OVH
Innovation is Freedom

Introducing Time Series & Warp 10

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OVH
Team DevRel

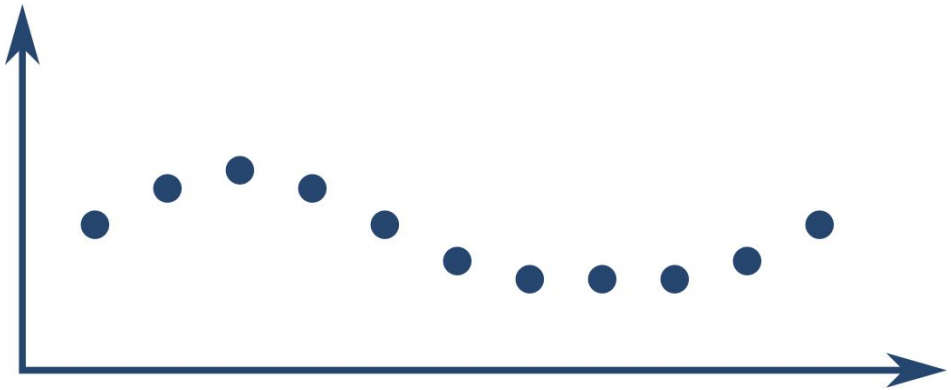
Time Series

What are they?

Time Series

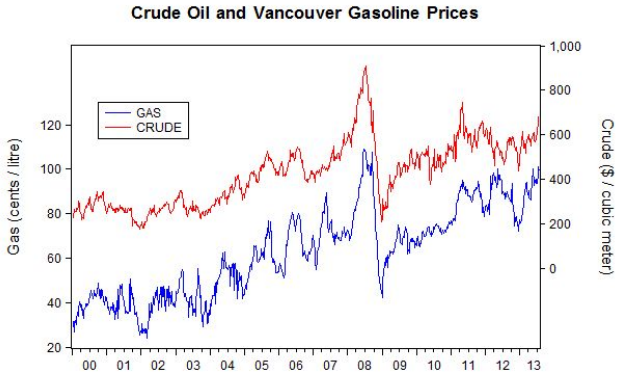
Definition of Time Series:

An ordered sequence of values of a variable at equally spaced time intervals.



Time Series

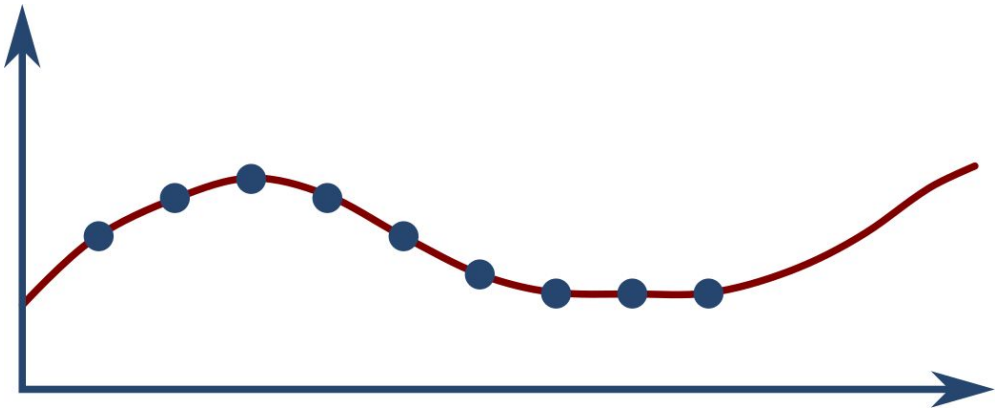
- Stock Market Analysis
- Economic Forecasting
- Budgetary Analysis
- Process and Quality Control
- Workload Projections
- Census Analysis
- ...



Time Series

Applications:

- Understanding the data
- Fit a model
  - Monitoring
  - Forecasting



Time Series

Stock market Analytics

Economic Forecasting

$$$

Study & Research

Time Series

Many specific analytical tools:

- Moving average
- ARMA (AutoRegressive Moving Average)
- Multivariate ARMA models
- ARCH (AutoRegressive Conditional Heteroscedasticity)
- Dynamic time warping
- ...

Time Series

Specific application of general tools

- Artificial neural networks
- Hidden Markov model
- Fourier & Wavelets transforms
- Entropy encoding
- ...

Time Series Databases

What tools do I use?

