



Build Unique Search Experiences

# OUR JOURNEY TO A HIGHLY DISTRIBUTED & AVAILABLE SEARCH API... ...ON BARE-METAL

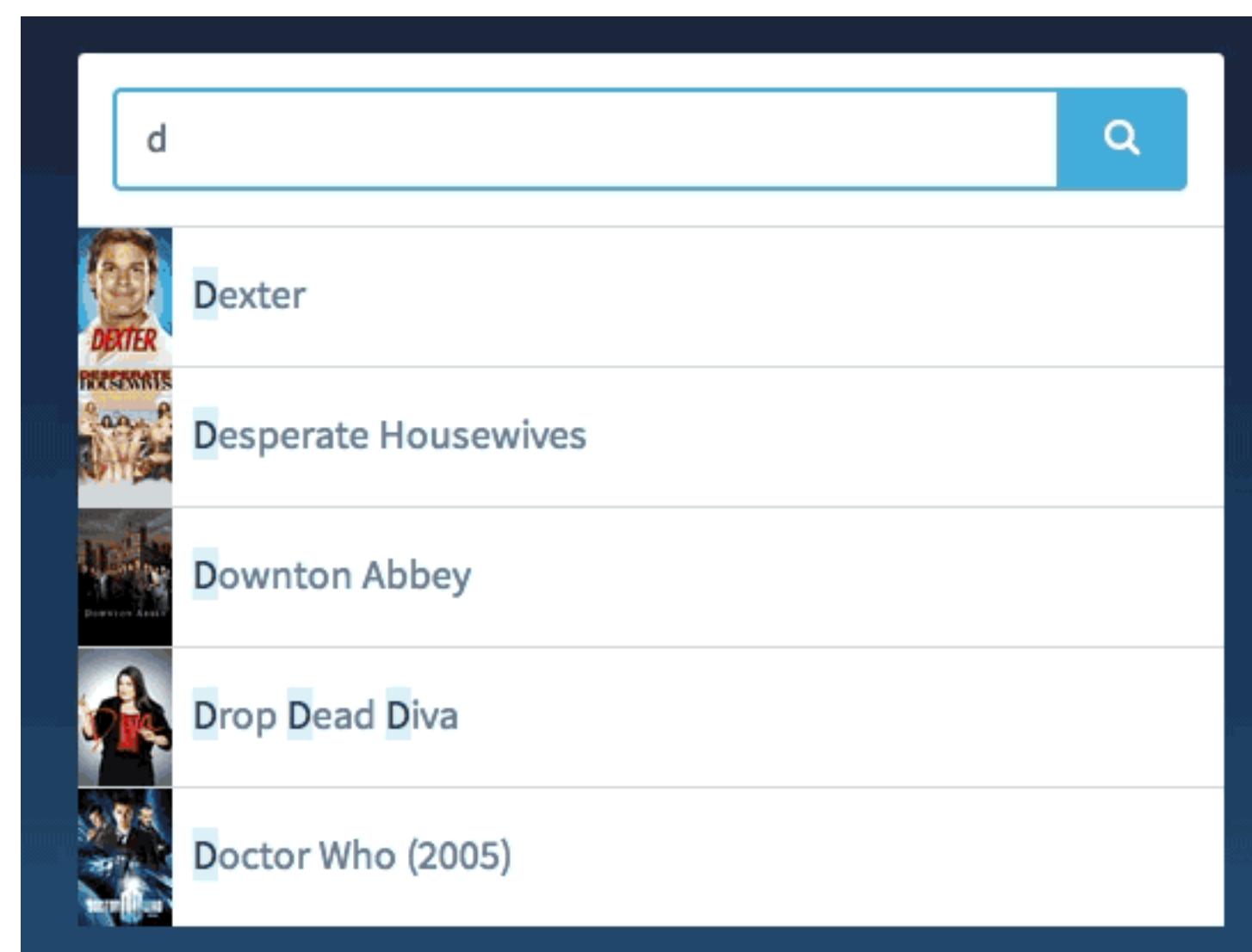


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[@sylvainutard](https://twitter.com/sylvainutard)

## A hosted search API

# A hosted search API



instant SEARCH — DEMO — instant.dev/#q=&page=1

Search by name, brand, description... 🔍

Super minimal demo of an instant-search result page by Algolia.  
Read the online [Tutorial](#) or see the source code on [Github](#).

8,790 RESULTS Found in 7ms Sort by: Relevance ▾

TYPE	Count
HardGood	6182
Movie	1419
Music	588
Game	440
Software	127
BlackTie	34

SHIPPING	Count
Free shipping	4684

# REVIEWS	Count
1	7461

CATEGORY	Count
Movies & TV Shows	1422
Cell Phone Cases & Clips	493
Headphones	188
Flat-Panel TVs	169
iPad Cases, Covers & Sleeves	142
Power Banks	140

**Webroot SecureAnywhere Internet Security (3-Device) (1-Year Subscription) - Mac/Windows \$49.99**  
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**Performance  
is our DNA**





