Ampere eMAG™ Processor
Optimized for the Cloud

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Ampere: Targeting the Cloud Processor Market

The Cloud processor market is growing at 11% CAGR from 2017 to 2021 and reaching $8B by 2021.

Cloud accounts for over 50% of the overall server revenue by 2021.
Rack Level TCO savings is one of the primary factors to transition to an alternate rack/server architecture.
Ampere eMAG Target Market Segments

**Web Tier**
- Web Servers/Proxy Servers → Apache, NGINX, HAProxy
- Web Apps/Hosting → Dhrupal, WordPress, Rails

**Big Data, Data Analytics, Data Management**
- Hadoop, MapReduce, Search, Apache Storm, Kafka, Apache SPARK
- Databases → Memcached, Redis, Cassandra, MongoDB, Postgres, MySQL

**IT Apps/Storage**
- Cold/Warm Storage → CEPH, GlusterFS, Openstack Swift, Cinder
- Enterprise Storage
- Networking
- Security
Current Ampere™ eMAG™ Product Overview

1. High Performance Custom Cores
   - 32 Ampere designed ARMv8 64-bit cores up to 3.3GHz with Turbo
   - ARMv8 Architectural Licensee - ARM SBSA/SBBR standards compliant

2. Leading Memory Capacity and Bandwidth
   - 8x DDR4-2667 memory channels
   - 33% higher capacity and bandwidth versus competition

3. Connectivity and Enterprise class RAS
   - Large number of high bandwidth IO – 42 lanes of PCIE Gen 3
   - End-End enterprise server class RAS

4. Optimized for data centers
   - Over 40% higher Perf/Watt and over 90% higher Perf/$ versus competition

5. Mature Fabrication Technology
   - Mature 16 FF+ TSMC process node

6. Leading OEM Partnerships and Tier 1 Customer Engagements
   - Partnered with leading ODM/OEM with worldwide presence for platform designs
   - Multiple Tier 1 customer engagements
## Ampere™ eMAG™ Software Ecosystem

### Tools/BIOS/BMC
- GCC
- LLVM
- Aptio BIOS
- MEGARAC BMC

### OS
- Open Source Linux
  - Latest Kernel v4.14
- RedHat
  - RHELSA7.3 (Kernel 4.5)
  - RHELSA7.4 (Kernel 4.11)
- CentOS
  - CentOS 7.3 (Kernel 4.5)
  - CentOS7.4 (Kernel 4.11)
- Ubuntu
  - 16.04 LTS (Kernel 4.10)
- SLES
  - SLES 15 (Kernel 4.12)
- Oracle Linux
  - 7.4 (Kernel 4.14)

### Virtualization/Java
- KVM
- Citrix
- docker
- OpenJDK
- Oracle

### Additional Details
- Open Source GCC 6.x/7.x
- LLVM >= v3.9
- Latest version v5.0

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**Products for the Future of the Cloud and Datacenter | 1.24.2018 | CONFIDENTIAL**
Cloud Workloads on Ampere eMAG
Web Tier, Big Data, Data Analytics & Storage

Web Apps/Hosting
- Rails
- Drupal
- MediaWiki
- WordPress

Web Server/Proxy
- Apache
- LightTPD
- HAProxy
- NGINX
- Solr

Languages
- Ruby
- Go
- Java
- Erlang
- Python

Database
- Cassandra
- Couchbase
- MySQL
- MongoDB
- PostgreSQL

Web Caching
- Memcached
- Redis

Storage
- Ceph
- Gluster
- OpenStack Swift
- Cinder

Cloud/Big Data/Data Analytics
- Hadoop
- Spark
- Kibana
- marginRight
Ampere eMAG Lenovo Evaluation Platform

eMAG Lenovo Server Top View

eMAG Lenovo Server Front View

eMAG Lenovo Server Rear View
Web Apps Software Stack on Oracle Linux and MySQL
Microsoft Windows Server on Ampere eMag

Device specifications

- **Device name**: WIN-ARM64-DEMO
- **Processor**: Ampere(TM) eMAG 3.00 GHz
- **Installed RAM**: 256 GB (256 GB usable)
- **Device ID**: 1027767E-2B6E-4D1-9860-0A6A1581EA25
- **Product ID**: 00351-00000-00000-AA232
- **System type**: 64-bit operating system, ARM-based processor
- **Pen and touch**: No pen or touch input is available for this display

Windows specifications

- **Edition**: Windows Server
- **Version**: 1709
- **Installed on**: 2/22/2018
- **OS build**: 17604.1000
Ampere eMAG Value Proposition with Cassandra

Rack Level Performance vs. Intel Xeon Silver 4110 and Gold 6130

42U Rack
42U rack with 40 1U servers
Server Config
• 384GB Memory
• 8x SSD storage
• 1x 2x10GE networking

Relative Performance

Perf/Watt
Perf/$
Perf/Rack

Perf/W: eMAG is ~15% higher than Gold and ~10% higher than Silver at the rack level
Perf/$: eMAG is over 35% higher than Gold and over 20% higher than Silver at the rack level
Perf/Rack: eMAG has ~20% higher than Gold and ~35% higher than Silver
Experience Next Generation Cloud and Data Centers Today

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Thank you.