



République et Canton de Genève

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Mission report (October 2005)

Mission in Lesotho



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Terms of Reference

- To offer a training course on Ubuntu – Linux and a workshop to install servers and clients for their final localisation.



The PC Project in Lesotho is the first concrete project to realise the agreement between the Canton of Geneva and UNCTAD.

Date of the Mission

From the 15/10/2005 until 30/10/2005 (16/10/2005 – 29/10/2005 in Maseru)

Mission's Team

Dr Dominique Hausser (DHA)¹, Scientific and Methodological Counsellor, OT, Geneva, Switzerland

Professor Arturo Montejo Ráez (AMR)², Dpto. de Informática, Universidad de Jaén, Spain

Jean-Jacques Buregeya (JJB), High School of Management (Haute Ecole de Gestion), Geneva, Switzerland



1 more on http://www.ge.ch/obstech/Organisation/dominique_hausser.html

2 more on <http://www.di.ujaen.es/~amontejo/>

Executive Summary AND Brief conclusions

This mission (15/10/2005-30/10/2005) is the third one organised for the PC project in Lesotho. This project is elaborated under the umbrella of UNCTAD which has established an agreement with the République et Canton de Genève for technical assistance to some least advanced countries.



The major objective of this project is to elaborate a concrete and pragmatic solution to move from policy to action.

This third mission has been set up to offer training to IT Technicians of the Government of Lesotho and Tertiary school using the PCs and other equipment sent from Geneva.

The equipment is essentially 2nd hand material from the

Geneva administration, the International School of Geneva and some other anonymous donors. The IT material has been revised by Réalise, an association working in the reinsertion of marginalised persons in Geneva. The transport has been assured by the Geneva shipping company Ordem. The material left Geneva the 4th August 2005 and arrived in Maseru very beginning of September. The container was unfortunately collected only beginning of October 2005.



The training course has been prepared with the support of the Universidad de Jaén, Spain, in particular with the help and the participation of Professor Arturo Montejo Ráez and some of his students.

Additional material and description of useful software have been elaborated by Professor Enrico Viganò from the High School of Management (Haute Ecole de Gestion) of Geneva, his assistant Yanik Ruchat and some of his students, in particular Jean-Jacques Buregeya and Samuel Carrupt.

All this material³ related to Ubuntu distribution⁴ has been given to the students as well as to the Ministry of Communication, Science and Technology.

3 Three CDs : 1 with Ubuntu 5.10 package client and server installation, 1 with APT-Repository (more than 600 MB of software packages, 1 with documentation & useful applications (more than 6000 files)

4 "Ubuntu" is an ancient African word, meaning "humanity to others". Ubuntu also means "I am what I am because of who we all are". The Ubuntu Linux distribution brings the spirit of Ubuntu to the software world. (<http://ubuntulinux.org>)

The training course run accordingly to the programme elaborated by the mission team and having received the formal agreement of the Ministry of Communication, Science and Technology (by the Principal Secretary and the ICT department Director during their stay in Geneva for PrepCom III for the WSIS 2nd part in Tunis).

In summary, I believe that this training course has been very successful. The participants have push us to give them much more that was intended in the beginning. All participants have attend more than regularly the training course and were asking us what happened when unfortunately for professional reasons they has to be absent for a while.

The progress, the students have made are important; they are now able to install local networks with the equipment received and Open Source Solutions. Their motivation to develop project with Open Source Solutions is very high. I really hope that they will get strong support from their respective hierarchy and the political authorities.

Framework of the International Co operation

1. The objective of the OT is to develop a concrete collaboration with some of the least developed countries in the field of information systems within the framework of the Millennium Declaration (<http://www.un.org/millenniumgoals/index.shtml>).
2. The agreement signed in Sao Paulo between UNCTAD and OT, Canton of Geneva, June 2004. (Protocole d'accord entre l'Observatoire technologique du Centre des technologies de l'information, République et canton de Genève et la Conférence des Nations Unies pour le Commerce et Développement). This agreement cover a programme of technical assistance in different fields of ICT with a priority directed to the least advanced counties (LCDs) and targeting the objectives defined in the Millennium Declaration.

Decision for Collaboration taken (February 2005 in Maseru)⁵

1. Geneva will give support to the MCST to move from policy into action in term of coordination of concrete projects and collection of pertinent information. According to the Draft ICT Policy Paper this could be run by the ICT Department, but decision has to be made by the Minister of CST.
2. Geneva will offer 100 PCs. Decision has to be taken where and for which purpose they will be used. A workshop has to be set up in order to prepare the machines and to assure the follow-up. The disks of the PCs will charged with useful information collected over internet at the central level (This has to be done to bypass the problem of insufficient connections.). The OS and the applications should use open standards and open source. The project LIFE developed by ISF at CERN is an interesting solution.
3. Geneva will offer a specific training to a maximum of three persons to be able to achieve the first two objectives. These persons have to be in a senior position.

5 see February Mission Report (LesothoMissionReport200500304.pdf)

Concept paper adopted by the Minister of Communication, Science and Technology (May 2005 in Maseru)⁶

In summary:

The objectives of the collaboration will be according to this concept paper achieved till the end of 2005. It has been possible to ensure that this pragmatic approach is fully integrated in the ICT policy paper (accepted by the Cabinet in April 2005) as well as the ICT implementing plan (which is still in a draft version, but should be also presented to the Cabinet within the next weeks).

You will, in particular, notice the establishment of a Technical division in the ICT department which will be the structure not only in charge of this modest PC project, but also of the whole infrastructure of the Lesotho government.

Important also is the fact that all PCs will be distributed to end users such as tertiary training structures, high schools, health centres and tele-centres (structures implemented in the Post-Offices and accessible by the general public).

Finally a total of around 60 persons will be trained during the project, 5 or 6 persons who are working in the Technical Division as well as Computer staff from the different structures that will benefit of the PCs, in particular the professors of the Lesotho College of Education and the Lerotholi Polytechnic to allow them to configure and maintain the PCs with LIFE package (develop at CERN with the help of HEG) and one or two persons from the structures (40-50 persons) where the PCs are installed to be able to assure a minimal maintenance of the infrastructure (which means a level equivalent to our "super-users").

