# Unstructured Data Accelerator (UDA)

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Market Trends Big Data

- Growing technology deployments are creating an exponential increase in the volume of data available

- Existing analytical techniques not adequate for business decision-making processes

- A successful approach of big data analytics will be a critical core competency
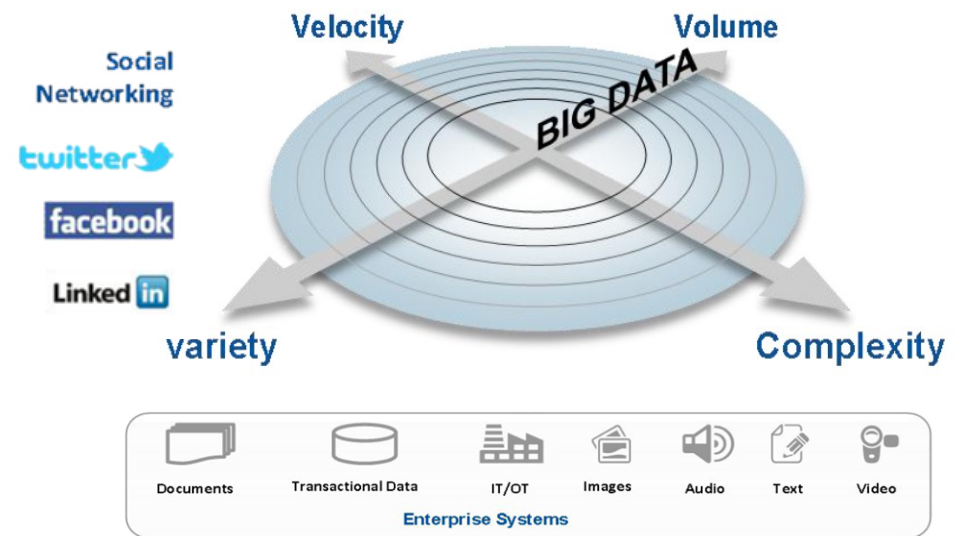 - Delivering significant competitive advantage to organizations
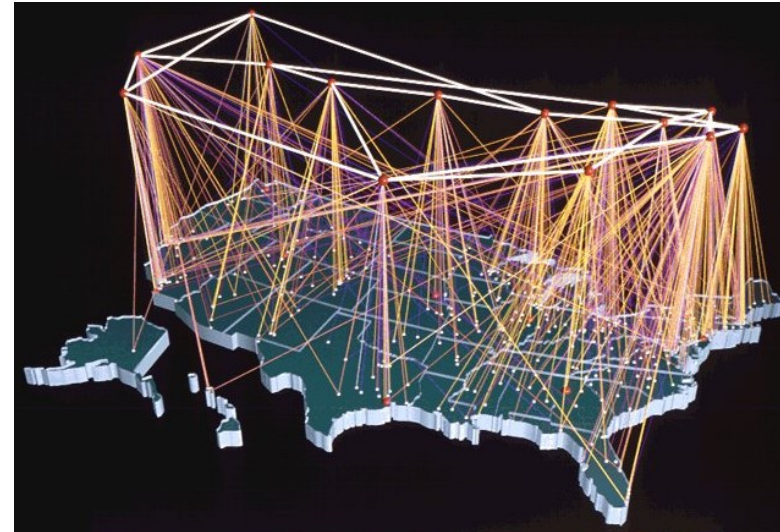
Nationwide Electricity Grid Analysis

Big Data – Not just a Volume Play

- Facebook statistics 2009
    - 350 Million Named users
    - 175 Million Active users in one day
    - 35 Million Users updating status each day
    - 2.5 Billion Photos / Month
    - 1.6 Million Active pages
   - Growth: 12 TB /day, 2 PB /year
    - Global data volume : 8.7 PB

LARGE HADRON COLLIDER (LHC) of CERN

15PB of DATA per YEAR

BIG DATA !!