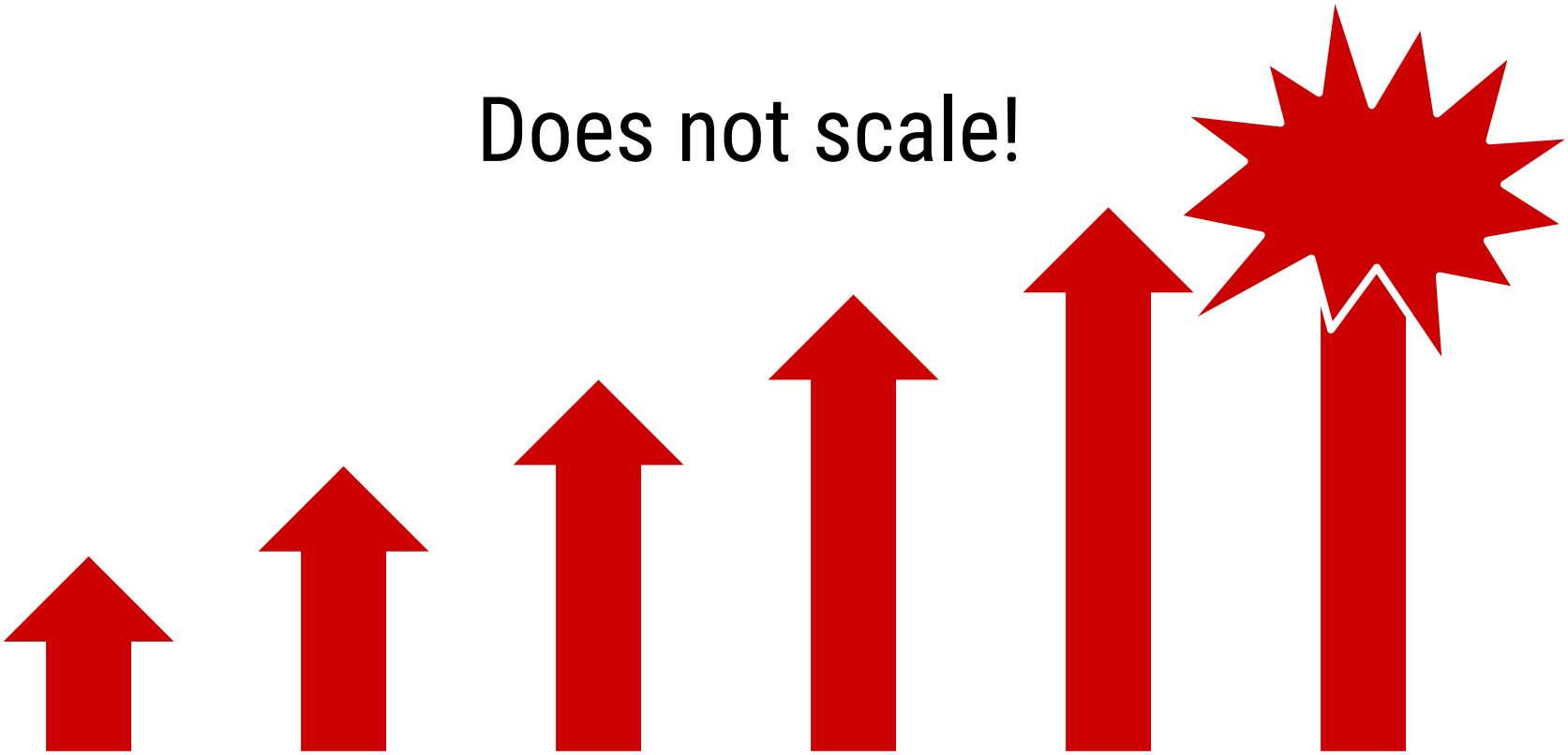
Time Series Databases

General purpose data analytics tools:

- Matlab
- Python
- R
- …

General purpose relational database engine

Time Series Databases



Time Series Databases

Many type of database engine

- Relational databases
- Key-value databases
- Document databases
- Graph databases
- ...

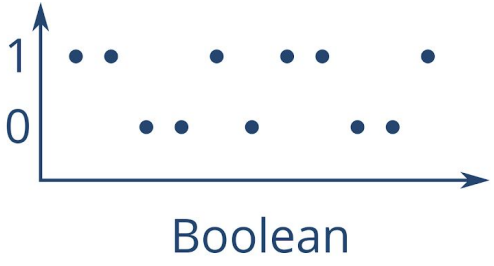
Time Series Databases

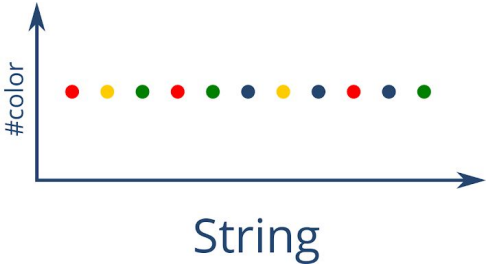
What about Time Series?

Time Series databases!

Time Series Databases

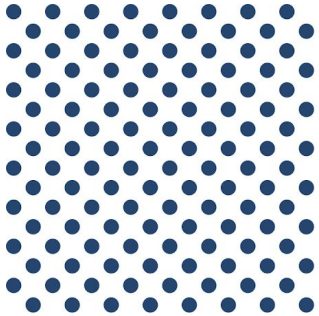
Data model: time series



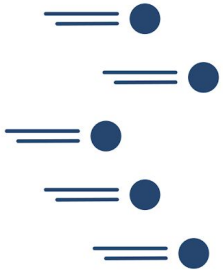


Time Series Databases

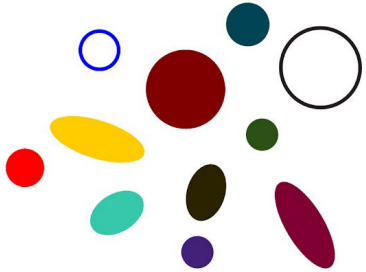
The 3 'v'



Volume



Velocity



Variety

Time Series Databases

Many options

Time Series Databases

Time Series Databases

OpenTSDB

Time Series Databases

Time Series Databases

Time Series Databases

OVH Metrics

What did we choose?

What's OVH Metrics

Managed Cloud Platform for Geo Time Series®

What's a metric?

[**me**-trik] : the science of measuring

What's a metric?

"To measure is to know"

William "Lord Kelvin" Thomson

What's a metric?