Programme of the Mission

15/10/2005: Departure of DHA & JJB from Geneva, Switzerland

Departure of AMR from J    n, Spain

16/10/2005: Arrival of DHA & JJB in Maseru, Lesotho

17/10/2005 Beginning of the training course by DHA & JJB

Arrival of AMR in Maseru, Lesotho with 24h delay due to overbooking

19/10/2005 Official ceremony

28/10/2005 End of the training course given by AMR, DHA & JJB

29/05/2005: Departure DHA, AMR & JJB from Maseru, Lesotho

30/10/2005: Arrival of DHA in Geneva, Switzerland

30/10/2005 Arrival of AMR in J    n, Spain

⁶ see May Mission Report (LesothoMissionReport200500530.pdf)

Training Course description

The objectives of the training course was to initiate the students to:

1. To train IT technicians from different ministries and tertiary schools to configure Network, PCs Server and Clients in order to respond to the needs of end-users (defined in the concept paper).
2. To give a basic overview on Open Source Solutions and in Particular to the GNU – Linux Ubuntu distribution.
3. To elaborate projects plan from the needs to the realisation.

The content of the training course could be summarised as follow:

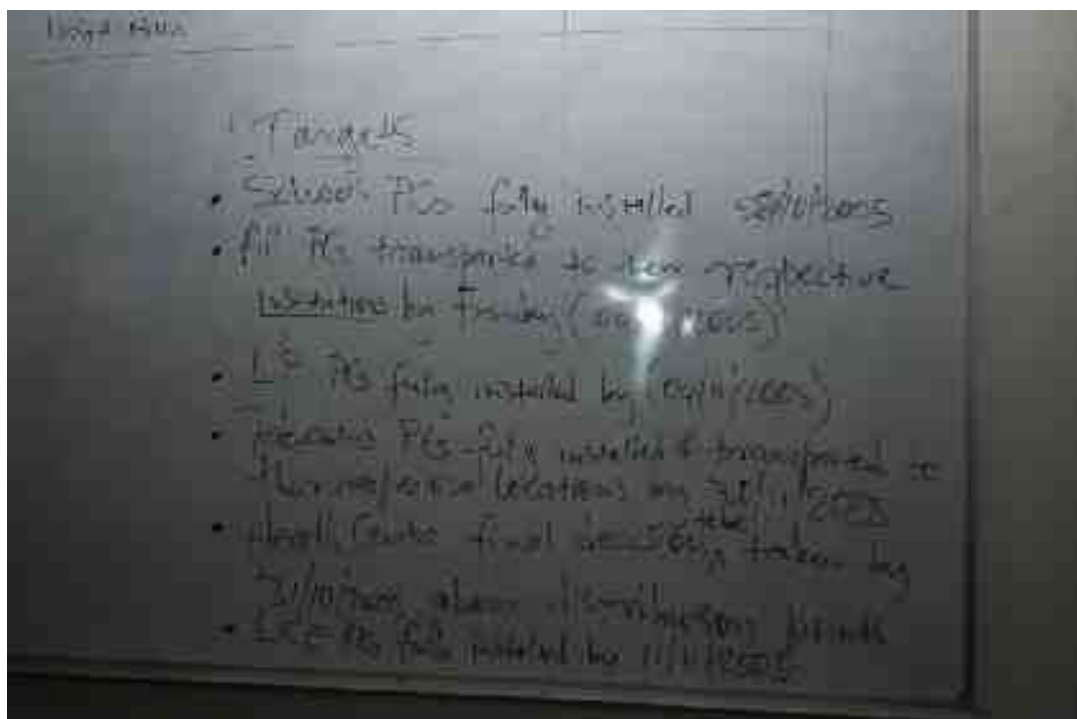
- Installation of a local network to allow students to have a workstation for the training course
- Introduction to open source, open standards and free software
- How to install and configure a client with Ubuntu Linux distribution
- Introduction au system UNIX, Linux to manage files, directories and users
- Configuration of local network
- Installation of server with Ubuntu, including services and local sub network (including NAT, DHCP and DNS)
- Installation and configuration of Apache2, php and MySQL
- Introduction to APT-repository, including installation of it on server
- Installation, configuration and management of SSH services

During the two weeks, the students had the opportunity to take over the architecture of Ubuntu Linux, X-Window system and some of the major concepts of the UNIX's world.

The students have achieved the training with the necessary capacity to install and configure a local network with the available equipment donated by the Canton of Geneva and the suggested open source solutions (in practical terms Ubuntu Linux version Breezy Badger 5.10): All participants have expressed their satisfaction at the end of the training course⁷.

As you will notice on the picture below, the complete installation for end-users will be ready till the end of November 2005. The students intend to create a group of Ubuntu Linux users to be able to help each other and as well as to study the opportunity to install in Lesotho a APT-repository of Ubuntu to facilitate updates despite a very low connection with the World web.

⁷ The students have been ask by mail on Tuesday 2nd November 2005 to fill an evaluation adapted from the one used by the training centre of Canton of Geneva till Friday 4th November 2005.



Annex 1 List of Contact Persons in Lesotho

Hon. Motsoahae Thomas Thabane, Minister of CST

Mr Tseliso 'Mokela, Principal Secretary, Ministry of CST

Dr. Nketsi Makhera, Director of the ICT Department, MCST

Annex 2 List of Persons attending the training course



- | | | |
|--|---|--|
| 1. Kingdom of Lesotho; Ministry of Communication, Science and Technology, Postal Department:
Khojane Lepholisa | 5. Kingdom of Lesotho; Ministry of Education and Training:
Tsepo Katali | 10. Lerotholi Polytechnic:
Malla Mahloko |
| 2. Kingdom of Lesotho; Ministry of Communication, Science and Technology; ICT department:
Tumane Mahloane | 6. Kingdom of Lesotho; Ministry of Health and Social Welfare:
Mokoena Lesenyeho | 11. Lerotholi Polytechnic:
Naroi Lephoto |
| 3. Kingdom of Lesotho; Ministry of Education and Training:
Molefe Nkalai | 7. Kingdom of Lesotho; Ministry of Public Services:
Noosi Nchoba | 12. Lesotho College of Education:
Kasongo Kalanda |
| 4. Kingdom of Lesotho; Lesotho Government Computer Centre:
Samuel Keketsi | 8. Lerotholi Polytechnic:
Fonya Thabo | 13. Lesotho College of Education:
Ketseletso Raleche |
| | 9. Lerotholi Polytechnic
Limpho Seotsanyana | 14. Lesotho College of Education:
Lesadana Putsoane |
| | | 15. National University of Lesotho:
Moeketsi Matsepe |
| | | 16. National University of Lesotho:
Thite Lerotholi |

