

Technology Consulting in the Global Community

Final Report

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Community Partner: Agahozo-Shalom Youth Village



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Executive Summary

I. About the Organization

The Agahozo-Shalom Youth Village (ASYV), founded by Anne Heyman, is a residential community that provides education for children who were orphaned during and after the genocide. Agahozo-Shalom design activities and provides an environment which comprises of love and safety for the children, with an aim to help them mature as intellectually and emotionally strong adults.

The mission of the Agahozo-Shalom Youth Village is to enable orphaned and vulnerable youth to realize their maximum potential by providing them with a safe and secure living environment, health care, education and necessary life skills.

II. A complete Student Information Systems is required

Currently the school has separate information systems to meet the needs of different departments using Rediker, Microsoft Excel and Microsoft Access. An integrated student information system is required to capture a complete student profile containing formal education, informal education and alumni information. Furthermore, the existing systems are slow and hard to use. The staff need a user-friendly and stable integrated system with the capability to analyze data and generate reports.

Outcomes

- Created scenario-based Integrated Student System use case
- Updated system Entity Relationship Diagram (ERD) for the Integrated Student System
- Researched commercial and open source school management systems
- Built and deployed a customized working prototype based on Ruby on Rails
- Consolidated and loaded student data into the customized system
- Completed user testing and further customizations based on user feedback
- Held training sessions and created Instruction Manual for the customized system
- Connected to local Ruby on Rails professionals to ensure system sustainability

Major risks to the sustainability of the task

- Lack of onsite staff with relevant IT skills
- Unstable network conditions
- Changing user needs

III. The Technology Infrastructure requires attention

The wireless network in ASYV was built using multiple access points, wireless distribution systems and repeaters. After several years the network in some parts of the village has been very weak due to attenuation. It is susceptible to disruptions such as power outage and automatic resetting of the routers. Apart from the wireless infrastructure, we have found other problems including lack of anti-virus software of many computers, and automatic data backup of the three servers out of operation.

Outcomes

- Completed network site survey
- Installed additional access points
- Experimented with firmware and angles of Access Points
- Monitored the upgraded and improved network
- Rescheduled automatic backups of the servers

Major risks to the sustainability of the task

- Unstable main backbone of the Internet bandwidth
- High cost of laying the physical wires and maintenance

IV. Organising a Hackathon Competition for the students

To encourage the students in ASYV to learn programming independently and provide them with further resources to explore into IT, the Alice Challenge is aimed to provide a rewarding experience of self-learning and collaboration for the students. Meanwhile, it serves as a demonstration project to test feasibility and collect feedback for future repetition.

Outcomes

- Introduced Alice 3D interactive programming software to the students
- Provided consultation sessions and learning resources
- Collected and organized feedback
- Completed sustainability analysis
- Created online Facebook group as a local platform for future development
- Follow-up networking with kLab IT professionals

Major risks to the sustainability of the task

- High collaboration needed to expand the competition to a large scale

Final Consulting Report

I. About the Organization

Organization

The Agahozo-Shalom Youth Village (ASYV) is a residential community set up in Rwanda. It is a home to youths who were orphaned during and after the genocide, which occurred in 1994. The mission statement of the organization is as follows:

To enable orphaned and vulnerable youth to realize their maximum potential by providing them with a safe and secure living environment, health care, education and necessary life skills. Education and service are used to model and create socially responsible citizens in Rwanda and around the world.

- www.asyv.org

After all, education and service are used to model and create socially responsible citizens in Rwanda and around the world. Agahozo-Shalom design activities and provides an environment which comprises of love and safety for the children, with an aim to help them mature as intellectually and emotionally strong adults.

Agahozo-Shalom also teaches the principle of serving the community both locally and globally. The young people at Agahozo-Shalom are taught to practice the value of mending the world around them, and these youths will emerge from Agahozo-Shalom as balanced adults who are not only able to care for themselves and their loved ones, but who are committed to making their community, their country, and their world, a better place.

Facilities

ASYV covers 144 acres, including two main areas: the village and the school. The whole ASYV is fenced completely, and the distance between the village and school is 0.3 miles.

The school is located on the top of the hill, with 17 classrooms, 3 science labs, 3 computer labs, 1 server room, 1 study lab, 1 library, 3 administration offices, 1 volunteer room, 1 social worker/counselors room, and 2 teacher lounges.

In the server room, there are 3 windows servers – Sky, Earth and Sea, 3 UPS, 3 other servers (ASUS e-box machines), a switch, a Linux server that serves as a router, a caching proxy, and voltage regulators.

The village is the residential area. It has 32 family houses, 8 staff houses, 4 guesthouses and 2 newly built club houses. Between the village and the school is the dining hall. There are two learning centers. The science center has a science lab, a media lab and a computer lab. In the computer lab there are 16 computers. In the media lab there are 5 computers. And in the recording studio there are 3 computers and other recording equipment. The art center has a music room, a

recording studio, a guitar room and a visual arts room. Next to the learning centers are the admin house, clinic house and a small canteen, which is only open on Thursday and Friday afternoons.

At the school Computer Lab1 has 33 computers; Lab2 has 33 computers and, Lab3, 27 computers. In the administration offices at the school there are 3 computers (one in each admin office). Besides, there is one computer in each family, which is mainly used by the Mamas (acting mothers of each family who are responsible for domestic affairs of the family) to write reports and document family events. Other computers are located in the canteen and the library.

There is a storeroom located behind the administration building, which acts as the storage space for the necessities/essentials, maintenance items and the donations given to the village.

In 2012, 2 new club houses were built to hold staff meetings and student events.

The school has purchased 31 computers recently but hasn't installed operating systems for them. Deo is planning to build a new computer lab for research and study with these HP computers.

Electricity is not constant and power outages occur regularly. This is the main reason for acquiring many voltage regulators, especially for the omnidirectional antennas.

The village is all covered with WiFi. There are at least 16 antennas scattered across the village and the school. All the computers in the computer labs use cable so the Internet is more stable.

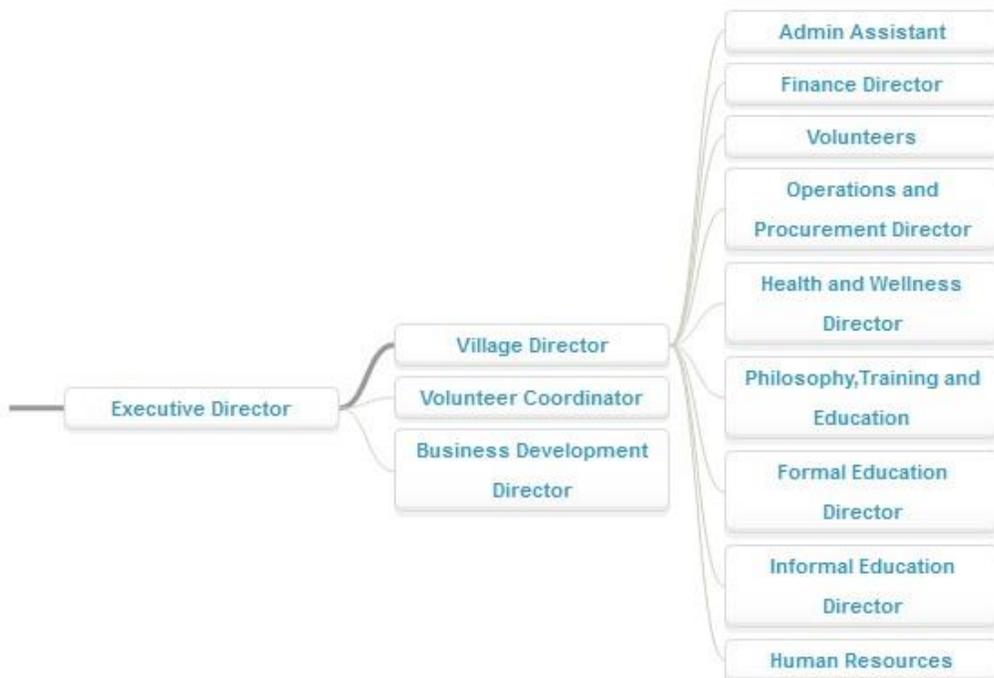
Programs

There are 3 terms in a school year. The program in Agahozo Shalom are divided into two main branches: formal education and informal education.

Formal Education	Informal Education
<ul style="list-style-type: none"> • For enrichment year, students review the material for Senior 1, 2 and 3 years (Junior High School) – last 3 years of mandatory classes in Rwanda • Students attend basic computer class (learn typing and basic computer functions) in enrichment year. • All students learn Microsoft office applications in Senior 4, 5, 6 (Senior High School) • Students choose subject combination at end of 3rd term for Seniors 4, 5, 6. <ul style="list-style-type: none"> ○ Math, Physics, Computer Science (C/C++ / MS Access) ○ Math, Economics, Computer Science (C/C++ / MS Access) 	<ul style="list-style-type: none"> • Has a programme called “Tikkun olam”, or “repairing the world” • Gives Seniors 5 and 6 student opportunities to engage in weekly social services and community services in the following ways: <ul style="list-style-type: none"> ○ Teaching English in nearby schools ○ Taking care of patients in nearby clinic and deal with admin work ○ Repairing houses of nearby poor villages ○ One Laptop Per Child training • Every student also chooses a sport activity and an art activity (Digital

<ul style="list-style-type: none"> ○ Math, Biology, Computer Science ○ Math, Economics, Geography ○ History, Economics, Geography ○ English, French, Kinyarwanda 	<p>Media and Recording & Photography and Movie making)</p> <ul style="list-style-type: none"> • Club activities such as the Dance club, Drums club etc. The Information Technology club meet every Mondays and Thursdays and they operate and maintain computers, offer technical support for the village • Family time which occurs after dinner from Sundays to Thursdays where they discuss activities, discussions and make announcements. • Village time which occurs on Fridays, where the whole village gathers and have a show, watch the news and enjoy each other's company.
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Staff



Anne Heyman is the founder of the village. She is a native of South Africa. With respect to Tikkun Olam, the Jewish obligation to repair the world, she shows ongoing commitment to improving the life of homebound and homeless people. She currently lives in Manhattan, New York with her family, and she visits the village every year.

Mara Berde is the Manager of Volunteer Services for Agahozo-Shalom Youth Village. Based in New York, she is the main coordinator between Carnegie Mellon University and ASYV.

Jean-Claude Nkulikiyimfura is the Village Director. He is dedicated to providing a platform and a voice to the voiceless. He received a degree in Mass Communication from the University of Central Arkansas in the United States, and came back to Rwanda as a media and protocol officer in the Office of the President in 2001. He joined Agahozo-Shalom as Director of the Village in July 2011.

Deo Kabirigi is the IT Manager, who is in charge of all the IT-related activities in the village. He also teaches IT professional skills. In the village, Deo is the most IT-savvy person around.

Eric Salongo Kalisa is the Chief Operating Officer (COO).

Bonaventure Mujyeneza is the Director of Formal Education.

Sonia Mikanagu is the Director of Health and Wellness.

Alain Munyaburanga is the Director of Philosophy, Education, and Training.

Jean-Pierre Nkuranga is the Director of Informal Education.

Sylvia Gata-Salama is the Director of Finance and Administration.

Celine Uwineza is Director of Human Resource.

Noella Nyamuniga is Village Administration Assistant.

Lovell Biira is the School's Administration Assistant.

Apart from housemothers, all staff have their own laptops. They have access to Internet and Microsoft Office applications. Most of them have an email address with the domain asyv.org. They use Microsoft Word/Excel to plan lessons and generate reports. Some of the staff also use Microsoft Access to manage databases and the statistic software (SPSS/STATA) for basic analysis. In general, staff in ASYV are comfortable with using Microsoft Office applications and email.

The teachers input the exam grades into an Excel Document and then send their grade reports to Biira Lovell, the administration office worker, who is in charging of entering all data into Rediker. For most staff in the village, data entering is very time consuming because of the limited typing skills. Therefore, some volunteers are helping with this.

There is neither a counselor for photography nor movie-making activities but Jean-Claude Parisien advises the TV club which uses software Adobe Photoshop and Pinnacle Studio. This club is responsible for broadcasting ASYV news and clips from the Rwandan local news every Friday.

There are 9 long-term volunteers in ASYV. They are placed into professional roles and each serves as a mentor to 16 teenage students in a family. They are involved in informal education, development of new programs, professional skills, school administration and manage the two learning centers in the village.

The residential life in the village is organized as families. Each family has a housemother, a big sister/brother, a long-term volunteer as cousin, and 16 students.

LiquidNet, as the main donor and partner, sends an IT team to the village for maintenance and technology improvement every year. This year, an IT team of 5 from LiquidNet globally came with new equipment for wireless network and server backup. They provided technical support for troubleshooting and network improvement.

