UNIVERSITY OF EMBU

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, COMPUTING & IT

SIT 223:OPEN SOURCE

Purpose of the course:

The purpose of the course is to introduce students to the concepts of Open Source software, giving a brief history of the movement and examining current issues in the development and use of open-source software.

Expected Learning Outcomes of the Course:

At the end of this course/unit, the learner should be able to:

i. Explain how the Open Source movement has arisen, what it is, how it works;
ii. Describe some of the recent contributions made by open-source approaches;
iii. Demonstrate skills in the use of the GNU/Linux operating system including editing tools, libraries, and utilities;
iv. Use the concurrent versions system in the management of software projects;

Course Content:

Open Standards. Open Source Software. Open Source Licensing. Open source adoption challenges. Assessment. Stages of a deployment project. Purpose of assessment stage. Risk Identification. Java EE application migrations. Java EE application assessment. Integration with existing systems. History of Linux: a review of previous studies in Linux/Unix. GNU/Linux utilities: vi, sed, tr, grep, awk, cut, etc. Installation of applications: binaries, source code, package managers; the Concurrent Versions System. Open Source applications. Software development using Open Source methodologies and tools.

INTRODUCTION TO OPEN SOURCE:

OPEN SOURCE SOFTWARE:

Free and open-source software has had a major impact on the computer industry since the late 1990s and has changed the way software is perceived, developed, and deployed in many areas. Free and open-source technology or software, is typically developed in a collaborative fashion and the majority of contributors are volunteers. Even though this collaborative form of development has produced a significant body of software, the development process is often described as unstructured and unorganized.

This dissertation studies the FOSS phenomenon from a quality perspective and investigates where improvements to the development process are possible. In particular, the focus is on release management since this is concerned with the delivery of a high-quality product to end-users. The biggest downside of closed source software is that you have no idea how it was made.

Open source technology is an often-misused term, it is not just a synonym for 'free'. With the relatively recent rise of the internet and the human dependency on the internet, the amount of new applications/software being developed has also risen. The most widely used operating system for smartphones, android is also freeware. A lot of people contribute their work to the android market. Linux operating system was one of the famous software that was announced open source in the early days.

The Apache Software Foundation (ASF) is the world's largest open-source foundation. Some of the world-famous software by ASF are Apache HTTP Server, Apache Hadoop, Apache Lucene, Apache OpenOffice, and many more. The following are the highlights of the ASF's contribution as listed on its website.

- 200M+ lines of code in stewardship
- 1,058,321,099 lines of code committed
- 3,022,836 code commits
- 730 individual ASF Members
- 7,000 Apache code committers
- All volunteer community

"As a non-profit corporation whose mission is to provide open-source software for the public good at no cost, the Apache Software Foundation (ASF) ensures that all Apache projects provide both source and (when available) binary releases ***free of charge*** *on our official Apache project download pages. Our corporate bylaws explicitly state that Apache projects create "open-source" software for distribution to the public at no charge. Apache projects will never charge a fee for downloading or using their software." ~ The Apache*

The Apache License meets both the Open Source Initiative's (OSI) Open Source Definition, and the Free Software Foundation's definition of "free software".

Definition.

Open-source software is computer software that has a source code available to the general public for use as is or with modifications. This software typically does not require a license fee. There are open-source software applications for a variety of different uses such as office automation, web design, content management, operating systems, and communications. The key fact that makes open-source software (OSS) different from proprietary software is its license. As copyright material, the software is almost always licensed. The license indicates how the software may be used. OSS is unique in that it is always released under a license that has been certified to meet the criteria of the Open Source Definition. These criteria include the right to:

- ✓ Redistribute the software without restriction;
- ✓ Access the source code;
- ✓ Modify the source code; and
- ✓ Distribute the modified version of the software.

In contrast, creators of proprietary software usually do not make their source code available to others to modify. When considering the advantages of open-source software, you should consider the open-source product itself. Open source products vary in quality. OSS software does not come with phone support or personalized e-mail support. However, there are commercial service providers who will provide support. If you need a lot of support, consider whether the overall costs of using an open-source product will be higher than that of a proprietary product

Is it free?