Annex 3 Programme of the training course

The programme has been established and followed for the training course as summarised below. The course started every day at 8h00 and ended at 16h00 (often 17h00)

17-Oct Course 1: Installation of Ubuntu client

- Machines preparation and Network settings
- Ubuntu: first impressions

18-Oct Course 2: Introduction to GNU/Linux systems

- Notions on partitioning and OS installation
- What is UNIX? What is Linux?
- Linux architecture

19-Oct Course 2: Introduction to GNU/Linux systems

- The shell

20-Oct Course 2: Introduction to GNU/Linux systems

- The X-Window system
- Desktop projects: KDE and Gnome
- Desktop applications: OpenOffice, Gimp, Mozilla Browser, Mail client...

21-Oct Course 2: Introduction to GNU/Linux systems

- The power of Linux: a client and a server
- Overview of different Linux distributions

22-Oct Course 3: GNU/Linux Administration

- Installation of Ubuntu server
- Machines preparation

23-Oct Day off

24-Oct Course 3: GNU/Linux Administration

- Installation of Ubuntu server and subnets
- Setup of printer
- User administration: rights and accounts

25-Oct Course 4: GNU/Linux Administration

- Managing packages: APT and Synaptic
- Compiling source packages

26-Oct Course 4: GNU/Linux Administration

- Server administration: brief introduction to server services
- Network administration
- System monitoring and fall backs

27-Oct Course 4: GNU/Linux Administration & Project management

- Finding help
- The kernel: Hardware, devices, storage media and related tools (modules)
- Project management
- Set up of the agenda for the deployment of PCs to final destination

28-Oct Installation of clients and servers for final destination

Annex 4 Handover Official ceremony

Annex 4.1 Programme for official launching – Canton of Geneva open source software, hardware and support to Lesotho at the Lesotho College of Education on 19th October 2005

Master of Ceremonies: Principal Secretary – Ministry of Education and Training (MOET)

0800	Arrival of the general public
0830	Arrival of senior officials from MOET, MoHSW, MCST
0930	Minister's arrival
0935	Tour of computer laboratory and briefing by trainers
0950	Opening prayer
0955	Welcome remarks by LCE Director – Dr. N.P. Lesoetsa
1010	Project background by ICT Director, MCST – Dr. N. Makhera
1020	Remarks by Dr. D. Hausser, Canton of Geneva
1030	Song – College Choir
1035	Remarks by Honourable Minister of Education and Training – Mr. M.K. Tsekoa
1050	Song – College Choir
1055	Receipt of equipment and official launch of training by Honourable Minister of Communication, Science and Technology – Mr. M.T. Thabane
1110	Media briefing
1120	Refreshments
1130	Departure

Annex 4.2 Discourse of Dr. Dominique Hausser, MD, Msc

Honourables Ministers,

Ladies and Gentlemen,

Dear Colleagues and Dear Friends,

I am really happy to be for the third time this year in Maseru and to work with you to achieve the PC project which we set up together. This project is the result of a collaboration between the government of Lesotho and the State and Canton of Geneva, but I can already say that it has already involved more than 50 persons to assure its success.

The next few minutes, I will address briefly 4 points.

1. This PC project is, I already mentioned in May 2005 a small project even if it could be summarized through one of its dimension as 34 m3 or more than 8 tons of materials.

Just remind that the main objective is to move from policy, from “blabla” to action.

The 200 PCs and the installed software are then just tools used to test the possibility, even with a relative lack of resources and in difficult situation that the one lived by the Basotho people, the possibility to develop tools participating to the development of the country and the population living here.

We started 2 days ago the last step of our defined project: the training course of our professional colleagues, who will be in charge of the training of future computer scientists, computer technicians and end users and for other in charge of installing IT solutions based on needs.

This training course is based on the material and the technical solution we are suggesting and I do think, it works pretty well as you have notice visiting the class room.

2. Why Open source ?

Economically, it is an interesting / promising solution that is completely follow Agenda 21 and should have a positive influence for the economy of the country.

Open source solutions give to the government complete independence and complete control of its data, the most richness of a state. Using open standard like open document will ensure the access of the information independently of the software.

If Open Document was initially a format developed by the community working on Open Office, the open source solution doing the same things than cousin Bill's Office; today Open Document is officially a open standard validated by an autonomous structure from the community of developers.

Stability of open source products (OS and applications) can be assured because a large community is involved in the projects, and this is clearly the case with the suggested solution like UBUNTU (a software for human beings ready to share their knowledge, because their win a lot doing that).

3. There is clearly a local responsibility at all levels – from government to the field – to ensure the success of such a project.

This official launching shows clearly the involvement of the concerned authorities and more largely of the whole government and I am really happy to see it.

I, really, hope that there will be a concrete sign in setting up the Technical Division and in the budget 2006-2007 in term of investments as well as in the current expenses for maintenance and replacement of materials and software.

The only ones who really should care of their own future are the locals.

We, as a foreign team, may be nice, we are just flying through and spreading some ideas that should grow in the local earth under your own care.

We are working with colleagues, not with end-users. It is not our job, but yours.

The politicians must support this dynamic.

Concretely to support the idea of setting up a mirror of the Ubuntu's repositories at the National University of Lesotho and /or to support a team spending some time to bring Sesotho in Ubuntu.

I will be happy to have a final feedback for really evaluating the results achieved with this project.

4. In my last point, let me thank you all for your confidence in this project.

Basothos for your kindness and the nice way you welcome us, the crazy Swiss guy and my colleagues, today as well as in February and May 2005.

