# picel - HTTP middleware for image processing

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# Introduction

Times have changed since WorldWideWeb.

In 2004: Average web page size of the top 1000 websites passed 1600KB.

By 2015 images comprised 62% of the weight of the top 1000 web pages.

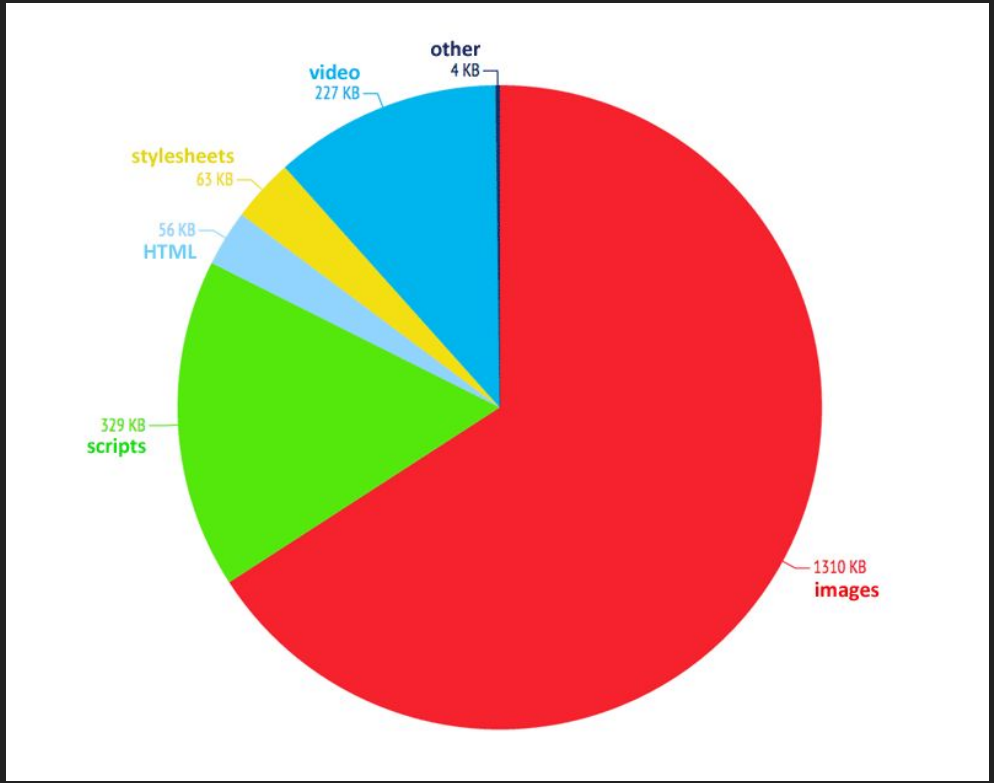



**Figure 1. The average web page size is more than 2MB.** [1]

# Common web site structure for large systems

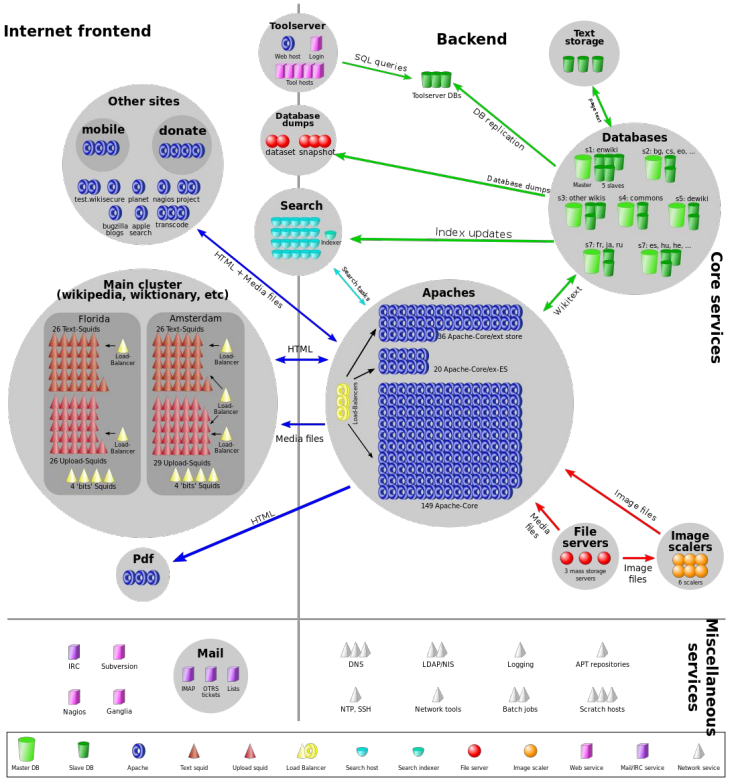



**Figure 2. Wikimedia multi-tier topology.**

# Similar software and services on the market

- thumbor
- JPEGmini Server
- Imgix

# Architecture and Handling requests

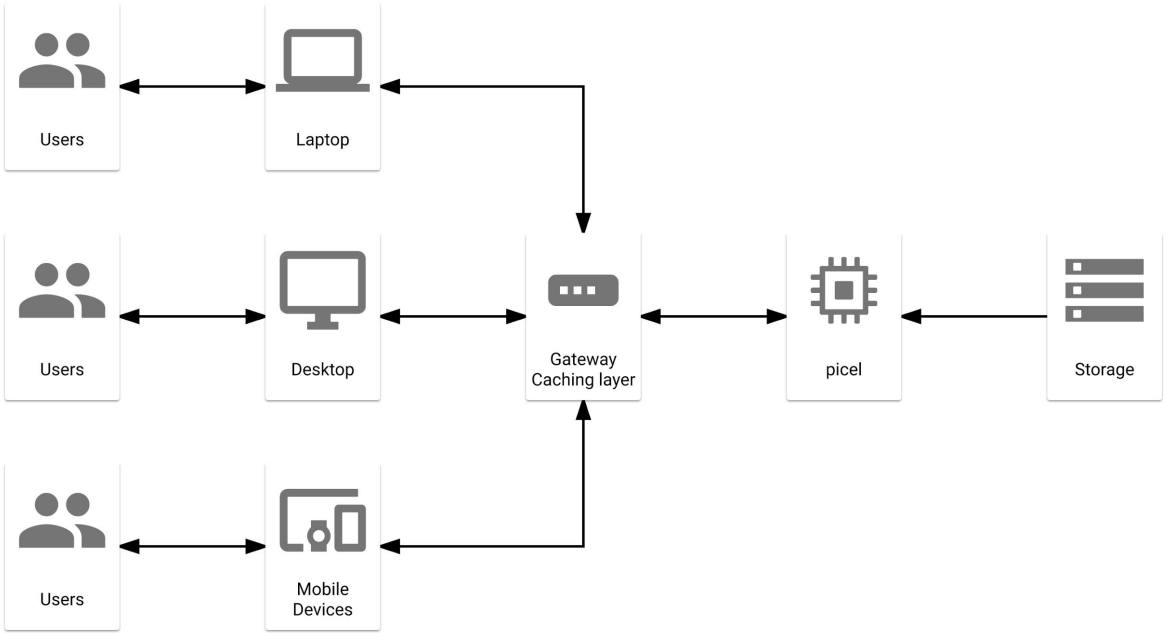


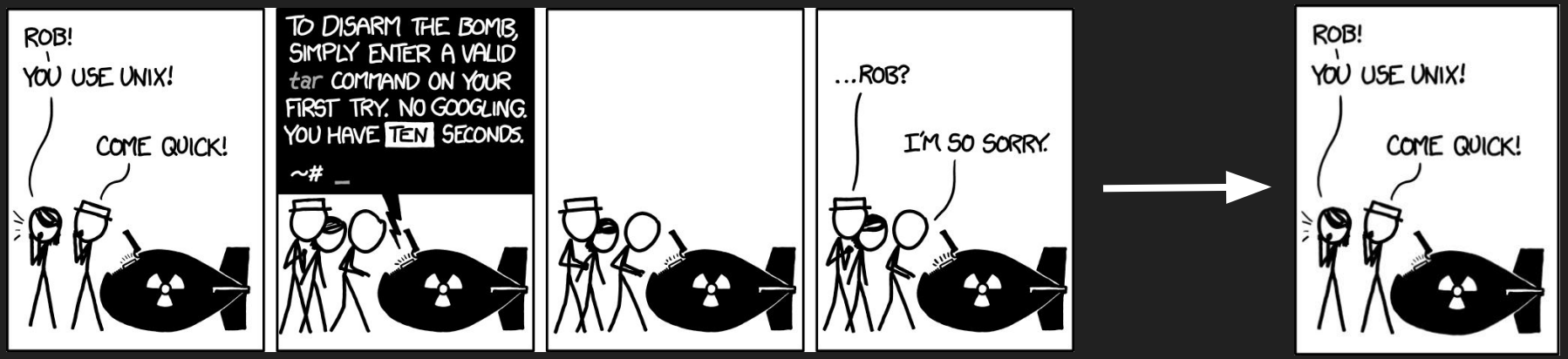

**Figure 3. picel handling requests**

# Implementation

Goals:

- Input/output common file formats such as JPEG efficiently.
- Do image manipulation for common operations such as cropping.
- Propose a deployment architecture to serve content efficiently.
- Identify browser capabilities to serve best available format

# Example of image transformation




```
picel.encode({
    prefix: "http://localhost:8123",
    backend: "https://imgs.xkcd.com",
    path: "comics/tar_2x.png",
    crop: {x: 0, y: 0, width: 346, height: 458},
    width: 300
});
```

http://localhost:8123/s:imgs.xkcd.com/comics/tar__2x_0x0:346x458_300x_png

# Installing and running

$ docker pull henvic/picel

$ docker run -p 8123:8123 henvic/picel