Actionable metric ≠ vanity metric

What is a metric?

Metrics are Time Series!

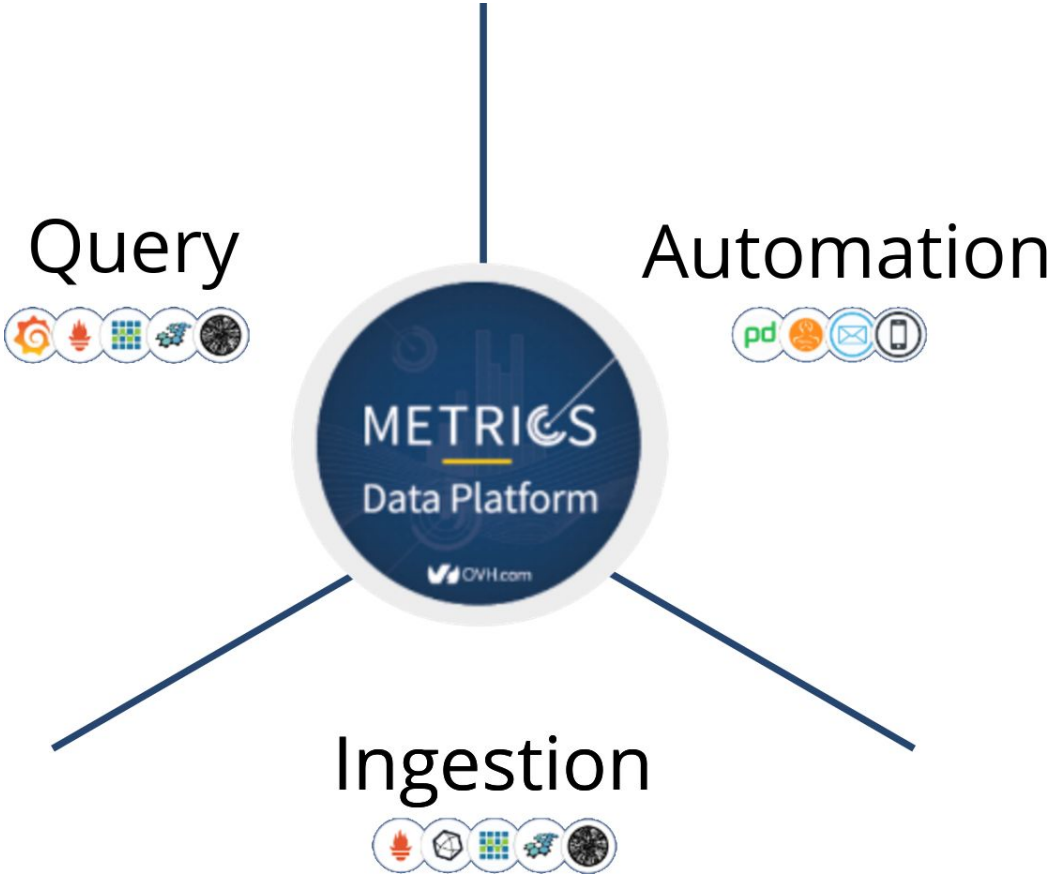
How do we deal with metrics?

Using a Time Series Database!

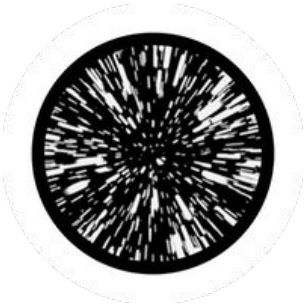
But… which one?

Why choose? Let’s support all of them!

