

Using Varnish or VCL for webmasters

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VCL Basics

Comments are 'C', 'C++' or Shell style:

```
# This is a comment
```

```
// So is this
```

```
/*  
 * And this is also a comment  
 */
```

VCL Basics

Strings are in "... " and use %-escapes

```
"Hello World!%0a"
```

```
"\ .jpg$" // notice no \ to escape \
```

```
"strings"
```

```
  "can be"
```

```
  "continued"; // (most places)
```

Inline C-code

Can be added between, and in functions.

Requires C-clue.

Can do almost anything.

```
C{  
    printf("Hello World\n");  
}C
```

Backends

Definition of servers to get content from

```
backend b1 { .host = "10.0.0.1"; }
```

```
backend b2 { .host = "10.0.0.2"; }
```

```
sub vcl_recv {  
    // Default is first backend  
    set req.backend b2;  
}
```

Directors

Policy choice of backend.

```
backend b3 = { .host = "b3"; }
```

```
director b2 random {  
    { .backend = { .host = "b1"; }  
      .weight = 7; }  
    { .backend = b3;  
      .weight = 2; }  
}
```

Using VCL code

At startup:

Specify backend (`-b webhost1`)

or

Specify VCL code (`-f conf1.vcl`)

Using (more) VCL code

From CLI:

```
vcl.load      config filename  
vcl.inline   config "vcl program"  
vcl.use      config  
vcl.discard  config  
vcl.list  
vcl.show     config
```


Using (more) VCL code

Multiple VCL loaded at the same time.

Change of VCL (**vcl.use**):

- > Instant
- > Does not invalidate cache
- > Affects only all new requests.

Situation/Load mitigation:

```
vcl.use emergency  
vcl.use weekend  
vcl.use damn_cnn
```

Debugging VCL code

Check varnishlog records.

VCL function called

```
11 VCL_call      c recv
11 VCL_acl       c MATCH block "127.0.0.1"
11 VCL_return    c error
```

Action returned

Debugging VCL code

Extra tracing controlled by parameter:

`param.set vcl_trace on`

Code-block = 1
Src-Line = 47
Src-Char = 14

```
11 VCL_call      c recv
11 VCL_trace     c 1 47.14
11 VCL_trace     c 2 48.13
11 VCL_acl       c MATCH block "127.0.0.1"
11 VCL_trace     c 3.48.32
11 VCL_return    c error
```

Debugging VCL code

If all else fails: study the compiled C-code:

varnishd -d -f foo.vcl -C

```
static int
VGC_function_vcl_recv (struct sess *sp)
{
    {
        {
            VRT_count(sp, 1);
            if
                (
                    (
                        (
                            VRT_count(sp, 2),
                            (
                                VRT_strcmp(VRT_r_req_request(sp), "GET")
                            )
                        ) && (
                            VRT_count(sp, 3),
                            (
                                VRT_strcmp(VRT_r_req_request(sp), "HEAD")
                            )
                        )
                    )
                )
            [...]
        }
    }
}
```

```
sub vcl_recv {
    if (req.request != "GET" &&
        req.request != "HEAD" &&
        [...])
}
```