2017/12/12 19:41:29 picel started listening on :8123

```
$ picel
picel

Usage:
  picel [flags]
  picel [command]

Available Commands:
  serve        Serve images
  dependencies Verify dependencies
  help         Help about any command

Flags:
  -h, --help            Show help message
  -v, --verbose         Verbose mode (show image processing output)
      --version         Print version information and quit

Use "picel [command] --help" for more information about a
command.
```

# Application Programming Interface (API)

- Files should be available on an external HTTP server
- Accessing images uses a Composable URIs mechanism:

Example:

http://<picel-server>/big__sur_50x40:600x600_x300

Output format: better supported (with fallback to JPEG)
Crop box points: (x, y, width, height) = (50, 40, 600, 600)
Height: 600

# Conclusion and future work

A working prototype is available on Docker and instructions how to use it are available on https://github.com/henvic/picel

With an accompanying image encoder library: https://github.com/henvic/picel-js

Future work includes:

- Adding guidelines for setting a caching layer on a production environment
- Stress tests
- Adding support to SVG and HEIF file formats to improve efficiency
- Add more encoder libraries for other languages
- etc.

# References

[1]. **Page bloat: The average web page size is more than 2MB.** Avaliable in https://www.soasta.com/blog/page-bloat-average-web-page-2-mb/. Last visited on 12th December, 2017.