

Gashora Girls Academy of Science and Technology

Executive Summary

Student Consultant, FangZheng Tian and Yunlu Cao

Community Partner, Peter Thorp

I. About the Organization

Gashora Girls Academy was founded by two American women, Suzanne Sinegal McGill and Shalisan L. Foster. It is an upper-secondary boarding school which is located in Gashora Sector. The mission of the school is as following:

“We believe access to education is the fundamental right for all and not just a privilege for those who can afford it. We support an environment of academic excellence, ensuring that graduates will become inspired young leaders filled with confidence, a love of learning and a sense of economic empowerment to strengthen their communities and foster Rwanda’s growth. We will develop a new model for investing in the education of girls in Rwanda”

II. Check status of all computers and install Deep Freeze in all Laptops

After the conversation with the ICT staff here, the student consultants agreed that all the laptops need to be wiped out to be in a good condition to install Deep Freeze. Also, the student consultants need to fix the laptops in the locker so that students can use more laptops. The reinstallation is successful. All laptops are reinstalled and their processing speed becomes faster than before. The student consultants also creates an excel file to store all the necessary information of laptops and a manual for the followers to maintain the laptops.

III. Implement FET free timetabling software and give training to the academic dean

Mr. Paulin is the Dean of Academic, and he is in charge of generating class schedules. Usually it occupies him a lot of time to come up with a perfect class schedule, and time conflicts will occur after school begins. Student consultants installed an online open source called FET free timetabling software to help him solve this problem. Student consultants has given Mr. Paulin several training sessions, which including how to input into the database and how to apply the constraints to the class schedule. A manual has been created by student consultants and has been gone through with Mr. Paulin. The software has also been backed up on the server.

IV. Figure out the problem of Easy Tomato and Network monitoring

The student consultants identify that Gashora Girls Academy would like to have an assessment of their bandwidth to ensure the maximum of utilization. The router in the lab

is ASUS RT-N16 and its NVRAM is 32KB. The bandwidth management software that school uses is Easy Tomato. Student consultants realized that the NVRAM of the router is only 5.9% free left after adding hundreds of MAC addresses, and the overused NVRAM may cause the unstable of the internet. Student consultants reset the router to get more free space. After the reset, the group information of MAC address had been deleted, and the internet got stable. Right now the free space of NVRAM is about 39%. Student consultants also enabled the quality of services function of Easy Tomato to monitor the bandwidth distribution. Since Easy Tomato is limited to the ASUS RT-N16 type router. Student consultants also researched two pieces of suitable bandwidth management software and made a comparison for school.

V. Recommendation: NewGenLib open source for school library system

There are about 900 books in Gashora Girls Academy, and student librarians use a notebook to record check-in and check-out. It is difficult and inefficient to track the overdue items. Student consultants recommend the open source called NewGenLib for school to solve this problem. NewGenLib has several functional modules, such as cataloging books, managing the check-in and check-out, recalling overdue items and generating reports. Student consultants have installed the software and the database for Gashora Girls Academy and given a short training session to the teacher librarian. All the installing files have been backed up on the server.

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Gashora Girls Academy of Science and Technology

Final Consulting Report

Student Consultant, FangZheng Tian and Yunlu Cao

Community Partner, Peter Thorp

I. About the Organization

Organization

Rwanda Girls Initiative is founded by Suzanne Sinegal McGill and Shalisan L. Foster. The initial reason is that they think every child no matter where he or she was born should have the right to be educated. In a trip to Africa, the two women were astonished by the barriers that stood between young students and their education.¹ They are convinced that building a school in Africa can really make huge differences to this area. After much research and many visits, finally they chose Rwanda with which they could effectively partner. They were determined to develop a different educational model, which focused on partnerships and strong connections to the local community. The first project of Rwanda Girls Initiative is building Gashora Girls Academy. The founders hope that Gashora Girls Academy will serve as a replicable model for educating girls and developing the country.

Gashora Girls Academy of Science and Technology is an upper-secondary boarding school which is located in Gashora Sector, Bugesera District of Eastern Province in Rwanda. It is also the first project of Rwanda Girls Initiative. The school opened in February 2011 with 90 students. Now there are 268 students in three grades, which are senior 4, senior 5 and senior 6. Girls at school are provided with housing and meals and access to healthcare. The academy focuses on science and technology.

Both founders have passion for children's and women's issues and believe education can make a difference in the lives of girls. The vision for students in Gashora Girls Academy is that *they will graduate as inspired young leaders filled with confidence, a love of learning, and a sense of economic empowerment to strengthen their communities and foster Rwanda's growth.*

Republic of Rwanda is a sovereign country in central and east Africa. It suffered a massive genocide in 1994, which took the lives of millions people. These years Rwanda has made significant progress on stability. Rwanda government pays a lot of attention on women and their education since half percent of the population are women. President Kagame believes that Rwanda cannot meet its development goals without women's participation. The Rwandan government also provides free education in state-run schools for nine years, and plans to extend the free education to the three final secondary years since there are still many poor children who fail to attend to schools.²

¹ http://www.rwandagirlsinitiative.org/ABOUT_US/story

² <http://www.microsoft.com/casestudies/Windows-Multipoint-Server-2011/Gashora-Girls-Academy/Rwandan-Girls-Academy-Models-Cost-EffectiveTechnology-Solution-for-Future-Schools/4000010078>

Facilities

Gashora Girls Academy overlooks Lake Milayi. It covers about 30 acres. There are student dormitories, staff and volunteer dormitories, one dining hall, three science lab, two computer labs, classrooms, one library within a classroom, one art/mixed media center, sports fields, and vegetable fields on campus. School also supports a community center for the village of Gashora. The community center is usually used for educational seminars and community gatherings.

There are 36 PCs in computer lab, and 29 laptops in another computer lab. 6 PCs in computer lab is not in use. 15 Dell laptops and 6 Gateway laptops are assigned to teachers and staff for administration and academy purpose.

There are 136 one laptop per child (OLPC) computers donated to Gashora Girls Academy. All of these OLPC computers are in good conditions right now. Students are only scheduled to use these computers during limited time on Sunday. Each OLPC computer has its primary key number, which is corresponding to the student's bed number. The OLPC computers are stored in one of the computer lab. Student ICT (Information, Communication and Technology) monitors are responsible for managing and lending them.

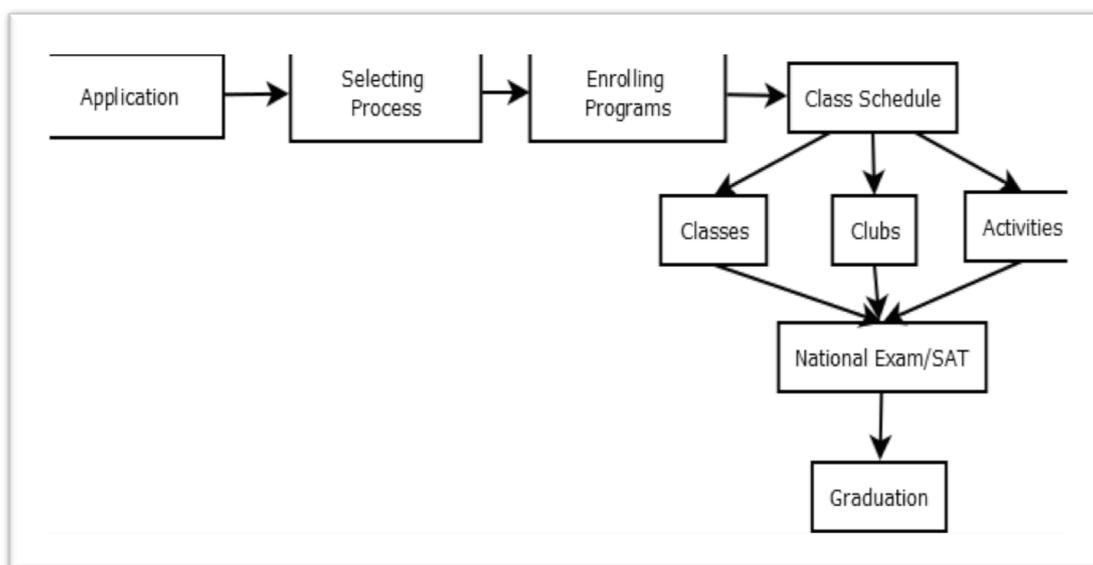
There is no independent library room for Gashora Girls Academy, and the only one library is at one corner of the English classroom. All the borrowing and returning are kept in paperwork by student librarian. There is no searchable catalogue for books, so it is hard to find books when students need to. Since all the books are in an open classroom, losing books becomes possible. There are about 700 books recorded in the library, but school loses about 20 books per semester.

Electricity is available in every classroom and office. Since the voltage is not stable here, school has voltage regulators installed in two computer labs.

Programs

Education background in Rwanda: The government of Rwanda is less corrupt and gives more support to schools compared to other countries in Africa. Children in Rwanda first need to take six years of primary school. After the primary school they have to take the first national exam and then they take three years of secondary school. After the three years secondary school they take another national exam and then take another three years of secondary school which what Gashora Girls Academy teaches. Finally students will take a final national exam and then go to college.

The whole process of Gashora Girls Academy is as follows:



Each year, the school has nearly 300 applicants and only 90 of them will be accepted by Gashora Girls Academy. The school really wants to give education to girls who are dedicated to continue their education regardless of their background and financial situation. Only 20% of the students pay the full tuition and the other 80% students have scholarship. The school is supposed to be a model to all the schools in Rwanda and the current headmaster, Peter Thorp, who is an American, wants to add the American values of critical thinking and creativity into the culture of the school. This year is the first year that students in Gashora Girls Academy will take the national exam and people have high hopes about the school. Some girls will go abroad to finish their education instead of studying in local universities.

