

Applicability of Open Source Software (OSS) with Cloud Computing

Gunjan Kotwani, Pawan Kalyani

Abstract— Cloud computing is a very new and innovative technology being used in today's business scenario. Everything is available on the cloud; you can access the data, files, software, etc. from anywhere in the world. You do not need a particular type of hardware or software configuration. In large companies cloud computing is used as a strategic tool for outsourcing their IT or other requirements. The companies have to ensure maximum usage of expensive server and storage investments. Cloud computing data centers deploy input/output and networking solutions that scale to support any level of performance. Open Source Software is a unique concept where everybody is free to change the code of software and upgrade its utility. The concept behind the development of Open Source Software (OSS) has been sharing of source code for modification, improvement and dissemination. IT professionals from all over the world are joining in this revolution. We can just imagine the future of cloud computing and open source software, together.

Open Source's main attributes of openness and community based collaboration make OSS and Cloud Computing strongly synergetic, thus laying the foundation for a technological revolution, majorly helping the small and middle sized companies with their services. Limitless opportunity of programming, website hosting, new business opportunity, strategic tool, cost effective, etc. could be the few reasons to make this technology popular in future. In this research paper we explore the options of Open Source Software that can add to the productivity and applicability of Cloud Computing.

Index Terms—Cloud Computing, Open Source Software, Future technology, small and middle sized companies.

I. INTRODUCTION

Since late 90s and even today, academicians, web developers, solution architects or anyone involved in web development use the symbol of cloud to represent Internet on board or on paper. The most widely used metaphor for Internet is cloud. Cloud computing has derived its name from the same line of thinking. Cloud Computing is a style of computing which must essentially caters to the computing needs of **dynamism, abstraction and resource sharing**.

A. Dynamism

The business environment is very dynamic today, with computing requirements fluctuating with demand. Demand on the other hand is unpredictable and inconsistent leading to uncertainty about computing requirements.

For example, if your business is growing exponentially and as a result your computing needs and usage is getting bigger with every passing day. What would you do? Would you add servers and other hardware and software to meet the new demand?

Take another example, recession is resulting in losing of customers. You invested heavily on servers, hardware and software during last quarter's peak season. The resources are now lying idle. Will you sell them?

In the above scenarios we see that demand keeps on varying based on world or regional economy, seasonal traffic burst, sudden lean periods, government policies, etc. This kind of fluctuation in demand leaves the businessmen perplexed about the amount of investment required to fulfill the information technology and computing needs of the organization.

Here is where Cloud Computing comes to your rescue! You just need to configure and your provider will take care of the fluctuating demands.

B. Abstraction

Your business should focus on core competency and should not worry about security, operating system (OS), software platform, updates, patches, etc. These chores are taken care by the provider. From the perspective of an end user we do not need to care for the OS, plug-ins, web-security and the software platform. Everything would be in place through the use of Cloud Computing.

The users even need not have knowledge of, expertise in, or control over the technology infrastructure "in the cloud" that supports them.

C. Resource Sharing

Resource sharing is the most important benefit of cloud computing. This helps the cloud providers to attain optimum utilization of resources. The cloud architecture implementation provides the flexibility to share applications as well as other network resources (hardware), etc. This flexibility leads to a need based flexible architecture where the resources can expand or contract with minor configuration changes.

The services provided by Cloud Computing can be broadly categorized into 3 stacks,

1. IaaS (Infrastructure as a Service)
2. PaaS (Platform as a Service)
3. SaaS (Software as a Service)

Cloud Computing also incorporates Web 2.0 and other recent technology trends which have the common theme of reliance on the Internet for satisfying the computing needs of the users.

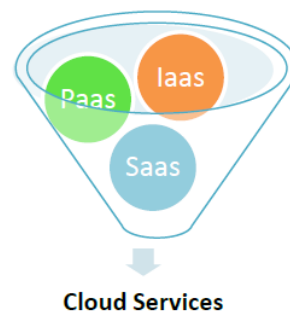


Fig. 1 Services provided by the Cloud

Manuscript received September, 2013.

Gunjan Kotwani, Computer Science, Maya Ratna Education Society, Ajmer, India.

Pawan Kalyani, Management, Maya Ratna Education Society, Ajmer, India.