Metrics Data Platform



Metrics Data Platform



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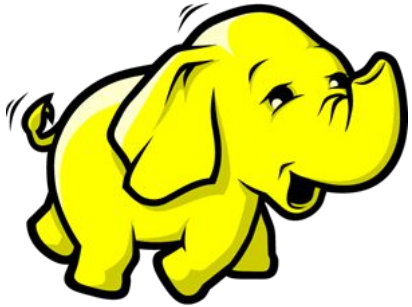
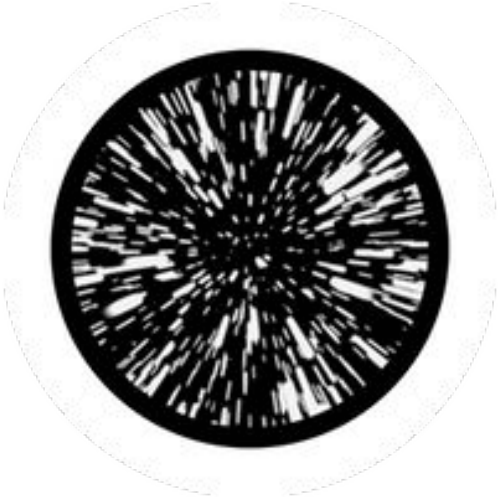
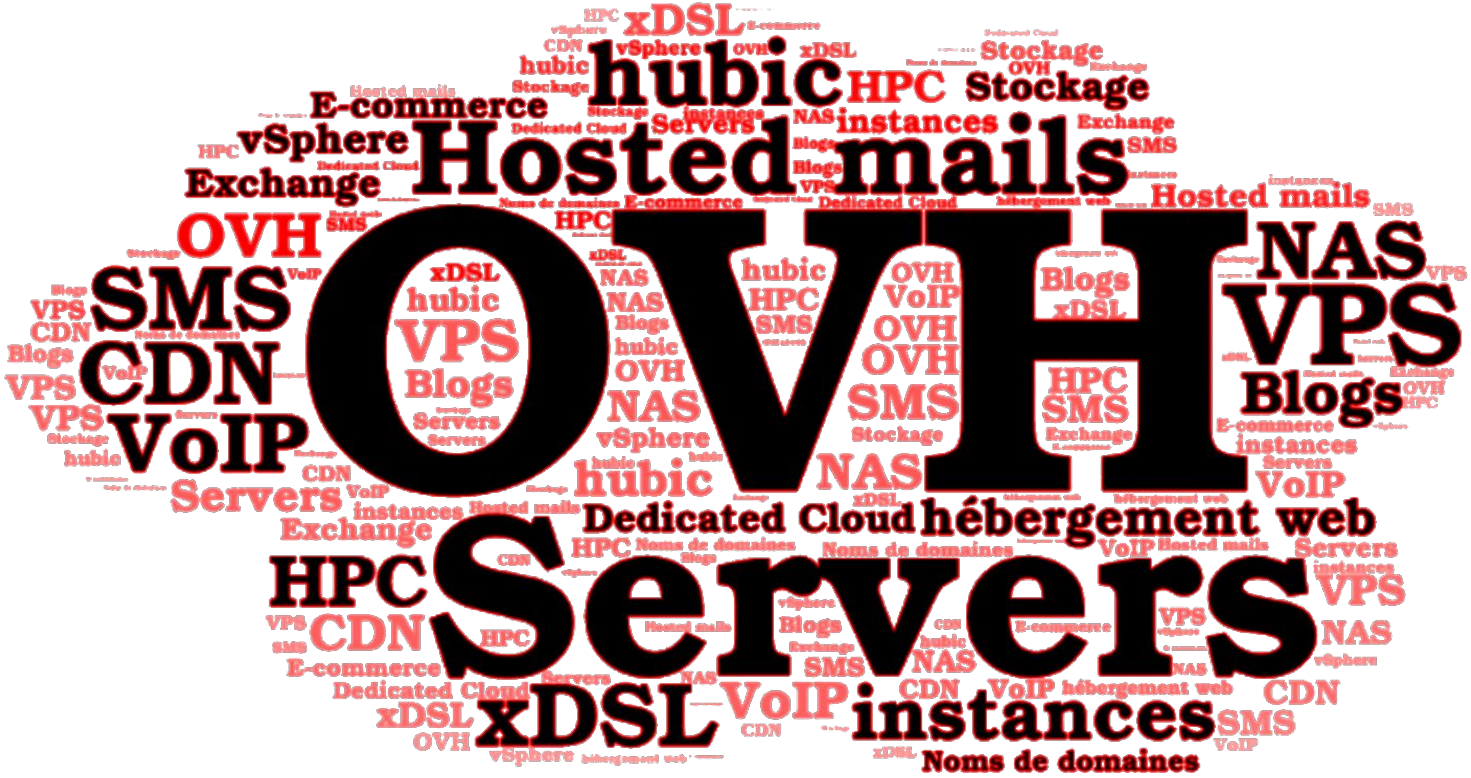


Metrics Data Platform

And why Warp 10?



Monitoring OVH



Metrics Data Platform

Some Metrics's metrics:

- 1.5M datapoints/s, 24h/7
- Peaks at ~10M datapoints/s
- 500M unique series
- Deleted (varying) up to 8M datapoints/s
- 2 Trillion deletes capacity per week

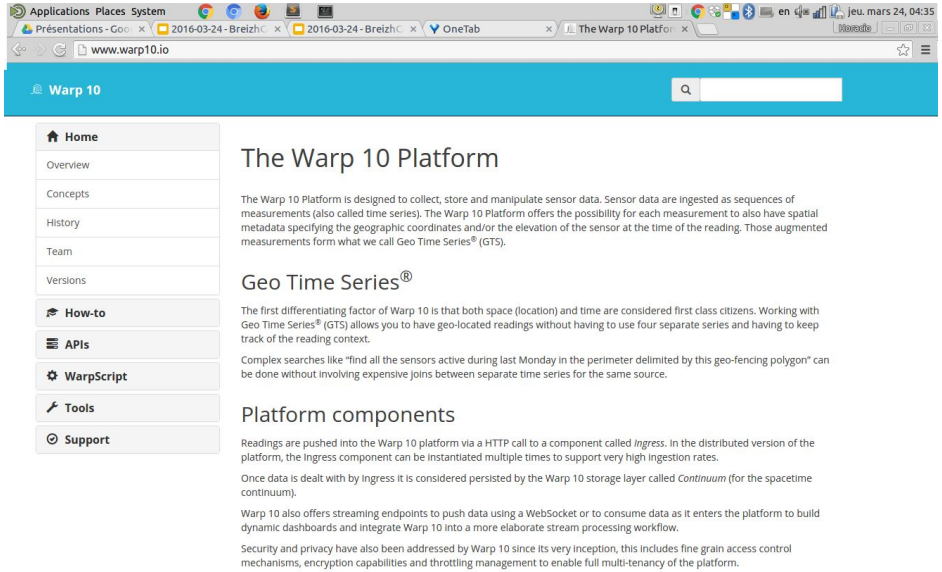
Warp 10

Open-source Time Series Database

More than a Time Series DB

Warp 10 is a software platform that

- Ingests and stores time series
- Manipulates and analyzes time series



Many time-series solutions

TSAR

OpenTSDB

influxdata

TempoIQ

Predix

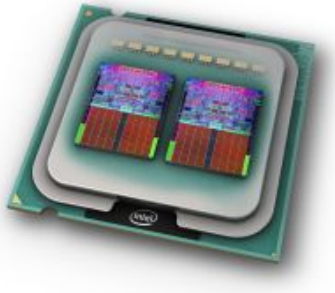
But they are only stores...

