

The background of the slide features a dense, abstract network visualization. It consists of numerous small, colorful dots (yellow, green, blue, orange) connected by thin, translucent lines of the same colors, creating a complex web-like structure that suggests a neural network or a complex system of data connections.

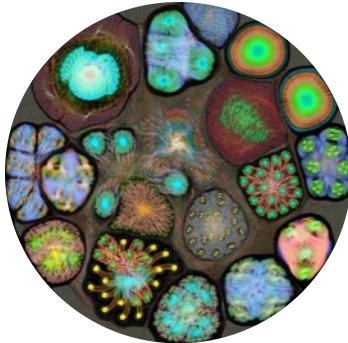
# Graphcore®

A new kind of hardware  
designed for machine intelligence

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# Graphcore

## Technology



Intelligence Processing Unit

## Products



AI Servers and Accelerators

## Investors



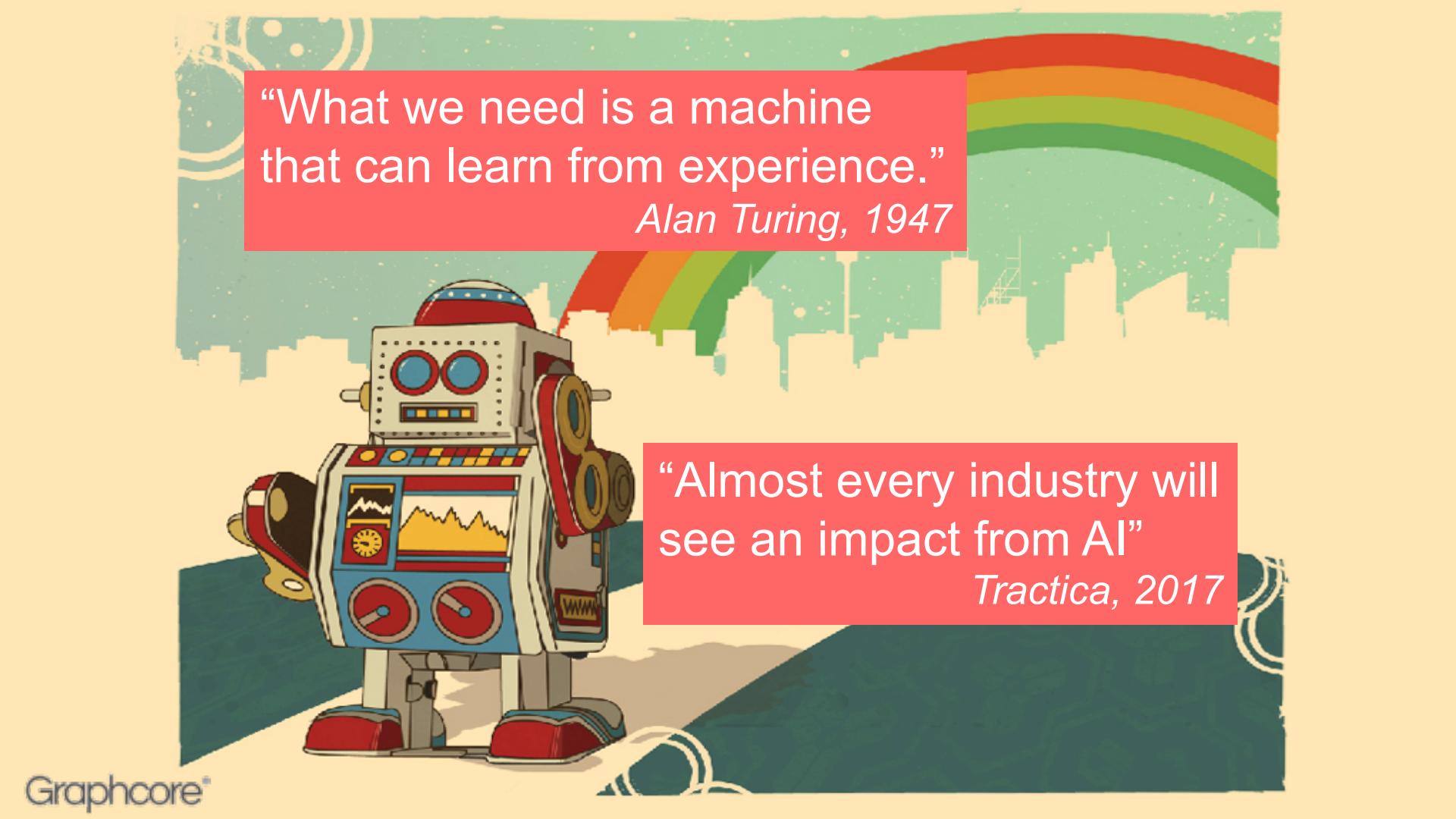
Amadeus Capital



BOSCH



\$30m Series A July 2016



“What we need is a machine  
that can learn from experience.”