Technology Infrastructure

Servers and Computers

Equipment	Name	Operating System	Specification	IP	Location
Server	Earth	Windows Server 2008 R2	CPU: Intel® Pentium® D CPU 2.80 GHz 2.79 GHz RAM: 4.00 GB	192.168.10 0.43	School server room
Server	Sky	Windows Server 2008 R2 64 bit	CPU: Intel® Core™ 2 CPU 6400 @ 2.13GHz 2.13 GHz RAM: 4.00 GB	192.168.10 0.40	School server room
Server	RWOREDIKE R	Windows Server 2003 R2 64 bit	CPU: Intel® Pentium® D CPU 2.80 GHz 2.79 GHz RAM: 2.00 GB	192.168.10 0.45	School server room
Server	Fire.lan	Windows XP SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	192.168.10 0.8	School server room
Server	Wood.lan	Windows XP SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	192.168.10 0.7	School server room
Server	Heart.lan	Windows XP SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	192.168.10 0.9	School server room
PC	SLC-LAB-01	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-02	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center

PC	SLC-LAB-03	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-04	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-05	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-06	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-07	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-08	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-09	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-10	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-11	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center
PC	SLC-LAB-12	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center

PC	SLC-LAB-13	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00GHz 3.00GB	DHCP	Science Learning Center RAM
PC	SLC-LAB-14	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00GHz 3.00GB	DHCP	Science Learning Center
PC	SLC-LAB-15	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00GHz 3.00GB	DHCP	Science Learning Center
PC	SLC-LAB-16	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00GHz 3.00GB	DHCP	Science Learning Center
PC	Recording Studios	OSX 10.5.3 Running on a DELL	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00GHz 3.00GB	DHCP	Music Center
PC	SLC-TVLAB-1	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00GHz 3.00GB	DHCP	Science Learning Center
PC	SLC-TVLAB-2	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00GHz 3.00GB	DHCP	Science Learning Center
PC	SLC-TVLAB-3	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00GHz 3.00GB	DHCP	Science Learning Center

PC	SLC-TVLAB-4	Windows 7 Professional 32 bit	CPU: Pentium® Dual-core CPU @ 3.00 GHz 3.00 GHz RAM: 3.00 GB	DHCP	Science Learning Center TV Lab
PC	Agahozo-2	Windows XP Professional SP3	CPU: Intel® Pentium® M professor 1.3 GHz 1.29 GHz RAM: 512MB	DHCP	School administration office
PC	LAB1PC1	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC2	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC3	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC4	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC5	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC6	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC7	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab

PC	LAB1PC8	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC9	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC10	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
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PC	LAB1PC16	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB1PC18	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab

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PC	LAB1PC27	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
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PC	LAB2PC1	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
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PC	LAB3PC2	Windows 7 32bit	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab

PC	LAB3PC3	Windows 7 32bit	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC4	Windows 7 32bit	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC5	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC6	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC7	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC8	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC9	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC10	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC11	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC22	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab

PC	LAB3PC23	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC24	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC25	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab
PC	LAB3PC26	Windows XP Professional SP3	CPU: Intel® Atom CPU N270 @ 1.60 GHz 1.61 GHz RAM: 1.00 GB	DHCP	School computer lab

Wireless Equipment

IP Address	Host Name	Location	Hardware	Station Mode	SSID	Channel
10.10.10.1	School	School	Powerstation2	Access Point	school	1
192.168.100.254	BackBone	School	Nano Station M5	Access Point	backbone- p2mp	36
10.10.20.1	dining-rtr	Dining Hall	Nano Station M5	Station	backbone- p2mp	36
10.10.20.2	dining-AP	Dining Hall	Nano Station 2	Access Point	Dining Hall	11
10.10.30.1	residence-rtr	Village water tower	Nano Station M5	Station	backbone- p2mp	36
10.10.30.2	residence-AP	Village water tower	Powerstation2	Access Point	residence	1
10.10.30.15	house16-station	Village residential area	Nano Station 2	Station	residence	1
10.10.30.20	resi-wds-L-Station	Village residential area	Powerstation2	Access Point WDS	resi-wds-l	6
10.10.30.21	resi-wds-L-ap01	Village residential area	Powerstation2	Access Point WDS	resi-wds-l	6
10.10.30.22	resi-wds-L-ap02	Village residential area	Powerstation2	Access Point WDS	resi-wds-l	6
10.10.30.45	East Lodges-Station	Village residential area	Nano Station 2	Station	residence	1
10.10.30.46	Lodge East AP	Village residential area	Powerstation2	Access Point	resi-lodgeE	11
10.10.30.31	Resi-office-station	Village residential area	Nano Station 2	Station	residence	1
10.10.60.11	Admn-Office-Printer-Station	Village administration office	Nano Station 2	Station	Administration	6
10.10.50.1	Science-Center-Station	Science Learning Center	Nano Station M5	Station	backbone- p2mp	36
10.10.50.2	UBNT	Science Learning Center	Nano Station 2	Access point	Science Center	6

Technology Management

As the IT Manager, Kabirigi Deo is in charge of all the IT-related activities in the village. He teaches IT professional skills and leads the IT club. He manages the technology infrastructure, wireless network stations, servers and other IT equipment. Because there is no long-term IT volunteer since 2012, the workload for Deo is actually very heavy. On top of these, he also manages IT planning, information systems and communicates the problems with the LiquidNet team for external support.

Besides, Deo is responsible for troubleshooting whenever there are problems with the laptops in the village. People seek advice from Deo for IT issues. They do not log problems right now. Currently there are two IT interns, Nizerimana Egide and Niyigena Patient, helping Deo with professional skills and troubleshooting. They are the first graduates of the village, and will probably go to universities before October this year.

Regular server backups are scheduled in the system. For some reason, the scheduled backup systems haven't been working for a long time. This year, working with the LiquidNet IT support team, we have replaced the old external hard drives with new ones, reset the backup policies, and finished initial testing. For the Sky server, the backup policy is monthly full backups with incremental daily backups as it stores the most data. For the Sea server and Earth server, weekly full backups and daily incremental backups are scheduled.

Since the electricity is very unstable in the village, special attention must be paid to power failure. Deo will receive a notice email upon power failure. Then backup jobs need to be restarted manually.

One of the servers downloads Windows updates, and distributes them to all the computers in the local network. Each computer in ASYV automatically updates other software and virus definitions when they are connected to the Internet.

Technology Planning

Kabirigi Deo is the main person responsible for technology planning at ASYV. Deo reports to Eric, Chief Operating Officer, and Jean-Claude, Village Director, for approval. Previously, Jack Bates, a full-time volunteer who works with Deo since December 2011, has left since. Occasionally (about once a year), technology experts from Liquidnet will come to ASYV to assist them with their wireless issues. A team of 5 was present from 5th June 2013 to 12th June 2013.

In terms of the wireless infrastructure, Deo from ASYV, the Liquidnet team and the CMU students team did some maintenance and site survey throughout the week. Some of the Aps and Omni directional antennas were replaced because they were broken from wear and tear. New Ubiquiti APs (Nanostations and Powerstations) were also installed, and configured from the Ubiquiti firmware to the Openwrt open source firmware which the existing APs were installed.

We also worked with the Liquidnet personnel to schedule some automated backup for the Sky, Sea and Earth servers onto 3 x 3TB hard drives using Symantec Backup Exec. The servers have not been backed up since 2011.

Jack Bates worked closely with Deo in early 2012 to set up a caching proxy in the wireless infrastructure to improve the speed of the network and accelerate requests. Software such as Nagios, Ntop and Cacti are used to monitor the connection and network status in the village. Some common problems which caused the access points to go down include the power source being accidentally (or intentionally) plugged out by people, or the access points restarting due to its inability to support a large amount of users or connected stations due to loop backs.

Mike was the IT volunteer before Jack, and he wrote a technology plan for the village back in February 2011. It identified technical issues and opportunities at ASYV, which included building and managing the wireless network, as well as increasing the specifications (especially RAM) on the servers. A proposal, with the aim of Stability, Reliability and Ease of use, for writing up computer labs was also submitted. The proposal was soon approved and equipment were quickly purchased, and the lab was wired up by May 2011. The labs served as an attractive learning environment for students.

Internal Communication

Due to the limit of Internet speed and number of computers, most of the internal communication is done orally from person to person. The students are not allowed to use cell phones at school. All the staff and volunteers are easily reachable by cell phones.

However, the school wants a more efficient way of communication. Currently every employee has been given an email address with the school domain (asyv.org). However, since the Internet is not stable, email hasn't become widely-used in the village.

In terms of real time communication, the leadership team of the village wants to integrate attendance record into their information systems. So attendance will be tracked by both sides, the family mamas and the teachers. Also, it will be reported as one part of the student profile.

ASYV has a website hosted in the United States, which can be accessed through both www.asyv.org and www.agahozo-shalom.org. The website is well-designed and timely updated. It provides detailed information about the village as well as the links to ASYV's YouTube page (<http://www.youtube.com/user/theasyv>) and Blog (<http://asyv.org/blog>). There is a main section "Donate" on the website, explicitly indicating three ways of donation: online, by phone and by mail.

The current Intranet was built using html and PHP (<http://heart.lan/>). It includes the introduction to the village departments, latest events, news and provides some student resources such as career guidance, TOEFL preparation and information of Rwandan universities. However, due to the difficulty of content change using HTML, a new Intranet based on the suggestion of 2012 CMU student consultants has been in construction using the WordPress. The new Intranet is currently being outsourced and will be launched in the next few weeks.

Currently the file sharing is mainly done offline; when the new Intranet is accomplished, it is expected to provide more online resources for the students to download.

Information Management

There are 3 main dedicated servers which are used to manage the data in the village, and they are mainly called Sky, Earth and Sea. All workstations at ASYV depend on these servers for directory and domain name services. Earth serves as a file server, where staff and students store and share their files.

Within the school, a commercial product, Administrator Plus by Rediker Inc. is used to manage the student information. Administrator Plus includes the following features, of which those in bold are currently being used by ASYV:

- **Student Information Database**
- Attendance tracking
- Class Scheduling

- **Report Cards**
- **Photo ID Cards**
- Library Management
- Cafeteria Management
- School Health Management

Rediker is managed by Biira Lovell, who have processed and stored 5 years of academic data, which includes test scores and grades.

The Rediker software at ASYV has some limitations. For instance, the software can only be accessed through a client application that has to be installed on a computer. Currently, not all the computers have the software installed. Moreover, the documentations also do not explain fully the system's functionalities, and the interface is also not user friendly for teachers to use. Thus, at the end of each term, the teachers submit Excel spreadsheets which contain the student performance information to Sika and Biira for entering the data into Rediker.

Items and inventory are tracked using Excel spreadsheets. The library has 1,800 books and 42 CDs and DVDs. Mike has developed a database using Microsoft Access previously, but has yet to be used by the staff. This is because they find it comfortable so far to use Excel rather than switching to a new database.

Student health medical records are recorded by the clinic using books that are stored in file cabinets, as well as using a Microsoft Access database system developed last year by CMU students.

Business Systems

Christine Icyigetse is in charge of accounting at ASYV. She is responsible for recording, reporting, and analyzing the organization's financial transactions in Rwanda. She does payroll as well. Christine has been using Microsoft Excel to accomplish all these tasks since the village was founded.

She started using Codipaie to manage payroll, salaries and staff information three months ago. Codipaie is a commercial software connected to the server. It does payroll and generates monthly/annual reports. It enables automatic deductions and sends pay slips to the employee's email. This software has met all of Christine's needs for payroll management and she thinks it is easy to use.

ASYV has been using Quickbook Pro 2006 as the main financial management software since 2011. Quickbook 2006 allows Christine to automate some of her reporting tasks, generating financial statements and budgeting. It supports the imports and exports between Excel and QuickBooks. It also provides some features that are not available in Excel such as the snapshot function. ASYV plans to upgrade the current QuickBooks to the Intuit QuickBooks version so that it can be assessed to more than 2 users from the server.

There is an issue with keeping track of the inventory but Quickbook has an inventory system but it is not being used. This is more of an organizational issue rather than technical.

Overall, the accounting information systems meet the needs of the accountants well.

II. A complete Student Information Systems is required

Motivation

Currently the school has several separate information systems to meet the needs of different departments. Most of the information are stored in Microsoft Excel or Microsoft Access, and are scattered all over the place, with different sets of information held by different staff.

The village would like to integrate all of these student information and alumni database into a common student information system with one integrated platform, which also allows concurrent access by different users and staff.

For informal education, there is no proper database and most of the documentation is stored in the server in either a Microsoft Word .doc or Microsoft Excel .xls format. The village would like to have informal education information in the same module, but not mixed with formal education since there are different needs for analysis based on the two categories.

The alumni database has been built with the assistance of the CMU student consultants in 2012 using Microsoft Access. It can create simple reports, but is not able to cover the width of information that the village needs, such as the profile of the student during the 4 years in ASYV. Furthermore, it does not support events nor interface for updating content.

Basically, according to the managing directors of the village, an ideal student information system should provide a complete student profile covering his/her pre-school, in-school and after-graduation experiences.

As mentioned above, ASYV enrolls students based on vulnerability. There is a lot of pre-school information to be recorded and evaluated including student's physical and psychological health, family conditions, and academic performance, which are to be added into the standards for enrollment in the future.

The needs for alumni information are twofold. From the business perspective, the alumni database displays the achievements of ASYV so that it can help promote the reputation and attract investment; from the village perspective, it can help strengthen the communication between graduates and the village.

For formal education, Rediker is the main Student Information System (SIS), which is primarily used to enter grades and generate report cards; it also includes some basic student information such as profile picture, guardians etc. Rediker was a donation to the school with a limited version. There are other modules that cannot be accessed, such as importing of data, quick entering of grades etc.

In terms of user friendliness, Rediker has many problems. Entering grades and generating reports are time consuming for the administrative staff. The time for entering grades each term is estimated to be over 40 hours. GradeQuick is an application that can map the data between Rediker and Excel/Access more efficiently; however, due to the licensing issues, this does not work properly.

The user interface is complicated and hard to understand, including all the redundant entries to those inaccessible modules. This adds to the difficulty of user training. In 2011, there were two volunteers managing the system; however, after the volunteers left, all the information has to be entered by Biira. Deo and Birra are the only users as well as administrators of Rediker.

Another desired feature that Rediker does not provide is the analysis based on the current students' information. Rediker can capture a student's academic profile in formal education; however, it is unable

to display the statistics of the overall student population. The school now does the analysis by exporting data from Rediker in the Excel/Access format and then using SPSS/STATA to generate statistic reports.

Overall, the current version of Rediker can hardly meet the needs of the school in terms of functionality, efficiency and sustainability, although the main users, Deo and Birra, are already very familiar with it.

Outcomes

We held meetings and interviews with staff from different departments so as to understand their working process, needs, as well as what they hope to see improved. On top of that, we also experimented with their existing software and servers. We have since identified major scenarios and documented the ASYV Student Information System use cases (see Appendix 1A) from an integrated perspective. Based on the use cases and their existing information systems, we have also updated the ERDs (see Appendix 1B), as well as built a custom prototype, so that these could be helpful to get vendor quotes and reduce costs when outsourced.

We have realized that they need a centralized, student-centric system that captures information of a student across different departments. According to our analysis, there are 3 possible solutions as follows:

a) Drill into Rediker

Since the village has been using Rediker for its formal education system, a reasonable solution is to customize Rediker or extend its modules. For example, in the system, there are sections and data fields to be customized; so we can enter additional information. Rediker is designed for multiple schools. This function can be utilized to separate formal education information and informal education information into different modules and still use the same system.

