# *Streaming* regex matching and substitution by the sregex library

☺ *agentzh@gmail.com* ☺

*Yichun Zhang (agentzh)*

CLOUDFLARE.

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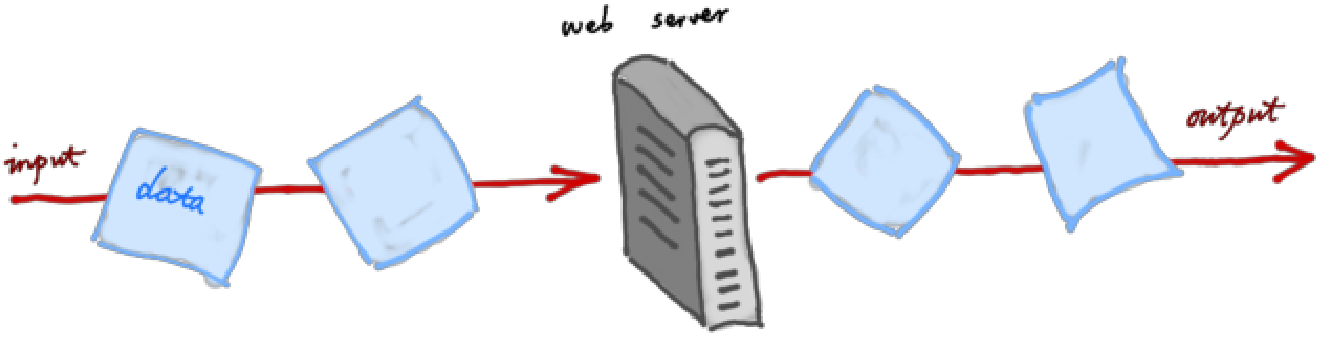
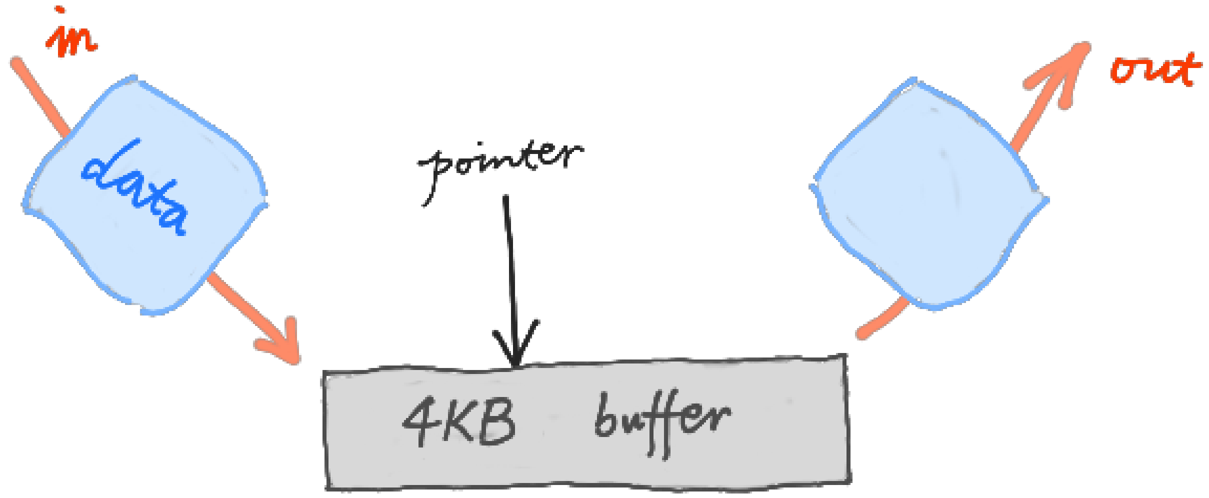
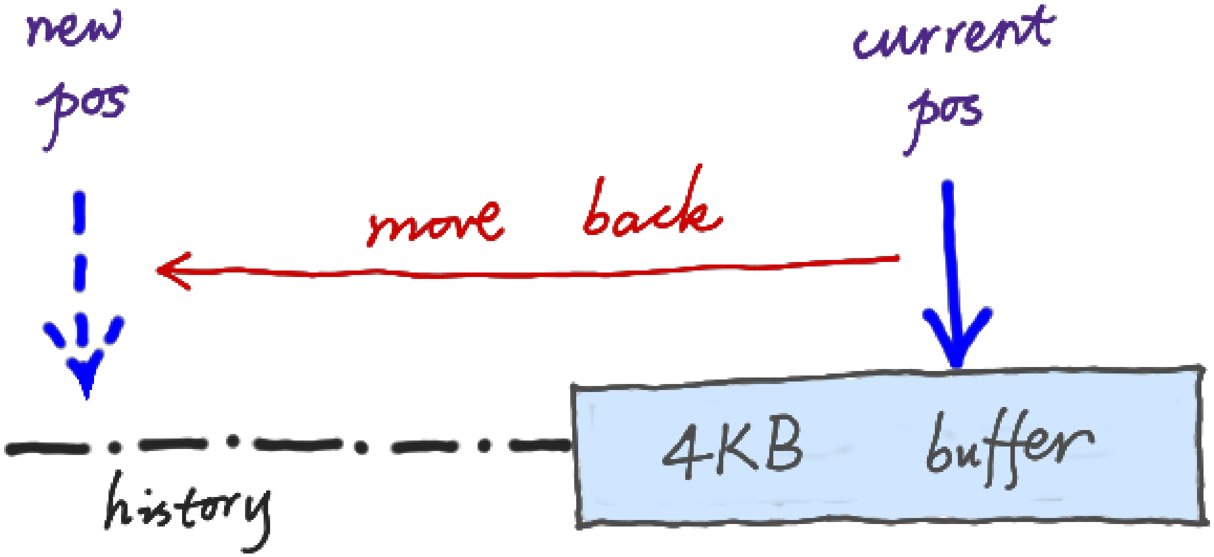
♡ In *efficient* web servers, request bodies and response bodies are processed in data chunks.