*Alan Turing, 1947*

“Almost every industry will  
see an impact from AI”

*Tractica, 2017*

## Nervous System

takes input from sensors

controls muscles & movement

surprisingly ‘smart’

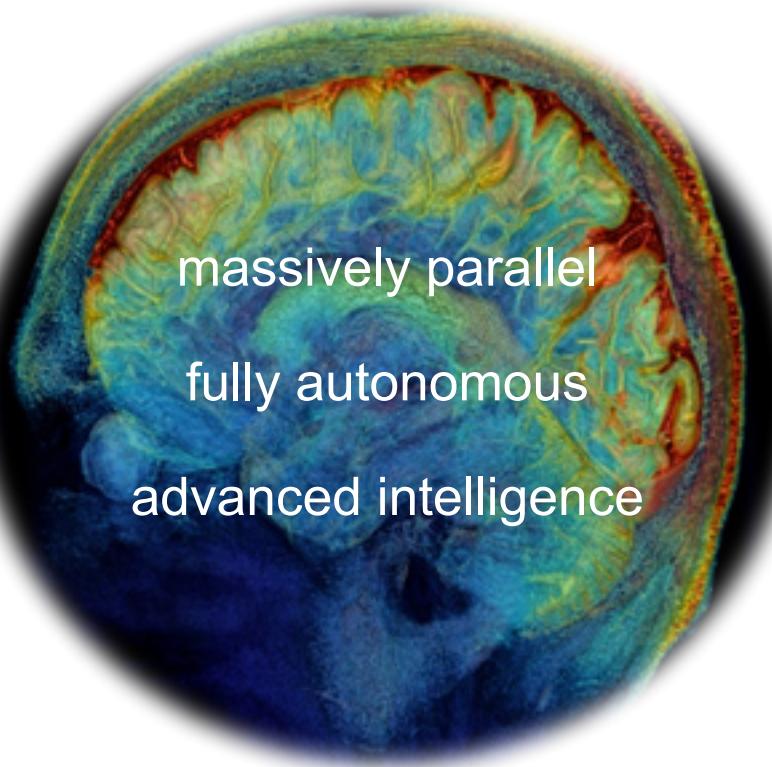
## Processor

handles inputs

controls outputs

runs smart programs

## Human Brain

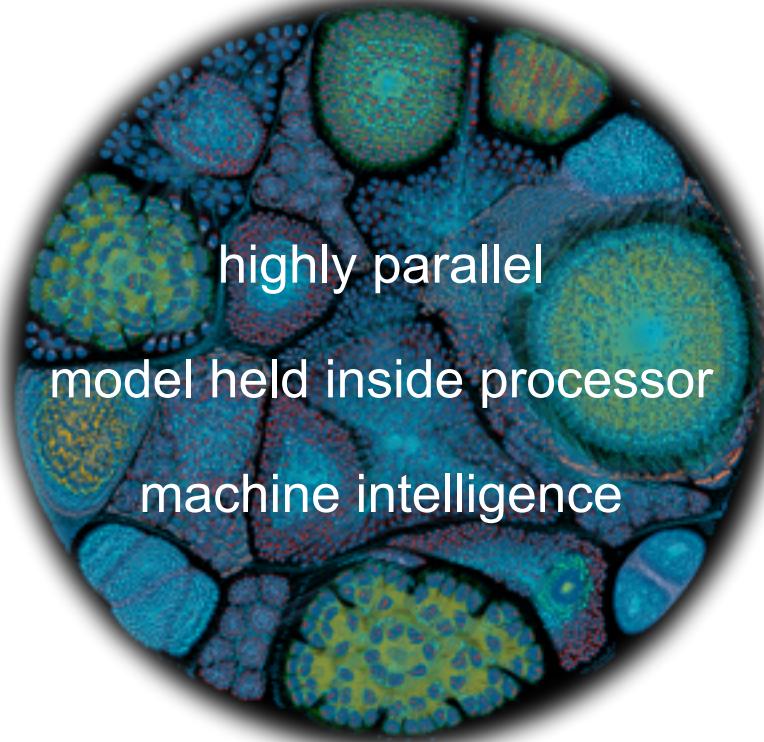


massively parallel

fully autonomous

advanced intelligence

## Intelligence Processor



highly parallel

model held inside processor

machine intelligence

*visualization from Graphcore Poplar framework*

# What is intelligence?

A female scientist with dark hair tied back is wearing a white lab coat. She is looking through the eyepiece of a compound light microscope. Her hands are visible as she holds the microscope's body. The background is a blurred laboratory setting.

