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Midori – Cloud Based Windows Operating System

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Abstract- Cloud computing means the use of computing resources that are delivered in form of service over the internet. Through Cloud computing consumers and businesses uses applications without installation and access their personal files at any computer without internet access. Microsoft Corporation going to introduce a new cloud based operating system named Midori. This operating system would be highly distributed, concurrent and virtualized. Services such as storage would be provided across a "trusted distributed environment" in Midori. Midori will store data on a central Microsoft Server and remove the storage service from the single PC. Since Midori is completely separate from Windows and has different goals, it is not designed for complete compatibility with Windows.

Keywords: Windows1, Midori2, Singularity3, Virtualization4, Concurrency5

1. INTRODUCTION

Windows is the name that has ruled the whole computer world since its launch by Microsoft Corporation in November, 1985. It is a trademark for Microsoft Corporation. With many advanced versions of Windows available today such as Windows XP, Windows Vista, Windows 7, Windows 8 it is the most used operating system in the world. But now here is time to experience some another technology of operating systems[1]. MICROSOFT is working on a new generation of operating systems called Cloud-Based Operating System and rumours are there that Midori will be their first such operating system, which will replace Windows fully from computer map. The reason behind Midori is to develop a lightweight portable OS which can be matched easily to lots of various applications. This new operating system will be based on the concept of virtualization and singularity but its development is still in the "incubation" phase.

2. OVERVIEW OF MIDORI OPERATING SYSTEM

This section presents a general overview of Midori operating system, including its definition and main features.

2.1 Definitions

Midori is the code name for a managed code operating system being developed by Microsoft Corporation. The main idea behind its development is to achieve concurrency, singularity and virtualization. This is a highly-dependable operating system in which the kernel, applications, and device drivers are all written in managed code. With the help of it, we can run a program spread across multiple nodes at once. It is expected to be highly componentized, which will allow users to install only what they believe necessary for their application[2]. It is a non-Windows operating system, and how the billions of Windows applications will run, or not run, under Midori is speculation.

2.2 Main Features

2.2.1 Virtualization

Virtualization is a technology that abstracts away the details of physical hardware and provides virtualized resources for high-level applications. It provides a number of benefits, including transparent migration of applications, server consolidation, enhanced system security and online operating system maintenance.

2.2.2 Singularity

It creates "software-isolated processes" to reduce the dependencies between individual applications, and between the applications and the OS itself. This concept enhances security by using micro kernel based architecture[7]. Components of

Midori operating system execute in the same address space which contains "Software Isolated Processes". Each SIP has its own data and code layout, and is independent from other SIPs. These SIPs behave like normal processes, but avoid the cost of context-switches.

2.2.3 Concurrency

Concurrency is the interleaving of processes in time to give the appearance of simultaneous execution. By using this concept, a person can handle several tasks at once[5]. Concurrency allows multiple applications to share resources in such a way that distributed applications appear to run at a same time. The model will be consistent for both the distributed and local concurrency layers, and it is internally know as, "Asynchronous Promise Architecture."

3. MIDORI DESIGN METHODOLOGY

3.1 Midori operating system design is based on some important modules like:

- **Microkernel architecture**
- **Software Isolated Processes (SIPs)**
- **Contract Based Channels**
- **Metadata Infrastructure**

3.2 Kernel

This is the most important part of an operating system. It acts as an interface between user and computer hardware. This is the only part of an operating system that can have direct interaction with the computer hardware[3]. It connects the application software to the hardware of a computer.

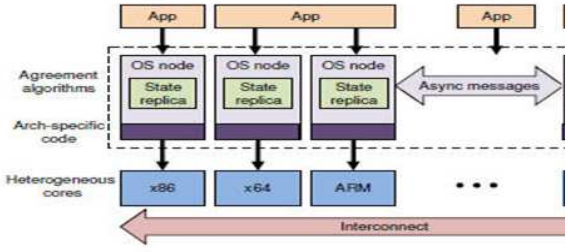

Fig. 1: Microkernel Architecture

3.3 Software Isolated Processes

This methodology is to reduce the dependencies between individual applications, and between the applications and the operating system itself. It enhances security and provides backward compatibility, thus
can execute codes in case of any device drivers' failure. In this, Protection and safety is not from memory management hardware but due to language safety and verification tools in software.

