

# Decision making process in migration from Microsoft to Linux.

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## Abstract

In recent times there has been a considerable amount of interest in migration of operating systems to Linux, particularly from that of Microsoft based. There are several factors that influence the migration to Linux. The aim of this research was to study the decision making phase that organisations adopted before they considered migrating their systems from Microsoft based operating systems to Linux.

*Keywords:* Linux, Microsoft, migration, test, decision

## 1 Introduction

The role of IT in businesses has been substantial for over 20 years. As more and more businesses use it for a broader range of their business processes, it continues to grow rapidly. In the process of their evolution, IT has seen the rise and fall of UNIX, the surge of Apple operating system, the emergence and dominance of Microsoft operating system and in the recent past the coming of age of the operating system with a relatively new category of software called open source, of which Linux operating system is a major player. For almost two decades, Microsoft has been the leader of the operating system market to a point that it had virtually become a monopoly. Competitors or alternative operating systems emerged but disappeared without making much impact or diminishing Microsoft operating systems' market share.

For various reasons, businesses have been looking for a viable alternative to Microsoft operating system and in the recent past, it has arrived in the form of Linux, which is a free operating system similar to UNIX and belongs to the open source software category. Open source software has been gaining recognition during the last decade and major credit for that goes to Linux. Apart from becoming a major competitor for Microsoft operating system, Linux has been able to cause a change in the mentality of business organisations (small to large) and has been able to register a steady to significant growth over the last decade. According to IDC estimates, Linux will be the operating system registering the fastest growth in the next few years (eWeek, 2004).

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What attracts many people and organisations to Linux is that it is a free and open source operating system, which means that it is free to download and also have access to its source code. It is an interesting option for those who would like to customise the operating system. Besides, several free applications like Moodle, Apache, MySQL, PHP, Firefox, Open Office are also available that run on both Linux and Microsoft operating system. This allows people to try these options and the fact that despite being free, the operating system and the applications have so many features that they can completely replace any Microsoft operating system or applications, including Microsoft operating system file formats, which is a major attraction (Holton, n.d.).

Over the last five years there have been ongoing debates about the viability of Linux, its effectiveness in the business environment, comparative performance advantage over Microsoft operating systems, cost benefit, security, TCO and various other factors (Wagner, 2004; Metz, 2004; Wheatley, 2004; Didio, 2005).

In this paper the focus is on the migration from Microsoft operating system to Linux on servers and desktops in business organisations of varying sizes and types. The comparative rate of migration on servers and desktops are also discussed. Further research and analysis is being carried out to identify the factors that are driving the migration.

## 2 Literature review

Though operating systems have been around for nearly as long as the computers have been around for, Linux emerged only in the last sixteen years. It has been considered as a serious contender for use as a server operating system only in recent times. This has meant that there is a scarcity of relevant material available on this research topic. Most of the materials that were found were from IT-related websites, magazines and newspapers.

Linux and open source have now become a mature technology and have been able to prove their cost effectiveness in the business world (Barker, 2005). More and more business organisations are looking at Linux as an alternative to Microsoft operating system. Various major corporations (Becker, 2004b; Lettice, 2003), banks (Loney, 2002), governments departments (Shankland, 2004; Shankland, 2005a; Marson, 2005b) and other businesses have migrated to Linux and this has popularised the movement of migrating to Linux. In the process, the operating systems that have been affected the

most are Microsoft operating systems (Becker, 2004b; Shankland, 2004; Keizer, 2004; Wilcox, 2002; Bloor, 2004b).

When Linux was still on the verge of gaining market share in the server and desktop areas, companies like Sun, Dell and IBM had come out in support of Linux. However, in the year 2002 they had to drop their support for Linux due to lack of response. A major reason for the lack of demand was that the systems were very expensive for large organisations to replace their existing ones and it was never priced in the range of a home use PC (MacVittie, 2002).

Then came a phase where organisations were happy to trial Linux on cheap or unused PCs and once they saw the potential it could offer, they subsequently began installing them on servers and desktops and deployed MCAs on Linux servers. (MacVittie, 2002).

