Volume 2, Issue 9, September 2012 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

The Wane of Dominant (Symbian Operating System)

Gaurav Jindal
Assistant Professor
Gitarattan International Business School
India

Shivangi Munjal
Student (MCA)
Indira Gandhi Institute of Technology
India

ABSTRACT:
"Necessity is the mother of Inventions "
-Plato
With the emerging needs of the users abundance of technology has been invented to fulfill these sprouting needs of the users. Due to these plenty of inventions, technology has made its advancement in all fields. Mobiles Phones is an amazing invention of technology that has made itself a necessity in everyone's life. As the popularity of Smartphone's is increasing, the companies need to pack more interesting and attractive features and applications in upcoming devices so as to make them more interactive and user friendly for the users. For this reason, the companies have made the operating system of mobiles an open source like symbian operating system.
In this paper, we analyses the key features of the symbian to know its importance in some or the other field .After studying Symbian from history and knowing about all of its versions we have found that companies have been releasing new versions time to time to meet the needs of customers and also due to continuous virus attacks in Symbian, company have been releasing new versions. But there have been a lot of limitations in Symbian operating system that lead to the failure of Symbian.

KEYWORDS - Symbian, Symbian versions, open source

I. INTRODUCTION

As we all know IT industry is ever augmenting. Technicians are coming up with more complex and sophisticated gadgets every now and then. Every user wants to have more interesting, interactive and easy to use interface of technology so as to make their work simpler, faster and more accurate. Thus many companies are developing new software's and releasing better gadgets with the latest software's; and even with enhancements in their previous versions of software to meet these emerging needs of the user. One of such gadgets is mobile; which are emerging as an integral part of every human's life, be it an employee, student or any big personality. Everyone have their own requirements of software's according to their usage and interest in mobiles. So Companies are more focused towards developing latest features which can build interest in users and match their respective needs. They all add features to their mobile's operating system to make it more interactive and user friendly. One of such operating system's used by companies is Symbian. It has a simplified interface for its users to work upon. This Operating System requires less memory space in mobiles and provides the users with entire world in their hands right from calling anyone, mailing, gaming, sharing data and a lot more features. With time, the company enhances the software by introducing new features to it and thus upgrades the version; thereby producing new mobiles with operating system of latest version.

In this paper we will try to familiarize with the Symbian operating system, key features of symbian, it's all versions, what all features were added or deleted in the versions, its advantages and disadvantages, why nokia uses it? And why symbian failed? Thus, through this paper we will try to help you understand about symbian and all of its features so that you can select your operating system wisely according to your needs and benefits.

II. LITERATURE SURVEY

Symbian is an operating system for mobile devices with limited resources, multitasking needs and soft real time requirements [1]. It is a multitasking operating system and very less dependent on peripherals. It is an operating system that runs on mobile ''Smartphone'' platforms from several different manufacturers. Smartphone's are so named because they run fully-featured operating systems and utilize the features of desktop computers. Symbian OS is designed so that it can be the basis of a wide variety of Smartphone from several different manufacturers. It was carefully designed specifically to run on smart phone platforms: general-purpose computers with limited CPU, memory and storage capacity, focused on communication.

An OS is the most critical software element on any running processor-based device. The OS manages the hardware and software resources within a device and performs and manages basic tasks such as the recognition of input from the device keyboard and generation of output to the device's screen. It also ensures that different programs running at the same time do not interfere with each other. It is responsible for the management of memory and for communication

within the device. OSs may be extended to add additional complexity and hence functionality to the code. In the mobile world, the more complex OSs will contain, for example, UI (User Interface) elements as these become increasingly important as the devices become more complex. As an example of this, the Symbian OS integrates the functionality of three different UI options.

Symbian's system model is segmented into 3 main layers:

OS Layer: Includes the hardware adaptation layer (HAL) that abstracts all higher layers from actual hardware and the Kernel including physical and logical device drivers. [11] It also provides programmable interface for hardware and OS through frameworks, libraries and utilities etc. and higher level OS services for communications, networking, graphics, multimedia and so on.

Middleware Layer: Provides services (independent of hardware, applications or user interface) to applications and other higher-level programs. Services can be specific application technology such as messaging and multimedia, or generic to the device such as web services, security, device management, IP services and so on.

Application Layer: Contains all the Symbian provided applications, such as multimedia applications, telephony and IP applications etc.