The current Rediker version used by the school is a very old Rediker Administrator's Plus with limited module access. The Windows client application is placed on the server and currently has only two main users, Biira and Deo. To continue using Rediker, the following problems need to be solved:

- i. The exam mark entry process is too time-consuming.
- ii. The software cannot generate statistic reports according to the user requirements.
- iii. The user interface is too complicated and software slow to access on the server.
- iv. There is no reliable and regular backup due to the frequent power failures.

According to our research, the latest version of Rediker Administrator's Plus (see Appendix 1C) is a comprehensive student information system which can be integrated with TeacherPlus Web Gradebook and Parent/Student Portal. Through TeacherPlus Web Gradebook, teachers with authorization can enter grades directly into the system and generate reports for either a particular student or the whole class.

The complete Administrator's Plus also provides the option of delivery on the web or on the school's network, and Excel wizard enabling smooth importing and exporting of data.

However, despite the richness of features displayed on Rediker official website, we have concerns about the implementation and cost of such a complicated student information system.

First, as mentioned earlier, the system has many unnecessary modules. This leads to a cluttered user interface, which is not improved much in the updated version.

Second, as a well-designed product in the market, it mainly meets the needs of formal education. However, ASYV has very unique needs in terms of informal education and alumni database management, which the existing modules do not meet.

Third, the current Rediker in use is very slow due to the use of their local server which is old. Due to the complexity of the system, we have doubts in terms of stability and data backup if deployed on the school's own server.

Considering all the factors, we do not recommend upgrading the current Rediker as an economical and optimal solution.

b) Open source tools

We have researched on some open source tools based on our understanding of the integrated requirements from the departments of formal education, informal education and resource center. The needs of formal education are more typical, with our major considerations on ease of use and customization. Among the tools we have taken a look at, SchoolTool (<http://schooltool.org/>) is run on Linux server (The school has three Windows servers); Moodle (<https://moodle.org/>) is more suitable for course management rather than student information management; Fedena (<http://www.projectfedena.org/>), a school ERP based on Ruby on Rails, has a friendly user interface and good features but is very difficult to customize as we attempted to do so. However, all the above-mentioned open source tools are mainly designed for academic information management, and are difficult to be customized to include informal education and alumni database according to the specific needs of the village.

Nevertheless, Akura (<http://akuraschools.org/>) (see Appendix 1D), a school management system initially developed for St. Joseph's College, Colombo, Sri Lanka, is a free open source software that manages daily activities of a school, from academic/co-curricular activities to report generation. Akura runs on Windows servers, and is based on Java.

Akura contains the following modules:

- Reference Module
- School Module
- Staff Module
- Student Module
- Reporting Module
- Attendance Module

Akura is a well-designed education management system with comprehensive functionalities. It is specially developed for the schools in Sri Lanka; therefore, further extensive customization is necessary before it can actually be used here in Rwanda. Due to our limited timeframe, we have only explored some features of Akura, but we consider it a good direction to move forward to in the future for the following reasons:

- i. Apart from formal education modules, Akura includes club & societies, membership positions, house, sports, scholarships, disciplinary actions and other extracurricular activities in the student profile, which can be customized to record student performance in informal education and their DNA (Discussion Negotiation Agreement) cases.
- ii. Akura has advanced search functions based on class, subject, sports, professions...etc.
- iii. Akura can dynamically generate statistical reports (summary, grade wise, class wise, subject wise, and graphs) according to different user requirements.
- iv. Akura is based on Java; it is not hard to find local contacts with relevant skills to ensure sustainability and help maintenance here in Rwanda, where the main skills sets are concentrated on PHP and Java.

c) **Build a customized system**

The best way to realize all the specialized needs of the school is to develop a new system.

Recently, the village was considering a software solution promoted by a local company. We have attended the first presentation of the representatives from the company and communicated the basic requirements of the village to them. However, based on our judgment of the presentation, we figured that they do not understand the requirements of the village, and might not have the skills and resources of building an application for the village.

We have considered building a customized system for them during our stay here, however, from our consultation with Professor Michel of CMU Rwanda, he highlighted to us that this might not be a good idea. This is because this involves a huge amount of work, high risk of sustainability and possibly a plethora of bugs to fix, and given out short time frame of 10 weeks.

That said, after understanding the village's requirements, we have documented them, and plan for them to be forwarded to vendors to build a customized system for long term sustainability.

On top of this, based on our understanding of the requirements of the village, we have also built and deployed a customized working prototype using Ruby on Rails (see Appendix 1F for screenshots). Ruby on Rails was used because it is a rapid and convenient framework that is used to build a secure and robust database system.

The aim of this prototype is to provide us with a platform to perform user testing. This working prototype therefore not only solves the village's immediate short-term need for an integrated student-centric database based on their needs, but also provides them with an opportunity to experiment with a system to figure out what they want for a custom built solution. Also, this prototype allows the ASYV staff to collect usage data and user feedback on the solution prior to outsourcing so as to build a more suitable system.

This customized prototype has been carefully designed to tide the needs of the village in the short run, until they find a vendor to custom build a system for them. Here are some of the benefits of the customized prototype:

- i. Provides summary of the 3 stages of a student profile – pre-ASYV, during ASYV, and also after ASYV, as required by the village.
- ii. Includes features to manage students' Informal Education, Health and Psychological Wellness, Books management and summary of Formal Education.
- iii. Different level of access rights is given to users based on their role. i.e. only Health and Wellness staff have access to students' confidential health information, Administrators have access to user accounts management etc.
- iv. Quick data export for backup and for managing data.
- v. Simple and intuitive user interface to cater to staff's proficiency of using an information system. User Guide is also provided for reference.
- vi. Heroku-hosting Web-based system
 - This allows users to access the system from anytime and anywhere, even from the New York office. Also, having this hosted off-site from the local server improves reliability, as the local server is susceptible to power outages and operating systems issues.
 - Allows for automatic daily backup of database, and for easy restoration.
 - Allows for remote maintenance of the system from anyone and anywhere around the world, which taps on foreign expertise.

Also, here are some of the benefits we have considered for using Ruby on Rails:

- i. Quick and rapid deploying
- ii. Modular Design using Models, Views and Controllers
- iii. Availability of many plug-ins and libraries (gems)
- iv. Less code and configuration involved, and hence less bugs
- v. Integrated testing with agile practices
- vi. Has built in security (i.e. against SQL injections etc.)
- vii. Object relational mapping – Students are the main objects

The early system was tested by the senior management committee, all volunteers, as well as staff in each of the departments (mainly those whom we have met and interviewed). From the early stage of user testing, we learnt that the system fulfills their needs to a large extent. Also, from early feedback, we have made some of the following changes to the prototype to suit their needs:

- i. Having multiple search criteria to search for students
- ii. To include grade names (i.e. Urumuli, Imbuto etc.)
- iii. Summary reports for number of report sick cases

- iv. Including a different list of Genre for the Library
- v. Storing updated/current contacts of the Alumni students
- vi. Quick export of data
- vii. Quick one-button promote all students
- viii. Login counter to track usage
- ix. Track user edit transactions (last-updated student by each staff)

Within the prototype, there are a total of 9 tables (namely Alumni, Books, Students, Formal Education, Information Education, Medical, Psycho Social, Report Sick and Users). In general, being a student-centric system, each of the tables contains a foreign key/id that links back to the student table see Appendix 1E for data dictionary).

The prototype consists of 10 sections/views (namely view All Students, Current Students, Alumni, Special Search, Formal Education, Informal Education, Library, Report Sick cases, View Dashboard and Manage Users), which deals with different pages showing different types of informal of the students, and the users.

The system has been in used for 3 weeks, of which student data is being consolidated and loaded into the system. During the 3 weeks, we sent out an instruction manual, as well as held training and informative sessions for users to ensure that they knew how to use the system (see Appendix 1F for Instruction Manual). During the demo, they generally commented that they were very happy with it and felt that the solution was very timely. Eric said, “Yes! This is what we need”, while Moses and Dimitrie said, “Wow, you (the prototype and us in particular) are our solutions to our problems”. One of the volunteers, Elizabeth, also mentioned, “Wow, this system is like an early Christmas present”. The system was also highlighted and documented during their end-of-term briefing by Deo and JC in terms of progress in IT in the village.

While the system is a working prototype, is user friendly and can meet the urgent need of the village, there is a need for a local person in the community to maintain the system where necessary. We had a meeting with Deo to explain to him on his role and responsibilities of managing the system as a system administrator. Deo has also been given full access to the code on the Heroku server as a collaborator, where he is authorized to make changes to the code. On top of that, we have also talked to members of kLab, CMU-Rwanda and the LiquidNet team for contacts of individuals who have had experience in Ruby on Rails and Heroku. These members can serve as advisors and contact for the working prototype should there be an urgent need for support. These members and their contacts are:

- i. Getkeep - Michael Benedict (michael@getkeep.com)
- ii. Liquid Net – Val Zhupan (vzhupan@liquidnet.com)
- iii. Liquid Net – Jim Westerby (jwesterby@liquidnet.com)
- iv. KLab – Migisha Kalisa Claude (mikaclau@gmail.com)
- v. CMU Rwanda – Professor Bezy (bezy@andrew.cmu.edu)

Recommendations

There are both commercial and open source online school systems that can meet the requirements of formal education well, but for an integrated system, we have not found any existing solutions that can perfectly meet the needs due to the idiosyncratic nature of the requirements.

Outsourcing the development of the new system is very risky considering the level of experience required for building such a complex system. It may be hard to find a local company in Rwanda with many successful cases and enough qualifications. That said, it may also be a good idea to outsource the work to a non-local company which is capable of providing maintenance and support remotely.

Given the complexity, sustainability and cost of an integrated system, we propose two possible long-term solutions, of which the 2nd one is favored:

1. There may be open source software available to meet the needs of a typical school – which may be considered for its formal education portion. Nevertheless, the village has very unique and special needs in terms of its informal education system, which is in fact very complex. Hence, we considered a possibility of having a custom-built system just for its informal education, and an open source one for formal education. However, there is still a minor problem that these two systems will be separate, which may not serve their need of having a centralized system, where members from the alumni and career department can fully access the students' formal education data. Moreover, Akura is a possible integrated solution if the extra customization can be done by subsequent CMU consultants or IT Volunteers.

One of the risks involved in this solution is the sustainability of this system, therefore collaboration with local organizations (KLab or other companies) is highly important. It will be ideal if a full or part time employee with the relevant skills provides support for ASYV in the long run.

2. Given the uniqueness of ASYV systems, outsourcing the development of the student information system to a vendor is the best way to meet the requirements of different departments perfectly.

According to our research, a custom-built solution should be considered if:

- a) The solution does not exist already in the market
- b) The needs are simple and easy to maintain
- c) The needs are very idiosyncratic
- d) The organization has the internal skills necessary or can hire a part-time employee for maintenance

Based on our understanding of the village's needs, we recommend a custom-build solution for the following reasons:

- a) Partial solution (Formal Education) exists in the market
- b) The needs for a student-centric system is relatively easy to build with good understanding of their needs (For its Alumni and Informal Education system, as reflected in the prototype)
- c) The needs are idiosyncratic because they want an integration between formal education and informal education
- d) ASYV has funds to out-source and pay for annual maintenance.

With regards to the above challenges, we have analyzed them and put in a fair amount of work to mitigate the risks. We have documented a set of use cases and ERD diagram based on our interviews to help potential vendors understand the need of the system required by the village. Moreover, we have built a working prototype, which the staff in the village can use in the meantime to not only solve their impending need for a database. On top of that, they can experiment with the prototype and figure out what they like or dislike about the system. Their feedback from their experience, along with the prototype, can be used as demo to show vendors what their requirements are, and they can also easily tell vendors what changes they would like to see in the custom-built solution based on the prototype. Local vendors with provable experience would be ideal; besides, there are many mature commercial products providing good international support and customization. With improved Internet connection within the village, cloud service can be considered as it enables convenient maintenance and data backup.

The major risk involved in this solution is high cost. On top of that, choosing a qualified vendor is critical. While JC mentioned that he has some contacts, we have also found the following contacts that may serve as potential vendors to build the system:

- i. Rwanda Gateway (<http://www.gateway.rw>)
- ii. Kigali Coders (<http://www.kigalicoders.com>)
- iii. Netsys Computers (<http://www.netsyscomputers.com/en>)
- iv. Art Kenya Web Design (<http://www.artkenya.net/softwaredevelopment.htm>)
- v. Kenya Web (<http://www.kenyaweb.com/>)

In general, we found contacts that are within Africa (rather than from America), because firstly, the vendors in Africa have a better understanding of the local situation as compared to America, and secondly, because they operate in the same time zone.

III. The Technology Infrastructure requires attention

Motivation

The wireless network in ASYV was set up couple of years ago. Because it would have cost too much money to install cables, the Wifi network was set up as such: At the school which is located on a hill, a WiMax satellite is the default gateway to provide internet connectivity from Rwamagana approximately 13 miles away. The Internet is then used to serve the school, the village about 0.3 miles away downhill, and the cookhouse, which is located between the school and the village.

From the school, the Internet connection is then sent to the water tower as the central distribution point, which is located near the administration buildings. From there, the village is spread out in a circle, with the water tower at the center of the circle. The Internet connectivity is then expanded throughout the rest of the village houses using a complex method of multiple access points, wireless distribution systems and repeaters.

The network in some of the villages at the further ends of the village (those furthest away from the water tower) is actually very weak due to attenuation. Moreover, because the network on the further end of the village is dependent on the access points in between, any disruption to the access points in between can cripple the network. Disruptions include occasional power outage (due to students turning off the power or power failure) or the automatic resetting of the routers when the numbers of connections increase

Apart from the wireless infrastructure, we also investigated that many computers do not have anti-virus software installed. This may easily cause a pandemic should a virus get introduced into a computer. Besides that, we also realized that the main data servers (Sky, Earth and Sea) had its last data backup done in 2011.

Outcomes

Firstly, we did a network site survey in our first 2 weeks here to identify the weak areas. Then, we installed a couple of additional access points to improve the distribution of the network. Initially, we met with a lot of problems, because the firmware of the exiting Ubiquiti Access Points have been flashed by Jack Bates couple of months ago to use an open source firmware (OpenWrt), and the new Ubiquiti Access Points brought over by the LiquidNet people were running on the original Ubiquiti firmware. Initially, we thought it will work, but eventually we realized that that all had to be flashed with the same OpenWrt firmware in order for the Wireless Distribution System to work. We considered a few alternatives – to re-flash all the operating system back to the default, or to try to install the OpenWrt firmware on the new access points. In the end, we decided that it would be easier to install the OpenWrt firmware on the newer one because it is more economical.