A special thanks to the professor Arturo Montejo Ráez, from the University of Jaén and Jean-Jacques Buregeya for the HEG, a tertiary school training in particular administrative computer management.

An official thank, even if these people are not here to those nearly 35 persons in Europe involved at different level in this project. These persons have given a lot of their time to prepare the success of this training mission.

Finally, a warm thank to all of you here also working hard to make a success story with this project.

5. Thank you for your attention and long life to this extremely dynamic process.



Annex 5 Mission report of Professor Arturo Montejo Raéz

(without annexes that are similar to annexes 1 and 2)



Proyecto Lesotho

Informe de la Misión a Maseru

Arturo Montejo Ráez

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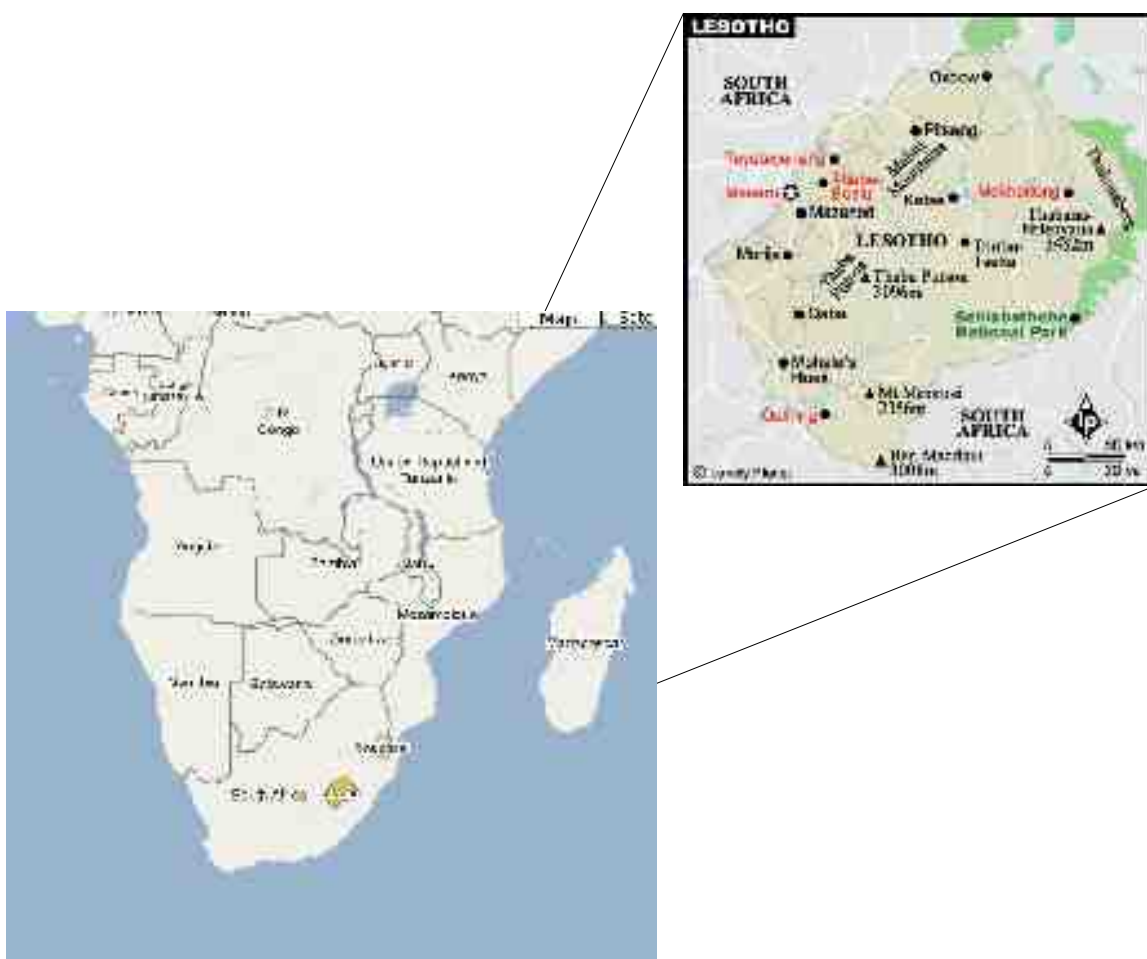
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Jaén, 3 de noviembre de 2005

Presentación del proyecto

El *Proyecto Lesotho* surgió hace menos de un año, promovido por el Cantón de Ginebra (Suiza) como proyecto de cooperación para el desarrollo tecnológico de Lesotho (situado en el sur de África). Las necesidades informáticas de dicho país son grandes, y sus carencias en infraestructura y formación afecta a varios sectores: los centros de salud, los centros de educación y las comunicaciones públicas. Lesotho es un país pobre, y posición en el mundo de las nuevas tecnologías lo sitúan claramente en el lado desfavorable de lo que se ha venido a denominar “la brecha digital”. Pero presenta ciertas características propias que lo hace peculiar y muy adecuado como beneficiario de las pretensiones de este proyecto: dispone de un sistema de educación aceptable (muy mejorable, pero envidiable dentro del paradigma de otras regiones de África), por lo que su nivel de analfabetismo es bajo; además, es un país pequeño, por lo que la inversión en una ayuda de este tipo es factible y puede representar realmente una ayuda efectiva.

El proyecto puede resumirse en tres fases: envío de equipamiento informático, formación de un grupo de técnicos en el uso de software libre, e instalación de redes locales en diversos centros públicos. Detallaremos estas fases más adelante.