Though Microsoft operating systems have been market leaders, ever since the emergence of Linux, Microsoft operating system's market share has gradually reduced and one of the various reasons identified for the reduction is its remote administration feature, which after all the recent releases and improvements, still ranges from being painful to a nightmare (Dickerson, 2003).

There are various reasons why Linux adoption has gained momentum around the world of which its low upfront cost, low TCO, customisability, control, security and flexibility are some of the major factors (Hanrahan, 2005; Rowe, 2001).

Although there have been relatively few endeavours to research and analyse the factors influencing the migration to Linux (Rankin, 2006), most of them have been carried out by businesses (IBM, 2005) or have been opinion pieces (Korzeniowski, 2005; Earnshaw, 2003). This brings to light the fact there is an acute shortage of academic research that has been carried out on the topic of migration from Microsoft operating system to Linux. Hence, this research is aimed to fill that gap.

## 2.1 About Linux

Linux operating system is a UNIX variant, which has some very exceptional features. One of them being that Linux is based on the highly dependable UNIX operating system. That makes Linux an extremely secure and robust operating system. Additionally it also means Linux's file structure, commands and behaviour are very similar to those of UNIX (Easttom, 2004).

It may look strange that a free operating system has become a powerful entity in servers and is gaining market share in desktops. Unlike most of the other operating systems, Linux's growth was not from entry level PCs to the servers rather it has been from high-end servers dominated by UNIX and Microsoft operating systems, down to desktops. One of the main reasons for this is its compatibility with the various UNIX flavours (Rowe, 2001).

Linux had a small and slow beginning in 1991 when Linus Torvalds, a student of the University of Helsinki, asked people to help him build an operating system that in his words would be "just a hobby; won't be big and professional". (Langley, 2004). In recent years, Linux has

emerged as one of the major competitors for Microsoft operating systems on both servers and desktops.

One of the most common misapprehensions of Linux is that it is not very user friendly and is difficult to understand, which is far from true. On the contrary, Linux is as user friendly and only as difficult as any popular Microsoft or Apple operating system (Easttom, 2006).

For some time now, Microsoft has been cautiously considering the threat of the open source phenomenon; they have had to be very pragmatic about the fact that Linux is here to stay and is gaining market share. It is soon going to reach a point where Microsoft will have to accommodate or counter it and as a step towards doing so, they have started to make their proprietary code available to software developers. This will allow software developers to have a look at how Microsoft operating system works and develop programs that operate on the operating system, thereby preventing Microsoft software programmers from defecting to Linux or other substitutes (Flatow, 2004).

## 2.2 Migration to Linux by businesses

It is an undisputed fact that Microsoft operating system dominates the IT world with almost 95 percent of the PCs worldwide running on Microsoft operating system with Apple Macintosh and Linux in second and third places respectively. This does not mean that Linux is sitting on the fringes, rather it is continuing to make strides and reducing Microsoft's market share. An IDC study forecasts that by the year 2008 the sale of PCs with Linux installations will be US \$10 million. It also predicts that the Linux environment will grow at an annual rate of over 25 percent to more than US \$35 million (Singer, 2005).

While that is the projection, the good news for people looking at implementing Linux is that companies like Oracle, Novell, Credit Suisse First Boston, IBM and Merrill Lynch have moved over to Linux in a big way (Baker, n.d.). Countries like India, China, Japan, Germany, England, Korea, Brazil and Mexico have during the last year, initiated fresh projects to migrate their government servers and desktops from Microsoft operating system to Linux. IBM, U.S. Department of Defence and various other businesses and organisations have started the process of migrating to Linux (Alacos, 2005). One of the major boosts came when Dreamworks used Linux in the production of some of their major blockbuster movies like Shrek, Spirit: Stallion of the Cimarron and Lord of the Rings (Baker, n.d.).