Requirements of Symbian Operating System

Symbian OS is an operating system designed especially for data enabled mobile phone [7]. According to symbian limited, the operating system was needed because scaling down PC operating systems or expanding existing light weight operating systems would have led to too many fundamental compromises. Symbian OS is designed to fulfill some special requirements of mobile phones:

- Devices are small
- The target is a consumer mass market
- Devices can be used when connected to the wireless network, locally to other devices or when not connected to any network.
- Manufacturers must be able to use it on very different kinds of products on different Hardware designs, user interfaces and networks.
- It must be open for the third party development of additional applications and services.
- Handling user data must be reliable even in case of un reliable
- Communication, lack of resources, etc.
- All device resources, especially power consumption and memory must be used efficiently.

History of Symbian

Psion: In 1980, Psion was founded by David Potter.
EPOC: EPOC is family of graphical OS developed by Psion for portable device
EPOC 16: EPOC 16 was the OS developed by Psion in 1980 and early 1990s for Psion's SIBO devices like MC200, MC400, Series3 etc.
EPOC-32: The first version of EPOC 32, Release1 appeared on Psion series 5 in 1997. EPOC 32 OS, at that time simply referred to EPOC was later renames to Symbian OS. In 1998, Psion software became Symbian, a major joint venture between Psion and Ericsson, Nokia, Motorola. EPOC simply become Symbian OS.
EPOC OS Release 1-3 (ER1, ER3): The Series 5 device released in June 1997 used it.
EPOC Release 4: The device Osaris used it.
EPOC Release 5: The device like Psion series 5mx, series7 were released using ER5. ER5u: Ericsson R380 was released using ER5u in November 2000.
Symbian OS v6.0 and 6.1: This release sometime is called ER6. The first Symbian OS phone 9210 was released in June 2001.
Symbian OS 7.0 and 7.0s: First released in 2003 which was important release. It also added EDGE.
Symbian OS 8.0: First shipped in 2004. It included new APIs to support CDMA, 3G, DVB-H.
Symbian OS 8.1: Basically a cleanup version of 8.0. Most famous Smartphone featuring 8.1a was N90 in 2005.
Symbian OS 9.0: This version was used for internal purpose only. This version has no binary code compatibility with previous version.
Symbian OS 9.1: Released early 2005. It includes a controversial mandatory code signing. Developers need to retool and recode. Support for Bluetooth 2.0(was 1.2)
Symbian OS 9.2: Released Q1 2006. S60 3rd editions, Feature Pack 1 have OS 9.2.
Symbian OS 9.3: Released on 12 July 2006. Native support for WiFi 802.11,HSDPA.
Symbian OS 9.4: Announced on March 2007. SQL support was present for the same. Used as the basis for Symbian^1, the first symbian platform released also known as S60 5th edition.
Symbian OS 9.5: native support for mobile TV broadcast in DVB-H and ISDB-T format. [8]

Key features of Symbian OS

- Generally, the language C++ is used in most of the symbian operating systems. But in many Symbian Operating System the operating system can also use languages like Python, Visual Basic, OPL and Perl. [5]
- Symbian Operating System was built in such a way that it follows the three basic design rules.
    - The integrity and security of user data is of paramount importance.
    - Response time must not be as small as possible.
    - All resources are scarce.
- Symbian OS programming is said to be event based, and the Central Processing Unit is switched off when the running applications and programs are not linked to the event. This is achieved through a programming logic called active objects.
- The Symbian Operating system is compatible with all kinds of devices, mostly removable media file systems.
- Symbian Operating system 9.x which is one of the latest models has adopted a better model.
- The Symbian system is not Open Source software.

- Performance – Symbian OS is designed to make minimal demands on batteries and to have low memory.
- Multitasking – telephony and universal messaging are fundamental components. All applications are designed to work seamlessly in parallel.
- Standards – the use of technologies based on agreed-upon standards is a basic principle of Symbian OS, ensuring that applications are robust, portable, and interoperable Object-oriented software architecture.
- Memory management optimized for embedded software environment.
- Runtime memory requirements are minimized – very small executable sizes and ROM-based code that executes in place.
- Security mechanisms for enabling secure communications and safe data storage.
- Application support for international environment with built-in Unicode character sets.
- A rich and varied API allowing access to reusable components in developer applications.
- Browsing - a WAP stack is provided with support for WAP 1.2.1 for mobile browsing
- Messaging - multimedia messaging (MMS), enhanced messaging (EMS) and SMS; internet mail; attachments; fax
- Multimedia - audio and video support for recording, playback and streaming; image Conversion.
- Graphics - direct access to screen and keyboard for high performance; graphics accelerator API.
- User Inputs - generic input mechanism supporting full keyboard, 0-9*# (numeric mobile phone keypad), voice, handwriting recognition and reductive text input 2.1
- **Versions of Symbian**