Replies in milliseconds



From anywhere



With intuitive relevance

## Algolia Today

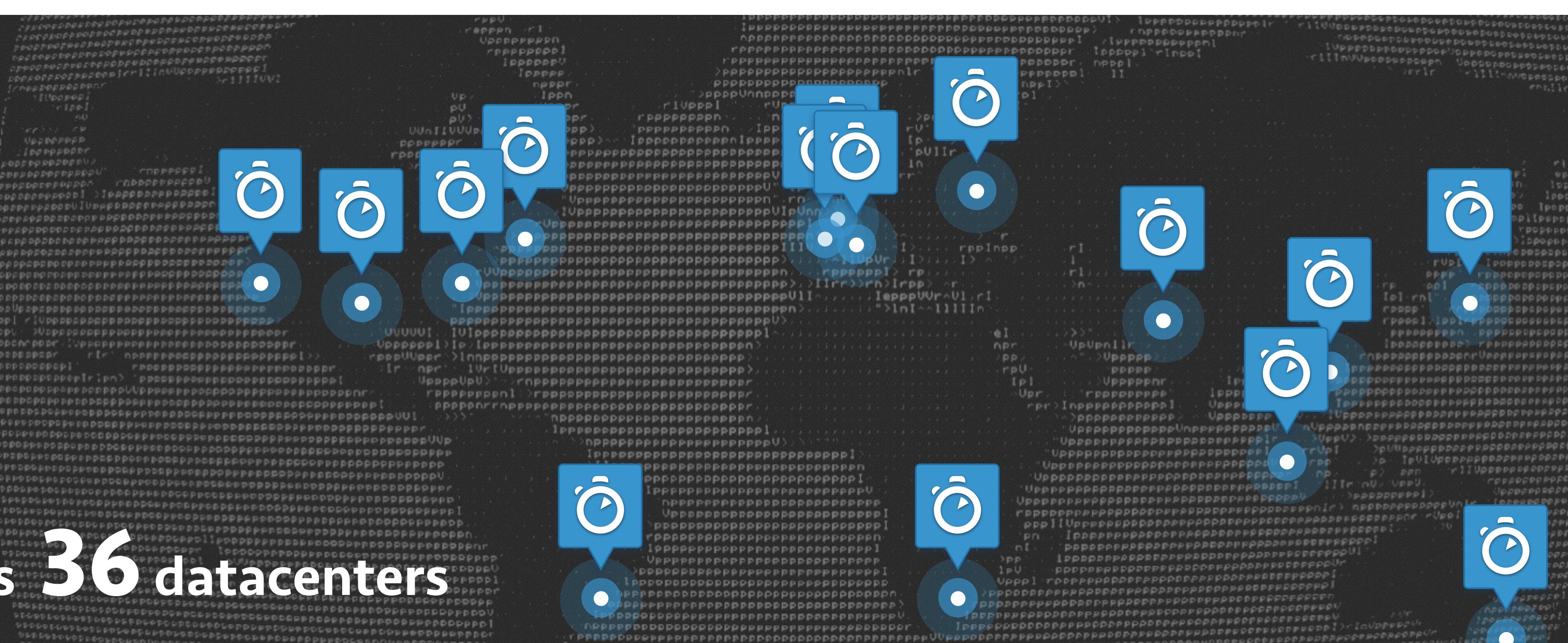
**1200+** customers in 100+ countries

**40B+** Write operations per month

**11B+** User-generated queries per month



**15 regions** **36 datacenters**



## Behind the scene

## **Unique set of constraints**

High volume of Read & Write operations

High-availability

Worldwide data distribution

## **Unique set of constraints**

High volume of Read & Write operations

High-availability

Worldwide data distribution

**... obviously with compromises :)**

## Software Stack



# Started as an offline SDK

- Before being a hosted API
  - Small SDK **embedded** on mobile apps
  - Providing indexing & search **offline**
  - Running on the **cheapest Android** phone



## Written in C++

- Full **C++** search-engine
- **Custom** data-structures
- Almost **no dependencies**:
  - Google sparsehash (hashtable)
  - yajl (JSON parser)
  - hiredis (redis client)



# Deployed as an nginx module

- As close as possible to the HTTP request
- No reverse-proxy
- Built-in **hot-reload**
- ... but far from **C10k!!!**

```
events {  
    worker_connections 190000;  
    use epoll;  
    multi_accept on;  
}
```

```
server {  
    listen 443 ssl backlog=2048;
```

```
default['alg']['sysctl']['net.netfilter.nf_conntrack_tcp_timeout_established'] = 600  
default['alg']['sysctl']['net.nf_conntrack_max'] = 100000  
default['alg']['sysctl']['net.ipv4.tcp_max_syn_backlog'] = 8192  
default['alg']['sysctl']['net.ipv4.tcp_fin_timeout'] = 60  
default['alg']['sysctl']['kernel.core_pattern'] = 'core_%p'  
default['alg']['sysctl']['net.ipv4.tcp_fastopen'] = 3  
default['alg']['sysctl']['net.ipv4.tcp_tw_REUSE'] = 1
```

# Search VS Indexing

- Search
  - Read-only
  - **CPU & RAM**
  - More priority
- Indexing
  - Read & Write
  - **CPU & RAM & Disk**
  - Must not impact search performance

2 processes



```
:nice => cluster_custom['build_nice'] || 5
```

```
echo deadline > /sys/block/<%= device %>/queue/scheduler
echo 100 > /sys/block/<%= device %>/queue/iosched/read_expire
echo 10000 > /sys/block/<%= device %>/queue/iosched/write_expire
echo 6 > /sys/block/<%= device %>/queue/iosched/writes_starved
echo 0 > /sys/block/<%= device %>/queue/iosched/front_merges
echo 0 > /sys/block/<%= device %>/queue/iosched/fifo_batch
echo 2 > /sys/block/<%= device %>/queue/nomerges
echo 2 > /sys/block/<%= device %>/queue/rq_affinity
echo 0 > /sys/block/<%= device %>/queue/rotational
echo 0 > /sys/block/<%= device %>/queue/read_ahead_kb
echo 0 > /sys/block/<%= device %>/queue/add_random
```