IaaS

Infrastructure as a Service (IaaS) forms the base layer of the cloud stack and serves as a foundation for the other two layers, for their execution. The basic idea behind the functioning of this layer is virtualization. The customer has the choice of virtual computer, where the desired and optimal configuration of CPU, memory and storage can be selected based on the application needs. IaaS provides the complete infrastructure viz. servers, routers, hardware based load-balancing, firewalls, storage and other network equipments. The customer can buy the infrastructure as a service on a need basis.

For example, Amazon Elastic Compute Cloud (EC2), Windows Azure, Rackspace.

PaaS

Normally to develop a developing platform for the functioning of developers, a heavy investment is required. Platform as a Service (PaaS) providers deliver the platforms on the web which can be used using the browser, which means no need of downloading any software. PaaS has empowered small and medium sized companies and individual developers to launch their own SaaS employing the power of the platform providers, without any initial investment.

For example, Google App Engine, AWS Elastic Beanstalk.

SaaS

Software as a Service (SaaS) is the top most layer of the cloud computing stack that is directly consumed by the end user. On-Premise applications have a very high upfront capital expenditure resulting in high total cost of ownership (TCO). They also require skilled developers to maintain the application. Thus, small and middle sized businesses cannot afford such applications. But, not any more. SaaS is providing best software solutions for businesses without any substantial investment on infrastructure / platform / skilled manpower. The only basic requirement is computer with browser and the best applications are at your disposable on payment for use.

For example, Google Apps, Microsoft Office 365, Salesforce.

II. OPEN SOURCE SOFTWARE (OSS)

Open Source Software (OSS) is a recent phenomenon that has the potential to revolutionize the software industry. It has already gained a strong foothold in the server software segment, with a leading market share worldwide in some software categories. It is also gaining ground in desktop applications and it has been predicted that its use on the desktop will become significant in the near future. The impact of OSS will be felt in many areas. OSS provides depth of selection. OSS supports ethical, safe, and legal use of technology. It supports communication, collaboration and project based learning and activities. It supports global cultural understanding. Programmers demonstrate creative thinking, construct knowledge, and develop innovative products and processes using OSS technology. They contribute by writing new software, packaging additional software, or fixing bugs in existing software. Programmers apply digital tools to gather, evaluate, and use information. Programmers use critical thinking skills to plan and conduct research, manage projects, solve problems, and make

informed decisions using appropriate digital tools and resources. They understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. They also demonstrate a sound understanding of technology concepts, systems, and operations.

Open source has become a key enabler for cloud computing by providing both cheap inputs (as in free) as well as rich capabilities to providers of cloud services. The writing, however, is beginning to appear on the wall: the cloud computing industry will use open source as leverage for a new generation of proprietary platforms-as-a-service, very much like the established Web 2.0 services in the consumer space have used open source platforms to capture and create lock-in around data.[5]

III. APPLICABILITY OF OPEN SOURCE SOFTWARE WITH CLOUD COMPUTING

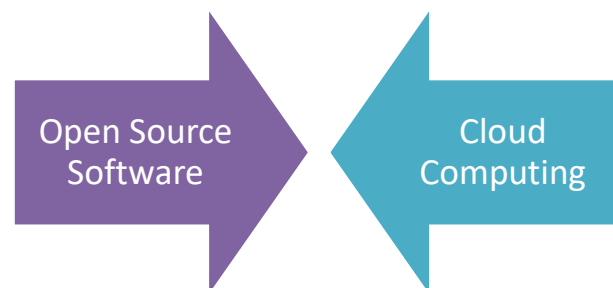


Fig. 2 Open Source Software with Cloud Computing

Over the past few years, the open-source community, in all its different colors and hues, has demanded that the technology world pay attention to software freedom and its tendency to lower cost, improve interoperability, and more. This freedom is accomplished through open-source licenses like the GNU General Public License.

Along the way, however, open-source businesses started making an adjacent argument that freedom of code ensured maximum choice in selecting a vendor to support that code. While not absolutely true, this argument served to separate the idea of services that complement software from the software itself.

As much as anything, cloud computing has borrowed from open source in terms of its governing principles, which could well be open source's lasting contribution to the cloud. It took a few decades of Microsoft dominance to really get the open-source movement in full swing, but it only took a few months for things like the Open Cloud Consortium to spring to life. Open source has taught us to expect openness by default. The cloud is no different.

