

Baboon problem

Semaphores

turnstile = 1

mutex = 1

rope = 5

east = 1

west = 1

int eastCount = 0
westCount = 0

East()

{ wait (turnstile)

wait (east)

eastCount++;

if (eastCount == 1)

wait (mutex)

Signal (east)

Signal (turnstile)

wait (rope)

cross()

Signal (rope)

```

wait (east)
eastCount--;
if (eastCount == 0)
    signal (mutex)
    signal (east)
}

```

west() // very similar to east but inverse

Semaphore

```

cook = 0
pot = 0
mutex = 1

```

```

cook() {
    wait (cook)
    fill pot()
    servings = M
    signal (pot)
}

```

```

Salvage()
{
    while (true) {
        do_stuff()
        signal (mutex);
        if (servings == 0) {
            signal (cook)
            wait (pot)
        }
        servings --
        fill bowl()
        signal (mutex)
        eat()
    }
}

```

}

Semaphore → Clause

Semaphores

semaphore = 0

feinwait = 0

elfwait = 0

mutex = 1

emutex = 1

mutex = 1

Semaphore {

wait(semaphore)

wait(mutex)

if (feinwait == 0) {

wait(mutex)

feinwait = 0

signal(mutex)

signal(feinwait)

hitch up sleigh()

deliver()

} else {

signal(elfwait) - 3 times

answer Questions()

wait(emutex)

elfcount += 3

int feincount = 0

elfcount = 0

elfque = 3;

```

    }
    signal(mutex)
}

```

```

Pinner
{
    vacation()
    wait(rmutex)
    rcount++;
    if (rcount == 9) {
        signal(senta)
        signal(mutex) }
    else
        signal(rmutex)
    wait(rinner)
}

```

```

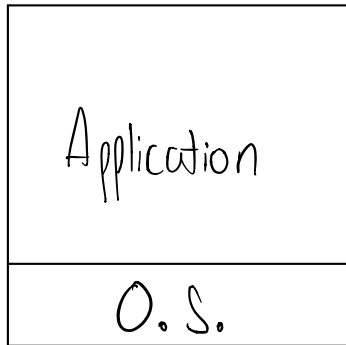
Elf() {
    wait(elfgoe)
    wait(elfmutex)
    elfcount++;
    if (elfcount >= 3) {
        signal(elfmutex)
        signal(senta) }
    else
        signal(elfmutex)
}

```

wait(⁰elfwait) // blocked for Santa

} signal(elfgoe)

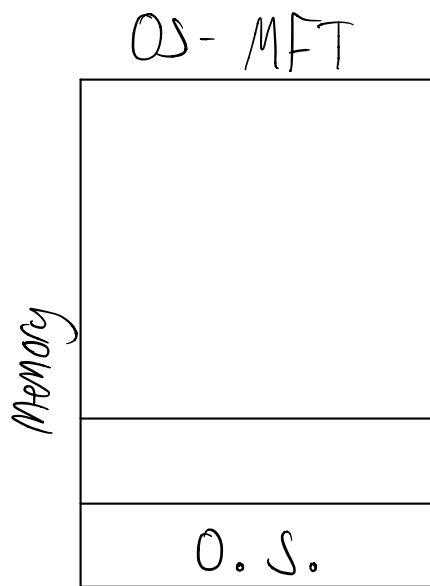
Memory management



- Overlays - loading and unloading memory to manage amount of memory used,



Multi programming with a fixed number of partitions



Internal fragmentation
 Can't resize partitions
 fixed number of processes.

IBM 360 - method for dealing with traps
 memory divided memory into 2KB blocks
 each block had a 4 bit protection code
 PSW contained a 4 bit key hardware
 trapped any reference to block where protection
 blocks did not match key

Another solution

CDC 6600

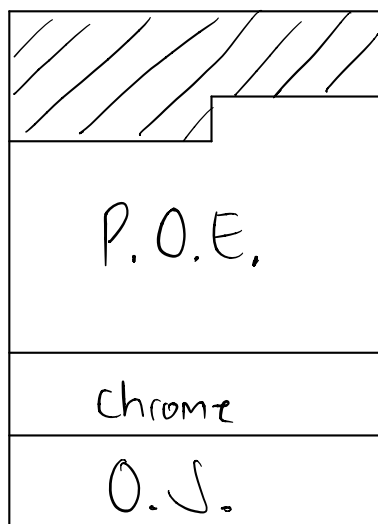
2 special registers

base and limit

Dynamic partitioning

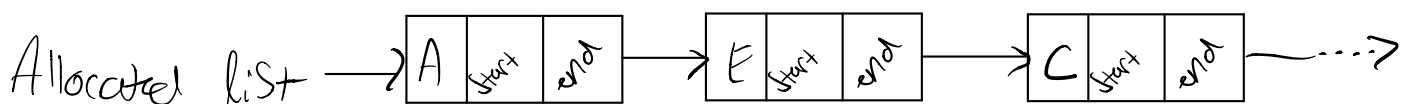
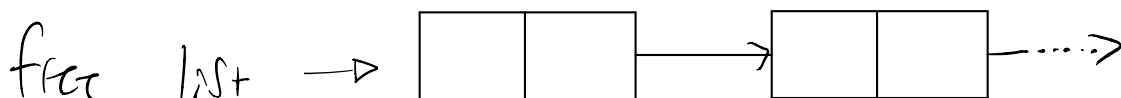
OS - MVT

Multiprogramming with variable number of tasks.



- has external fragmentation when program finish and another smaller fills their space but not all.
- Memory compaction fixes this prob

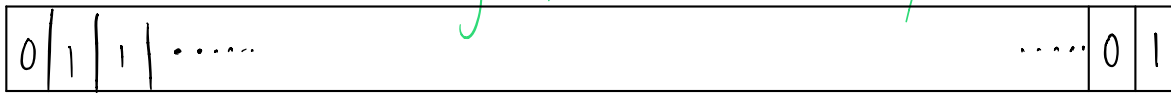
Memory management with Linked list



Memory management with bit map



// divide memory into fixed sized pieces



Next fit - same as first fit but starts search when 1st one stopped.

Best fit - free space that best relates to process needs. fragments will be smaller.

worst fit - large free spaces will be used more but fragments are larger letting more programs use them.

Paging and segmentation

- paging segments are all the same size
- segmentation allows segments to vary in size

Page - divide virtual memory into equal size pieces.
frame - divide physical memory into equal size pieces.

page table used to map tables to frames.

Virtual address (page #, offset)

(1 , 100)

(2 , 100)