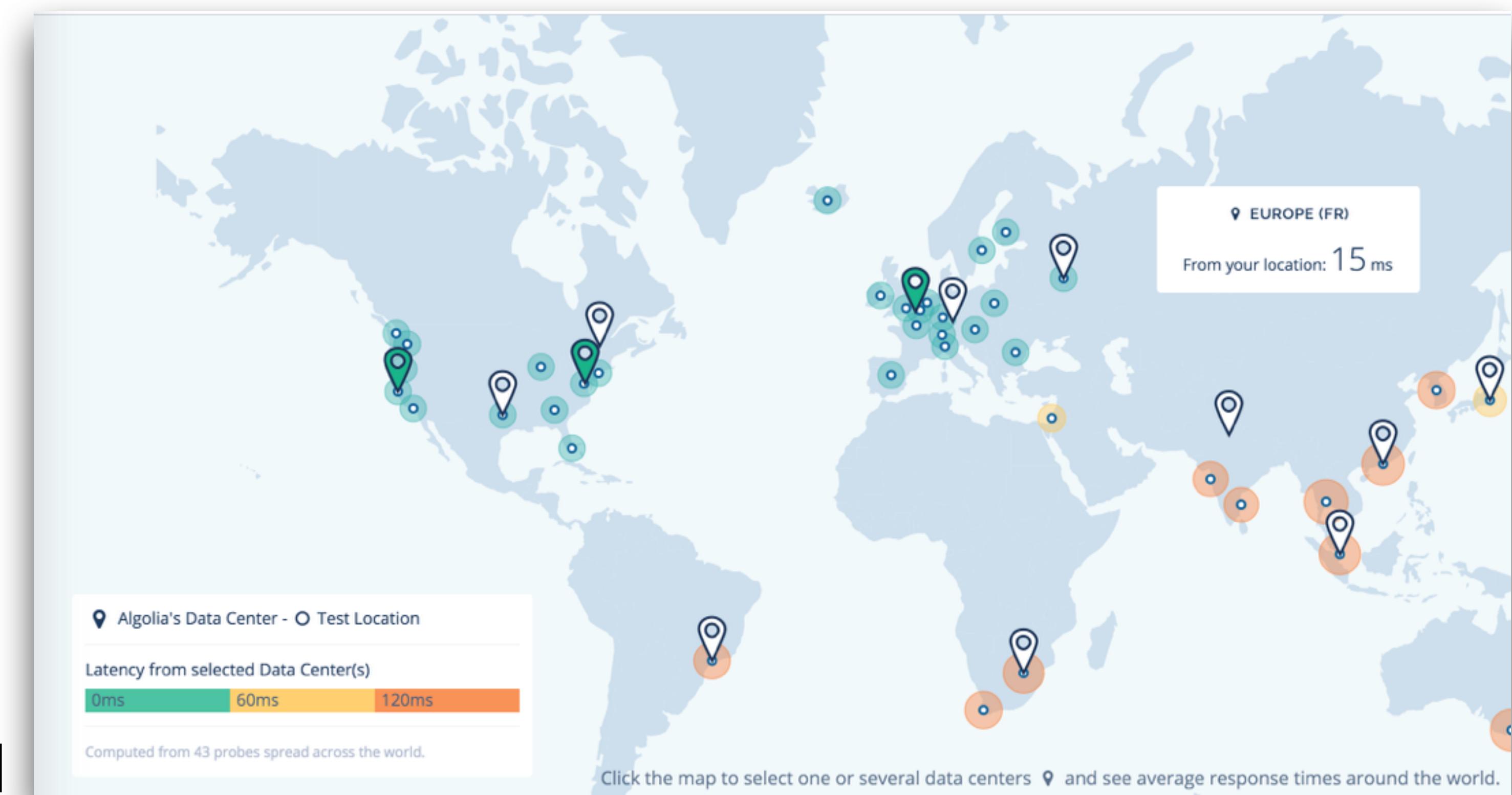
## Cluster of 3 machines

- **Distributed** consensus (RAFT)
- **No** load balancer
  - **Smart** API clients
  - APP\_ID.algolia.net
  - APP\_ID-{1,2,3}.algolia.net