Open source, then, has made an indelible imprint on cloud computing. It gave it life by providing the raw material upon which many private and public clouds are built. It gave it a conscience by setting the industry's default principle to openness.

There are strong synergies between Open Source Software (OSS) and cloud computing. The cloud makes it a great platform on which OSS business models ranging from powering the cloud to offer OSS as SaaS can flourish.

For cloud computing, "why wouldn't you run it on Linux?" [IBM's Bob Sutor] asked, because Linux can deliver all kinds of virtualization and those who want Windows desktops need never know they're not.

Thanks to clouds, IBM can profitably deliver thousands of desktops that look like Windows but have Linux on the back-end.

Cloud computing can prove to be a catalyst in innovating OSS business models.

OSS can power the cloud infrastructure similarly as it has been powering the on-premise infrastructure to let cloud vendors minimize the TCO. Not so discussed benefit of the OSS for cloud is the use of core algorithms such as MapReduce and Google Protocol Buffer that are core to the parallel computing and lightweight data exchange. There are hundreds of other open (source) standards and algorithms that are a perfect fit for powering the cloud.

There is a disconnect between the source code repositories, design time tools, and application runtime. The cloud vendors have potential not only to provide an open source repository such as Sourceforge but also allow developers to build the code and deploy it on the cloud using the horsepower of the cloud computing. Such centralized access to a distributed computing makes it feasible to support the end-to-end OSS application lifecycle on single platform.

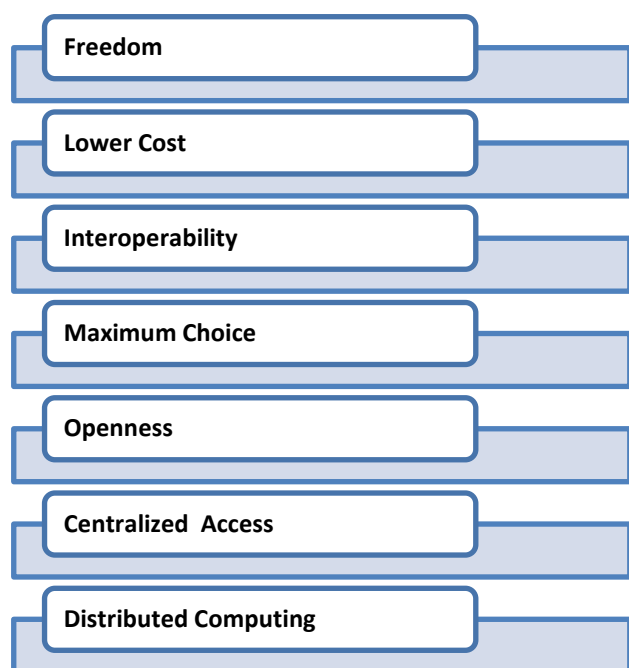


Fig. 3 Advantages of Open Source Software

A. OSS dissemination

Delivering pre-packaged and tested OSS bundles with the support and upgrades has been proven to be a successful business model for the vendors such as RedHat andSpikesource. Cloud as an OSS dissemination platform could allow the vendors to scale up their infrastructure and operations to disseminate the OSS to their customers. These vendors also have a strategic advantage in case their customers want to move their infrastructure to the cloud. This architectural approach will scale to support all kinds of customer deployments - cloud, on-premise, or side-by-side. The distributed computing capabilities of the cloud can also be used to perform static scans to identify the changes in the versions, track dependencies, minimize the time to run the regression tests etc. This could allow the companies such as Blackduck to significantly shorten their code scans for a variety of their offerings.

B. Compose and run on the cloud

Vendors such as Coghead and Bungee Connect provide composition, development, and deployment of the tools and applications on the cloud. These are not OSS solutions but the OSS can build a similar business model as the commercial software to deliver the application lifecycle on the cloud.

C. OSS as SaaS

This is the holy grail of all the OSS business models. Don't just build, compose, or disseminate but deliver a true SaaS experience to all the users. In this kind of experience the "service" is free and open source. The monetization is not about consuming the services but use the OSS services as a base platform and provide value proposition on top of that. Using the cloud as an OSS business platform would allow companies to experiment with their offerings in a true try-before-you-buy sense.