Fetching data is only the tip of the iceberg

Analysing the data

High level analysis must be done elsewhere

Algorithms are resource hungry



Your computer is not a datacenter

Manipulating Time Series

To be scalable, analysis must be done in the TSDB engine, not in user's computer

Manipulating Time Series with Warp 10

A true Time Series analysis toolbox

- Hundreds of functions
- Manipulation frameworks
- Analysis workflow

Why not a simple REST API?

- One endpoint by function?
- How to chain a workflow analysis?

REST API not suitable for complex manipulations

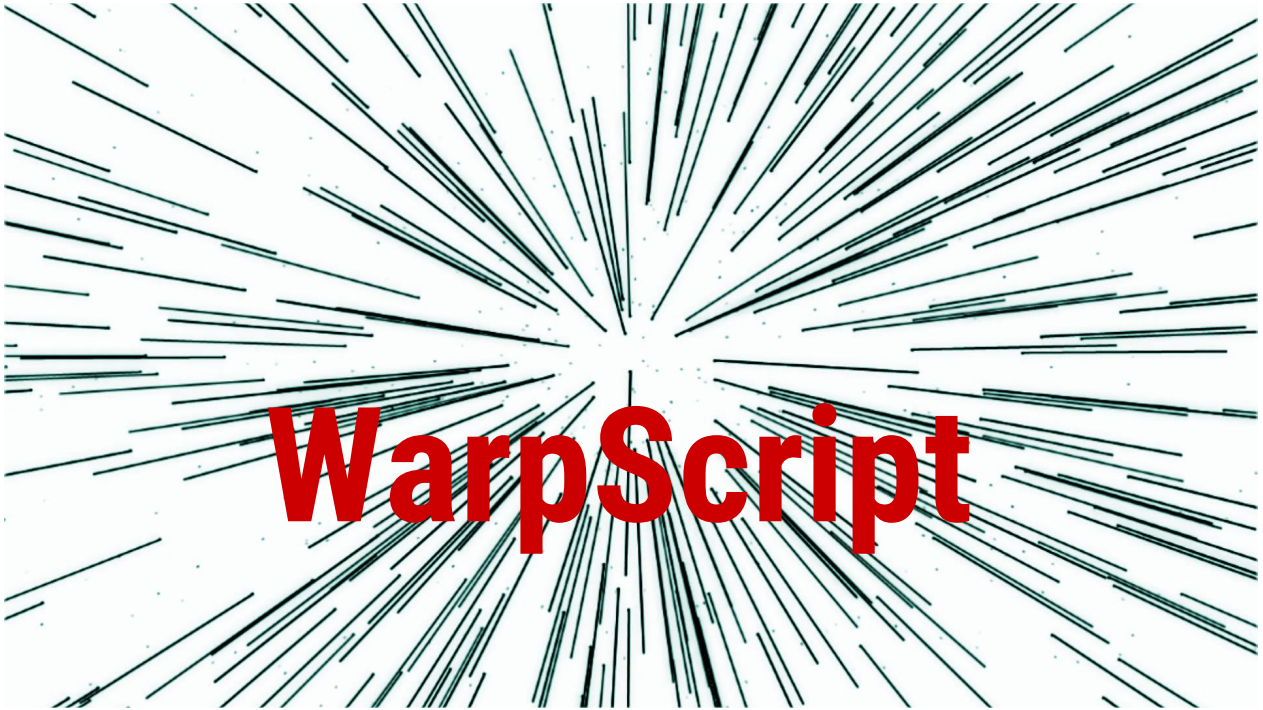
Why not a SQL dialect?

- How do you do a simple moving average in SQL?
- How do you geo-time fencing in SQL?

SQL is not adapted to TS analysis!

