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Helping Powering Potential Inc. understand impact of technology at Tanzanian schools

August 8, 2016 John Feller and Ryan Soley

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The IBM jStart team is helping the Powering Potential

of Tanzania by analyzing data collected from log files. Powering Potential Inc. (PPI) is a non-profit organization that supplies technology to enhance education at secondary schools in rural Tanzania.   They supply these schools with a solar energy system and a small computer network.   The computer network consists of several low-wattage Raspberry Pi computers and monitors along with an offline digital library of education material.   This material is hosted on a local server because there are no active network connections directly to the Internet. In addition to the Computer Lab program, PPI also implements a Pi-oneer program (portable projector/Pi computer/offline content) which teachers can take into their classrooms.

Janice Lathen, an American entrepreneur, started Powering Potential in 2006 after visiting a rural Tanzanian school and becoming inspired by the students who responded so enthusiastically when she introduced herself in Swahili. She says, "It's been an adventurous and challenging ten years and it is all worthwhile when you see the excitement on the faces of the students as they are using the computers. Program beneficiaries have secured employment because of their technology skills and that is especially rewarding."

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Initiative (OSI) web site that described the Powering Potential program and how Raspberry Pi computers were being used in Tanzanian schools. Janice Lathen, founding director and president of Powering Potential, was asked how people can help her organization.   In addition to monetary contributions, Janice mentioned that they were looking for a "professional analyst to review our impact data and create visual representations of it." For the past few years, the IBM jStart team has been working with big data technologies often using cloud-based services. We thought it would be great if our jStart team could help this worthwhile organization by using IBM's analytics cloud technologies to help them understand usage of the equipment that they are supplying to schools.

The Powering Potential team supplied us with several server log files from one of their schools. Even though the initial dataset supplied for analysis was relatively small in size, we were able to provide insights to the Powering Potential management team.   Our jStart team used Spark and Jupyter notebook technologies hosted on IBM's Bluemix Platform-as-a-Service to analyze the data.   Even though the Spark computing framework is primarily used to analyze large data sets, we created a cloud based solution so that future analytics results could be easily calculated. If the Powering Potential team experiences huge size growth in their collected data sets, our solution running on the Bluemix Spark service can handle it.

Since most of the schools have no direct Internet network access, educational material has to be supplied offline.   Therefore, the educational material is supplied via a package called RACHEL. RACHEL allows student offline access to selected Wikipedia articles, Khan Academy math and science educational videos, ebooks of world literature from Project Gutenberg, and medical

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We first analyzed the data to identify the main sources of content accessed (ex: Wikipedia or Khan Acadamy videos?), the frequency the content is being accessed, and how often the computers were utilized.   By far, Wikipedia content and Khan Academy were the most popular content sources accessed by the students.

Top 10 Educational Sources Accessed by Students

- wikipedia_for_schools
- khan_academy
- ebooks-en
- ck12
- infonet
- practical_action
- understanding_algebra
- olpc
- iicba
- scratch

From log data analysis, we were able to determine how often the computers were utilized.   We found that the computers were accessed during concentrated series of days, followed by periods of non-usage, followed by another concentrated series of days of usage.   This utilization activity could happen if a teacher had a particular lesson plan over a series of days that involved the use of computers followed by lessons that did not utilize the computers or if the school had a holiday break.   We also have been creating data charts and graphs to help the PPI team evaluate CSEE (Certificate of Secondary Education Examination) exam results for students enrolled at the schools that possess PPI computers.

As we continue to collaborate with the PPI management team, we plan to analyze server logs from additional schools.   From these logs, we plan to determine which schools are utilizing the computers more often and identify the most popular content. Eventually, we'd like to analyze the effectiveness of the participating schools compared to students who attend schools that don't have access to Powering Potential computers. However, additional survey data needs to be collected from students from both PPI and non-PPI schools in order to calculate statistically significant results.

Janice Lathen is looking forward to see how analytics of the data from Tanzanian schools can help her organization better serve students with technology. Janice says, "It is an honor to be working with jStart; they are upping our game." The IBM jStart team is pleased to help this non-profit organization with its worthwhile mission to enhance the educational experience of Tanzanian students with computer and networking technology.

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Senior Software Engineer Manager at IBM

John Feller is the manager of the IBM jStart Emerging Technologies development team. He manages a creative and energetic team of developers that architect, design, and develop innovative solutions focused on emerging internet software technologies and creating solutions with tangible benefit to jStart's clients. John and his team also validates these technologies in the real world with customer use cases, technology evaluations with customers, and works with IBM product teams for integration of those technologies into the IBM portfolio.

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Ryan Soley

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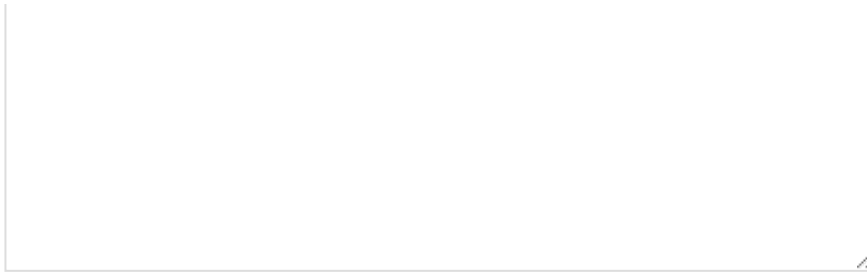Your email address will not be published. Required fields are marked *

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