For all the students in school, they have to take English, General Paper and Entrepreneurship. The school offers different subjects for the students. Students pick three different subjects as the subject combination. According to what the students pick, the school has eight combinations.

- Physics Chemistry Biology (PCB),
- Physics Chemistry Math (PCM),
- Computer Economics Math (CEM),
- Math Economics Geography (MEG),
- Math Physics Geography (MPG),
- Math Physics Computer (MPC),
- Math Chemistry Biology (MCB),
- Physics Economics Math (PEM), only one student.

Actually, not all the students can choose whatever they want to learn. For instance, only students who do well in the national exam can choose PCB as their major. These combinations in some extent also decide the future career of the students. For example, if a student chooses PCB as her major subjects, she probably becomes a doctor in the future. In each grade, there are 10 to 20 students who are learning computer courses.

Except these programs, school also has volunteers who tutor SAT and TOEFL for those who want to study abroad.

Gashora Girls Academy also has different kinds of clubs for students to participate in every week. They have Debate club, young women club, English club, Entrepreneurship club, sports club, art club, fashion club and traditional dance club to join based on their interests.

Staff

Most of the board of directors comes from United States, and they provide money raising support and technology support for Gashora Girls Academy

Suzanne Sinegal McGill is the president and co-founder at Gashora Girls Academy. She is from Seattle, Washington state of the United States. She works as the liaison for Costco Wholesale, with the non-profit communities in schools program and serves as an advisor to the Sinegal Family Foundation.

Shalisan L. Foster is the vice president, treasurer and co-founder at Gashora Girls Academy. She worked in the finance industry, and currently serves as a Trustee for The Foster Foundation. She lives in Seattle, WA.

Linda Myhrvold is the secretary of Gashora Girls Academy. She graduated from University of Washington, and currently serves on the board of trustees for St. Thomas school in Medina, WA, the Foundation Board at Seattle Children's and the Islandwood Board. She lives in Seattle, WA.

Kimberly Mecham is the technical advisor of Gashora Girls Academy. Kimberly was a senior IT Product Manager at Microsoft. She is a co-founder and past-president of the We Believe Guild. She also lives in Seattle, WA.

The school's teachers and staff come from both insides and outsides of Rwanda. There are 26 teachers and staff at school, including 2 teaching interns and 3 teaching volunteers.

Peter Thorp is the head of Gashora Girls Academy. He is experienced in teaching and education. He served as the Interim CEO of the California Charter Schools Association and the Chief of Staff for CCSA. Now Mr. Thorp also teaches Entrepreneurship at Gashora Girls Academy.

Alain Munyaburanga is the vice head of Gashora Girls Academy. He is also to be the next head of school.

Amy Thorp is the associate director of university counseling. She manages all the student information, and specifically in charge of the U.S. University consulting.

Paulin Ndahayo is the academic dean of Gashora Girls Academy. He is from Rwanda. He is mainly in charge of the administration of teachers and management of class schedule. He also teaches English at school.

Alaine Uwambaye is the accountant of Gashora Girls Academy. She is from D.R.Congo, and moves to Rwanda after the genocide. Alaine lives in Kigali.

Lyla Fujiwara is graduated from Brown University. Currently she is the information computer technology teacher and technical staff at Gashora Girls Academy, and she is also a volunteer from Peace Corps. She is from Rochester, NY.

Jennie McCulloch is an English teacher at Gashora Girls Academy, and she is also in charge of school library. She taught exchange and teaching program in Japan two years ago. She is from Seattle, WA.

Ms. Amy Thorp manages student information by paperwork. Right now Gashora Girls Academy doesn't have an effective student information database.

Mr. Paulin Ndahayo manages all the information and teachers, staff and volunteers. He also keeps records of students' academy and organizes class schedules for school. He use Microsoft Excel to make class schedules, but usually time conflicts will occur after school begins. It sometimes costs the whole holiday for him to make class schedules. Mr. Paulin puts school meeting and activities on Google calendar so that every teacher can see it. Moreover, Mr. Paulin uses printed teaching evaluation form to record the performance of every teacher. He attends different class each week, and has evaluation at the end of every class. For each evaluation, the teacher gets one form, he keeps one, and another one is given to Rwanda Education Institution.

All the teachers at Gashora Girls Academy are assigned laptops or they use their own laptops. Teachers use Microsoft Word to plan lessons and write Exams, and also Microsoft PowerPoint to make handouts. Teachers are required to input student grades into a web based student information system called SchoolTool, which is an open source written in Python using the Zope 3 framework. Ms. Lyla Fujiwara is making some customized changes on SchoolTool, so she is also in charge of telling teachers and staff how to upload and download grades and reports from SchoolTool. A few month ago, students are introduced to use Dropbox, which is a cloud storage file hosting service operated by Dropbox, Inc., to submit their assignments. It is much easier for teachers to mark the assignments, but the assignments can be revised or deleted by others.

Some volunteers on campus provide English consulting service to students who plan to study abroad, such as TOEFL and SAT. They all have their own laptops. They use it for Internet and Microsoft Office applications.

Technology Infrastructure

School deploys Windows MultiPoint Server 2011 in its PC lab. It allows multiple users to share one computer simultaneously, each with their own independent experience.

Gashora Girls Academy Computer Infrastructure: (see Excel attachment)

Technology Management

Lyla Fujiwara has been in Gashora Girls Academy for six month. She is a volunteer from Peace Corp. She teaches basic computer knowledge for senior 4 students and programming languages for senior 5 and senior 6 students. Lyla is in charge of all the technology infrastructure and network at school. If there is a technology problem that she can't solve, Lyla will contact the person, who is an IT consultant setting up all the antennas for Gashora Girls Academy, of Rock Global in Kigali. Every time it will cost \$500 for the person coming to solve the problem.

Since it is too difficult for Lyla to handle everything herself, she sets up a group of students called "Technical Masters" to help her manage the computer labs. These students are divided into three groups, responsible for teaching, equipment maintenance and

troubleshooting. Student monitors will record each technical problem, and share it on a Google doc, so that Lyla can give solutions to the problems.

Lyla now is building up SchoolTool. She is trying to set up a student database system for school to efficiently manage student information and academy records. SchoolTool has been used to record grades and generate academic reports for two months, but student database hasn't been ready to use yet.

The update of software is done on an ad-hoc basis. Lyla will update and install software as needed. The virus definitions of most computers have been put on automatic settings. No backups are occurring for both students and staff computers.

Technology Planning

Now the school does not have any plans to buy more laptops for the education of the students, since all the infrastructures are sponsored by Kimberly, who is a board member and in charge of all the technical issues of the school. The leadership's expectation is to maximize the use of the current technology infrastructure.

Gashora Girls Academy is sponsored 136 One Laptop per Child (OLPC) laptops. Thus every two girls can have one laptop to use. However, because of the limited bandwidth of the school, students can only use these laptops to surf the internet and to listen to some music on Sunday. Next, the school plans to extend the use of all the OLPC laptops.

Lyla Fujiwara, who is a volunteer and a computer teacher here, programmed a roll call system to let the monitors take serious responsibility for their jobs. The monitors need to be in the computer lab and laptop lab when she is on duty. But sometimes monitors do not get to the lab on time or leave the labs when they are still on duty. This system can record the time they arrived there and give points to each monitor. However, although this system worked well when running on the virtual machine, it cannot work on the real server. Lyla plans to solve this problem and get the system ready to use soon.

The leadership of Gashora Girls Academy also expects to open an IT club for senior 5 students to better apply their programming knowledge to real life. Some projects are expected to come up to motivate these girls to learn programming language.

Internal Communication

Email is the official primary choice for communication here in Gashora Girls Academy. Since every teachers and staff here has laptop and get access to the internet. Every two weeks there is one staff meeting, some important decisions and announcements will be made in the meeting. School will also put important dates and activities on Google Calendar.

All staff use cellphones to communicate with each other. Mr. Paulin, Dean of Academy will send out group messages to staff when something emergency happen.

The administration office will regularly have a Skype meeting with board of directors and technology advisor in Seattle, WA. They also use email to contact people in Seattle.

Information Management

Now Gashora Girls Academy use paper documents to keep the information of students. The sample student document includes the application form of the student, grade reports from the previous school, the printed mark table of each term, medical form, national exam results, pregnancy test results and other important files. The school keeps the documents in the document cabinet. Sometimes there are mistakes such as the students' names are spelled wrongly or the files put into the wrong file envelope. Since the school has just been two and a half years and there are no graduated students, the school has not faced the issue of how to deal with the documents of the graduated students. Probably the school will archive all the documents of graduated students in the future. There is one barrier for the school to digitalize all the documents and create a database of the students. It is that some files need to be the original copy. The scanned copy does not have the power of the original one. Thus, currently Gashora Girls Academy need to keep the information using paper files. But the school now is trying to keep all the marks by using SchoolTool.

SchoolTool is open source software and is a student information system for schools.

The features of SchoolTool:

- Student and staff demographics and personal data
- Gradebooks
- Assignment submission
- Class attendance and participation
- School Calendars
- Track progress

As open source software, SchoolTool can be customized into applications for individual schools.

Business Systems

Alaine Uwambaye is the person directly in charge of school accounting and payroll. Alaine has been to Gashora Girls Academy since the school was founded. She uses Microsoft Excel to record and report the task to her supervisor Tassie Medlin. Then Tassie will book the numbers and record accounting information into system using Quickbook. Since Tassie Medlin is in Seattle, WA, Alaine will choose Email and Skype to communicate with Tassie. Alaine also lives off campus in Kigali, so she will come to school once or twice per week.

