UNIT-5
Commercial Mobile Operating Systems

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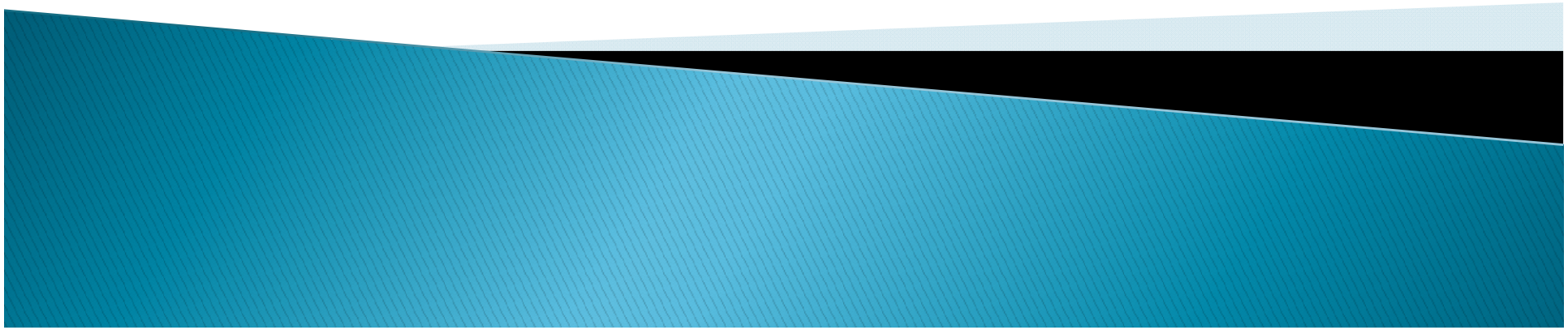
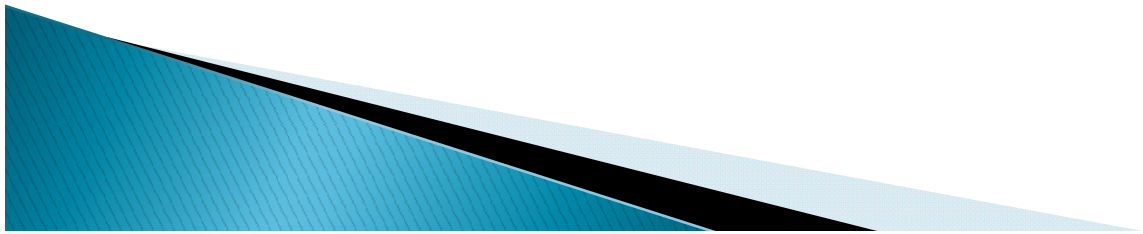


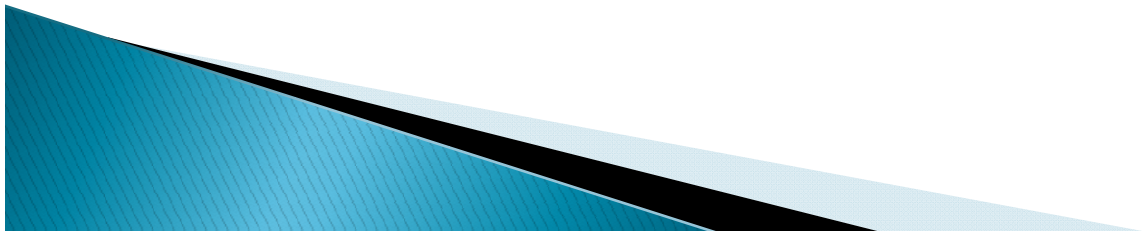
Commercial Mobile Operating Systems

- Windows Mobile
- Palm OS
- Symbian OS
- iOS
- Android
- Blackberry Operating system



Windows Mobile OS

- Windows Mobile is a compact operating system designed for mobile devices and based on Microsoft Win32.
- It provides ultimate interoperability. Users with various requirements are able to manipulate their data.
- Windows CE (Compact Edtion) - designed specifically for handheld devices, based on Win32 API.
- PDA (personal digital assistant), palmtop computer, PocketPC were original intended platform for the Windows Mobile OS.
- For devices without mobile phone capabilities, and those that included mobile phone capabilities