Working together with the LiquidNet technology experts, we also did a couple of experiments such as disabling the Wireless Distribution System at the Access Points that are furthest away from the water tower. This is because we suspected that the Access Points restarts itself due to connection overload due to the multiple Wireless Distribution Modes that has been set, as we realized that there was no need for the Wireless Distribution System to be enabled for Access Points that are already the furthest, as only client computers will be connected to them, and no more client Access Points.

On top of these, we also replaced a few faulty Access Points, experimented with and changed the angles of others, so that the signal of one Access Point is propagated sufficiently to another to support the network which is heavily dependent on the other Access Points for the Wireless Distribution network.

Together with Deo and the LiquidNet team, we monitored the network over the next couple of days, to ensure that the network remained stable after installing and changing the hardware. The feedback from the village suggested that the network bandwidth has improved since.

With regards to the Anti-Virus problem, the LiquidNet team brought some software of which we installed into the computers. We also set up a monthly policy to do a full backup of the server, and a weekly incremental backup using Symantec Backup Exec (see Appendix 3).

Recommendations

Due to the fact that the administration depends heavily on Internet for their work and correspondence with New York, we recommend that a wired network be constructed within the administration building as well as to the WiMax satellite. This will help to improve on the network latency.

Moreover, because the main backbone of the Internet bandwidth is dependent on a WiMax satellite to receive signal from Rwamagana, it can be unstable at times. Hence, should budget allow, the next step that should be taken would be to run a wire to Rwamagana to replace the WiMax satellite. However, this might be a costly decision, in terms of laying the cable and maintenance, but it will definitely increase the situation of the Internet.

To increase the stability and bandwidth of the Internet connection within the village, all access points also can be installed with a backup power surge so that it can still function in an event of a power failure, or accidental power trips by students. Also, should budget allow, more access points can be installed within the village to improve coverage, and also, should budget allow, physical wires can be laid to connect the access points to share the Local Area Network, rather than the current situation of using a Wireless Distribution Network and repeaters, which are subjected to a lot of attenuation and interference. Finally, the village may also consider other options in terms of the service provider.

IV. Organising a Hackathon Competition for the students

Motivation

The students at ASYV are extremely motivated to learn, and have been heavily involved not just in classes in school, but also in other informal activities such as volunteer work, teaching, sports etc. However, based on past experiences and our observations, we have found that many students do not have the initiative to learn programming independently despite their strong interest in technology.

The ASYV Challenge is targeted for all ASYV students interested in programming. Through the event, we would like the students to achieve a rewarding experience of self-learning and collaboration, as well as motivate them and provide them with the resources to explore further into IT. Therefore, unlike other hackathons which focuses more on the outcome, the ASYV Challenge focuses more on the learning process. On top of that, we want to provide these vulnerable students with an opportunity to express their ideas on their dreams and aspirations.

This year, the Alice Challenge serves as a demonstration project to test the feasibility and collect feedback (see Appendix 2B). The project documentation will include the logistics necessary for future repetition, feedback survey and sustainability analysis.

Outcomes

2013 ASYV Alice Challenge Schedule		
Date	Item	Description
28 June	Project Launch	<ul style="list-style-type: none"> • Alice demo & Competition announcement
29 June – 30 June	Project Preparation	<ul style="list-style-type: none"> • Established the Alice Challenge email account • Uploaded resources on the server for reference • Conducted registration and finalized the teams list • Ideas brainstorming • Software (Alice) installation in the computer labs
1 July – 4 July	Coding & Consultation	<ul style="list-style-type: none"> • Consultation sessions • Provided assistance and monitored team progress • Finalized judges and presentation details • Invited media (ASYV TV news) and recorded competition process • Designed the feedback form
4 July	Teams Presentation	<ul style="list-style-type: none"> • Evaluated the participants' projects according to the competition rubrics • Collected & organized feedback
5 July	Prize Presentation	<ul style="list-style-type: none"> • Presented medals to the top three teams • Group pictures • Follow-up networking

The competition lasted for one week and 20 students were registered. Students were allowed to group themselves into teams of 3 maximum. However, we have noticed that most of the students did not commence on the coding process until one or two days prior to the final presentation. Among the 7 teams who registered, only 5 showed up in the final presentation. They mainly used the computers in the computer labs/Orange club house for the projects.

According to our survey (see Appendix 2B), the competition was well received by the students. All of the feedback stated that students enjoyed themselves during the competition. They have given various reasons for this: Alice is interesting to learn; they worked well in a team; the projects opened their minds and produced amazing outcomes...etc. A common reason and hence a contributing factor was that the participants were given an avenue to express their ideas through creative means.

Overall, team collaboration turns out to be very good. 12 out of 16 students gave the highest score for “I worked well with my team member(s) during the competition”; 13 students gave 5 for “I feel more confident in learning programming on my own after the ASYV Challenge 2013”.

Furthermore, the feedback shows that 15 out of 16 students are more interested in towards an IT-related career/education in the future, while 1 student remained neutral. Moreover, 15 out of 16 students expressed a strong interest in attending programming competitions in future, while 1 remained neutral.

The students have given interesting answers to what they have learned in the competition, including teamwork, critical thinking, presenting their ideas and independent learning. One student mentioned learning to be patient; many mentioned that the project made them create something with their skills, which was a very rewarding experience.

The enthusiasm and efforts the students have shown in the competition were extremely impressive. We have created a Facebook group (Code 4 Good Rwanda) to extend the connections built during the competition. This group welcomes anyone interested in computers, IT and coding in Rwanda, for the better of Rwanda. It aims to provide a channel for networking and events, as well as for members to pool together and share resources. We are currently working to invite students, as well as people from K-lab (<http://klab.rw/> which consists of IT entrepreneurs in Kigali) to join this group.

The group can be accessed via <http://tinyurl.com/code4good> (see Appendix 2A).

Media coverage was provided during the event, and a write-up was sent to the New York headquarters. Eventually, an article on the event was published on the ASYV blog (<http://www.asyv.org/blog/alice-hackathon-for-rwanda>), which was featured on the official ASYV website (see Appendix 2A).

Recommendations

As mentioned above, 15 out of 16 students have expressed a strong interest in participating in a programming competition in the future. Given the passion shown by the students, there will be no issues with expanding the competition and getting more participants. For instance, we have received a lot of feedback from students requesting for more programming competitions on a semester/annual basis. We have also received feedback that many of their friends are interested in learning Alice and these students have shown enthusiasm in teaching to pass on the knowledge.

Regarding the future plans for the programming competition, there are some points worth consideration:

- **Organizers.** Given the low investment of both money and time, we are convinced that the competition should and can be continued by other consultants/volunteers. Currently, Claude, the director of K-lab has shown interest in a collaboration to organize a hackathon to make this a larger-scaled event, which is an opportunity worth considering.

We propose having CMU consultants in future under the Technology Consulting in the Global Community program to assist with its execution.

Moreover, many students themselves have indicated interest in organizing the subsequent events. This may be a good opportunity to expose students to running an event, with the supervision of the CMU consultants.

- **Tool.** As a 3D interactive animation environment, Alice is interesting, visual and easy to learn. It does not require any prior programming knowledge, and is able to produce amazing works in a short time. All these features make Alice a good choice for the competition – it motivates the students to learn on their own and express themselves. As an inaugural event where students were first exposed to Alice, the technical expectations were low. Should Alice be used as the tool in subsequent runs, more advanced features should be expected because some of the students have already gained prior experience using Alice. Also, there are other possible alternatives, such as Bootstrap, Scratch and FMS Logo, which may be considered in future to expose the students to different software.
- **Time & Training.** Some students mentioned in the feedback that they were given insufficient time for preparation. That may be true for some teams; however, there were also teams who started their work at the last minute. In the competition context, time limit is a test of teamwork and time management skills. The amount of time given should be based on the complexity of the chosen tool. In terms of guidance, we have only given the first introduction presentation and walked them through a basic

tutorial. We also held several consultation sessions and solved the problems with the students together. Basically, we tried a hands-off approach so they could learn by themselves.

An alternative approach is providing a systematic pre-hackathon training course and limited time for theme-based projects, which can motivate the students to develop useful applications/websites according to the requirements and with the guidance of a mentor. This needs close collaboration with mentors and long-term student endeavors, but it establishes a bridge between students and real world IT projects.

- **Structure.** In this Alice Challenge competition, all the students worked in teams. A 20% weightage was given to final presentation too, so that emphasis is not placed only on the programming aspects. From the feedback, we can see that the presentation of their own ideas has given them one of the most rewarding experiences throughout the process. Therefore, for the future competitions, we propose a structure which enables students to exercise teamwork, presentation as well as technical exploration.
- **Follow-up.** We have seen great potential for these students to be involved in the IT-scene in Rwanda. To extend the impact of the hackathon, we have created a Facebook group and tried to involve local entrepreneurs from kLab. We foresee this to become a platform for resource sharing and further networking events. In the future competitions, the organizers could consider reaching out to the tech entrepreneurs for more support. The director from Klab has shown interest in recruitment of high school graduates, and further involvement in Klab projects can benefit the students in both practical IT experience and career development.

Appendix 1A – ASYV Student Information System Use Cases

Summary

In our interviews with different departments across ASYV, we have found the two common user requirements, and they are namely:

- 1) Sharing a complete student profile which includes demographic information, formal education, informal education and alumni information.
- 2) Doing statistical analysis/generating reports based on data.

Currently, the village uses Microsoft Access for student health information and alumni databases. The formal education department keeps student academic records in spreadsheets. The informal education has no standard evaluation process for individual students. Dimitrie (Informal Education), Moses (Resource Center) and Elizabeth (Resource Center) have access to the alumni database, but it is rarely used because of the complicated user interface.

There are three libraries in total. Two of them are located in the school, which contain mostly textbooks. The other one is in the Orange Club House in the village, which is managed by Michell, one of the volunteers.

Aloys manages the library books in the school. He is in charge of purchasing new books according to the curriculum, and ensuring a student/book ratio of 2:1. He adds new items into the spreadsheets when receiving new books/donations. That is the only electronic document for libraries.

Aloys is located in one of the libraries in the school, and keeps record of borrowings and returns on paper. The other school library is open to the students most of the day, and the books are not tracked. Aloys only checks the number of books annually, which is a very time consuming process. There are a lot of books missing/broken each year, and Aloys will figure out how many new books to purchase based on this information.

Considering the major needs and complexity, we propose a student-centric system integrating formal education, informal education and student health & wellness information, which keeps record of complete student activities from pre-enrollment till post-graduation.

For library management, there are some important prerequisites to be met before the library module can be put in use. First of all, every library should have a librarian in its opening hours. Second, there are approximately 6000 books scattered in the libraries, club houses and families in ASYV. Currently there is no proper system tracking all the books. Given the lack of manpower, it requires a lot of efforts to organize, label, and track all the books in the system.

Based on our recommendations, we have custom-built a student system mainly for informal education and alumni information to solve the most urgent needs of the village. This system is not meant to replace the current Rediker used by formal education, which is currently well-managed by Biira. We have also built the library module, which, considering all the above reasons, is not ready to be used yet.

Finally, given the inconvenience and licensing issues of Rediker, on top of long term stability and sustainability issues, the long-term solution should be outsourcing the whole integrated system to a vendor. The objectives of this use case document are to specify user requirements elicited from all of our interviews and to provide perspectives for future system development.

Use case scenarios

UC-1:	Manage Student Profile
Actors:	Administrator, Moderator, Staff
Preconditions:	<ol style="list-style-type: none"> a) User's identity has been authenticated. b) Administrator/Moderator is authorized to create and revise student profile. c) Staff is authorized to view and update all student information.
Main Scenario:	<ol style="list-style-type: none"> 1. When a new student is enrolled, the following information is required to create a new student profile: <ul style="list-style-type: none"> • Student ID (can be generated by the system automatically) • Rwandan name • Gender • Date of birth • Province of origin • Admission year • Guardian name 2. During the 4 years in ASYV, the following profile information of a student will be retrieved from different modules of the system: <ul style="list-style-type: none"> • Family [Informal Education] • Enrichment Program (EP) [Informal Education] • Subject Combination [Formal Education] • Professional Skills [Informal Education] • Leadership Roles [Informal Education] • Discussion Negotiation Agreement (DNA) Case [Informal Education] 3. When the student graduates, the student type changes to alumni. The following information will be collected/updated before graduation: <ul style="list-style-type: none"> • National Exam (NE) results • Phone • Email • Current Address • Government Program/Scholarships/University • Career goal/Current job • Social qualities • Interest • Overall evaluation

Alternative Scenarios:	<ol style="list-style-type: none"> 1. The following information is optional and can be updated by staff users: <ul style="list-style-type: none"> • Christian name • Profile picture • Sector of origin • Village of origin • Guardian phone • Remarks 2. The alumni information is supposed to be updated regularly by the staff in charge to track the career development of graduates.
Priority:	High
Other requirements:	The student profile information can be imported and exported.

UC-2:	Manage Student Academic Information
Actors:	Administrator, Moderator, Staff
Preconditions:	<ol style="list-style-type: none"> a) User's identity has been authenticated. b) Administrator/Moderator is authorized to assign students, create and manage classes, semesters, subjects and exams. c) Staff is authorized to view and update student academic information.
Main Scenario:	<ol style="list-style-type: none"> 1. In enrichment year, the students are assigned to A, B, C, or D class. 2. In Seniors 4, 5, 6, the students are assigned according to their combinations. 3. The moderator creates semesters, sets of subjects, exams and teacher information for each class. 4. Staff can access exam modules and enter student exam marks and comments for the subject he/she teaches. 5. The system can generate reports per student/class/grade/combo.
Alternative Scenarios:	<ol style="list-style-type: none"> 1. Moderator may enroll students into additional optional subjects 2. Moderator should be able to query for students based on their subjects, combination, and results (i.e. Top 5 students for Subject X)
Priority:	High
Other requirements:	Student academic information can be imported from and exported to Excel.

