- Obsolete but important: CGI.
- Newer technologies: CSS 3, canvas, svg, web sockets, web workers.

CGI used for building dynamic web sites by calling command-line programs.

- Pass HTTP request to program using standard input and environment variables.
- Return program's standard output as HTTP response.
- Problem was that each request spawned a new process. Processes are very heavy-weight and will not scale well to handling multiple concurrent requests.

Example Perl CGI Script

In echo.pl which echoes environment, HTTP headers, URL and query parameters. *Run it* for `/cgi-bin/echo.pl?x=1&y=2&x=42`.

```perl
#!/usr/bin/env perl

use strict;
use warnings;

use CGI;

my $cgi = CGI->new;

print $cgi->header('text/plain');
```

```perl
print "ENVIRONMENT\n";
foreach my $e (sort keys %ENV) {
  print "$e=", $ENV{$e}, "\n";
}

print "\nHEADERS\n";
foreach my $h ($cgi->http()) {
  print "$h=", $cgi->http($h), "\n";
}

print "\nURL=", $cgi->url(), "\n";

print "\nQUERY PARAMETERS\n";
foreach my $k ($cgi->param()) {
  print "$k: ", join(', ', $cgi->param($k)), "\n";
}
```

- Get around problem with each request spawning separate process.
- Route request from web server to a application server like Java tomcat.
- Handle request using a thread or process pool.

CSS 3

- Traditionally any animation was done by programmers using JavaScript.
- Latest versions of CSS standards allow simple animations to be done by designers.
- CSS 3 animations include fade-in and fade-out, zoom in and out, rotations, repetitions.
- Many examples available on the web.

- Draw rasterized graphics using **canvas**; vector graphics using **Scalable Vector Graphics** SVG.
- Canvas draws directly to pixels whereas SVG is XML embedded within HTML.
- Canvas is resolution dependent, hence can loose quality when displayed at different resolutions. SVG is scalable; quality maintained across different resolutions.
- SVG elements are part of DOM.
- Canvas requires JavaScript, SVG need not.
- Canvas more performant than SVG.
- Both can be combined.

Web Sockets

- Can open full-duplex connection to a server.
- Send and receive messages over a TCP stream to a server.
- Event-driven API.
- Handshake to transition over from HTTP.

- Allows separate JavaScript threads.
- No access to DOM.
- Interaction using ports.
- Minimal concurrency issues because of minimum shared state.