FACTORS	MONOLITHIC KERNEL	MICRO KERNEL
Size	**Huge**	**Small**
IPC	**Signals/Sockets**	**Message queues**
Security	**System-wide halt**	**Local process hale**
Correctness	**Hard to ensure**	**Easier to ensure**
I/O Communication	**Fully integration**	**Message-per-IRQ**

Table 1: Monolithic vs. Micro kernel

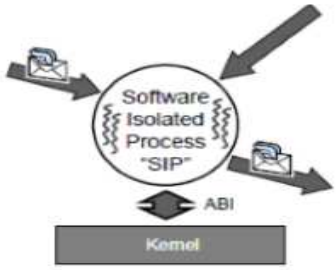

Fig. 2: Software Isolated Process

MULTIPLE ADDRESS SPACE (CURRENT SYSTEMS)	SINGLE ADDRESS SPACE
Requires context switch for IPC	Efficient IPC through Exchange Heap
Processor state must be saved and restored	Loses memory hardware based
TLB must be flushed-Enormous penalty for context switch	Protection mechanisms

Table 2: Multiple Address Space vs. Single Address Space

Systems	Cost (in CPU Cycles)			
	API Call	**Thread Yield**	**Message Ping/Pong**	**Create Process**
Midori	91	346	803	352,873
Free BSD	878	911	13,304	1,032,254

Linux	437	906	5,797	719,447
Windows	627	753	6,344	5,375,735

Table 3: Inexpensive in terms of CPU cycles

3.4 Contract Based Channels

Contract based channels provide the way of communication between Software Isolated processes. These are the bi-directional channels and provide reliability. In this, each end point has its own queue and belongs to exactly one thread at a time.

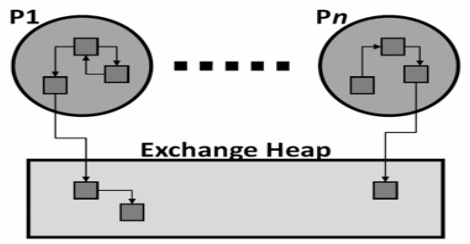

Fig. 3: Exchange Heap

Message Size(Bytes)	CPU Cycles		
	Midori	**Linux**	**Windows**
4	933	5,544	6,641
16	928	5,379	6,600
64	942	5,549	6,999
256	929	5,519	7,353
1,024	926	5,971	10,303
4,096	919	8,032	17,875
16,384	928	19,167	47,149
65,536	920	87,941	187,439

Table 4: Inter-process communication cost

3.5 Metadata Infrastructure

This is used to describe program's resources, capabilities and responsibilities. It prevents conflicts and facilitates static verification of run time properties.

4. MIDORI AS A WEB BROWSER

Midori also acts as a web browser in any operating system. But the fact is that Midori OS is separate from Midori web browser. As a web browser, its aim is to be fast and lightweight. It uses the web kit rendering engine. Midori has 14 extensions that are installed by default that can be activated through the side panel[6]. It has various features like user scripts and user styles support, straightforward bookmark management, supports HTML5 on YouTube, fast rendering with web kit, full integration with GTK+2 and search box based on open search.

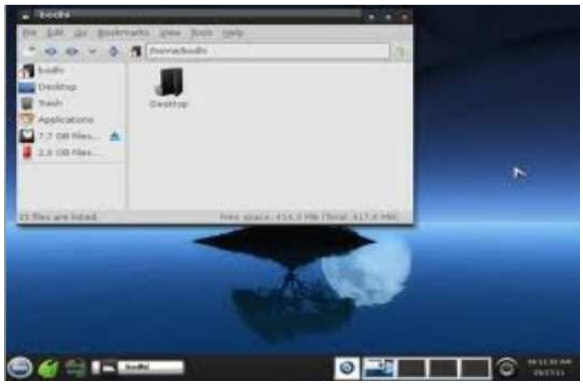

Fig 4: Web page of Midori (As a web browser)

Fig 5: Midori: Internet Tablet Talk

To open Midori first go to applications - > Internet -> Midori web browser

Fig. 6: How to open a Midori web browser

5. FUTURE SCOPE

Midori is the next generation operating system by Microsoft Corporation. It will present a higher level application model that extracts the details of

physical machines and processors. It will be having cloud computing where application components exist in data centres. It will contain two kernel layers. A microkernel that contains unmanaged code that will control hardware and higher level managed kernel services that furnish the operating system functionality. In future, Midori will be used over the web, where applications reside over the centralized servers[4]. Midori will be designed with an asynchronous-only architecture and it will always assume that the user is online. The business world will be impacted by Midori because it will be more virtually-oriented than any other OS we have ever seen. Its software will fully harness the power of the computer even though it will contain many cores on a single chip.

6. CONCLUSION

Windows is a trademark of Microsoft Corporation but the fact is that Microsoft is not planning to release any new version of it, but is looking beyond the Windows architecture with a cloud based operating system named Midori. Midori operating system architecture is still under incubation phase. It would be highly distributed, singularity based, virtualized and lightweight operating system. Its documents foresee many applications running across a huge number of topologies ranging from client – server and multi-tier deployments to peer to peer at the edge, and in the cloud data centre. Those topologies form a heterogeneous network where capabilities can exist at separate places.

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