HTML5 Speedtest

Federico Dossena
and the Speedtest contributors

Why?

- Lack of a good Free and Open Source Speedtest that runs in the browser
- Users need some way to easily check the speed of their Internet connection, now more than ever
- High license fees from proprietary solutions such as OOKLA
- Allow ISPs to be in control of their data instead of giving it to some external company, and potentially to provide a better service
- Allow website owners to easily add a speedtest to their websites

Requirements

Server side:

- Apache2, IIS, nginx (also tested by users on other platforms)
- PHP 5.4 or newer with OpenSSL (other backends also available)
- MySQL, PostgreSQL, SQLite (optional)
- A lot of bandwidth!

Client side:

- Any browser that supports XHR Level 2 and Web Workers (IE11, Chrome, Edge Firefox, …) No plugins required.
- Up to 5-600MB of RAM during the test, depending on connection speed

Download/Upload tests

- Works by transferring large blobs of garbage data from the server to the client and viceversa
- Based on XmlHttpRequest Level 2, no need for WebSockets
- Multiple parallel streams
- Automatic test duration depeding on connection speed (or fixed)
- Speed visible in real-time during the test
- Compensates for initial TCP window adjustment and upload buffers
- Measures how quickly data can be downloaded or uploaded on websites that transfer large amounts of data like YouTube