II. Task 1: Check status of all computers and install Deep Freeze in all Laptops

After one computer teacher quit her job and left school. The student consultants found out that the ICT staff, Ms. Lyla Fujiwara does not know the information of local administrator accounts of all laptops. She needs to know this information in case of installing new educational software in the computers. Moreover, there were more than 10 laptops in the locker. All these laptops have some problems which prevented them to be used but half of them can be fixed by reinstall the operating system into them. Now there are only 29 laptops in the laptop lab and 30 computers in the computer lab. And the school has 268 students. If the student consultants can fix some laptops, more students can use computers. If the student consultants can standardize and make manuals of the process of installation,

it will be easier for the ICT staff to configure the laptops donated to the school in the future. Also, the student consultants discovered that the processing speed of laptops in the lab was really slow because the laptops generated amounts of trash files when students used them and no one cleared these files. Ms. Lyla Fujiwara told the student consultants that someone donated a piece of software called Deep Freeze to the school but she had no time to install it in all laptops. In the official guide book of Deep Freeze, it describes the function of this software: “Deep Freeze helps eliminate computer damage and downtime by making computer configurations indestructible. Once Deep Freeze is installed in a computer, any changes made to the computer are never permanent.” After trying this software on one laptop, it showed great help because anything which the user did with the laptops was deleted after logging off. It means that even though students download something with virus in it, the laptops will not be affected. Deep Freeze also has a control console which can be installed in the server and the console can control all the laptops.

In preparation for reinstalling all laptops, the student consultants first gathered information of all the software which the students need. Then the student consultants downloaded the software as well as window 7 and office suite. After that, the student consultants tried the reinstallation in one laptop and made sure that there was no problem when students use this laptop.

After all the preparation was finished, the student consultants started checking the status of all the computers in the lab and in the locker. There are total 40 laptops and 6 computer pods, each has 6 computers. The student consultants checked and documented the status of each laptop. When reinstalling all laptops, the student consultants made an excel file to store the information of all laptops. The information include the name of the laptop, the local user name and password of the laptop, the password of Deep Freeze, current location of the laptop, brand name and other detailed information (see attachment to find the excel file). Before the reinstallation, the student consultants found that many Dell laptops were not used by students. The Dell laptops are older than the Gateway laptops so that the processing speed of these laptops is much slower. After the student consultants finished the reinstallation, they found that all the laptops were used by students.

Because Ms. Lyla Fujiwara will finish her voluntary job in half a year, the student consultants talked to her about the maintenance of all the laptops and make sure that the future ICT staff will get all the documents the student consultants made (see Appendix A). In case any emergency happens, the student consultants also left the copies of all the software and documents to the headmaster and in the server.

III. Task 2: Implement FET free timetabling software and give training to the academic dean

Class schedule generation is a headache problem to Mr. Paulin Ndahayo, who is in charge of generating class schedule for students every semester. Gashora Girls Academy applies A/B different schedules for students every the other week. Students take the same class in a group which depends on their subject combinations. Mr. Paulin is the Dean of Academic, and he also teaches some Senior 4 English classes. The class schedule generation occupies him a lot of time by his mind and hand. However, the class schedule that he comes up with is not always the perfect one. Time conflicts will still occur after school begins and class schedule is being used. So he has a high expectation if student consultants could help him solve this problem.

To help Mr. Paulin be more effective on class schedule generation, student consultants found an online open source called FET free timetabling software to solve this problem. It is platform independent implementation, allowing running on Windows. The size is 7.5 MB. The algorithm is fully automatic generation, but also allowing semi-automatic or manual allocation. The resulted timetables will be exported into HTML, XML and CSV formats. There is also some limitations that user can set up for the algorithm.

The software sets the maximum total number of teachers is 6000, and the maximum total number of students is 30000. Compared to the number of students and teachers that student consultants are given before, the software is suitable and sustainable for Gashora Girls Academy even the school has enrollment expansion plans in the future. The interface of the software is easy to understand and use. User needs to enter the following information firstly:

- Time period
- Teacher's name
- Students will be divided into different groups to take classes, the number of students needs to be recorded
- Activity information including teacher, split time period, student groups, subject, and percentage of confidence to apply the constraints
- Room information

Different constraints then are set up according to actual operation. There is virtually unlimited number of time constraints and space constraints can be applied by users.

Student consultants arranged three training session with Mr. Paulin. The main contents of each session were as follows:

- Install the software and give a tour of the software
- How to insert student, teacher and room information into system
- How to add constrains to the class schedules

User manual has been created by student consultants after these training sessions. The manual is specifically designed for Gashora Girls Academy. Student consultants explained in detail the constraints that were the most useful to Gashora in the manual (see Appendix B).

After these helpful training sessions, Mr. Paulin can use FET to generate the class schedule by himself. He is very satisfied with the outcome. Student consultants help him save precious time and improve his efficiency obviously. He says he definitely will use this software to create class schedule and exam schedule in the future.

Student consultants also put the installing files and manuals on the server to back up.

IV. Task 3: Figure out the problem of Easy Tomato and Network monitoring

The student consultants identify that Gashora Girls Academy would like to have an assessment of their bandwidth to ensure the maximum of utilization. The router in the lab is ASUS RT-N16. The CPU frequency of the system is 480MHz, and the NVRAM is 32KB. The bandwidth management software that school uses is Easy Tomato. Easy Tomato has several useful functions, such as blocking specific websites and adult content,

applying rules selectively to a group of devices, applying block rules by time and day of the week, and monitoring bandwidth.

Ms. Lyla tried to group the MAC addresses of all the users and applied block rules by schedules to limit the access of students to some social websites. The problem she faced was that the whole internet would shut down if too many MAC addresses were entered into the system. After getting familiar with the Easy Tomato software, student consultants realized that the NVRAM of the router is only 5.9% free left, and the overused NVRAM may cause the unstable of the internet. Student consultants also tried to apply another method that modifying the settings of group policy to make some group users unable to get access to those social websites, but this idea didn't meet client's requirements. Ms. Lyla expects to schedule a timetable for students to get access to the social websites, which means students are not allowed to get access to some social websites at scheduled time on weekdays but are allowed to anytime on weekends.

To fix the NVRAM problem, student consultants reset the router to get more free space. After the reset, the group information of MAC address had been deleted, and the internet got stable. Right now the free space of NVRAM is about 39%. Student consultants also enabled the quality of services function of Easy Tomato, and came to the following conclusions based on the distribution of bandwidth (see Appendix C). The Media and WWW takes up almost 50% of bandwidth space in the afternoon, and it will take up to over 80% of bandwidth at night. The P2P/Bulk and FileXfer also takes up some space of the bandwidth. P2P refers to peer-to-peer network. Applications of P2P are such as P2PTV and Skype. FileXfer means file exchange.

Also, from the bandwidth monitoring, student consultants realized that the average received traffic (download speed) was 325KB/s and the average transmitted traffic (upload speed) was 60 KB/s, which indicates the actual average speed of downloading is close to 3Mbps. Since the computer teacher just resigned without documents left, the bandwidth that school pays for becomes unknown.

Although Easy Tomato has several useful functions on bandwidth management, it is limited to the ASUS RT-N16 type router. Student consultants researched two pieces of suitable bandwidth management software and compared the major features as following:

	Paessler Router Traffic Grapher (PRTG)	Spiceworks
System Requirements	1) PC, sever or virtual machine with roughly the CPU performance of an average PC built in the year 2007 or better and minimum 1024 MB RAM memory 2) Microsoft Windows XP or later(32 or 64 bit) 3) Web browser Google Chrome 27 or later, Firefox 21 or later, IE9 or 10 to access the web interface	OS: Win7/XP Professional SP2+/Vista/2003 Server SP1+/server Hardware: 1.5 GHz Pentium 4 Class Processor/2.0 GB RAM
Bandwidth Monitoring Features	Auto Discovery of sensors or manual sensor setup	Network management software gives user a full scan of the network devices, from workstations and servers to router and printers
	More than 170 sensor types covering all aspects of network monitoring	Tracking software licenses
	Bandwidth monitoring using SNMP, WMI, NetFlow, sFlow, jFlow, Packet Sniffing	User standard protocols including WMI, SNMP and SSH to gather accurate device information
	QoS monitoring	Quickly generate custom, snazzy-looking reports on all the network assets
	Alerts user before emergencies occur	Take full control of system inventory scans
		Set multiple IP ranges with custom schedules
Price	Freeware (limited to 10 Sensors)	Free!
Website	http://www.paessler.com/	http://www.spiceworks.com/

If school has budget to purchase a new router or get donated by other organizations in the future, student consultants recommend the above software to be considered for network monitoring.

V. Recommendation: NewGenLib open source for school library system

Right now there are about 900 books in Gashora Girls Academy, and the library may be expanded in the future. Most of the books are donated from U.S. The library is located in one of the English classrooms, and there is one notebook there to record check-in and check-out (see Appendix D). Student consultants meet Ms. Jennie several times. She is the

person who is in charge of the library in Gashora. She has a strong desire to apply information system to manage school library. Student consultants got the facts that school library has an Excel based library catalog. This database records the name of the book, author/publisher, genre, tracking number and title repeats. There is no relation between this library catalog and the notebook that student librarians are using to keep track of check-in and check-out. It is too hard for student librarians to well manage the whole library by paperwork, so the library will lose about 20 books every year,

To meet the expectation of Ms. Jennie, student consultant recommend implementing open source software called NewGenLib (NGL) to help school effectively manage the library. NGL is an outcome of collaboration between Verus and Kesavan Institute of Information and Knowledge management. It developed and maintained by Verus Solution, and Kesavan Institute has provided the domain expertise. According to the real situation of Gashora Girls Academy, NGL has four useful functional modules, and they are technical processing (cataloging), circulation, web OPAC and reports. These functional modules are completely web-based, using Java Web Start™ Technology.

