

Evolutionary Aspects Of Windows Operating System To Enhance Existing Technology

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Abstract - The evolutionary trends in windows technology tends to change since from the beginning including kernel, Graphical (GUI), Device drivers, interfaces etc. This paper presents a brief and comprehensive statistical analysis and view of the evolving hardware technologies, enhancements up gradations, major bugs, and technology difference of the different versions of the windows. Complete description of why there is transfer of the windows technology from one version to the enhanced /updated version. Starting from a very initial MS-Dos operating System getting upwards till the windows 7, overall innovations that are incorporated in these editions are detailed in the paper.

Key words: Evolution of windows, Generations of Windows, Enhancements in windows editions, Reasons to upgrade Windows, Comparison of windows different versions, Statistical view of windows enhancements.

I. INTRODUCTION

The term Operating system (OS) is referred as software/program that controls the execution of the application as well as the system programs, and works as a interface between the user and the computer hardware. The key issues required from an OS are mainly efficiency, convenience and the changing updatable environment. The windows platform as being a resource manager of changing needs of the customer's requirements got updating whenever there is change in the requirements and technology as well. Windows evolution era is divided in to configurable categories to distinguish between different generations of windows computing and the further additions made to them.

Figure-1 depicts the windows different generations distribution according to the time span of their evolution, characteristics and evolutions in them. Separation of one generation to the other describes the evolutionary additions made to the upcoming versions .Four distinguishable eras of windows evolution are completely comparable and different from each other because their functionality interfaces, compatibility varies from era to era.

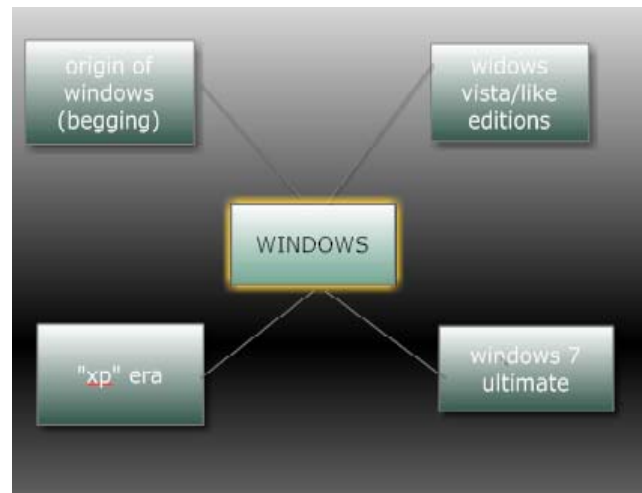


Figure 1. Showing the generations of windows division in the different categories is on the basis of the characteristics of the varying types.

Evolution Eras of Windows are:

- 1). Origin of Windows (Beginning)
- 2). "XP" Era.
- 3). Vista /like editions.
- 4). Windows 7 ultimate.

The overall of the evolution cycle revolves around these categories. The flaws that occurred in one generation of the Windows are debugged in the second generation vice versa. Starting from the very beginning when the concept of the windows computing started, the early systems were Ms-Dos based.

II. ORIGIN OF WINDOWS

In the very early stages the type of the operating system was Ms-Dos based [1]. Following diagram shows change in windows started from origin till today's latest technology and till future.

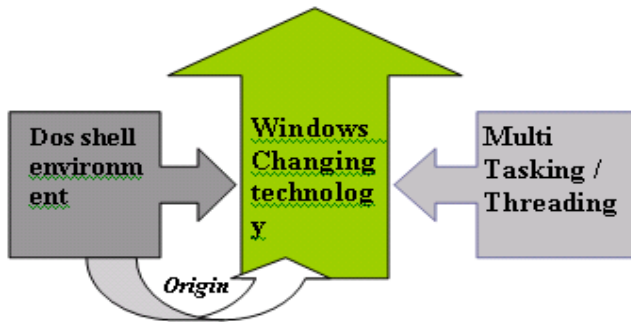


Figure 2. Describes the emergence of the windows technology growth

Below figure shows the clear categorical view of the distribution of the windows different eras.

III. MS-DOS BASED OS

WINDOWS 1.0:

In November 20,1985 the first commercial version of the windows was introduced commercially named as the “Windows 1.0 “.This released version of windows was numbered as 1.01.The main concept of Microsoft behind the launching of this system was to enable multitasking of limited dos program and transfer pc platform from dos to the graphical world.