Linux has grown from obscurity to a relatively wide acceptance and support in a very short span of two to three years. According to IBM, Linux use has grown around 65 percent over the last five or six years. In France, the Ministry of Equipment is one of the organisations that have migrated from Microsoft operating systems to Linux. The migration was quite substantial since it involved replacing 1500 Microsoft Windows NT servers with Linux and this highlights a trend seen among medium to large sized European organisations. One of the reasons for this migrating is cost cutting (Mohamed, 2004).

Earlier another organisation, Allied Irish Bank, migrated 7,500 desktops from Microsoft operating system to Linux. According to estimates made by IDC, an analyst firm, various organisations in Western Europe spent up to £5.3 million on Linux and other open source software in 2004 and will have invested up to £23 million by the end of 2008. IDC further predicts that more and more public sector organisations will be migrating to open source software in the immediate future. One of IDC's senior researchers notes that large organisations have been adopting a cautious stance with regard to Linux and other free software. However, many public sector organisations in France, Germany and other Nordic countries are now moving from the assessment phase to implementing Linux and other free software like StarOffice productivity suite, Ximian email and Firefox browser. The migration trend is helped by similar announcements in recent times by public sector organisations in Norway, Munich and Paris (Mohamed, 2004).

In addition to this, major IT players like Novell, Dell, HP, Oracle, IBM and Red Hat have proclaimed their backing for Linux. This is an indication that they regard Linux to be the standard operating system of future business and government organisations. Today, almost all the leading PC manufacturers offer PCs with Linux pre-installed on them (Rowe, 2001). Because of these developments, many organisations are beginning to appreciate the benefits delivered by Linux operating system and have started migrating proprietary applications to Linux (Alacos, 2005).

### 3 Methodology

This research was initiated with the primary objective of exploring and finding out the rate of migration from Microsoft operating system to Linux on servers and desktops, among small, medium and large sized organisations.

For this research there was a primary need to identify the responses of the participants for various factors of Linux and Microsoft operating system and compare them in order to get a clearer idea. Clear boundaries and meanings associated with values was a very important factor to be able to make the comparison.

Quantitative data was collected by means of a questionnaire that was sent out to a group of 200 people in the networking and decision-making fraternity in countries like India, New Zealand, Australia, Singapore, UK and USA. The group consisted of people from organisations and businesses that have already implemented, or were in the process of implementing Linux, independent or major resellers and technical support organisations. These participants were selected through personal and professional contacts and referrals by organisations and businesses involved in the process of implementing Linux.

The data was collected from the following types of people:

- Network consultants
- ISS managers of medium to large sized organisations
- Owners of small to medium size IT businesses and

- Technical policy managers

The research was aimed at finding out the decision making processes adopted by various organisations before they migrated from MS OS to Linux. Hence the questionnaires were primarily sent to organisations that had completed migration, were in the process of migration or were contemplating migration from MS OS to Linux. That was perhaps the best approach to get arrive at unambiguous results on the topic. Since organisations that had not considered migrating to Linux could not practically provide any meaningful data to the research, they were not approached. This research was carried out with data collected from seven countries around the world and from various types & sizes of organisations. This was to get an overall perspective on the topic rather than confining it to small or medium or large organisations or organisations from a specific field or sector or geographical location.

## 4 Results

The research aim was to find out some of the processes carried out by various organisations before deciding on migrating from MS OS to Linux. The respondents were asked questions on various topics like the time they were aware of Linux, had tested Linux, considered Linux was suitable for implementing in their organisation and when they carried out the migration. They were also requested to provide data for their Linux source, first time hands-on experience with Linux (of the person responding to the questionnaire), and the influential factor in deciding to migrate to Linux.

