

Extended OS



OS is an extended virtual machine

- Multiplexes the “machine” between applications
 - Time sharing, multitasking, batching
- Provided a higher-level machine for
 - Ease of use
 - Portability
 - Efficiency
 - Security
 - Etc....



JAVA – Higher-level Virtual Machine

- write a program once, and run it anywhere
 - Architecture independent
 - Operating System independent
- Language itself was clean, robust, garbage collection
- Program compiled into bytecode
 - Interpreted or just-in-time compiled.
 - Lower than native performance



Issues

- Legacy applications
- No isolation nor resource management between applets
- Security
 - Trust JVM implementation? Trust underlying OS?
- Performance compared to native



Is the OS the “right” level of extended machine?

- Security
 - Trust the underlying OS?
- Legacy application and OSs
- Resource management of existing systems suitable for all applications?
- What about activities requiring “root” privileges

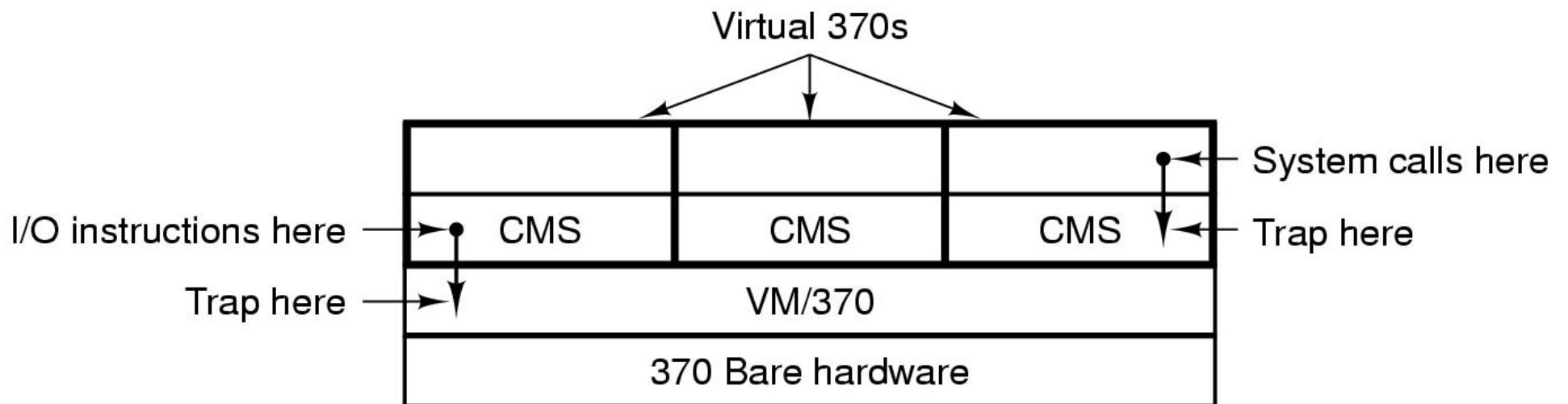


Virtual Machine Monitors

- Provide scheduling and resource management
- Extended “machine” is the actual machine interface.



IBM VM/370



Advantages

- Legacy OSes (and applications)
- Concurrent OSes
 - Linux – Windows
 - Primary – Backup
- Security
 - VMM (hopefully) small and correct
- Performance near bare hardware
 - For some applications



Virtual R3000???

- Interpret
 - System/161
 - slow
 - JIT dynamic compilation
- Run on the real hardware??



Issues

- Privileged registers (CP0)
- Privileged instructions
- Address Spaces
- Exceptions (including syscalls, interrupts)
- Devices