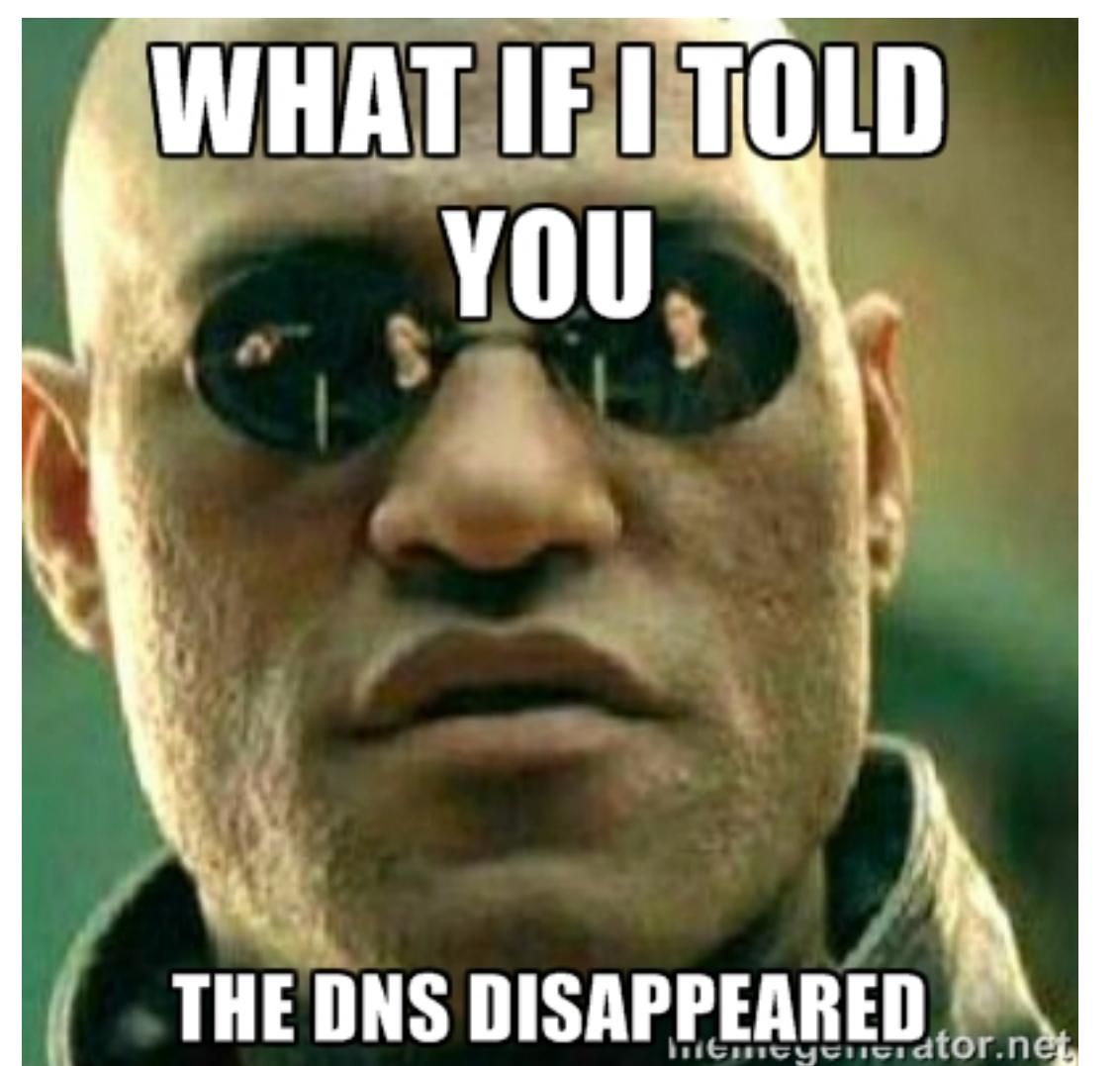
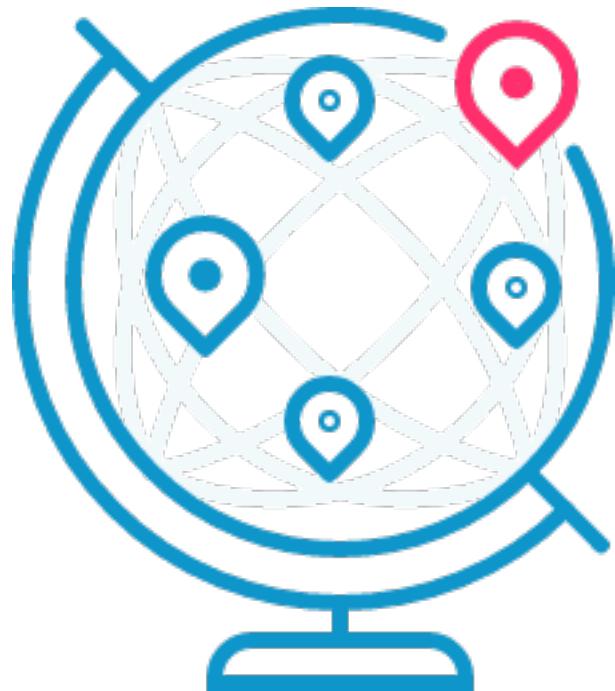
# Distributed Search Network

- World-wide replication
  - **Not** a cache
  - Geo-IP based **routing**
    - **EDNS** is a plus
    - Users target the closest datacenter hosting their data
    - +45 probes around the world calibrating/monitoring it