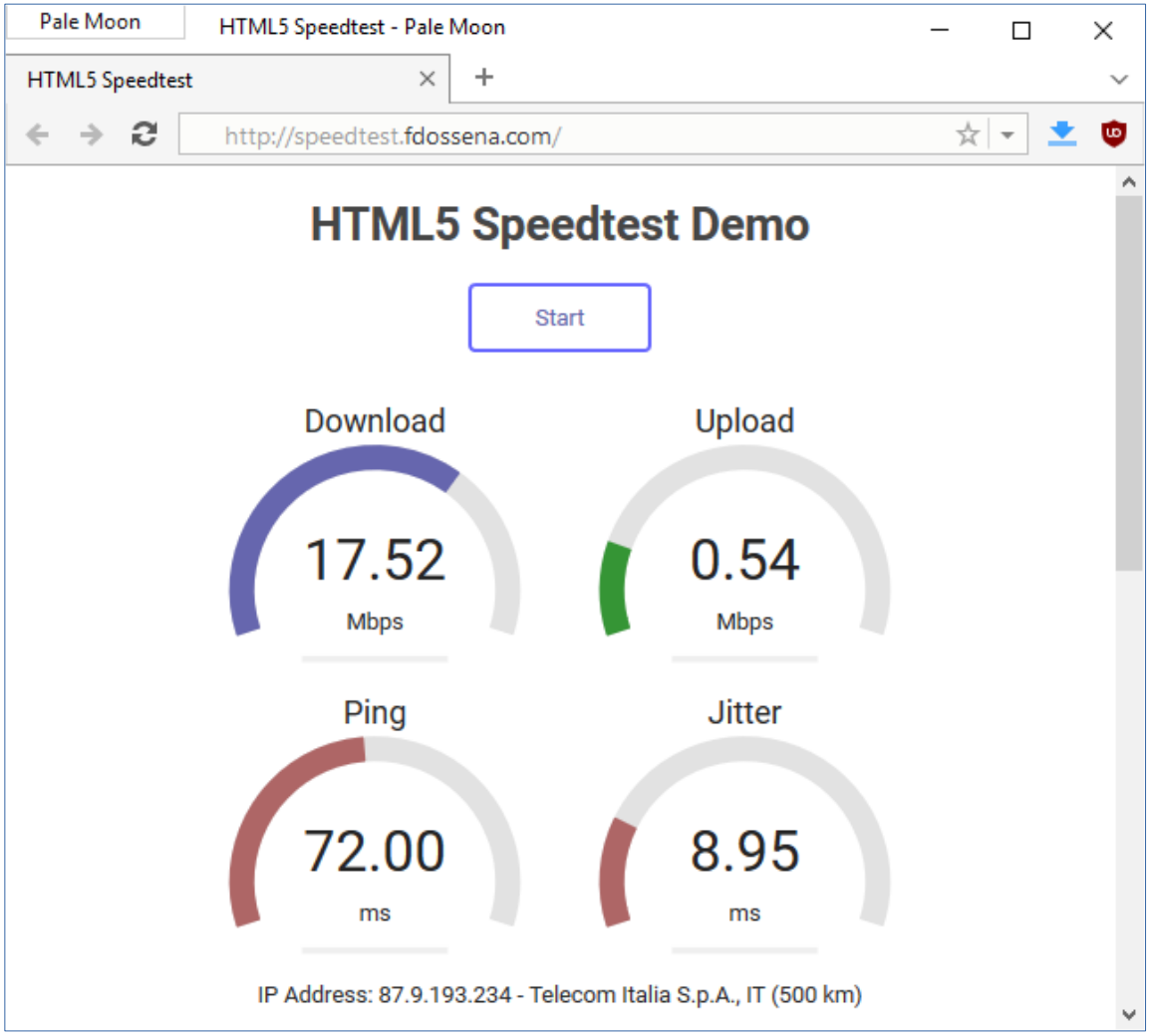
Ping+Jitter test

- Ping test works by measuring how long it takes to transfer an uncachable empty file over a persistent HTTP connection, ~1 RTT
- Timing measured using Performance API for better precision (if available)
- Not an ICMP ping!
- Jitter is measured as the variance between consecutive pings
- Results are slightly smoothed to remove outliers
- Ping and Jitter visible in real-time during the test

IP, ISP and distance detection

- The user's IP address, ISP name and distance from test server can be displayed
- IP Address is retrieved either from the incoming connection or from an HTTP header added by a proxy/firewall/load balancer/etc. in front of the server (supports the most commonly used headers, more can be added)
- ISP name and approximate user position are retrieved using the public APIs provided by ipinfo.io
- Distance between client and server is measured as physical distance between their approximate coordinates
- Distance displayed in metric or imperial units, with 15km accuracy
- Server must be allowed to connect to ipinfo.io, obviously

