

After a series of development-related efforts, we managed to arrive at a “stable” linux prototype, however, it is a prototype that uses an old version of LibreOffice (5.3) as a base. Even though it is a prototype, results and positive feedbacks have already been obtained from usability tests with deaf people carried out in two public schools in Rio de Janeiro. We concluded that it would not be a good idea to maintain software of this size (a fork of LibreOffice), with 2 active developers (undergraduate students) and without an open source software community behind it.

Due to the fact that we have a specific demand for using LibreOffice, we were looking for an accessibility solution for the deaf when using LibreOffice, and not a general solution for the deaf when using a computer.

Current assistive technologies do not serve the deaf community, because they were designed and based on assistive technologies created for blind people. LIBRASOffice signals are based on tooltips. From signals based on tooltips, we obtained good feedback from the deaf community, mainly with the user experience related to the interactivity of the software, because, at the same time that the tooltips would appear in text format, a corresponding sign is shown in the lower right corner of the screen. Despite being "text content", tooltips are not available in today's assistive technologies, which make text content available for later use by screen readers.



<https://youtu.be/6TFQYFIkEAI>

There are some accessibility applications for the deaf that make the internet an accessible place, including Brazilian solutions reasonably known and used, like VLibras ([www.vlibras.gov.br](http://www.vlibras.gov.br)) and HandTalk ([www.handtalk.me/en/](http://www.handtalk.me/en/)), but there are no actual solutions that assist the deaf in desktop activities, or at least, some solution widely/commonly accepted by community as a solution. The assistive technologies sent in the IRC conversation were for use on websites and not on the desktop.

Another way that has already been explored and that, as it is already known, provides a bad user experience for the deaf, is the way of direct translation in which "desktop solutions" suggest that users copy&paste or simply reproduce the text they want to translate for sign language in a separate window, for translation. Most translations do not match the sign language in reality, because instead of reproducing the signs for a certain word, they reproduce the sign of each letter that word has. This, in most of cases, does not help the deaf user at all. In addition to a sequence of letters reproduced by the translator does not help, if word signs are displayed instead of letter signs, there is a possibility that the sign is not the corresponding sign for that region. At least in LIBRAS (Brazilian Sign Language), there are regionalisms/accents, in which a sign for a particular object or action may be different depending on the region.

The LIBRASOffice prototype, although aiming to serve other sign languages around the world in the distant future, was focused on building a solution together with the community, for the community. Specifically, together with the deaf community in Rio de Janeiro (with the direct contact of more than 500 deaf people). In order to consider a real implantation environment (several deaf communities, with many regionalisms), an option to “send your signal” was implemented, in an attempt to alleviate issues related to regionalism. But, we believe that the ideal would be that, in addition, representatives of a regionalism of the deaf community send their “sign packages”/”translation packages”, within certain requirements, through an option “send your translation package” Present in the LIBRASOffice interface.

Sign languages, in general, are not fully standardized, and have accents/regionalisms. This makes specific solutions, like LIBRASOffice, which was made together and for the deaf community, be better accepted for LibreOffice use, than, for example, solutions that suggest that they copy the text and paste it in a separate window, where a “generic translation” be generated. Solutions that were probably created “for the deaf”, considering the creators personal ideas, and not what the deaf themselves thought about.

Considering the specificities of deaf people, it is really complicated to develop a general solution that is widely accepted and really facilitates the use of a computer, improving the user experience. LibreOffice was created considering several accessibility APIs (starting with LibreOffice 4.3) that make the textual elements of the interface available for use by screen readers. Considering the lack of any multiplatform AT (Assistive Technology), creating a solution that is multiplatform requires considerably different code for each operating system. Further increasing the complexity of the project, and making development unfeasible without a community of developers who maintain the code.

This would be a solution widely used in public school computers in Brazil. Public schools in Brazil generally use Linux systems. However, at home, most deaf users use Windows on their computers. The same is true for most university labs, which use Linux systems.

A multiplatform solution is essential for the project. Considering the fact that an extension for LibreOffice works on almost all operating systems on which LibreOffice works, and is no longer new software to install on your computer, creating a extension becoming an attractive option, including in terms of complexity (we imagine). The leap in complexity increases considerably when the creation of a general solution, which is a multiplatform screen reader that reproduces signals considering the specifics of the deaf regarding the user experience and regionalisms, is placed as an option.

Due to the fact that the LIBRASOffice project has arrived at a functional prototype, accepted by the deaf community, the next step would be to send the project to a open source software community for to be developed and maintained (together with our laboratory).

I presented LIBRASOffice as a new functionality idea for LibreOffice, to be developed in GSoC, however, I was asked why a specific solution if a general solution could be developed using the assistive technologies that it implements. It is also worth mentioning the difference in complexity of creating an extension for existing software (which has an API for creating extensions, widely compatible between new and old versions), and the beginning of the development of new software.

At LabIS, it was discussed that the next steps for the project would be:

- **To cease to exist (at least, with the name LIBRASOffice), so that we could direct our efforts, together with the LibreOffice/TDF developer community, to make it a new extension for LibreOffice.**
- **To cease to exist (at least under the name LIBRASOffice), after a discussion and possible approval within LibreOffice/TDF for to be developed as a new LibreOffice functionality.**

Anyway, the project would be starting again in terms of code and architecture development, both as a new functionality and as an extension to LibreOffice. We have a clear demand, already mentioned, of more than 500 deaf people who are very happy and thankful for this partnership in solving the collective problem of using an office suite (which they need to use in personal, work or school activities/university), but we are willing to expand development for a general purpose. Of course, this should be done together with, for example, developers of the TDF/LibreOffice community, deaf community, and we would be happy to be included in that.

Although we are working directly with approximately 500 deaf people, it is worth considering the population with severe deafness in Brazil, which, according to data from competent public agencies, is around 2 million. According to data from WHO (World Health Organization), there are approximately 500 million deaf people in the world today, and there will be about 1 billion by 2050. A considerable increase for the culture of using LibreOffice, at least, in the case of a specific solution to be developed.

For a number of reasons, deaf people do not like to see dolls representing their sign language. So, for example, we have a deaf undergraduate student

collaborator, who records LIBRASOffice signals. We have partnerships and conditions to record signals for LIBRAS as a whole, considering a large part of its regionalism. And we believe that it would not be difficult to find partnerships for other sign languages and their regionalisms.

**Some interesting links to be seen are:**

*Project presentation video, used in Solve MIT (<https://solve.mit.edu/>):*

<https://www.youtube.com/watch?v=DVAWjRV0dTw>

*Presentation of the project at Solve MIT:*

<https://solve.mit.edu/challenges/community-driven-innovation/solutions/8988>