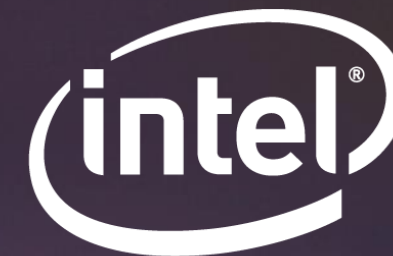




**Hewlett Packard  
Enterprise**



# The Future of Technology Begins

**Fernando Rio Maior**

Senior Solutions Architect  
Hewlett Packard Enterprise Portugal

SAS Forum Portugal 2016 | 27 de Outubro de 2016

Intel e o logótipo Intel são marcas registadas e/ou marcas comerciais registadas da Intel Corporation, nos E.U.A. e noutros países.





## Global Mega Trends 2020

**Connectivity** - 80 billion connected devices worldwide

**IoT** - Reaches \$3.0 trillion; 30bi autonomous things attach to Internet

**Mobility**- 9.5 billion mobile subscriptions

**Big Data Analytics** - Data traffic values at 44 Zb

**Smart cities** - Market value of \$1.57 trillion

**Mobile Robot** - Fully autonomy machines

**Cloud in Services** - Public cloud market reaches \$191 billion

**Enterprise Security** - 50% of mobile access via biometrics

Magnitude of the data

Real-time insight needed

Velocity of data

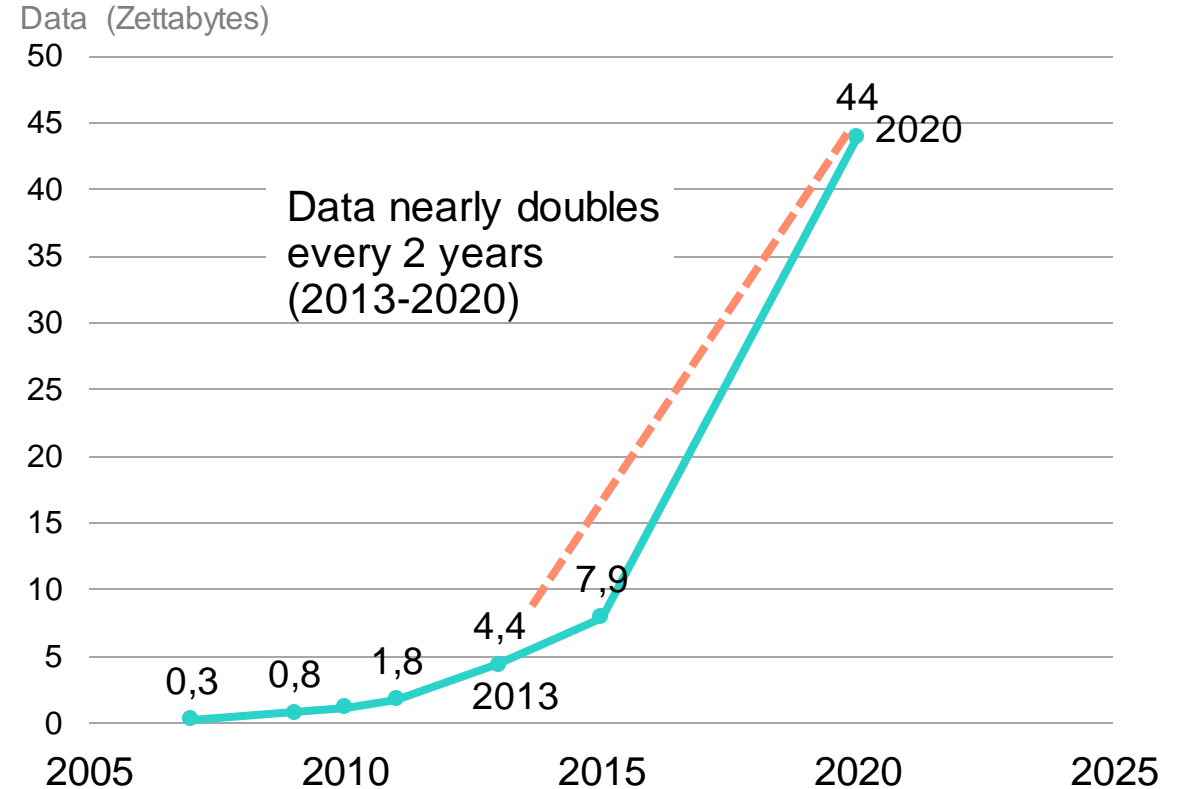
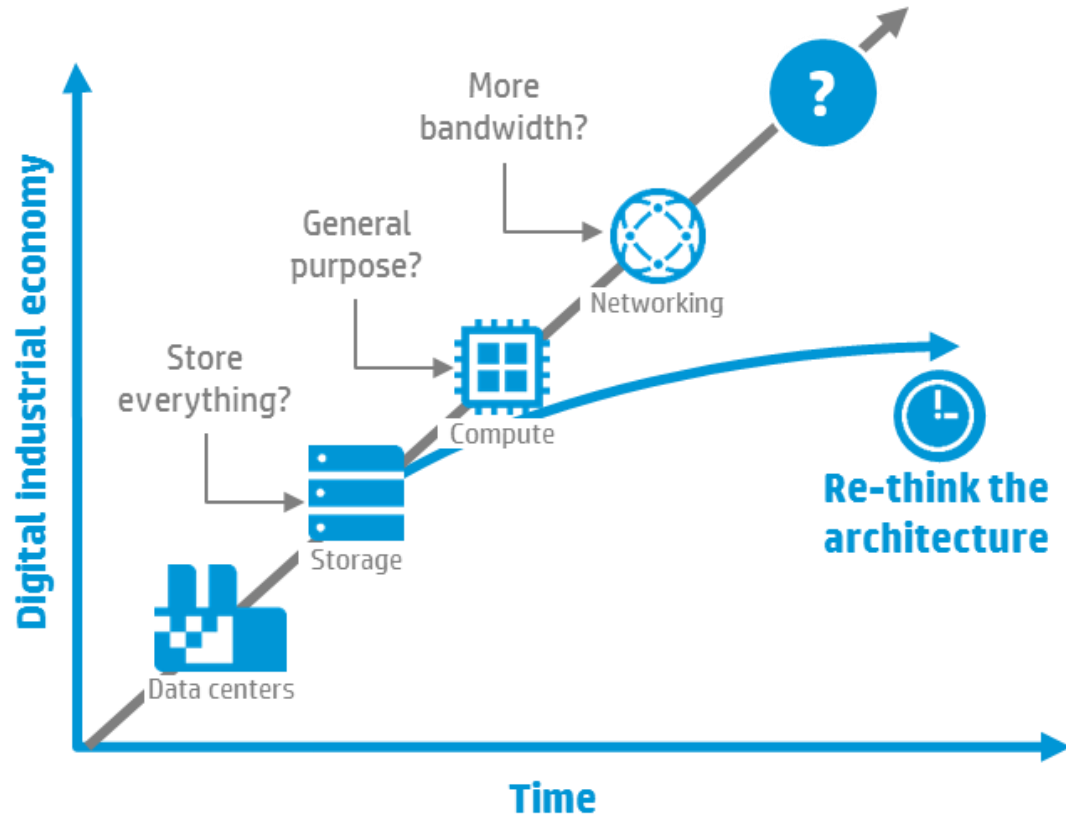
Unable to secure