Social Networking

twitter

facebook

Linked in

Velocity   Volume

BIG DATA

variety   Complexity

Documents   Transactional Data   IT/OT   Images   Audio   Text   Video

Enterprise Systems

Source: Gartner

Market Trends – Serial to Parallel Computing
Big Data Analytics is Parallel Processing
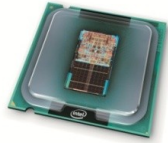
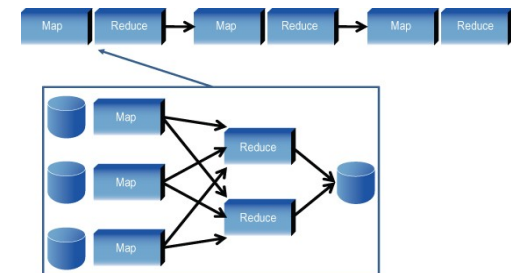
Single Core → Multi cores

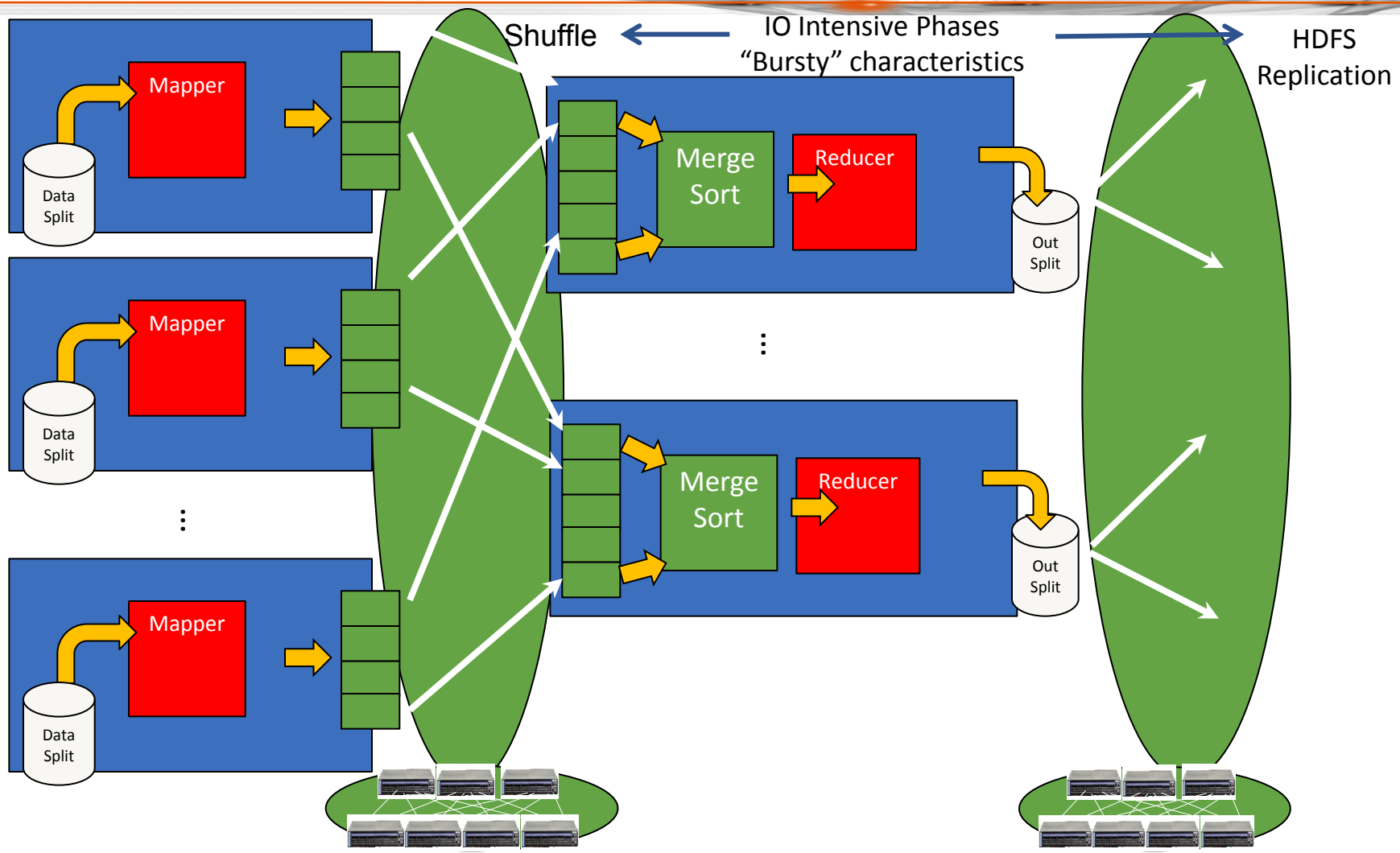Single Computer → Clustered Computing

Traditional Data-Processing Pipeline → Big Data parallel processing over Hadoop

