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Abstract - The cooperative and collaborative work between Universities and Libraries are key points for teachers, researchers and students to make progress in their studies and research. The Library Linkage Initiative has pursued this purpose since its creation, and it has been very useful for many Institutions, Universities and Libraries in America and Spain, specially for those with scant resources. In PrEBi[2] UNLP[3] it has been created the Celsius software, which has become the standard application for management of users requests in the Initiative. The result of many years of use, improvement and experience acquisition has result in Celsius Network which has made a breakthrough in the Celsius development history. This last version intends to connect all instances of Celsius in a network, meeting the needs of users and operators that belong to the participants Institutions members of ISTEC[1]. In the following article we have included a brief description of what ISTEC, LL Initiative and Celsius are - in order to present global view where Celsius Software fits - and a detailed description of users needs, new features and advantages in Celsius Network as well.

Index terms - Library Linkage, Document Provision and Search, Worldwide cooperation, ISTEC.

CELSIUS SOFTWARE, AN OVERVIEW

Celsius is an application that permits the integral management of bibliographic resources requests of Library Linkage Initiative (LL) users belonging to Ibero American Science and Technology Education Consortium (ISTEC), in which more than 50 universities of America and Spain participate actively, together with the cooperation of more than 300 Institutions and Libraries all around the world. Nowadays Celsius Software is being used in more than 30 ISTEC Institutions, and new installations or instances of LL participants are constantly registered. With each new institution having Celsius there are benefits in both sides:

- Teachers, students and researchers of the new institution count on a document provision service besides the chance of accessing to documentation stored in hundreds of libraries
- Institutions inside the project count on a new Catalog to perform their searches and request bibliographic resources for their own users.

Since its first version, created in the year 2001, Celsius has been characterize by its ease of use, speed and the amount of statistics included in all of its versions. This Client/Server web application has been installed under many Operative Systems (Unix/Linux, Solaris, MS Windows) and can be accessed using any web browser (FireFox, Opera, Konqueror, MS Internet Explorer), which has contributed with a great portability allowing thousands of users to access and use it from any PC anywhere. New Celsius versions – nowadays 1.6- have incorporated several tools, new and more advanced functions and have improved the visual interface, making the use of Celsius nicer and simpler with every new upgrade.

In the same way, and always under the premise of making things easier and faster, but also paying attention to the lack of systems qualified personal and financial resources in many of the participating institutions, it has been developed an installer which performs the Celsius setup in an appropriated server very easily and with no need of advanced computer science knowledge. There have also been created many user guides, software updates and several help documents. In order to organize and facilitate the access to these files, it has been created the Celsius Software Website[4], in which users may find, as well as the already mentioned files, patches, translations, Celsius installations directory and a forum for users, librarians and administrators to put doubts and advices, share experiences and suggest changes and improvements. Celsius is available with no cost for all LL participants, and since its source is opened and delivery with the software, anyone can improve it, solving problems or adding new and custom functionality.

TASKS AUTOMATIZATION

Currently, Celsius operators deal with a huge number of users requests, which includes book chapters, journal articles, theses, congress proceedings and patents. For each request, the operators perform the search in the catalogs of members institutions and, once the document is found, they log in into the Celsius of the corresponding institution (we will call them Remote Celsius and Remote Institution) and enter by hand all the data of the request, which are exactly the same the have in their own Celsius (which we will call Local Celsius) entered by the user that has made the request. Once the remote institution has obtained and digitalized the resource, they make contact with Celsius Operator and inform him that its request has been satisfied; finally, Celsius operator logs in again into Remote Celsius and downloads the pdf file in order to make it available for the user that has requested it. Some variants to this scheme related to the way documents are sent are email clients or third part software such as Infotrieve's Ariel® .

Clearly, this repetitive process demands a lot of operator's time; besides it must be considered that it is very fault prone and human mistakes since it requires constant intervention by operators in both Local and Remote Celsius.