Family of Windows Mobile OS

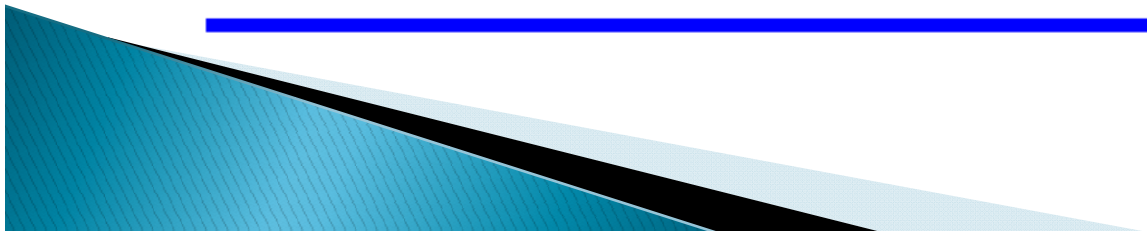
- 1996 – Windows CE 1.0
- 1997 – Windows CE 2.0 (ATM, games consoles, Handheld PC's, kitchen utensils)
- 2000 - Windows CE 3.0 - Pocket PC 2000 - (became the os of choice on many Pocket PCs, looked and worked like Windows 98, no phone feature)
- 2001 - CE 3.0 - Smartphone 2002– used for Pocket PC phones and Smartphones, UI reflect the new Windows XP
- 2003 – Windws Mobile 2003 (Windows CE 4.2) - first release under the Windows Mobile banner - name changed form PocketPC to Windows Mobile
- 2005 - WM5 (CE5.0) - new standard API created for a simplified programming of 3D apps and games with Direct3Dmobile. It use .Net Compact Framework environment

Family of Windows Mobile OS

- 2007 – WM6 (CE 5.2) – (also year of introducing iPhone) similar in design to the Vista, works much like WM5, but with much better stability
- 2008 – WM 6.1 – (year of releasing Android)
- 2009 – WM6.5, vertically scrollable labels, Windows Marketplace announced
- Feb 2010 – WM6.5.3, was officially announced as first Windows Phone 6.5.3 smartphone

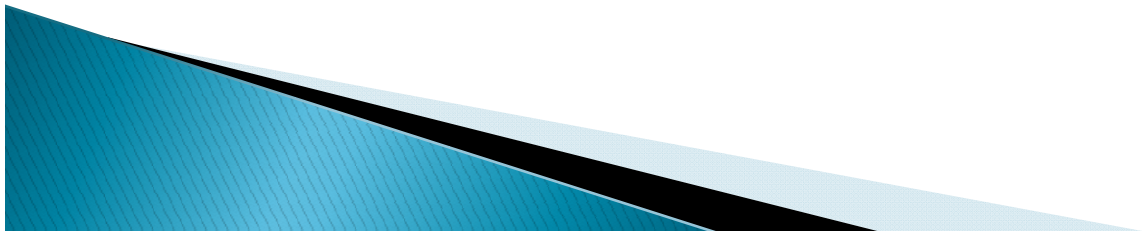
Palm OS

- Palm OS is an embedded operating system designed for ease of use with a touch screen-based graphical user interface.
- It has been implemented on a wide variety of mobile devices such as smart phones, barcode readers, and GPS devices.
- It is run on Arm architecture-based processors. It is designed as a 32-bit architecture.



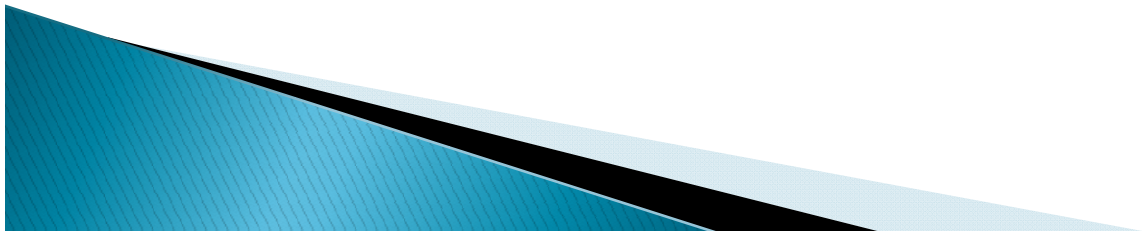
Palm OS

- The key features of Palm OS
  - A single-tasking OS:
    - Palm OS Garnet (5.x) uses a kernel developed at Palm, but it does not expose tasks or threads to user applications. In fact, it is built with a set of threads that can not be changed at runtime.
    - Palm OS Cobalt (6.0 or higher) does support multiple threads but does not support creating additional processes by user applications.