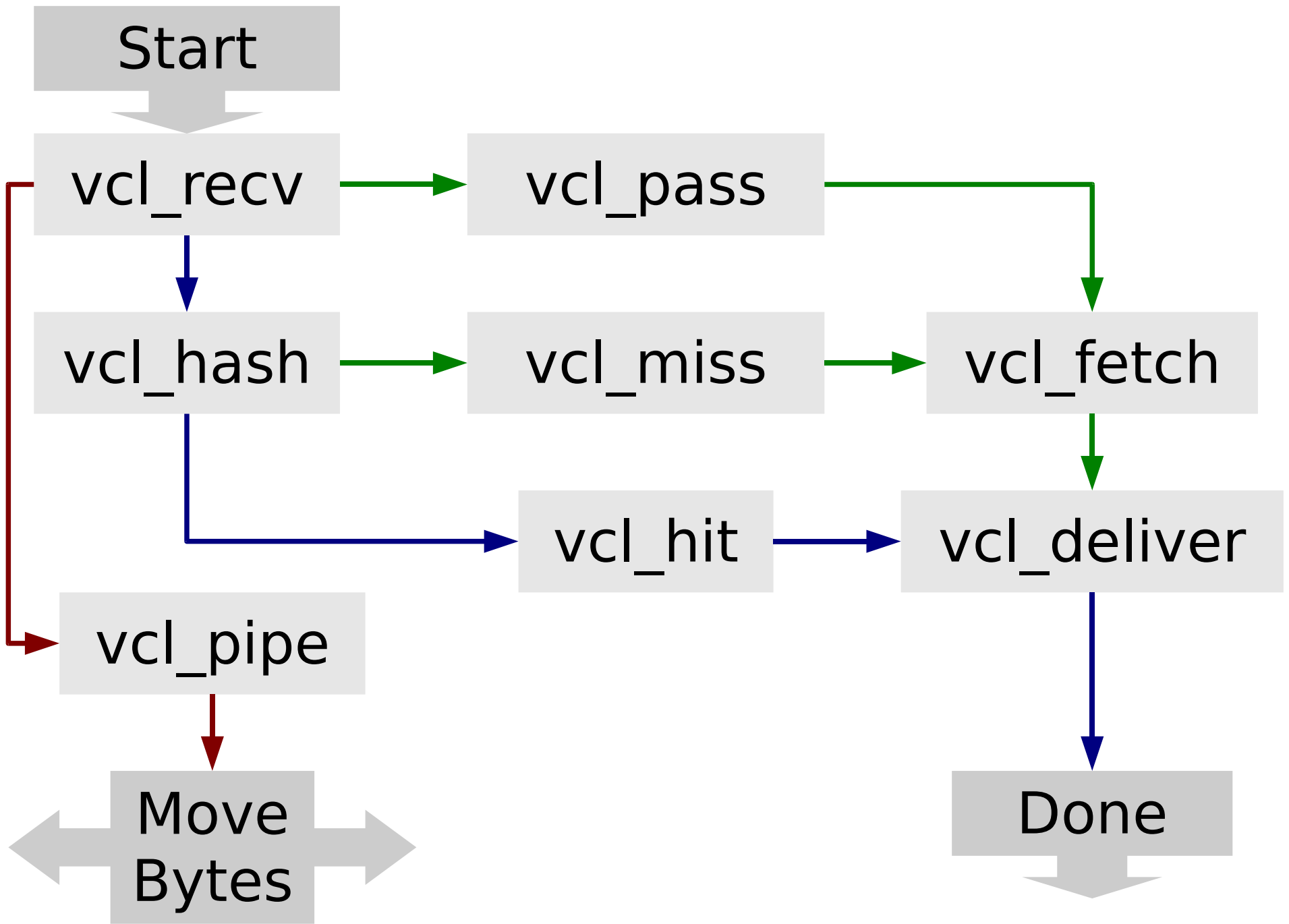
Debugging VCL code

If all else fails: study the compiled C-code:

varnishd -d -f foo.vcl -C

```
static int
VGC_function_vcl_recv (struct sess *sp)
{
  {
    {
      VRT_count(sp, 1);
      if
        (
          (
            (
              VRT_count(sp, 2),
              (
                VRT_strcmp(VRT_r_req_request(sp), "GET")
              )
            ) && (
              VRT_count(sp, 3),
              (
                VRT_strcmp(VRT_r_req_request(sp), "HEAD")
              )
            )
          )
        )
      [...]
    }
  }
}

sub vcl_recv {[1]
  if ([2]req.request != "GET" &&
      [3]req.request != "HEAD" &&
      [...])
}
```



vcl_recv – wash, clean and judge

```
sub vcl_recv {
    if (req.request != "GET" &&
        req.request != "HEAD" &&
        req.request != "PUT" &&
        req.request != "POST" &&
        req.request != "TRACE" &&
        req.request != "OPTIONS" &&
        req.request != "DELETE") {
        // Non-RFC2616 or CONNECT
        pipe;
    }
    [...]
}
```

vcl_recv – wash, clean and decide

```
[...]
    if (req.http.Expect) {
        // Too hard
        pipe;
    }
    if (req.request != "GET" &&
        req.request != "HEAD") {
        // Not cacheable by default
        pass;
    }
[...]
```


vcl_recv – wash, clean and decide

```
[...]
    if (req.http.Authenticate ||
        req.http.Cookie) {
        // Not cacheable
        pass;
    }
    lookup;
}
```

vcl_hash – what does “object” mean

```
sub vcl_hash {  
    set req.hash += req.url;  
    if (req.http.host) {  
        set req.hash += req.http.host;  
    } else {  
        set req.hash += server.ip;  
    }  
    hash;  
}
```

Elements terminated by '#' character in final hash string, thus: `"/#myhost.com#"`.


This is important to know for `purge_hash()`.

vcl_fetch – what we got

```
sub vcl_fetch {
    if (!obj.valid) {
        error obj.status;
    }
    if (!obj.cacheable) {
        pass;
    }
    if (obj.http.Set-Cookie) {
        pass;
    }
    insert;
}
```

vcl_hit – what now ?

```
sub vcl_hit {  
    if (!obj.cacheable) {  
        pass;  
    }  
    deliver;  
}
```



We can cache the fact that we can not cache a given object.