### 4.1 Aware of Linux

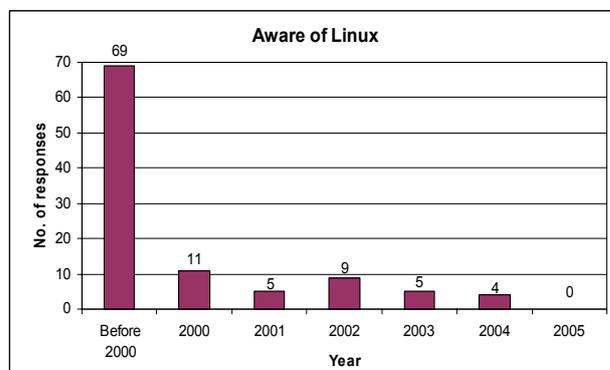
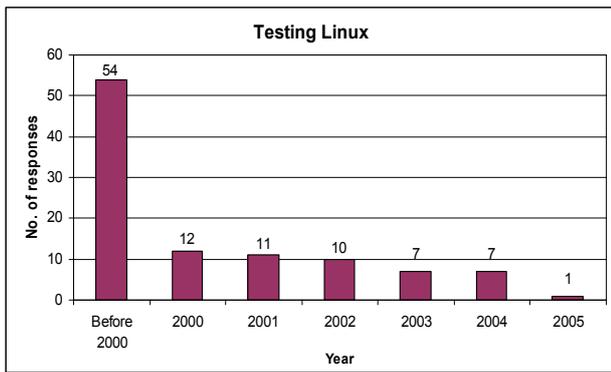


Figure 1: Year when the organisation was aware of Linux.

The first analysis carried out was on the data collected for the year that the organisation was aware of Linux (figure 1). The graph shows an overview of all the responses collected for the question. It shows that most of the organisations were aware of it early on. The chart shows that very few organisations were late on noticing the growth of Linux.

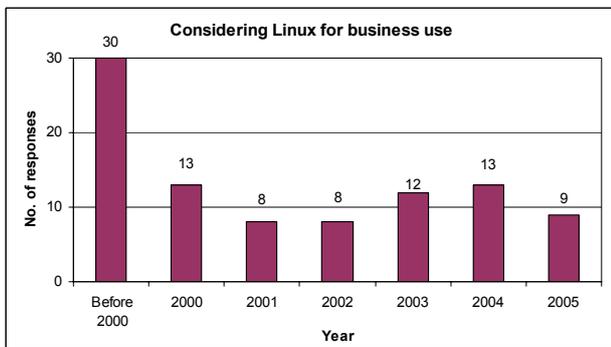
## 4.2 Test Linux



**Figure 2: Year when the organisation tested Linux.**

The next question that was asked was when the organisations had tested Linux. The analysis of the data (figure 2) came out with results similar to the previous question. It was interesting to note that most of the organisations that had participated in the survey had tested Linux prior to the year 2000.

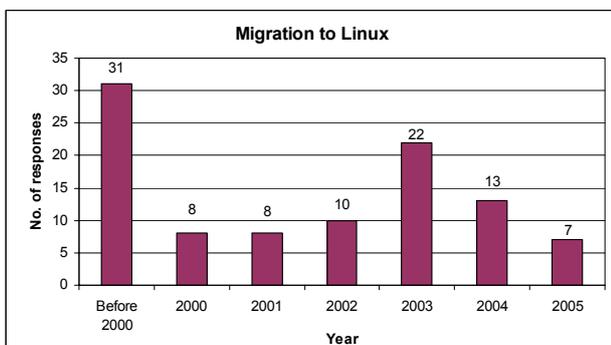
## 4.3 Consider Linux for business use



**Figure 3: Consider Linux for business use.**

The data collected for the question of when the organisations considered Linux for business use, gives us slightly different results. While yet again, a significant number of respondents had considered Linux as a serious option to be implemented in their organisation during the period before the year 2000, the numbers are not the same compared to that of the number of organisations that were aware of Linux or tested it during the same period (figure 3).