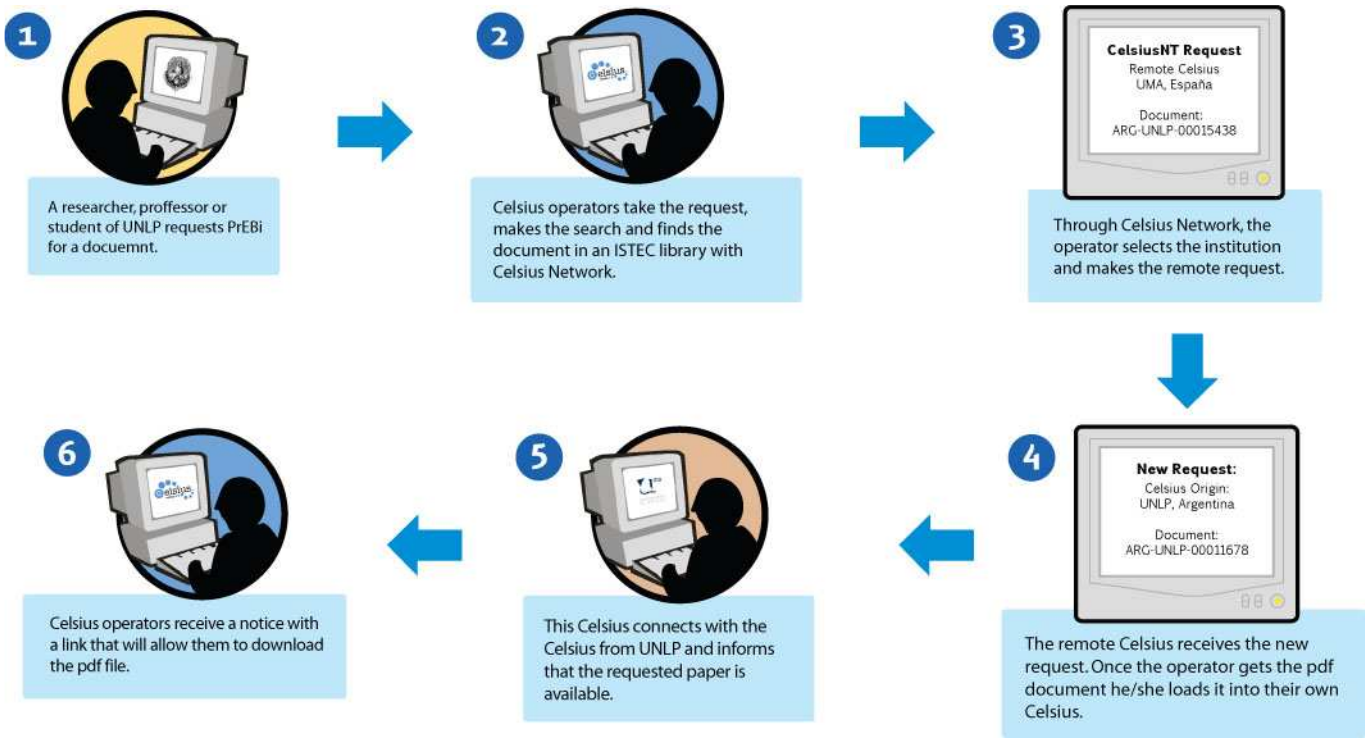

Figure 1: User's request workflow in Celsius NT

In addition to that, the current isolation of Celsius instances around the world makes global statistics obtaining a really hard task that demands too much time and too many people. In the same way that local statistics but in a larger scale, this data help to find problems in the provision and search service, and permit a constant improvement of the project.

This problem has faced LL members to the need of finding practical solutions that do not translate into a degradation of the service, but resulting in a constant improvement in both local and global levels. The two main problems here are:

- Remote and transparent access for the operators
- Global statistics obtaining

The solution to these problems allows to make the service more agile, to minimize the error, to improve communications among members, to early detect problems and to improve the service.

CELSIUS NETWORK NEW FEATURES.

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In order to solve the problems mention in the past section, it has been developed a new version of Celsius, which has been named Celsius Network or Celsius NT. Just like its name suggests, Celsius NT pretends to connect Celsius instances in the world in a logical network to allow the interaction between them and the obtaining of remote information in an immediate and transparent way for users and administrator.

Celsius NT also implies a global redesign in the software architecture, implementation and visualization, new development technologies and current web technologies – such as SOAP + Web Services, DHTML, AJAX – which offer a better user experience, a clear speed up and use or resources, and a greater dynamism in the web pages.

Remote management.

As mentioned before, one of the factors that demands more time and increase the error rate is the need of adding an user request in each Remote Celsius the the resource is requested. To avoid these problems, Celsius NT allows the remote generation and access to requests information stored in other Celsius.

How does it work? First of all, users create their requests in a personalized Users site offered by Celsius, and the corresponding operators take these requests and start searching in libraries catalogs. So far, the process is just identical both in Celsius 1.x and Celsius NT, but at this point the new features turn up .