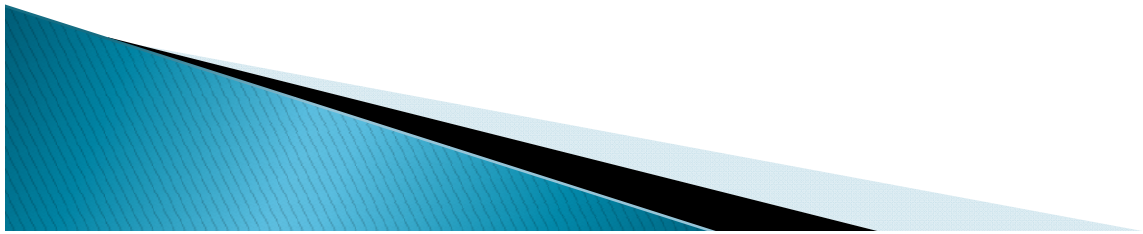
Palm OS

- Palm OS has a preemptive multitasking kernel that provides basic tasks but it does not expose this **feature** to user applications.
- Memory Management: The Memory, RAM and ROM, for each Palm resides on a memory module known as card. In other words, each memory card contains RAM, ROM or both. Palms can have no card, one card or multiple cards.
- Handwriting recognition input called Graffiti 2



Palm OS

- Expansion support: This capability not only augments the memory and I/O , but also it facilitates data interchanges with other Palm devices and with other non-Palm devices such as digital cameras, and digital audio players.
- HotSync technology for synchronization with PC computers
- Sound playback and record capabilities
- TCP/IP network access



Palm OS

- Support of serial port, USB, Infrared, Bluetooth and Wi-Fi connections
- Defined standard data format for PIM (Personal Information Management) applications to store calendar, address, task and note entries, accessible by third-party applications

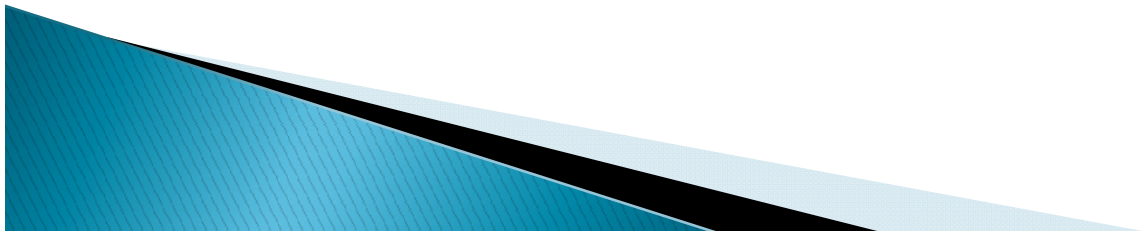
Symbian OS

- Symbian OS is 32 bit, little-endian operating system, running on different flavors of ARM architecture

- It is a multitasking operating system and very less dependence on peripherals.
- Kernel runs in the privileged mode and exports its service to user applications via user libraries.

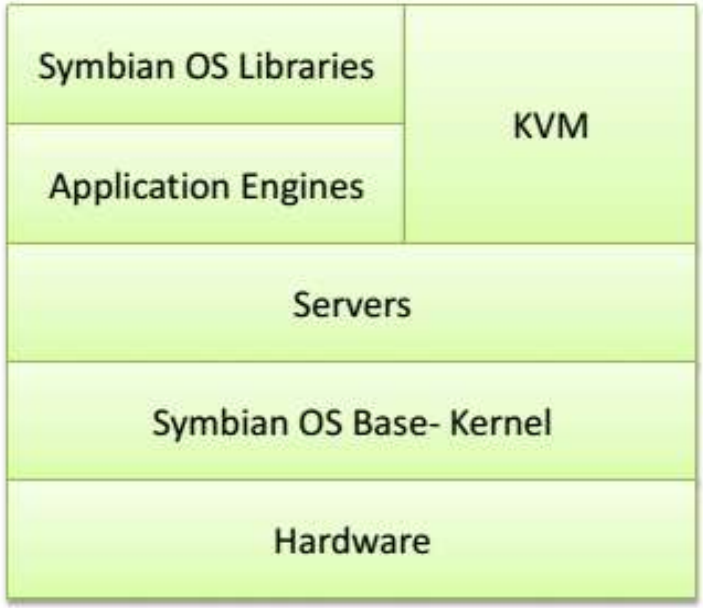
Symbian OS

- User libraries include networking, communication, I/O interfaces and etc.
- Access to these services and resources is coordinated through a client-server framework.
- Clients use the service APIs exposed by the server to communicate with the server.
- The client-server communication is conducted by the kernel.