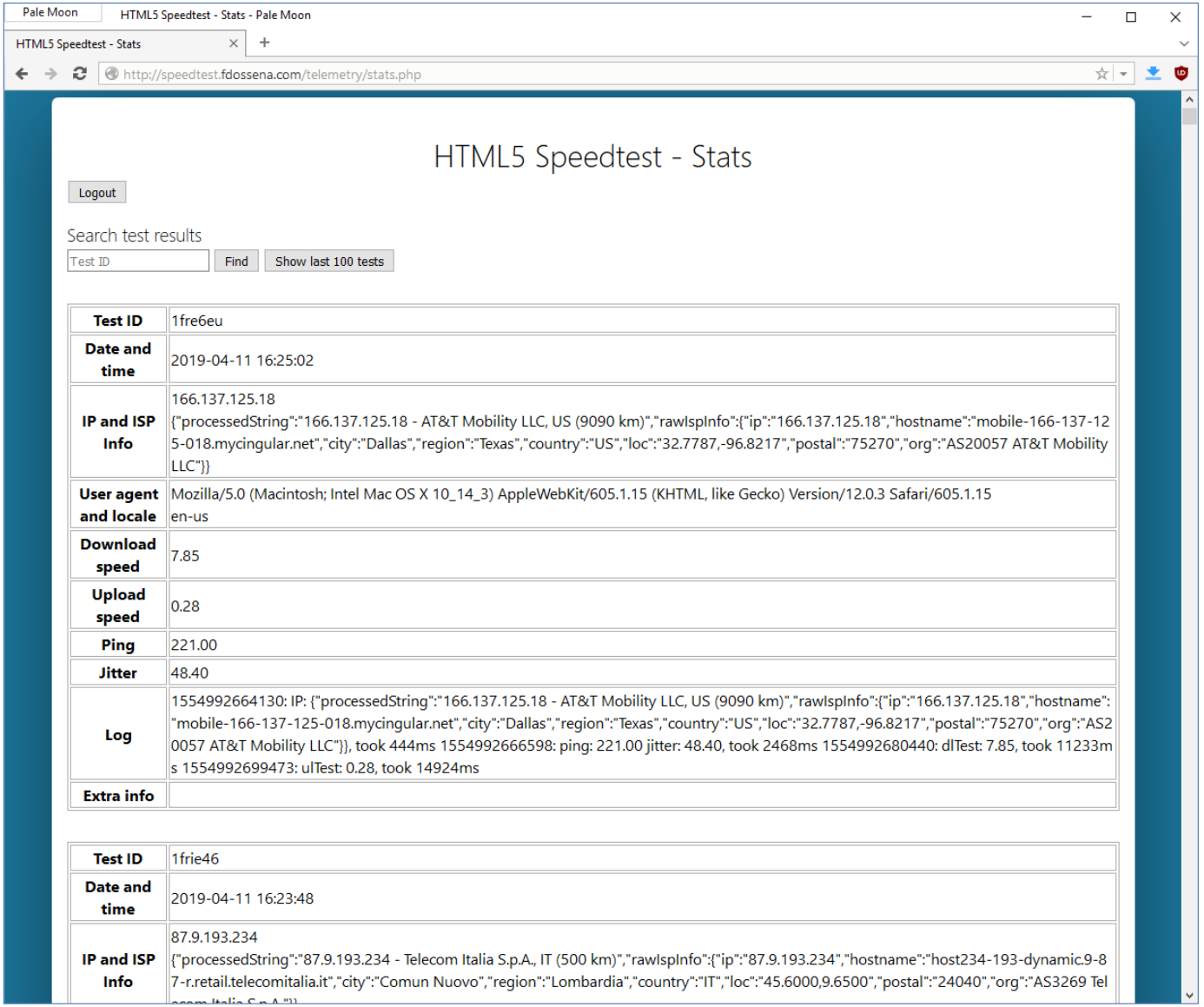
Screenshot: test



Telemetry

- Test results can be saved on the server. Optionally, you can choose to add a log with timing information and store aborted or failed tests
- 3 database backends are supported with minimal or no configuration at all:
  - MySQL (or MariaDB)
  - PostgreSQL
  - SQLite
- A password-protected page for seeing the test results and searching is also provided

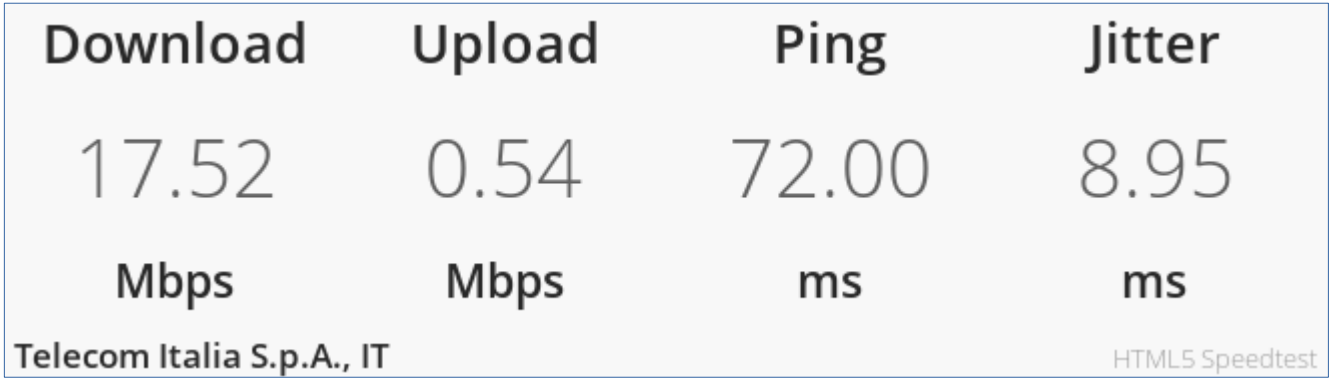
Screenshot: test results



Results sharing

- Generates a link to an image that can be shared, embedded in forum signatures, etc.
- No identifying information is exposed by this
- Optionally, test IDs can be obfuscated to avoid revealing database IDs
- Requires FreeType2