EPOC Releases

Generic Technologies

- HTML
- Java
- PC Connectivity
- IrDA
- SMS

EPOC 16 was the OS developed by Psion in 1980 and early 1990s for Psion's SIBO devices like MC200, MC400, Series3 etc. The first version of EPOC 32, Release1 appeared on Psion series 5 in 1997. EPOC 32 OS, at that time simply referred to EPOC was later renames to Symbian OS.In 1998, Psion software became Symbian, a major joint venture between Psion and Ericsson, Nokia, Motorola. EPOC simply become Symbian OS. EPOC OS Release 1-3 (ER1, ER3): The Series 5 device released in June 1997 used it. EPOC Release 4: The device Osaris used it. EPOC Release 5: The device like Psion series 5mx, series7 were released using ER5.

Symbian OS 6.0 and 6.1

Generic Technologies

- WAP
- JavaPhone API
- Bluetooth & GPRS
- Java MIDP
- In-Target App Debugging
- Enhanced text manipulation

The OS was renamed Symbian OS and was envisioned as the base for a new range of smart-phones. This release sometime is called ER6. The first 'open' Symbian OS phone, the Nokia 9210 Communicator, was released in June 2001. Bluetooth support was added

Development of different UIs was made generic with a "reference design strategy" for either 'smart-phone' or 'communicator' devices, subdivided further into keyboard- or tablet-based designs. Two reference UIs (DFRDs or Device Family Reference Designs) were shipped – "Quartz" and "Crystal". The former was merged with Ericsson's 'Ronneby' design and became the basis for the UIQ interface; the latter reached the market as the Nokia Series 80 UI.
Later DFRDs were Sapphire, Ruby, and Emerald. Only Sapphire came to market, evolving into the Pearl DFRD and finally the Nokia Series 60 UI, a keypad-based 'square' UI for the first true smar-tphones. The first one of them was the Nokia 7650 smart-phone (featuring Symbian OS 6.1), which was also the first with a built-in camera, with VGA (0.3 Mpx = 640×480) resolution. Despite these efforts to be generic, the UI was clearly split between competing companies: Crystal or Sapphire was Nokia, Quartz was Ericsson.

Symbian OS 7.0 and 7.0s
Generic Technologies

- Multimode ETel
- ECOM
- HW acceleration
- IPv6
- Transport Framework for both
- HTTP & WAP
- Test UI called TechView
- CodeWarrior IDE supported

This is an important Symbian release which appeared with all contemporary user interfaces including UIQ (Sony Ericsson P800, P900, P910, Motorola A925, A1000), Series 80 (Nokia 9300, 9500), Series 90 (Nokia 7710), Series 60 (Nokia 3230, 6260, 6600, 6670, 7610) as well as several FOMA phones in Japan. It also added EDGE support and IPv6. Java support was changed from pJava and JavaPhone to one based on the Java ME standard.
Symbian OS 7.0s was a version of 7.0 special adapted to have greater backward compatibility with Symbian OS 6.x, partly for compatibility between the Communicator 9500 and its predecessor the Communicator 9210.

Symbian OS 8.0 and 8.1
Generic Technologies

- Audio and video support for recording, playback and streaming; image conversion
- Significant upgrade to Java including CLDC 1.1 (Connected Limited Device Configuration) and multimedia
- Support of multiple displays and scalable UIs
- better PAN support: Bluetooth 1.1, USB 1.1
- Security improvements
- Software development
  - J2ME MIDP 2.0 supported by all mainstream Java tools
  - C++
    - Metrowerks CodeWarrior
    - Borland C++ BuilderX
    - MS Visual Studio
  - PC emulation environment

One of the advantages of Symbian 8.0 would have been a choice of two different kernels (EKA1 or EKA2). However, the EKA2 kernel version did not ship until Symbian OS 8.1b. The kernels behave more or less identically from user-side, but are internally very different. EKA1 was chosen by some manufacturers to maintain compatibility with old device drivers, while EKA2 was a real-time kernel. 8.0b was deproductised in 2003.
An improved version of 8.0, this was available in 8.1a and 8.1b versions, with EKA1 and EKA2 kernels respectively. The 8.1b version, with EKA2's single-chip phone support but no additional security layer, was popular among Japanese phone companies desiring the real-time support but not allowing open application installation. The first and maybe the most famous Smartphone featuring Symbian OS 8.1a was Nokia N90 in 2005, Nokia's first in Nseries.