Brief Introduction of the NGL functional modules:

Technical Processing— Librarians can catalog books, journals, book chapters, journal articles, maps and search catalog.

Circulation — Librarians can check in and check out items, reserve items, recall items on loan or renew items on loan.

Web OPAC — Students can reserve, cancel reservations and renew items online. Students can also suggest their interested books online. The list of new arrivals will also be shown online.

Reports — The software can help librarians generate reports, such as patron list, item reported lost, daily circulation translation, overdue material etc.

Student consultants choose PostgreSQL as the database server. The client PCs for library staff to use require to install JAVA Plug in. Student consultants have already helped download and install the software for school. The minimum hardware requirements of the server are Pentium 4 or equivalent, 1 GB RAM and 40 GB Hard disk. The minimum software requirements of the server are Windows 2000 Professional, 2000 Adv Server, XP Home, XP Professional, and 2003 server. The laptop that student consultants choose to install the software meets the minimum requirements of both hardware and software. The library catalog Excel has been migrated to NewGenLib database. The database is recommended to be backed up regularly.

Student consultants recommend the laptop that have been installed the NGL software to be set in the library. Student librarians can process check-in and check-out by the laptop. Teacher librarians can go through daily transactions by generating reports. Overdue books can be tracked and recalled back in time to reduce the probability of loss.

Student consultants also informed Ms. Jennie the contact information of Verus Solution, who is in charge of providing free technical help to organizations using NewGenLib. The contact email of Verus Solution is atyourservice@verussolutions.biz, and they usually will reply emails in one business day.

Appendix A: Manual for laptops

How to unfrozen/frozen the laptop

- 1) Ctrl + Shift + Alt + F6 to call the control window.
- 2) Enter the password.
- 3) Choose thawed/frozen.
- 4) Restart the laptop.
- 5) Once the restart process is done, the laptop is unfrozen or frozen.

****Before the restart, the laptop is still frozen and any change before the restart will be lost.**

How to uninstall Deepfreeze

- 1) Unfrozen computer.
- 2) Use the original installation program (for workstation, not for server) to uninstall both Deepfreeze and the seed for the console.
- 3) Run DFWksSeed.exe.
- 4) Choose uninstall to uninstall Deepfreeze Seed. The system may restarts automatically.
- 5) Run DFWks.exe to uninstall Deepfreeze. The system may restarts automatically.

How to enter the local user account of the laptop

- 1) Log off the current account.
- 2) Click “Switch User” button.
- 3) Enter “GGAxxx\GGAxxx” in the user name area, you can find the local domain name and user name in the excel file “laptop”.
- 4) Enter password.
- 5) Press “Enter” key.

****All local username and password you can find in the excel sheet.**

How to deal with the “no logon server” message

- 1) Log into the local account of the laptop, you can find the username and pass word in the excel sheet.
- 2) Press “Fn + F2” to close wifi function. You may try several times to close it successfully.
- 3) Wait a few minutes.
- 4) Press “Fn + F2” again to start wifi function.
- 5) Try to connect to internet again. You may try several times.

****I only found this problem in some Gateway laptops and I indicate this in the excel sheet using “Network connection problem”. Another solution is just to try to wait 5 minutes before you log in. This problem is caused by aging or low quality network card of the laptops. Or you can try to upgrade the antenna so that the wifi signal is stronger in the lab.**

How to reinstall the windows 7

- 1) Restart laptop. When the first screen with the brand name shows, quickly press F12 to go into boot option.
- 2) Insert installation disc of Win 7.
- 3) Choose boot from DVD.
- 4) Wait until the screen shows a line “Press any key to boot from DVD”. I usually press Enter key.
- 5) Wait a couple of minutes to get into the setup program.
- 6) Choose language and region. Click “Next”.
- 7) Accept the agreement. Click “Next”.
- 8) Click “Install”.
- 9) Choose “Custom”.
- 10) Format all the partitions. This will let you lose all the documents in the laptop. Or you can choose only format Partition C which has the Win 7.
- 11) Click Next to reinstall the laptop.

**During the installation the system may starts several times. Do not press any key when restarts. Just wait until you see the screen which lets you input the local user name and password.

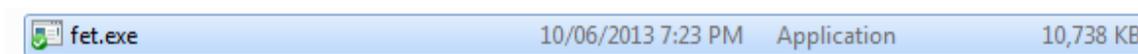
Other things you should pay attention to

- 1) The validation of the anti-virus software, Avast, is 1 year. I used registerlaptop@gashoragirlsacademy.org to register for all the laptops. You need to remember to extend the validation after one year.
- 2) The BrowsingHistory software is in the documents folder of local user.

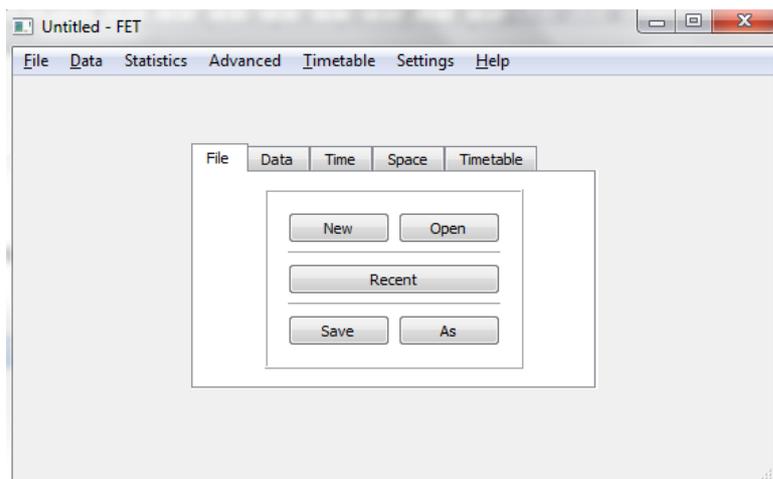
Appendix B: FET timetabling software manual

Extract file `fet-5.19.3.exe` to folder `fet-5.19.3`

Open application `fet.exe`



FET User Interface:



1) Data tab:

Basic:

- a) Institution information
 - a. Institution name → Type in institution name: Gashora Girls Academy
 - b. Comments → Any comments will be shown on the timetable
- b) Days and hours
 - a. Days per week
 - b. Hours (Periods) per day → Type in time periods, such as 9:00—10:20

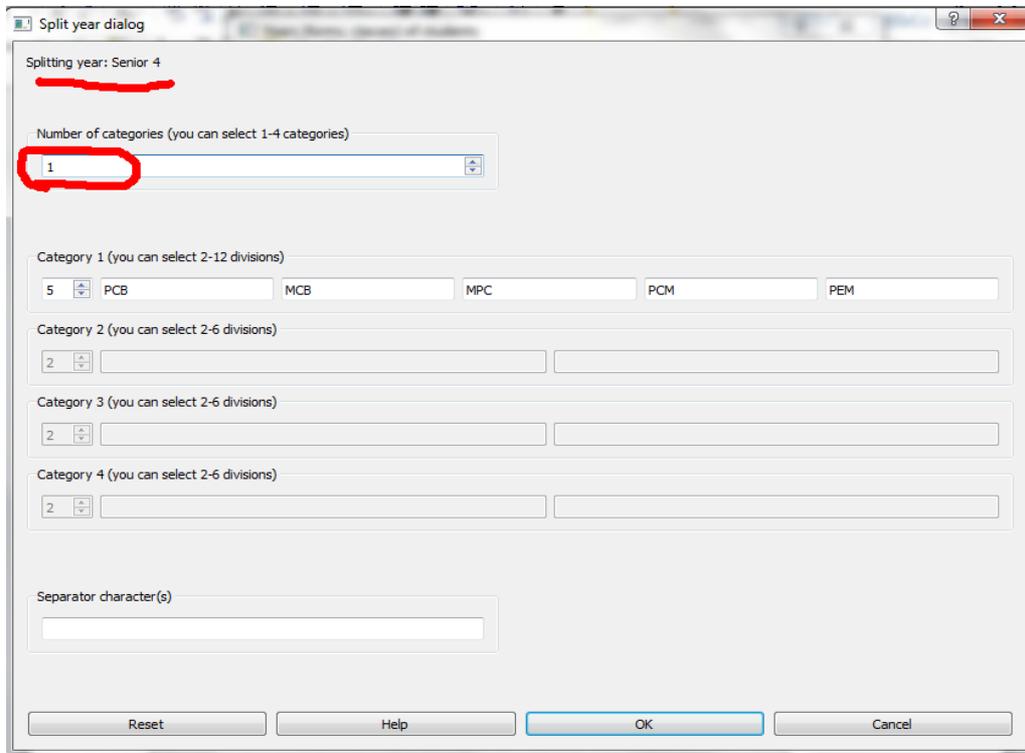
Teachers:

- a) Add → Add the name of a teacher
- b) Rename → Rename selected teacher
- c) Sort → Sort the order of teacher by alphabet
- d) Remove → Remove selected teacher