Windows 1.0 replaced the world of computers from MS-Dos with graphical environment mode .Work mode changed from the black screen of dos to the different windows (working panels) that could not overlap with each other .However the look of the system was still Dos like. This version of windows was an extended version of the dos, and Dos application with 16 bit-graphical interface.

The shell provided in this system was name as the “MS-DOS EXECUTIVE” to avoid collapse between the different windows; windows were displayed tiled/side by side of each other.

The system requirements of the “Windows 1.0” are:

- Minimum RAM size of 256 KB (kilo byte).
- Version 2.0 of MS-DOS.
- HARD DRIVE or 2 double sided drives.

The utilities provided by this released edition of windows are:

- Clock, Colander.
- Clipboard, Card file, Control Panel.
- Windows note pad editor.
- Windows Paint and Write utility.
- Reversi.

However, this was the first version of windows launched; it was further replaced with the windows version 2.0.

WINDOWS 2.0 AND WINDOWS 2.1X:

The second version of the windows was released on December 9, 1987.Windows 2.1 xs relates to the graphical interface systems, its further released extended versions were windows 286 and windows 386 published in 1980’s and sold for the \$100

○ **Windows/286:**

This launched version of the Windows 2.1 xs was used to extend the memory available for the operating system programs .This version was completely working on the 80286 processor’s family.Himm.exe software was used for memory increase purpose.

○ **Windows/386:**

First time protected mode for the base shell on which the applications run as parallel in “Virtual 8086 mode”.

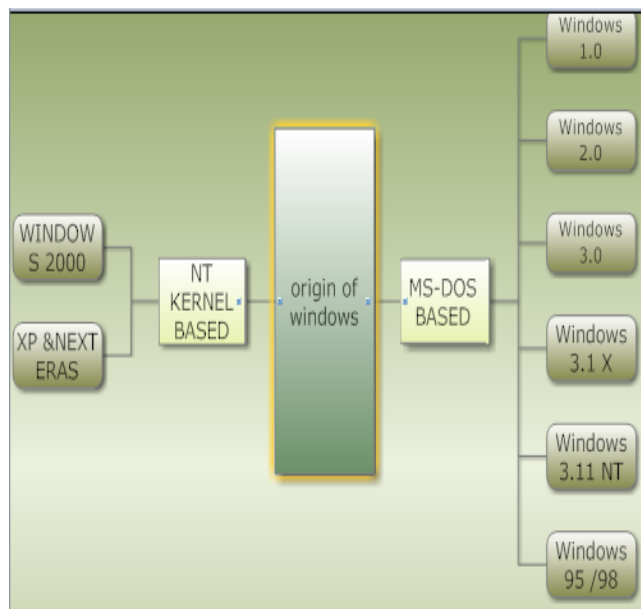


Figure 3. Describes the different phases of the windows operating system

Minimum amount of system's memory was provided to the system applications to reserve extra memory consumption.

Windows 286 and 386 not worked with the Dos shell these have their own protected modes, which enables the GUI sleeker.

○ **Features:**

Windows 1.0 does not allows the clashes of the windows because of the tiled display format whereas in windows 2.0 it was replaced with new terminology this new version of windows allowing the overlap of windows .Multitasking and the use of the mouse , bit map was introduced and better graphics environment support was introduced. Windows 2.0 also replaced other terminologies of its preceding windows 1.0 as "ZOOM" and "Iconize" with the different shortcut keys from the keyboard as "Minimize" and the "Maximize".

Applications utilities provided by these versions were:

- Notepad, write.
- Calendar, Clock same as windows 1.0.
- Terminal, Reversi.
- CVT Paint, Clipbrd.
- Card file, Calculator.
- Overlapping windows were made enabled

System Requirements:

The configuration and compatibility of the system to run the Windows 2.0 should have the following characteristics:

- Minimum Ram size required 512 KB (kilo byte).
- Ms-Dos version 3.0.
- Single floppy and a Hard disk.
- The facility of mouse is optional.

"Apple" suit on Windows 2.0:

On March 1980s the legal suit of the Apple against "Microsoft "was filed in the court. The copyrights of the Apple's system designed for the Macintosh were inherited in the Windows 2.0. Apple claimed that the copyrights of their Macintosh software were protected but windows 2.0 violated these rights as the "Interface " and "Environment " of this version is same as of the Apple's .