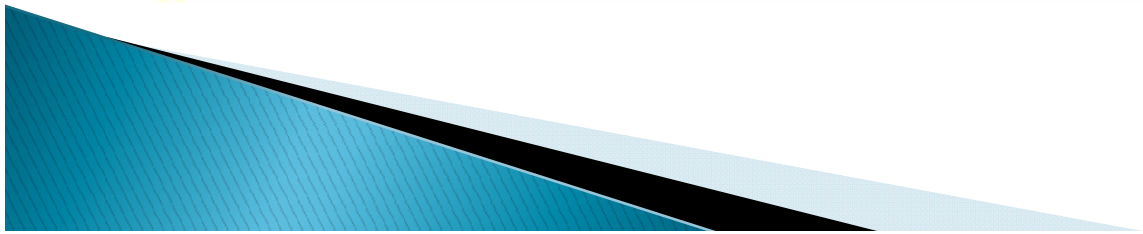
Symbian OS

The following demonstrates the Symbian OS architecture



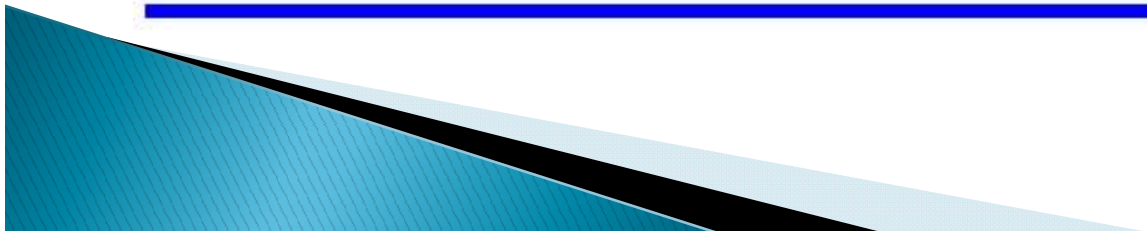
Symbian OS Features

- Real-time: it has a real-time, multithreaded kernel.
- Data Caging
  - it allows applications to have their own private data partition. This feature allows for applications to guarantee a secure data store. It can be used for e-commerce applications, location aware applications and etc.
- Platform Security
  - Symbian provides a security mechanism against malware. It allows sensitive operations can be accessed by applications which have been certified by a signing authority. In addition, it supports full encryption and certificate management, secure protocols (HTTPS, TLS and SSL) and WIM framework.



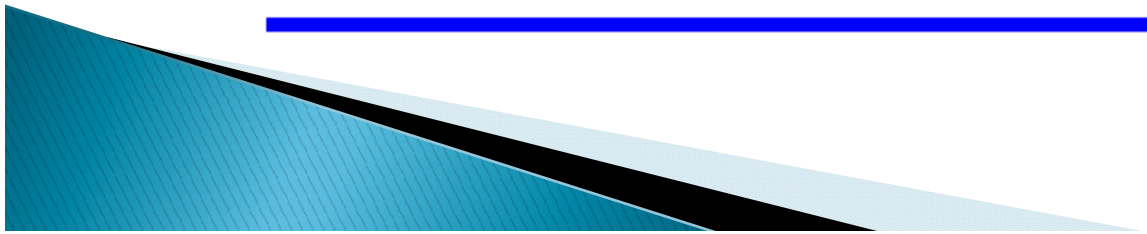
Symbian OS Features

- Multimedia
  - it supports audio, video recording, playback and streaming, and Image conversion.
- Internationalization support
  - it supports Unicode standard.
- Fully object-oriented and component- based
- Optimized memory management
- Client-server architecture
  - it provides simple and high-efficient inter process communication. This feature also eases porting of code written for other platforms to Symbian OS.