Hadoop Cluster over High Performance Networking

Shuffle

IO Intensive Phases
"Bursty" characteristics

HDFS
Replication

Mapper

Data
Split

Merge
Sort

Reducer

Out
Split

Mapper

Data
Split

Merge
Sort

Reducer

Out
Split

Mapper

Data
Split

I/O Bottlenecks: from Disk to Network

- **Trends**
  - Use multiple SATA drives
  - SSD is around the corner
- **Matching network speed**
  - 10Gigabit Ethernet and beyond

Disk and Network Performance

Enterprise Server SSD Trends
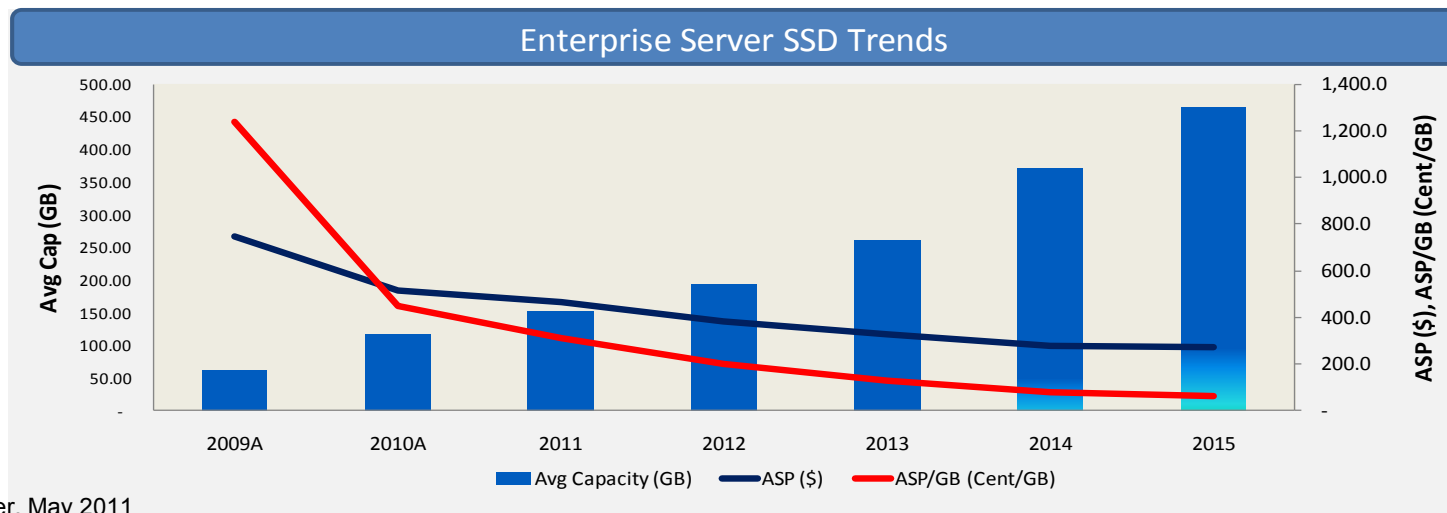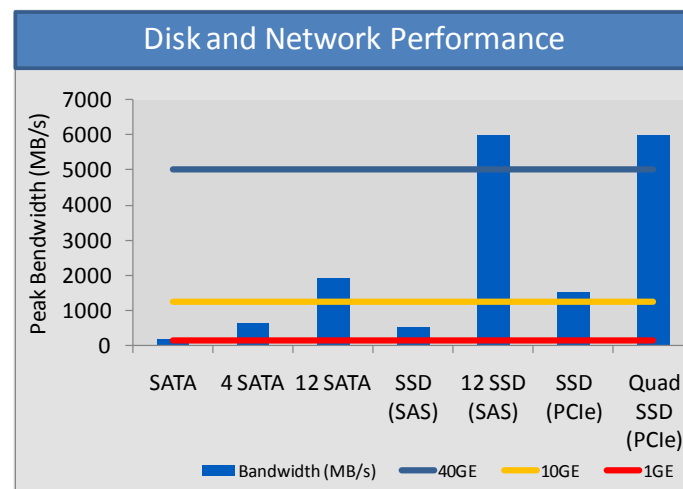
Source: "SSD Summary", Gartner, May 2011

