Flash - 500

This was one of the first high-scoring questions released. The solution I came up with is very simple, but required a bit of prior knowledge.

The simple solution requires knowledge of:

- A fast programming language
- Unix pipes

Problem

```
Calculate the MD5 of every IP4 address on the planet, before the contest ends...
Good luck with that :)

You need to create a list of every possible IP4 address in reverse order.
One address per line.
255.255.255.255
...
0.0.0.0

Once completed get the md5 of the entire list as the flag.
```

Thoughts

Alright, first of all, '0.0.0.0' is seven characters, '255.255.255.255' is fifteen characters, let's say the average IP takes up eleven characters, that's twelve including the newline (thirteen if you're on windows, which needs a carriage return). There are 256^4 IP addresses. $256^4 * 12 = 51539607552$ bytes for all the IPs. Divide that by 1024 a couple of times and it seems we would need exactly 48Gib to store all of the IPs in a .txt file.

I don't know about you, but I showed up to ZeroDays with a 120Gb SSD in my laptop, with 40GB free in my home partition.

Luckily, if you're using a good OS, you can run 'md5sum' in a terminal, and it will accept input from stdin. If you know anything about Unix pipes, they're buffered to the nearest newline (unless the line is super-long) by default. This means that if you pipe all the IPs into md5sum, they will only be stored in memory one IP at a time.

First of all, let's write a program to generate them all.

Program

```c
#include <stdio.h>

int main() {
    for (int a = 255; a >= 0; a--) {
        fprintf(stderr, "%d\n", a);
        for (int b = 255; b >= 0; b--) {
            for (int c = 255; c >= 0; c--) {
                for (int d = 255; d >= 0; d--) {
                    printf("%d.%d.%d.%d\n", a, b, c, d);
                }
            }
        }
    }
}
```

Right, yeah, that should do it. Notice that we're printing extra stuff to stderr every once in a while. This is so we can keep track of our progress. We're not going to pipe stderr to md5sum.

Great, compile with -O2 for great speedups. If you're thinking of turning on crazy optimizations, it's a waste of time. Program's too simple. You could of course force unravelling of all the loops, but then your binary would be on the scale of 48Gb.

Let's run this baby

```
./ips | md5sum
```

You should see it count down from 255 to 0, without printing any IPs, then spit out an md5 hash.

On my system, this only took ten or fifteen minutes, I reccommend running it in `tmux` or `screen` so that if you accidentally close your terminal, it will still be running and accessible.

Whoo! We did it with some for loops, and zero md5 libraries. We are now hackers. Watch out CIA, Notepad++ has been patched, and we want revenge.