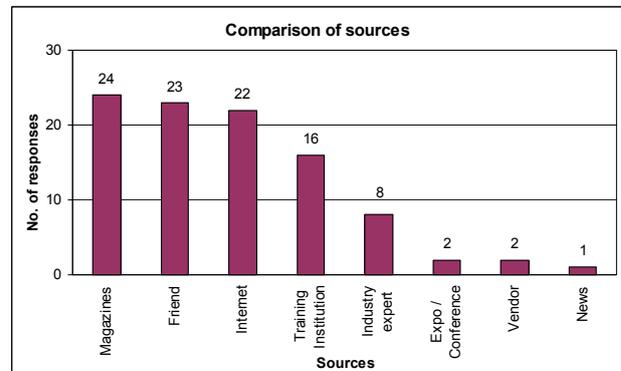
## 4.4 Migrate to Linux



**Figure 4: Migrate to Linux.**

The time of migration to Linux was the next question asked to the respondents. This was a major question since it was the one that was used to give a clearer picture of when the trend of migrating from Microsoft OS to Linux started or gained momentum. The result of analysis of the data (figure 4) shows that it had gained momentum before the year 2000 and has been continuing at a reasonably steady pace since.

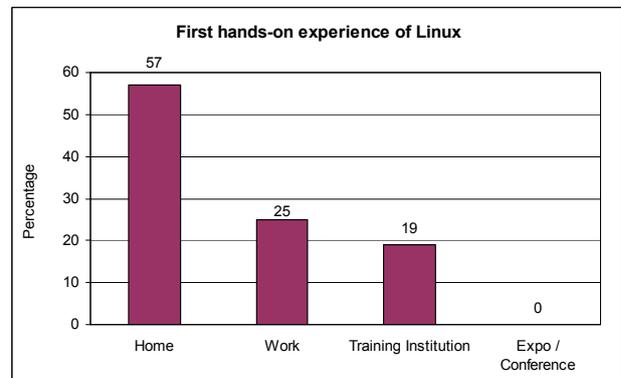
## 4.5 Source(s) of Linux



**Figure 5: Source of Linux.**

Since Linux started out as a hobby for Linus Trovaldus and gained prominence over the internet, it was an interesting aspect for this research to find out the sources of information about Linux, for those who were aware of it. Hence, it is not surprising to see from the analysis of the data (figure 5), that traditional entities like vendors, expositions or conferences do not figure highly in the list of sources from which the companies came to be aware of Linux.

## 4.6 First hands-on experience of Linux



**Figure 6: First hands-on experience of Linux.**

Keeping up with the trend of non-traditional nature of Linux, most of the respondents had their first hands-on experience at home (figure 6). Of the 101 participants who responded to the question, 57 indicated their first hands-on experience of Linux was at home. Work comes second with 25 respondents, which is less than half that of the hands-on at home category. Training in the 'next best thing' to happen or re-training of staff are the likely reasons why training institutions came a close third with 19 respondents.

#### 4.7 Reasons for migrating to Linux

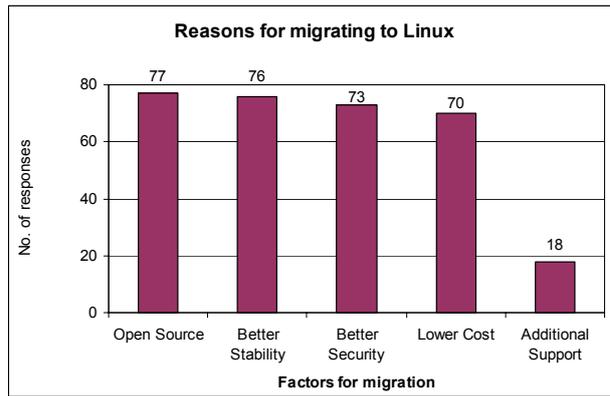


Figure 7: Reasons for migrating to Linux.

This was one of the most significant questions in the research. While there have been many debates about the reasons for migration, with and without concrete proof to back them up. So it was essential for this research to find out the real reasons why organisations choose to migrate to Linux. The analysis of the data shows (figure 7) that surprisingly lower costs were not the reason why organisations decided to migrate to Linux rather it was for other reasons like open source, better stability and better security.