Keep in mind that while OSS is usually free there are some exceptions. You will usually be able to determine what these exceptions are by considering the total cost of ownership (TCO) involved in adopting and managing open-source software. While the software itself may be free, make sure you consider the need for additional services or products, as these may have costs attached (e.g. access to software updates, support services). You also have to take into account possible switching costs. These costs would include moving data from an old system to new systems, training costs, and costs involved when switching from one platform to another one (e.g. the costs of switching from Microsoft Windows to a Linux operating system). If your business does not have enough information technology expertise, you may have to outsource outside technical services to provide open source support or to manage its implementation and delivery.

How Did Open Source Get Start? In the 1970s, proprietary software – i.e. software that did not allow users to redistribute it, modify it, or access its source code – became the norm. The development of open-source software was a reaction to the fact that changes or improvements could not be made to proprietary software by other developers or users. The open-source movement started with Richard Stallman's general public license model (in the 1980s), which holds that software should be freely modifiable, with the condition that if you make improvements to the software, you must put the improvements back in the open-source community. The rationale for the open-source movement is that a larger group of programmers not concerned with proprietary ownership will produce a better product.

How is Open Source Software Useful to Small Businesses?

If you were to review information on open source software you will find many different claims and counterclaims concerning its advantages and limitations. Some of the differing opinions arise from the fact that while an open-source software package may work very well in one business environment, it might not work so well in a different environment. Depending on your current system (i.e. what software you are using now), your business needs, and the open-source product you choose (some are better than others) certain advantages of using open source software will vary.

Advantages of Open Source Software Lower Costs:

- Open-source software usually does not require a licensing fee and its lower cost is generally one of the key reasons why small businesses choose to adopt this software. Make sure that you consider the total costs of ownership when considering open-source software.
- Flexibility: A programmer can take a standard software package and modify it to better suit business needs. You can usually hire a programmer to add a particular function to open-source software.
- Reliability and Quality: When looking at improved quality, you have to compare the products themselves. It is impossible to say that open-source software is better than proprietary software in terms of reliability and quality – both have a range of products. However, mature open-source software is generally viewed to be of good quality and reliability. If your business is not familiar with open source software, you may only want to review some of the more mature products (e.g. Linux, Apache, and Sendmail).
- Reduces "Vendor Lock-in": If you are using proprietary software you may be restricted to using certain vendors. Switching vendors in this case usually involves significant costs. Keep in mind though that choosing an OSS product may not make you independent of vendors. For some OSS products, there may be a limited number of vendors that can provide you with services, upgrades, or security patches.
- Availability of External Support: External technical support is available for many of the open-source software packages. Some vendors offer support contracts and there are service providers that install, configure, and maintain an OSS system. Many open source products also have active online community support that may be able to answer your questions through online blogs. Is

There a Downside to Using Open Source Software? Remember when considering the limitations of open-source software, it is important to look at the product individually as each product can vary in terms of quality and limitations. Some of the limitations can be overcome with adequate training and service support.

Limitations for you to consider:

- Lack of Personalized Support. Unlike proprietary software, OSS packages do not come with phone support or personalized e-mail support. However, as mentioned there are commercial service providers who will provide support. If you need a lot of support, consider whether the overall costs of using an open-source product will be higher than that of a proprietary product.
- Restricted Choice. There are fewer choices available for open-source software. Speed of Change. Software is being modified on an ongoing basis in the open-source world, which can make it difficult to ensure that the software is compatible with other applications.
- No warranty. OSS does not come with a warranty, as there is no single company backing the product.

Examples of Open Source Software:

- Open-source web design.
- Open source presentation software.
- Open source spreadsheets.
- Open-source shopping carts.
- Open source communications.

View the following table for descriptions of some of the most popular open-source software applications by category. The examples in the table include only a few of the many OSS applications available. You should investigate whether any of the packages are suitable for your needs.

Examples of Open Source Software

TYPE OF APPLICATION	OSS EXAMPLES	DESCRIPTION
Office Automation (word processing, spreadsheet and presentation software) *(Sources: Effing Technology, Carol's Vault, Soft32.com)*	**AbiWord**	• Word-processing program • Similar to predominant proprietary word-processing programs • Suitable for a wide variety of word processing tasks
	OpenOffice	• Office suite • Suitable for individuals and businesses • Includes a word processor (compatible with predominant proprietary word-processing programs), spreadsheet (compatible with predominant proprietary spreadsheet programs) and presentation system (compatible with predominant proprietary presentation systems)
	KOffice	• Integrated office suite • Intended for the KDesktop Environment • Includes a word processor, spreadsheet application, and presentation program
Web Design *(Sources: Zyxware Technologies, Carol's Vault)*	**Nvu**	• Intended for those with no technical or programming expertise • Enables creation of web pages and management of websites
	GIMPShop	• Image editor similar to Adobe Photoshop
	Bluefish	• Editor targeted towards programmers and web designers • Supports many programming and mark-up languages • Focused on editing dynamic and interactive websites