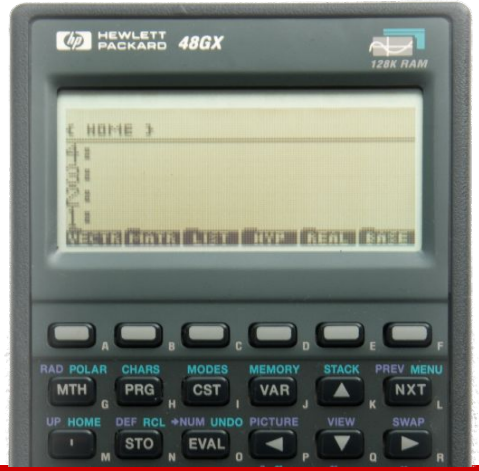
Manipulating Time Series with Warp 10

Solution: a Time Series manipulation language



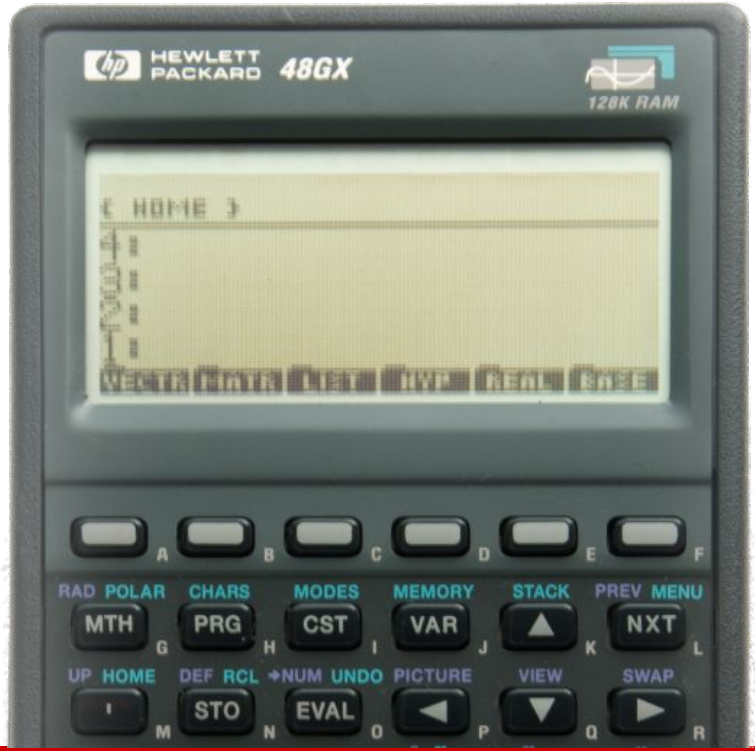
WarpScript

Time Series manipulation language



A stack based language

Input	2	3	add	11	mul	1	add
Stack	2	3 2	5	11 5	55	1 55	56



Basic operations

```
// This is a commentary
'a'   // string value
true  // boolean value
42    // long value
3.14159 // double value
+     // operations

20 22 + // several items in one line
```