UC-3:	Manage Student Health & Wellness Information
Actors:	Administrator, Staff from the health & wellness department
Preconditions:	<ol style="list-style-type: none"> a) User's identity has been authenticated. b) User is authorized to access student health & wellness information.
Main Scenario:	<ol style="list-style-type: none"> 1. When a new student profile is created, the clinic staff enters the student medical assessment upon entrance: <ul style="list-style-type: none"> • Date • Height • Weight • BMI • Blood pressure • Pulse • Conjunctiva • Skin • Head and neck • Ears • Eyes • Chest • Cardiovascular • Respiratory • Abdomen • Unitary • Posture • Systematic Mebendazol • Other Systematic Prevention • History of illness/chronic medical problems • History of medical operations • Allergy • History of skin problems • History of ears problems • History of vision problems • History of Cardio vascular problems • History of respiratory system problems • History of gastrointestinal system problems

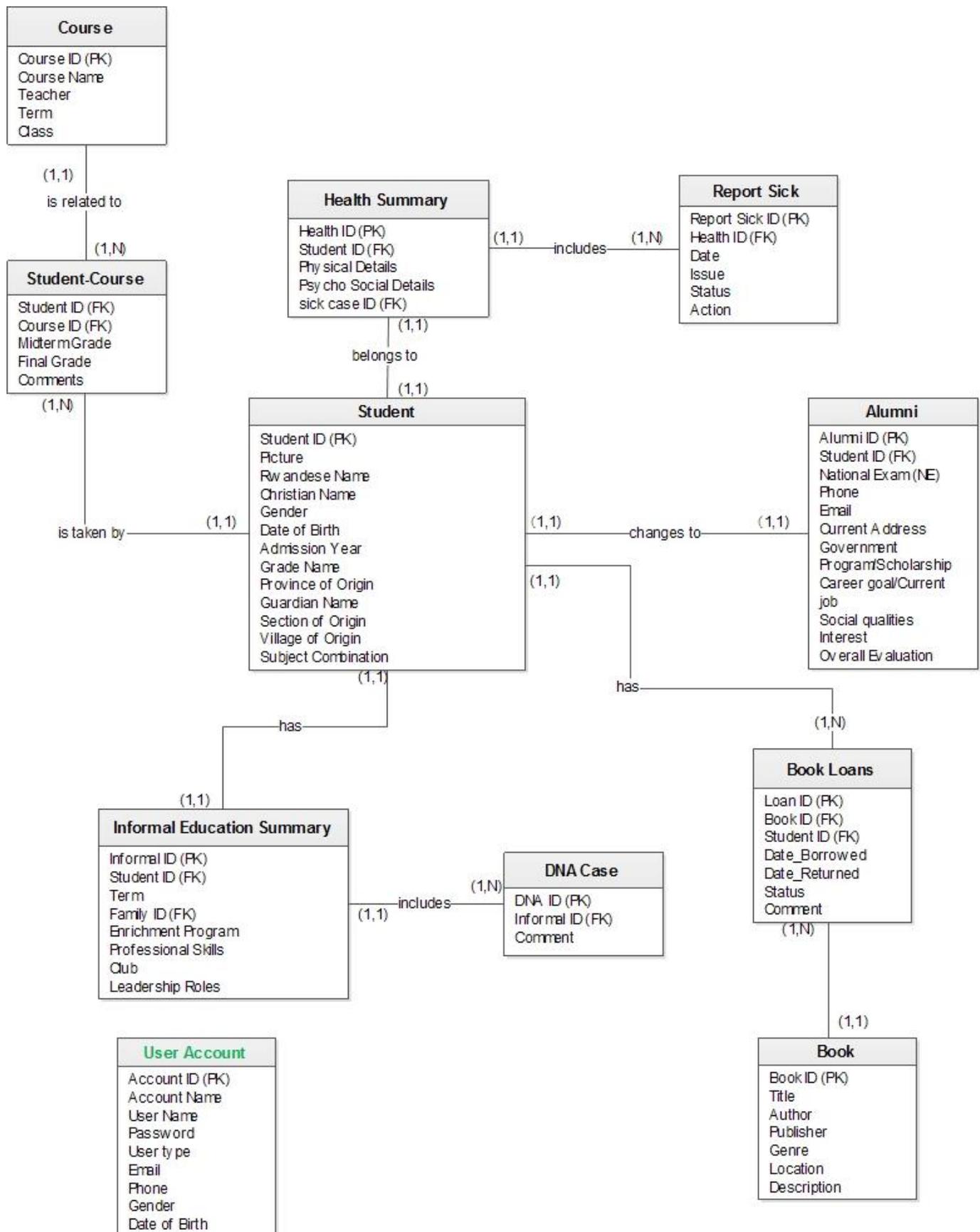
	<ul style="list-style-type: none"> • History of urinary system problems • History of musculoskeletal system problems • General status • Comments <p>2. Student psycho social information upon entrance:</p> <ul style="list-style-type: none"> • Child Lives With • Is father alive? • Cause of Father's death • Is Mother Alive? • Cause of mother's death • Support System • Resources • History of Physical Abuse • History of Emotional Abuse • History of Sexual Abuse • History of Depression • History of PTSD • Other Anxiety • History of Drug Abuse • History of Alcohol Use • History of Cigarette Use • Contact with Legal System • Arrested • Imprisoned • HIV Test Result • Date of Test • Treatment • Special Concerns • Sexually Active • Future Vision • Physical Mental Support • Current Treatment <p>3. When a student seeks help from the health & wellness center, a new sick case is created specifying date, issue, case status (open/closed) and action.</p>
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	<ol style="list-style-type: none"> 4. When the case does no longer require follow up, the case status is changed to closed. 5. Only staff with authorization (usually clinic staff) can view and update student health information and generate statistical reports.
Alternative Scenarios:	<ol style="list-style-type: none"> 1. The sick case reports can track information of different periods, such as the recent 7 days, one month, half year...etc. 2. The system can generate statistical reports per person/grade based on their entrance health examination information.
Priority:	High
Other requirements:	Student health information can be imported from and exported to Excel.

UC-4:	Manage Informal Education and Alumni Information
Actors:	Administrator, Moderator, Staff
Preconditions:	<ol style="list-style-type: none"> a) User's identity has been authenticated. b) Administrator/Moderator/Staff can view and update student informal education and alumni information.
Main Scenario:	<ol style="list-style-type: none"> 1. Upon enrollment, moderator assigns each student to a family. 2. Moderator/Staff enters the Enrichment Program (EP) each student chooses. 3. At the end of enrichment year, staff enters overall evaluation/comments for EP. 4. Staff can enter the professional skills each student chooses. 5. Skill evaluation and comments are entered at the end of semester/year. 6. When the student graduates, the status changes to alumni with all the alumni database information collected and entered.
Alternative Scenarios:	<ol style="list-style-type: none"> 1. When the student joins a club, club name and leadership position are entered. 2. The student's overall involvement in club activities can be recorded by club supervisor. 3. Staff can enter DNA information.
Priority:	High
Other requirements:	<ol style="list-style-type: none"> 1. Multiple filters can be used for search, such as Professional skills + Combination. 2. Multiple keywords/tags can be used for search. 3. The informal education and alumni information can be imported from and exported to Excel.

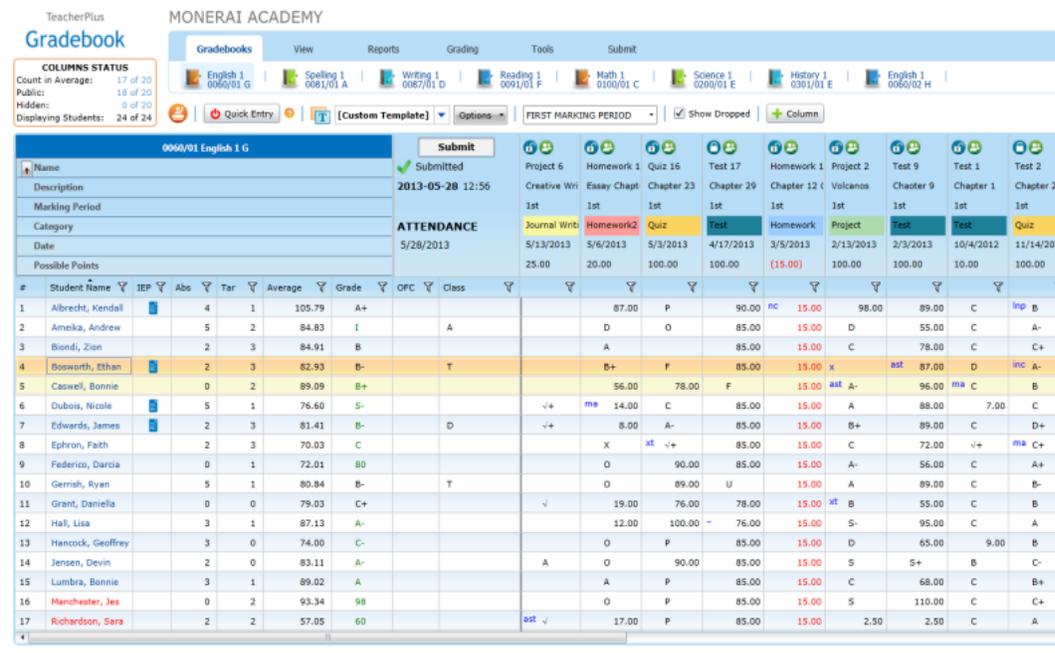
UC-5:	Manage Library System
Actors:	Administrator, Moderator, Staff
Preconditions:	<ol style="list-style-type: none"> a) All the books have been labeled with barcode. b) Existing book information is recorded in the system: ID, Title, Author, Publisher, Category, Location and other necessary information. c) The user is authorized to access the library module. d) There is at least one librarian in charge of each library in the opening hours.
Main Scenario:	<ol style="list-style-type: none"> 1. When new books are donated or purchased, enter the book information into library system. 2. The maximum number of books that can be borrowed at one time is set up for different users. 3. When a book is borrowed or returned, the librarian records Student ID, Book ID, date and book status changes. 4. The return reminder can be sent to the borrower's email by system.
Alternative Scenarios:	<ol style="list-style-type: none"> 1. The user can search for books based on name, author, status, category, location...etc.. 2. The system can list all the books on loan by a specific group of users.(e.g. Senior 6 students who are going to graduate) 3. System ensures that all graduating students have returned all books and prompt if they have not.
Priority:	Medium
Comments:	The priority is set at medium because there are a lot of preconditions that ASYV needs to work on if this module is going to be used. As a student-centric system, this module is not closely related to other student information. It is mainly used for library management.
Other requirements:	<ol style="list-style-type: none"> 1. All the book data can be imported from or exported to Excel. 2. All the loan records can be imported from or exported to Excel.

Appendix 1B – ASYV Integrated ERD



Appendix 1C – Rediker Administrator’s Plus Evaluation

a) TeacherPlus Gradebook – Complicated user interface



b) Excel Wizard – enabling smooth importing and exporting



c) Customizable Student Profile

The screenshot displays the Admissions Plus Pro interface. At the top, there is a navigation bar with icons for Home, Setup, Online Forms, Receive, Enroll, QuickMail, Reports, Statistics, Tools, Help, and Exit. Below this, the student profile for Sarah Aaron is shown, including her photo, contact information, and admission details. The main area features a table titled 'Upper School' with columns for Status, Requirement, Date, Portfolio, and Notes. A list of student names is on the left, and filter options are at the bottom.

Student Profile: Aaron; Sarah
 1939 Green Road #224
 Ellington, CT 44121
 Mailing Name: Mr. Robert Aaron
 Prospect Phone: 216-409-6875
 Birth Date: 09-01-2000
 Gender: F

Contacts:
 Father: Dr. Robert Aaron
 Mother: Mrs. Beth Aaron
 Sponsor: Microsoft Foundation

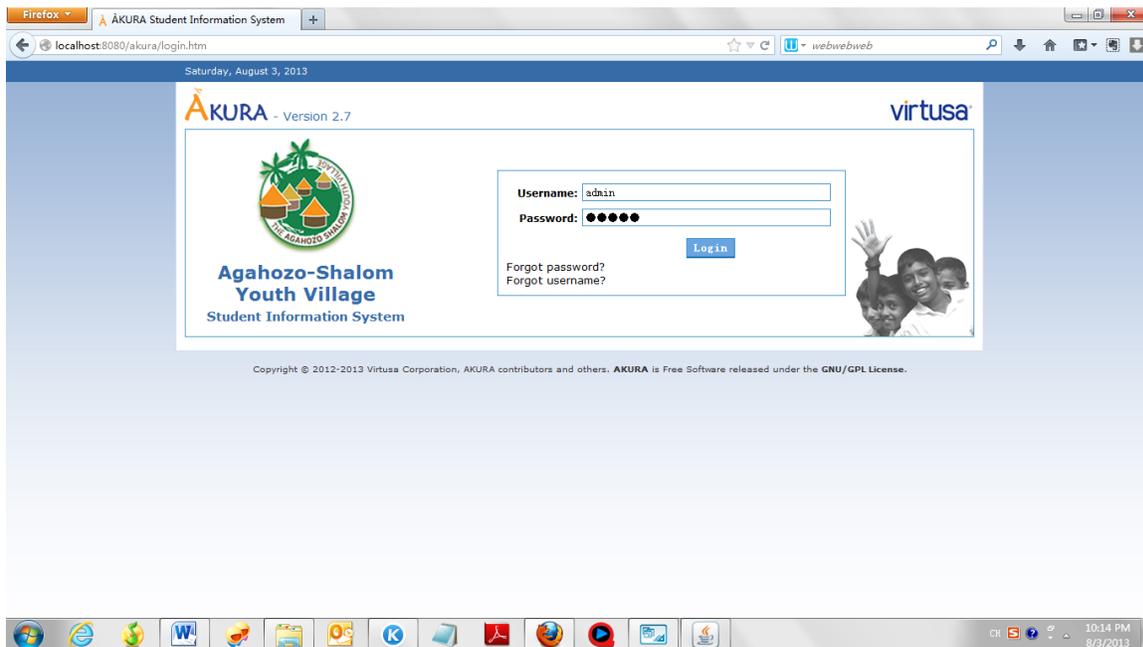
Admissions:
 School: REDIKER ACADEMY
 Program: Upper School
 Grade Level: 09
 Year: 2011-12
 Record Date: 09-02-2016

