Data center:
The center of possibility

Diane Bryant
Executive vice president & general manager
Data center group, Intel Corporation
DATA CENTER: THE CENTER OF POSSIBILITY
THE FUTURE IS
THOUSANDS OF CLOUDS
DELIVERING MILLIONS OF SERVICES
CONNECTING BILLIONS OF DEVICES
Hybrid

PUBLIC

HYBRID

PRIVATE
The Future of Cloud Computing

Quest for Ultimate Efficiency
INTEL® RACK SCALE DESIGN
OPTIMIZING THE UNIT OF COMPUTE

- Through common set of industry-standard APIs,
- Improves data center operations,
- Delivers increased performance / $,
- Enables hyperscale agility,
- Through pooled resources,
- Via flexible, modular architecture.

---

**Pooled resources**

- **Network pool**
- **Compute pool**
- **Storage pool**
INTEL® RACK SCALE DESIGN
OPTIMIZING THE UNIT OF COMPUTE

AVAILABLE END OF 2016

Other names and brands may be claimed as the property of others
SNAP
OPEN TELEMETRY FRAMEWORK

COLLECT

PROCESS

PUBLISH
Other names and brands may be claimed as the property of others.
DATA CENTER TRAFFIC IS DOUBLING EVERY 12 MONTHS
Introducing Intel® Silicon Photonics
The future of Intel® Silicon Photonics

100G 100X Bandwidth Density

Row to Row To the Rack To the Server
THE FUTURE OF NETWORK INFRASTRUCTURE
LAYING THE FOUNDATION FOR 5G
THE FUTURE OF NETWORK INFRASTRUCTURE

VIRTUALIZED

SOFTWARE DEFINED

CLOUD-ENABLED
THE SUPER 7
CLOUD SERVICE PROVIDERS

Other names and brands may be claimed as the property of others
THE SUPER 7
CLOUD SERVICE PROVIDERS

Other names and brands may be claimed as the property of others.
Other names and brands may be claimed as the property of others.
Other names and brands may be claimed as the property of others.
THE FUTURE WITH ARTIFICIAL INTELLIGENCE
 Designed for Machine Learning

**Intel Platform for Training**
- **Best Performance**
- **Maximum Scalability**

**Intel Platform for Scoring**
- **Best Performance / TCO**
- **Preeminent Scoring Solution**

Other names and brands may be claimed as the property of others.
All comparative descriptions used in this slide are made based on the comparison of Intel’s own products.
VALUE OF ONLOAD

Topology: AlexNet*
Dataset: Large image database

Normalized Training Time (Higher is better)

<table>
<thead>
<tr>
<th>Nodes</th>
<th>Normalized Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.0X</td>
</tr>
<tr>
<td>2</td>
<td>1.9X</td>
</tr>
<tr>
<td>4</td>
<td>3.7X</td>
</tr>
<tr>
<td>8</td>
<td>6.6X</td>
</tr>
<tr>
<td>16</td>
<td>12.8X</td>
</tr>
<tr>
<td>32</td>
<td>23.5X</td>
</tr>
<tr>
<td>64</td>
<td>33.7X</td>
</tr>
<tr>
<td>128</td>
<td>52.2X</td>
</tr>
</tbody>
</table>

Scaling Benefits

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance/datacenter.

Configurations: Up to 50x faster training on 128-node as compared to single-node based on AlexNet* topology workload (batch size = 1024) training time using a large image database running one node Intel Xeon Phi processor 7250 (16 GB MCDRAM, 1.4 GHz, 68 Cores) in Intel® Server System LADMP2312KXXX41, 96GB DDR4-2400 MHz, quad cluster mode, MCDRAM flat memory mode, Red Hat Enterprise Linux* 6.7 (Santiago), 1.0 TB SATA drive WD1003FZEX-00MK2A0 System Disk, running Intel® Optimized DNN Framework, training in 39.17 hours compared to 128-node identically configured with Intel® Omni-Path Host Fabric Interface Adapter 100 Series 1 Port PCIe x16 connectors training in 0.75 hours. Contact your Intel representative for more information on how to obtain the binary. For information on workload, see https://papers.nips.cc/paper/4824-Large-image-database-classification-with-deep-convolutional-neural-network-kb.pdf.
JING WANG
SENIOR VICE PRESIDENT OF BAI DU
CHAIRMAN OF TECHNICAL STRATEGY COMMITTEE
AND GENERAL MANAGER OF AUTONOMOUS DRIVING UNIT
Other names and brands may be claimed as the property of others
DEVELOPING AI
OPEN & OPTIMIZED

OPEN SOURCE ANALYTICS

OPTIMIZED FRAMEWORKS

COMING SOON

DEVELOPER TOOLS

Intel Math Kernel Library

Intel Data Analytics Acceleration Library

COMING SOON

Intel MKL-DNN

Intel Deep Learning SDK

ACADEMIC PROGRAMS

Berkeley University of California

Carnegie Mellon University

Stanford University

Other names and brands may be claimed as the property of others
COMING 2017

KNIGHTS MILL: NEXT GEN INTEL® XEON PHI™

OPTIMIZED FOR DEEP LEARNING

- Improved efficiency
- Optimized for scale-out
- Enhanced variable precision
- Flexible, high capacity memory

Knights Mill: Next Gen Intel® Xeon Phi™

Single-Precision Teraflops
ADVANCING THE FUTURE OF AI

Other names and brands may be claimed as the property of others.
THE FUTURE IS POSSIBILITY
THE FUTURE IS WHAT YOU MAKE