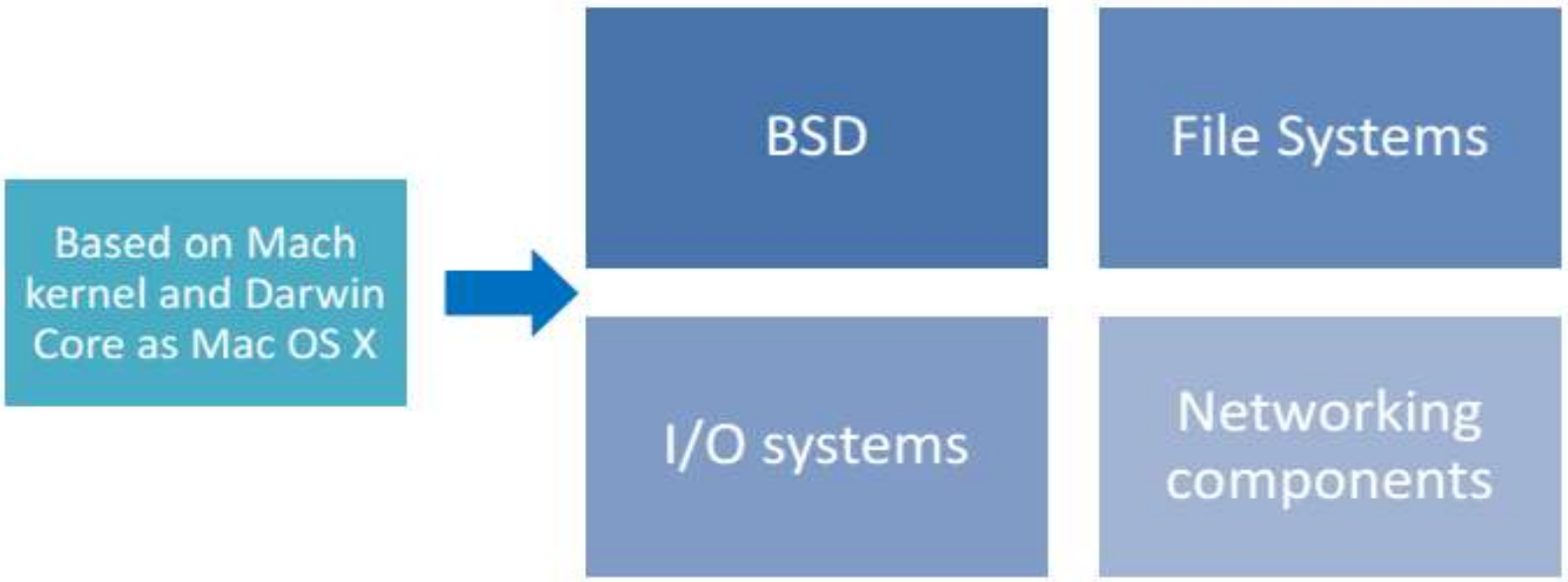


Symbian OS Features

- A Hardware Abstraction Layer (HAL)
  - This layer provides a consistent interface to hardware and supports device-independency
  - Kernel offers hard real-time guarantees to kernel and user mode threads.



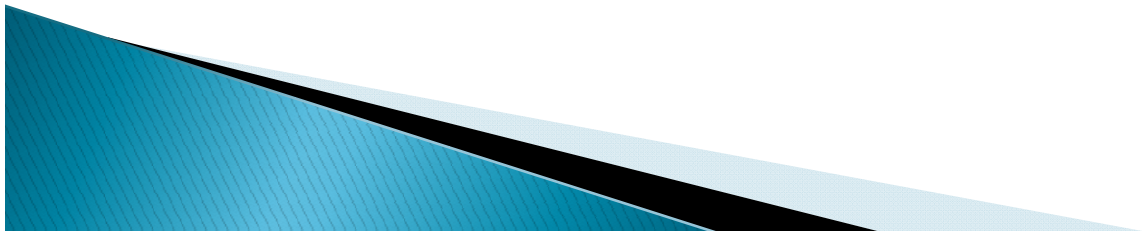
iPhone OS


Based on Mach kernel and Darwin Core as Mac OS X
BSD
File Systems
I/O systems
Networking components

iOS

Apple's Proprietary Mobile

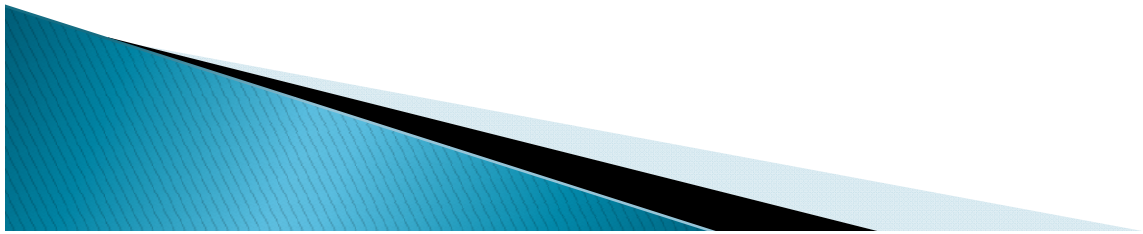
- iOS is Apple's proprietary mobile operating system initially developed for iPhone and now extended to iPAD, iPod Touch and Apple TV.
- Initially known as "iPhone OS", in June 2010 renamed "iOS".
- iOS is not enabled for cross licensing, it can only be used on Apple's devices.