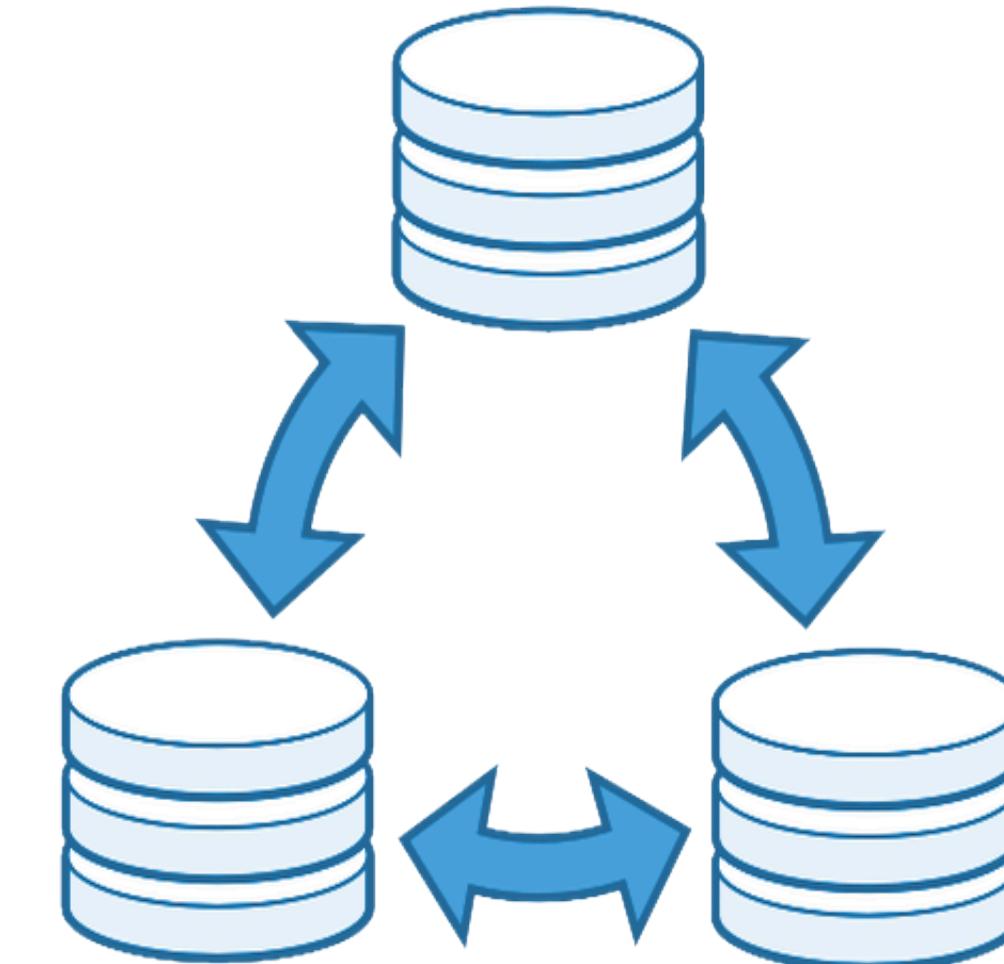


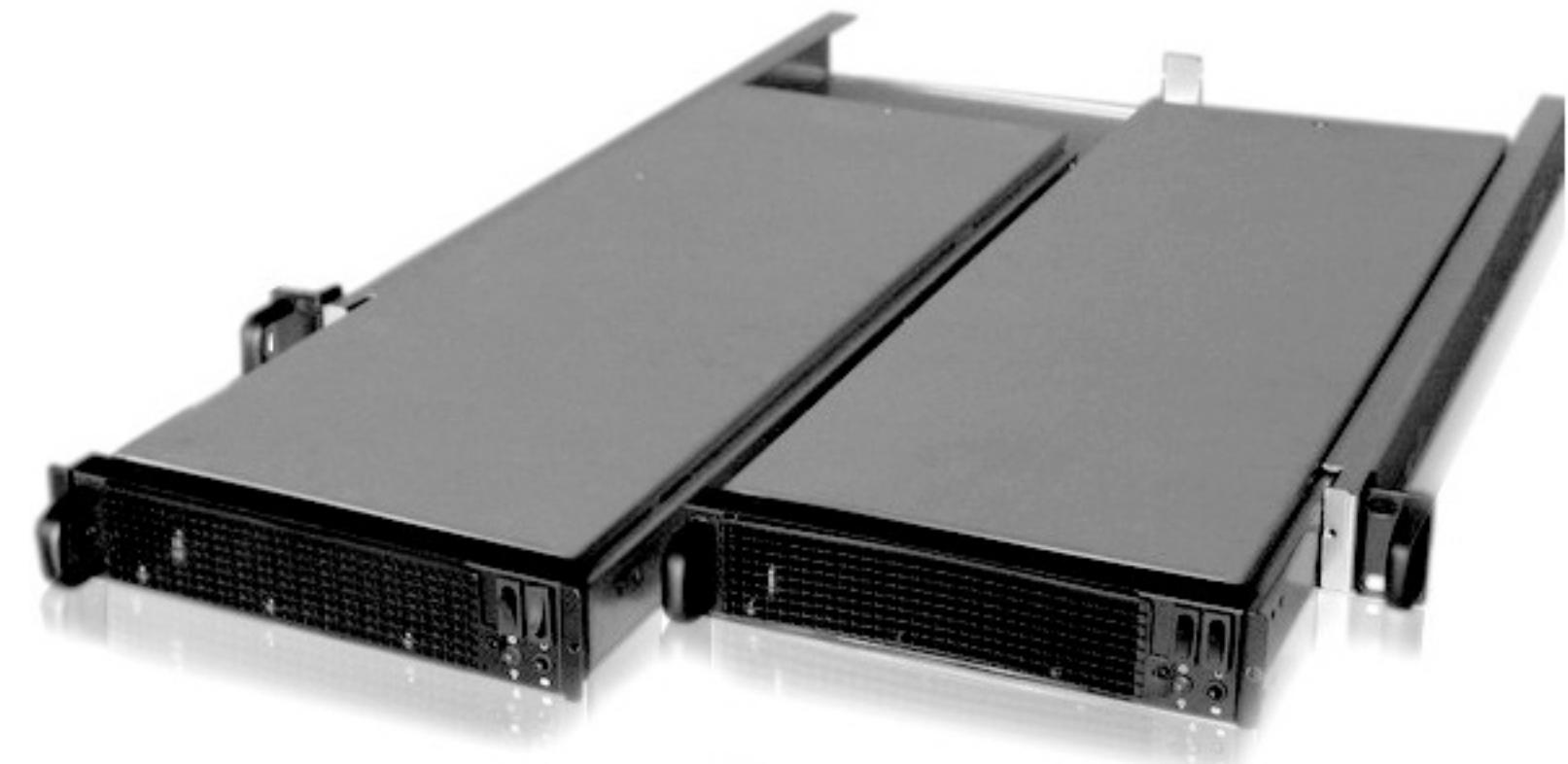
## DNS redundancy

- **DNS providers** are also failing
- 2 DNS providers:
  - \* .algolia.net
  - \* .algolianet.com
- TLD tips: **.io** is a bad idea (slower)



