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GREEN COMPUTING-A DEMAND OF TECHNOLOGY

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ABSTRACT

Computing is not presently very environmentally friendly. The use of personal computers, servers, and storage centers cost energy and hence, more gases emissions. These days, we are inundated with electronic greeting cards. We deem that by switching from paper to electronic mode of communications, we are "green", and that in doing so we have saved paper and thus done a bit to save the environment and generate less CO2. But it appears not as much as we are led to believe. "Electronic Greeting cards or E-mails are not so green". This paper work takes a fresh and updated look at the energy consumption due to computing devices in perception of global consumption. It further quantifies the impact of energy consumed by the computing sector on the environment, as well as on the electricity cost to an average consumer. This paper helps to recognize key issues related to green computing and appraise different approaches to these problems. Finally, paper point out future directions of research and conclude the paper.

Keywords: Eco Friendly Computing, green computers, Carbon, Conservation, E-waste, Global Warming, Green search engine, Best practice- Disposal .

I. INTRODUCTION

Green Computing is a study in which we can create update or develop an applications or system which has brings zero impact on the environment. This study focus on manufacturing and recycling computer resources like monitors, servers, CPU, hard disk , networking and communication system efficiently without give impact to the environment. Green computing can helps on preventing global warming that origin of improper function in the natural atmosphere. Such practices include the accomplishment of energy-efficient central processing units , servers and other devices as well as reduced resource consumption and proper dumping of electronic waste (e-waste).Current IT systems depend upon a complex blend of people, networks, and hardware, as such a green computing proposal must be systemic in nature, and address increasingly sophisticated problems. Green computing is the highest requirement to protect environment and save energy along with operational expenses in today's increasingly competitive world. Also, every large change begins from small initiatives. For example, we started some of the simple but effective initiatives like pre setting the power options on your personal computer or in phones to switch to sleep mode when it is not in use. When we're going to be away from PC for small time, setting it to stand-by mode and turning off the monitor will save a huge amount of energy. Even consumers are now becoming more aware of green technologies and are starting to demand more environmentally friendly products. This trend also encompasses the vehicle market. Automakers also give more

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emphasis to costumer need that have better fuel economy, have lower emissions of gasses, and include natural materials.

The foremost purpose for doing research on green computing is to reduce the dangerous material, utilize energy efficiency during the product's lifetime and promote the proper disposal and recycling of computer products. When it comes to research for Green Computing, the practice is not just to promote the efficiency, but involves number of activities by which we can develop a software or application that can reduce electronic waste for computer resources. Research covered specific area of green computing. Research areas are listed as per below:

- Increasing Energy efficiency at Data Centers
- Recycling and Disposal
- Telecommuting
- Virtualization of server resources
- Thin Client Solutions
- Use of open source software
- The development of new software that address green computing for internal use and potential sale to other organizations
- Cloud Computing Usage
- Energy Efficient Coding

II. WHY GREEN COMPUTING?

Now days, companies need to collect, store, track and analyses enormous volumes of data—everything from click stream data and event logs to mobile call records and more. But all of these comes with a cost to both businesses and the environment. Data warehouses and the extensive data centres that store them use up a huge amount of power, both to run servers and to cool them. It requires 61 billion kw of electricity, at an estimated cost of $4.5B annually. The IT industry has begun to address energy consumption in the data center through a range of approaches as well as the use of more capable cooling systems, virtualization etc . But a elementary challenge remains. As data volumes increases, traditional data warehousing approaches can only produce more hardware at the problem. This can quickly go against any green gains seen through better cooling or more tightly packed servers. To minimize their hardware requirement, companies also need to minimize their "data footprint" by addressing how much server space and resources their information analysis requires in the first place. A combination of new database technologies definitely designed for analysis of huge quantities of data and reasonable, resource-efficient, open-source software can help organizations save money and become eco friendly. This technology is favorable as it:-

- Reduce energy consumption of computing resources during operation
- Save energy during inactive operation
- Use eco-friendly sources of energy
- Reduce dangerous effects of computing resources
- Reduce computing e-wastes

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Global warming and the problem of minimizing environmental impact from co2 emissions have risen to the top of global public issues. As a result, organizations and consumers alike have started to hold environmentally friendly products that offer low-carbon solutions that can not only reduce their harmful gasses emissions, but can do so by more efficient energy consumption and lower costs.

III. HOW GREEN COMPUTING CAN ACHIEVED:- ECO FRIENDLY COMPUTING

There are a number of fundamental steps that can be taken to significantly decrease the environmental impact of computing. These mainly involve actions for reducing energy consumption. Following are the steps discussed one by one.

