Low-Cost Flash-Only Datacenters Going Mainstream

Dr. Radoslav Danilak, Founder & CEO
Proven Team: World-Class Innovation

10x Flash Life
$20 → $3 / GB
SLC → MLC

100x Flash Life
$20 → $3 → $1 / GB
eMLC → MLC → TLC
Compression + Dedup.

500x Flash Life
70¢ → 16¢ / GB
TLC → QLC
Multi-failure Tolerant Compression + Dedup.
Hyperscale-Out
Future is Cloud-y

- Datacenters consume >2% total power
  - Larger carbon footprint than all aircraft
  - Consume 40% more power than UK

- Will hit power wall in ~10 years
  - 15% CAGR means 2x every 5 years

- Gartner predicts in 2017:
  - World-wide cloud services market will grow 18% to $247B
The Compute Performance Plateau

- New computational mechanism is needed to overcome this plateau
  - ARM A72 not an answer; Intel Atom has similar performance & power
  - FPGA, GPU, TPU apply only to limited applications versus CPU
New Technology Is Answer

- Unlocks the performance of nanometer-size devices
  - By transparently resolving fast transistors and slow wires problem
  - Breaking through compute performance plateau

- Wide range of applications
  - Way more efficient than CPU but much easier to use as GPU
  - Incomparably more flexible than TPU

- Software non-disruptively enables existing applications
  - Eliminates market and customer adoption barriers
  - Optimized for big data, deep learning, and hyperscale computing
Cloud Chip

- Cloud Chip is composed of:
  - \( n \times 100 \) Gigabit/s networking ports
  - \( m \times 64 \) GB/s PCI Express
  - Flash storage processing
  - Data-path and AI processing
  - Fast and universal control-path

- Datacenter value proposition
  - 10-15x lower power
  - 3x lower CAPEX
  - 4x lower TCO
A Disruptive Value Proposition

4x Lower TCO With Cloud Chip

- Servers
- Network
- Power HW
- Energy
- Other
- Processing

$24.5M

10x Less Power

3x Lower Cost

Savings At Moderate Attach Rate

- Google
- Amazon
- Microsoft Azure

Cloud HW Spending CAGR

<table>
<thead>
<tr>
<th>Year</th>
<th>Spending</th>
<th>CAGR</th>
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<tbody>
<tr>
<td>IDC 2016</td>
<td>$37B</td>
<td>15%</td>
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<tr>
<td>IDC 2020</td>
<td>$59B</td>
<td>13%</td>
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All-Flash Datacenters Below Disk Cost

- Disk 16.5¢/GB = 3 copies x $300/10TB + 1.5¢/GB system + 1¢/GB OPEX
- Flash 16¢/GB = 15¢/GB QLC* + 0.7¢/GB system + 0.3¢/GB OPEX

* DRAM Exchange 8/3/17: $73 mSATA 256GB is 28¢/GB MLC, est. 15¢/GB QLC