Time-consuming data integration

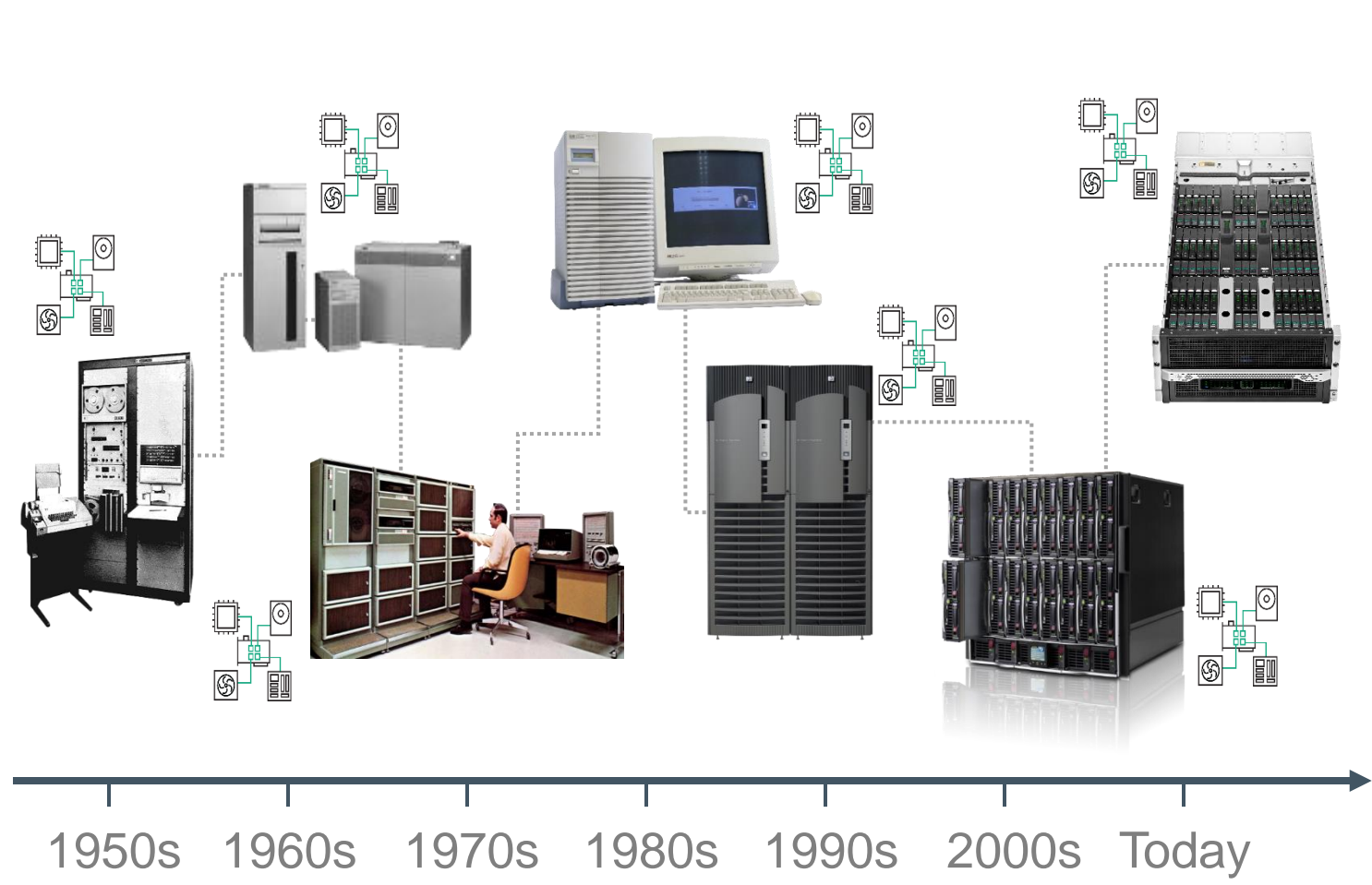
**Insufficient resources**

# The end of scaling at just the wrong time...

Compute is not keeping up



# The Past 60 Years



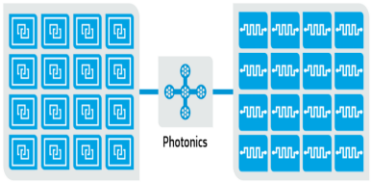
It's time to rethink how computers are built