Decision: ACCEPTED
 Reason:
 Step: COMPLETED ALL
 READY FOR ENROLLMENT

Name	Status	Requirement	Date	Portfolio	Notes
Aaron, Sarah	<input checked="" type="checkbox"/>	Marketing List			
Aaron, Sarah	<input checked="" type="checkbox"/>	Initial Contact	01-05-2009		
Aaron, Sarah	<input checked="" type="checkbox"/>	Query			
Aaron, Sarah	<input checked="" type="checkbox"/>	Application Submitted	09-02-2010		
Aaron, Sarah	<input checked="" type="checkbox"/>	Application			
Aaron, Sarah	<input checked="" type="checkbox"/>	Parent Interview	11-02-2008		
Aaron, Sarah	<input checked="" type="checkbox"/>	Prospect Interview	11-02-2008		
Aaron, Sarah	<input checked="" type="checkbox"/>	Health Records	12-10-2010		
Aaron, Sarah	<input checked="" type="checkbox"/>	Student Essay	04-12-2012		
Aaron, Sarah	<input checked="" type="checkbox"/>	Recommendation: Math Teacher	10-29-2008		
Aaron, Sarah	<input checked="" type="checkbox"/>	Recommendation: English Teacher	11-02-2008		
Aaron, Sarah	<input checked="" type="checkbox"/>	Recommendation: Any Teacher	12-12-2008		
Aaron, Sarah	<input checked="" type="checkbox"/>	Birth Certificate	05-08-2009		
Aaron, Sarah	<input checked="" type="checkbox"/>	Transcript from Prev Sch	04-30-2012		
Aaron, Sarah	<input checked="" type="checkbox"/>	Student Photo	04-30-2012		
Aaron, Sarah	<input checked="" type="checkbox"/>	Decision			Accepted
Aaron, Sarah	<input checked="" type="checkbox"/>	Registered	04-09-2009		
Aaron, Sarah	<input checked="" type="checkbox"/>	Deposit	11-02-2008		
Aaron, Sarah	<input checked="" type="checkbox"/>	Tuition Plan Signature	11-02-2008		
Aaron, Sarah	<input checked="" type="checkbox"/>	Bank Information	12-12-2008		
Aaron, Sarah	<input checked="" type="checkbox"/>	Enrolled			
Aaron, Sarah	<input checked="" type="checkbox"/>	Ready for Attendance			

Appendix 1D – Akura Student Information System

a) User Login



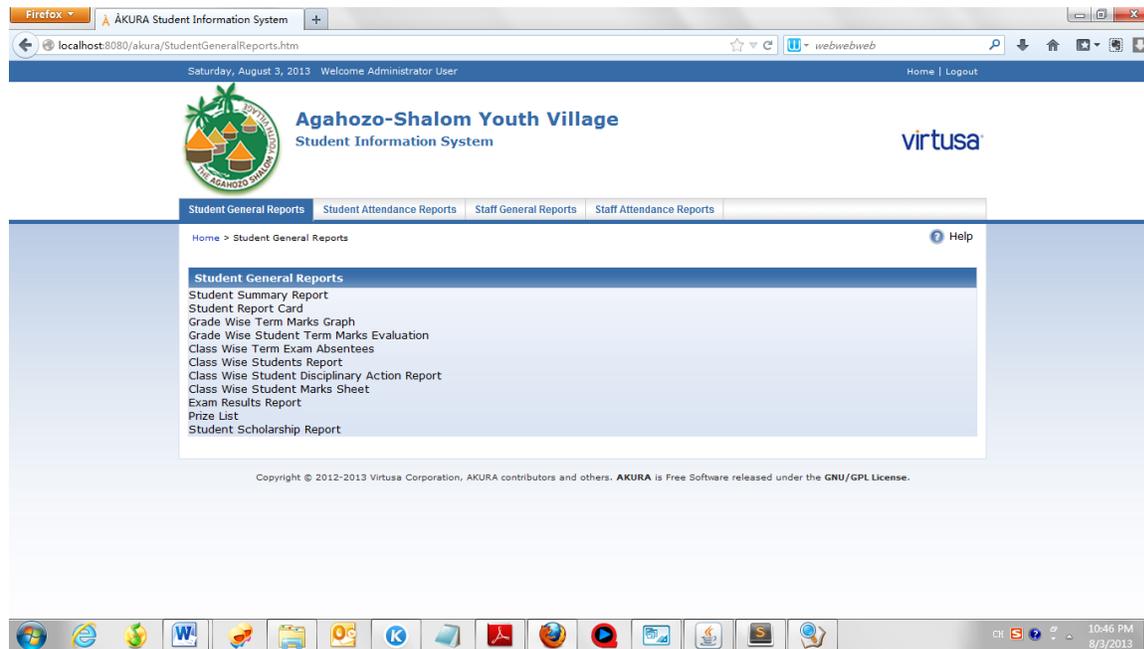
b) Welcome page – News & Events



c) Reference Module



d) Reporting Module



Appendix 1E – Data Dictionary for Customized Prototype

Key

Table name (Attribute: Type)

- i. Alumni (id: integer, student_id: integer, national_exam: text, career_goal: text, interest: text, current_employment: text, year_of_graduation: string, comments: text, created_at: datetime, updated_at: datetime, grade_name: string, current_address: string)
- ii. Books (id: integer, student_id: integer, title: string, author: string, publisher: string, genre: string, language: string, source: string, date_received: date, description: string, location: string, date_borrowed: date, created_at: datetime, updated_at: datetime, copy: string, section: string, fiction_non_fiction: string)
- iii. Student (id: integer, rwandan_name: string, christian_name: string, gender: string, dob: date, sector_of_origin: string, village_of_origin: string, province_of_origin: string, phone: string, grade: string, mama_name: string, family_name: string, guardian_name: string, relationship_with_guardian: string, guardian_phone1: string, guardian_phone2: string, nationality: string, email: string, created_at: datetime, updated_at: datetime)
- iv. Formal Education (id: integer, student_id: integer, combination: string, courses: text, grades: text, comments: text, created_at: datetime, updated_at: datetime)
- v. Informal Education (id: integer, student_id: integer, club: text, sports: text, enrichment_programme: text, professional_skills: text, events: text, dna_cases: text, individual_evaluation: text, attendance_records: text, comments: text, created_at: datetime, updated_at: datetime)
- vi. Medical (id: integer, student_id: integer, date_of_checkup: date, medical_history: text, history_of_medical_operation: text, allergy: string, specific_allergy: string, history_of_skin_problems: string, specific_skin_problems: string, history_of_ears_problems: string, history_of_vision_problems: string, history_of_cadiovascular_problems: string, history_of_respiratory_problems: string, history_of_gastrointestinal_problems: string, history_of_unitary_problems: string, history_of_skeletal_problems: string, weight: integer, height: integer, bmi: integer, blood_pressure: string, pulse: integer, general_status_impression: string, conjuntiva: string, skin: string, head_and_neck: string, ears: string, eyes: string, chest: string, cardio_vascular: string, respiratory: string, abdomen: string, unitary_string: string, posture: string, systematic_mebendazol: string, other_systematic_prevention: string, specific_systematic_prevention: string, doctor_name: string, created_at: datetime, updated_at: datetime)
- vii. Psycho Social (id: integer, student_id: integer, child_lives_with: string, is_father_alive: string, cause_of_father_death: string, is_mother_alive: string, cause_of_mother_death: string, support_system: string, resources_string: string, history_of_physical_abuse: string, history_of_emotional_abuse: string, history_of_sexual_abuse: string, history_of_depression: string, history_of_ptsd: string, other_anxiety: string, history_of_drug_abuse: string, history_of_alcohol_use: string, history_of_cigarette_use: string, contact_with_legal_system: string, arrested: string, imprisoned: string, hiv_tested: string, date_of_test: date, result: string, treatment: string, special_concerns: string, specific_concerns: string, sexually_active:

string, future_vision: string, phy_mental_support: string, current_treatment: string, appointment: string, institution: string, name_of_person_intake: string, created_at: datetime, updated_at: datetime)

viii. Report Sick (id: integer, student_id: integer, doctor_name: string, visit_date: date, visit_time: time, issue: text, medication: text, resolved: string, documentation: text, created_at: datetime, updated_at: datetime)

ix. Users (id: integer, username: string, email: string, password_hash: string, password_salt: string, created_at: datetime, updated_at: datetime, rwandan_name: string, christian_name: string, role: string, dept: string, gender: string, phone: string, dob: date, address: string, last_login: datetime)

AGAHOZO-SHALOM YOUTH VILLAGE

Integrated Information Systems Guide



Instruction Manual

WRITTEN BY

Carnegie Mellon University

Student Consultants:

Terence Lim

Qiulu Gong

Table of Contents

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Logging On

ASYV Login

Username or Email Address

Password

Built by CMU Student Consultants 2013 - Terence Lim & Gong Qiulu

Figure 1. Login screen

1. The application can be accessed via: <http://asyv.herokuapp.com>
2. Input either *username* or *registered email address* into the first field
3. Input *password* into the second field
4. Click on the *blue log in* button.
5. If login is successful, users will be redirected to the dashboard (Chapter 2). Otherwise, users will be redirected back to the login page to re-enter their username/email and password.

Dashboard

Students Information					
Total Number of Students in Record	244				
Number of Current Students	Enrichment: 126	Senior 4: 0	Senior 5: 0	Senior 6: 0	Total: 126
Total Number of Graduated Students	118				

Alumni Information	
Total Number of Alumni	118
Alumni With Jobs	16

Figure 2a. Standard account dashboard

Health and Wellness Information	Enrichment	Senior 4	Senior 5	Senior 6	Total
Mean Height (cm)	161.81	0	0	0	161.81
Median Height (cm)	161.0	0	0	0	161.0
Min Height (cm)	140	0	0	0	140
Max Height (cm)	185	0	0	0	185

Report Sick Information	
Total Report Sick Cases	3

Figure 2b. Health and Wellness, Moderator, Admin accounts dashboard

1. The dashboard for Standard users consists of a quick summary of important information (Figure 2a).
2. The dashboard for Moderator/Admins/Health and Wellness users will display additional information that includes health and report sick statistics (Figure 2b).
3. The dashboard can be accessed by either:
 - a. Clicking on ASYV on the top left corner.
 - b. Clicking on the *Settings logo* on the top right corner, followed by *View Dashboard* in the dropdown menu.

Students

Name	Gender	Family	Phone	Grade	Email
Abindekwe ngarambe Celestine		Rwagasore		Graduated	
Asimwe Fred		Kagame		Graduated	
Bandushimana muneza Blandine		Socrates		Graduated	
Benemariya Hyacinthe		Anne Frank		Graduated	
Bizimana J.M.V		GW President		Graduated	
Byukusenge Berthe		GW Carver		Graduated	
Byukusenge Yvette		Socrates		Graduated	
Cyiza Christine		Socrates		Graduated	
Cyuzuzo Marius		GW President		Graduated	
Diamant Diane		Benazir		Graduated	
Dusenge Venuste		Sankara		Graduated	
Furaha Jeannette		Anne Frank		Graduated	
Gasasira Theogene		GW President		Graduated	

Figure 3a. List students (View for Moderators & Admins)

1. The **List Students** -> **All Students** shows a full list of all the students (current students and alumni).
2. The **List Students** -> **Current Students** shows the full list of students currently enrolled in school (Enrichment Year, Senior 4, Senior 5 and Senior 6).
3. The **List Students** -> **Alumni** shows the full list of students who has graduated from ASYV.
4. The **List Students** -> **Special Search** allows users to search for specific student(s) based on and up to 3 criteria. For example, users may search for student(s) who fulfills all 3 criteria: studied the **MPC** subject combination, from the **Anne Frank** family, and has an interest/career goal in **IT**.

All Students

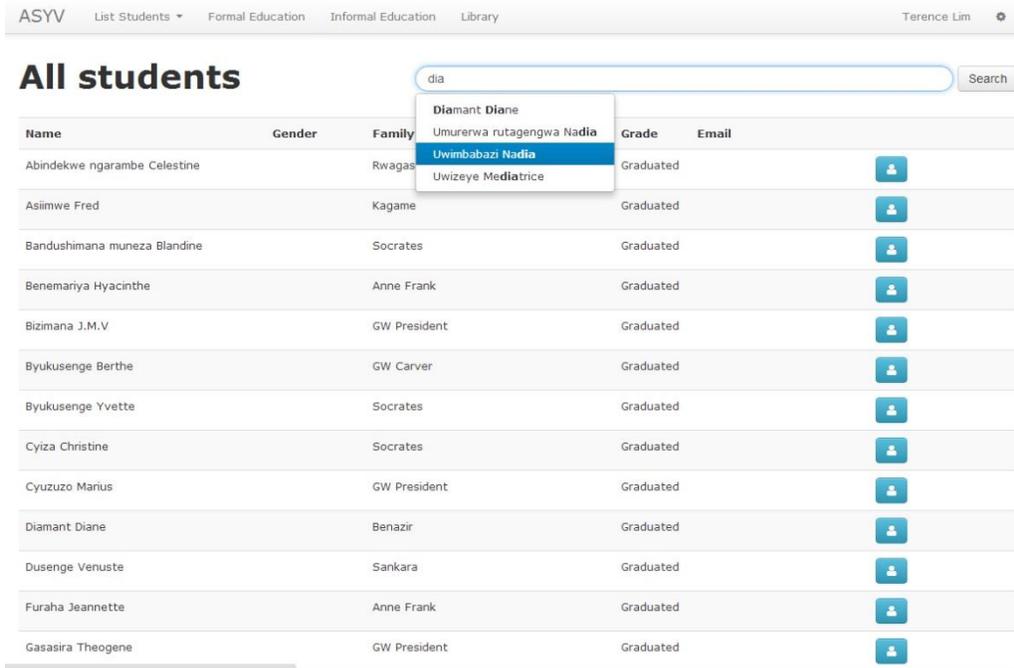


Figure 3b. All students (View for Standard Users)

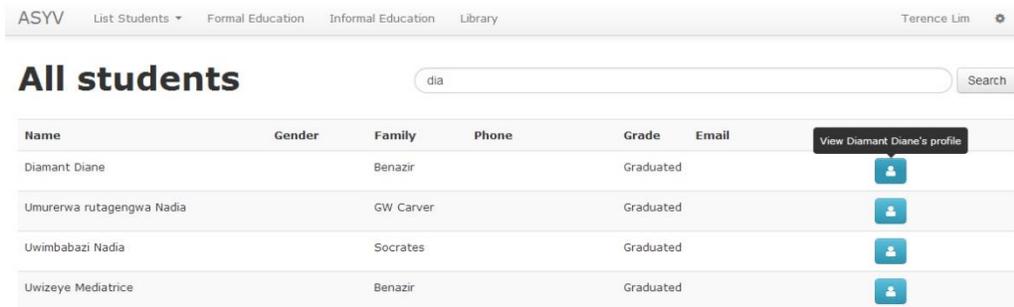


Figure 3c. Search results (View for Standard Users)

1. Within *All Students*, users may search for Students by *Name*, *Family*, *Grade*, *Phone* or *Email*.
2. Standard users may click on the *blue button* to view full student profile, while Moderators & Admins can click on a *red button* (Figure 3a) to delete a student.
3. Users may scroll to bottom of the page and choose to *export all student data* to excel, while Moderators & Admins can also add a new student.