iOS

Apple's Proprietary Mobile OS

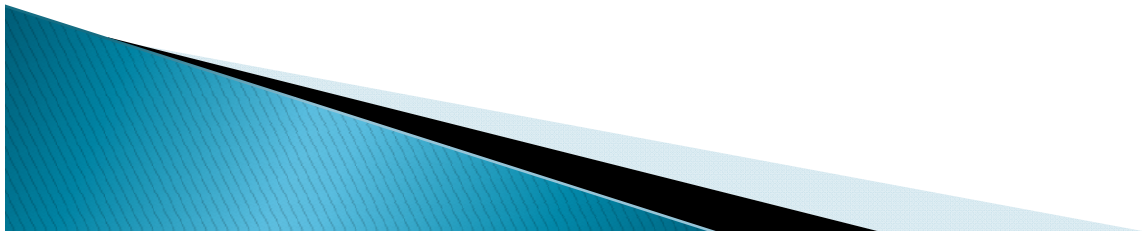
- The user interface of iOS is based on the concept of usage of multi touch gestures.
- iOS is a Unix based OS.
- iOS uses four abstraction layers, namely: the Core OS layer, the Core Services layer, the Media layer, and the Cocoa Touch layer.
- Apple's App store contains close to 550,000 applications as of March 2012.



iOS

Apple's Proprietary Mobile OS

- It is estimated that the APPs are downloaded 25B times till now.
- First version of iOS is released in 2007 with the mane 'OS X' and then in 2008 the first beta version of 'iPhone OS' is released.
- In 2007 September Apple released first iPod Touch that also used this OS.
- In 2010 iPad is released that has a bigger screen than the iPod and iPhone.

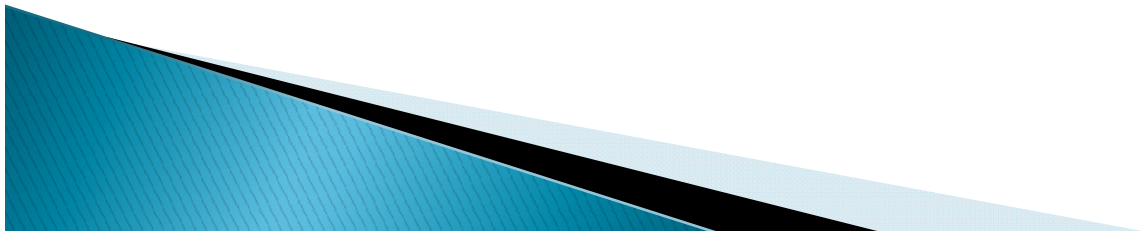


iOS

- Cisco owns the trademark for 'IOS'; Apple licenses the usage of 'iOS' from Cisco.

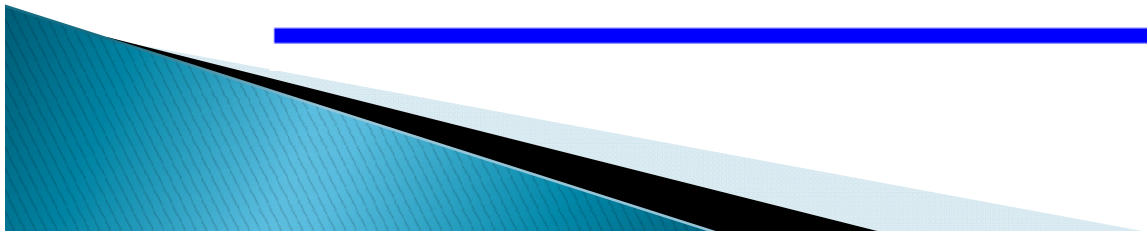
Android

- Google owns a trademark for Android – Google's permission is necessary to use Android's trademark
- In 2011, Microsoft announced it has made an agreement with Android device manufacturers (including Samsung and HTC) to collect fees from them.
- Android's source code is available under Apache License version 2.0. The Linux kernel changes are available under the GNU General Public License version 2.



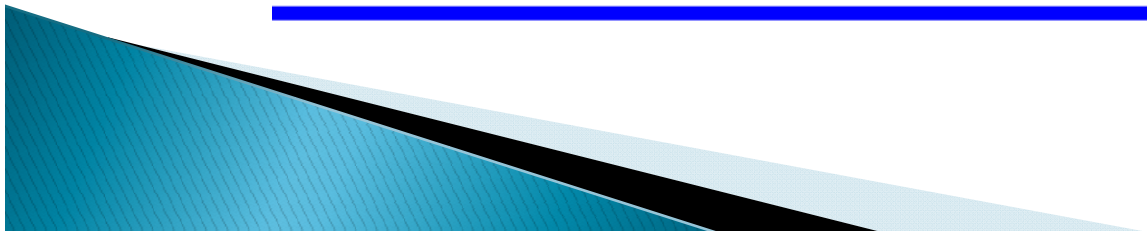
Android OS

- Android is Linux based mobile OS for mobile devices such as Tablets and Smartphones.
- In 2005 Google acquired the initial developer of the OS, Android Inc.
- Then in 2007 Google formed an Open Handset Alliance with 86 hardware, software and telecom companies.
- This alliance developed and announced Android as an open source mobile OS under the Apache License.