Windows 3.0 and 3.1 NT:

These editions of windows revolutionized in the era of 1900's. This edition made the user environment as well as

the technical environment better so that the best use of the memory capabilities of the 80286 and 80386 processor.

○ **Features.**

To improve the multitasking "Program manager" and "file manager "programs were introduced these were the icon based programs and replaced the Dos executive based program/file managers.

Windows 3.1 belongs to the family of the 16-bit color system schemes for the home use of computer .Pre installed set of the different font styles were available to make the desk top publishing platform. Three memory modes were introduced in these systems "Standard " , "Real " and "Enhanced 386 " mode.

Windows 3.0 was the first windows version that could run in the three of the memory modes. Maximum applications of the windows 3.0 run in the standard mode or the 386 enhanced modes. To change the virtual memory settings, windows 3.0 must be booted in the Real memory mode to loads its required boot file that is "Swapfile.exe".

The user facilities provided by these editions are:

○ **Utilities:**

- Supported multimedia extensions, audio files supported, the bit depth rate of the audio files minimum required was 44.1 MHZ (kilo hertz).
- This version was the first that was pre-installed on the hard drives to make it sleek and faster.
- Pre-installed font styles.
- Abode type manager (ATM) font system.
- Minesweeper was introduced instead of Reversi.
- Multimedia viewer to play video/audio files.
- Integration for the CD-ROM facility.
- Internet Explorer 2.0.
- Note pad, paint brush.
- In windows 3.0 Reversi embedded with the card game solitaire.

The system specifications to run these versions are.

○ **System Requirements.**

- Processor 80286 or later version.
- Hard disk with minimum 6 MB free space.
- CGA/VGA or compatible monitor.
- Ms-Mouse utility was recommended.
- Ms-Dos 3.1 or later.

- Minimum 1 Mega byte (MB) of the memory, 64 kb of the conventional memory.

Evolution Steps up towards Windows versions 9 x based [2]:

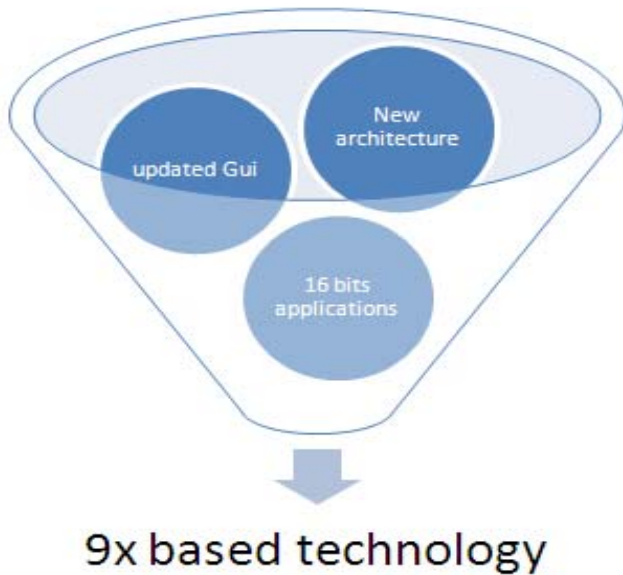


Figure 4. Showing arrival of 9x based technology and different components joined together to form 9x based technology

After the Ms-Dos based versions succeeded, new terminologies of the 9x based versions of the windows were launched. Following are the major editions of 9x base type.

- A). Windows 95.
- B) Windows 98.
- C) Windows 2000.
- D) Windows ME.

The technology difference and the evolutions in these versions are detailed as follows:

Windows 95:

Microsoft released the better enhance version as compared to its previous released products with new 9x based technology on 24th August 1995 that is “ Windows 95 “. Firstly it was also referred as “Windows 4.0 “ or “Chicago “. Many of the beta versions of the Windows 95 was launched before its final delivery as Build 58s, Build 73g, Build 81, Build 122, Build 189, Build 224, Build 468 etc. Originally Windows 95 was an evolution of the windows 386

Enhancements in windows95:

Here in this version Microsoft clearly separated the Ms-D from the Windows products but still the root shell on which windows executes was the Dos. It was compatible with the 16-bit applications. The bottom level of the windows 95 formed by a considerable number of the “Virtual Device Drivers “ which are considered responsible for the management of the devices such as video ,display and network cards etc.

