



A New Era of Storage Innovation

Turning Data into Dollars

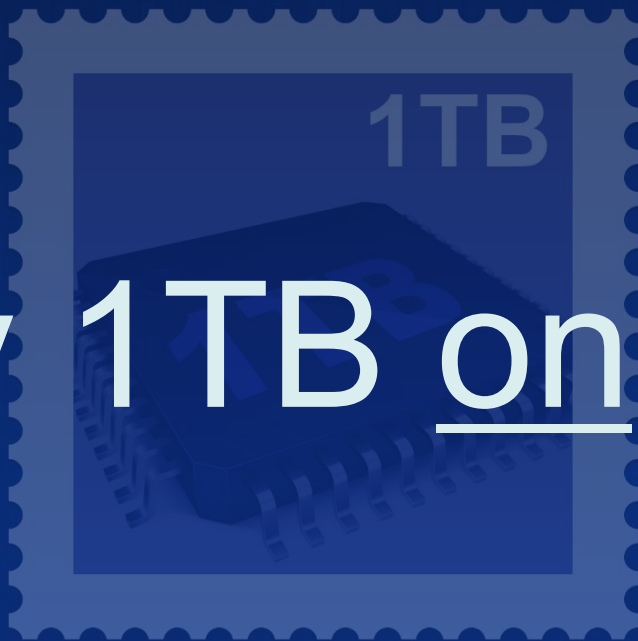
Dr. George Minassian
Chief Executive Officer, Crossbar

Crossbar

1TB in a Postage Stamp



1TB in a Postage Stamp



Why 1TB on chip?

Data
is the New
Oil



Data is the New Oil



facebook.

Huge data + complex algorithms
happening in real time

Data is the New Oil

Keys to winning:

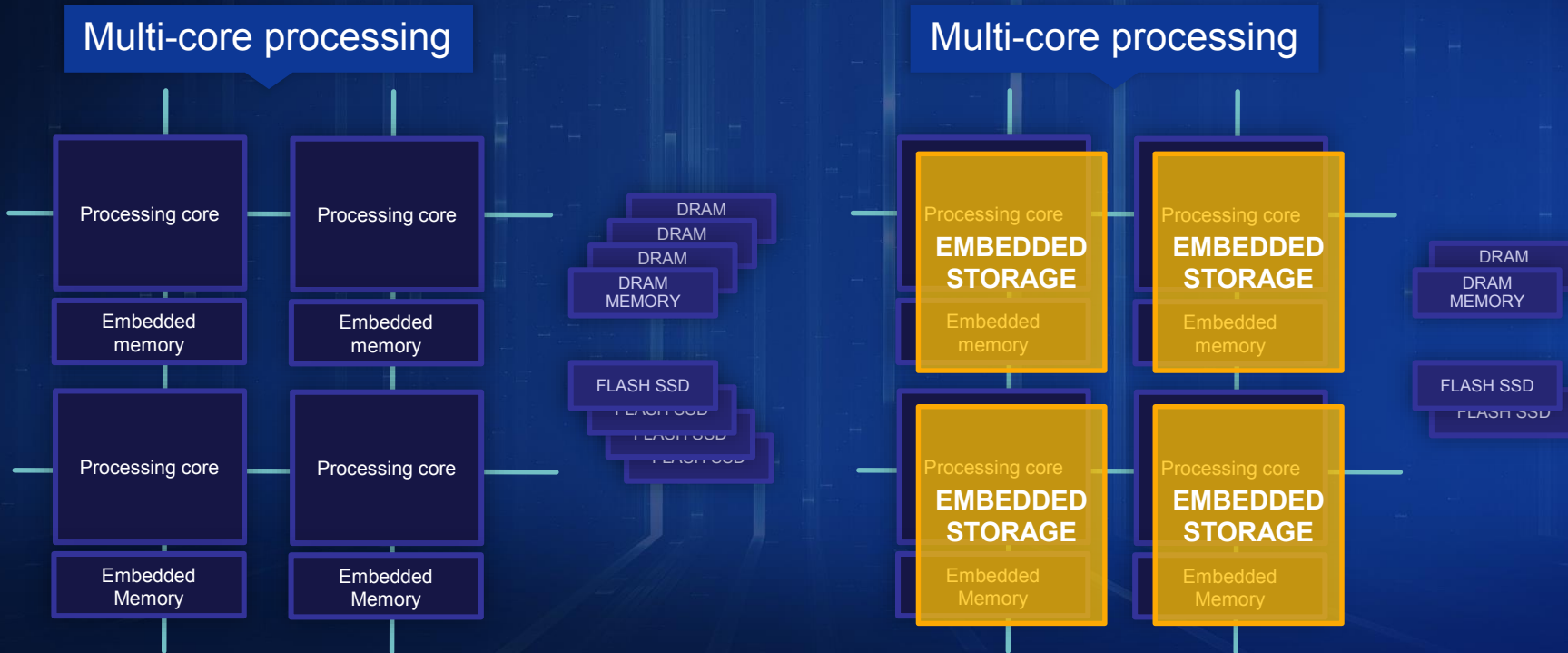
- 1- Get access to lots of data
- 2- Get access to right data
- 3- New algorithms
- 4- Outcompete the next guy

