main *(kernel enty point)*

- **kinit1** *(frees pages)*
  - **freerange** *(frees pages)*
  - **kfree** *(frees single page)*
- **kvmalloc** *(builds new page table)*
  - **setupkvm** *(sets up kernel page table)*
  - **mappages** *(adds translations to page table)*
    - **walkpgdir** *(allocates and maps page)*
    - **kalloc** *(allocates page)*
    - **memset** *(clean new page)*
- **seginit** *(sets up segmentation table)*
- **tvinit** *(initializes interrupt table)*
- **kinit2** *(frees pages)*
  - **freerange** *(frees pages)*
  - **kfree** *(frees single page)*
- **userinit** *(initialize the First Process)*
  - **allocproc** *(allocates new proc)*
  - **setupkvm** *(sets up kernel page table)*
  - **mappages** *(adds translations to page table)*
    - **walkpgdir** *(allocates and maps page)*
    - **kalloc** *(allocates page)*
    - **memset** *(clean new page)*
  - **inituvm** *(allocates and maps single page, and copies First Process code to it)*
- **mpmain**
  - **idtinit** *(sets %IDTR to point at existing interrupt table)*
  - **scheduler** *(runs runnable processes)*
  - **acquire** *(locks process table)*
    - **pushcli** *(makes us ignore interrupts)*
  - **switchuvm** *(prepares proc's kernel stack and makes TSS point to it)*
  - **swtch** *(saves current context on proc, and switch to new proc)*
  - **switchkvm** *(switches back to kernel page table)*
  - **release** *(unlocks process table)*
    - **popcli** *(makes us stop ignoring interrupts)*

---

fork *(creates child process)*

- **allocproc** *(allocates new proc)*
- **copyuvm** *(copies memory)*
  - **setupkvm** *(sets up kernel page table)*
  - **mappages** *(adds translations to page table)
    - **walkpgdir** *(allocates and maps page)*

        - **kalloc** *(allocates page)*
        - **memset** *(clean new page)*
    - **walkpgdir** *(validate that page mapping exists, without allocating or cleaning)*
    - **kalloc** *(allocate new page for user-code)*
    - **memmove** *(copy page data)*
    - **mappages** *(add user-code page)*
    - **walkpgdir** *(maps page, without allocating or cleaning)*
    - **freevm** *(free page table in case of error)*
    - **deallocuvm** ()
        - **walkpgdir** *(get entry of internal page)*
        - **kfree** *(free actual page)*
    - **kfree** *(free inner table)*
    - **kfree** *(free outer table)*
- **kfree** *(if error, free kernel-stack)*
- **filedup**
- **idup**
- **safestrcpy**