Quantum



Neuromorphic



Special purpose cores      Photonics      Massive memory pool

The Machine

# The Machine



## Powerful

A quantum leap in performance, beyond what you can imagine

## Open

An open architecture designed to foster a vibrant innovation ecosystem

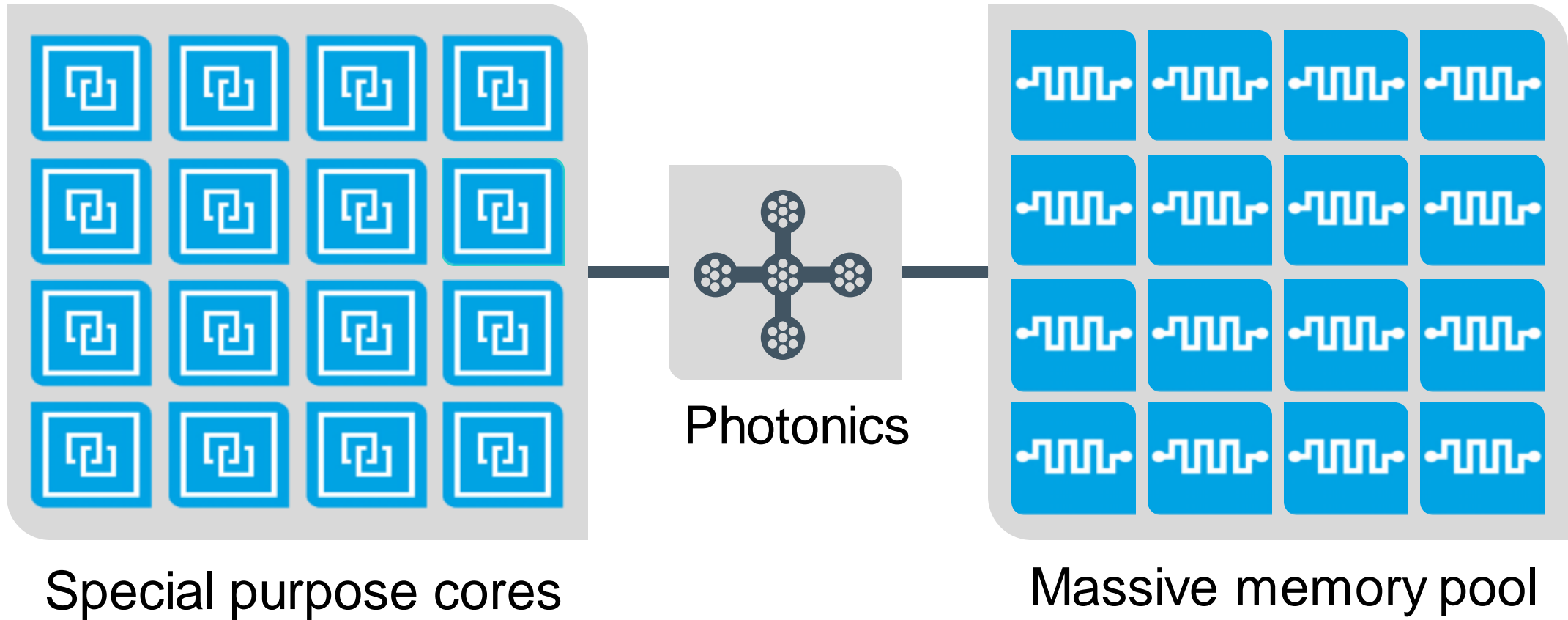
## Trusted

Always safe, always recoverable

All the benefits without asking for sacrifice

## Simple

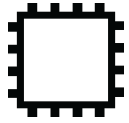
Structurally simple, manageable and automatic, so that “it just works”