web server
input
data
output

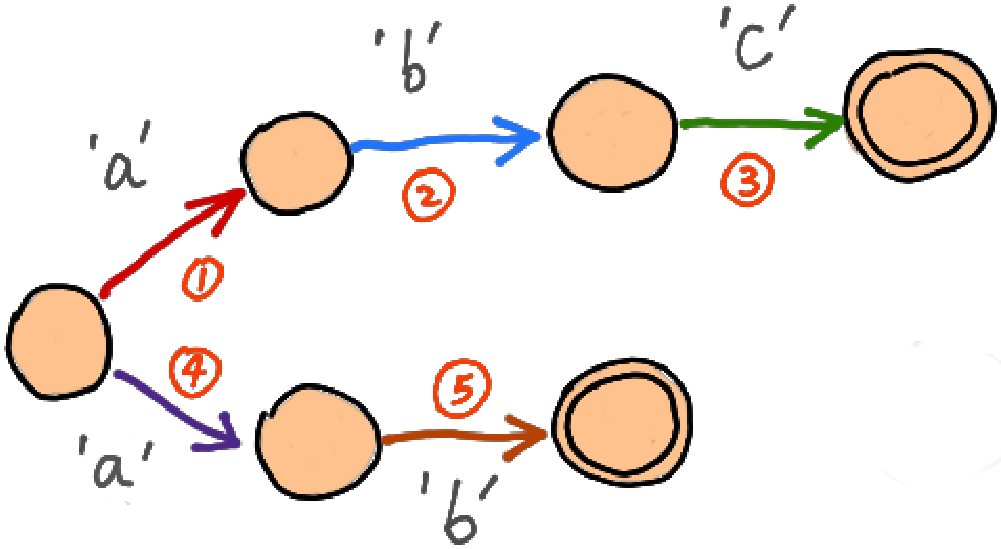
♡ We usually use a *fixed size* buffer even we are processing a much larger data stream.


in
data
pointer
4KB buffer
out

♡ *Backtracking* regex engines suck.