- **Increasing Energy efficiency at Data Centers**

Energy efficiency is that activity in which we can minimize the impact of electronic waste on natural environment by designing application that can save energy. To develop data center ecosystem is one way to optimize the energy and material used in reducing environmental impact. International Business Machine (IBM) is one of the major companies in the world that implement green computing for their data center infrastructure. In articles, ROI: "Extending the benefits of energy efficiency by IBM", Logan Scott explains that, IBM energy efficiency offering manager, "If we keep growing with the current model of distributed IT model where a number of companies are using by running one application per server that is not really going to be sustainable. And even on the issue of storage management it is just becoming too difficult to keep up with the increasing demand for storage capacity. As Scott said that some smaller businesses may not yet be ready for virtualization. Still, these businesses can also get benefit from consolidation and more efficient server designs. As an example, he suggests that by transitioning from traditional rack-mounted servers to energy-efficient blade servers can save energy costs by up to 40 percent. Similar benefits we can get in the storage environment.

- **Recycling and Disposal**

Usage of electronic products has increased extensively over the past two decades, leading to invention of new technologies, information and entertainment. According to the Consumer Electronics Association (CEA), Americans now have possession of approximately 24 electronic products per family unit. All the electronic products and tools must have proper disposal and will lead to minimize cost and give repayment to environment space. Recycling is that activity that teaches human being or even companies on making money by selling all those recycles products. At least 22 states have law that makes electronics manufacturers like Sony, Apple and Toshiba financially answerable for recycling their old products. But lack of supervision of these programs has led to extensive fraud. In one mode, quietly known in the industry as "paper transactions," recyclers buy paperwork to indicate that they collected a certain amount of electronic waste that they never actually collected. At the company's own place waste sorting can be very efficient leading to true closed loop material circles. We can use financial incentives for taking initiating the recycling behavior, but the weight of them is getting lower when recycling becomes a daily habit.

- **Telecommuting**

Telecommuting means to work from home, by using the Internet, email, and the telephone. For recent years, place of work has been plugged telecommuting programs as a low cost way to attract new employees and remain existing ones. Work from home is the best way reducing hundreds of workers in workplace. "A recent

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study found that less than 5 percent of U.S. private sector employees actually work from home, that number could be reached as high as 30 percent by 2019", Green impact to environment and workplace and real money savings on it, better business resiliency and increased self-confidence. Even just one-day of telecommuting could save about to 423,500 tons of greenhouse gas, according to the Telework Research Network – It is equivalent of taking 77,500 cars off the road for a year. As reported on Information Week, the US Patent Office's telework program in 2007 (consisting of 3,610 home workers) helped save over 613,500 gallons of gas, prevent 9,650 tons of carbon emissions, and save over $1.8 million annually in fuel costs. Other companies such as Cisco and Bell Canada report similar environmental benefits.

- **Virtualization of server resources**

Server virtualization is that technique in which we can mask the server resources, including the number and uniqueness of individual physical servers, processors, and operating systems, from server users. In this the server administrator uses a software application to partition one physical server into multiple isolated virtual environments. These virtual environments are sometimes called virtual private server systems, but they are also known as guests, containers or emulations. Cloud computing has recently known these days as a platform to outsourced server sources instead of being powered on site. In IBM use of server virtualization technology can save capital, money, floor space and energy by consolidating multiple workloads on the fewer physical servers. They introduced visualizations of technologies that can help to achieve new efficiencies by reducing machines and maintenance. Server utilization can help down the cost and reinvesting the savings to support new services and improve the offerings.

- **Use of thin Client Solution**

Thin client is that way in which we can save on energy use by the PC's and data centers. This term refers to reducing usage of energy, reductions in materials used, using of virtualization of servers, and usage of open source software. Fujitsu unveiled a new thin client machine that cuts energy by about to two-thirds. In a article by Greener Computing published on August 24, 2009. in this it has been written that In addition to saving on procurement costs, thin client also adopts cloud servers and data center computing.

- **open source software**

Open Source is that approach which is not linked with any vendor or supplier. Open source is an idyllic development and business model for today's online participatory, shared, networked culture. The open source model offers liberty to users and software developers and supports true collaborative improvements. Open source software can provide accessibility, low or no upgrade costs, and provide a better value in an environment that allows for everyone's participation in the competition of coding. Open source software provides us an alternate open source license that allows users to study, change, improve and distribute software. Open source software is often developed in a collaborative manner. The report given by the Standish Group states that adoption of open source software models have resulted in the savings of cost over $62 billion a year to consumers.