the capacity for judgement  
informed by knowledge  
adapted by experience

# Intelligent Compute

## Learning

condensing data  
into a  
**high-dimensional  
knowledge model**

## Judgement

**summarizing the contents**  
of the  
knowledge model

## Prediction

given some **inputs**  
using the model to  
**deduce probable outputs,**

## Inference

given some **outputs**  
using the model to  
**deduce probable inputs,**

all are optimization processes  
suitable for one compute machine

Knowledge models are naturally represented as **graphs**...

vertices are **features**  
edges are **correlations**



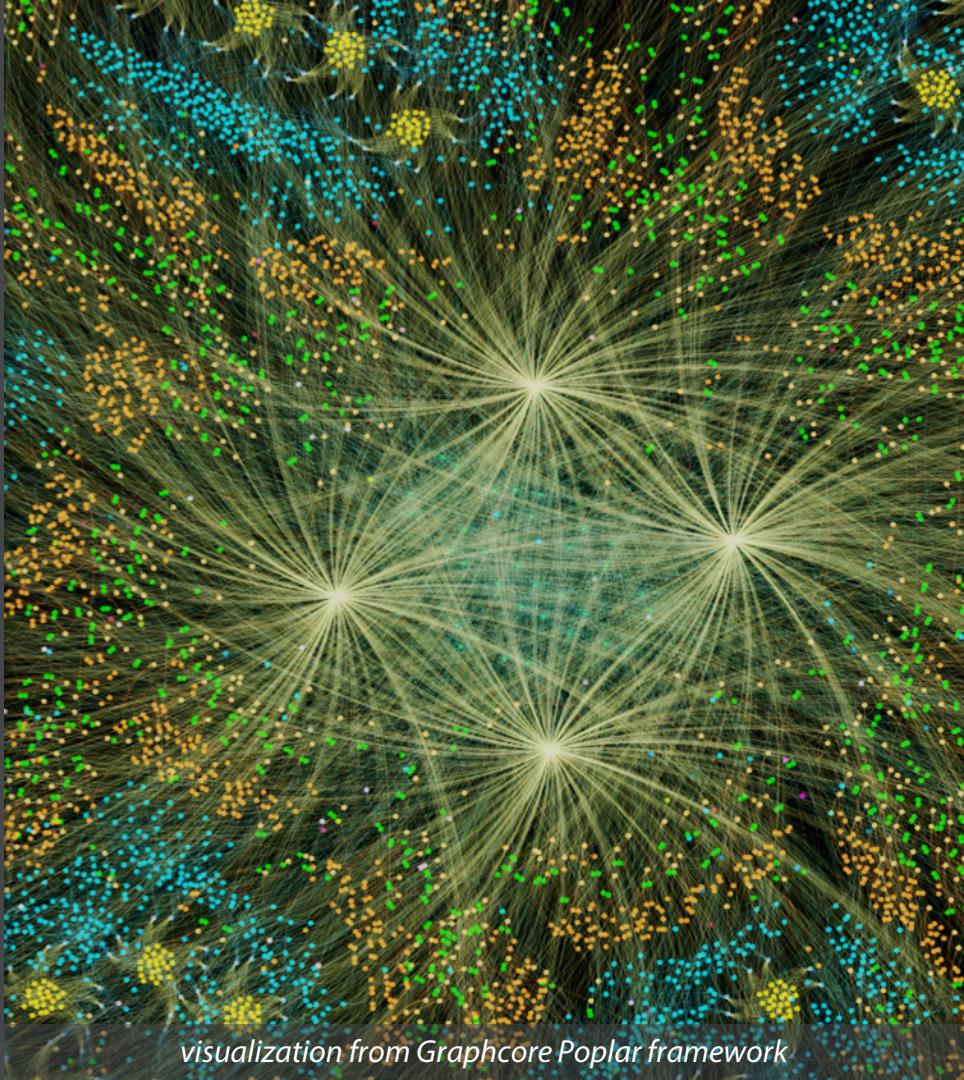
*visualization from Graphcore Poplar framework*