### 5 Discussion

This paper is based on a component of a major research project that endeavoured to find the various factors that influence, the trend and the outcome of migrating from MS OS to Linux. The focus of this paper is to find out about the stages before the actual migration to Linux, in terms of the decision making phase that organisations adopted before they considered migrating and the reasons that made them decide to migrate to Linux. The results show that most of the organisations were aware of Linux well before the year 2000 and a significant number of them have been testing Linux to assess for its suitability even prior to the year 2000 and hence proving that the migration from Microsoft to Linux is not a very recent phenomenon rather something that has been gaining significance for some time now. The most important outcome has been that organisations did not migrate to Linux because of its lower costs rather for its open source nature and the better security and stability that it offers.

#### 5.1 Aware of Linux

Linux awareness has varied over the last decade and has differed across organisations. One of the aims of this research was to trace the growth of Linux over the last seven years. Of the 103 participants who responded to the question about the year they first became aware of Linux OS, a considerable majority of 69 respondents (67 percent) indicated that they were aware of Linux prior to the year 2000 (figure 1). The analysis reveals that since 2000 there were fewer organisations were unaware of it.

In the year 2000, 11 organisations (11 percent) indicated they became aware of Linux, while in 2001 it was down to five organisations (5 percent), which then had a slight increase in 2002 with nine organisations (9 percent). Since the year 2003, the numbers have been steadily

declining with five organisations (5 percent) saying they were aware of Linux in 2003, four organisations (4 percent) in 2004 and by the year 2005 all the organisations were aware of Linux and hence nil figures for that year. It is interesting because it points to the fact that businesses were aware of Linux quite early on and it was gaining recognition. By 2005, all the participating business organisations were aware of Linux as an OS.

#### 5.2 Test Linux

It was not just that many participating organisations were aware of Linux by the year 2000 but also that by then a significant number had already started testing Linux to have a feel of the OS (figure 2). Testing has steadily declined since 2000 and in the year 2005 all organisations except for one had tested it already. Testing Linux early gives the organisations enough time to examine the suitability of the OS for their environment and decide to adopt it without delay or to look at it at a later instance.

#### 5.3 Consider Linux for business use

When it came to considering Linux for business use, yet again, a significant number of organisations had done so during the period before the year 2000. However, the numbers are not the same compared to that of the number of organisations that were aware of Linux or tested it during the same period (figure 3). Of the 93 respondents to the question, 30 organisations (32 percent) indicated that they had considered Linux as a possibility prior to the year 2000 and 13 respondents (14 percent) during the year 2000. The number of organisations that indicated they had considered Linux during the years 2001 and 2002 were the same at eight respondents (9 percent) each. The years 2003 and 2004 had a marginal increase with 12 organisations (13 percent) and 13 organisations (14 percent) respectively, Nine organisations (10 percent) indicated they considered Linux as a possibility in the year 2005.

Hence, from the results of the analysis it is evident that there has been a substantial increase in the numbers between the years 2000 and 2005. While the numbers before 2000 is considerably less than for being aware of or testing Linux during the same period, it is offset by the numbers since 2000.

#### 5.4 Migrate to Linux

The final step in the process after trialling or considering Linux as an alternative or a substitute; is to migrate, if the organisations are happy with the results of their trial or investigation. In addition, migration to Linux is not a very recent trend. It is something that has been around for at least seven years as figure 4 suggests. It is interesting to see that many organisations have been early adopters of Linux by having migrated before the year 2000. While migration has been steady during the rest of the years, 2003 saw many businesses adopting Linux.

It is indeed interesting to note that the whole concept of migration to Linux is not a very recent trend but something that has been gaining ground even before 2000 and has been going steady ever since. An explanation for the uneven trend in migrating to Linux is that though a vast majority of business organisations plan to migrate

from MS OS to Linux, they are trying to adopt a slow and guarded approach while evaluating various economic factors (Becker, 2004b).

### 5.5 Source(s) of Linux

Topping the list of sources is magazines, which include all IT related publications, at 24 of the total 98 responses that were received for the question. That is closely followed by friends of employees of the organisations with 23 responses, Internet with 22 responses and training institutions with 16 responses.