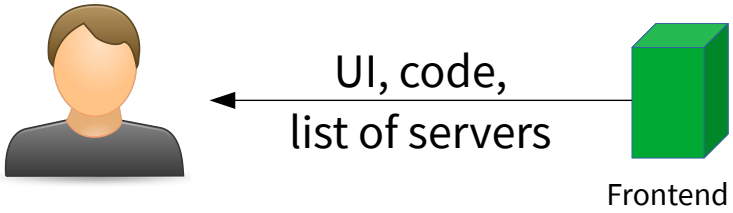
Screenshot: results sharing

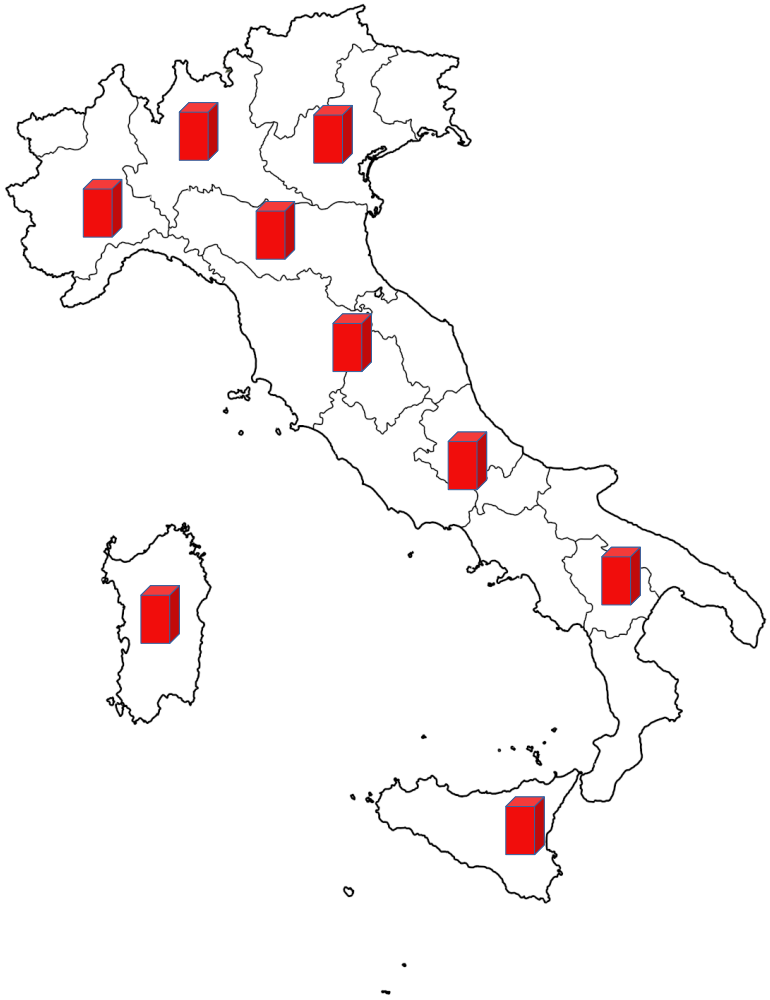


Multiple Points of Test

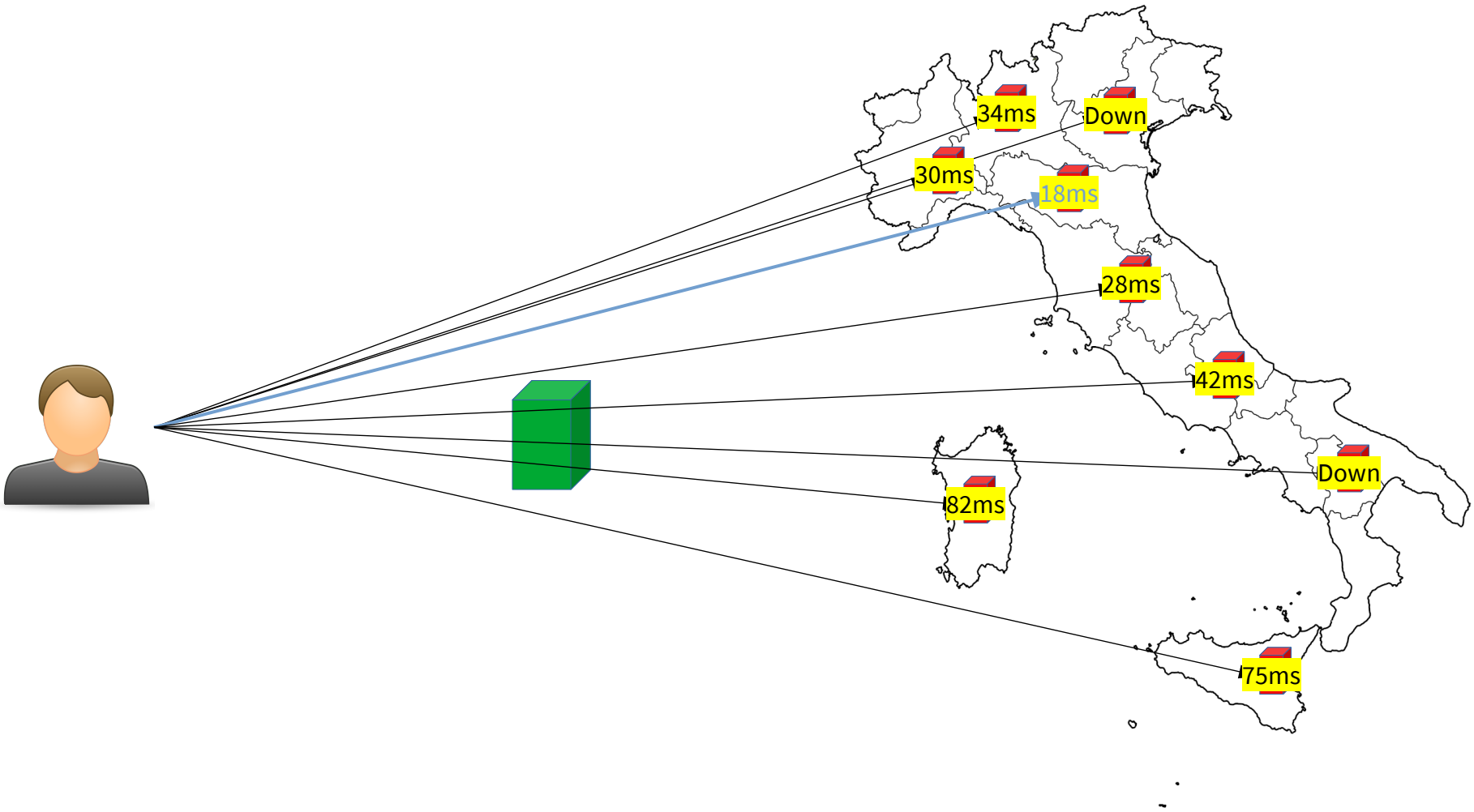
- Very useful for ISPs who have servers all over the country
- The Speedtest selects the server with the lowest ping below a certain threshold from a provided list of servers. Servers that are offline are skipped
- Automatic or manual selection