# The Machine

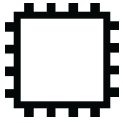
# Speed is relative

Imagine if a computer ran at human speed



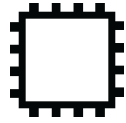
**Processor**

1 Nanosecond



**SRAM**

5 Nanoseconds



**DRAM**

100  
Nanoseconds



**Flash**

200,000  
Nanoseconds



**Hard Drive**

10,000,000  
Nanoseconds



**Tape**

40,000,000,000  
Nanoseconds

**Human**

30 cm



A ruler

**Human**

1.5 m



About 3 steps

**Human**

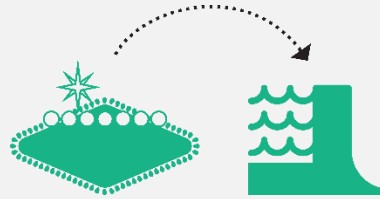
30 m



About 10 times  
around your desk

**Human**

61 Km



The distance from the  
Venetian, Las Vegas to the  
Hoover Dam

**Human**

3.048 Km



The distance from  
Los Angeles, CA to  
New Orleans, LA

**Human**

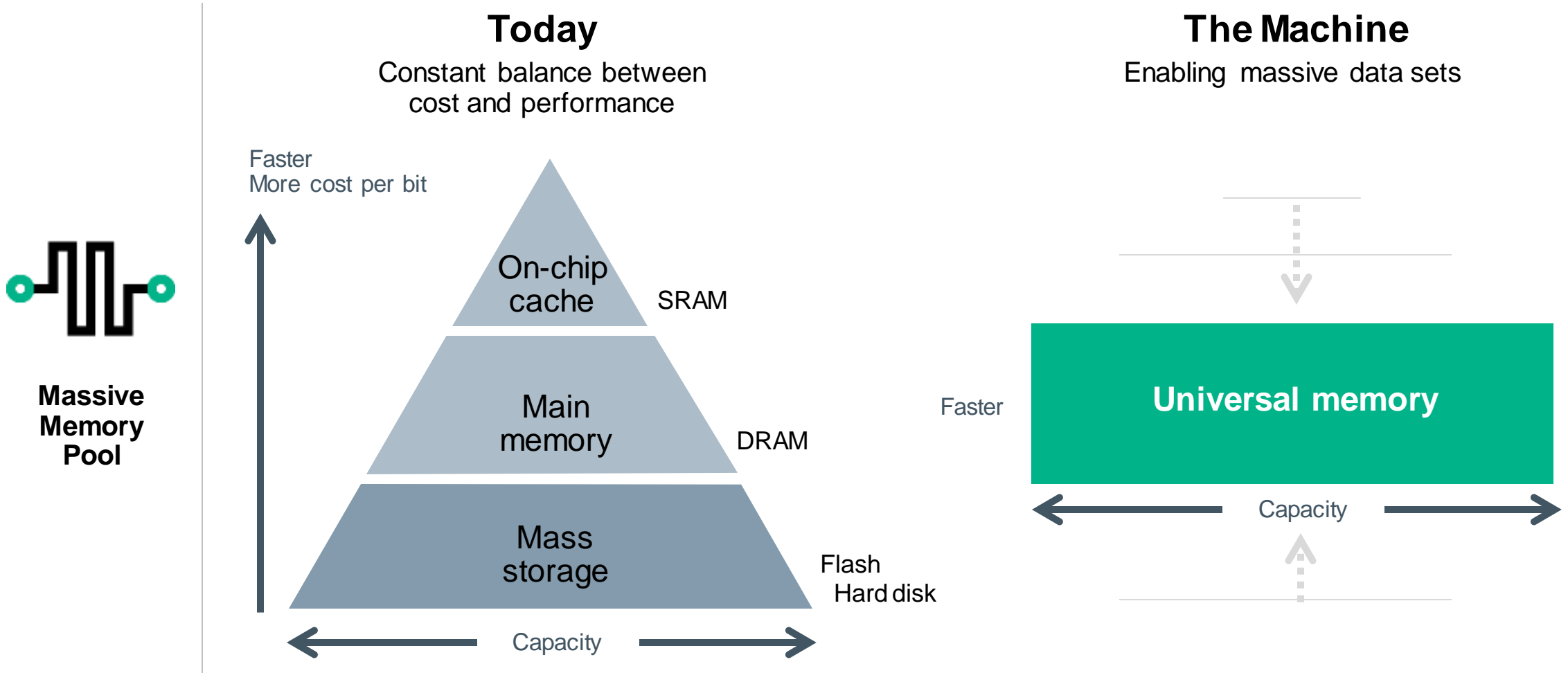
412.192.000 Km



304 times around  
the earth



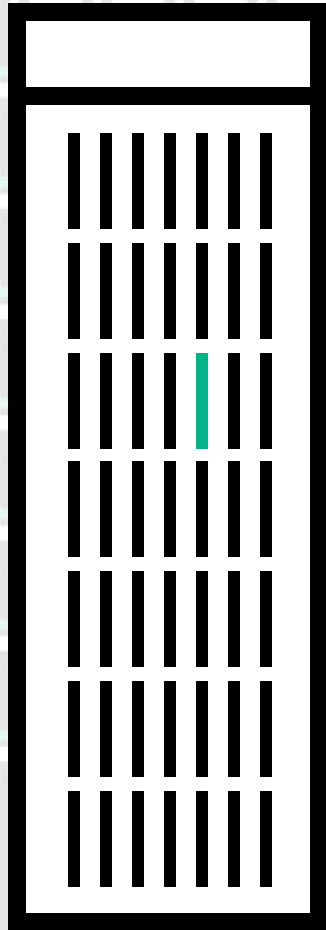
# Making the memory hierarchy obsolete



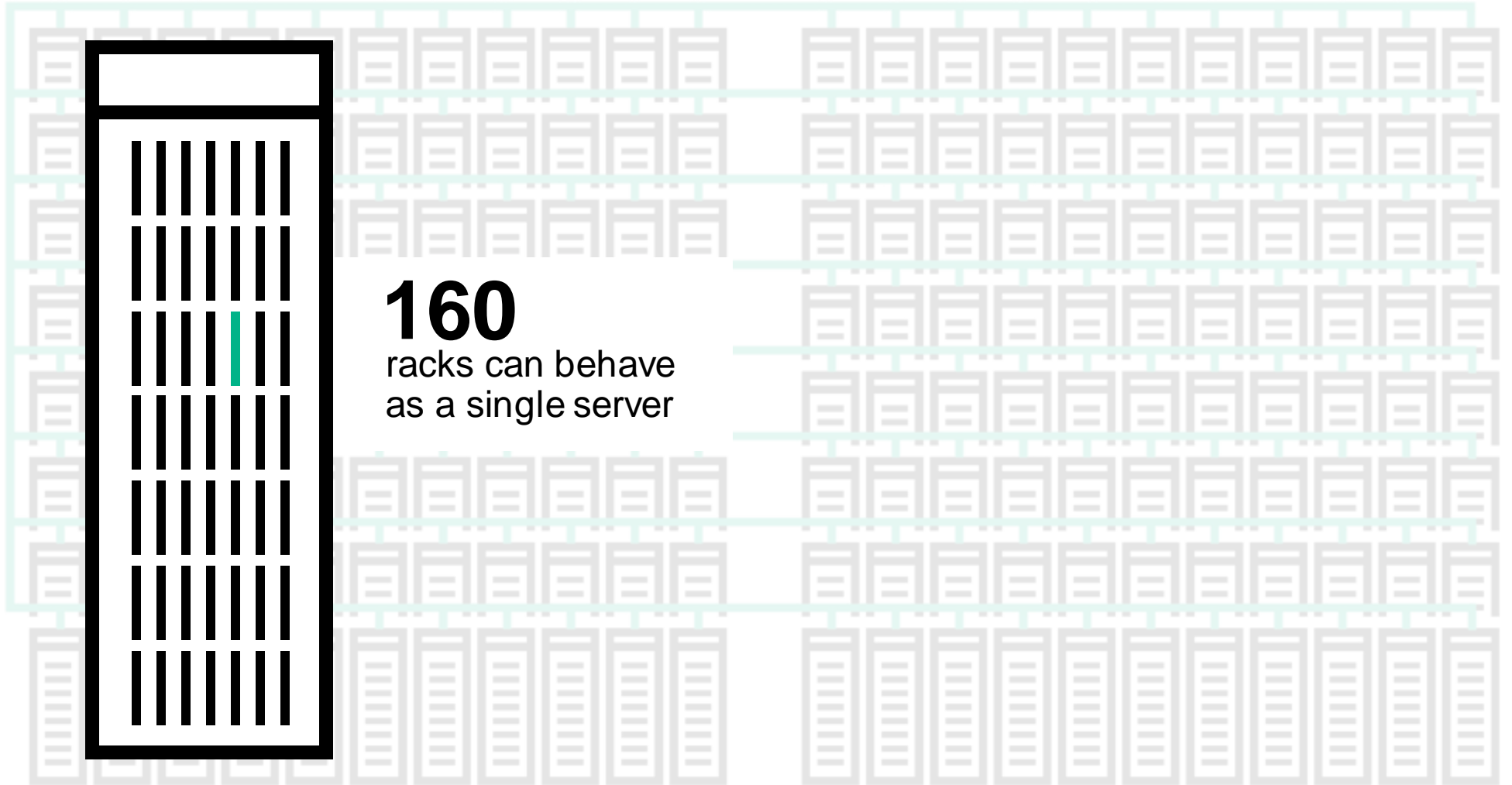