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Examples of Open Source Software

TYPE OF APPLICATION	OSS EXAMPLES	DESCRIPTION
Communications *(Sources: Open Source Windows, Lifehacker, Zyxware Technologies)*	**Pidgin**	• Free Instant Messaging (IM) client • Allows use of all IM accounts at once.
	Thunderbird	• Cross-platform e-mail and news client
	PhpBB	• Internet forum package written in computer scripting language PHP
E-Commerce *(Sources: Zyxware Technologies, Blogger)*	**OsCom-merce**	• E-commerce and online store-management application • Offers a wide range of features that allows online stores • Can be used on any web server that has PHP web scripting language and the MySQL database
	VirtueMart	• E-commerce solution intended for use with the content-management system Joomla or Mambo • Written in PHP • Made for easy use in a PHP/MySQL environment
	Zen Cart	• Free, shopping-cart system • Features multiple customer modes, unlimited category depth, multiple sales and discounts, multiple display modes, multiple ad banner controller, multiple payment options, etc.
Content Management Systems *(Sources: Zyxware Technologies, Lifehacker)*	**Drupal**	• Free, modular, content-management framework, content-management system and blogging engine • Written in PHP • Allows an individual or a community of users to easily publish, manage and organize a wide variety of content on a website
	Joomla	• Free open source content-management system meant for publishing content on the Web and intranets using the MySQL database • Written in PHP • Includes features such as page caching to improve performance, RSS feeds, printable versions of pages, news flashes, blogs, polls, website searching, and language internationalization
	PHP-Nuke	• Free, web-based automated news publishing and content-management system • Based on PHP and MySQL • Fully controlled using a web-based user interface

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Examples of Open Source Software

TYPE OF APPLICATION	OSS EXAMPLES	DESCRIPTION
Operating Systems (all Linux distributions) (Sources: Softpedia, Fulgura Software, Wikipedia, Information Week, user forums)	**Ubuntu**	• Largest community maintained Linux OS – enables users to draw upon a wide network for support
	Fedora	• Open source Fedora is a general purpose Linux operating system, developed by the community-supported Fedora Project and sponsored by Red Hat (a company committed to open source software, and a major Linux distribution vendor).

How Do I Know if a Particular OSS Application Is Right for My Business?

The following series of questions can help you decide if a particular OSS application is right for your business:

Determining Whether a Particular OSS Application Is Right for You	Comments
1. How long has the software been around? Is the software well established? As a general rule, open source software that has been around longer is more reliable and of good quality. Each open source software application has a version number. The software may represent the first version or ninth-or more. Mature OSS software examples - Linux, OpenOffice, and Thunderbird.	
2. Are there regular updates, patches and new features? Open source software that receives regular updates, patches and new features will likely be less bug-ridden, more secure, and more feature-rich than that which does not.	
3. Does your company have the skills to install and maintain the software? If your company does not have the expertise, there are service providers out there that do. You should also consider whether staff need training to help use and maintain the software. (this consideration applies to any type of software).	
4. Is there commercial support available to help you install and manage the software? Are service providers available to provide you with installation and management support for your software? Two well known specialist OSS organizations that provide support are - www.redhat.com and www.mysql.com.	
5. Are the costs reasonable for the service and support that you might require? The less technical expertise your business has, the more likely it is that you will need professional support for your open source software.	