Datos sobre Lesotho

<i>Capital</i>	Maseru
<i>Superficie</i>	30.350 km2
<i>Población</i>	1.802.000
<i>Nombre de Estado</i>	Reino de Lesotho
<i>Moneda</i>	loti y rand sudafricano
<i>Idiomas</i>	sesotho, inglés, ...
<i>Densidad hab/km2</i>	59,4 hab./km2
<i>Crecimiento anual</i>	0,1 %
<i>Mortalidad infantil</i>	92,1 por 1.000
<i>Esperanza de Vida</i>	35,1 años
<i>Población Urbana</i>	17,9 %
<i>Analfabetismo</i>	25,5 % en hombres y 5,5 % en mujeres
<i>Escolarización tercer grado</i>	2,4 %
<i>Internet</i>	6,69 por 1.000 hab.
<i>Libros publicados (títulos)</i>	.
<i>PIB total</i>	4.798 millones de US \$
<i>Crecimiento anual (2003)</i>	3,9 %
<i>PIB por hab.</i>	1.999 US \$
<i>Indice de inflación</i>	7,1 %
<i>Gasto en Educación</i>	10 % del PIB
<i>Gasto en Defensa</i>	3,1 % del PIB
<i>Deuda externa</i>	637 millones de US \$
<i>Servicio de la deuda/Export.</i>	11,9 %
<i>Importaciones</i>	720 millones de US \$
<i>Exportaciones</i>	250 millones de US \$
<i>Principales clientes %</i>	Sudafrica (52,6), Norteamérica (47), UE (0,2)
<i>Ejercito de Tierra</i>	2.000 personas
<i>Ejercito del Aire</i>	.
<i>Organismos Internacionales</i>	ACP, COMMONWEALTH, UA, BAD, SADC, SACU

Participantes en el proyecto

Observatorio Tecnológico de Ginebra

Departamento de Informática de la Universidad de Jaén

Escuela Superior de Gestión de Ginebra

Colabora la ONG *Informaticiens Sans Frontières*, con sede en Ginebra

Objetivos

1. Mejorar la posición de Lesotho en el paradigma de la Sociedad de la Información, a través de dos actuaciones principales: donación de equipos y formación gratuita en sistemas basados en software libre.
2. Aprovechar de equipamiento informático a diversos centros públicos del gobierno de Lesotho:
 - 2.1. Hospitales
 - 2.2. Diversos centros de educación secundaria
 - 2.3. Escuela Politécnica de Lesotho
 - 2.4. Oficinas de correos, para la puesta en marcha de tele-centros
3. Formar a un grupo de técnicos en la instalación y configuración de redes locales para cada uno de los centros anteriormente citados, haciendo uso del equipo informático facilitado y de exclusivamente tecnologías basadas en software libre. Esta formación debe ser lo suficientemente completa como para permitirles una autonomía total en el uso de dichas tecnologías.

Metodología

Envío de equipamiento informático donado por el Gobierno Cantonal de Ginebra:

- 220 ordenadores Pentium 500 y 600 Mhz, capacidad de disco entre 6,5 y 10 GB, equipados con tarjeta de red Ethernet, teclado, ratón y cables correspondientes
- 244 monitores CRT
- 16 impresoras láser
- 41 enrutadores
- Varios kilos de cables de red
- Tarjetas de red Ethernet adicionales

Todo este equipamiento (varias toneladas) fue recibido en Maseru a finales de septiembre de 2005.

El gobierno de Lesotho prepararía el lugar adecuado para su almacenamiento. Dicho lugar sería también utilizado para la formación de 16 técnicos locales en la instalación y configuración de redes locales usando el equipamiento donado.

La formación correría a cargo de un equipo de tres personas:

- Dominique Hausser: consejero científico y de metodología del Observatorio Tecnológico de Ginebra, coordinador y principal responsable del proyecto. Su labor en la formación sería principalmente estratégica y pedagógica, asegurando las infraestructuras y servicios para su correcta marcha.
- Arturo Montejó Ráez: profesor de la Universidad de Jaén. Participante como experto en el uso de software libre, encargado de la formación de grupo de técnicos.
- Jean-Jacques Buregeya: estudiante de la Escuela Superior de Gestión de Ginebra, que participaría como apoyo técnico.

El curso se extendió a lo largo de las dos semanas que van del 17 al 28 de octubre de 2005, y tuvo lugar en el *Lesotho College of Education*, en la capital del país, Maseru. El contenido del curso puede resumirse como sigue:

- Instalación de una primera red local para disponer de un puesto por alumno
- Presentación del curso: objetivos y metodología
- Introducción a los sistemas de código abierto (*Open Source*) y el software libre

- Introducción a la instalación y configuración básica de un sistema Ubuntu Linux
- Uso del sistema, introducción a las herramientas básicas de un sistema Ubuntu
- Reinstalación del sistema cliente profundizando en los conceptos de particionado, arquitectura del sistema e instalación de aplicaciones
- Introducción a los sistemas UNIX: gestión de ficheros, derechos y usuarios
- Configuración de la red
- Instalación de un sistema Ubuntu para servidor
- Instalación y configuración de servicios de red. Se formaron tres grupos, encargándose a cada grupo la instalación de su propia red local, con un número de clientes y un servidor
- Instalación y configuración de una subred NAT, con DHCP y DNS propios
- Instalación y configuración de Apache, PHP, MySQL
- Puesta en marcha de un repositorio APT en los servidores
- Instalación y configuración del servicio SSH, explotación de dicho servicio

Durante el curso se fue profundizando poco a poco en la arquitectura de Ubuntu Linux, el sistema X-Window, la jerarquía del sistema de ficheros y otros conceptos propios del mundo UNIX como la programación shell, la programación de eventos con CRON, etc.

A cada participante se le ha proporcionado el **material didáctico y los recursos software** siguientes:

- Un CD con la instalación de Ubuntu 5.10
- Un CD con un repositorio APT de más de 600 MB con software adicional, orientado a la instalación de servicios para máquinas servidor, y los grupos de software específicos a cada uno de los destinos posibles (hospitales, tele-centros o centros educativos)
- Un CD con una recopilación de documentos cuidadosamente seleccionados para la consulta o la ampliación de conocimientos (más de 200 MB de manuales, recetas, guías de usuario, etc.)
- Dos documentos guía del curso de formación, uno para la instalación y configuración de máquinas cliente, y otro para la instalación y configuración de máquinas servidor.

Resultados finales

Los 16 asistentes al curso completaron su formación con la capacidad necesaria para instalar y configurar una red local haciendo uso del equipamiento donado y de software libre (en concreto, la versión 5.10 de Ubuntu Linux). Todos los participantes quedaron realmente satisfechos, si bien desearon un periodo de formación más amplio, para asegurar la asimilación de conceptos con seguimiento presencial por parte del docente.