Data
is the New
Oil

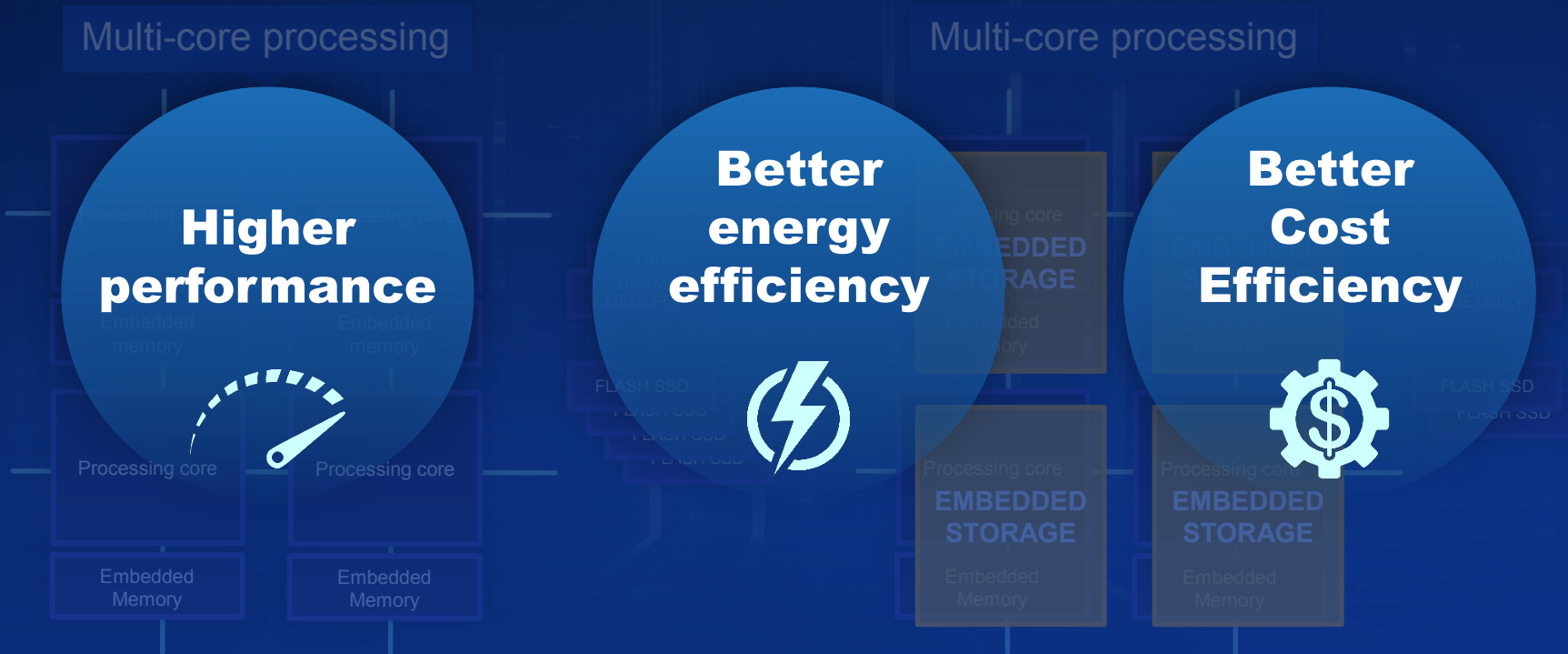
System overhaul
required to usher the
new era of AI