## Hardware Stack

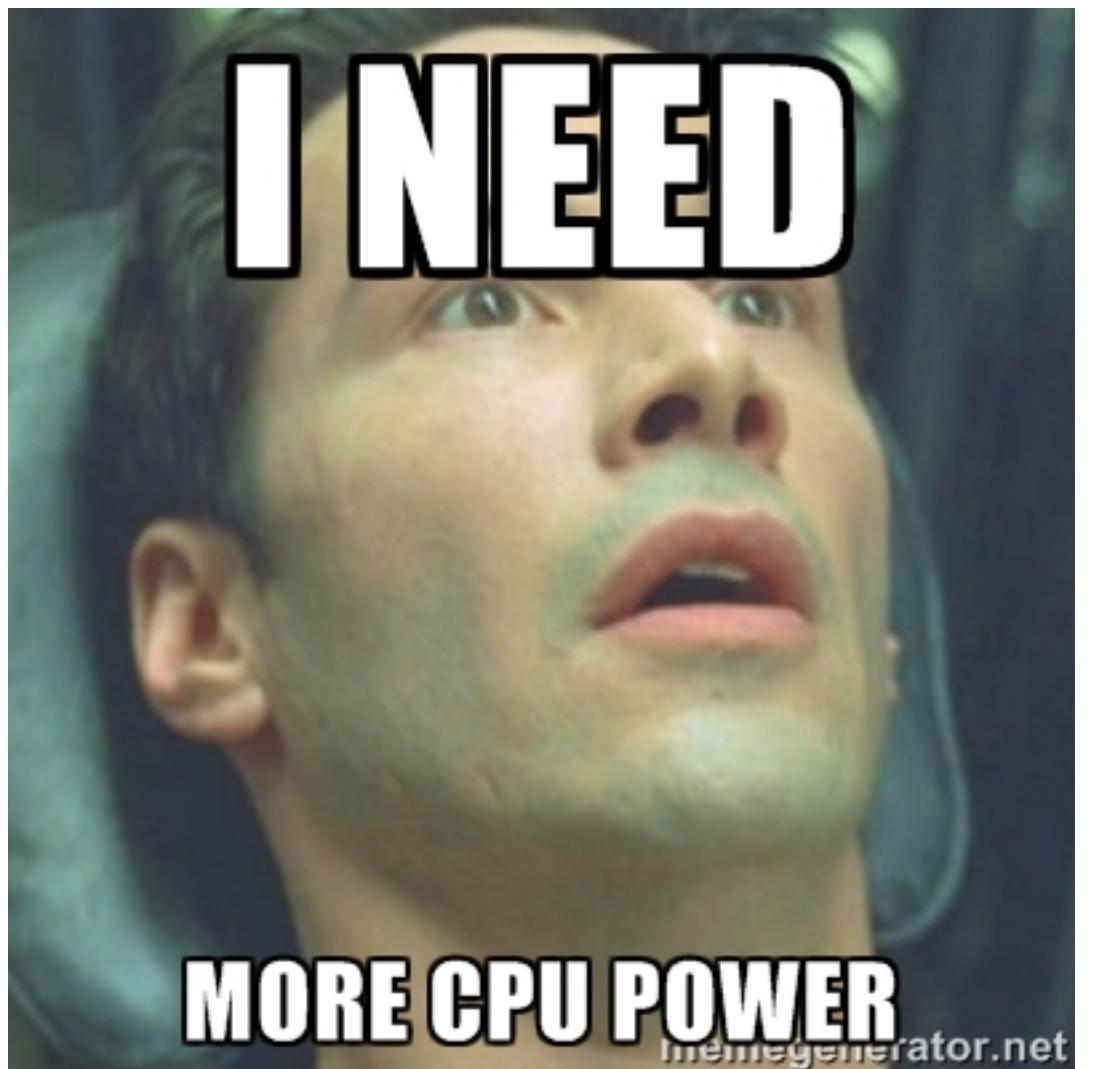




**Cloud**      **vs**      **Bare metal**

## High-end CPU

- Fast CPU
  - At least **3.5Ghz**
  - Only 8 or 12 threads (a single processing unit is single-threaded anyway)
  - Best models: Intel E5-1650v2/3



## High-end RAM

- RAM
  - 64 or **128GB**
  - **ECC**, 1600 or **2400** Mhz
  - Indices are **in memory**



## High-end SSD

- SSD in **Raid-0**
  - 400 GB to 1.5 TB
  - Heavyweight I/O operations
  - Burned a bunch of them...
  - Best models: Intel S3700, S3710
  - **mmap** FTW

### [PATCH] raid0: data corruption when using trim

[Date Prev][Date Next][Thread Prev][Thread Next][Date Index][Thread Index] [G+1](#) 4

- 
- *To:* [neilb@xxxxxxxx](mailto:neilb@xxxxxxxx)
  - *Subject:* [PATCH] raid0: data corruption when using trim
  - *From:* Seunguk Shin <[seunguk.shin@xxxxxxxxxxxx](mailto:seunguk.shin@xxxxxxxxxxxx)>
  - *Date:* Sun, 19 Jul 2015 12:28:16 +0900
  - *Cc:* [linux-raid@xxxxxxxxxxxxxxx](mailto:linux-raid@xxxxxxxxxxxxxxx)
  - *Dlp-filter:* Pass
  - *Thread-index:* AdDB0p+sh1bJ7soiSea9KclweqiZPg==

Hi,

There was report at Algolia's blog website regarding some problems using software raid and trim in SSD.