La planificación de instalación propuesta por los participantes prevé la consecución final del proyecto en el plazo de un mes. Por nuestra parte hemos instado a los responsables políticos a facilitar dicha labor y garantizar una continuidad del proyecto que asegure la creación de un cuerpo de expertos a partir del grupo de participantes para continuar la labor de mantenimiento y desarrollo de sistemas basados en software de código abierto.

El proyecto, no obstante, ha articulado mecanismos de seguimiento para la correcta supervisión de las fases posteriores a la recepción de equipos y la formación de personal técnico. El Observatorio Tecnológico de Ginebra monitoriza la evolución de los distintos agentes implicados en las acciones siguientes a la misión.

Conclusiones

La experiencia ha sido muy positiva, y el proyecto, desde todos los puntos de vista, un éxito. Este proyecto ha sido capaz de dar forma a una ayuda concreta que no sólo aumenta considerablemente las infraestructuras informáticas del país, sino que abre la puerta a una serie de tecnologías cuyo uso podrá continuar, y de cuyo

desarrollo pueden llegar a ser partícipes. La transferencia de conocimiento ha sido parte fundamental, sacando el máximo partido al equipamiento facilitado.

La valoración ha sido tan satisfactoria que el gobierno de Ginebra prevé proyectos similares (en concreto, en Mali).

Este proyecto demuestra las excelencias del software libre como herramienta fundamental para salvar la denominada *Brecha Digital*. El uso de una distribución GNU/Linux totalmente libre como *Ubuntu* ayuda a garantizar el acceso a un nutrido grupo de tecnologías informáticas con un coste muy bajo, ya que el software en sí es gratuito. Pero además, el software de código abierto otorga la potencialidad de continuar el desarrollo de software, así como su adaptación a los requisitos propios de sus usuarios. Al formar al grupo de técnicos en el uso de tecnologías libres, hemos aumentado, al mismo tiempo, sus expectativas y capacidades de desarrollo tecnológico, ayudándoles a, no sólo salvar la brecha digital, sino además proporcionándole una serie de herramientas que les permitirá seguir la evolución de dichas tecnologías y posicionándoles dignamente en la Sociedad de la Información.

Annex 6 How to install by Arturo Montejo Ráez

Annex 6.1 Installing the Server

1. Plug the machine
2. Switch the machine on with the Ubuntu Installation CD loaded into the drive
3. When the *boot* prompt appears, type “server” and hit ENTER:

```
boot: server
```

4. Partition the disk as follows:
 - Approx. 4 GB for / (primary, bootable, ext3, #1)
 - Approx. x2 the size of your memory, but $\leq$ 512 MB for SWAP (logical, swap, #5)
 - The rest for the /var directory (logical, ext3, #6)
5. Create an account for the **admin** user (password: *adm1n2005*). Only this user will be able to perform *sudo* operations
6. Network configuration:
 - Host name: *server*
 - IP: *192.168.X.1*
 - Netmask: *255.255.255.0*
 - Gateway: *192.168.1.1*

X refers to the number we will give to our subnetwork. Anyhow, we will take care of fine-tune network configuration later.

7. After installation we should get a *login:* prompt, for the system waiting for us to login. Use the *admin* account we have created.
8. Since we are not real servers yet, we have to download additional software from the repository, so we need to connect to the local network. We ask the network for an IP:

```
$ sudo dhclient eth0
```

After that, we should be able to ping our lovely server:

```
$ ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=0.056 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=0.044 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=64 time=0.034 ms
```

Press **CRTL+C** to abort the pinging. If we get something like the response above, we can connect to the server.

8. Now we have to edit the APT server repository. Edit your */etc/apt/sources.list* file, leave it with the CD repository (the first one) and add a new one:

```
deb http://192.168.1.1/apt-repository ./
```

Comment the rest with a leading '#'.

9. Update the APT database and upgrade your system with recent versions of software:

```
$ sudo apt-get update
$ sudo apt-get upgrade
$ sudo apt-get dist-upgrade
```

9. The machine is ready for installing additional software. But first let's finish configuring network stuff. Edit the file `/etc/resolv.conf` to set some values as follows:

```
search local.net
domain local.net
nameserver 64.57.112.1
```

We will use `local.net` as the domain name of our local network. The `nameserver` states which DNS server we will ask when resolving a host name, it may be differ for you.

10. Now, change the content of `/etc/hostname` to the name of your server (should be already `server`, but just to be sure:

```
# echo "server" > /etc/hostname
```

11. Edit the content of `/etc/hosts` to add your host name and look like:

```
127.0.0.1 localhost.localdomain localhost server
192.168.X.1 server.local.net
```

12. We can start now to install programs. In order to be able to check the web server and other operations we are about to install a **X-Window System** and a **light window manager** called `xfce4`.

```
$ sudo apt-get install xorg-common xserver-xorg xfce4 xterm xfonts-*
```

13. We have to set the X-Window system to use `xfce4` when starting it from the console. Do this as `admin`:

```
$ echo "xfce4-session" > /home/admin/.Xsession
```

14. Now we can launch the graphical environment:

```
$ startx
```

15. Open a terminal (execute the program `xterm`) and install Apache Web Server, PHP, MySQL and Firefox to access the web.:

```
$ sudo apt-get install apache2 libapache2-mod-php4 mysql-server firefox
```

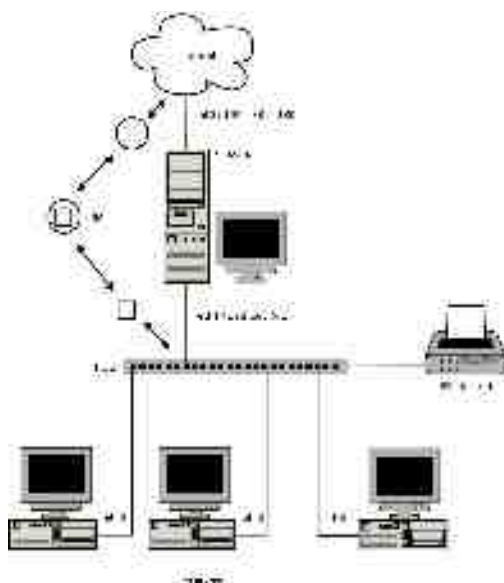
16. Great, our **LAMP architecture** is ready. Your server should be running now. Open Firefox and points it to the url <http://localhost/>

17. Before doing anything else we have to secure the access to the MySQL database:

```
mysqladmin -u root password "r00tpass"
```

18. Access your database from the web at <http://localhost/phpmyadmin>. You will have to give the login `root` and the password `r00tpass` to access the database web-based manager.

