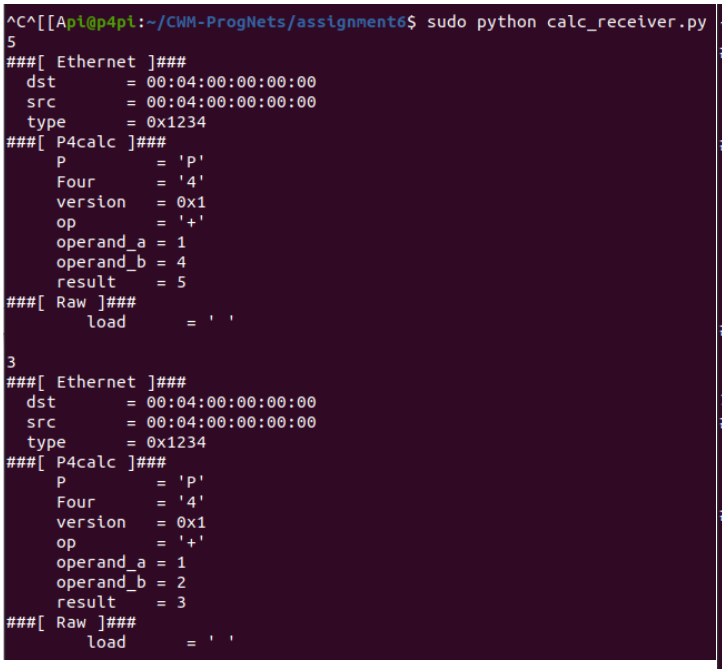
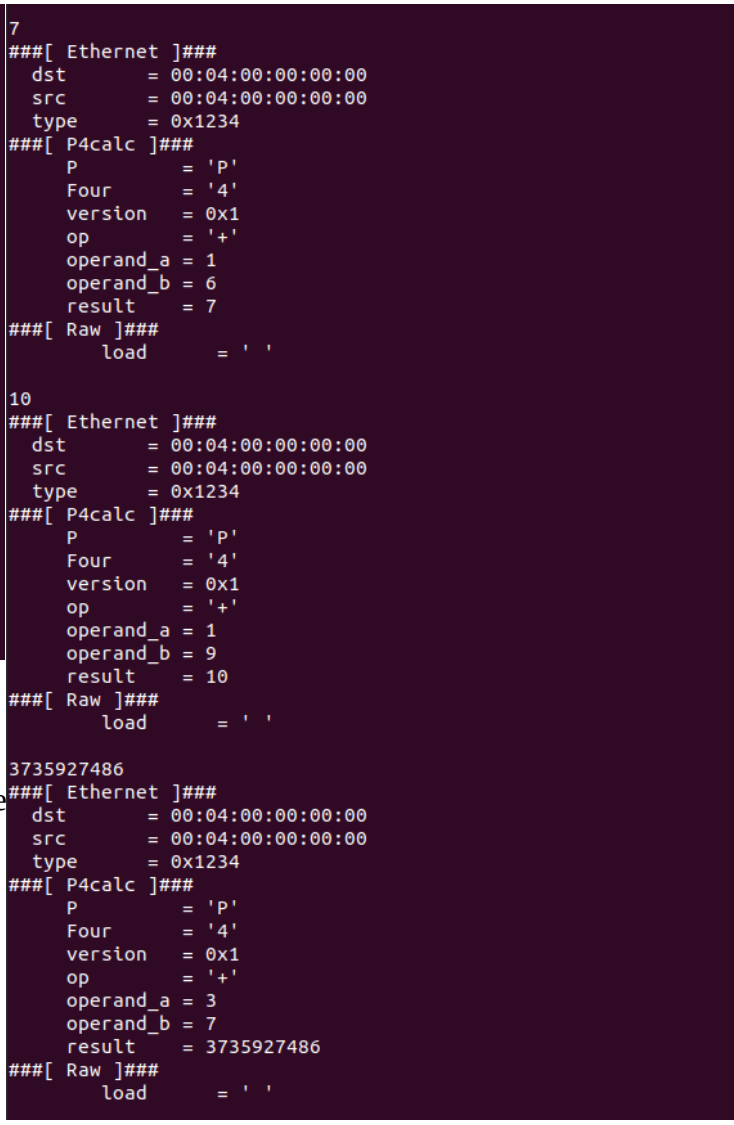
The program used adds a limit on the total number of packets that the destination is able to receive. In order to be tested on only 1 lab machine and 1 raspberry pi, the code has been added into into the calc.p4 file.

To show that the code itself works, after running a certain number of calculations, the switch no longer carries out the calculations. It will proceed to drop the files, reflecting back an error file that gives 3735927486 instead of the correct answer.

If used in forwarding system as a switch with 3 raspberry pis, the second pi (switch) will continue to receive all packets beyond the limit stated (in this case 4) from the sender, but proceed to drop all the remaining packets and not have them forwarded to the destination address (receiver)





Left photo is the 1st 2 calculations, and the photo on the right is the remaining 2 calculations before getting an error on the 5th calculation.

```
235     apply {
236         if (hdr.p4calc.isValid()) {
237 
238          r.read(meta.read_from_register,0);
239           if (meta.read_from_register < 4) {
240                calculate.apply();
241                meta.read_from_register = meta.read_from_register + 1;
242                r.write(0,meta.read_from_register);
243                }
244         } else {
245             operation_drop();
246         }
247     }
248 }
249 
```

The main changes to the p4 code is under the apply section. In order to utilise r.read and r.write, it was necessary to also store it into a variable, in this case meta.read_from_register.

```
 2 #define REGISTER_SIZE 1
158 register<bit<8>>(REGISTER_SIZE) r;
```

The above 2 lines were also added in order to initialise r, and have a register capable of storing it.

Link to use in reality

In reality, this acts as a limiter on the destination side of things. If a timer is added as an additional layer on top of the code, which is very complex, it can allow the register to reset every fix amount of time. This restricts the total number of packets per second that can arrive at the destination side, preventing clients from being flooded by packets in an attack while still optimising the amount of data they can receive.

Limitations are that it does not help telecoms side by reducing wasted packets, which can be improved by implementing a source side limit on number of packets sent to a certain destination. That can help throttle internet usage when there are extremely heavy-duty users.