<https://blog.algolia.com/when-solid-state-drives-are-not-that-solid/>

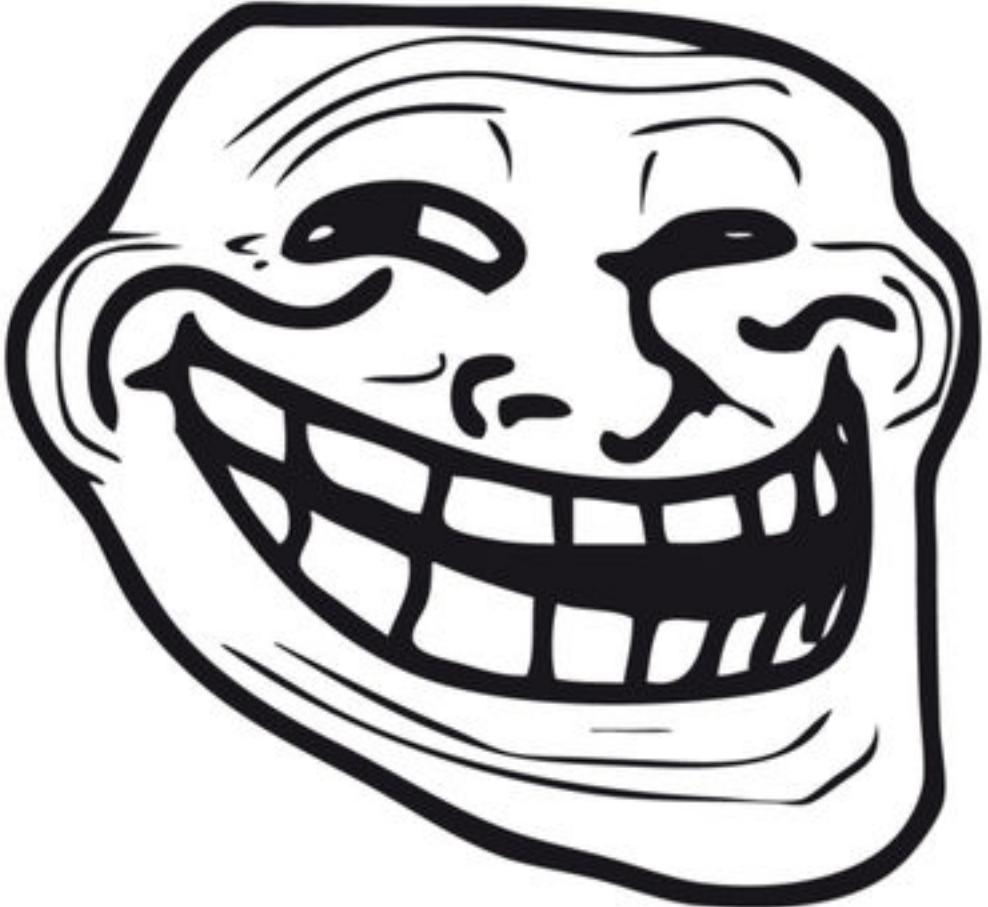


## Network

- Machines spread in 15 regions
  - **36** datacenters
  - **+400** machines
  - **11** network providers
  - Best practice: 2 or 3-providers setup



# Pricing



## Storage Optimized - Current Generation

	4	14	30.5	1 x 800 SSD	\$0.853 per Hour
i2.xlarge	4	14	30.5	1 x 800 SSD	\$0.853 per Hour
i2.2xlarge	8	27	61	2 x 800 SSD	\$1.705 per Hour
i2.4xlarge	16	53	122	4 x 800 SSD	\$3.41 per Hour
i2.8xlarge	32	104	244	8 x 800 SSD	\$6.82 per Hour

i2.2xlarge

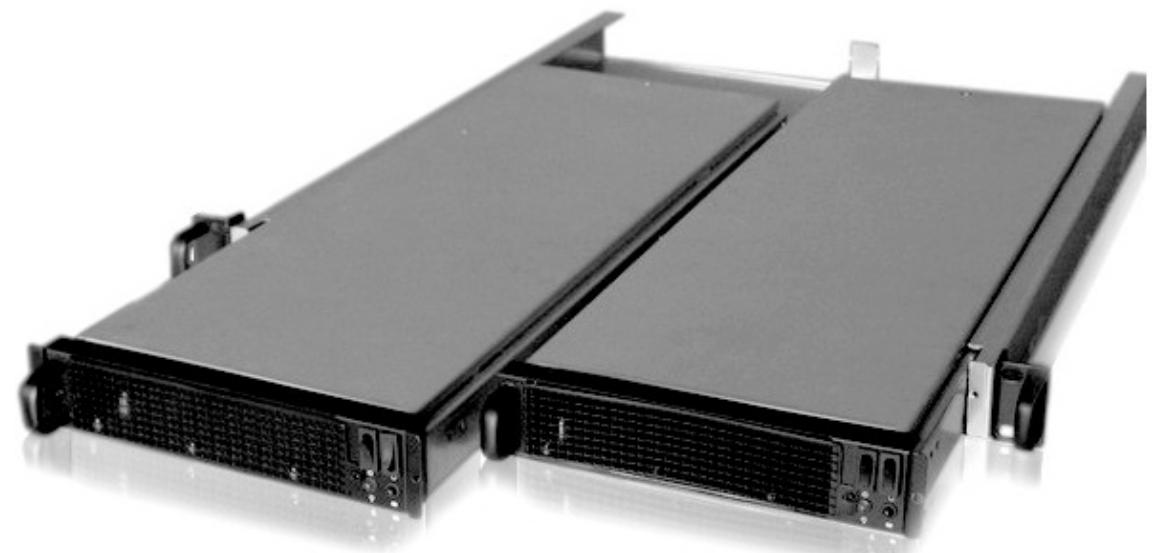
1-YEAR TERM				
Payment Option	Upfront	Monthly*	Effective Hourly**	Savings over On-Demand
No Upfront	\$0	\$619.04	\$0.848	50%

i2.4xlarge

1-YEAR TERM				
Payment Option	Upfront	Monthly*	Effective Hourly**	Savings over On-Demand
No Upfront	\$0	\$1238.08	\$1.696	50%
Partial Upfront	\$7280	\$453.33	\$1.4521	57%
All Upfront	\$12465	\$0	\$1.4229	58%

1-YEAR TERM				
Payment Option	Upfront	Monthly*	Effective Hourly**	Savings over On-Demand
No Upfront	\$0	\$1781.2	\$2.44	40%
Partial Upfront	\$10483	\$652.62	\$2.0907	49%
All Upfront	\$17948	\$0	\$2.0489	50%

## Pricing



SUPERMICRO

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Embedded World / Feb.23-25 / Hall 1, Booth #1-330 CeBIT 2016 CeBIT / Mar.14-18 / Hall 12, Stand B67

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SUPERMICRO

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Intel E5-  
MC-128 1650v2  
E5-1650v2