Efficient Fabric Services

- Scalable and non-blocking
  - Matches extensive data exchange at peak rates
  - Non blocking east-west traffic

- High Capacity
  - Match all I/O bandwidth of the server

- Losslessness
  - Efficiency and avoidance of retransmission

- Offload
  - Full transport offload – reduces CPU utilization
 - RDMA zero copy operations
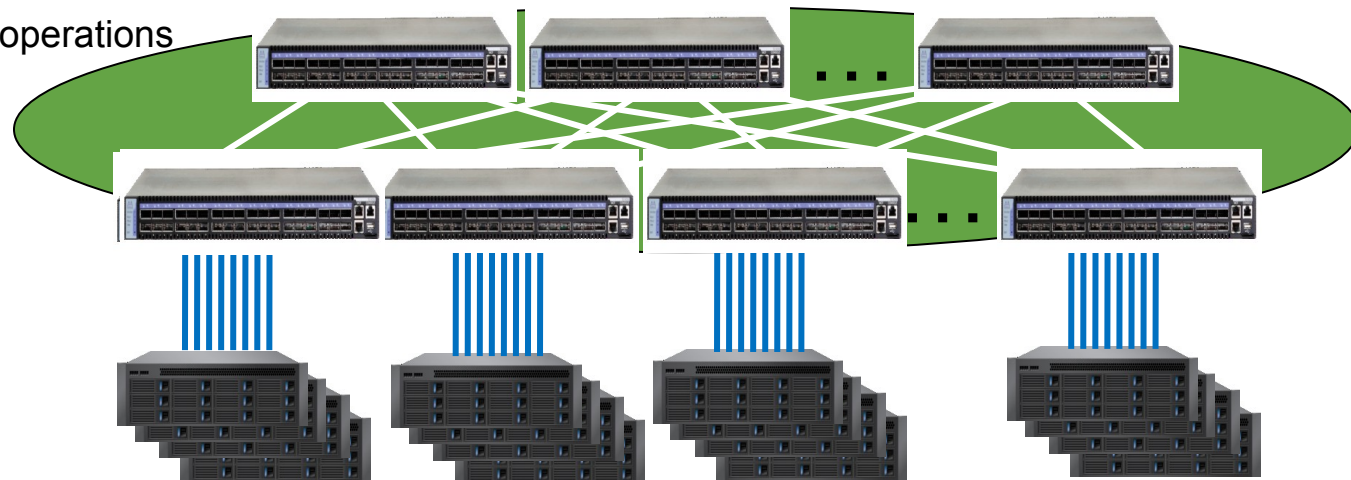
UDA Plug In Architecture

- ## Plug-in architecture
  - Hadoop applications are unmodified
  - Plug-in to Apache Hadoop
  - Enabled via xml configuration