Current Students

The screenshot shows a web interface for 'Current Students'. At the top, there is a navigation bar with 'ASYV' on the left and 'List Students', 'Formal Education', 'Informal Education', and 'Library' in the center. On the right of the navigation bar, the user's name 'Terence Lim' and a settings icon are visible. Below the navigation bar, the title 'Current students' is displayed in a large font. To the right of the title is a search bar with the placeholder text 'Search Current Students by Name, Family, Grade, Phone, Email' and a 'Search' button. Below the search bar is a table with the following columns: 'Rwandan name', 'Gender', 'Family', 'Grade', and 'Email'. The table contains 13 rows of student data. Each row has a blue button with a person icon in the rightmost column, which is used to view the student's profile.

Rwandan name	Gender	Family	Grade	Email
Mukashyaka Sabrina	Female		Enrichment	
Umutoniwase Aline	Female		Enrichment	
Ikirezi Butera Sapientia	Female		Enrichment	
Nayitunki Immaculee	Female		Enrichment	
Uwase Olive	Female		Enrichment	
Kayitesi Divine	Female		Enrichment	
Ingabire Mireille	Female		Enrichment	
Mushimiyimana Marie Rose	Female		Enrichment	
Uwamahirwe Florence	Female		Enrichment	
Niyonkuru Divine	Female		Enrichment	
Niragire Josepha	Female		Enrichment	
Mukarumongi Solange	Female		Enrichment	
Uwizeramariya Syvie	Female		Enrichment	

Figure 3d. Current students (View for Standard Users)

1. Within *Current Students*, users may search for Students by *Name, Family, Grade, Phone* or *Email*.
2. During search, autocomplete may be generated to help users with their search.
3. Users may click on the *blue button* to view full student profile.

Alumni

ASVV List Students ▾ Formal Education Informal Education Library Terence Lim

Alumni

Search Alumni by Name, Batch, Family, Career Goal, Employment, Interest, Courses, Comment: Search

Rwandan Name	Batch	Family	National exam	Career goal	Current employment	Year of graduation	Comments	
Abindekwe ngarambe Celestine	Urumuli	Rwagasore	43		OLPC staff	2012		 
Asiimwe Fred	Urumuli	Kagame	22			2012	Waiting: OLPC trainer soon	 
Bandushimana muneza Blandine	Urumuli	Socrates	10			2012	Waiting: OLPC trainer soon	 
Benemariya Hyacinthe	Urumuli	Anne Frank	22			2012	Waiting: SACCO job soon	 
Bizimana J.M.V	Urumuli	GW President	40			2012	Waiting: OLPC trainer soon	 
Byukusenge Berthe	Urumuli	GW Carver	46			2012	Waiting: SACCO job soon	 
Byukusenge Yvette	Urumuli	Socrates	61			2012	Scholarship: Akillah Student	 
Cyiza Christine	Urumuli	Socrates	25			2012	Waiting: SACCO job soon	 
Cyuzuzo Marius	Urumuli	GW President	70			2012	Waiting: OLPC trainer soon	 
Diamant Diane	Urumuli	Benazir	49			2012	Scholarship: Akillah student	 
Dusenge Venuste	Urumuli	Sankara	43			2012	Waiting: OLPC trainer soon	 
Furaha Jeannette	Urumuli	Anne Frank	55			2012		 
Gasasira Theogene	Urumuli	GW President	22			2012	Scholarship: SACCO job soon	 

Figure 3e. Alumni (View for Standard Users)

1. Within *Alumni*, users may search for Students by *Name*, *Batch*, *Family*, *Career Goal*, *Employment*, *Interest*, *Courses* and *Comments*.
2. Users may click on the *blue button* to view full student profile.
3. Users may click on the *yellow button* to edit student alumni profile.

Special Search

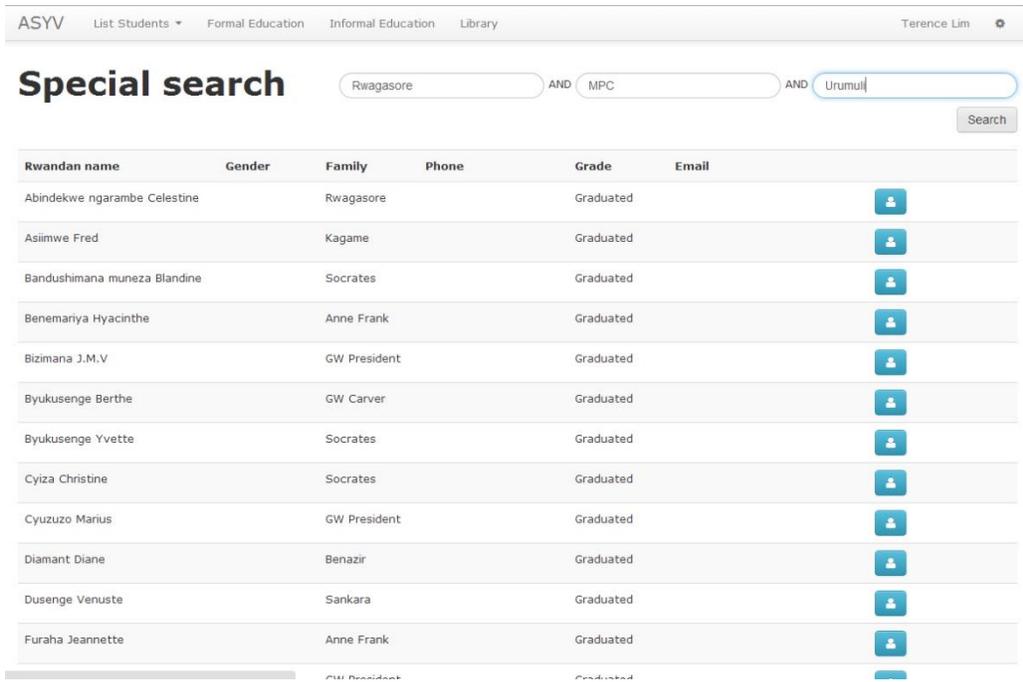


Figure 3f. Special Search (View for Standard Users)

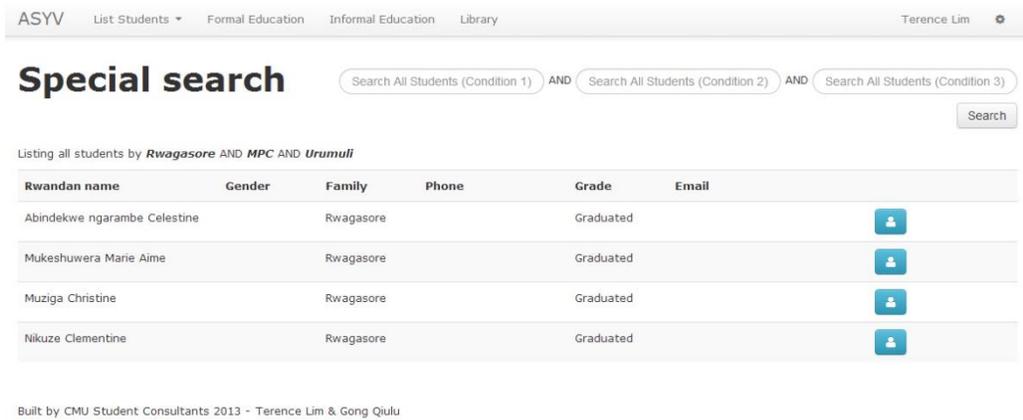


Figure 3g. Special Search Results (View for Standard Users)

1. Within *Special Search*, users may search for Students by *Name, Phone, Email, Family, Grade, Professional Skills, Combination, Courses, Clubs, Sports, Enrichment Program, Events, Individual Evaluation, National Exam, Career Goal, Interest, Employment, Batch* and *Comments*.
2. Users may click on the *blue button* to view full student profile.

View Profile

Demographic Information [Edit Demographic Information]	
Rwandan name	Diamant Diane
Christian name	
Gender	
Date of Birth	
Sector of Origin	Kicukiro
Village of Origin	
Province of Origin	
Phone	
Grade	Graduated
Mama name	
Family name	Benazir
Guardian name	
Relationship with Guardian	
Guardian phone 1	
Guardian phone 2	
Nationality	
Email	

Alumni Information [Edit Alumni Information]	
--	--

Figure 3h. View Student Profile (View for Standard Users)

1. Users may click on the **blue button** to view full student profile.
2. Within **View Profile**, Standard users may **Edit Demographic Information**, **Edit Alumni Information**, **Edit Formal Education Information** and **Edit Informal Education Information**.
3. Additionally, **Moderators**, **Admins** and Users from **Health and Wellness** may **Edit Medical Information**, **Edit Psycho Social Information**, and **View Report Sick information**.

Edit Profile

ASYV List Students ▾ Formal Education Informal Education Library Terence Lim ✖

Editing Student Information

Rwandan name

Christian name

Gender

Dob

Sector of origin

Village of origin

Province of origin

Phone

Figure 3i. Edit Student Profile

1. Users may edit components of student profile within *View Student Profile*.
2. Once done, users can save the updated student profile in the database.
3. *Alumni*, *Formal Education* and *Information Education* components of each student can also be edited by clicking on *yellow buttons* (Figures 3e, 4 and 5) in the respective pages.

Formal Education

ASYV List Students ▾ Formal Education Informal Education Library Terence Lim ⚙

Formal Education

Search All Students by Name, Combination, Courses, Grades, Comments Search

Rwandan Name	Grade	Combination	Courses	Grades	Comments	
Abindekwe ngarambe Celestine	Graduated	MPC				 
Asiimwe Fred	Graduated	MPC				 
Bandushimana muneza Blandine	Graduated	MPC				 
Benemariya Hyacinthe	Graduated	MCB				 
Bizimana J.M.V	Graduated	MPC				 
Byukusenge Berthe	Graduated	HEGB				 
Byukusenge Yvette	Graduated	HEGB				 
Cyiza Christine	Graduated	MEG				 
Cyuzuzo Marius	Graduated	HEGA				 
Diamant Diane	Graduated	MEG				 
Dusenge Venuste	Graduated	MPC				 
Furaha Jeannette	Graduated	HEGB				 
Gasasira Theogene	Graduated	MCB				 

Figure 4. Formal education page

1. The Formal Education page lists a summary of all students' formal education information.
2. Students can be searched by *Name*, *Combination*, *Courses*, *Grades* and *Comments*.
3. Users may click on the *blue button* to view full student profile, or the *yellow button* to edit Formal Education Information component of the student.

Informal Education

ASVV List Students ▾ Formal Education Informal Education Library Terence Lim ⚙

Informal Education

Search All Students by Name, Clubs, Sports, EPs, Prof. Skills, Events, Comments Search

Rwandan Name	Grade	Enrichment Programmes	Professional Skills	Clubs	Sports	Comments
Asimwe Fred	Graduated		IT			 
Bandushimana muneza Blandine	Graduated		IT			 
Benemariya Hyacinthe	Graduated		Hosp			 
Bizimana J.M.V	Graduated		IT			 
Byukusenge Berthe	Graduated		Hosp			 
Byukusenge Yvette	Graduated		Hosp			 
Cyuzuzo Marius	Graduated		IT			 
Diamant Diane	Graduated		Hosp			 
Dusenge Venuste	Graduated		IT			 
Furaha Jeannette	Graduated		Hosp			 
Gasasira Theogene	Graduated		IT			 
Habingabire Emmanuel	Graduated		IT			 
Hakizimana Marcel	Graduated		IT			 

Figure 5. Informal education page

1. The Informal Education page lists a summary of all students' informal education information.
2. Students can be searched by *Name, Clubs, Sports, Enrichment Program, Professional Skills, Events* and *Comments*.
3. Users may click on the *blue button* to view full student profile, or the *yellow button* to edit Informal Education Information component of the student.

Library

The screenshot shows the ASYV Library interface. At the top, there are navigation links: ASYV, List Students, Formal Education, Informal Education, and Library. The user's name, Terence Lim, is displayed in the top right. Below the navigation is the heading "All Books" and a search bar with the placeholder text "Search All Books by Title, Author, Publisher, Genre, Location, Language, Description".

Title	Author	Publisher	Genre	Location	On Loan To
Inferno	Dan Brown	UK Pub	Fiction	School Main Library	
How to save a life	George Bush	ASSV	References	School Library Store	Mukashyaka Sabrina
The world of Physics	Bay Watee	Lovre	References	School Main Library	

Below the table is an "Add Book" button and a footer that reads "Built by CMU Student Consultants 2013 - Terence Lim & Gong Qiulu". A tooltip is visible over the "How to save a life" row, stating "Student returned book: How to save a life".

Figure 6a. All books and returning book

1. The Library page shows a list of all books.
2. Books can be searched by *Title*, *Author*, *Publisher*, *Genre*, *Location*, *Language* and *Description*.
3. Books on loan has a name of student under *On Loan To*. Users may click on the *green button* when the student has returned the book to check-in and return the book.