6c/12t	128 Go RAM
3,5 / 3,9	DDR3 ECC 1600
GHz	MHz

2x480Go SSD SOFT



159,99€  
HT/mois

Commander

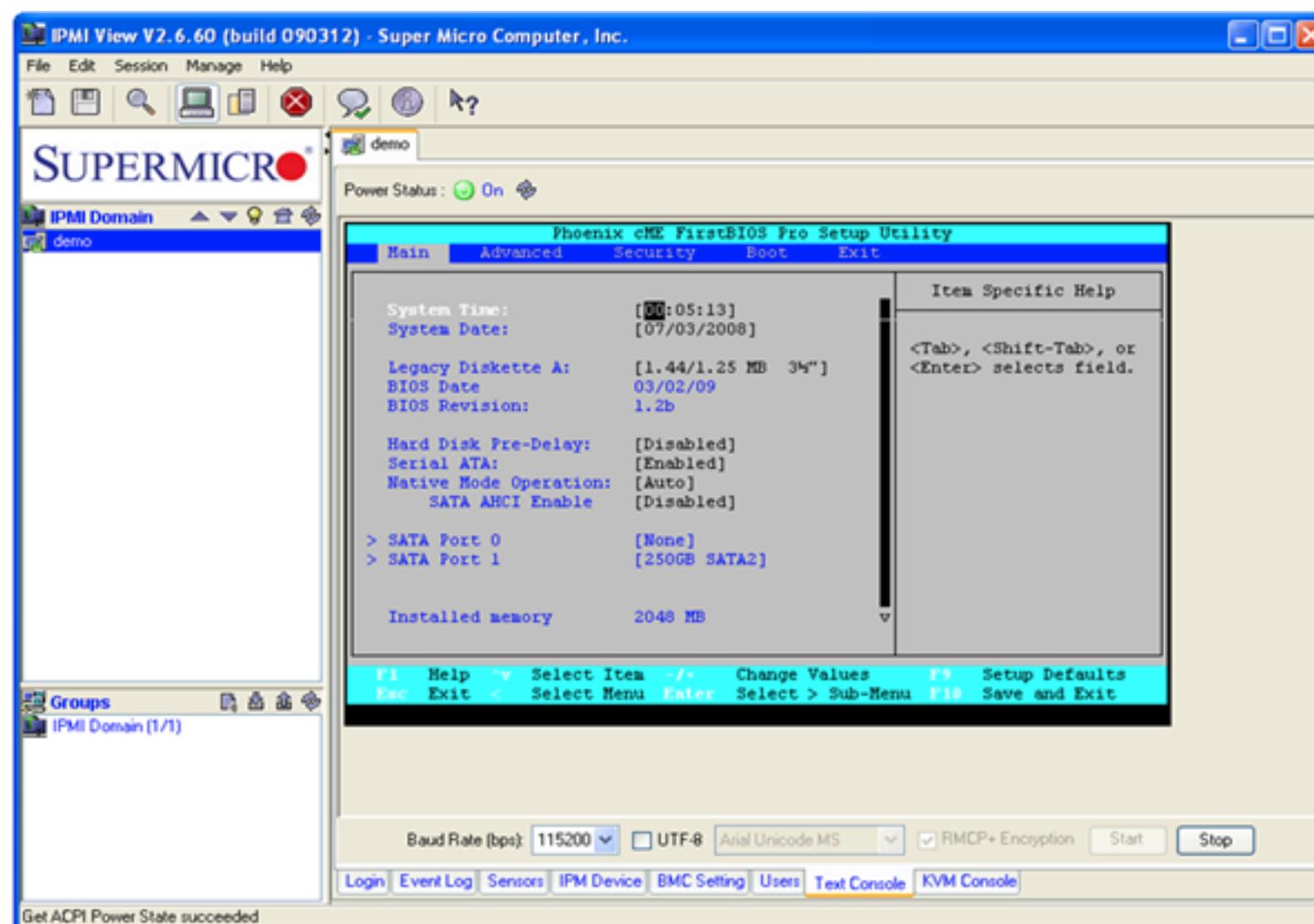
COF #293914_1 Dedicated hosting service for Supermicro 5038MR-H8TRF (1 node), 1 x Intel E5-1650v3, 128GB RAM, 2 x SSD 400 GB Intel S3710, 1 x IP address, IP Port (Internet Access) with 2 TB traffic limit at DC5 Equinix Ashburn period: 03/01/2016 - 03/31/2016	1.00	385.00	385.00
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But...



## But...

- Bye bye provisioning APIs...
- ... welcome Java & Windows-based **applet/KVM**



## But...

- Bye bye instant delivery...
- ... welcome 2-months **shipment**
- ... and **customs** taxes /o\



# But...



## Dedicated Servers

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	₹ 11,999 (₹ 13,738.86 with taxes) / month	₹ 22,999 (₹ 26,333.86 with taxes) / month	₹ 25,999 (₹ 29,768.86 with taxes) / month	₹ 40,999 (₹ 46,943.86 with taxes) / month	₹ 51,999 (₹ 59,538.86 with taxes) / month
	Single Quadcore Intel Xeon E3-1231 v3	Single Hexcore Intel Xeon E5-1650 v3	Single Octacore Intel Xeon E5-1660 v3	Dual Hexcore Intel Xeon E5-2643 v3	Dual Octacore Intel Xeon E5-2667 v3
	8 VCPUs	12 VCPUs	16 VCPUs	24 VCPUs	32 VCPUs
	CentOS / Debian / Ubuntu				
	32 GB RAM	64 GB RAM	64 GB RAM	64 GB RAM	128 GB RAM
	2 x 120 GB SSD diskspace (RAID-1)	2 x 240 GB SSD diskspace (RAID-1)	2 x 240 GB SSD diskspace (RAID-1)	2 x 480 GB SSD diskspace (RAID-1)	2 x 480 GB SSD diskspace (RAID-1)
	1 IP Address				
	<a href="#">Buy Now</a>				

- Bye bye 2016-ready global providers...
- ... welcome **local** providers

We are hiring in SF and Paris 😊



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## Q & A

Sylvain Utard  
VP of Engineering

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