There is a significant drop in the number of responses for the rest of the sources like industry expert with eight responses, expositions / conference and vendors at two responses each, and news with one response. The rationale for magazines appearing at the top of the list is that for a long time, IT magazines have provided free CDs with freeware or shareware programs on them as part of their package and that seems to be the most popular source of Linux for most of the organisations / individuals. Since Linux is an open source type OS, it has been available freely over the internet ever since it came into existence. Most of the websites are referred to by magazines, friends or other websites and hence friends and internet are featured second and third in the list, respectively.

In view of the fact that Linux is an open source software and its EULA provides for the legal distribution of its software with or without modifications to its source code, there are no legal issues with passing on a copy of the OS to another person or organisation. Hence, friends have been identified as a popular source of Linux. There are various free distributions of Linux available on-line for download without any legality involved in it and since most IT personnel are also heavy users of Internet, it is naturally one of the top three sources for Linux. Even though training institutions have started to provide Linux courses only in the recent past, they are the fourth source of information followed by industry experts.

It is interesting to see the reversal of the sources list where vendors, their expos / conferences and industry experts normally lead the list of sources of information. However, in the case of Linux it is different for the reason that it is an open source OS and because it evolved over a period without one major vendor owning it. It also proves that Linux had very little initial support from the traditional sources of vendors, industry experts and news media until it transformed itself into a force to reckon with. Some of the other sources mentioned by the respondents include online forums, Usenet groups and other software vendors.

### 5.6 First hands-on experience of Linux

None of the respondents indicated that they had their first hands-on experience of Linux at an exposition or conference (figure 6). Once again, as in the previous case, it is because vendors

were late in reacting to the Linux market and compounded by the free availability of Linux on CDs and on Internet. The above reasons and the fact that unlike Mac OS or UNIX OS, Linux can be installed on normal

PCs meant that people had an opportunity to try the OS at home and play around with it. Since it is easy to install Linux as a dual boot OS with any regular version of MS OS, it has been further more reason for people to try Linux without replacing / making changes to their existing set ups. Hence, the trend of people having their first hands-on experience of Linux at home being very popular is not surprising at all.

### 5.7 Reasons for migrating to Linux

It is clear that businesses have migrated to Linux for all the obvious reasons like lower cost, open source nature, better security and better stability than MS OS (figure 16). In fact, lower cost comes last of the above said four reasons as to why organisations migrate to Linux demystifying the myth that cost is the major or only reason why they migrate. The main reason for migration is the open source nature of Linux with 77 responses to it. The reason for this being that it allows them to have access to the source code and hence make changes to it as required to suit the nature of their operations or needs.

The second most popular factor is better stability with 76 responses. Linux has been gaining reputation for being a very stable OS. The third factor is Linux's security, with 73 responses, which is considered better than that of some of its competitors. Lower cost is the fourth major factor with 70 responses, while additional support is the fifth and the last with 18 responses. Being open source Linux is not well known for its support, though companies like Red Hat, Ubuntu and SuSe provide support that comes at an annual or one-off fee but still almost all the Linux distributions have free community support over internet.

The cost factor is quite evident especially in the case of small businesses where there is a large percentage (52 percent approximately) of them still using older versions of MS OS. Most of the small businesses try to stretch the usability of their resources and are not particularly happy when forced to upgrade them in order to conform to vendors' product lifecycle goals. For such organisations, costs are a major priority. Even medium and large sized organisations are usually on a tight budget that does not allow them to keep paying up for unjustifiable upgrades (Becker, 2004a).

Some of the other reasons why organisations migrate to Linux are better reliability, lesser maintenance needs, reduced licensing / annual fees and maintenance fees, which translates into improved OS effectiveness, overall growth in revenue and a better ROI. This is achieved when most of the services like file and print services, web service, firewall and DNS are migrated on to Linux machines and with option of clustering on Linux, organisations are able to put together inexpensive and redundant systems that are scalable. An excellent example is that of Google, where they have implemented these features to run their search engines (Ganesan, 2005).