- ## Efficient Map Reduce
  - Data communication over RDMA
    - Using RDMA for In-Memory processing
  - Enables to start the Reduce operation in parallel to the Shuffle operation
    - Reduce disk IO operation
  - Supports InfiniBand and Ethernet
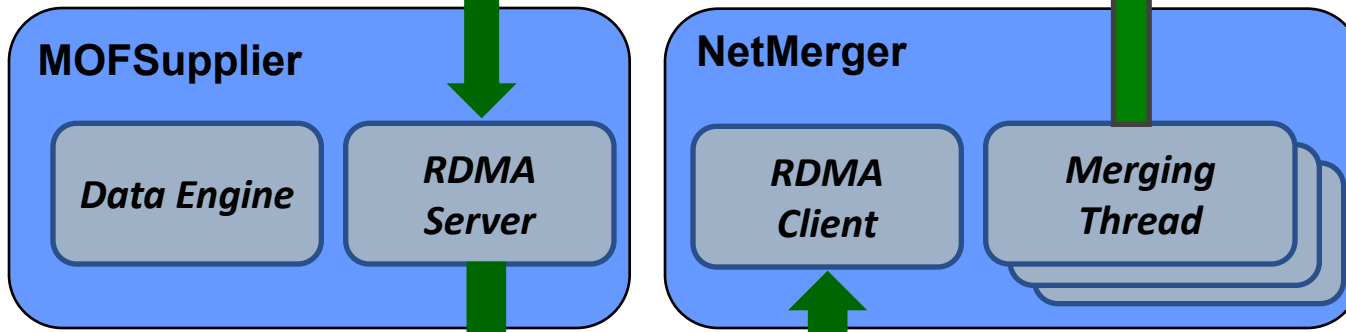 - Zero copy, transport offload, kernel bypass
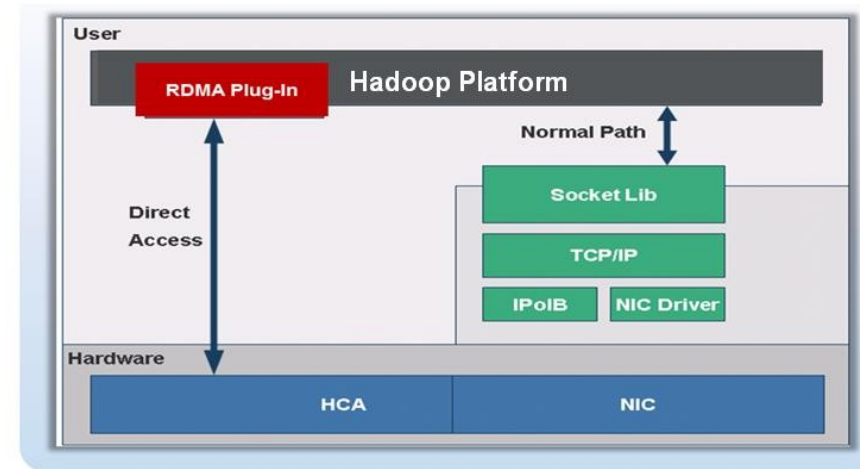
Software Architecture
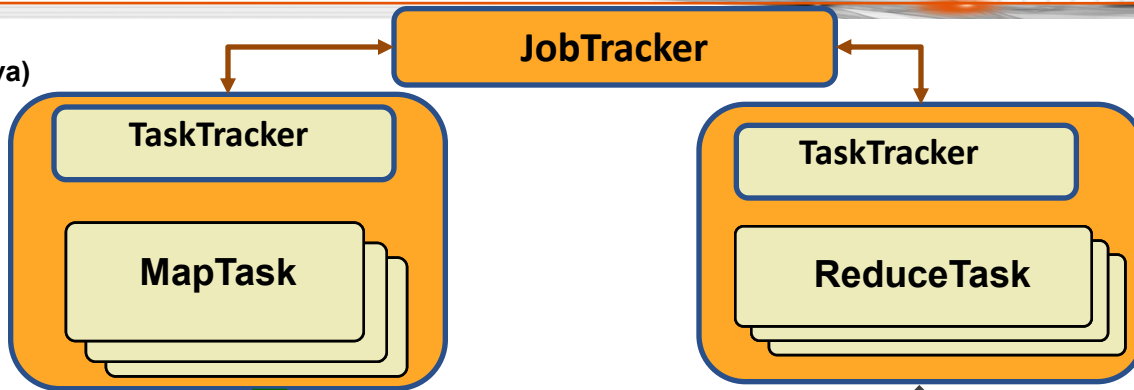