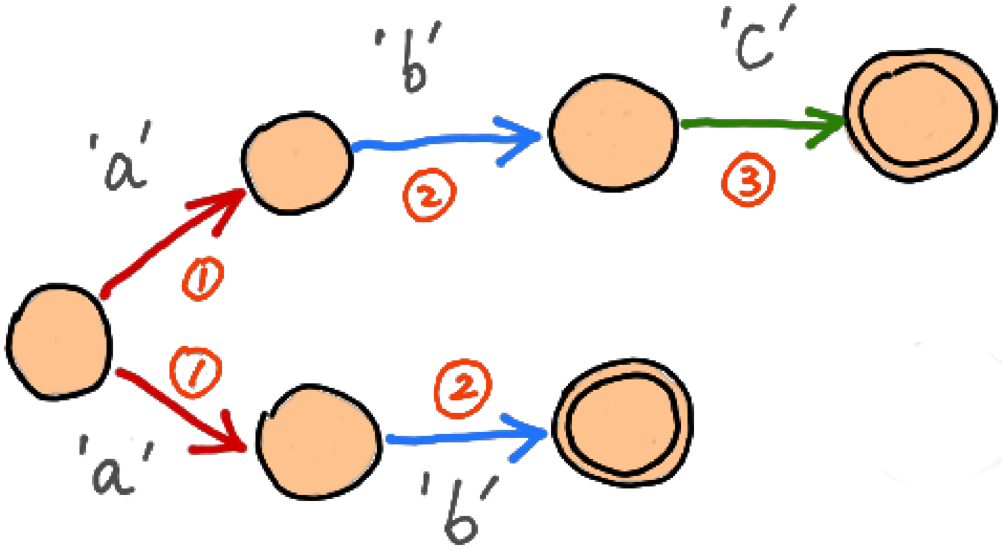

new pos
current pos
move back
4KB buffer
history

/abc|ab/ (backtracking)