At the end of the day, cloud providers generally have two major advantages they can offer to the marketplace: better ways of doing things or lower costs. By applying economies of scale to both areas (both infrastructure costs and R&D can be distributed across all customers, for example), clouds offer a more complete and compelling solution than open source alone can.

IV. ADVANTAGES OF OSS WITH CLOUD



Fig. 4 Advantages of Open Source Software with Cloud Computing

A. Better Services

As the market will proliferate and expand, more and more businesses and people will take the services provided by the cloud. Cloud services can be provided, afforded and managed by a handful of service providers. This will gradually result in a scenario where the demand exceeds the supply. In such a case, monopoly will prevail and thus there will be a stage when stagnation will arrive along with higher prices for the cloud services. This situation will be disadvantageous for businesses as well as people who are using cloud for their personal usage.

Moreover, we cannot expect a handful of service providers to cater to the needs of the ever-rising cloud users. A handful of service providers with a handful of services with limited resources will result in the conclusion of the development of cloud computing.

The world of technology needs a federal system in which there are more players and incessant evolution of newer and better services takes place. Such a system can be provided by open source software which not only reduce the cost factor but also lower the entry barrier for smaller service providers.

B. Boost for small to medium businesses

Low budget Business and Operations Support System services delivered over the cloud give the right impetus to small and medium businesses by offering them the right mix of high-end technology along with flexibility for optimization according to their business needs.[14]

C. Breaking the Language and Boundary Barriers

Language was made to communicate and remove the barriers we have in our thought processes. But with increasing fraction and divisions in boundaries, language somewhere became a hindrance rather than a tool. Chinese language is very different from English, as it makes use of symbols. If there could be a medium through which, even if we do not know any language still we can communicate effectively, imagine how great it would be for the world as the exchange of ideas only leads to development and progress.[6]

Technology is a great equalizer in today's era. With globalization, companies situated in remote places have been able to expand their businesses across the globe. With the increase in smartphone usage and more and more awareness towards E-Commerce, the companies look forward to use the Internet as their marketing tool. There are software available that translate huge amount of content in your desired language in the flicker of your eyelid. Such software, when hosted on the cloud give an easy access to the user.

D. Benefit for the Society

Recently, Fujitsu has introduced a milestone in social health care sector. It has launched a new cloud service that supports the health care and lifestyles of senior citizens by providing home health care and nursing facilities for the elderly. This service has been launched in Tokyo, Japan.

Such revolutionary ideas can result in betterment of the social fabric of the nations. It provides multi-vendor, multi-network and multi-layer service level agreement. With OSS such ideas can proliferate.

E. Augmentation of E-Learning

E-learning has grown into a widely popular and acceptable way of learning. Most beneficial for places where resources are scarce. In India also, IITs have started to use virtual classrooms and video-conferencing as regular classroom learning. E-learning not only provides direct access to valuable resources but also provides content, services, and that too at affordable costs. Thanks to Open Source Software. Many countries like China, have tapped into this useful arena and are in the process of construction of such knowledge clouds. Software such as Moodle, Sakai, Canvas are examples of OSS based E-learning initiatives. [3]

F. Handle Mass Data Management Problem

With more usage of computers, there has been an astronomical increase in online and soft data. The websites, web-pages, audio, video content, pictures form the chunk of data that needs space on the Internet. Apart from it, individual users need space to store their content and data, companies need space to store their information, and organizations need space to save their data economically and reliably. From where are we going to fulfill this ever growing need for space and memory? How many proprietary clouds are we going to use?

The answer lies in Clouds that use Open Source software. They provide excellent services at low costs. Examples are innumerable to see.

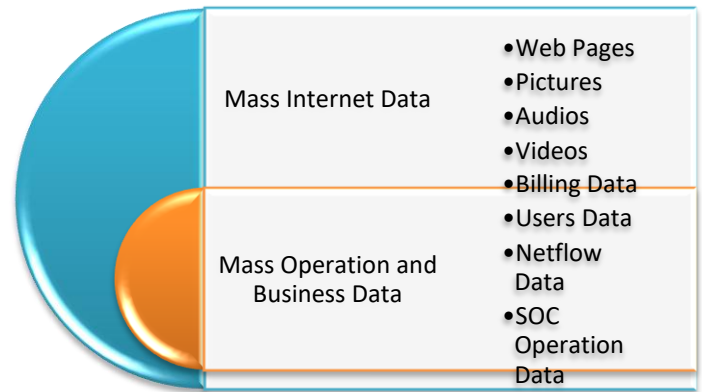


Fig. 5 Mass Data Management Requirements

V. POTENTIAL PITFALLS

Every coin has two sides, so has OSS with Cloud Computing.