# Photonics destroys distance



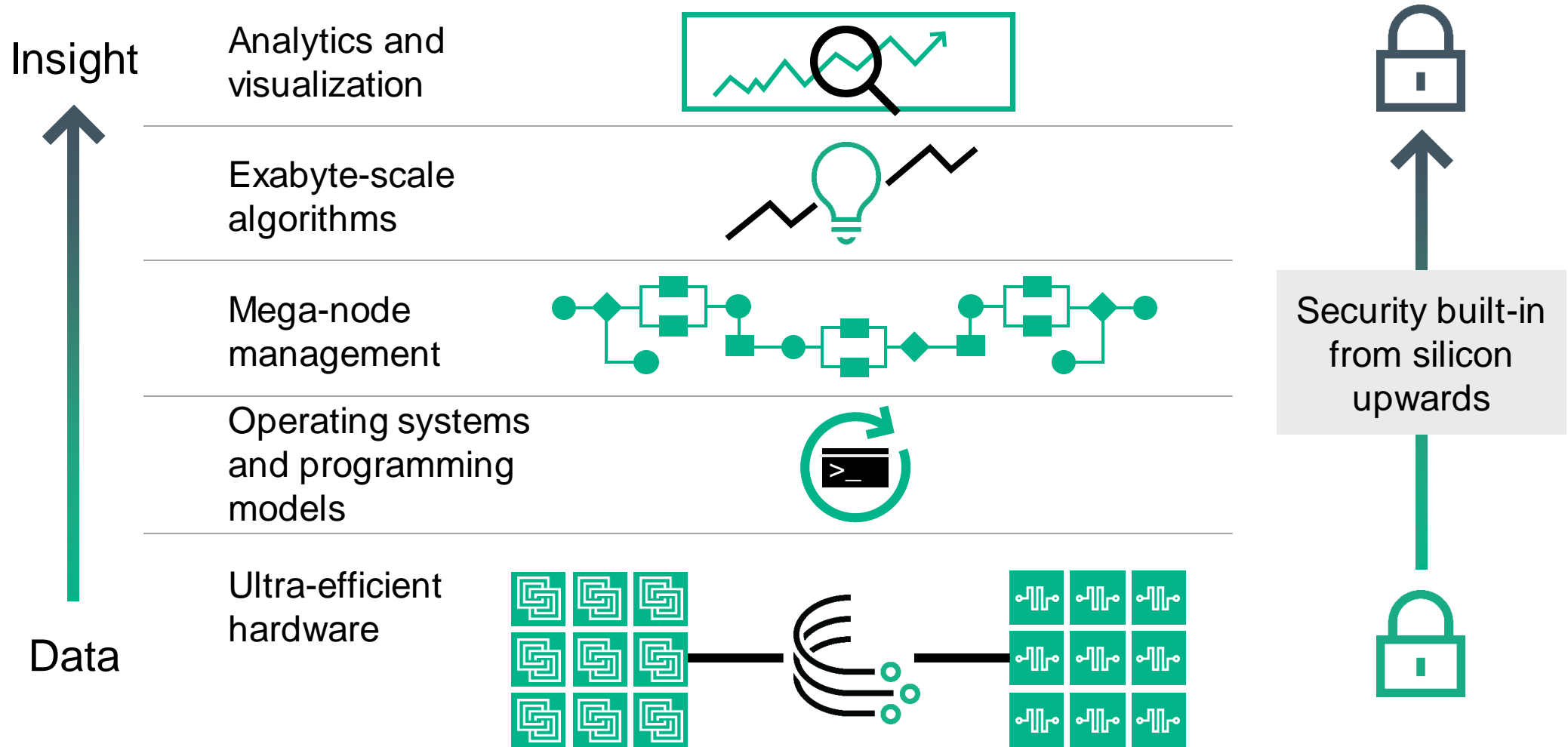
Photonics



**160**  
racks can behave  
as a single server



# Hardware + software stack



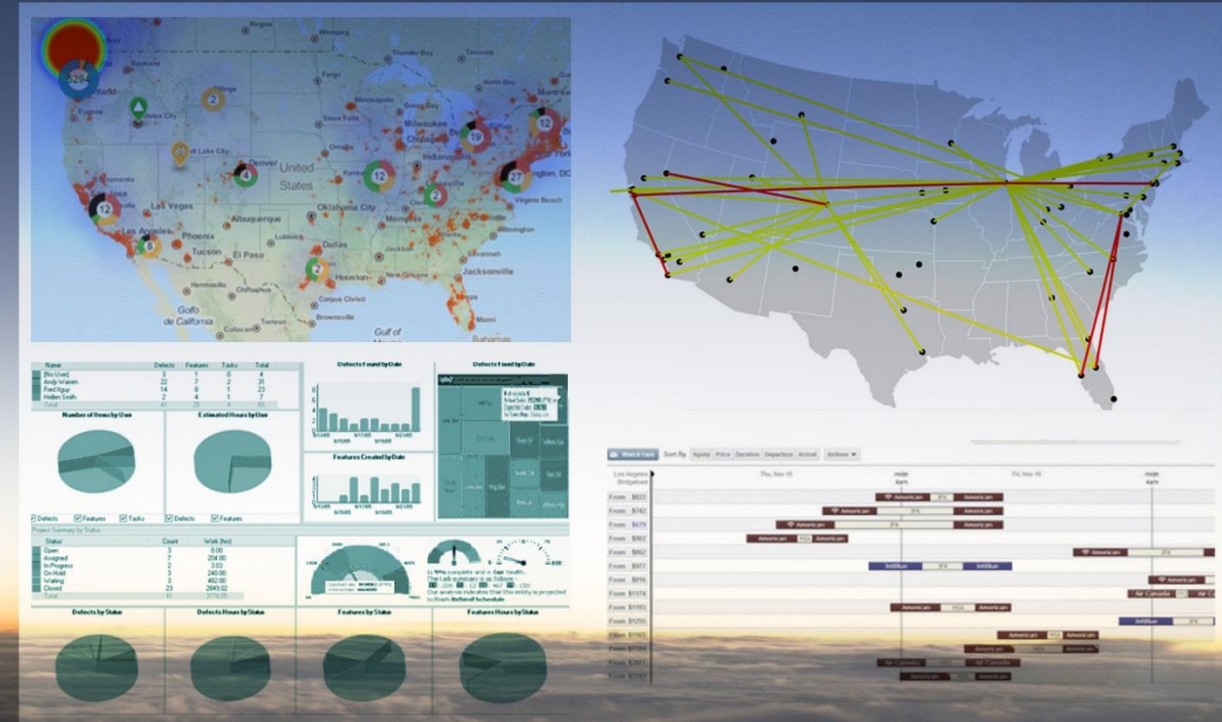


**What kind of world becomes possible?**

# What if we could pre-compute an almost infinite set of “what ifs”?

Optimization over a large search space in real time becomes realistic

Solve complex problems before they happen



# Machine Learning that can keep up with the now

Training up-to-date deep neural networks in minutes, not weeks

“Tell me the latest news on the severe weather.”

Contextual ads

Relevant content

Keeping up with every click, every meme

Suggested topics

$$J(W, b; x, y) = \frac{1}{\sigma} \|h_{W,b}(x) - y\|^2$$
$$W_{\theta}^{(l)} = \dots$$
$$b_i^{(l)} = b_i^{(l)} - \alpha \frac{\partial}{\partial b_i^{(l)}} J(W, b)$$

---

**Thank you**

**This changes  
everything**