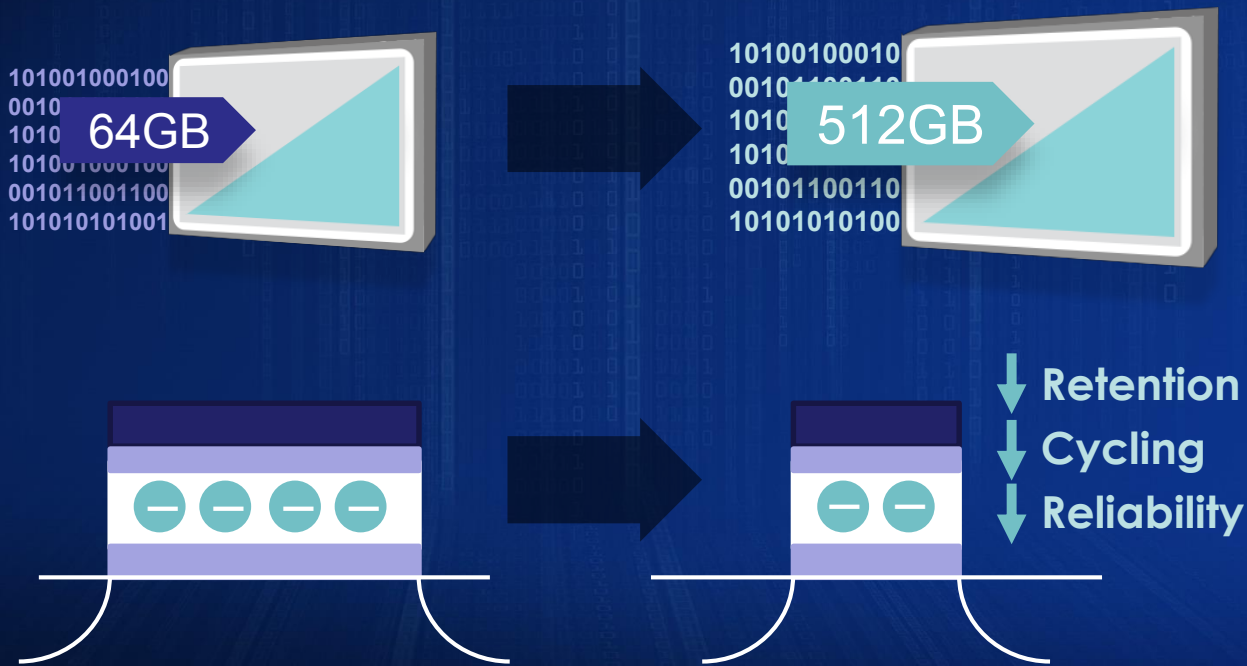
Get Off the Bus



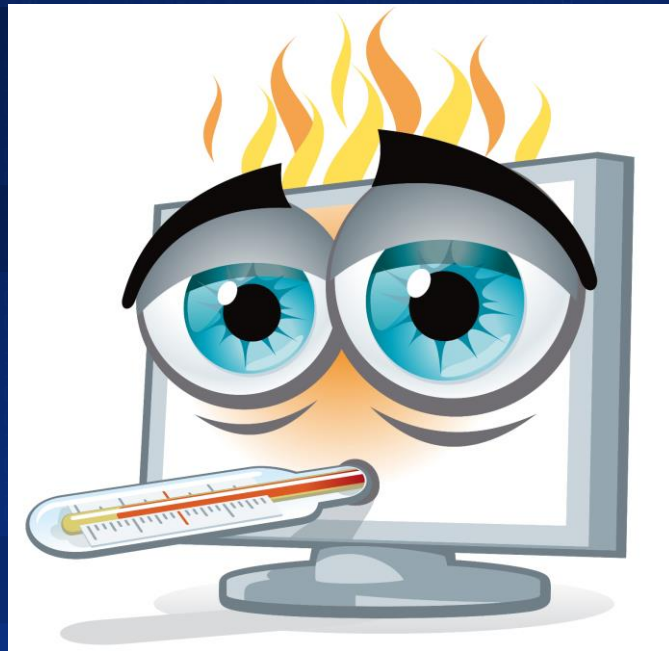
Get Off the Bus



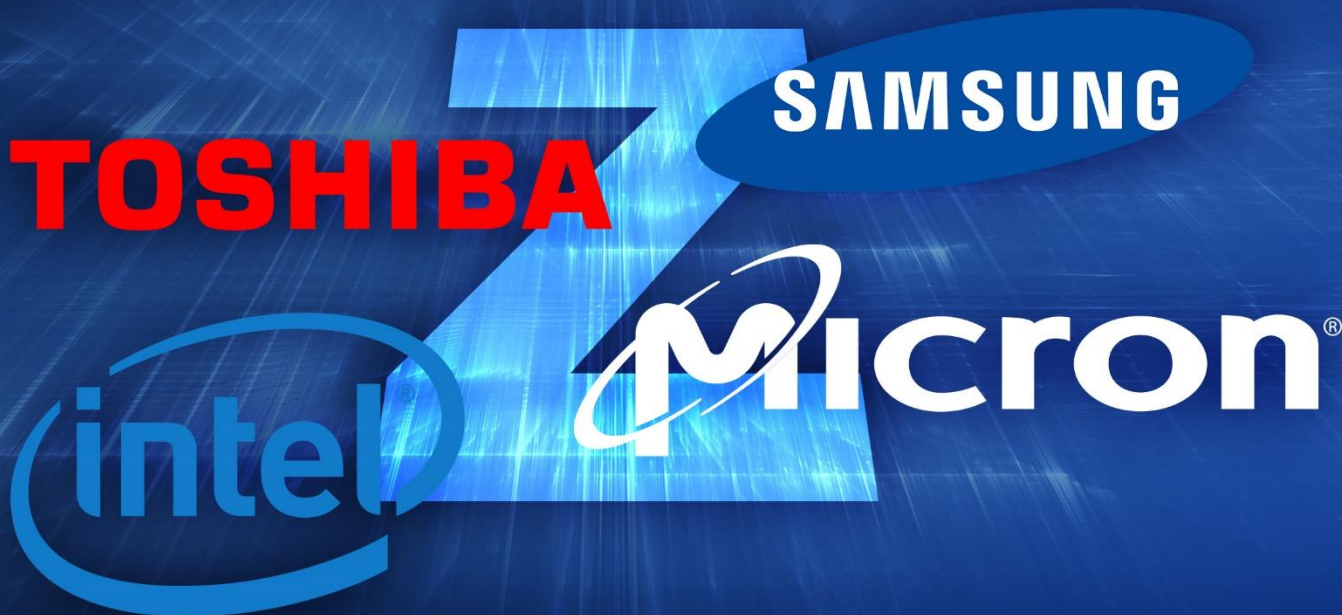
Traditional Flash Technology



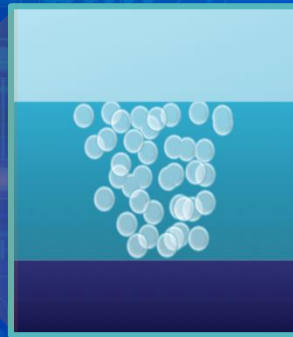
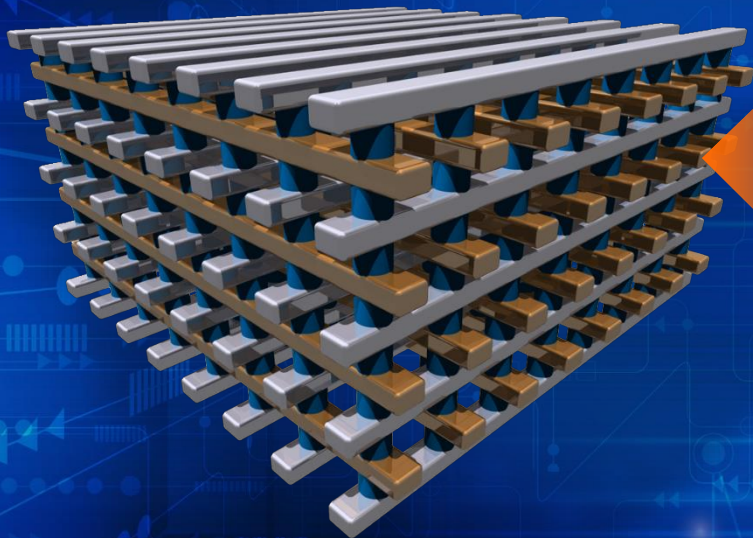
Traditional Flash Technology



The Race into the Z Dimension



Nano-filaments – the New Electron



- 1000X speed
- 1/20 the power
- 100X endurance
- Path to below 20nm
- CMOS fab

Silence is Golden



To hear one – the rest must be quiet.

Ideal for High Density Storage