Graphs expose huge **parallelism**

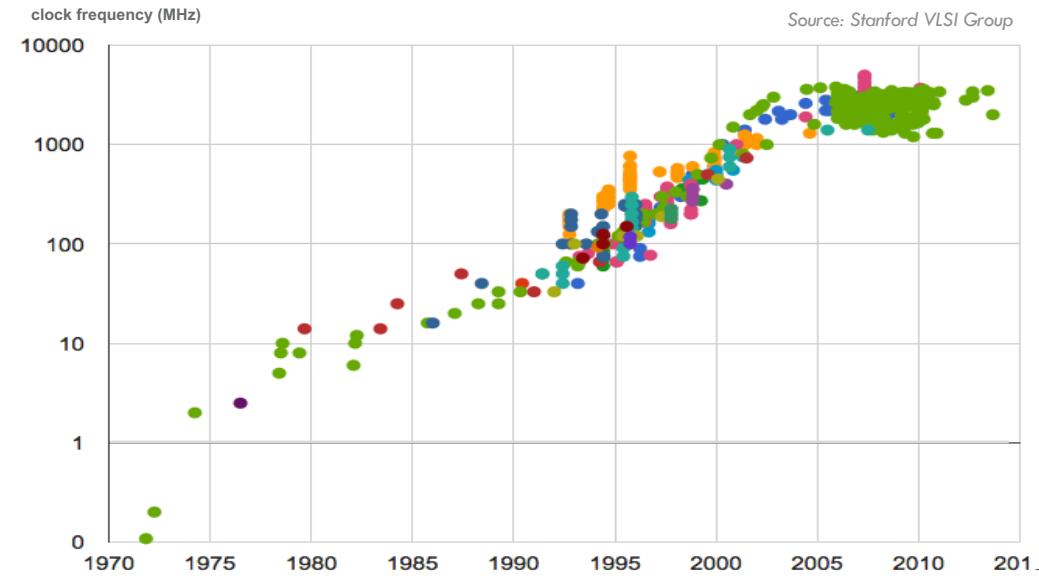
**Sparsity** changes  
memory access patterns