Cloud with Open source software considerably reduces vendor lock-ins and interoperability issues, but still such risks are not eliminated.

Some of the open source platforms need to mature based on the users' and businesses' needs. With time and need they will do so.

Open source based clouds that are community driven suffer problems due to lack of solid vendor support. Some kind of organization, society or association should be formed to take care of the management and progress of such community driven projects.

Security concerns regarding the data and content is a constant threat to clouds whether they are open source or proprietary.

Movement of Open Source based clouds to proprietary clouds is always possible.

VI. SOME PRACTICAL EXAMPLES OF OSS WITH CLOUD



Eucalyptus is an open source based cloud software that has the framework as a service (IaaS) software for building private clouds that are AWS (Amazon Web Services) compatible. A very useful application indeed that empowers the user to run and control isolated collections of virtual machine instances.



Abiquo is an open source based cloud computing platform that allows the customers to rapidly build and manage a fully automated and governed, public, private or hybrid cloud.



Cloudera is an open source Hadoop software based framework which has gained popularity due to its flexibility with data-intensive, cluster based queries.

OpenNebula

OpenNebula

OpenNebula is a boon for virtual machine management offerings. It is the most popular Virtual Infrastructure Manager.

Deltacloud

Δ-CLOUD

Deltacloud is an API (Application Programming Interface) that abstracts the differences between clouds and protects the applications from incompatibilities.

Enomaly

enomaly

Enomaly is an Elastic Computing Platform that provides the power, flexibility and compelling economics of cloud computing to its users.

Joyent

Joyent

Joyent offers IaaS and PaaS for large enterprises.

Zoho

ZOHO

Zoho provides support to businesses with applications that help to get increase in sales, support the customers and thus make the business more productive. It has applications for Customer Relationship Management (CRM).

Globus Nimbus

NIMBUS

Nimbus is an open source based cloud platform and infrastructure that delivers the power and versatility of clouds to the scientific users. It also allows to integrate with other clouds as OpenStack and Amazon.

Reservoir

RESERVOIR

The Reservoir Project is a breakthrough in service technologies that serve as Infrastructure as a service (IaaS) using the power of cloud.

puppet
labs

Puppet

Puppet is an open source configuration management tool designed by Puppet Labs.

Apache Traffic Server

trafficserver

The open source Apache Traffic Server 4 is a caching proxy server that accelerates the web.

Funambol

FUNAMBOL

Funambol is powered by open source and provides personal cloud solutions. It is the leading mobile cloud sync solution.

Drupal

Drupal

Drupal is again an open source based content management software which is currently behind millions of websites and applications round the globe. An amazing feature of Drupal is that, it is built, used and supported by an active and diverse community of people around the world. Thus, making it truly an epitome of open source.

There are still are many in the market, and many more developing each moment.

CloudBerry
Explorer

CloudBerry Explorer

cloudstack
open source cloud computi

CloudStack

Zend

Zend

jetty

Jetty

ZOPE

Zope

VII. LATEST DEVELOPMENTS

A. Putting Desktop in the Cloud

DAAS – Desktop as a service through which you can create desktops at your own speed. The desktop is separated from the physical device. You can get customized desktops with great speeds in exchange of the payment you give to the service provider.

B. Desktope

Desktope offers what is called as the Desktop Virtual-D platform which is a certified desktop virtualization platform. It integrates discrete virtualization technology manageable from single console. It also provides desktop grid or access fibre. This fibre is a software service that manages desktop virtualization.

C. Virtual Bridges

Virtual Bridges are used to create Virtual Desktop Interfaces (VDI) on Linux servers. It offers Virtual Enterprise Remote Desktop Environment (VERDE) which is a desktop virtualization solution for Linux and Windows that use VDI. This solution combines VERDE with the UBUNTU desktop.