Symbian OS 9, 9.1, 9.2, 9.3, 9.4 and 9.5

Generic Technologies

- RTP (Real-time Transfer Protocol) stack.
- Bluetooth

- support for Bluetooth eSCO and Bluetooth Stereo headset profiles
- Platform Security
  - Introduce certificates for applications to perform sensible operations
- Developing for Symbian OS – native system and application development in C++
- CodeWarrior and (from 2005H2) Eclipse-based IDEs.
- Java MIDP 2.0 supported by all mainstream Java tools.

Symbian OS 9.0
It was used for internal Symbian purposes only. It was de-productized in 2004. 9.0 marked the end of the road for EKA1. 8.1a is the final EKA1 version of Symbian OS. Symbian OS has generally maintained reasonable binary code compatibility. In theory the OS was BC from ER1-ER5, then from 6.0 to 8.1b.

Symbian OS 9.1 was released in early 2005. It includes many new security related features, including platform security module facilitating mandatory code signing. The new binary model means developers need to retool and the security changes mean they may have to recode. S60 platform 3rd Edition phones have Symbian OS 9.1. Support for Bluetooth 2.0 was also added.
Symbian 9.1 introduced capabilities and a Platform Security framework.

Symbian OS 9.2 was released Q1 2006. Support for OMA Device Management 1.2 (was 1.1.2). It had Vietnamese language support. S60 3rd Edition Feature Pack 1 phones have Symbian OS 9.2. Nokia phones with Symbian OS 9.2 OS include the Nokia E90, Nokia N95, Nokia N82 and Nokia 5700.

Symbian OS 9.3 was released on 12 July 2006. Upgrades include improved memory management and native support for Wifi 802.11, HSDPA. The Nokia E72, Nokia 5730 XpressMusic, Nokia N79, Nokia N96, Nokia E52, Nokia E75 and others feature Symbian OS 9.3.

Symbian OS 9.4 was announced in March 2007. Provides the concept of demand paging which is available from v9.3 onwards. Applications should launch up to 75% faster. Additionally, SQL support is provided by SQLite. It is shipped with the Samsung i8910 Omnia HD, Nokia N97, Nokia 5800 XpressMusic, Nokia 5530 XpressMusic and Sony Ericsson Satio. Used as the basis for Symbian^1, the first Symbian platform release. The release is also better known as S60 5th edition, as it is the bundled interface for the OS.
Symbian OS 9.5

In 26 March 2007 Symbian Ltd. announced v9.5 which includes native support for mobile digital television broadcasts in DVB-H and ISDB-T formats and also location services.

Advantages of Symbian OS

Advantages for Users:
Handy keyboards of pocket PCs e.g. Nokia 9210, and well designed applications allow working with huge amounts of data. [9] Small dimensions of computers working under Symbian OS allow having them with you all the time and adding data to them when necessary.
The handy and intuitively understandable interface allows users to make all necessary settings themselves right after purchasing the device. Then it allows installing additional programs while user progresses.
But the most important is that this OS is especially created for mobile devices with limited recourses. I.e. unlike pocket PCs they have small dimensions and weight, therefore they have a smaller number of chips and schemes, that's why they are very reliable. So during all the exploitation period they can be turned on (everyone wants to be always on-line).

Advantages for developers and programmers:
Developers find it very attractive that Symbian OS from the very beginning was developed in purpose of getting licenses for wide circle of Companies that develop the telecommunication equipment.
In the beginning of the OS for mobile devices development the necessity of full compatibility with different types of processors was declared. Symbian failed this task, but they found an alternative option - as the basic platform ARM Company processors were used, which have the best combination of productivity, output power and price. Processors were licensed by Intel and Nokia companies.

Another advantage of Symbian OS is the built-in multi-language support.
On the mobile devices market there are no standards for screen size, keyboard, buttons etc. Symbian is very attractive because of the wide circle of development tools for Symbian OS. Programs on standard C++ language are created on PC with the help of Microsoft Visual Studio environment and the emulator, which is very useful. The main advantage of Symbian OS is that the system is open. Naturally, these conditions make the number of programs for Symbian platform enormous, but don't forget that not all programs are harmless.