According to an IBM survey, many organisations, from small to large, are testing Linux with a view to adopting it as their principal OS instead of MS OS. Most of the organisations that took part in that survey believed that Linux would help them have a stable, secure, flexible OS

and save money in the process. The open source nature of the OS is another added advantage (Kotadia, 2003).

The open source nature of Linux gives independence as against the monopolist nature of MS OSs, where the organisations feel that MS has a monopolistic control over them when it comes to their MCA needs. With an MS OS, organisations have been required to perform unnecessary upgrades to products and services, that have very little to do with their business because of needless and premeditated integration of MS products. With open source, there is a range of vendors and the organisations can bargain with them for the required services and optimal cost. Above all Linux can be installed on a variety of hardware architectures and hence prevent organisations from having to purchase expensive hardware. Thanks to a broader range of options, it helps to prevent unrealistic prices, increase the organisations' revenue and importantly avoid vendor lock-in (Alacos, 2005).

No discussion on the topic of OS is complete without a mention about security. Like any other OS, Linux is not completely secure and enhancements are being carried out on a regular basis to make it more secure. Since Linux is open source, the concept of peer review exists, which means that other programmers not just from the vendor but also from various other organisations have an opportunity to look at the code, check it, debug it and thereby producing exceptionally secure and very dependable code (Guzman, 2002). This is another reason why people opt to migrate to Linux.

One respondent stated that the reason they migrated to Linux was that their application vendor required it. A few have mentioned the fact that Linux is free of vendor lock-in as one of the major reasons for their migration. Then there is the obvious reason of people who are not happy with MS business ethics and practice. Some of the respondents have mentioned the following reasons for their migration to Linux, which acts as a major encouragement to the Linux supporters:

*“excellent community and vendor support, a new OS, availability of excellent development tools, choice of multiple vendors, ability to tightly control setups and configurations, scalability, freedom, customisation, ease of use, flexibility, speed and low hardware resource requirements”.*

## 6 Conclusion

In the current business world, IT plays a major role in keeping businesses abreast or ahead of their competition. IT offers businesses the opportunity to increase their efficiency, effectiveness, reach out to a larger customer base and thereby enhance their growth in their business sector and geographical region.

Though there are numerous distributions of Linux available in the market and the responding organisations are using a variety of them, the finding is that a vast majority of the organisations are happy with their choice of distribution and expect to continue using the same in the near future. This result is consistent across the different sizes of organisations. Cost was not the only factor for the organisations to look at Linux as an

alternative and adopt it. In fact Linux's security and stability are perceived to be better than those of MS OS.

100 percent of the large organisations, 95 percent of the medium-sized organisation and 83 percent of the small organisations that took part in the research were found to be running at least one Mission Critical Application on Linux. Some of the important factors that influence the migration are: Linux is stable, robust, either free or costs very little, is of open source nature, requires meagre resources, runs on inexpensive hardware and runs on various processors. The research also found that a significant 94 percent of the organisations were able to achieve the strategic goals they had set for Linux. In the case of the expected financial results of the migration to Linux, the research findings were that a substantial 91 percent organisations achieved them.

It is clear from the above discussed results that Linux is more favoured on servers than on desktops and that migration is taking place more on servers than on desktops. One of the reasons for that is that Linux gained initial credibility by making rapid progress on web servers with Apache. Since then it has been installed on all types of servers. But when it comes to desktops, though it has been making reasonable progress, it has a long way to go before it can match the success it has achieved on the servers.

The research findings are that most of the organisations that have migrated their servers to Linux have migrated 50 percent or more, with a significant number of them migrating all their servers. One major reason for this is that it is easy to create server clusters with low cost and used Pentium II and Pentium III PCs. The same PCs cannot be used for any worthwhile purpose if installed with Microsoft operating systems. This helps organisations cost saving and enables them to extend the life of the PCs.

Though there are some key factors that help in the migration of desktops to Linux, like ease of use, better hardware detection, availability of productivity suites, web browsers etc.; the research found that the rate of migration was relatively low and hasn't been able to gain a significant market share. There are positive signs for Linux to grow and it is expected that Linux will have about 10% of the desktop market share by the end of the decade.

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