Three major tasks of the Virtual drivers are:

a) The Virtual Machine :

It works as the “kernel “of the windows OS it is considered responsible for the management of the tasks as:

- Memory Management.
- Events Management.
- Interrupt handling.
- Management of the device drivers.
- Scheduling of threads etc.

b) The Configuration Managements :

Configuration Management works as the manager of the “Plug N Play “function of OS. It checks the status of the entire attached device to the computer and functions as the platform to control the modification status, active status of the available status. To avoid collapse between different devices it allocates different resource to the device e.g. input/output (I/O) devices allocation, memory etc.

c) The Installable File System Manager :

This system defines the system access to the various files. File Allocation Table (FAT) used in Windows 95 is FAT 16.The fundamental components of the systems e.g. start bar, task bar ,WPM(Windows File Explorer Manager) remained same in the upcoming versions till “ XP generation “. In xp generation and further until windows 7 basic structure was same but the themes were changed in different versions.

o Improvements :

- Internet Explorer 4.0.
- Technical improvements (long file names, multitasking, 32-bits file access system.
- GUI was the ever best improvement in this version because “the basic structure of the windows is same

from this version upwards except some updating of extended interfaces.

- Full graphical user interface (GUI) support.
- Built in dialup networking, internet support, easily installation wizards.
- Integrated 32-bit TCP/IP (Transmission Control /Internet Protocol support) support.

○ **System Requirements:**

- Minimum Hard disk space required needed 50 MB.
- Minimum Ram required is 4 MB.
- Processor version 80386.

IV. WINDOWS 98 & WINDOWS 98 SE

It was officially launched on June 25, 1998. It was a version that was monolithic that is “16-bit” at the same time also support “32-bits “with a new introduction of the Ms-Dos “Boot loader “. Windows 98 SE (Second Edition) was released on the 5th May 1998 with the fixed bugs present in the 98’s first edition

A brief comparison of the both of the versions is described in this topic.

Enhancements:

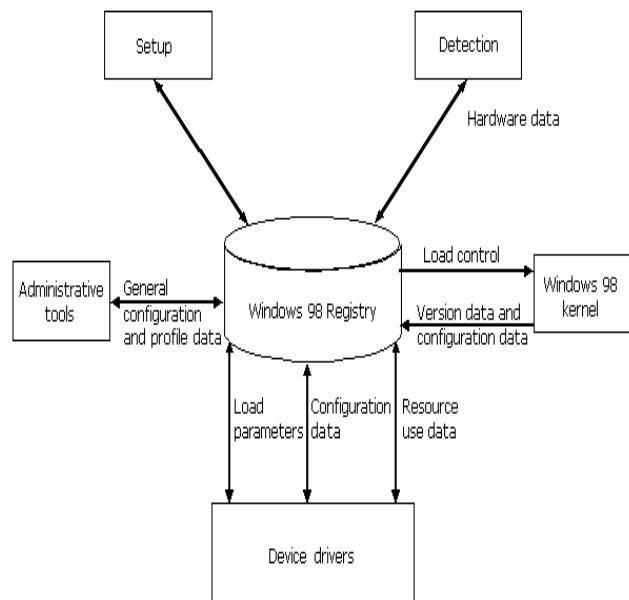
WDM (Windows Driver Model) was firstly introduced in this edition .This was the new technology of that time and most of the developers were not allowed of this reality so maximum products continued to be in structure compatible with previous version of the OS. Some major of the facilities provided in these products that are inherited during today’s systems as well are described as utilities of windows 98.

System Requirements:

- Minimum RAM required was 16 MB but recommended was 24 MB.
- Minimum required available space on hard disk was 500 MB.
- VGA or later Resolution monitor was recommended.
- Pentium’s Processor Recommended.
- Microsoft Mouse and CD drive or DV drive was recommended.
- Evolution from Windows 98 to Windows 98 SE.

Evolution form one edition to another leads to some reasons which are not according to requirements so get the problem resolved transmits to another simplified edition.

Bellow figure shows the systematic explanation of the windows 98.



