OPERATING SYSTEM

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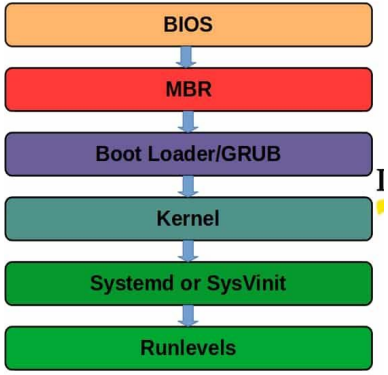
PROBLEM STATEMENT

Developing a bootloader program compatible with the **QEMU** emulator for x86 architecture.

OUR AIM

The primary focus is on simplicity and functionality, with minimalistic design. Our aim is to Ensure that the bootloader successfully loads and transfers control to the kernel without errors.



Software Components Used

nasm the netwide assembler

QEMU

OUR CODES IN QEMU

boot - Notepad

File Edit Format View Help

```
[BITS 16]
[ORG 0x7c00]

start:
    xor ax,ax
    mov ds,ax
    mov es,ax
    mov ss,ax
    mov sp,0x7c00

PrintMessage:
    mov ah,0x13
    mov al,1
    mov bx,0xa
    xor dx,dx
    mov bp,Message
    mov cx,MessageLen
    int 0x10

End:
    hlt
    jmp End

Message:    db "THIS BOOTL
```

```
    push 8
    push KernelEntry
    db 0x48
    retf

KernelEntry:
    mov byte[0xb8000],'K'
    mov byte[0xb8001],0xa

InitPIT:
    mov al,(1<<2)|(3<<4)
    out 0x43,al

    mov ax,11931
    out 0x40,al
    mov al,ah
    out 0x40,al

InitPIC:
    mov al,0x11
    out 0x20,al
    out 0xa0,al

    mov al,32
    out 0x21,al
    mov al,40
    out 0xa1,al

    mov al,4
    out 0x21,al
```

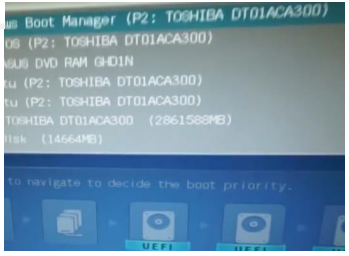
```
[    1.663392] isapnp: No Plug & Play device found
[    1.719627] Freeing unused kernel memory: 1092K
[    1.728940] Write protecting the kernel text: 8868k
[    1.729515] Write protecting the kernel read-only data: 3492k
/init: line 4: mount: not found
/init: line 5: mount: not found
This script just mounts and boots the rootfs, nothing else!
/init: line 11: umount: not found
/init: line 12: umount: not found
sh: cannot set terminal process group (-1): Inappropriate ioctl for device
sh: no job control in this shell
sh-4.2# [    1.987983] tsc: Refined TSC clocksource calibration: 3392.307 MHz
[    1.990265] clocksource: tsc: mask: 0xffffffffffffffff max_cycles: 0x30e5eb01
e92, max_idle_ns: 440795249040 ns
[    3.020480] clocksource: Switched to clocksource tsc
busybox ls
bin   dev   etc   init  lib   lib64 mnt   proc  root  sbin  sys
sh-4.2# [   53.351425] random: fast init done
```

Machine View

```
THIS BOOTLOADER WAS CREATED ON 15/2/2024 by shreehar
o write this .asm file

iPXE (https://ipxe.org) 00:03.0 CA00 PCI2.10 PnP PMM

Booting from Hard Disk...
```



REFERENCES

1. "Programming with 64-Bit Intel® Core™ Processors" by Vladimir Brazhnikov
2. "OSDev Wiki"
3. "Bare Bones" by Nick Blundell
4. "The Art of Assembly Language Programming" by Randall Hyde
5. Online forums and communities