D. Cloud Foundry

This is a unique cloud based service that focuses on the code and not on the infrastructure. It provides Open Source Platform as a service. You can deploy your applications on the cloud of your choice and the functionality is as easy as a push button. Cloud Foundry supports applications written in varied programming languages like Java, Scala, Groovy, etc.

VIII. FUTURE SCOPE

If companies like Facebook, decide to go on cloud then it might run advertisements on all pages to earn revenues, use Photo cloud to store pictures of users and keep only login data on Facebook servers. This way they will generate more revenues from advertisements and might be one day share and distribute their revenues with their customers based on their activity on Facebook.

The future is bright and dynamic. There is so much scope when OSS meets the cloud. Flexibility, freedom and economy of costs attracts the best brains of the IT industry to participate. In India, a recent news article highlighted that most of the upcoming websites, businesses and new innovations are the brain-child of students and working professionals who are based in small towns. Tier-II and tier-III cities are becoming the centres of innovations and experimentations. This is good news. It shows that finally Internet and technology is working towards bringing equality.

We hope that OSS with cloud will bring huge benefits in terms of services and costs to small and medium businesses which will in turn encourage more enterprising individuals to opt for entrepreneurship against opting for traditional jobs in the corporate sector.

IX. CONCLUSION

We are currently surviving in an era where the extended economic downturn is taking a toll on our businesses and business decisions. Open Source software has emerged as one such potential area which offers companies cost cutting with an added advantage of flexibility. Cloud deployment also saves money and helps the business-man to lead a

hazle free business in terms of computing services. Cloud with OSS is like eating the cake with the icing on it. A perfect solution for medium, small and even large businesses to cut costs and increase their survival in today's competitive business world.

REFERENCES

- [1] "Cloud Computing and Open Source: An Industry Altering One-Two Punch" (ID #G00159058)
- [2] IT@Intel White Paper, Open Source Cloud Integration September 2012
- [3] Yang, Zhihe, Construction of OSS-based E-Learning Cloud in China, Education Technology and Computer(ICETC), 2010 (ISBN: 978-1-4244-6367-1)
- [4] Mockus, R.T. Fielding and J. Herbsleb, A Case Study of Open Source Software Development: The Apache Server, Proc. 22nd Int'l Conf. Software Eng., 2000.[Abstract] [Full-Text PDF (952KB)]
- [5] J.W. Paulson, An Empirical Study on the Growth of Open Source and Commercial Software Products, master's thesis, Dept. of Electrical and Computer Eng., Univ. of Calgary, Alberta, 2001.
- [6] Krishnan Subrahmanian, Open Source and Cloud Computing
- [7] M.W. Godfrey and Q. Tu, Evolution in Open Source Software: A Case Study, Proc. Int'l Conf. Software Metrics, 2000. [Abstract] [Full-Text PDF (716KB)]
- [8] E.S. Raymond, The Cathedral and the Bazaar, <http://www.catb.org/esr/writings/cathedral-bazaar/cathedral-bazaar/>, Aug. 2003.
- [9] D. Wheeler, Why Open Source Software/Free Software (OSS/FS)? Look at the Numbers!, http://www.dwheeler.com/oss_fs_why.html, Aug. 2003.
- [10] <http://software.intel.com/sites/default/files/accelerating-deployment-of-cloud-services-using-open-source-software.pdf>
- [11] <http://www.serenesoftware.com/costContainment.html>
- [12] <http://www.abiquo.com/>
- [13] <http://gigaom.com/2009/11/06/10-top-open-source-resources-for-cloud-computing/>
- [14] [http://wikisperience.com/wiki/index.php?title=Business_support_systems_\(BSS\)](http://wikisperience.com/wiki/index.php?title=Business_support_systems_(BSS))
- [15] <http://www.slideshare.net/iawan/evaluating-the-impacts-of-mobile-cloud-computing-on-ossbss-landscape>
- [16] http://www.cloudinfinet.com/campaign/?utm_source=google_adwords&utm_medium=cpc&utm_term=general&utm_content=Cloud_Computing&utm_campaign=Cloud_Computing_Services
- [17] <http://deltacloud.apache.org/>