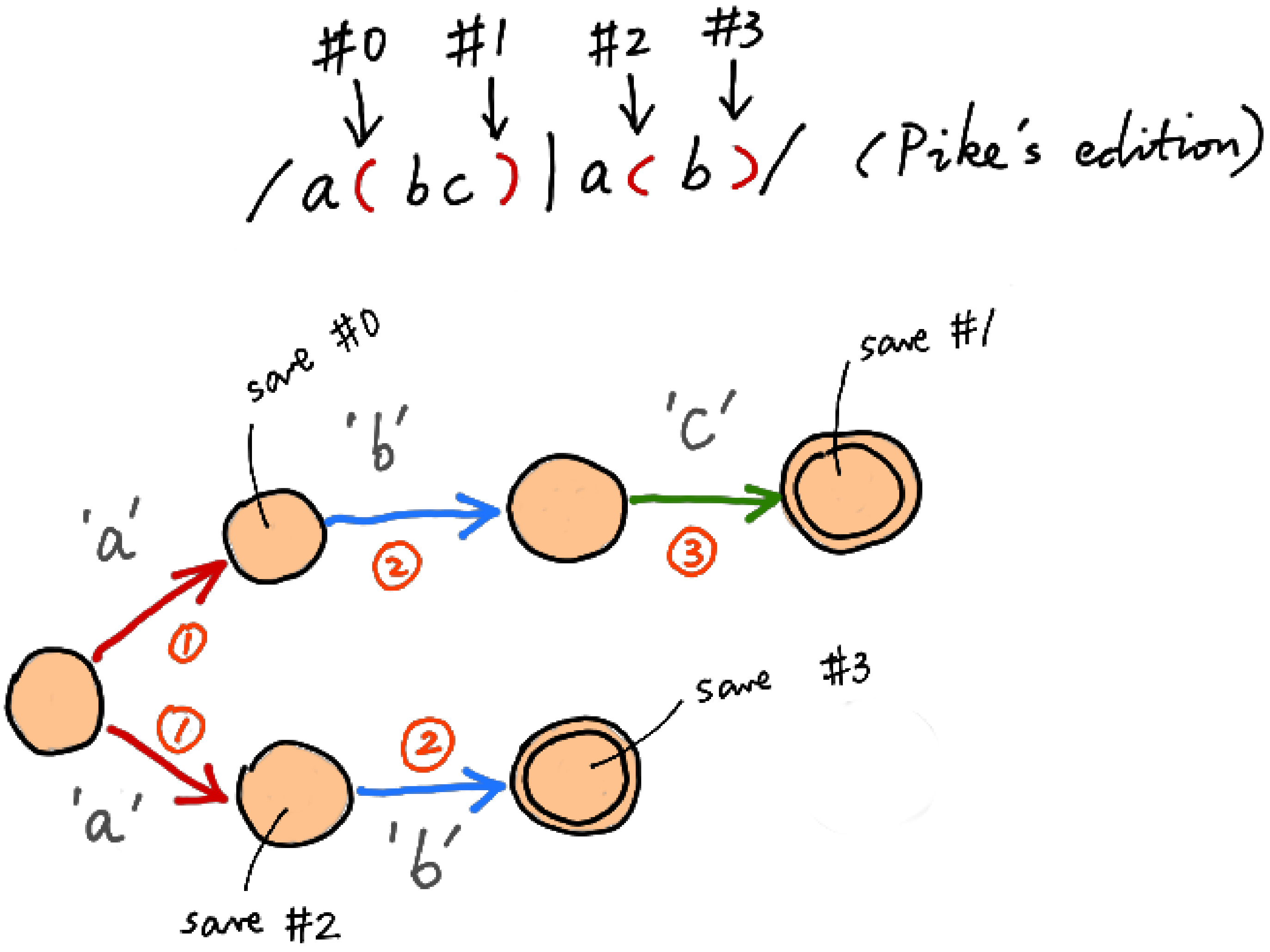


# ♡ *Thompson*'s Construction Algorithm comes to rescue!

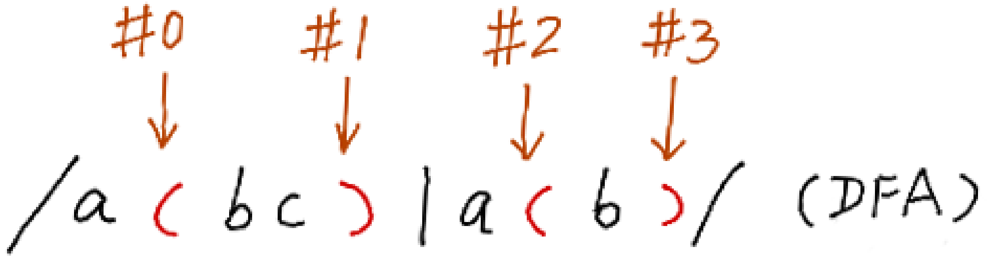
/abc|ab/ (Thompson's Construction)



♡ It also supports *submatch* captures!


#0
#1
#2
#3
/a(bc)|a(b)/ (Pike's edition)
save #0
'a'
'b'
'c'
save #1
②
③
①
①
'a'
②
'b'
save #3
save #2