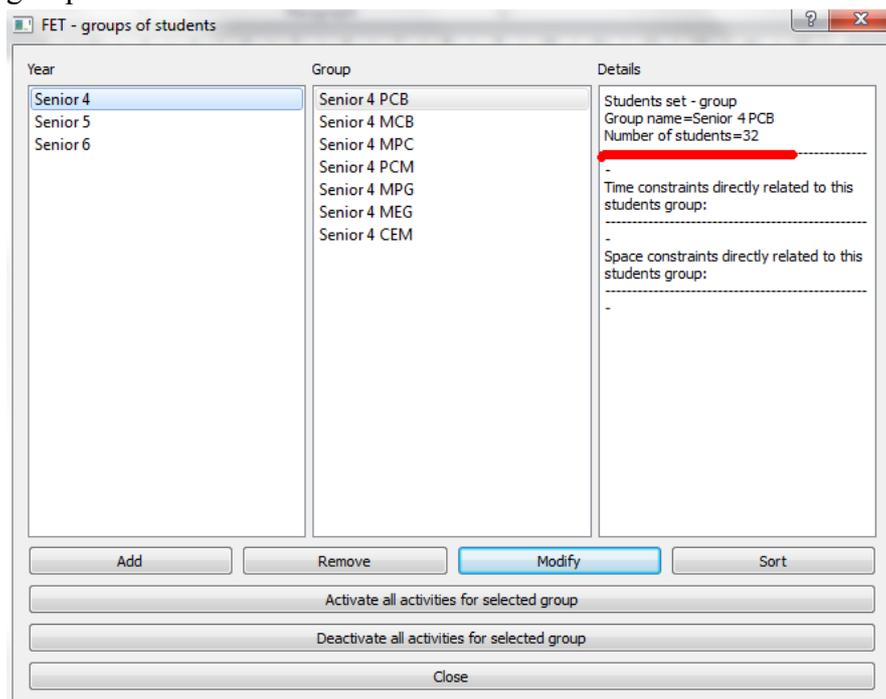
Students:

- a) Year(forms, classes)
 - a. Add → Add Senior 4, Senior 5, and Senior 6
 - b. Remove

- c. Modify → Here you can change the name of Year category, and the number of students
- d. Sort
- e. Divide year by selecting categories → Separate students into group here, split it for each year



- b) Groups → Here check the groups that you divided in the last step, double click on each group, and you can change the number of students in each group



c) Subgroups

Subjects:

- a) Add
- b) Rename
- c) Remove
- d) Sort

Caution: Only need to add the general title of subject, such as English, not English101, English 102....

Tags:

- a) Activity tag is an optional information to an activity, such as lecture, exercises, laboratory, or morning
- b) Work with subjects together under Space tab to set constraints.
 - Such as “An activity tag has a preferred room”

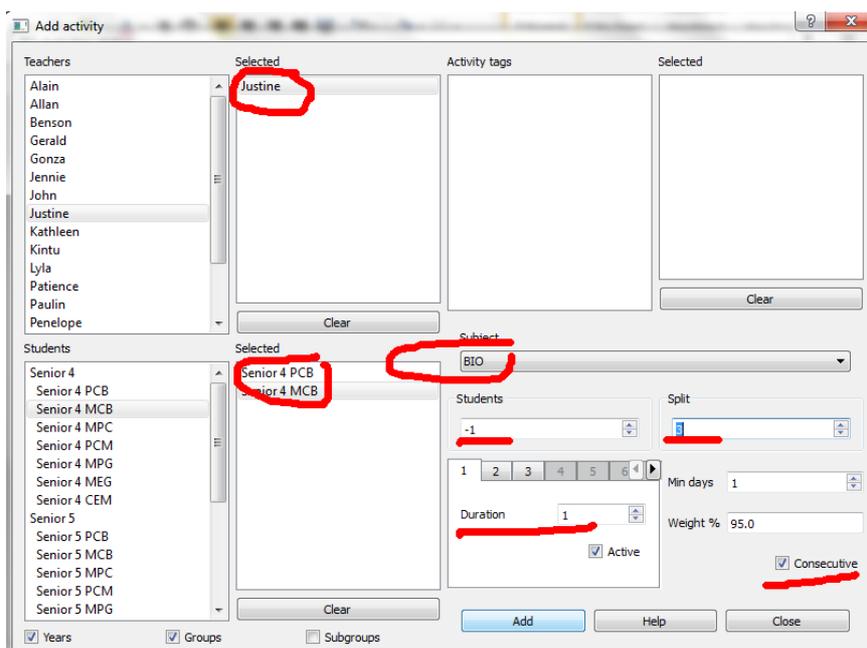
Space:

- a) Buildings: You can add, modify, sort and remove the name of buildings
- b) Rooms: Add and modify the capacity of each room

Caution: The capacity of each room should be big enough to carry the students for different combination

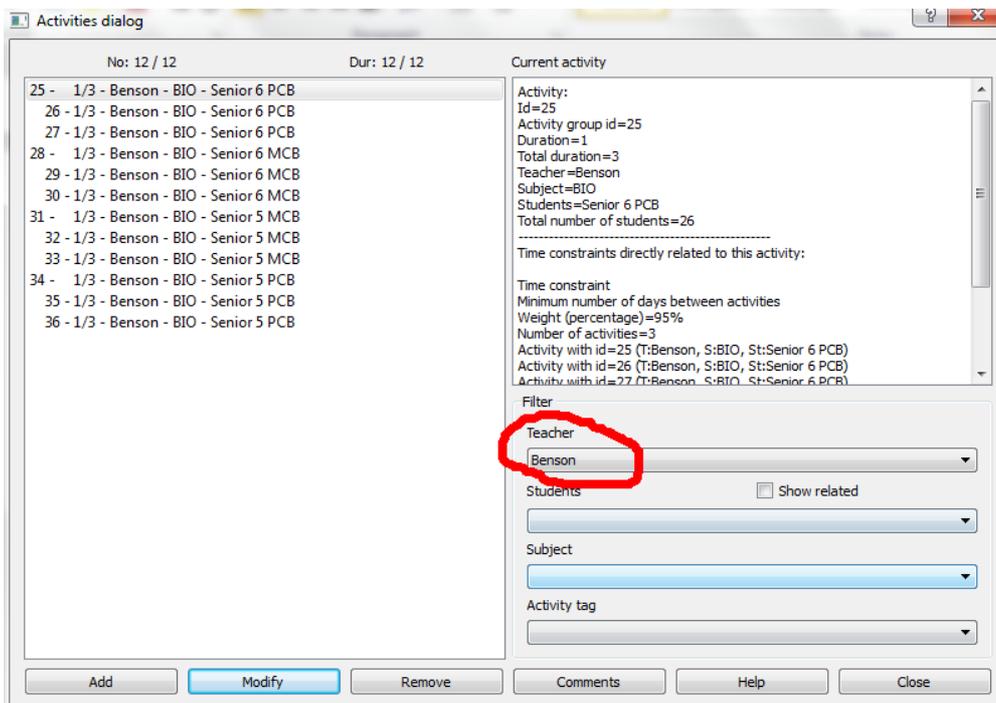
Activities :(=class)

- a) Click on “Activities”, then on “Add” in the new window that opens, Your screen will now look similar to the screen below:



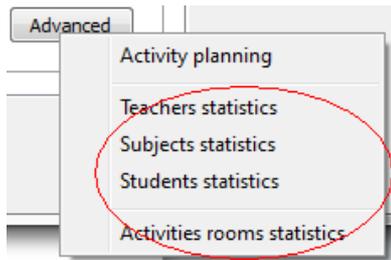
- b) Double click to add a teacher, and the teacher will appear in the “selected” box.
- c) Select a subject from the drop-down list
- d) Double click a group from “students” box.
- e) Number of students: **leave -1**. -1 here means automatically calculate the number of students
- f) Split: means split into n activities per week. If you want to split the course into three times per week, select 3 from the drop-down list.
- g) Min days: means the minimum required distance in days between each pair of activities.(Usually leave 1 here)
- h) Duration: 1 duration means the duration that you set up at the very beginning under “basic”
- i) Consecutive: means if activities on the same day, force consecutive?

---if you want to check the activities that you added for each teacher/each student/subject, on the screen below: (use the drop-down list)



Advanced:

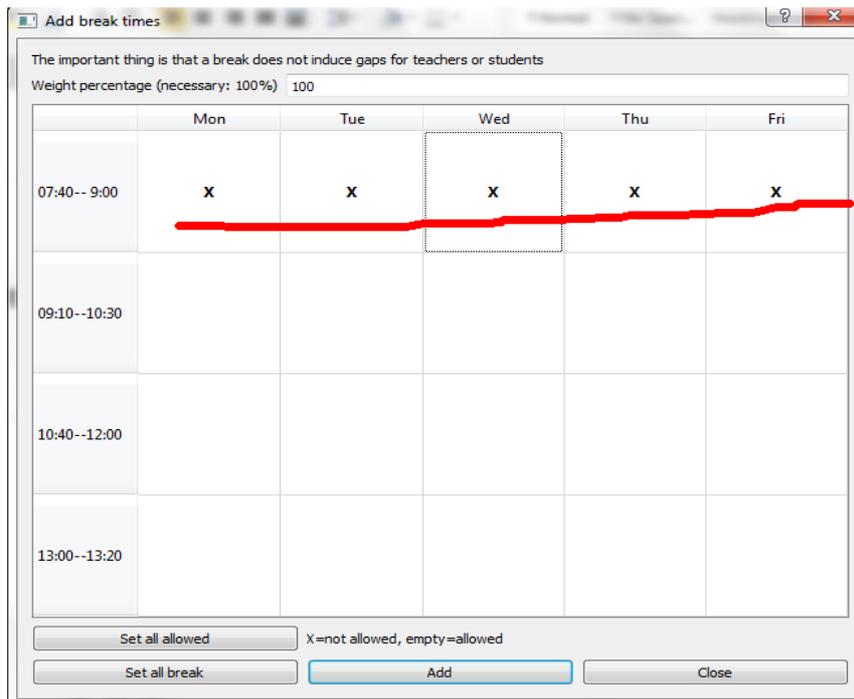
Check [students statistics](#)/[teachers statistics](#)/[subjects statistics](#), such as the number of activities for each teacher per week and the total duration per week.



