OPEN SOURCE SOFTWARE TO TEACH TECHNOLOGY ENTREPRENEURSHIP CONCEPTS AND PRACTICES

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Open source software (OSS) in academia can have multiple types of implementations and positive returns. This paper explores the use of OSS as a method to teach entrepreneurship concepts and practices to Science, Technology, Engineering, and Mathematics (STEM) majors. OSS allows for individuals to contribute and provide support services for applications. This will allow students to gain expertise in low level design, software project management, and software consulting services in order to successfully deploy their own spin off company. Covered in this submission will be examples of how the Linux software project development groups, mobile application development, video game design, and support services can be used in the classroom. These examples will serve as the base for any additions or changes in curriculum development, and design to aid institutions in deploying innovative programs in technology entrepreneurship to STEM students.

Keywords: technology entrepreneurship, open source software, software project management, Linux, Android, innovation

1 INTRODUCTION TO TECHNOLOGY ENTREPRENEURSHIP

There have been research using Free and Open Source Software (FOSS) and software engineering and development methodologies and processes. Sowe and other researchers developed a framework for teaching software engineering courses as part of a pilot study that was conducted with 125 students. This consists of three phases, in the first phase there are preparatory activities in which the instructor and students enter into a discussion on software testing using FOSS within projects that they are interested in working on [1] and fit the requirements of the class learning objectives. The second phase involves traditional software methodologies in which the students are involved in the configuration of a bug tracking system which will be used to keep track of bugs, and provide the instructor opportunities to monitor the status of the project and offer guidance to the students. In the third and final phase the students are asked to create a presentation which summarizes the different types of software engineering activities and procedures that were implemented, to include bug reporting and resolution [1].

The purpose of this study and others like it, is to get the students involved in real-world software development projects and associated activities. The students will learn to design, create and implement software solutions using best practices and within the confines of FOSS. Since this study in 2006 we have seen free and open source projects grow exponentially. Many students will come to software engineering class with experience developing solutions, as they have worked with active FOSS projects on their own. Many software engineering students will have this experience developing because there are a variety of FOSS projects which may be work based or personal based activities, such as game development.

By giving students hands on and real developing experiences, they are discovering the FOSS community, if they are not already involved in it. There is an expansion of the classroom by using FOSS software, as most projects have large user communities that actively develop and document the software engineering process. Another extension of this process is that the students learn about software development cycles and what it takes to plan, develop, and maintain software solutions. Students will also learn to appreciate the many advantages of developing FOSS, such as the low cost of maintaining the software once developed, as maintenance and future development is going to be done by development or user groups.
1.1 Research Parks

Cummings Research Park (CRP) in Huntsville, Alabama, is a world leader in the science and technology business parks [2]. CRP was established in 1962. A few noteworthy companies are Hubble Telescope, which supports the development of the Hubble Project; Baron Services, which is a leader in accurate weather notifications; and Hudson Alpha Institute for Biotechnology, which is a leader for innovative medical research [2]. Silicon Valley is another example of an internationally acclaimed research park. It is home to many technology giants such as the following: Apple, Google, Facebook, Cisco Systems, and Tesla Motors [3]. These research parks serve as incubators for technology startups for industries such as healthcare, aerospace, defense, and many others.

2 DEVELOPMENT GROUP

Development groups allow students the ability to participate in small to large scale application development. This provides real world experience in software lifecycle design from requirements capture, component level testing, and maintenance. Students learn about documentation, enterprise architecture (EA), and using common design practices [4]. Development groups provide information technology (IT) assistance for clients in both the Government and Private Sector [5]. However, there are various development groups specifically for Linux distributions, such as the following:

<table>
<thead>
<tr>
<th>Examples</th>
<th>Development Group Name/Project [6].</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha Linux, ARM Linux, iMac Linux, Linux/sun3</td>
<td>Hardware Ports</td>
</tr>
<tr>
<td>Linux 2.3.16 kernel source Tour; Universal Disk Format (UDF); HFS for Linux</td>
<td>Kernel/Device Drivers/File Systems</td>
</tr>
<tr>
<td>Linux Networking News, IPv6</td>
<td>Networking</td>
</tr>
<tr>
<td>XFree86, Linux Directory Service, Linux Buyers’ Consortium</td>
<td>Organizations and Groups</td>
</tr>
<tr>
<td>Artificial Intelligence Desktop Interface, Linux, Software Map, Mnemonic, Linux Game SDK Project</td>
<td>Linux and Free Open Source Software</td>
</tr>
<tr>
<td>Project Andromeda, hal9, Stampede Linux</td>
<td>Distributions</td>
</tr>
<tr>
<td>Linux Benchmark Archives, Filesystem Hierarchy Standard (FHS)</td>
<td>Benchmarks and Standards</td>
</tr>
</tbody>
</table>

3 PROVIDING SYSTEM ADMINISTRATION AND OS SUPPORT

Teaching students how to develop, operate, maintain, and integrate OS allows them to provide services to organizations. Students have the ability to take development skills for applications and sell software services who may need applications customized for their organization. The skills gained are transferrable to multiple industries. For example, learning how to administer Red Hat Enterprise Linux (RHEL) allows a student to comprehend server administration. This student could contract their services out and later bring on other students as well to form a company in which server administration is the service.

4 CONCLUSION

FOSS, software engineering, and development research are used to train students using real-world scenarios. The Sowe et. al. case study exemplified the application of this research and the importance of introducing entrepreneurship skills to students early in their curriculum. Students learned to learn to design, create and implement software solutions while adhering to the confines of FOSS. Through the use of OSS students are able to take advantage of projects and insert themselves in product design activities. From this experience students can use to develop their own consulting organization. Research parks, such as CRP and Silicon Valley foster entrepreneurship in technology through innovative research and collaboration. Further, student participation in development groups exposes them to the timeline of software design, application, and implementation. Finally, OSS is
essential to teaching technology focused entrepreneurship while minimizing the cost impact to the institution [7].

REFERENCES


