```
    [org 0x7c00]


    mov [BOOT_DISK], dl



    CODE_SEG equ GDT_code - GDT_start
    DATA_SEG equ GDT_data - GDT_start

    cli
    lgdt [GDT_descriptor]
    mov eax, cr0
    or eax, 1
    mov cr0, eax
    jmp CODE_SEG:start_protected_mode

    jmp $


    GDT_start:                                  ; must be at the end of real mode code
        GDT_null:
            dd 0x0
            dd 0x0

        GDT_code:
            dw 0xffff
            dw 0x0
            db 0x0
            db 0b10011010
            db 0b11001111
            db 0x0

        GDT_data:
            dw 0xffff
            dw 0x0
            db 0x0
            db 0b10010010
            db 0b11001111
            db 0x0

    GDT_end:

    GDT_descriptor:
        dw GDT_end - GDT_start - 1
        dd GDT_start


    [bits 32]
    start_protected_mode:
        mov al, 'A'
        mov ah, 0x0f
        mov [0xb8000], ax
        jmp $

    BOOT_DISK: db 0

    times 510-($-$$) db 0
    dw 0xaa55
```