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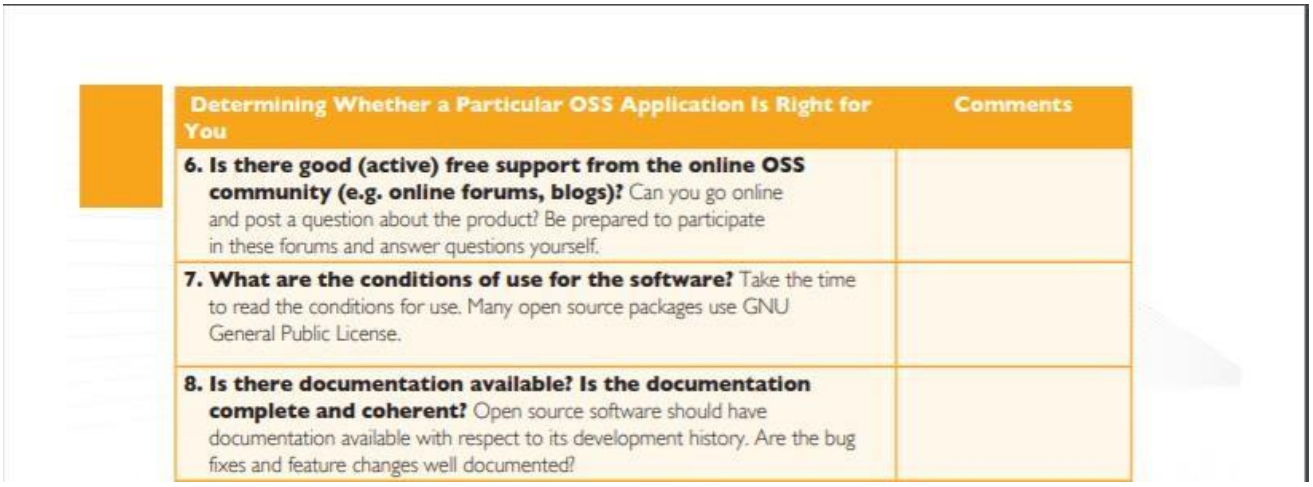

Determining Whether a Particular OSS Application Is Right for You	Comments
6. Is there good (active) free support from the online OSS community (e.g. online forums, blogs)? Can you go online and post a question about the product? Be prepared to participate in these forums and answer questions yourself.	
7. What are the conditions of use for the software? Take the time to read the conditions for use. Many open source packages use GNU General Public License.	
8. Is there documentation available? Is the documentation complete and coherent? Open source software should have documentation available with respect to its development history. Are the bug fixes and feature changes well documented?	

What Is an OSS Web Design Template?

An OSS website design template is a free template that can be used to help you quickly set up a website. Sites that offer design templates typically give you a broad range of styles to choose from, so that you have plenty of options when it comes to finding the design that will work best for you. You can even customize the template to meet your individual needs, so it will reflect your requirements. You can find several websites that offer OSS web templates, including.

- ✓ www.freewebtemplates.com.
- ✓ http://www.opensourcetemplates.org.
- ✓ http://www.oswd.org.

Freeware vs. Free Software vs. Shareware Freeware.

Free software, freeware, and shareware are three alternatives to OSS. Each of these options is described below:

Freeware.

Freeware is software that is made available for use by the author at no cost for an unlimited time. However, the author may retain the copyright. This means that users are not allowed to do anything with the software that is not permitted by the author. Your use of the software may be restricted to personal use, individual use, non-profit use, non-commercial use, academic use, commercial use, or any combination of these.

Free software.

Free software is software that can be used, modified, copied, and redistributed without restriction and for no cost. For software to be distributed as free software, the source code (a human-readable form of the program) must be made available to the recipient (along with the free software license releasing the source code to the public) to allow for modification. Free software is distinct from freeware in that it is not proprietary software and can be distributed freely. It should be noted that some proprietary software is not compatible with free software, such as those that depend on a user paying for a license to lawfully use a software product.

Shareware.

Shareware is both a type of software and a way to distribute the software. Authors of shareware give users a license to try out the software for a specific period of time, usually for 30 days. If a user wishes to

continue using the software after this trial period, he is required to register with the author by paying the author a small fee. (Likewise, users may copy shareware and pass it along to others, but they too are expected to pay a fee if they use the product beyond the 30-day trial period.) If, however, a user does not wish to continue using the software after the evaluation period lapses, he or she is expected to discontinue the use of the product and erase the product files. Thus, shareware is distributed based on an honor system. In many cases, however, once the trial period ends shareware will have updates and will require the user to pay a small fee for additional functionality. Shareware is inexpensive because it is usually produced by a single programmer and is offered directly to customers.

- ✓ Pitfalls to Using Freeware and Shareware The three primary pitfalls to using freeware and shareware are as follows: Both may contain viruses, spyware (i.e., software that secretly sends information about your Web surfing habits to its website).
- ✓ Some shareware and freeware programs do not have an uninstall feature, making them difficult to get rid of.
- ✓ There may be a lack of technical support if you have questions about a particular shareware or freeware program.

FREEWARE	FREE SOFTWARE	SHAREWARE
No cost (or optional fee)	No cost	Pay after trial period or for additional functionality