Courtesy of [http://i.technet.microsoft.com/Cc768201.wrko01\(en-us,TechNet.10\).gif](http://i.technet.microsoft.com/Cc768201.wrko01(en-us,TechNet.10).gif)

Updates:

- Scan Disk.
- Disk Defragmenter.
- Scan Reg.
- Ms Config.

Scan disk facility was used to maintain the available file system .Disk Defragmenter was responsible to count the non valid file system’s fragmentation effects. System Registry was restored by the Scan Reg (Scan Registry) facility. A user related facility to manually disable /enable the not required services and program during the run time of the Operating System.

- Enhanced Universal Serial Bus (USB) support with the system.
- Internet Explorer 5.0 replaced the Internet Explorer 4.0.
- LAN (Local Area Network) was introduced so that multiple nodes can communicate with each other using NAT (Network Address Transition) terminology.
- DVD-ROM support for the different drives.

There was a number of the bugs removed from the fist 98’s version .Major one which are investigated in this version are Listed below .Howe ever these were corrected

to some extent in the next versions .Flaws of windows 98 are :

Major Draw Back of 98:

If the windows 98 goes on running for the 49 days a memory overflow error occurred .This was the ever biggest bug which was resolved in the SE version.

V. WINDOWS 2000

Microsoft launched this 64-bit version on 17th February 2000 for the use in the business [4], Server and desktop work areas. The four successor releases of this system were:

- Professional Edition.
- Sever Edition.
- Advanced Server Edition.
- Data centre Server.

This was the final Microsoft's release for the completion of the "NT Family" products:

Features:

- FAT 32 File system used.
- NTFS (New Technology File System) 3.0 was introduced.
- Server Features, Different System utilities.
- New facility of the distributed file systems. Access of the files on different levels.
- Maximized administration applications e.g. Microsoft Console Manager.
- Configurable USB drivers, Mass storage devices support.
- Internet Explorer 5.0, Windows update Desktop facility.
- Outlook express, Internet connection sharing.
- Advanced System Recovery, Encrypt File system, extended data protection.
- Developed Control panel Accessibility, local and languages option.
- Gammig zone.
- Enhanced System's Window Explore Facility.

System Requirements:

- Recommended RAM size 64 MB, but minimum required was 32 MB.
- Pentium or later version 133 Mega Hertz (MHZ) CPU.
- Hard Drive of 2 GB.
- Microsoft keyboard & mouse recommended.

- For Windows 2000 Server Edition minimum RAM should be 256 MB.

Major Bug of Windows 2000:

Windows 2000 was a better secure version for above mentioned features but still this edition became the hit point of a several number of viruses as " NIMDA " , " CODE RED " etc. This degraded the value of this product and made its customers feel unreliable.

VI. WINDOWS ME

Windows Millennium (ME) was release on 24th September 2000. This version was basically developed for the home use of the computers. One year after its publication it was replaced with a new family of Microsoft's products called "XP" products.

○ **Features :**

- Internet Explorer 5.5 was introduced in this version.
- Windows Movie Maker (Video editing software for home users) & Windows Media Player 7, was factory defined in this product.
- Extended Gaming zone with "DirectX "was available.
- **Network topologies:** Dial up networking, TCP/IP terminologies, Home networking wizards etc.
- **System utilities:** Restore system to previous time, File System protection, System monitor etc.
- Usb mass storage Drivers support.
- Help and support centre, as a user manual guide to fetch information related the system etc.
- Removed Real mode Dos feature from this version.

○ **System Requirements :**

- Minimum and recommended RAM size required was 32 MB.
- Pentium processor size recommended was 150 MHZ.
- Hard disk minimum size should be 320 MB, but recommended size was 2 GB.

Bugs in Windows ME:

First of all its time period was so short, other due to the again and again crash and freezing lead this version to the conflict and unreliability of the data. Some times conflicts removed in the system occurred again after the system restore.