**Static** structure allows  
compiler to do more work

Model values are **low-resolution**



# Processors are not getting faster...

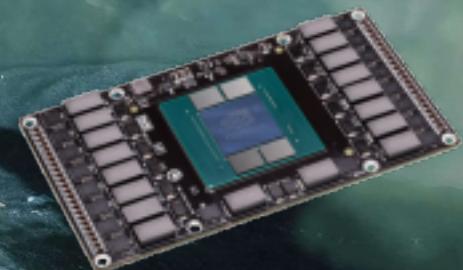


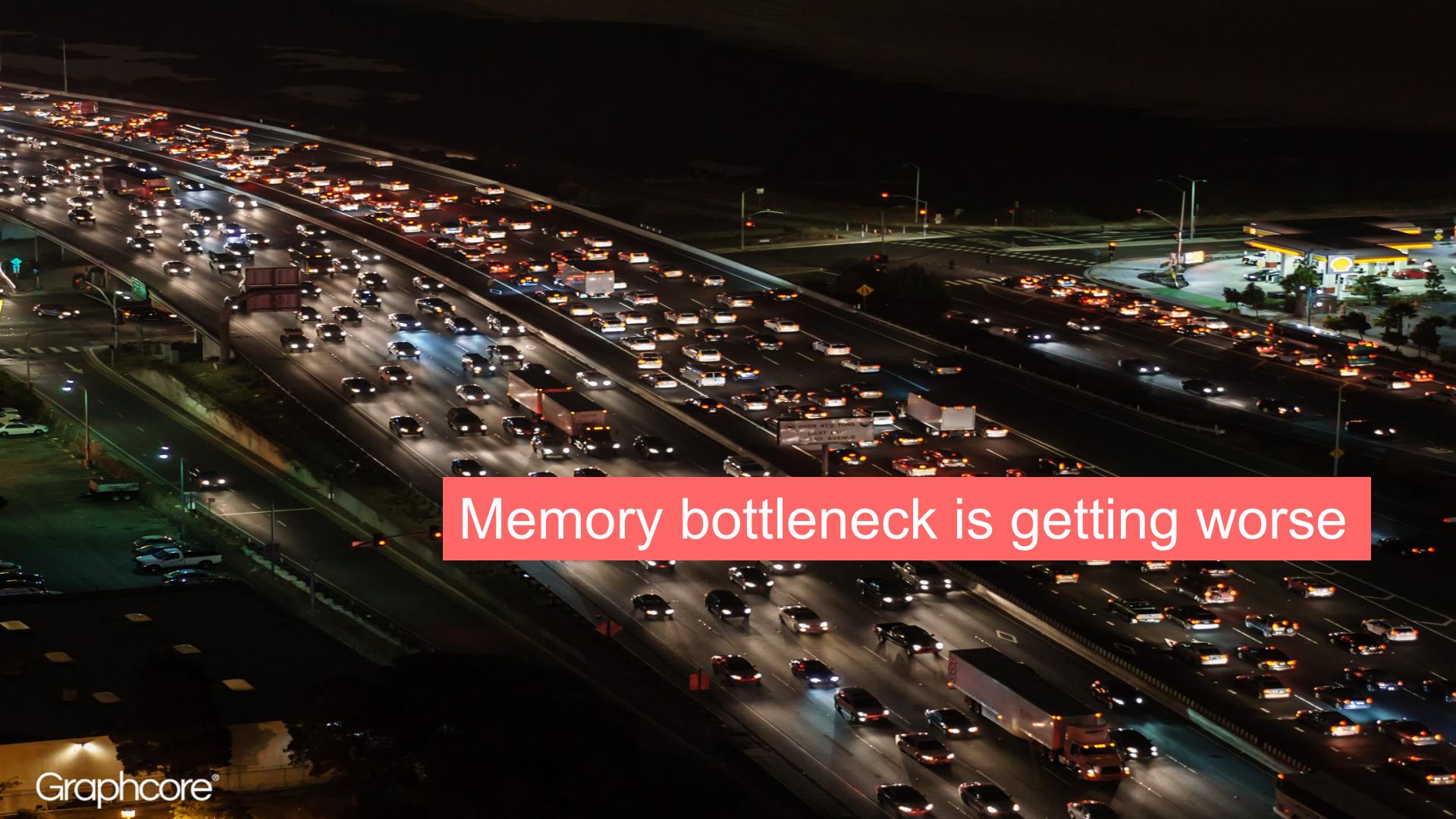
*...we have reached the limits of **Dennard Scaling***



# GPU's are great for gaming

were the highest compute density processors available  
dense-vector architecture limited to matrix operations  
not efficient for the next generation of machine learning