III. If Symbian is so good, why do they regularly release new versions?

Mostly because of the viruses, nowadays there are more than one hundred viruses that can operate under Symbian. New connection protocols and other mobile devices' characteristics are also released regularly and Symbian needs to be up to date to work with these new features.
Companies Associated with Symbian

- NOKIA
- Sony Ericsson
- Fujitsu
- Sendo
- LG Electronics Inc.
- Siemens
- BENQ
- Lenovo
- Motorola
- Samsung
- Panasonic
- Sanyo
- Arima

IV. Why NOKIA mainly uses Symbian as Operating System in its Mobiles?

Nokia mainly uses Symbian OS because this OS is user-friendly and Nokia prefers user-friendly as its first criteria in manufacturing a handset. Another thing is that Symbian OS has Greater range of applications and Connectivity is lot easier and faster. The Symbian Operating system is compatible with all kinds of devices, mostly removable media file systems The Symbian system is not Open Source software. The Symbian applications like the Themes, games, wall papers and software's are all SIS files which can also be easily transferred by using Bluetooth, or through the internet or through transfer using cables.
Indirect benefits for the whole industry

- The above benefits assume that the number of users stays constant. In establishing Symbian OS, [13] Nokia and the other industry players believe that there will be a Metcalfe effect - whereby the value of a network is the square of the number of users. As users proliferate, they will interact more, attracting even more users and consequently, more application developers, and content. This will benefit the whole industry.
- Symbian OS is the key to creation of the virtuous circle.

V. RESULTS AND DISCUSSIONS

Symbian OS is not even competing in Internet phones now, as the browser is also not up to the mark when you compare it to amazing ones like Chrome on Android. And most importantly, the UI is slow and unresponsive.
In current scenario, there has been a vast emergence of capacitive touch screens which are based on electrical capacity of the finger touching the screen like capacitive and resistive touch screens. Capacitive Touch screens are those in which the touch of the finger can be detected more than one point on the screen is possible. Resistive touch screens are not able to locate touch in more than one point. Symbian is not adequate for touch screens as Symbian came out with the phones launched with resistive touch screens but these were not impressive to use.
There is a lack of Application in Symbian as though for Symbian OS there is Nokia Store that provides bigger collection of applications than Android or Apple Store but it doesn't mean every application works perfectly for the devices. Also Symbian has no virtual memory.
Even Symbian phones do hang a lot and responses late and the security has been reduced because the software is widely known. Moreover, the developers find it difficult to work with Symbian because of poor documentation and development tools.
Due to all these disadvantages of Symbian, it failed to meet up the emerging expectations of the users and thus with time, Nokia is also moving to Windows Phone and leaving Symbian behind.

VI. CONCLUSION

Taking everything into account, we would like to conclude that though symbian is a biggest operating system and the oldest platform still in use, used by almost every major company at one time or another. Yet the biggest Symbian operating system failed due to the rough reviews of Nokia N8 device which was having the latest version of the Symbian

operating System. To this day Symbian benefits from battery life and lower hardware requirements than its competitors with simple features. Symbian is, arguably, the best operating system there has ever been, and the original standard bearer for the smart-phone concept.

But it's no longer competing to the best phone OS, or the best smart-phone OS as the user interface (UI) of the Symbian is outdated when you compare it to the other operating systems like iOS, android or Windows Phone. Windows Phone has the most modern and elegant UI, iOS second because of its consistency in 3rd party applications, android is not far behind, and Symbian is just dead last with a mile to go.

REFERENCES

[1] Open Source OS -The Future for Mobile? By juniper research
[2] http://faculties.sbu.ac.ir/~jahanian /Downloads/ESD/Slides/SymbianOS.pdf
[3] http://www.srcf.ucam.org/~tsl26/ material/Symbian_Introduction.pdf
[4] http://www.interop.com/newyork/ 2008/presentations/conference/dv13-patel.pdf
[5] Kamboj, Gupta, (2012) "Mobile Operating Systems", International Journal of Engineering Innovation & Research, Volume 1, Issue 2, ISSN: 2277 – 5668, Pp 115-120
[6] http://media.wiley.com/product_ data/excerpt/53/04700184/0470018453.pdf
[7] Symbian Application Development by senora mediaLab
[8] http://npwap.wen.ru/tool/symbian/ symbianhistory.html
[9] http://newarticlesfree.com/articles /hi-tech/mobile/all-about-symbian-os.html
[10] http://neo.dmcs.p.lodz.pl/symos/ wyklady/01a-Introduction.pdf
[11] Maji Amiya Kumar, Hao Kangli, Sultana Salmin, and Bagchi Saurabh (2010) "A Case Study with Android and Symbian"
[12] http://www.developer.nokia.com /Community/Wiki/Symbian_OS
[13] Nokia and Symbian OS White Paper by Nokia