19. Now is time to **configure our server with NAT** to provide to a set of client machines to a local network and to the Internet (if the server has connexion to the Internet, of course). This is the desired configuration of our local network:



Here we can see the topology to be used.

192.168.X.1 refers to the IP number of the server in the local network. X has to be replace by your desired network number.

We will use NAT for enabling packages coming from the local network being forwarded to the external network.

`eth0` and `eth1` refer to the external and internal Ethernet cards respectively installed on the server. This may change for you, please check that. You can see which cards are attached to your server by doing:

```
# cat /proc/net/dev
```

Note that we consider the server to use an external static address (`192.168.0.130`), though it may change for you (your

server may get its IP address by dhcp, in that case the entry for *eth0* in */etc/network/interfaces* would be much simpler, in fact, exactly like for clients).

20. NAT will enable use to do *marquerading*, that is, to encapsulate the packets coming from our local network (192.168.X) as if they had the IP of the server (192.168.0.130). For this we have, first, to create two scripts:

/etc/network/if-pre-up.d/nat.sh

```
echo 1 > /proc/sys/net/ipv4/ip_forward
iptables -t nat -A POSTROUTING -o eth0 -j MASQUERADE
```

/etc/network/if-post-down.d/nat.sh

```
iptables -F
iptables -t nat -F
iptables -t mangle -F
iptables -X
echo 0 > /proc/sys/net/ipv4/ip_forward
```

We have to make these two scripts executable:

```
$ sudo chmod +x /etc/network/if-pre-up.d/nat.sh
$ sudo chmod +x /etc/network/if-post-down.d/nat.sh
```

Now we modify */etc/network/interfaces*

```
auto lo eth0 eth1

iface lo [...]
[...]

mapping hotplug
    script grep
    map eth0
    map eth1

iface eth0 inet static
    address 192.168.0.130
    netmask 255.255.255.0
    gateway 192.168.0.1

iface eth1 inet static
    address 192.168.X.1
    netmask 255.255.255.0
```

After all these modifications we can relaunch the network:

```
$ sudo /etc/init.d/networking restart
```

The server is ready for forwarding packets coming from the local network.

21. We want to use DHCP to assign IP addresses to our clients. For that we have to install *dnsmasq*, a service which is both a **DNS server and DHCP server**:

```
$ sudo apt-get install dnsmasq
```

To configure it, we have to edit */etc/dnsmasq.conf* and leave it with the following entries (commented lines are not shown here):

```
bogus-priv
no-poll
interface=eth1
domain=local.net
dhcp-range=192.168.X.50,192.168.X.150,255.255.255.0,24h
cache-size=150
```

Now we can restart *dnsmasq* service.

```
$ sudo /etc/init.d/dnsmasq restart
```

Our clients can restart their networking service and they will get an IP number from the server.

22. Also, each client has to know that the server is its DNS server, so we edit */etc/resolv.conf* on every client:

```
search local.net
domain local.net
nameserver 192.168.X.1
```

Ready, we should be able to ping google.com:

```
$ ping google.com
[...]
```

23. We will also install **SSH** to be able to connect remotely to our server:

```
$ sudo apt-get install ssh-server
```

24. We install *sysv-rc-conf* to ease the **management of available services**:

```
$ sudo apt-get install sysv-rc-conf
```

25. The only thing that remains is to **configure the networked printer**. We will use the *Common Unix Printing System* (CUPS) for doing this.

```
$ sudo apt-get install cupsys
```

We have to edit the */etc/cups/cupsd.conf* and modify *Network options* to add a line after the first *Listen* parameter:

```
[...]
Listen 127.0.0.1:631
Listen 192.168.X.1:631
[...]
```

Now we have to set *Locations* as follows:

```
[...]
<Location />
Order Deny,Allow
Deny From All
Allow From 127.0.0.1
Allow From 192.168.X.
</Location>
[...]
<Location /printers>
Order Deny,Allow
Deny From All
Allow From 127.0.0.1
Allow From 192.168.X.
</Location>
[...]
<Location /admin>
Order Deny,Allow
Deny From All
Allow From 127.0.0.1
</Location>
[...]
```

So *AuthType* and *AuthClass* are commented or removed.

After this you should be able to reload *cupsys* service for the changes to take effect.

Connect the printer and configure it to have the IP *192.168.X.40*. You can telnet to it if you want to configure additional parameters. Be sure that its gateway is *192.168.X.1* and that the netmask is *255.255.255.0*.

Open in your server the web browser and point it to: <http://localhost:631>. You can add your printer now using the web interface. Set the name to *hplj4* for instance, and the URI to connect to it must be: *socket://192.168.X.40*. After defining the rest of parameters, everything should be ready to print your test page.

26. It is time to **configure the clients to access the networked printer**. We will do it from Gnome, selecting *System > Administration > Printing*. Then click on “Add new printer” and set it to be a networked printer, using CUPS with the following URI: <http://192.168.X.1:631/printers/hplj4>. Check that the driver used is *hpij*. After this, you should be ready for sending printing jobs from your client.

27. The last thing we will do is to schedule a *cron* task to make a **backup** of our MySQL data and WWW data every night. First we create a *backup* directory:

```
$ mkdir /home/admin/backup
```

Then, we create the script `/home/admin/backup/backup.sh` with the following code:

```
#!/bin/bash
DAY=`date +%w`
mysqldump -u root --all-databases --password="r00tpass" | \
gzip -c /home/admin/backup/${DAY}_mysql-databases.gz
tar zcf /home/admin/backup/${DAY}_www.tar.gz /var/www
```

We have to make executable and schedule the script. So we edit our *cron* table:

```
$ chmod +x /home/admin/backup/backup.sh
$ crontab -e
```

And we set it to minute 0, hour 0, any day of the month, any month and any day of the week:

```
0 0 * * * /home/admin/backup/backup.sh
```

Done, our backup will take place every night.