Five frameworks

- BUCKETIZE
- MAP
- REDUCE
- FILTER
- APPLY

More than 800 functions

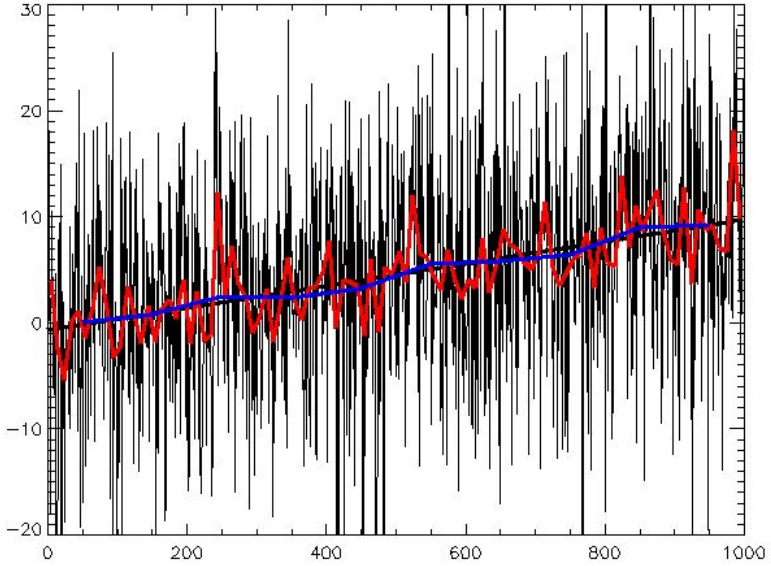
Trigonometry

Data & Time

Macros

List & Maps

Logic Structures

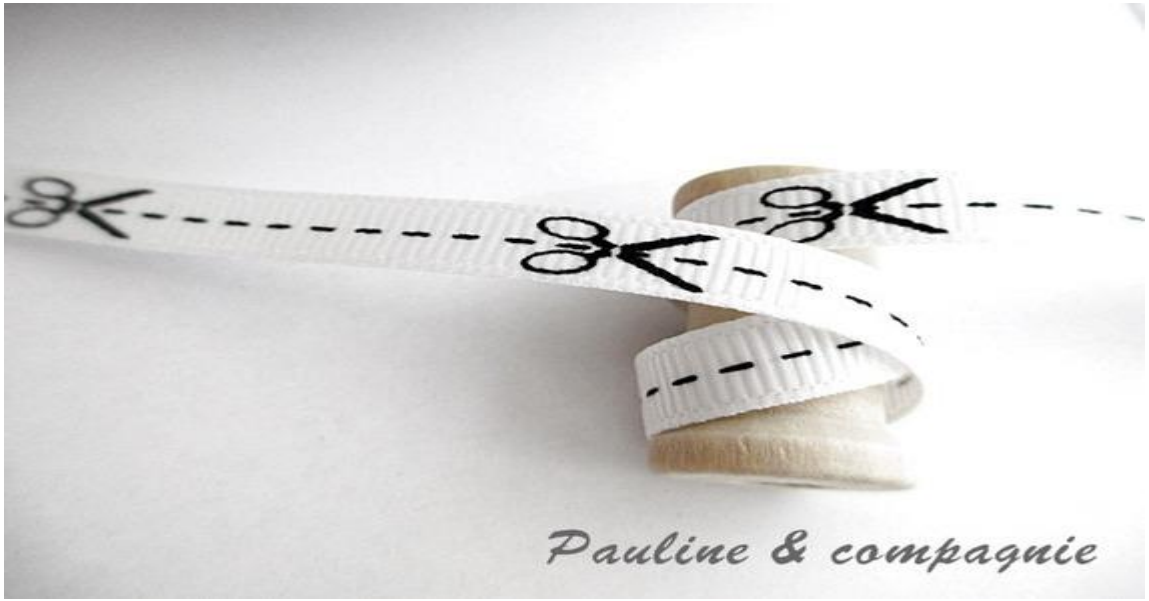


Strings

Maths & statistics

Loop Structures

Time series functions



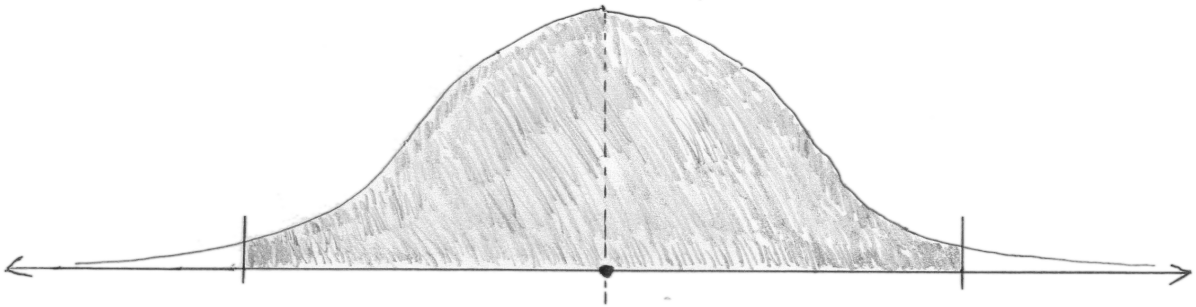

```
TIMECLIP

TIMESPLIT

SHRINK

MERGE
...
```

Time series functions



MUSIGMA

NORMALIZE

NSUMSUMQ

STANDARDISE

ZSCORE

Geo-Time Series functions

Geo mapping (WKT)

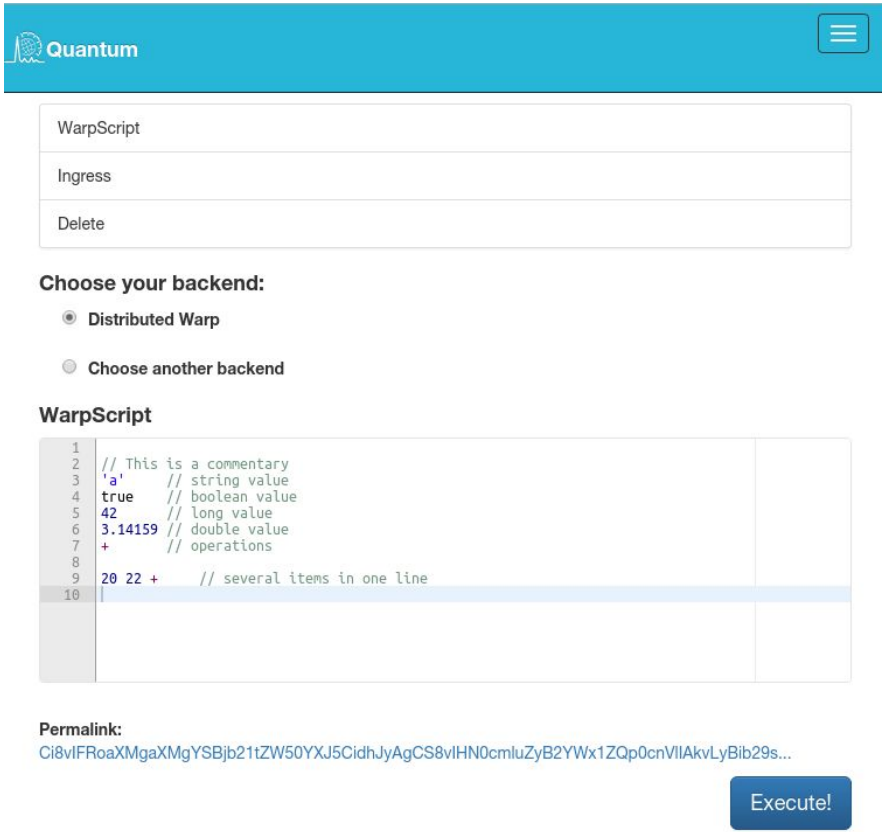
Horizontal & vertical speed

Horizontal & vertical distance

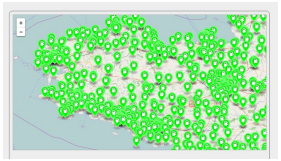
Haversine

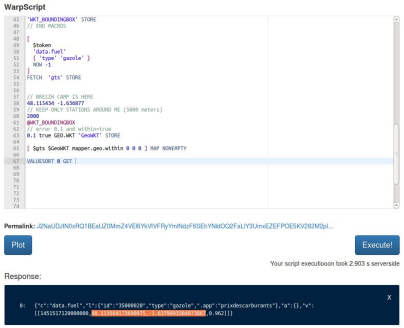
...

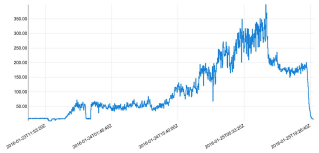
Quantum IDE


Quantum
WarpScript
Ingress
Delete
Choose your backend:
Distributed Warp
Choose another backend
WarpScript
1 // This is a commentary
2 'a' // string value
3 true // boolean value
4 42 // long value
5 3.14159 // double value
6 + // operations
7
8 20 22 + // several items in one line
9
10
Permalink:
Ci8vIFRoaXMgaXMgYSBjb21tZW50YXJ5CidhJyAgCS8vIHN0cmluZyB2YWx1ZQp0cnVlIAkvLyBib29s...
Execute!