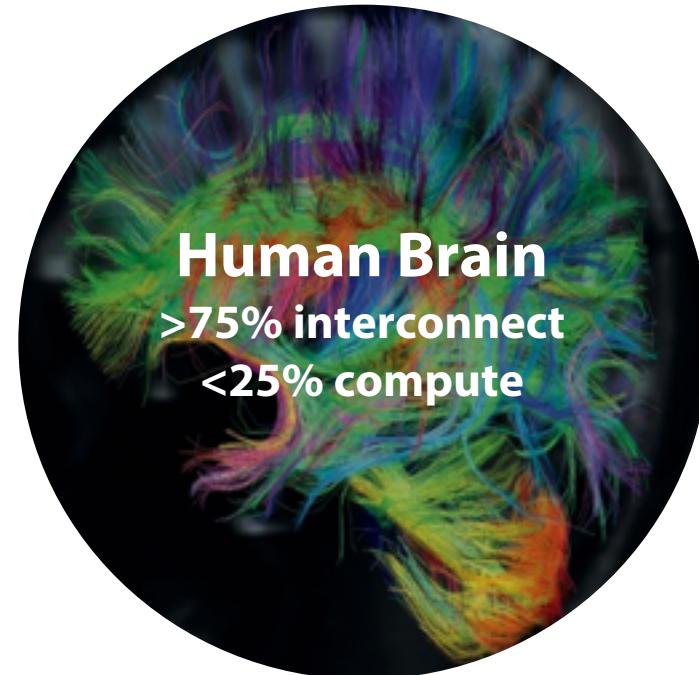
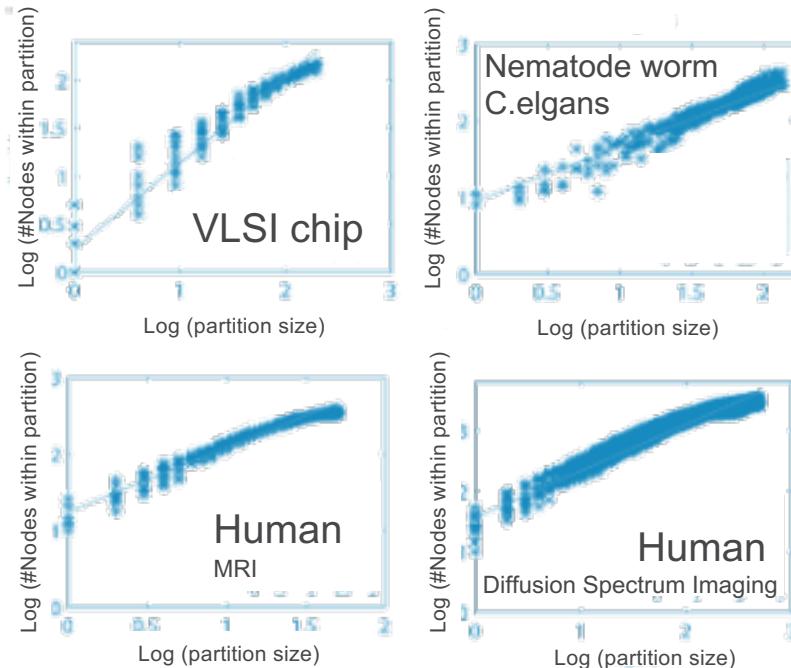


An aerial night photograph of a multi-lane highway. The road is filled with numerous cars and trucks, their headlights and tail lights creating bright points of light against the dark night sky. The highway curves through the frame, with several on-ramps and off-ramps visible. In the background, there are some buildings and streetlights. A large red rectangular box is overlaid on the bottom right portion of the image, containing the text.