- **The development of new software that address green computing for internal use and potential sale to other organizations**

Some technology can brings gain to the environment such as testing building materials which a chemical processes to trim down the use of unsafe material. Today Nanotechnology is also used in an attempt to manipulate materials at the nanometer scale; scientists have hope that it can transform manufacturing on a

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international level, from government purchasing to a technological revolution. In the survey it has been found that VIA is looking for to enable the next 1 billion people to get connected, with the use of computing and communications technologies. The company is focused on empowering new, promising markets, looking at models that reach away from individual ownership of a PC, such as local pay-for-use facilities. Products built for such a use are known by ultra-efficient energy consumption and the ability to withstand heat and dust in insensitive environments. Engineering higher performance computing like developing smarter software systems to explore parallel, multiprocessor architecture systems that will mean a more efficient use of hardware resources and better coding techniques. Lastly, another most important aspect of green software is the development of sustainable software systems and the use of Open source software system methodologies

- **Cloud Computing Usage**

Cloud computing is that place where software applications, processing power, data and potentially even artificial intelligence are accessed over the Internet. Cloud computing technology has many benefits, one of which is allowing anybody to attain the environmental benefits of virtualization. As we know that most of the servers in company data centers run at 30 to 40 per cent capacity, most cloud vendor servers run at 80 to 85 per cent capacity or more. By adopting cloud computing technology of online computer processing power in the form of PaaS or IaaS companies may therefore potentially reduce their carbon footprint. Cloud computing can also helps us to remove the need for most users to run high-power PCs and laptops.

- **Energy Efficient Coding**

An alternative approach for saving the power saving is energy efficient coding. The principle behind the energy efficient coding is to save power by designing software to make less use of the hardware, rather than constantly to run the same code on hardware that uses less power. Obviously combining these two approaches can lead to greater energy savings.

Out of Nine points discussed above to reduce energy consumptions .There are several other techniques for saving of energy and cutting down greenhouse gas from our end.

- First approach is to free up the memory space in the computer Clean up the e-mail box (in and out mails) periodically. If we will not do this then there will be great demand of storage and energy.
- The second, limit is the number of recipients for each e-mail (cut down the number of cc's to).
- Third point is to cut down the size of the attachments (boil less tea- water).
- Fourth method is to enter the URL address directly rather than use a search engine.
- Fifth technique is not to leave your computer and accessories on overnight (as many offices do), not even on _ sleep mode' (even if that eats up only 1-15 watts).
- Sixth: laptops use 25-60 watts while desktop computer use 250W. You can cut down the power by doing more _offline' work than online. Finally, you should remember that Facebooking and Twittering burn carbon and make CO2.

IV. CONCLUSION

Finally we can propose that green computing is very important aspect for today and tomorrow. As we have seen every day new technology is coming in the market. When a new technology product launched in the market, the old one becomes obsolete now a question where this old product will go. As we have discussed in this paper the

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thirst areas in which green computing can be applied or we can say that the concept of green computing can be implemented. The purpose of the "green computing" movement is to initiate the strong steps in thrust areas of computing say software, hardware or middleware to restrict of limit the use of eco-harming elements.

Also, the task is to proceed like an eye opener for all the human beings to help protect the environment by keeping the environment greener than the green. We should take care of all these factors of cloud computing, virtualization of servers, efficient coding, use of open source software, recycling and disposal of old products while buying/manufacturing a computer/laptop or while using computer. So that we can help a bit to save our environment..

V. FINDINGS

1. If we think computers is none polluting and consume very little energy we need to think again. It is estimated that out of $250 billion per year spent on powering computers all over the world only about 25% of that power is spent computing- the rest is wasted idling. Thus, energy saved on computer hardware and computing will equate tones of carbon emissions saved per year.

2. The plan towards green IT should include new electronic products and services with optimum efficiency and all possible options towards energy savings.

3. Power supplies are disgracefully bad, generally as little as 7% efficient. And since everything in a computer runs off the power supply, nothing can be efficient without a good power supply. Recent inventions of power supply are helping secure this by running at 80% efficiency or better

4. Mobile phones are better than computers – green computing. They have faster processors, more storage, good wireless Internet connectivity and larger memories. Mobile Phones consume very low power

5. Purchase LCD's monitors which consume less energy than CRT's screen and LCD's is also not harmful for the eyes.

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