VII. THE “XP ERA”

Evolution Steps up to NT kernel base architecture:

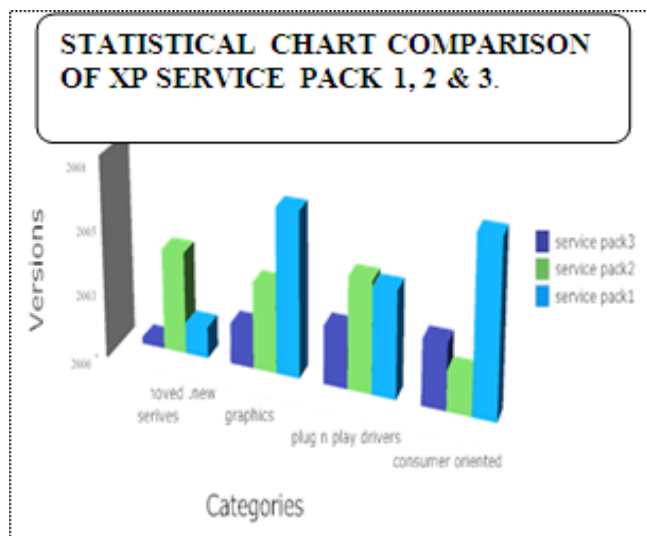


Figure 5. Shows the statistical comparisons of the widow’s xp versions) Completed systematic view of how the architecture of the XP era is designed is defined by the following diagram.

For the first time in this generation the basic architecture of the operating system changed from MS-DOS kernel base, 9X base to new technology that is “NT Kernel Based”.

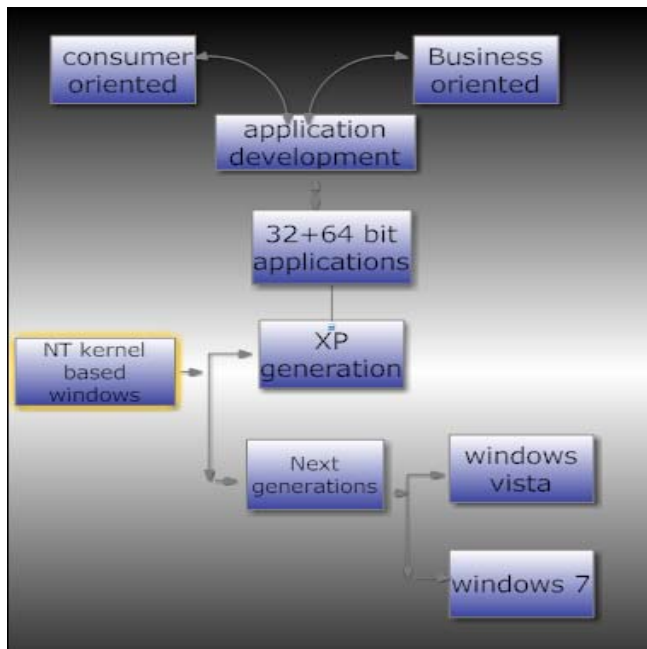


Figure 6. Shows the systematic architecture of the XP era, and complete layered atmosphere

The main purpose of this generation products was to enhance the home use of the computer with better services. This generation was the replacer of the entire preceding product especially the Windows 2000 and Windows ME.

“XP”:

Windows XP was officially released on 25th October, 2001. XP supports two architecture 32-bit and 64-bit. After few months of its arrival it was estimated that above 60% of the business and 70 % of the home use areas using XP.

o Features /evolutions in XP :

- Task bar And start menu:

Updated task bar and start button facility was introduced. “Start Menu “extended in the bandwidth so that the automatically / manually defined files can be frequently accessed from a single Platt form. Start menu was spitted into two distinct columns, first column depicts the user defined applications (frequently used applications automatically displayed here) whereas second column describe the system provided utilities e.g. (accessories, documents, control panel etc)[5].

Task bar was also developed with different additions such as quick launch, task bar group features, same type multiple applications in a single group (individual member pops up when clicked on the group),

- Windows Explorer.

Many changes made to the Windows Explorer relating to its formatting as well as its visual aspects also. The main purpose was to make XP more ‘Task oriented ‘system and ‘Digital Hub ‘many of the new features were added to the XP. Windows view is divided into the two portions ‘Task panel ‘on the left side of any active window, and ‘Navigation Panel ‘on the right side.

- Powered Graphics Structure:

2D Graphics were, textures, interface enhancements were developed.

- Structure Improvements :

a) Quick boot and logging on:

Login time minimized so that the user do not wait for the so much time during loading of the operating system.

b) **Windows Search Option:**

Advanced search utility in the system to search the files, folders in the database of computer in the hidden as well as system files.

c) **Plug and Play (PNP):**

Ever evolutionary functionality of this edition is, just plug any peripheral with the computer and don not get worried of the driver play that very device, because all the drivers are built in.

d) **Improved themes:**

A set of build in themes for the system is built in with in the system .More fascinating themes to make the look of the computer better and flexible. It includes The 24-bit color depth for the windows icons support.