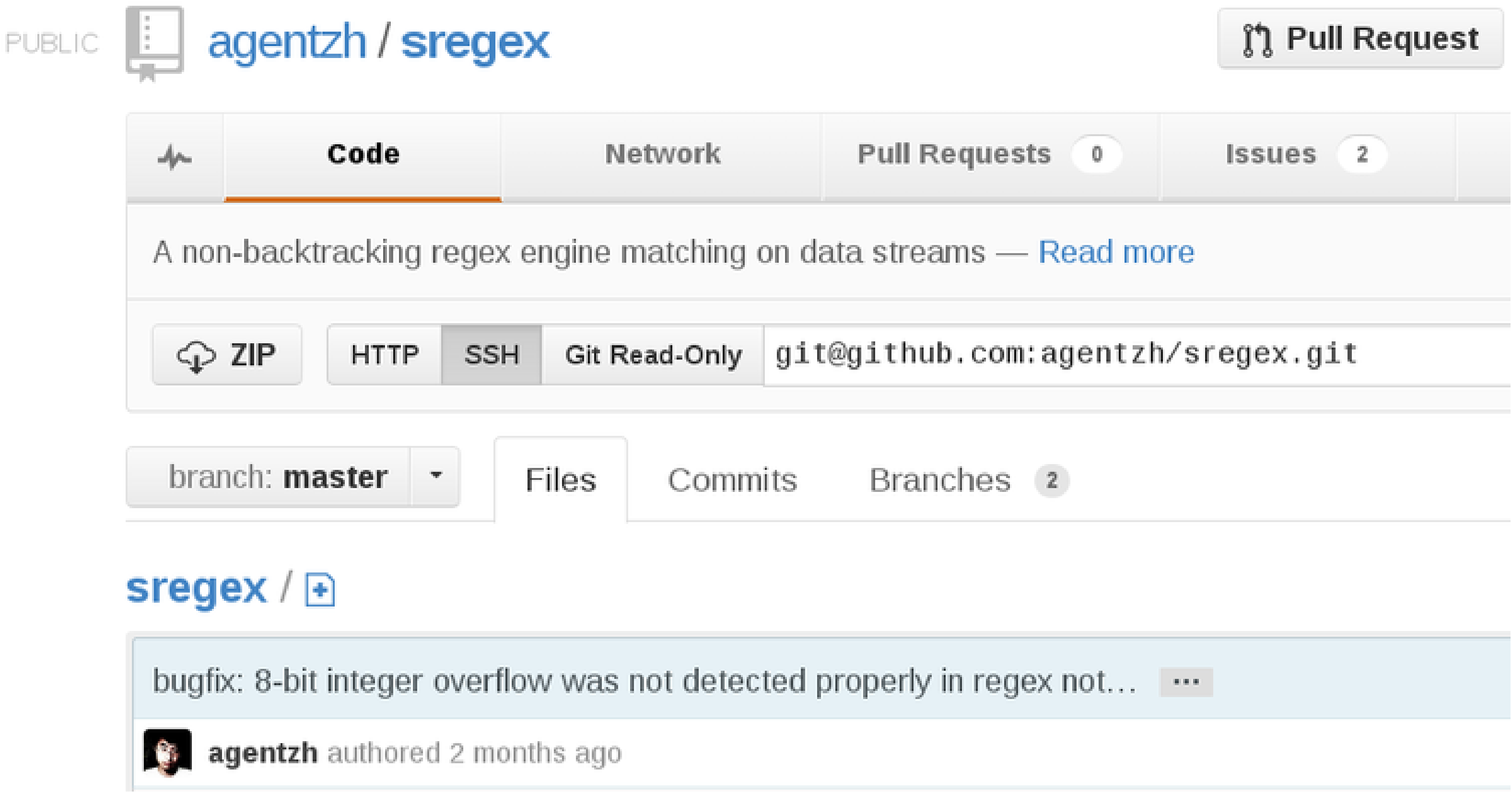
♡ DFAs *cannot* find
the *beginnings* of submatch captures
without matching backwards.



step 1: match /a(bc)|a(b)/ to locate #1 & #3.

step 2: match /(cb)a|(b)a/ to locate #0 & #2.

♡ I created the sregex library based on Russ Cox's *re1* library.



A non-backtracking regex engine matching on data streams — Read more

```
git@github.com:agentzh/sregex.git
```

bugfix: 8-bit integer overflow was not detected properly in regex not…

**agentzh** authored 2 months ago

♡ sregex is written in *pure* C.

♡ sregex includes *two* engines: Thompson VM & Pike VM.

```
^    $     \A    \z    \b    \B
.    \c    [0-9a-z]   [^0-9a-z]
\d   \D    \s    \S    \h    \H
\v   \V    \w    \W    \cK   \N
ab   a|b   (a)  (?:a)  a?    a*
a+   a??   a*?  a+?    a{n}  a{n,m}
a{n,}      a{n}?       a{n,m}?
a{n,}?     \t    \n    \r    \f
...
```

♡ Passing *all* the related test cases in both the official PCRE 8.32 and Perl 5.16.2 *test suites*.