28. So far, we haven't paid attention to properly **naming our clients and servers** by using a local domain. This is the scheme to be able to connect from clients to the server just by referring to *server* or *server.local.net* (note that # refers to the client number and X to the subnet number):



Be sure to remove `/etc/network/pre-up.d/postfix` and `/etc/network/post-down.d/postfix` files on the server, because they rewrite your *resolv.conf* file and we are not using Postfix. After these modifications, server and clients must be rebooted.

Final notes

- We have seen how to generate private a private keys with *ssh-keygen* so we **do not need to enter the password when accessing a remote server using SSH**. I summarizes the scheme here:
 - 1.1. At the **client** we generate the key (don't put any passphrase when asked, just hit enter):

```
$ ssh-keygen -t rsa -f id_rsa
```

You will get two files: *id_rsa* (the private key) and *id_rsa.pub* (the public key).

1.2. Put the public key on your server:

```
$ scp id_rsa admin@server:
```

Now put your private key in your *.ssh* directory (create it if it doesn't exist):

```
$ mkdir .ssh
$ mv id_rsa .ssh
$ chmod 0700 .ssh
$ chmod 0600 .ssh/id_rsa
```

1.3. Now, at the server add the public key to the list of authorized keys (again, create the *.ssh* directory if it doesn't exist):

```
$
$ cat id_rsa.pub >> .ssh/authorized_keys
$ chmod 0700 .ssh
$ chmod 0600 .ssh/authorized_keys
$ rm id_rsa.pub
```

1.4. We're ready, try to ssh from the client to the server and you should connect without being asked for a password.

Annex 6.2 Installing the client

1. Plug the machine
2. Switch the machine on with the Ubuntu Installation CD loaded into the drive
3. Install Ubuntu as usual, **without network configuration**, leaving three partitions:
 - Approx. 5 GB for / (primary, bootable, ext3, #1)
 - Approx. x2 the size of your memory, but $\leq$ 512 MB for SWAP (logical, swap, #5)
 - The rest for the /home directory (logical, ext3, #6)
4. Create an account for the **admin** user (password: *admin*). Only this user will be able to perform *sudo* operations
5. Once the system is installed, create an additional user:
 - *student/student* for educational networks
 - *user/user* for the rest

You can do that from the *System > Administration > Users and Groups* menu or manually from the shell as follows:

```
$ sudo adduser students
```

6. Edit your */etc/X11/xorg.conf* file and remove all resolutions higher than "1024x768", in this way we will be saving memory:

```
$ sudo gedit /etc/X11/xorg.conf
```

The section *Screen* should remain, for example, as follows:

```
Section "Screen"
    Identifier      "Default Screen"
    Device          "Intel Corporation 82852/855GM Integrated Graphics Device"
    Monitor         "Generic Monitor"
    DefaultDepth    24
    SubSection "Display"
        Depth       1
        Modes       "1024x768" "800x600" "640x480"
    EndSubSection
```

```

SubSection "Display"
    Depth        4
    Modes        "1024x768" "800x600" "640x480"
EndSubSection
SubSection "Display"
    Depth        8
    Modes        "1024x768" "800x600" "640x480"
EndSubSection
SubSection "Display"
    Depth        15
    Modes        "1024x768" "800x600" "640x480"
EndSubSection
SubSection "Display"
    Depth        16
    Modes        "1024x768" "800x600" "640x480"
EndSubSection
SubSection "Display"
    Depth        24
    Modes        "1024x768" "800x600" "640x480"
EndSubSection
EndSection

```

7. Edit the file `/etc/network/interfaces` to add following lines at the end:

```

iface eth0 unit dhcp
auto eth0

```

We can now activate the network and check it with the command:

```

$ sudo /etc/init.d/network restart
$ ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=0.056 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=0.044 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=64 time=0.034 ms

```

Press **CRTL+C** to abort pinging the server, it is clear that our network works!

8. Now we have to edit the APT server repository. Edit your `/etc/apt/sources.list` file, leave it with the CD repository (the first one) and add a new one:

```

deb http://192.168.1.1/apt-repository ./

```

Comment the rest with a leading '#'.

9. Update the APT database and upgrade your system with recent versions of software:

```

$ sudo apt-get update
$ sudo apt-get upgrade
$ sudo apt-get dist-upgrade

```

10. Create (or download) a custom `<location>.packages` file and put the software you want to install there, for instance:

```

$ cat > high-school.packages <<END
> gcompris
> wine
> stellarium
> octave
> kino
> gcalctool
> dia-gnome
> END

```

Install those packages:

```

$ sudo apt-get install `cat high-school.packages`

```

11. Everything should be ready, test the applications.
12. Create launchers for those not available (either through *Applications > System Tools > Applications Menu Editor* or by adding a launcher on the desktop via right-click mouse button)
13. Finally, clean the APT cache:

```
$ sudo apt-get clean
```

Your system is ready to be used!

Annex 7 List of useful applications tested on Ubuntu by Samuel Carrupt

-  [Office automation](#)
-  [Internet](#)
-  [Web developpement](#)
-  [Emulation](#)
-  [Graphics](#)
-  [Utilities](#)
-  [Multimedia](#)
-  [Programming](#)
-  [Games](#)
-  [Desktop](#)
-  [Server](#)
-  [Tele centers](#)
-  [Health centers](#)
-  [High Schools](#)
-  [Teachers](#)
-  [Tertiary schools](#)
-  [Database](#)
-  [Documentation](#)

For complete information: <http://www.geneve.ch/obstech/Activites/ConnectAfrica/appdoc/gvadoc/index.html>

Annex 8 References

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- **Ubuntu.** <http://ubuntulinux.org>
- **Ubuntu installation guide.** <http://archive.ubuntulinux.org/ubuntu/dists/breezy/main/installer-i386/current/doc/manual/en/index.html>
- **Debian Linux.** <http://debian.org>
- **The Linux Documentation Project.** <http://tldp.org>
- **OpenOffice.org.** <http://openoffice.org>
- **GNU Software.** <http://gnu.org>