Graph showing the statistical analysis of the windows Xp. A detailed view of the new updates in this version is as follows:

Further editions of the xp widows are:

▪ **Editions.**

Commercially optimized editions of the Windows XP were:

- Windows XP Server 2003.
- Windows XP Server 2008.

○ **System Requirements.**

- Minimum Ram size required 64 MB.
- Hard disk size required was 1.5 GB.
- DVD Drive / CD ROM device.
- VGA or EGA Graphics monitor.

Systematic view:

Below figures shows the systematic view of the XP Architecture and functionality, through the different layers [3]. How the kernel (main resources handler, manager), OS (operating system, a user hardware interaction), Development (application area development) are interconnected with each other is described in the below figure.

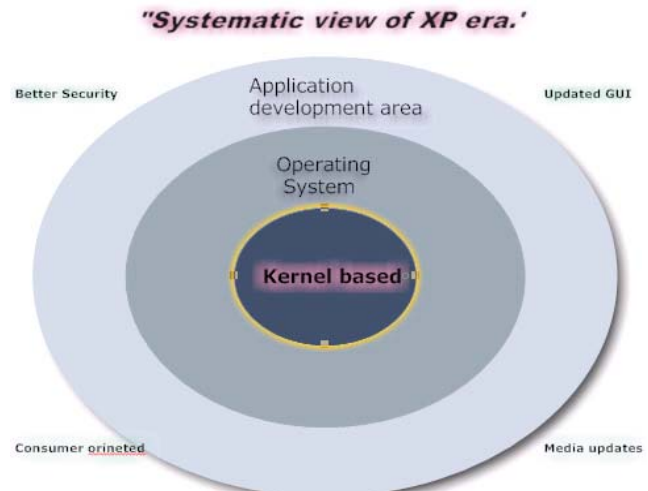


Figure 7. Shows systematic view of the XP windows and the kernel technology revolution

VIII. EVOLUTION TOWARDS VISTA GENERATION

A new replaced technology of XP generation was introduced as the Vista generation here in this generation Graphical aspects are improved and more additions made and previous flaws are removed.

Windows Vista:

Vista was released by Microsoft for home, business, server etc on 30th January 2005. Firstly it was also referred by its codename as “Longhorn”. This edition was the ever long time break between the two generations.

Revolution of Windows computing:

After passing along with the evolutions in the windows computing getting towards the more consistent systems one major and new generation started from Windows 7 to onwards. This generation was the successor of all its previous generations.

System Requirements:

- Minimum Hard disk space required should be more than 20 GB.
- Free space on the hard disk 15 GB.
- Graphics supportable memory 32 MB.
- Processor size 800 MHZ.

Figure 8 below shows the so much improved graphics of the windows vista and the new and embedded tools there.



Courtesy: image taken from <http://static.howstuffworks.com/gif/windows-vista-7.jpg> displaying the vista version of windows with enhanced graphics

○ **Major improvements :**

There were a considerable number of modifications made to the XP generation then it is transferred in the Vista generation, improvements include:

- Security improved.
- Graphics enhanced sleeker and precise documentation was used.
- Better Organizational Architecture for the file systems.
- Integrated Voice Recognition, a better tool for synchronization was also made available.
- Media player modification Windows Media Player (WMP) 11 was introduced.
- For Web related areas Internet Explorer 7 was introduced.
- System Utilities backup and restore services, Disk manager.
- A virtual folder concept was introduced.
- New user, OS Synchronization improvements.
- Extended File management and search technology.
- Fascinated Windows Explorer service.
- Visual look of the operating system.
- Windows shell, Windows aero was also improved.
- Windows Automatic Updates (WAD) also made more enhanced.

Flaws /Bugs of vista:

There referred a number of flaws in the Vista generation also as:

• **Up to the mark System Requirements :**

This was the major and the hectic problem in this version because the percentage of the people who don't have the system of these specifications can not install the Vista. This legged behind the use of Vista on the home level.

• **Copyrights of PDM (protected digital media), High Restrictions :**

The licensing terms of the Vista and among these restriction a software or hardware which is of previous generation of vista will not be compatible with the system, in order to run that we have the obey the rules and restrictions of the Vista generation.