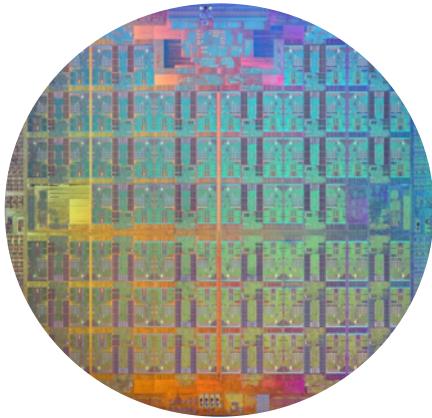
Memory bottleneck is getting worse

# How processor-cores cooperate is key...

## Rentian scaling

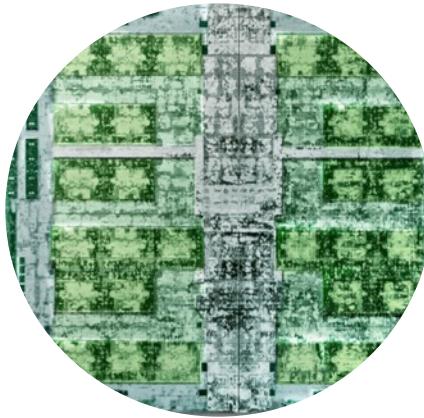


# A new type of processor is required



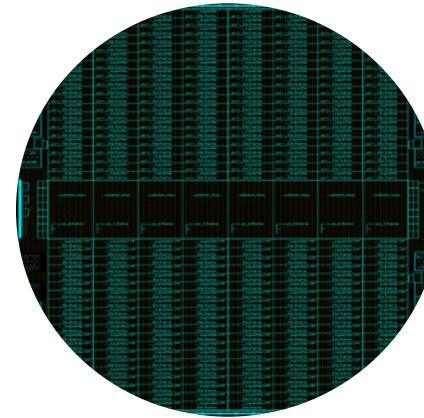
**CPU = Scalar**

Designed for office apps  
Has evolved for the web



**GPU = Vector**

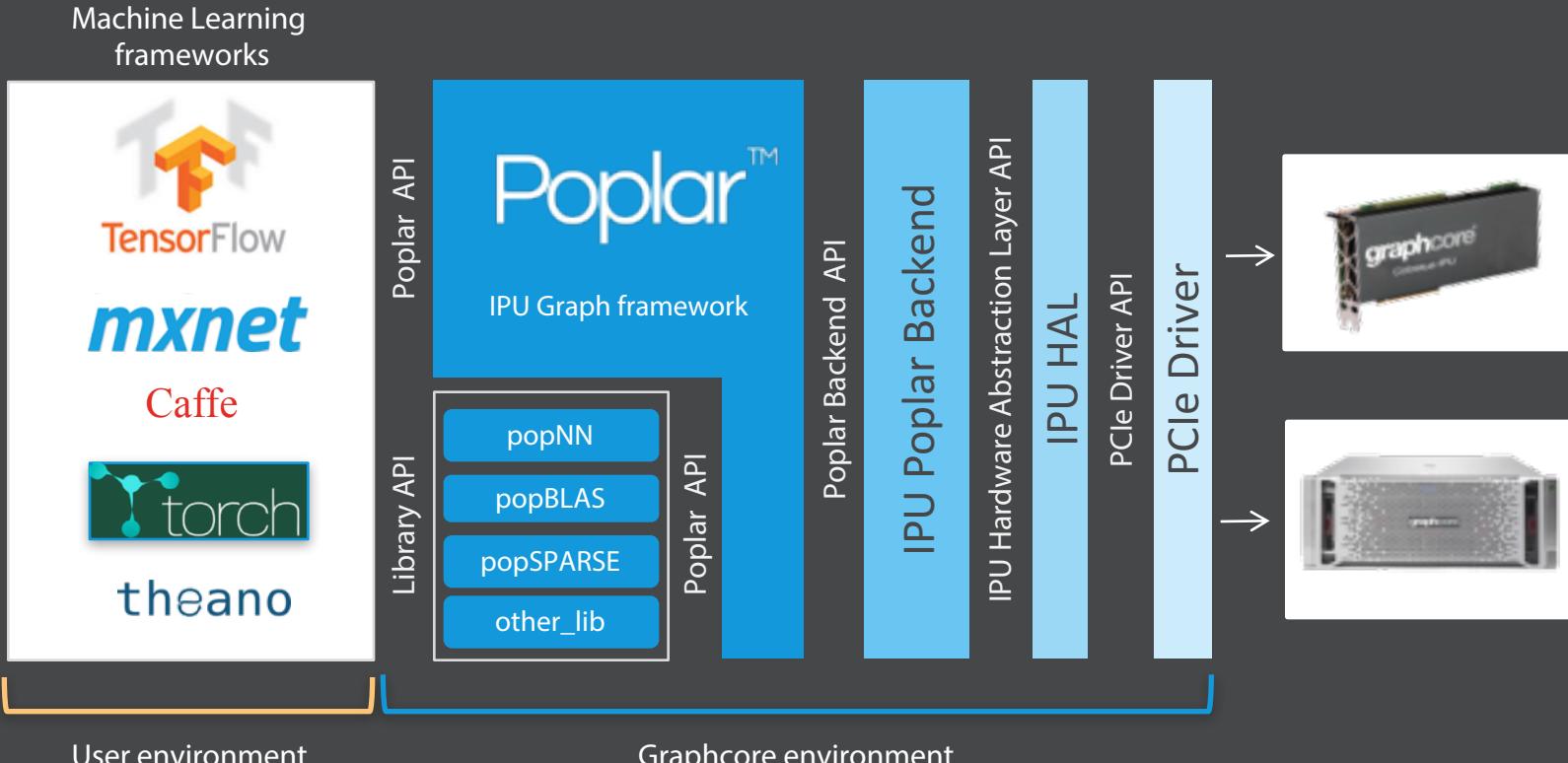
Designed for graphics  
Has evolved for HPC



**IPU = Graph**

Designed for intelligence  
The future of computing

# Seamless development





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