100X

1us random read
vs 100us 3D TLC NAND

1000X

2us writes vs ms

NO erase operation
required

Simplified HW/SW
memory management

24 MIOPS (512B)
on a 4TB NV-DIMM
(no DRAM, no super caps)

Ultra
Low
Latency

Simple
Controller

High
IOPS



Our Progress Keeps Ticking



Byte write in **12us**
0 block erase required
Read in **25ns**

**Delivering on
Embedded
Fast**



support

on
s

Powering IoT Applications

Byte write in **12us**
0 block erase required
Read in **25ns**

Fast

Available at **40nm**,
scalable below **10nm**

Fewer process steps
and masks vs eFlash

Scalable

– **40/150C** support

< 2V

10y retention
100k cycles

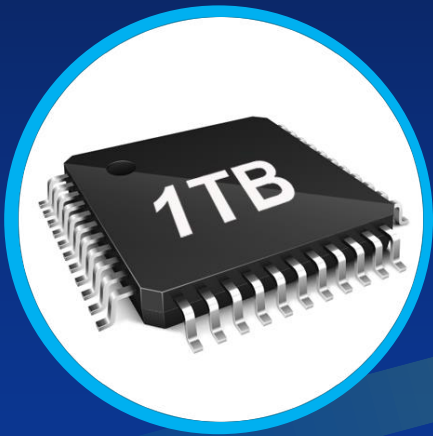
Reliable

RRAM

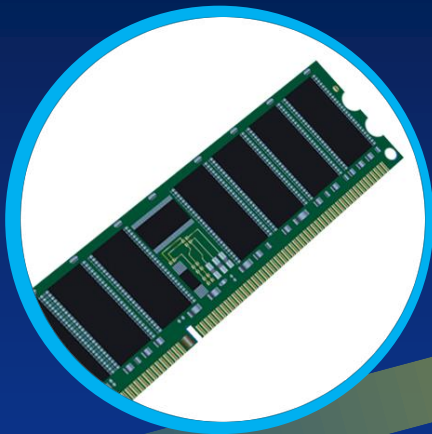
Our Progress Keeps Ticking

- ✓ Crossbar-1
- ✓ Embedded market
- Crossbar-N
- NV-DIMM
- Below 20nm

Imagine the Possibilities



1TB Chip



MIOPs per
NVDIMM



GIOPS
IU Server

Turning data
into
Dollars



Helping to Turn Data into Dollars



Stop by Booth 219
to see our demo

Tweet: Turn data
into dollars with
RRAM @Crossbar
#FlashMemorySummit