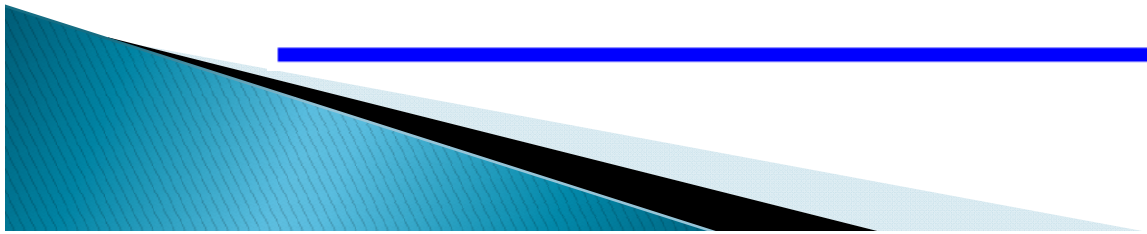
Android

- Now, this OS is being used by multiple device manufacturers (Samsung, Motorola, HTC, LG, Sony etc) in their handsets
- Android developer community has large number of developers preparing APPs in Java environment and the APP store 'Google Play' now has close to 450,000 APPs, among which few are free and others are paid.
- It is estimated that, as of December 2011, almost 10B APPs were downloaded.



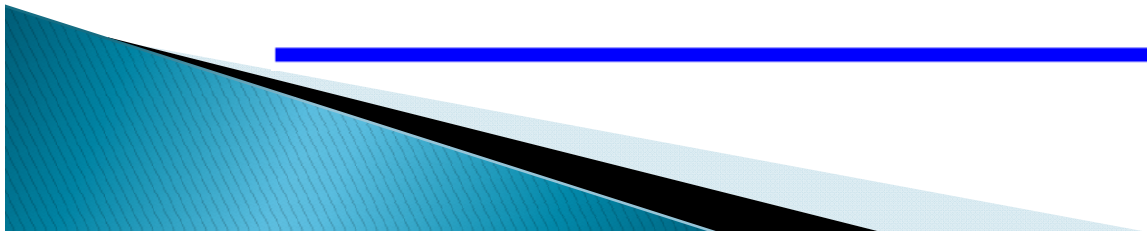
Android

- It is estimated that as of February 2012 there are over 300M Android devices and approximately 850,000 Android devices are activated every day.
- The earliest recognizable Android version is 2.3 Gingerbread, which supports SIP and NFC.
- In 2011 Android Honeycomb version (3.1 and 3.2) are released with focus on Tablets. This is mainly focused on large screen devices.



Android

- Handset layouts – compatible with different handset designs such as larger, VGA, 2D graphics library, 3D graphics library based.
- Storage – a lightweight relational database, is used for data storage
- Connectivit: GSM/EDGE, IDEN, CDMA, EV-DO,UMTS,Bluetooth,WiFi, LTE, NFC &WiMAX
- Messaging – SMS, MMS, threaded text messaging and Android Cloud To Device Messaging (C2DM)