ASVV List Students ▾ Formal Education Informal Education Library Terence Lim ⚙

Book Checkout

Student Name

Not on loan ▾

Not on loan ▾

- Mukashyaka Sabrina
- Umutohiwase Aline
- Ikirezi Butera Sapientia
- Nayituriki Immaculee
- Uwase Olive
- Kayitesi Divine
- Ingabire Mireille
- Mushimiyimana Marie Rose
- Uwamahirwe Florence
- Niyonkuru Divine
- Niragire Josepha
- Mukarumongi Solange
- Uwizeramariya Sywie
- Umwungeri Honorine
- Mukandayisenga Hycinthe
- Iranshimishje Sarah
- Ighozo Nadine
- Nyirakabanza Justine
- Mukankusi valentine

Dan Brown

July ▾ 22 ▾

Book Information

Publisher

UK Pub

Genre

Fiction ▾

Language

Figure 6b. Borrowing book and editing book information

1. Click on the **blue button** (Figure 4a) to **Edit and Check out book**.
2. Select the name of the student, followed by the **date of checkout** (default: current date).
3. Users may also update/edit book information by scrolling below the checkout page.
4. Click on the save/submit below to save the request.

Reporting Sick

[Applicable to Health and Wellness users, Moderators and Admins only]

Rwandan name	Gender	Family	Grade	Email	
Mukashyaka Sabrina	Female		Enrichment		Mukashyaka Sabrina Report Sick
Umutohiwase Aline	Female		Enrichment		
Ikirezi Butera Sapientia	Female		Enrichment		
Nayituriki Immaculee	Female		Enrichment		
Uwase Olive	Female		Enrichment		
Kayitesi Divine	Female		Enrichment		
Ingabire Mireille	Female		Enrichment		
Mushimiyimana Marie Rose	Female		Enrichment		
Uwamahirwe Florence	Female		Enrichment		
Niyonkuru Divine	Female		Enrichment		
Niragire Josepha	Female		Enrichment		
Mukarumongi Solange	Female		Enrichment		
Uwizeramariya Sylvie	Female		Enrichment		

Figure 7a. Current students reporting sick

1. Users may click on **List Students** -> **Current Students** to list all current students.
2. Users may click on the **yellow button** to create a report sick case report.

Student name	Doctor Name	Visit Date	Visit Time	Issue	Medication	Documentation	Case Status	Action
Mukashyaka Sabrina	Jaslyn	14 Jul 2013	01:18 hrs	Suicidal		Forwarded to Hospital	Case Open	
Mukashyaka Sabrina	Jaslyn	12 Jul 2013	01:15 hrs	Headache due to malaria	Painkillers		Case Closed	
Mukashyaka Sabrina	Benedict	18 Jul 2013	13:37 hrs	Student indicated depression		On 25th July, Student was found ok	Case Closed	

Export to Excel

Built by CMU Student Consultants 2013 - Terence Lim & Gong Qilulu

Figure 7b. View Report Sick Cases

Report Sick Cases																								
<table border="1"> <thead> <tr> <th>Doctor Name</th> <th>Visit Date</th> <th>Visit Time</th> <th>Issue</th> <th>Case Status</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Jaslyn</td> <td>14 Jul 2013</td> <td>01:18 hrs</td> <td>Suicidal</td> <td>Case Open</td> <td> </td> </tr> <tr> <td>Jaslyn</td> <td>12 Jul 2013</td> <td>01:15 hrs</td> <td>Headache due to malaria</td> <td>Case Closed</td> <td> </td> </tr> <tr> <td>Benedict</td> <td>18 Jul 2013</td> <td>13:37 hrs</td> <td>Student indicated depression</td> <td>Case Closed</td> <td> </td> </tr> </tbody> </table>	Doctor Name	Visit Date	Visit Time	Issue	Case Status	Action	Jaslyn	14 Jul 2013	01:18 hrs	Suicidal	Case Open		Jaslyn	12 Jul 2013	01:15 hrs	Headache due to malaria	Case Closed		Benedict	18 Jul 2013	13:37 hrs	Student indicated depression	Case Closed	
Doctor Name	Visit Date	Visit Time	Issue	Case Status	Action																			
Jaslyn	14 Jul 2013	01:18 hrs	Suicidal	Case Open																				
Jaslyn	12 Jul 2013	01:15 hrs	Headache due to malaria	Case Closed																				
Benedict	18 Jul 2013	13:37 hrs	Student indicated depression	Case Closed																				

Figure 7c. View student profile

1. Users with permission may view all report sick cases by clicking on the **Settings logo** on the top right corner, followed by **Report Sick Cases** in the dropdown menu.
2. Users may search for cases by **Student Name, Doctor, Issue, Medication** and **Case Status** (where **Case Open** requires follow up).
3. Users may edit a report sick case by clicking on the **yellow button**.
4. Users may **Export all report sick cases** to excel by clicking on the **blue button**.
5. Individual student profile shows all report sick cases by a particular student (Figure 7c), of which only staff with permission can view.

My Account



ASYV List Students ▾ Formal Education Informal Education Library Terence Lim ⚙

View Dashboard
My Account
Logout

Staff Information

Rwandan name	Terence Lim
Christian name	Standard
Username	standard
Email	standard@asyv.com
Department	Others

[Edit User](#)

Built by CMU Student Consultants 2013 - Terence Lim & Gong Qiulu

Figure 8. View and edit account information

1. Users may click on the *Settings logo* on the top right corner, followed by *My Account* in the dropdown menu to view and edit their account information.
2. Users may click on the *blue button* below to edit their *Rwandan Name, Christian Name, Email, Date of Birth, Address, Phone* and *Password*.
3. Users may leave the *Password* field blank if they do not wish to change their password.

Manage Accounts

[Applicable to Admins only]

ASVY List Students ▾ Formal Education Informal Education Library Terence Lim ⚙

All Staff

Rwandan Name	Username	Email	Department/Role	Account
Bernadette	bernadette	bernadette@asyv.org	Health and Wellness	Standard
Terence Lim	terencelim	terence@asyv.com	Others	Admin
Eric Salongo Kalisa	eric	eric@asyv.org	Operations	Moderator
Dimitrie Mukanyiligira Sissi	dimitrie	dimitrie@asyv.org	Informal Education	Moderator
Gong Qiulu	qiulu	qiulug@andrew.cmu.edu	Others	Admin
Elizabeth Siviski	elizabeth	elizabeth@asyv.org	Informal Education	Standard
Deo Kabirigi	deo	deo@asyv.org	Others	Admin
Terence Lim	standard	standard@asyv.com	Others	Standard
Jean Claude Nkukiyimfura	jc	jc@asyv.org	Others	Moderator

Account Information:

- 1) **Standard Accounts** can **View/Update Students** and their associated information (except confidential health records)
- 2) **Moderators** can **Add/View/Update/Delete Students** and their associated information (including confidential health records)
- 3) **All staff** in **Health and Wellness** Department can View/Update student confidential health records

[Add User](#)

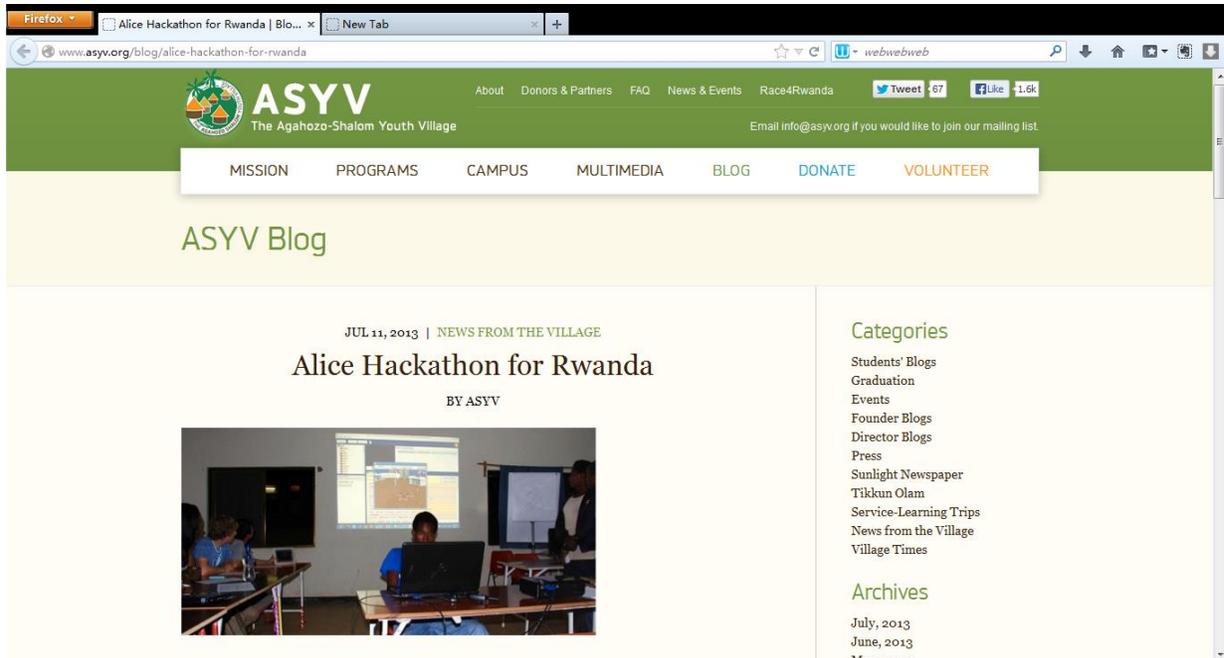
Build by CMU Student Consultants 2012 Terence Lim & Gong Qiulu

Figure 9. Manage all staff accounts

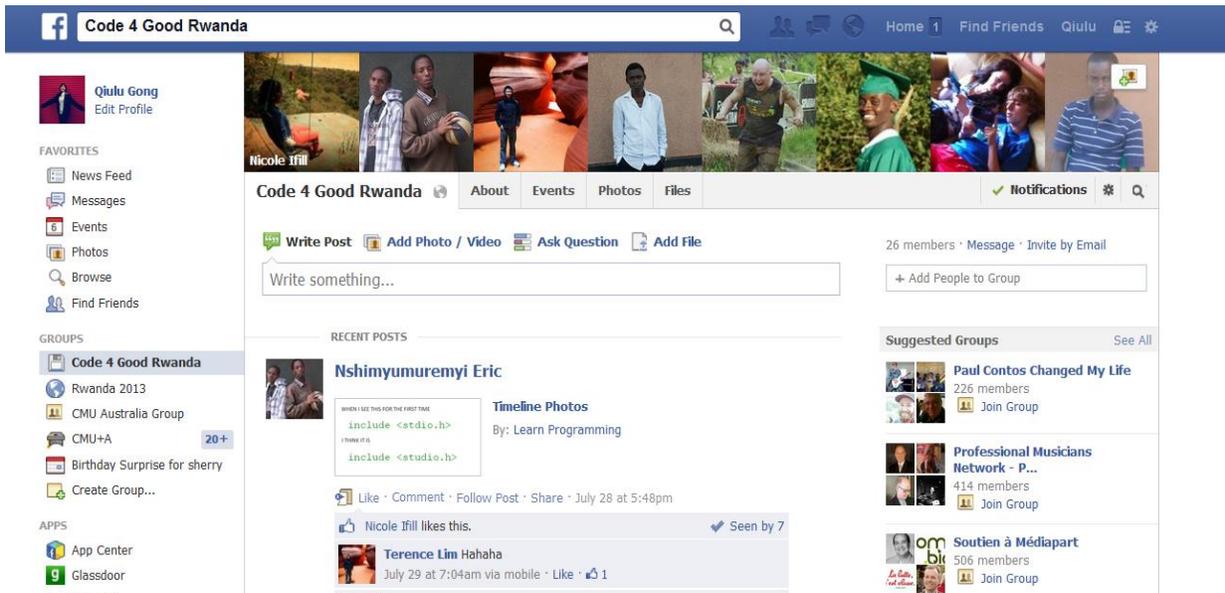
1. Admins may click on the **Settings logo** on the top right corner, followed by **Manage Users** in the dropdown menu to view and edit all account information.
2. Admins may add new users, or edit **Rwandan Name, Christian Name, Email, Username, Gender, Phone, Address, Date of Birth, Department/Role, Account Type** and **Password**.
3. Admins may leave the **Password** field blank if they do not wish to change the password.

Appendix 2A – Alice Hackathon online

a) ASYV Blog



b) Code 4 Good Rwanda Facebook Group



Appendix 2B – 2013 Alice Challenge Feedback Form

The ASYV Challenge 2013 – Post Hackathon Feedback Form

Name: _____

Grade/Combination: _____ Email: _____

Please circle your responses on a scale of 1 – 5, where **1 = strongly disagree**, and **5 = strongly agree**.

Q1) I enjoyed myself during this event.

1 2 3 4 5

Reason: _____

Q2) I worked well with my team member(s) during the competition.

1 2 3 4 5

Q3) I feel more confident in learning programming on my own after the ASYV Challenge 2013.

1 2 3 4 5

Q4) I am **more** interested towards an IT-related career/education in future.

1 2 3 4 5

Q5) I am interested in attending a programming competition again in the future.

1 2 3 4 5

Q6) What did you learn from the ASYV Challenge 2013?

Q7) Feedback for the organizers: How do you think this competition can be improved?

Appendix 3 Backup plan

Procedures for restarting Services after power returns from outage

Sky Server

When the server comes back online the Backup exec services do not start, therefore you need to start them manually.

1. Log onto Sky
2. Start Backup Exec via desktop Icon
3. Go to Tools -> Backup exec Services -> Make sure Sky is selected -> Click on start all services.

Sea & Earth Server

Make sure the Sea and Earth services are started-up after a reboot.

Rotating hard drives for backup

At the end of each month your hard drive needs to be rotated and kept off site. Possibly in the computer office.

There are 3 hard drives used for backups:

Drive 1 – January, April, July and October

Drive 2 – March, June, September and December

Drive 3 – February, May, August, and November

Hard drives are to be swapped out on the last Friday of the month in the morning. This is to ensure the month backups go on the new disk.

When swapping hard drives ensure that the same cables are used.

The device may go offline and there may be a need to put them back on line.

In Backup exec, go to Devices -> Right click on device that is offline, and place on line.

Backup Schedule

Full Backups

Earth	Last Friday of month
Sea	Every Friday
Sky	Every Friday

Daily Incremental

Earth	Mon – Friday
Sea	Mon – Thurs
Sky	Mon – Thurs