New Pipelined Data Flow
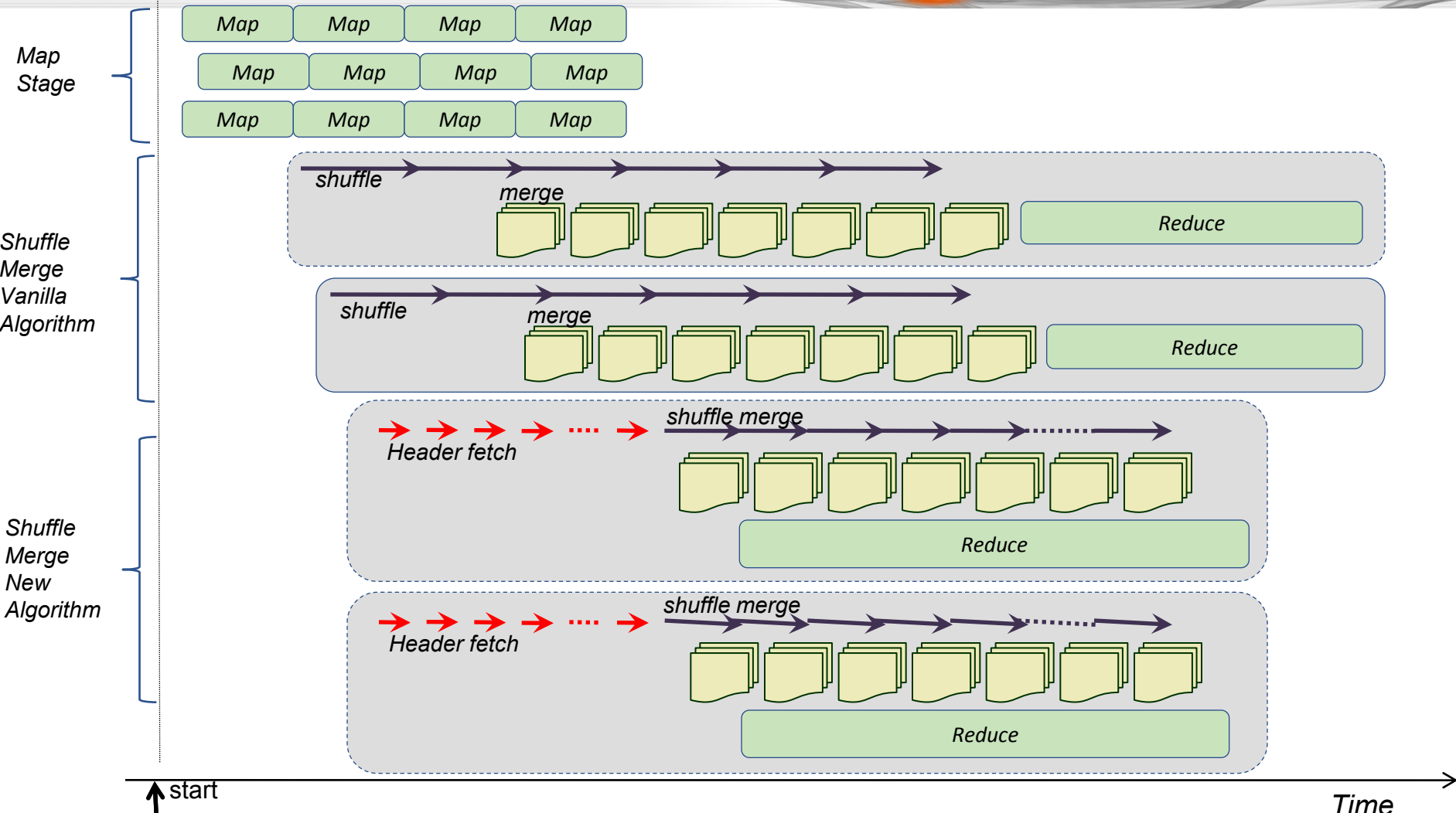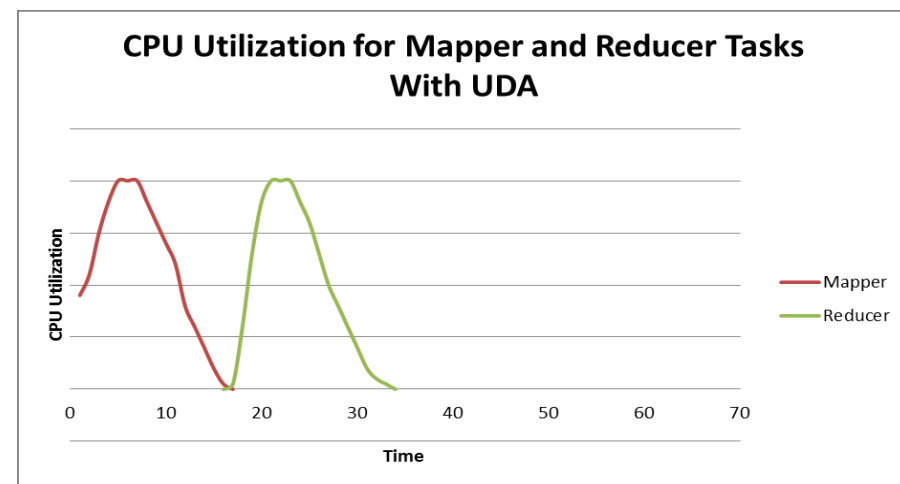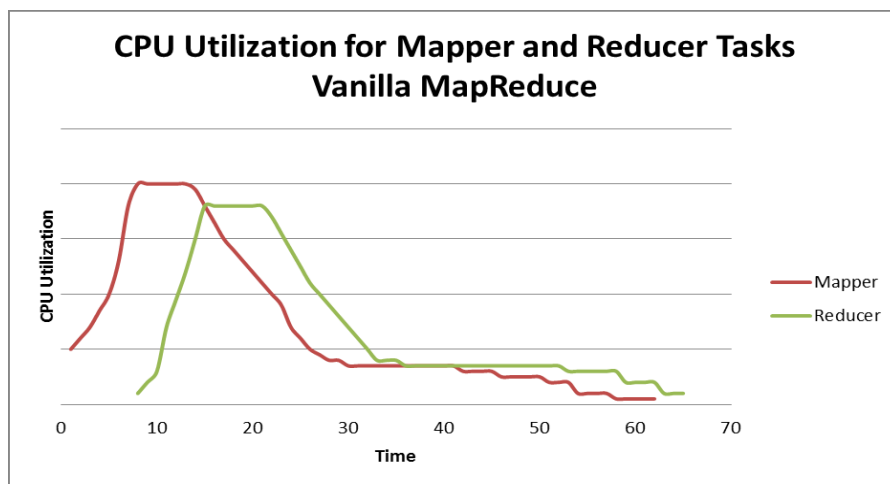
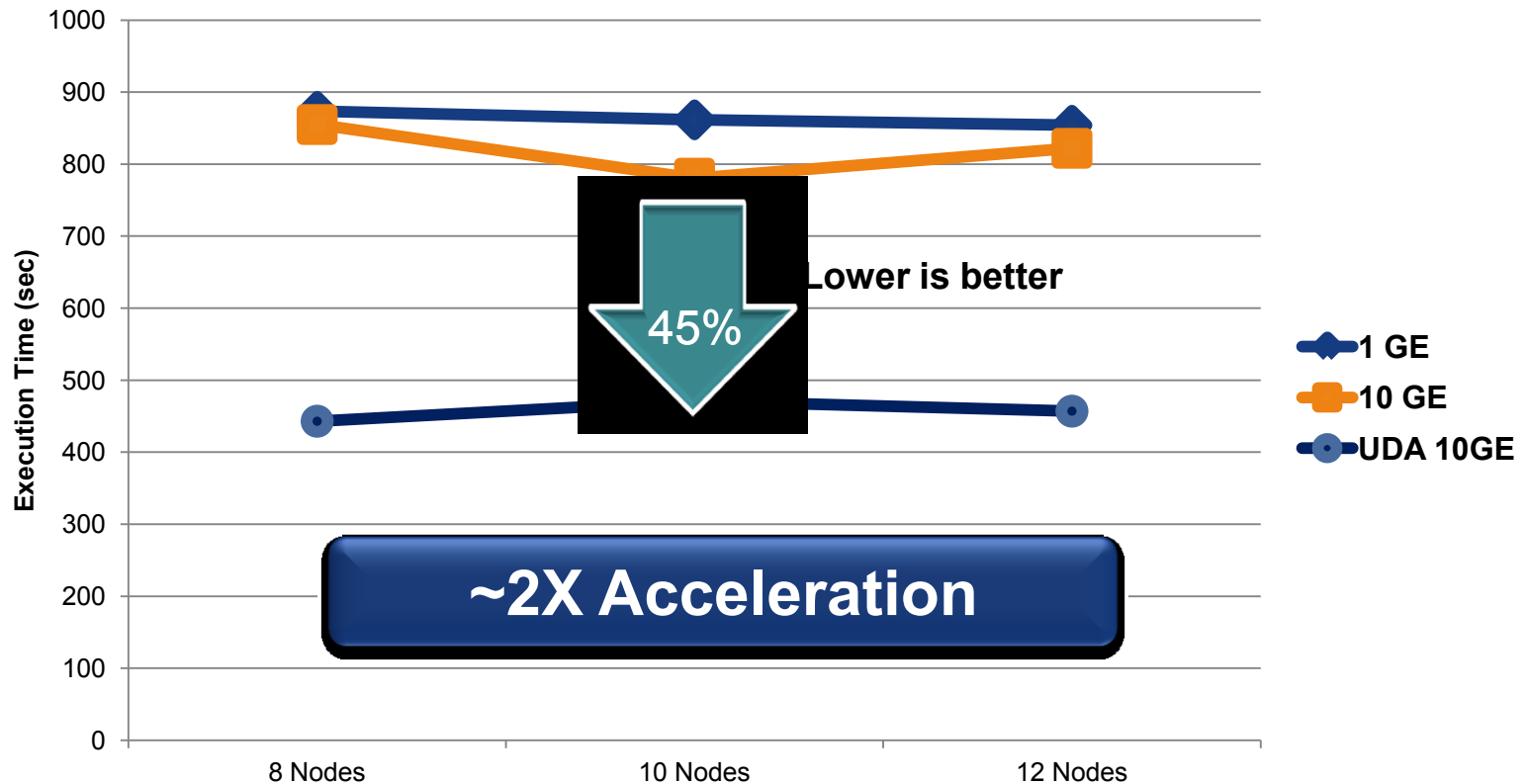# UDA MapReduce for Hadoop™ 1.X

- ## Shuffle portion executed in-memory
  - Eliminating time consuming HDD read/writes

- ## UDA reads Map Output Files (MOF) from mappers
  - Predefined portions of the MOFs, default 1KB
  - Reduce tasks begins only with all mapper tasks completion

UDA Enables Higher Performance

Terasort Benchmark*

(20GB file size, 16GB data per node, 8 Mappers, 4 reducers, 4 Disks)

Lower is better

45%

~2X Acceleration

1 GE
10 GE
UDA 10GE

Execution Time (sec)

8 Nodes   10 Nodes   12 Nodes

*TeraSort is a popular benchmark used to measure the performance of Hadoop cluster

Accelerating Big Data Analytics

- EMC 1000-Node Analytic Platform
- Accelerates Industry's Hadoop Development
- 24 PetaByte of physical storage
  - Half of every written word since inception of mankind
- Mellanox VPI Solutions

EMC² **GREENPLUM.** A DIVISION OF EMC **(intel)** **vmware**

UDA
Unstructured Data
Accelerator

| Hadoop Acceleration | *2X Faster Hadoop Job Run-Time* |

High Throughput, Low Latency, RDMA Critical for ROI

Thank You

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