Every time a user request is located, the operator that has attend to it will be able to use its own Celsius to make the request in the remote Celsius – let's assume that the remote institution also has Celsius NT – and he will leave the request until the remote institution sends the document. When it happens, local operator will have the document ready to hand in to the final user with no intervention needed.

On the other side of this working scheme, the remote operator has received a new request exactly like the others ones he usually receives, has processed it, digitalized and sent it to the user that requested it, all this in a transparent way.

This working scheme presents several advantages, besides the obvious simplification of many tasks. As already mentioned, it is notably reduced the error rate thanks to the lack in human intervention in many tasks of the process. There is also a clear increase of productivity in the service thanks to the reduction of some steps for generating requests in other Celsius. But this model has other advantages, among we can find:

- Multiple requirements: operators may eventually make many requirements to many different institutions for one single request. Then, once the request has been satisfied by one institution, the requests may be directly cancelled in the rest of them and again, in a transparent way, all the remote requests in each Celsius will be cancelled avoiding people from working unnecessarily.
- Integral unique tool: Nowadays operators use Celsius for requests management, email clients and chat software to communicate to each other, and third part applications (such as Ariel Software), email or even Celsius 1.5 and 1.6 for sending files. After Celsius NT, all these can be done without the need of other tools, which will permit a better trace of each request, to generate more exact statistics, and to increase productivity by integrating everything in one application.
- Flexibility in case of errors: sometimes there exist some problems that make users requests not to follow the normal sequence described above. These problems include incorrect data or mistakes when creating the request, wrong or incorrect document digitalization, the absence of the document in the Library because of some kind of inconsistency in the catalog online, corrupt files and many others. This make the operators remake the request, send it again to the same place or even to another Library, correct local or remote information, or event resend the files. Celsius NT has a wide range of functions that permit operators to make all this and other tasks, always with the same simplicity and ease of use the software has been designed with.

CELSIUS DIRECTORY.

The cooperative and distributed work of Celsius instances requires an unique application that centralizes common information for all instances in the network, that permits to know the information of every instance anytime, which allows the harvesting of information from the instances and generate statistics, and which is responsible for the global security, adding authentication, authorization and auditory.

In order to accomplish all these requirements, it has been developed the Celsius Directory. This application has as main objective the normalization of information related to organizational structures in each institution, in a hierarchical structure known as PIDU Tree – Country-Institution-Dependence-Unit from its Spanish acronym Pais – Institución – Dependencia – Unidad).

Another important function of the directory is to provide information for Celsius Instances to connect to each other and synchronize their tasks, which implies IP address or URL, ports, user name and password. Celsius Directory manages all the required information for each Celsius to have access to remote functions in other Celsius in the network, specially stressing in the security in order to avoid illegitimate access or remote procedure call and execution without the proper privileges.

CENTRALIZED STATISTICS.

To known the global operation of the Initiative is an essential requirement and its fulfillment has been pursued since the beginnings of the project. This information contributes with transparency to the Initiative, but it also permits the early detection of problems to constantly improve both search and provision services.

So far, in order to obtain global statistics, it was necessary to get statistics in each Celsius, accessing sequentially to all instances, which presents many limitations:

- It is required too much time for obtaining and processing these statistics, and there are usually needed too many people to perform this task
- Global statistics are not always real, since it takes too much time between the moment when the data has been collected and the post processing of the information, when the original data is very likely to have changed.
- Statistics are limited to those available in each Celsius. To generate new statistics today, it is necessary either to incorporate them in a new Celsius version and update all instances, or to obtain information from each instance (might be from existing statistics of requesting them to system administrators) and process it to generate new statistics.

Because of its design, Celsius Directory may request data from each Celsius NT in the network, process them

locally and generate an user friendly report; as a result, there is one unique access point for a greater amount of statistics, whether they are for a single instance, a country or even all participants in the Initiative. The amount of data and statistics that can be obtained with this model is almost unlimited, since statistics module has been created in a sufficiently generic way to achieve this purpose.

CONCLUSION.

The success of LibLink Initiative is mostly a result of the collaborative work of a great number of participants around the world. The use of an integral application like Celsius has made these people tasks much easier and has promote communication with each other, resulting a constant improvement of the service.

Under these lines of work Celsius software has constantly evolved, adding new functions, tools and technologies. Celsius NT has meant a big jump in this evolution and will allow not only too keep in force as a standard for the service, but to carry on promoting the Initiative, which means more new members, more users and specially a more and better among participants Institutions and Libraries. This last Celsius version is currently being tested by Celsius operator in PrEBi UNLP together with a small group of Universities in America; once the testing stage has finished, Celsius NT will be worldwide released.

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