write() vs fprintf vs printf

write() is a system call

int write(int fd, char *buf, int n)
User memory

Virtual addresses

User space

Kernel space

Project 01

malloc() / free()

head allocator

User memory

malloc() / free()

head allocator

Kernel space
```c
#include <stdio.h>

int main(int argc, char **argv)
```

```
int a;
int b;
char s[10];
char *xp;

a = foo(3);
```
1-leap

xv6 system call

\[ p = s b r k ( n ) \]

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Heap

\[ a = \text{malloc}() \]
\[ b = \text{malloc}() \]
\[ c = \text{malloc}() \]
\[ d = \text{malloc}() \]
\[ \text{free}(c) \]
\[ \text{free}(a) \]
\[ e = \text{malloc}() \]

Free-list

struct block_hdr {  
    struct listctrl elem;  
    int used;  
    int size;  
};
\[ a = \text{malloc(32)} \]

\[ e = \text{malloc(8)} \]
free(6) → F → 6F → F