This disables the "only one at a time" queue on subsequent accesses.

vcl_xxx ? -- the rest

```
sub vcl_miss { fetch; }
```

```
sub vcl_pipe { pipe; }
```

```
sub vcl_pass { pass; }
```

```
sub vcl_deliver { deliver; }
```

```
sub vcl_discard { discard; }
```


```
sub vcl_timeout { discard; }
```

Prepend and/or replace vcl code

```
acl inhouse { 10.0.0.0/8; }
```

```
sub vcl_recv {  
    if (client.ip ~ inhouse) {  
        pass;  
    }  
    if (req.url ~ "[.]jpg$") {  
        unset req.http.cookie;  
    }  
}
```

Pass is an action, so execution stops here.



No action here, continue into default vcl_recv{}



Access Control Lists

```
acl myfriends {  
    10.0.0.4;           // A single host  
  
    ! 10.1.0.1;       // Not this host  
  
    10.1.0.0/24;      // A network  
  
    (our.net/24);     // optional DNS + mask  
  
    !some.host.com;   // A DNS name  
  
    include "long_list_of_ips.txt";  
}
```

Fixing a mistake

```
sub vcl_recv {  
    if (req.url == "index.html") {  
        set req.url = "index.html";  
    }  
}
```


Stopping robots

```
sub vcl_miss {  
    if (req.http.user-agent ~ "spider") {  
        error 503 "Not presently in cache";  
    }  
}
```

Prevent google and other spiders from pulling 10 years worth of old articles into cache.

Deleting a tracking argument

```
sub vcl_hash {  
    vcl.hash += regsub(req.url, "\?.*", "");  
    hash;  
}
```



regsub(string, pattern, replacement)

Purging, squid style

```
sub vcl_recv {
    if (req.request == "PURGE") {
        if (client.ip ~ ournet) {
            lookup;
        } else {
            error 405 "Not allowed"
        }
    }
}
```

NB: Squid style purging only works if you have the exact URL you want to purge.

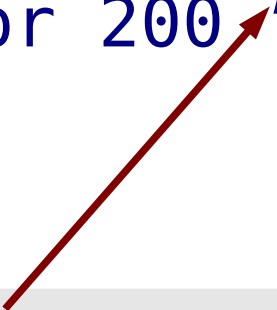
Purging, squid style

```
sub vcl_hit {  
    if (req.request == "PURGE") {  
        set obj.ttl = 0s;  
        error 200 "Purged"  
    }  
}
```

```
sub vcl_miss {  
    if (req.request == "PURGE") {  
        error 404 "Not in cache"  
    }  
}
```

Purging, varnish style

```
sub vcl_recv {  
    if (req.request == "PURGE") {  
        if (client.ip ~ our_net) {  
            purge_url(req.url);  
            error 200 "Purged";  
        }  
    }  
}
```

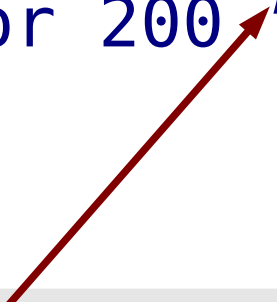


The argument is a regular expression, which is evaluated on demand only.

Because it is on demand, it is possible to instantly purge "\.jpg\$", even though that may be 1mio objects in a 100mio cache.

Purging, varnish style

```
sub vcl_recv {  
    if (req.request == "PURGE") {  
        if (client.ip ~ our_net) {  
            purge_hash(req.http.purgestring);  
            error 200 "Purged";  
        }  
    }  
}
```



purge_hash() matches against the hash-string built by vcl_hash, thus also taking hostname into account.


Selecting a backend

```
sub vcl_recv {
    if (req.url ~ "\.(gif|jpg|swf|css|j)$") {
        unset req.http.cookie;
        unset req.http.authenticate;
        set req.backend = b1;
    } else {
        set req.backend = b2;
    }
}
```

Trying another backend

```
sub vcl_recv {  
    if (req.restarts == 0) {  
        set req.backend = b1;  
    } else {  
        set req.backend = b2;  
    }  
}
```

```
sub vcl_fetch {  
    if (obj.status != 200) {  
        restart;  
    }  
}
```



Go to vcl_recv{} and try request again.
Parameter limits max number of restarts for each request.

Edge-Side-Includes ("ESI")

Per-user Page Scaffold, uncached (pass)

Index
TTL =
1 hour

Article

TTL = 1 month

Top 5
Stories
TTL=
1min

Ad
(pass)

Feature
TTL = 1d

ESI web document

```
[...]  
<TABLE>  
<TR><esi:include src="row1.html"/></TR>  
[...]
```

`<esi:include.../>` is replaced by the object "row1.html"

"row1.html" is treated as separate cache-object.

- > Has it's own TTL & Expiry
- > Can be fetched from a different backend
- > Can be ESI processed (max depth is a parameter)

Enabling ESI processing

```
sub vcl_fetch {  
    if (req.url ~ "\.html$") {  
        esi;  
    }  
}
```

ESI processing takes CPU time, only enable on relevant document (classes).

ESI can be used also on binary data, but make sure you know what you are doing.