Multiple Points of Test





Multiple Points of Test



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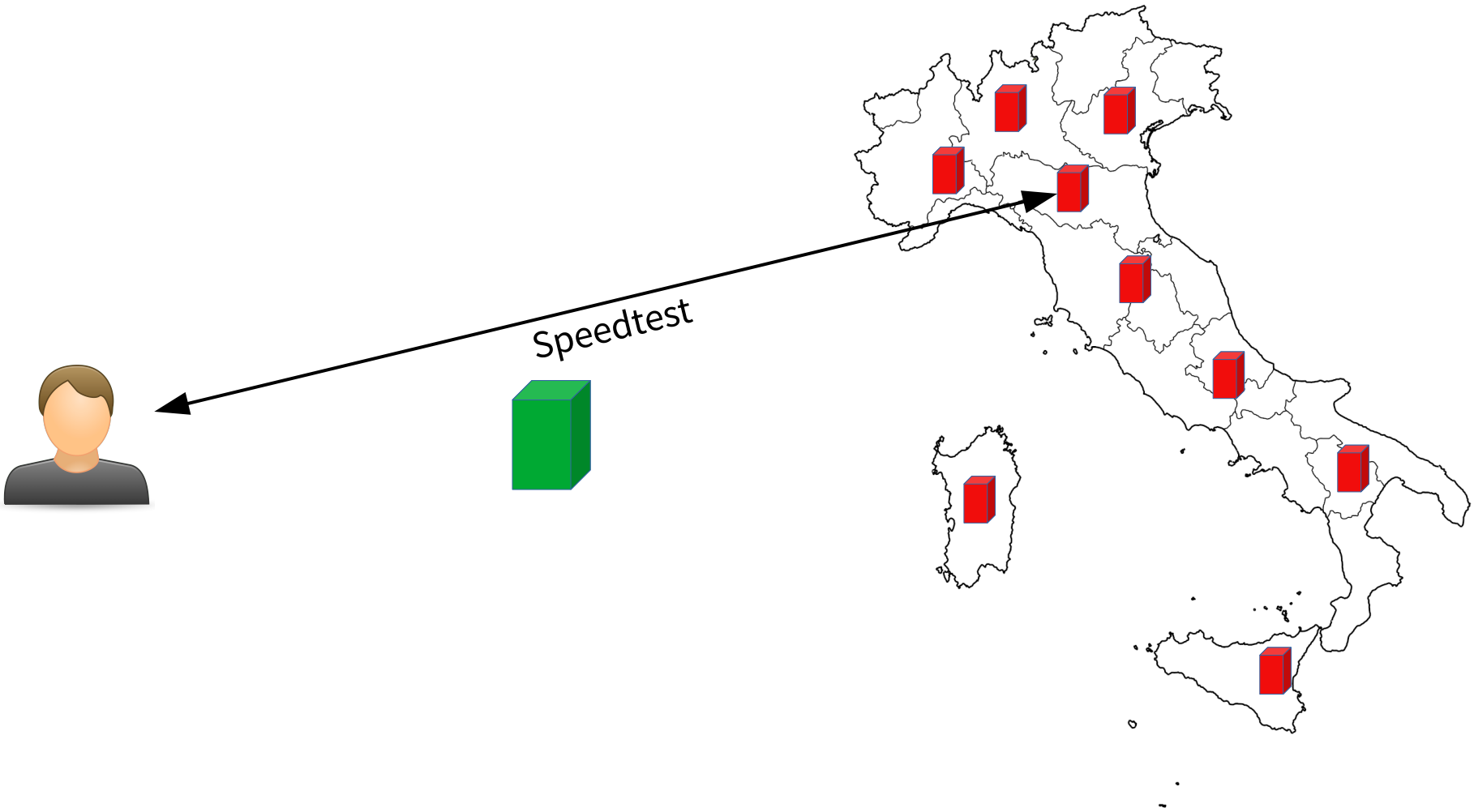