2) Time tab: (constraints)

Break:

a) Click on “Add”, the screen below shows up:



Just sing click the table, it will become “X”. The “X” time period will become the break time on the final time table.

Teachers:

--- Click on “teachers”, **21 constraints** will show up to set up.

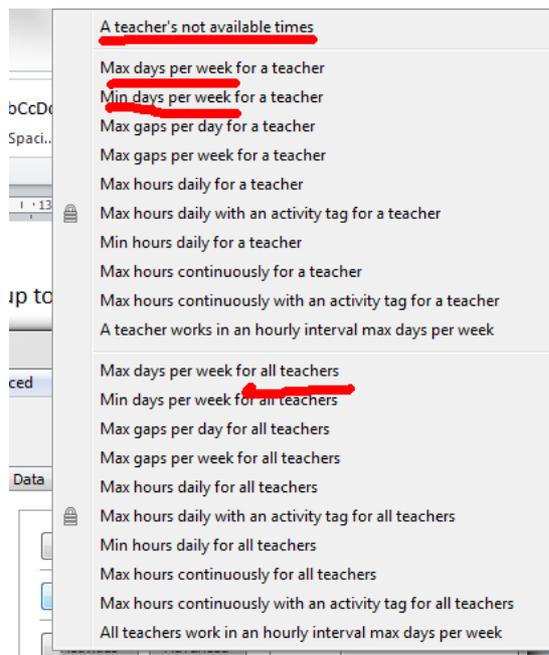
*****Constraint that may be useful to you:

--A teacher’s not available time

E.g.: Mr Paulin doesn’t prefer class every Monday morning because he has to come back from Kigali every Monday morning.

--Max/Min days per week for a teacher

E.g.: 4 means 4 day is the max/min for a teacher to have classes per week



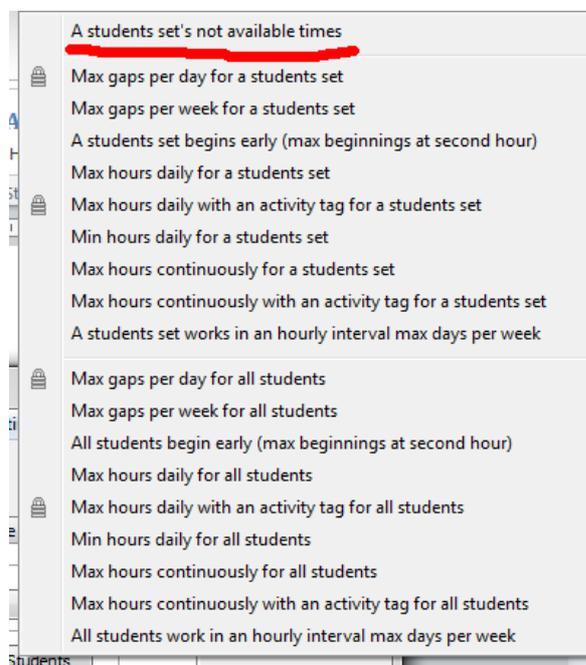
Students:

--- Click on “students”, 19 constraints will show up to set up.

*****Constraint that may be useful to you:

--A students set's not available times

E.g.: Senior 6 doesn't have class every Friday afternoon for TOEFL/SAT preparation.



Activities:

--- Click on “activities”, 22 constraints will show up to set up.

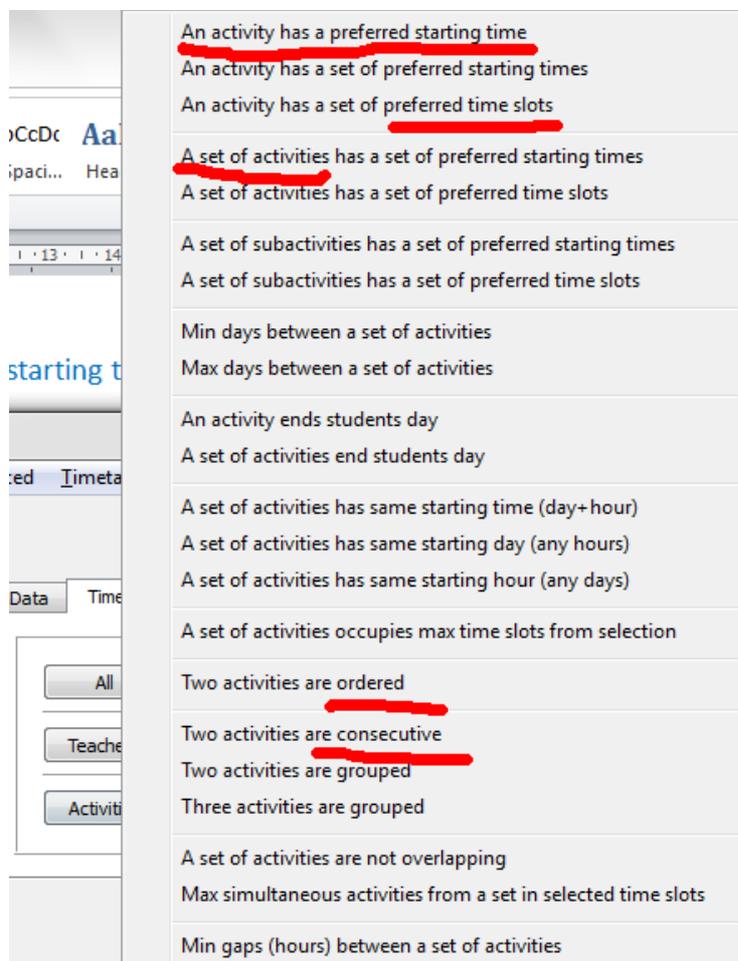
*****Constraint that may be useful to you:

--An activity has a preferred starting times/a set of preferred starting times

E.g.: If Ms Jennie's senior 4 PCB students needs to have English class starting at 07:40 every Monday, then click on "Add", and select teacher, student set, subject, activity tag if possible, activity, day and start hour to add this constraint.

--Two activities are ordered/consecutive

E.g.: If a physics class needs to have firstly before a physics lab, or a physics lab needs to follow a physics class, then the constraint could be applied. Click on "Add", and select teacher, student set, subject, activity tag if possible, first activity and second activity to add this constraint.

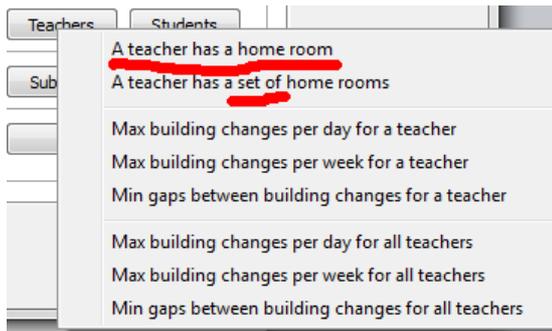


3) Space tab: (constraints)

All:

Teachers:

--- Click on "teachers", 8 constraints will show up to set up.



*****Constraint that may be useful to you:

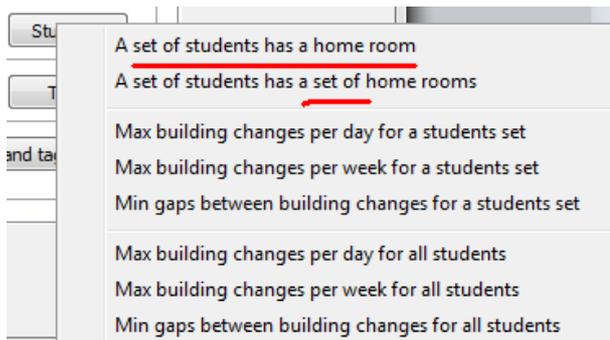
--A teacher has a home room/has a set of home rooms

E.g.: Chemistry teacher has a home room for her to teach. Click on “Add”, select teacher and room to apply constraints.

*A set of home rooms means a teacher has more than one room to teach

Students:

--- Click on “students”, 8 constraints will show up to set up.



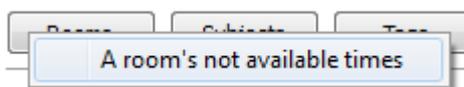
*****Constraint that may be useful to you:

--A set of students has a home room/a set of home rooms

E.g.: If senior PCB students only stay in one/several rooms to have their classes, then this constraint can be applied. Click on “Add”, select students set and room to apply the constraint.

Rooms:

--- Click on “rooms”, 1 constraint will show up to set up.

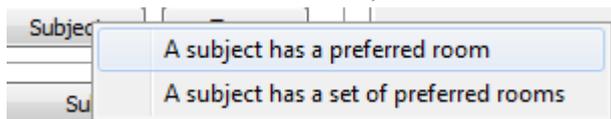


--A room’s not available times:

E.g.: if classroom A need to be used for club every Wednesday afternoon, then click on “Add”, select room and it’s not available time to apply the constraint.

Subjects:

--- Click on “rooms”, **2 constraints** will show up to set up.