Ms.Gunjan Kotwani



Ms. Gunjan Kotwani has more than 8 years of industry and teaching experience. She is an IT Post Graduate and an MBA in marketing and is pursuing her doctorate studies in the field of computer science. She has authored a series of eight (8) books published by Oxford University Press (OUP), focusing on Free and Open Source Software for school education. She has co-authored a text book for the subject Information Practices (IP) for class XI of Rajasthan Board. She is actively involved in workshops

conducted for the spread of free and open source software. She is a member of IEEE and IACSIT. Research paper titled "**Open Source Software (OSS): Realistic Implementation of OSS in School Education**" published in "Trends in Information Management", **TRIM**, December 2011 Issue, (ISSN: 0973-4163). The journal is included in Ulrichsweb, Global Serials Directory by Pro Quest (U.S.A) and Educational Technology and Library Science by Cabell Publishing Inc. (U.S.A). The journal is also web enabled through EBSCO's prestigious database, Business Source Complete (U.S.A). Also, it is under consideration in world's growing indexing abstracting database, SCOPUS, the product of Elsevier, largest publishers in Science, Technology and Medicine (S.T.M). Research paper titled, "**Cultivating Entrepreneurial Mindset and Skills In Students**" published in the "**International Journal**" Business Archives (ISSN-0976-6758). Presented research paper titled "**FOSS Drives Creativity and Innovation**" in the International Conference on "Innovation, Creativity and Change" organized by Delhi Business School (DBS), New Delhi (May 2011). Presented research paper titled "**Analysis and Application of Data Mining in Bioinformatics**" at the 1st International Conference on Adaptive Computing Technologies in various Engineering Applications (ICACTEA -

2011) held in Poornima College of Engineering, Jaipur (Feb, 2011), technically sponsored by The Institution of Electronics & Telecommunication Engineers (India), Indian Society for Technical Education (ISTE) and IEEE – MTTs India Council Chapter. Web Article on **“Information Technology: A Tool for Continuous and Comprehensive Evaluation”** for the Web Site of OUP (Oxford University Publications). Research Paper on **“Green: The New Colour of Computing”**, in National Conference on Environmental Accounting- Sustainable Development & Environmental Protection (UGC Sponsored) organized by Centre for Tourism and Heritage Research, Department of Commerce, Dayanand College, Ajmer. (Jan, 2012). Participated in the National Workshop on **“Analytical Techniques for Research”** organized by Government College, Ajmer (GCA) (June-2011)

Mr. Pawan Kalyani



Mr. Pawan Kalyani is a law graduate and has completed his masters in management with specialization in IT. He has industry and teaching experience of more than 10 years. He is pursuing his doctorate studies in the field of management. He has presented papers in national and international conferences and has won prizes and accolades for the same. He is also a member of IEEE and IACSIT. Research paper on, **“VirtuaCity: A Virtual World on the Web An Indian Perspective”** for the

International Conference on Organizations in the new Millenium: Challenges & Opportunities, ICON, Ajay Kumar Garg Institute of Management, Gaziabad. Contributed paper on, **“Group Buying: An E-Commerce Tool for Micro, Small and Middle Enterprises (MSME)”**, in the International Conference on Management of Micro, Small and Medium Enterprises (MSMECON – 2011) organized by Institute of Management Technology (IMT), Nagpur. Presented research paper on, **“B School Marketing and Faculty Perception in Quality Education: An Empirical Study”**, at Aishwarya Institute of Management & IT, Udaipur. Attended **The National Education Summit 2011** organized by Dainik Bhaskar; inaugurated by minister for human resource development Kapil Sibal on June 11, Oberoi Hotel, New Delhi. Attended the National Seminar on **“Customer Relationship Management: Success Through Value Creation, Nurturing and Loyalty”** organized by Management and Commerce Institute of Global Synergy, Ajmer. (August, 2011). Submitted the case study on **“Bhaskar: What next?”**, a national level hunt organized by Dainik Bhaskar Group (DBG). Submitted the case study on **“Succeed Management College: Marketing Strategy”** for the book titled **“Cases in Customer Centric Management”**, under publication by IGI Global, USA. Research paper titled, **“Cultivating Entrepreneurial Mindset and Skills In Students”** published in the **“International Journal” Business Archives (ISSN-0976-6758)**. Research paper on, **“B School Marketing and Faculty Perception in Quality Education: An Empirical Study”**, under publication at Aishwarya Institute of Management & IT, Udaipur.