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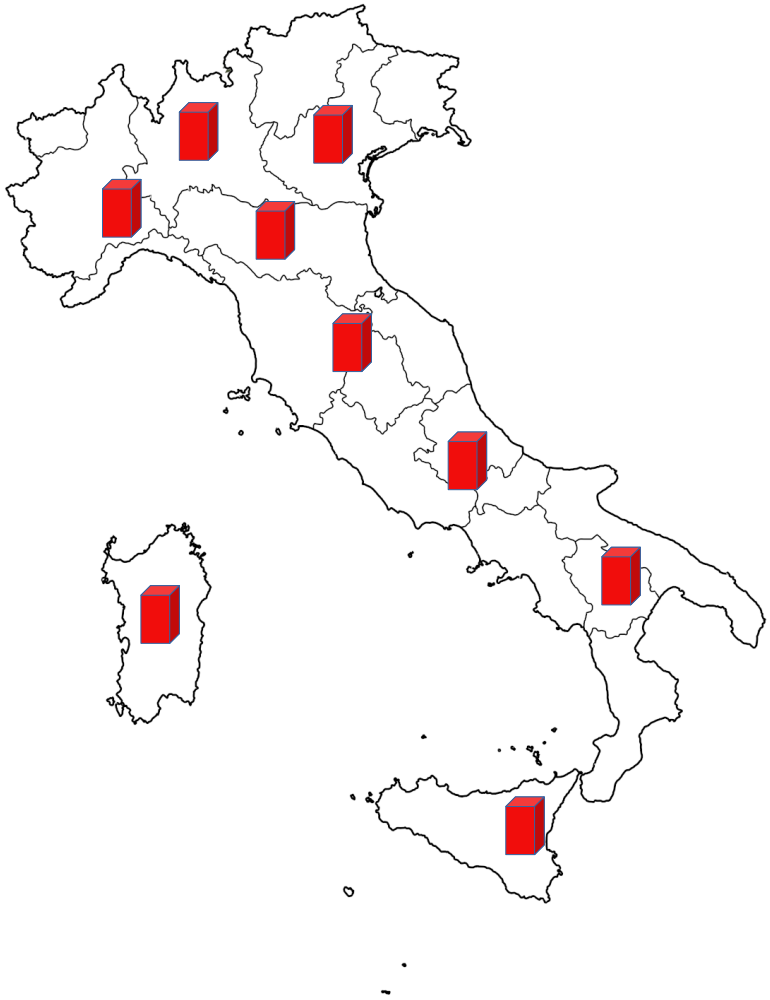
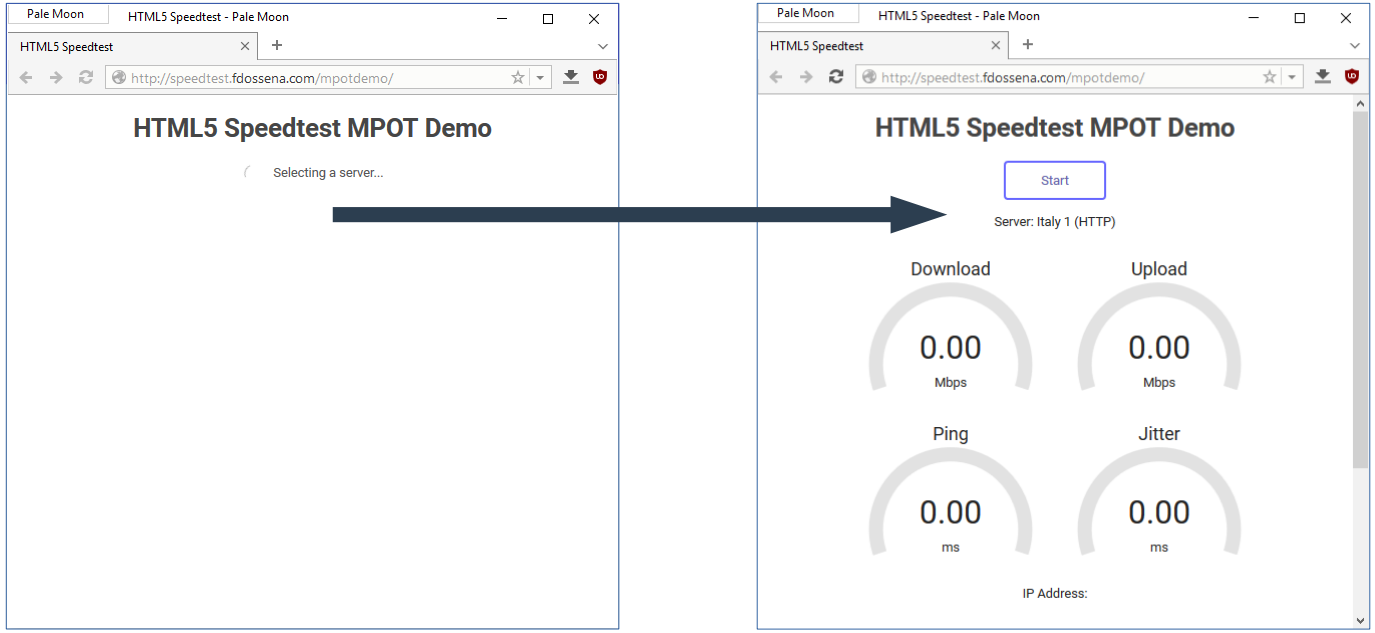