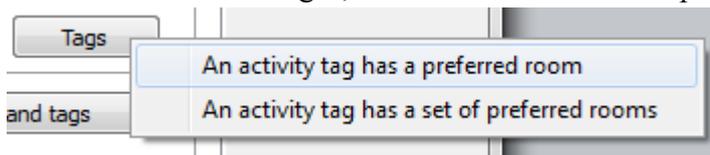


--A subject has a preferred room/a set of preferred rooms:

E.g.: Chemistry and biology have labs as their preferred rooms.

Tags:

--- Click on “tags”, **2 constraints** will show up to set up.

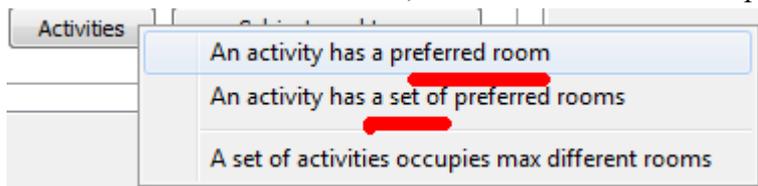


--An activity tag has a preferred room/a set of preferred rooms:

E.g.: the activity tag “morning” has a preferred room A2, then the class with the “morning” tag will be assigned to room A2

Activities:

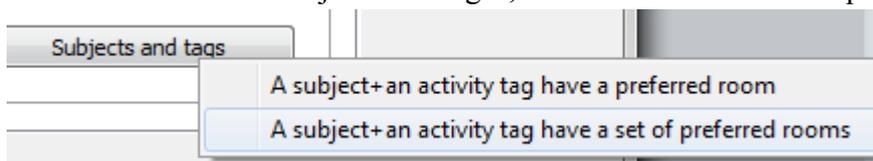
--- Click on “activities”, **3 constraints** will show up to set up.



--Activity here means each class. For example, Physics has a preferred room Lab1. Then click on “add”, select teacher, student set, subject, tags if possible, activity and room to apply the constraint.

Subjects and tags:

--- Click on “subjects and tags”, **2 constraints** will show up to set up.

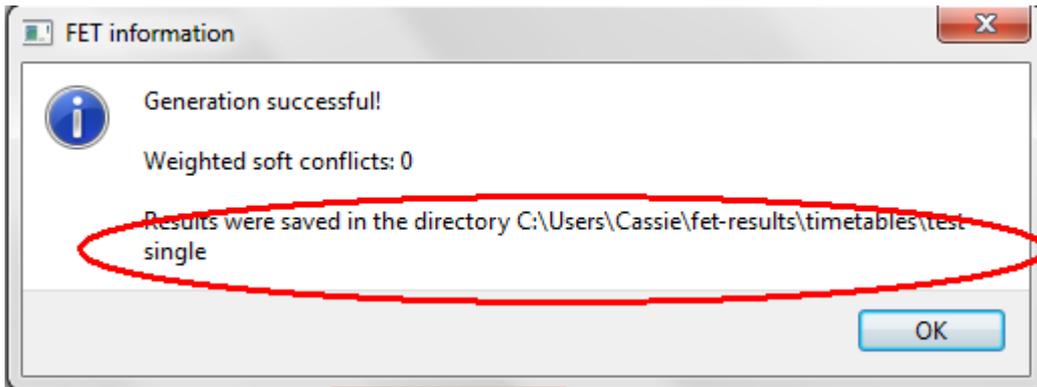


E.g.: a morning biology class has a preferred room, click on “add” , select subject, activity and room to apply the constraint.

4) **Timetable tab:**

Please **save the file first** before generating new timetable.

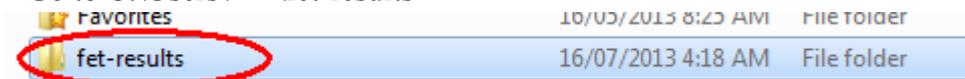
Generate: To generate a new timetable-----click on “start”



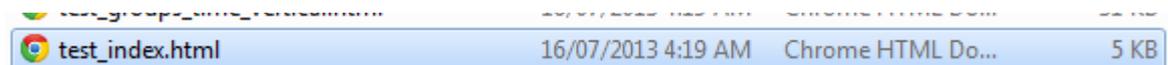
Caution!!

--Watch out the direction of new generated timetable.

--Go to C:\Users***\fet-results



--As long as you save the file before generating, find the named folder

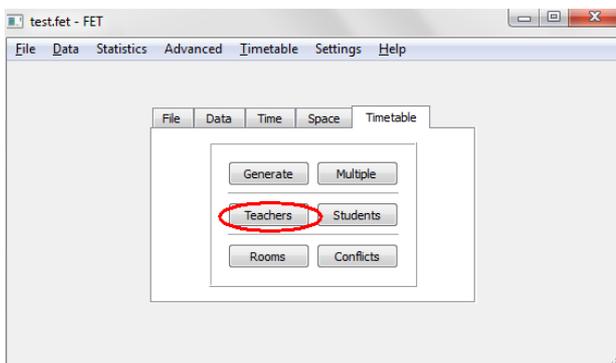


Open this **_index.html, you will find and print the class schedule for each teacher, for each student combination, or for each room.

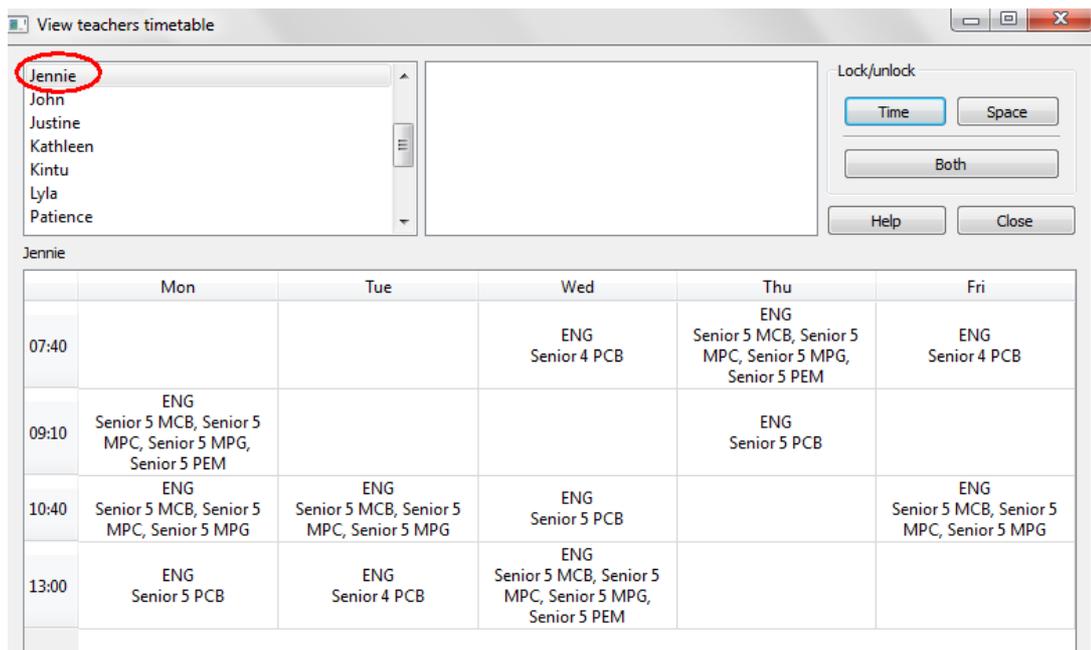
Gashora Girls Academy

	Timetables			
	Days Horizontal	Days Vertical	Time Horizontal	Time Vertical
Subgroups	view	view	view	view
Groups	view	view	view	view
Years	view	view	view	view
Teachers	view	view	view	view
Teachers Free Periods	view	view	---	---
Rooms	view	view	view	view
Subjects	view	view	view	view
Activities	view	view	view	view
Timetable generated with FET 5.19.3 on 7/16/13 4:19 AM				

Click on the “teacher” button



You can check each teacher’s schedule separately

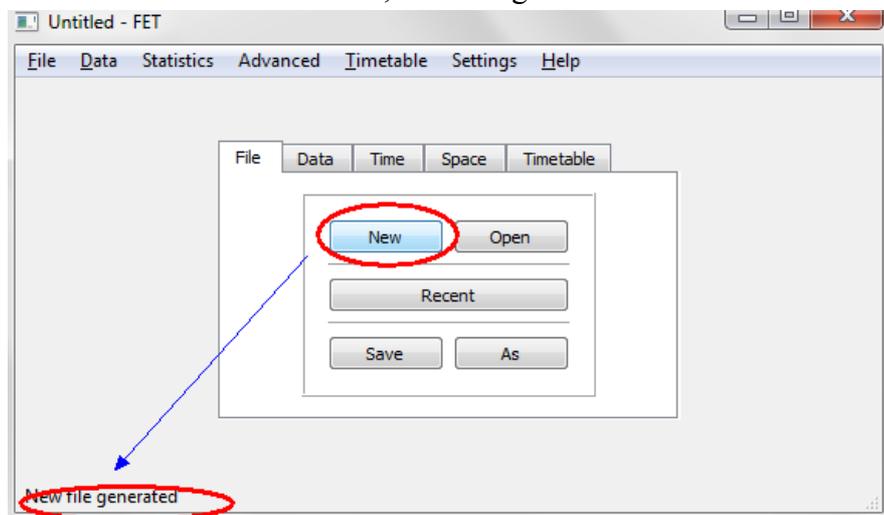


Click on the “student” button, student’s combination information can be checked

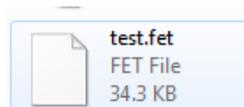
The same as “room” button

5) File tab:

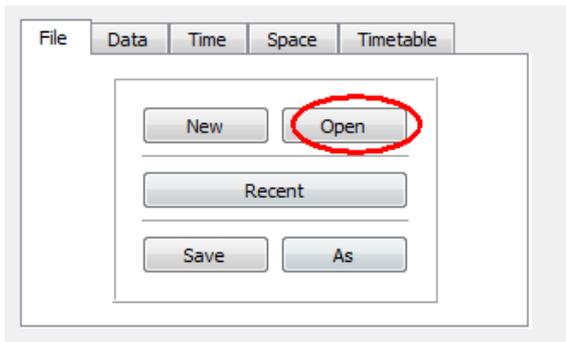
New: Click on “New” button, new file generated.