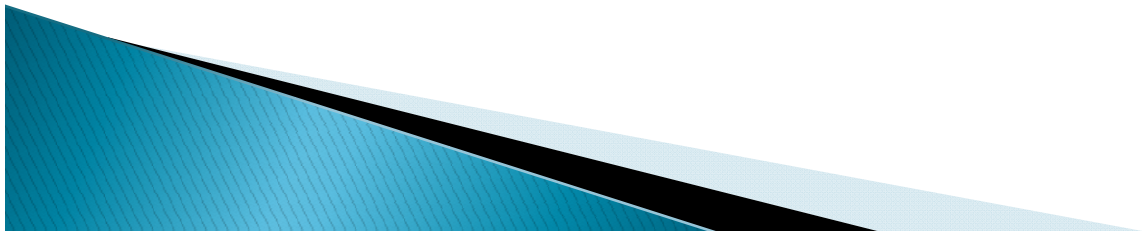


Android

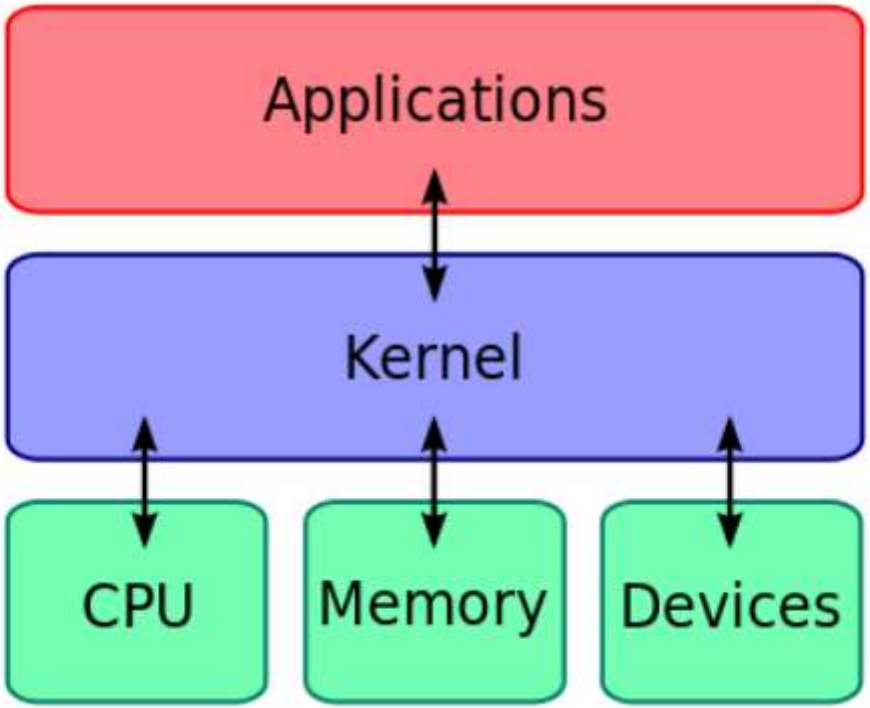
- Google faced many patent lawsuits against Android such as by Oracle in 2006 that included patents US5966702 and US6910205.

Blackberry OS

- The first operating system launched by **Research in Motion**(RIM -the company behind BlackBerry)
- Operating system structure mainly consists of following: -
  - GUI (Graphic User Interface).
  - Command processor.
  - Kernel.

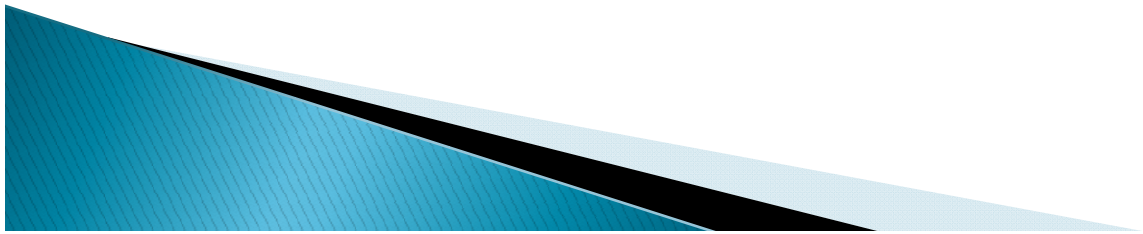


Blackberry OS Architecture



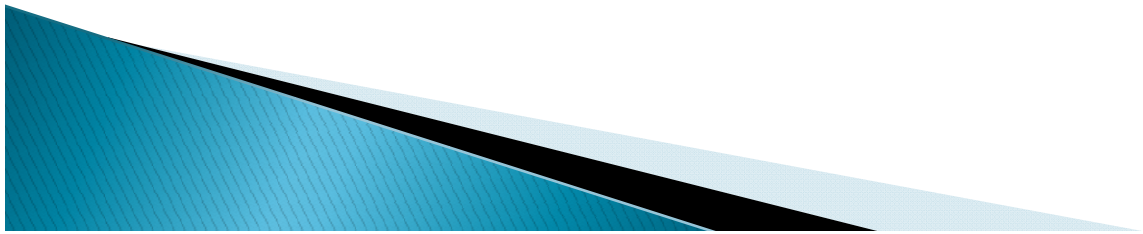
Blackberry OS Features

- **Gestures**
- Multi-tasking
- Blackberry Hub
- Blackberry Balance
- Keyboard
- Voice Control



Key Terms in Blackberry OS

- Process Management
- Memory Management
- Types of Kernel – Microkernel



Advantages of Blackberry OS

- It provides good security for data.
- It avoids collusion of personal and business data.
- Content promotion: Dedicated content channels and feature banners that provide prime real estate to help distribute your app to the right users.
- App discovery: Universal search, top lists, social sharing, reviews, and ratings help users find the right app.
- The Games app (in combination with Score loop): A specialized portal for gaming allowing multiplayer, social connections.

Disadvantages of Blackberry OS

- New operating system was introduced too late into the ever-growing market.
- Yet to have as many apps available for purchase or download compared to other phone in the market.
- Consumers have switched over to other devices made by Apple or Android.
- Swipe vs. home button. Once an application is opened, you have to swipe up to return to the main display.