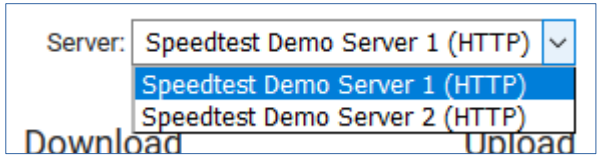
Multiple points of test

Careful:

- The frontend server doesn’t need a lot of bandwidth, but the backends servers do
- CORS headers are involved!

Screenshot: server selection

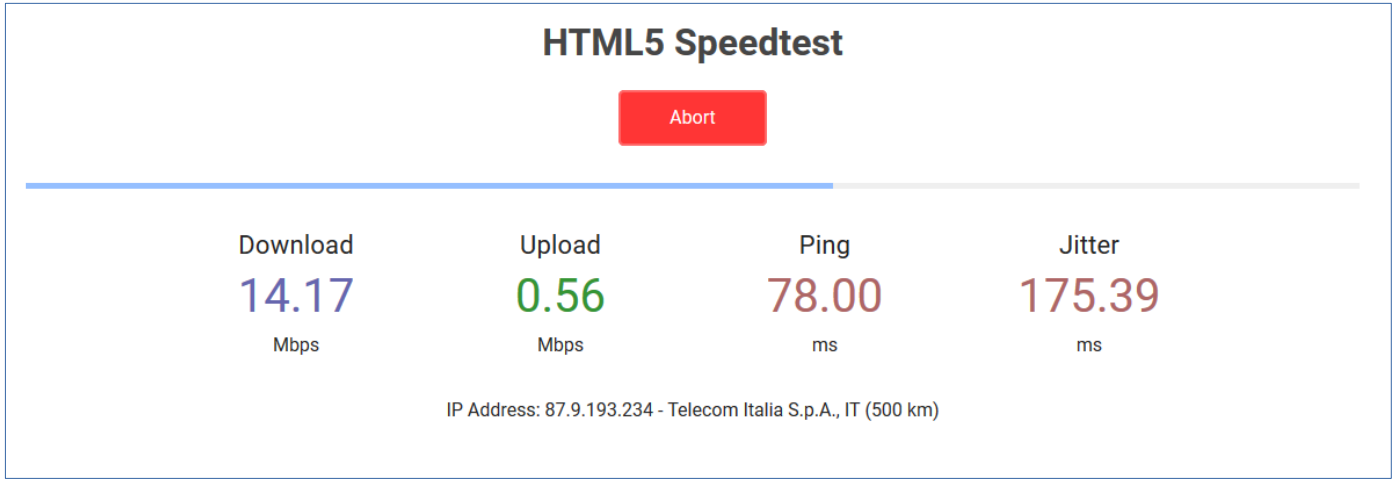


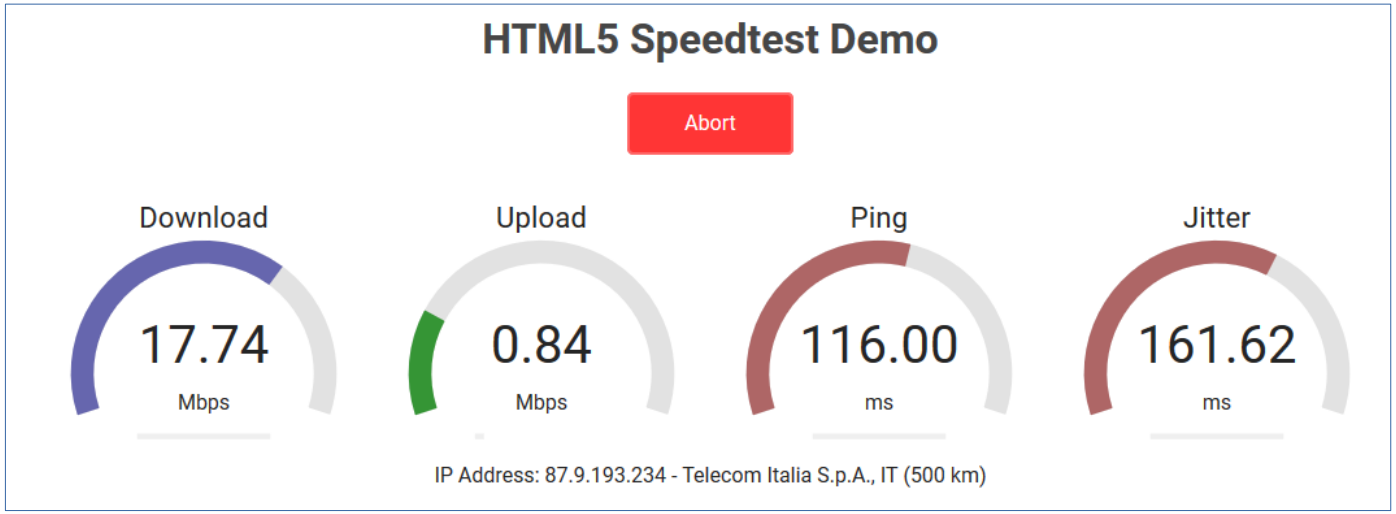


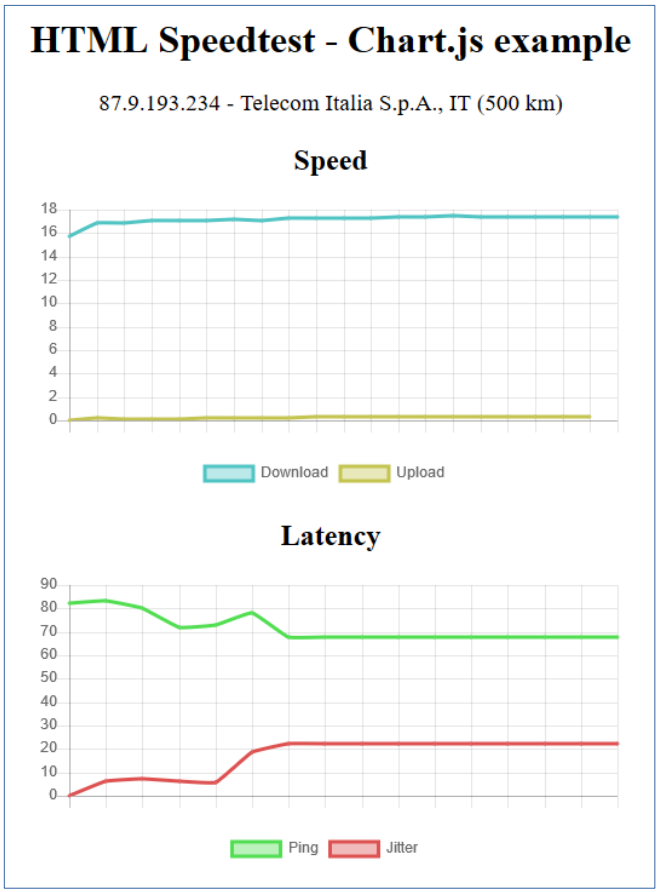
Customization

- Using the Speedtest in webpages is easy: all the data exchanged between the page and the worker is in JSON format with a straightforward syntax
- A large number of settings can be tweaked to optimize the internal workings of the test for specific scenarios, such as a satellite connection
- Several example files are included, demonstrating all the features, and different UIs that can be created
- An extensive documentation as well as a wiki on Github covers everything from a basic installation to telemetry and custom frontends

Screenshot: custom interfaces







Docker

- A Docker version of the Speedtest is also available on the Docker Hub
- Provides a simple container with a basic installation of the test for a single test point
- Additional features can be enabled by modifying the container

Other backends

- Node.js
  - Official port, maintained by a contributor
  - Currently supports testing but not telemetry and results sharing
- File server only
  - A large file of incompressible data can be used to perform the download test
  - An empty file can be used to perform the ping+jitter and the upload test
  - No other features can be used
- ASP.net (unofficial)
- JSP (unofficial)
- Possibly more in the wild

Project state

- 3 years old, quite mature, very few bug reports
- 2k stars on Github, most popular by far
- Over 500 forks, some of them active
- 19 contributors, 2 active developers
- Average of 50 git clones/day and 500 visitors
- Demo server serves ~250 tests/day
- In use by many ISPs around the world

Current limitations

- Not as accurate as iperf, not meant to replace it!
  - Maximum speed is limited by client CPU speed (how fast the browser can process XHR events)
  - 1Gbps is the maximum recommended speed in both directions
- No native clients (yet)
- No support team

The future

Planned:

- Native Android client app
  - Provide a template that can be configured and distributed by the test owner
  - Better performance and accuracy than web-based solution

Possible contributions:

- Improvements for the docker version
  - Full installation with options to enable/disable features
  - Docker images for multiple points of test (frontend and backends)
- Native client apps for other platforms
  - We need an iOS developer
- Diagnostic tool for easier troubleshooting of server issues

For more info:
https://fdossena.com/speedtest

Questions?