Warp 10 platform and tools



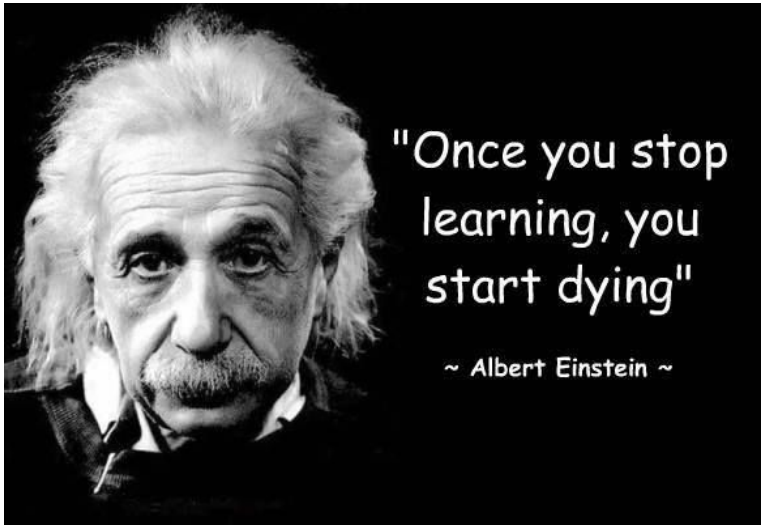




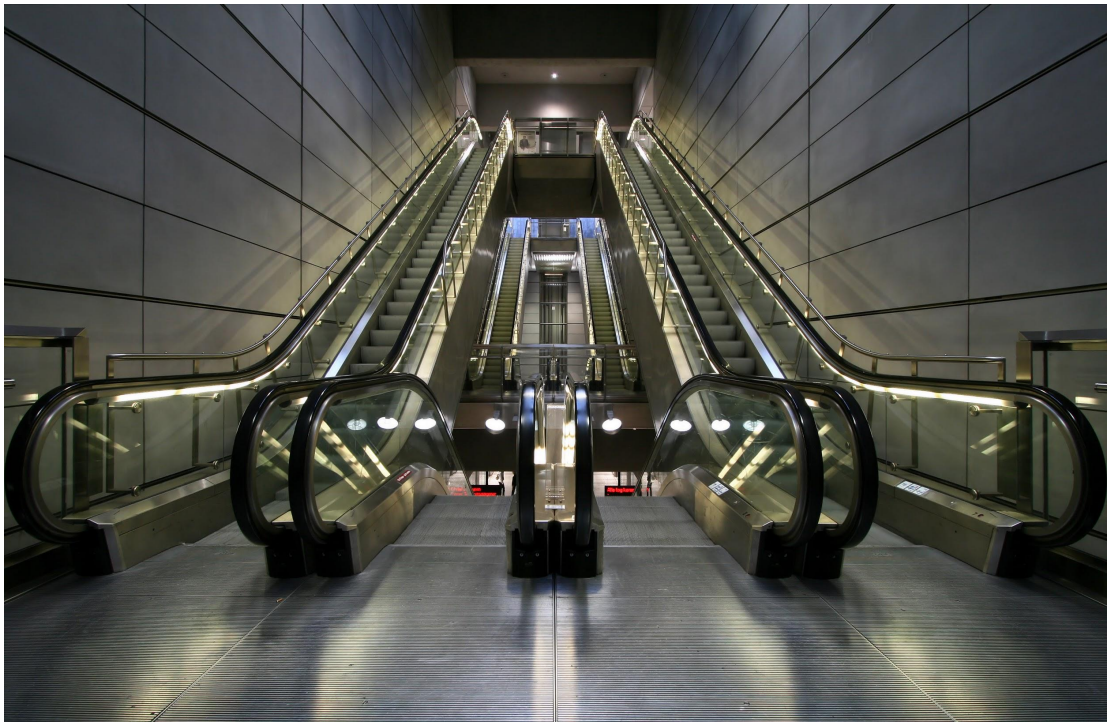
Warp 10

And this is only the surface

Possibilities are endless



Think differently



Time Series are everywhere

Thank you!


рахмат
danke
謝謝
spas
ngiyabonga
شكراً جزيلاً
Баярлалаа
mersi
kia ora
barka
welalin
tack
teşekkür ederim
mahalo
tapadh leat
спасибо
faafetai lava
vinaka
спасибі
blagodaram
dank je
misaotra
matondo
paldies
grazzi
kiitos
dankie
nanni
nandri
dhanyavad
thank you
gracias
хвала
asante
manana
obrigada
tenki
bedankt
bayarlalaa
gràcie
hvala
maururu
köszönöm
aciu
akun dankon
djiere dieuf
tau
mochchakkeram
murakoze
enkosi
dziękuję
дякую
mamnun
chokrane
chnorakaloutioun
gratias ago
gràcies
sulpáy
taiku
go raibh maith agat
sobodi
děkuji
obrigado
sağolun
sukriya
kop khun krap
arigatô
takk
dakujem
trugarez
mèsi
didi madloba
najis tuke
ありがとう
tanemirt
grazie
kam sah hamnida
rahmat
terima kasih
rahmet
ευχαριστώ
diolch
dhanyavadagalu
shukriya
merče
мерси
তোমাকে ধন্যবাদ
감사합니다
xièxie
merci