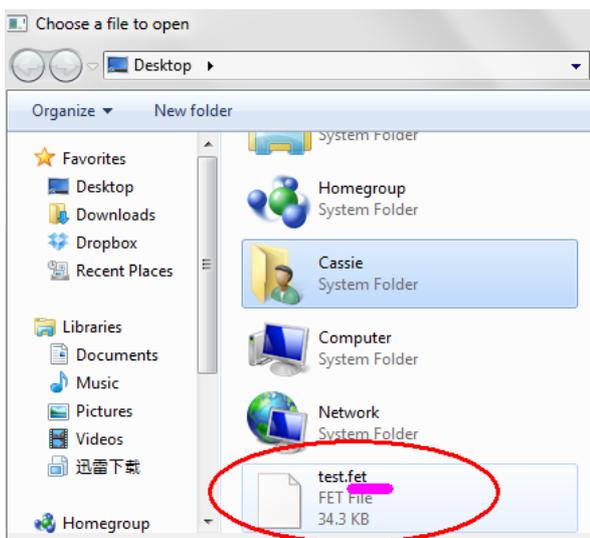
Open: File was saved as *.fet



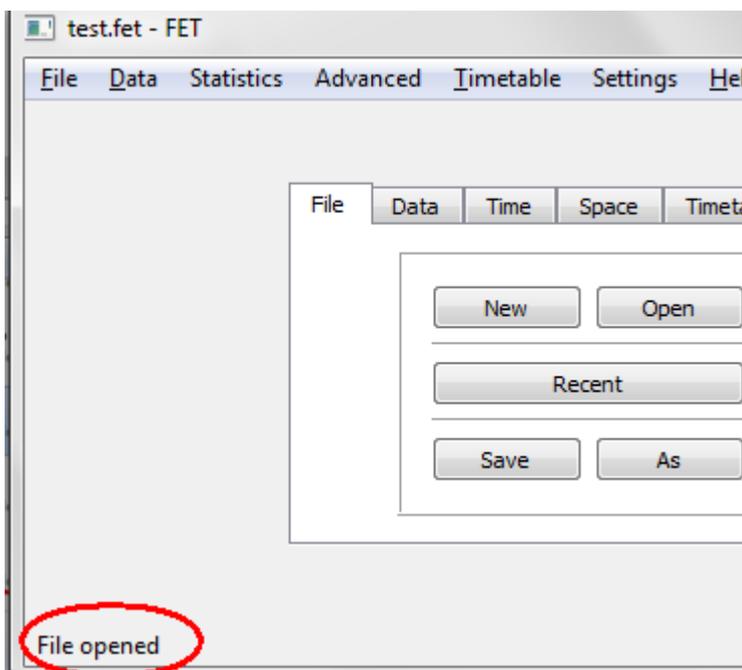
Click on “Open” button



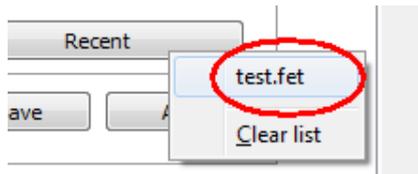
Then choose a file to open, file must be **xxx.fet**



File opened:



Recent: Click on “Recent” button, another way to open a file:



Save: File saved.

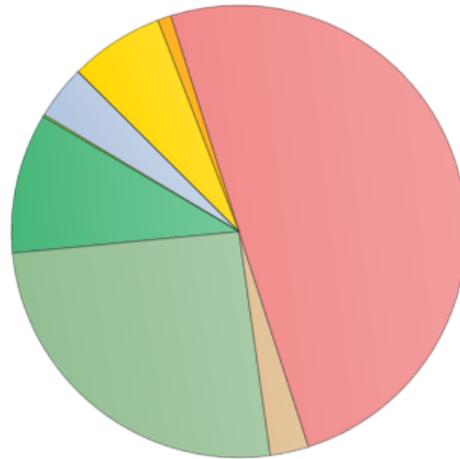
As: File saved as.....

Appendix C: Bandwidth Distribution (snipped picture from Easy Tomato)

Around 8:00pm at night

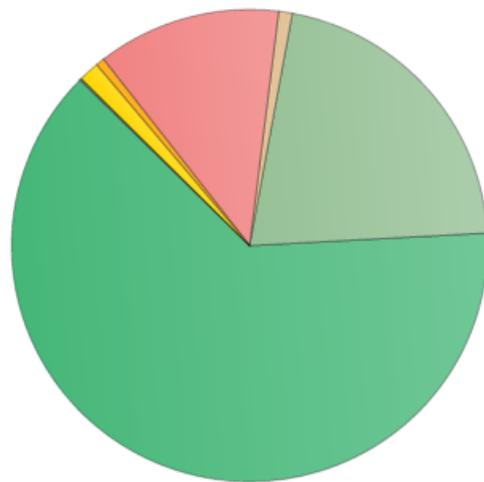
Bandwidth Distribution (Outbound)

	kbit/s	KB/s	Rate
Service	10.27	1.25	3.87%
VOIP/Game	0.38	0.05	0.14%
Media	26.61	3.25	10.02%
Remote	0.00	0.00	0.00%
WWW	68.20	8.33	25.68%
Mail	0.00	0.00	0.00%
Messenger	7.28	0.89	2.74%
FileXfer	132.54	16.18	49.90%
P2P/Bulk	2.55	0.31	0.96%
Crawl	17.77	2.17	6.69%
Total	265.61	32.42	100%



Bandwidth Distribution (Inbound)

	kbit/s	KB/s	Rate
Service	2.66	0.32	0.12%
VOIP/Game	0.36	0.04	0.02%
Media	1396.00	170.41	63.21%
Remote	0.00	0.00	0.00%
WWW	469.82	57.35	21.27%
Mail	0.00	0.00	0.00%
Messenger	20.38	2.49	0.92%
FileXfer	275.63	33.65	12.48%
P2P/Bulk	13.02	1.59	0.59%
Crawl	30.62	3.74	1.39%
Total	2208.49	269.59	100%



Appendix D: Library Notebook for check-in and check-out

Amelie	2 con - Ame/1	✓	Merveille	Greene - Comden/5
Shemaa	2 cab - p.wei/2	✓		(Levitt - Frankon/mr)
Peace	2 cab - p.par/2	✓		Lightman - Einstein/1
Queen (S4)	2 con - big/1	✓		Sei-erstad Kaba/1
Lea	2 con - par/1	✓	Diana	Cadet - Q. in pink
Lauren	Car - M. G. 2 nos - lif/1	✓	Ange H. (S4) ✓	Tyler Noah/2 ✓
Ornella Banyana	Nemla 2 Hor - Ful/1	✓	Marie Marie	Goldman - Pri/1 ✓
Angela Vanessa	2 Pat - fan/2	✓	Zus	Low - Women in Love
Zula	2 cab - air/1	✓	Olana Urizeyuma	2 low - num/3
Brioc	2 gnc - pav/1	✓	Sarah	2/Hale - Goss/1
Kaha	2 car - l'd tall/1	✓	Joan E.	7/Dand/Cons
D.C.	2 ccc - The Win/2		Betty T	2 mar. m - her/1
Isabelle	2 For - jul/1		Betty T	2 mar. m - jno/1
Nadia (S4)	2 car - nos/1		Betty T	2 mar. m + Call/1
Linda (S4)	2 cla - The los/1		Tracy	warmers twilight ✓
Daisy	2 Atw		Lamberline	2/col - Air/1 ✓
Lisa (S4)	The trants		Angelique I	2/Arch - kir/1 ✓
Livingstone	2 wri - Nat/1		Alexandrine	2/mcc - no/1 ✓
Grace K	2 ste - Myrk		Sabine	2/Fran - Fre/1 ✓
Umy	2 bic - bo. Ad/1		Sabine	2/Alle - Daw/1 ✓
Is	✓ 2 goo - nak/1			2/jones - Mus/1 ✓
Groot	2 car - mid/1		Kevin	2/Augl - Pri/1 ✓
Martie	2 cars - p. mel/3		Joannette Makawize	2/Ben - Bun/1 ✓
Juanette (S4)	2 sep - lett/2		Ada	2/RhyS - Wide/1 ✓
Tony (S4)	2 ice - wall/1		Ange Kalitanyi	2/cab - pri - in/1 ✓
Vanina (S4)	2 For - A. Sep/1		Yvonne Musime	2 SKL - mm/1 ✓
Natthe	2 can - out/1		chantal	2 Dec - soh/1 ✓ levels
Patricia	2 coc - the/1		Esther	Wat ✓
Chelsea	2 Gre. T. ex/1		Christelle X	2/SP11 - stat/3
ina	2/Chriche		Ines U sa	2 Mar - wel/1
voone	Jamel/1		Tamara	2/Dick - maze/1
	Alfred Shadaw		Hope	2 Hel - cat/1
			Ada	2/Fitz Gre/5