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CSC 504

ASSIGNMENT: COMPARE THE DIFFERENT FLAVOURS OF MOBILE OPERATING SYSTEMS

- IOS
- WINDOWS
- BLACKBERRY
- ANDROID

Introduction (About OS)

iOS is managed by the Apple Inc. and is coded in C, C++, Swift and Objective-C. According to Wikipedia, 17.9% of users have mobile phones running on iOS. This OS has a proprietary license except for its open source components. iOS is part of the Darwin family (XNU Kernel), supports ARM and ARM64 architecture. iPhones and iPads run iOS. Apple's operating system is known for being user-friendly. It's also the most tightly guarded of any OS, meaning you won't be able to make high-level changes to the way your device functions. The most recent version of iOS is 10.2.1

Android is managed by the Open Handset Alliance and is coded in C, C++ and Java. The most recent version is 7.1.1. According to Wikipedia, 81.7% of users have mobile phones running on Android OS. Android OS has a free and open source license and is part of the Linux family. Android supports the ARM, x86 and MIPS CPU architectures

Windows 10 Mobile is managed by Microsoft. According to Wikipedia, 0.3% of users have mobile phones running on Windows 10 Mobile. Windows 10 Mobile has a proprietary license and is part of the Windows 10 Mobile family. Windows 10 Mobile supports only the ARM CPU architecture and is programmed in .NET C#, VB.NET, Silverlight, native C/C++, WinRTP (XMLA), DirectX

Process Management

Android

Android does a good job of automatically managing processes.

When Android needs more system resources, it will start killing the least important processes first. Android will start to kill empty and background processes to free up memory if you're running low.

This OS also intelligently uses your device's RAM for caching apps and other data, because the RAM should not be empty.

iOS

Each process (application) in Mac OS X or iPhone OS is made up of one or more threads, each of which represents a single path of execution through the application's code. Every application starts with a single thread, which runs the application's main function. Applications can spawn additional threads, each of which executes the code of a specific function. Interrupt in iPhone OS are taken by ISR (Interrupt Service Routine), a function (subroutine) located within the code for the iPhone OS, acknowledges the interrupt and begins to process it via the corresponding driver BlackBerry: Process management consists of both process creation and destruction as well as the management of process attributes such as process IDs, process groups, user IDs, and so on. The process primitive for BB OS is spawn(). It give control over File descriptors, Process group ID, Signal mask, Ignored signals, The node to create the process on, Scheduling policy, Scheduling parameters (priority), Maximum stack size, Runmask (for SMP systems)

Windows

Windows Mobile provides several synchronization objects that enable you to synchronize a thread's actions with those of another thread. These objects include critical sections, mutexes, events, and semaphores. Each object type, such as memory maps, semaphores, events, message queues, mutexes, and watchdog

timers, has its own namespace. Empty strings ("") are handled as named objects.

Memory Management

Android

Android manages its memory automatically by Dalvik garbage collector. It will recollect memory resources when ongoing application is running out the memory based on the level of importance. However, it introduces a serious problem. When many allocations happen, the garbage collector will kick in and stop the user's application to let it free some memory. To avoid this problem, the Android SDK ships with a very useful tool called allocation tracker, which is a part of DDMS, to track the application's memory and guarantee correctness of the program.

iOS

In iPhone OS, the garbage collection is not available. Therefore, a mechanism should be introduced that allows you to mark an object as still being useful. In many respects, memory management is thus best understood in terms of "object ownership", which includes,

1. An object may have one or more owners.
2. When an object has no owners, it is destroyed.
3. One must become the owner to make sure if an object interested is destroyed.

To support the model, reference counting is used. Every object has a retain count. The retain count can be altered using primitives like alloc, copy, retain, release and autorelease.

When one create or copy an object, its retain count is 1. Thereafter other objects may express an ownership interest in your object, which increments its retain count. The owners of an object may also relinquish their ownership interest

in it, which decrements the retain count. When the retain count becomes zero, the object is destroyed.

Windows

In any Windows phone, ROM stores the entire OS, in addition to the applications that come with the OS design. Windows Mobile supports a 32-bit (4-GB) address space. When OS initializes, it maps the stack, the heap and some DLLs. DLLs are at the top of the memory address while stack and heap usually stay at the address's bottom.

BlackBerry

Blackberry uses MMU (memory management unit). When the OS performs a context switch (that is, suspends the execution of one thread and resumes another), it manipulates the MMU to use a potentially different set of page tables for the newly resumed thread. If the OS is switching between threads within a single process, no MMU manipulations are necessary.

When the new thread resumes execution, any addresses generated as the thread runs are mapped to physical memory through the assigned page tables. If the thread tries to use an address not mapped to it, or it tries to use an address in a way that violates the defined attributes (for example, writing to a read-only page), the CPU receives a fault (similar to a divide-by-zero error), typically implemented as a special type of interrupt.

File Management

Android

In Android, you can work with files directly, opening them in apps like you would on your computer.

Android file manager supports Navigating folders, Deleting Files and Folders, Renaming Files and Folders, Copying and Moving Files and Folders, Creating New Folders, Creating New Files and Documents, Sending Files via E-

devices do not have direct access to the file system. This is different from the Android OS which allows users to work with files directly.

Windows

The file management module in windows also supports direct access to files. Users have robust security features. They can also store data about different apps and drivers. Windows Mobile provides support for difference flavours of storage features.

BlackBerry

Procnto is blackberry's microkernel and process manager. At startup, procnto populates the pathname space with:

| | |
|-----------|---|
| /dev/zero | A device that always returns zero. Used for allocating zero-filled pages using the mmap() function. |
| /dev/mem | A device that represents all physical memory. |

Mail, Sending Files via Bluetooth. Hidden files on android start with a dot (.).

iOS

The file systems in iOS handle the persistent storage of data files, apps, and the files associated with the operating system itself. Therefore, the file system is one of the fundamental resources used by all processes.

The file system in iOS is HFS Plus. The iOS file system is geared toward apps running on their own. To keep the system simple, users of iOS

| Prefix | Description |
|-------------|--|
| / | Root of the file system. |
| /proc/boot/ | Some of the files from the boot image presented as a flat file system. |
| /proc/ pid | The running processes, each represented by its process ID (PID). |

References

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