IX. WINDOWS 7

Released on 22nd October 2009 was the operating system which succeeded the XP generation .This edition was released for the business, home and desktop use.

Features:

Graphics made better than the XP generation, there introduced a touch of 3D graphics. This edition was more users friendly.

New updated task bar “Super bar”:

A new architecture of the task bar was revolutionized with a new coding scheme, new installed, frequent used and auto available were placed here for the instant access.

Media Updating:

Windows Movie Maker (WMM), Windows Media player, Windows Photo Gallery.

System Requirements:

- For 64-bit Architecture.
- 64-bit Processor required size 1 GHZ.
- RAM size required 2 GB.
- DirectX9 Graphics processor required.
- Hard Disk size 20 GB required.
- DVD optical drive required.
- For 32-bi Architecture
- 32-bit Processor with 1 GHZ size.
- RAM of 1GB.
- Hard disk free capacity 16 GB.

Now, coming towards the final conclusion drawn from the whole observation of the evolutions, their reasons, flaws technology demands etc

X. CONCLUSION

The conclusion drawn after analyzing all the aspect of requirements is that as the Windows computing increasing day by day except of the user requirements it is a major issue on the world stage that the system requirements for the windows gradually increasing .As starting from the windows 1.0 which required just only 256 KB of RAM which is a very nominal amount of the memory as compared to the latest windows version which is windows 7 which required more than of 16 GB of free space on hard disk only for the installation of the windows further application are not included. There is a very stinking problem of “MEMORY MANAGEMENT” as windows computing are getting higher and higher “System requirements “are also got direct proportionality with the “Evolution of windows”.

Below Figure shows the system requirements gape of the major windows operating system that is increasing with the unbelievable speed that is windows 7 got so much high requirements just to install. Let’s wait and see what will happen with the next generation of windows? Whether the memory can be managed or still like previous generation enhances more system requirements. It seems that windows operating system technology will be replaced with any new technology that will be 100 times faster than OS, or will be forced towards the invisible operating systems technology.

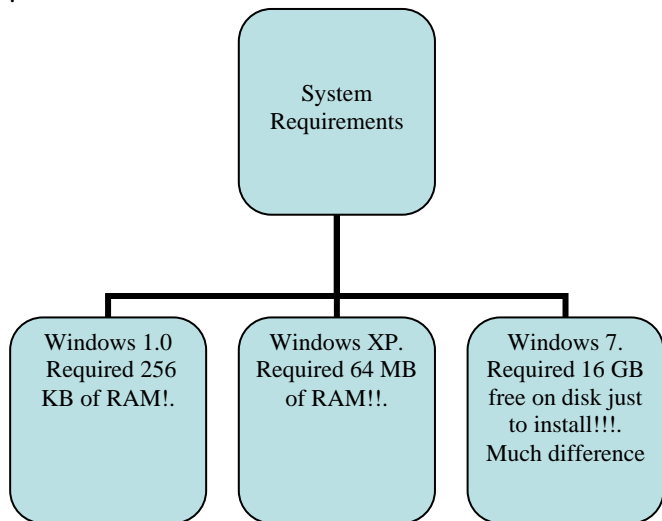


Figure 8. shows that the rapid increase in the system requirements

REFERENCES

- [1]. On the Windows Approach to language evolution by Rudolf Botha, Department of General Linguistics, Stellenbosch University, Stellenbosch, South Africa Available online 27 April 2005.
- [2]. The Old New Thing: Practical Development Throughout the Evolution of Windows Author: Raymond Chen Year of Publication: 2006 ISBN: 0321440307 Publisher: Addison-Wesley Professional
- [3]. Subverting the Windows Kernel Year of Publication: 2005 ISBN: 0321294319 Authors Greg Hoglund, Jamie Butler Publisher: Addison-Wesley Professional
- [4]. Inside Microsoft Windows 2000, 3rd edition Year of Publication: 2000 ISBN: 0735610215 Authors: David A. Solomon, Mark Russinovich Publisher Microsoft Press Redmond, WA, USA
- [5]. A Windows display program with millisecond accuracy KENNETH I. FORSTER and JONATHAN C. FORSTER Accepted August 6, 2002. Copyright 2003 Psychonomic Society, Inc.

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