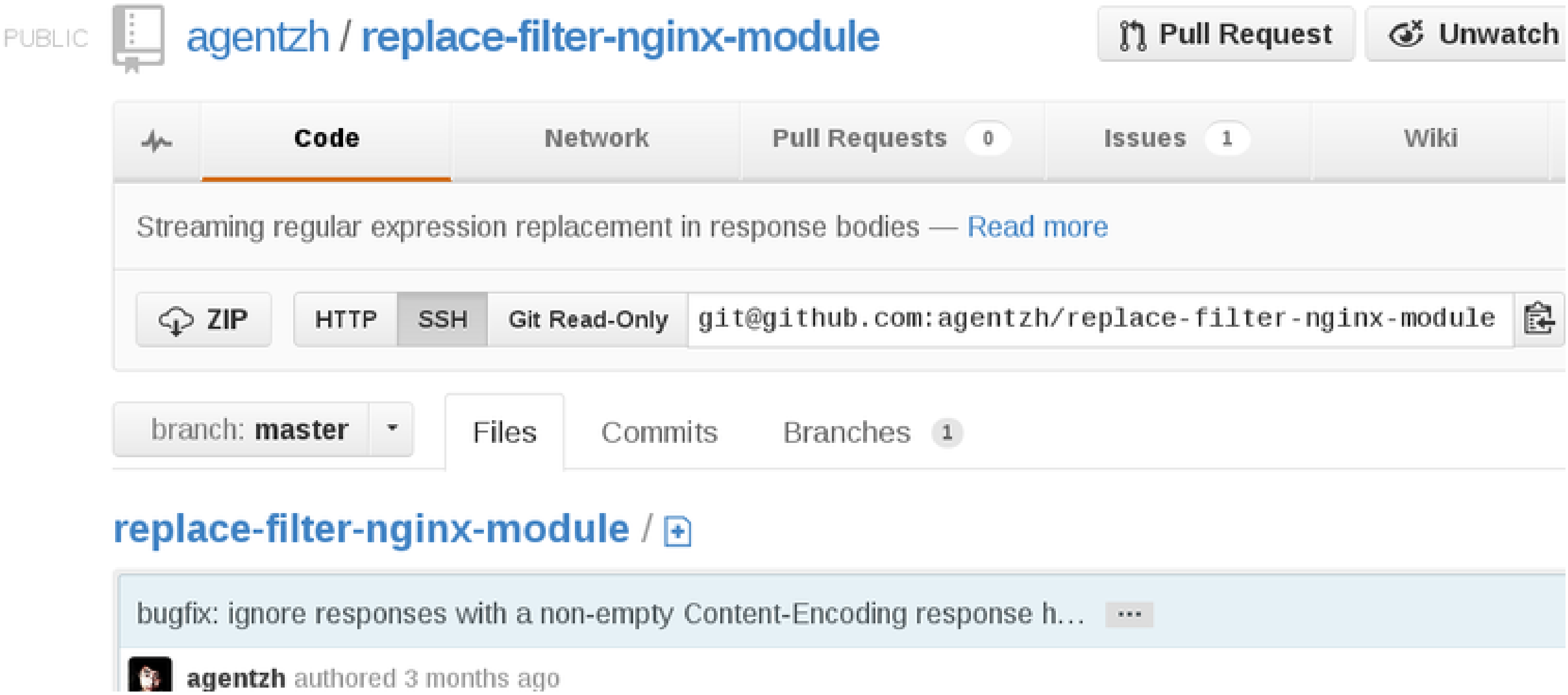
```
#include <sregex/sregex.h>

...

rc = sre_vm_pike_exec(vm_ctx, pos, len, last_buf,
                      &pending_matched);
```

♡ The Thompson VM has a simple *Just-in-Time* (JIT) compiler targeting *x86_64*.

♡ The regex JIT compiler uses *DynASM* which powers LuaJIT's interpreter.

♡ Still a lot of important *optimizations* to do.

♡ My Nginx C module ngx_replace_filter is the *first user* of sregex.



agentzh / replace-filter-nginx-module

Streaming regular expression replacement in response bodies — Read more

```
git@github.com:agentzh/replace-filter-nginx-module
```

branch: **master**

replace-filter-nginx-module /

bugfix: ignore responses with a non-empty Content-Encoding response h… ···

**agentzh** authored 3 months ago

```
location ~ '\.cpp$' {
    # proxy_pass ... / fastcgi_pass ...

    # remove all those ugly C/C++ comments:
    replace_filter '/\*.*?\*/|//[^\n]*' '' g;
}
```

```
# skip C/C++ string literals:
replace_filter "'(?:\\[^\n]|[^'\n])*'" $& g;
replace_filter '"(?:\\[^\n]|[^"\n])*"' $& g;
```

```
replace_filter_max_buffered_size 8k;
```

☺ *Thank you*! ☺