Activate the Value of Big Data with SAS® and Intel: The SAS® Rack Architecture with Hadoop and Enterprise Data Warehouse

The challenge of analyzing big data

The more data you capture for your business, the more potential value awaits you – if you can mine the data effectively. To store, transform, analyze and understand all that information, you need a strong solution with fast, in-depth analytics.

Building on more than 20 years of engineering collaboration and problem-solving, SAS and Intel have the answer. SAS world-class analytic capabilities and big data technologies using the Intel® Xeon® processor E7 v2 family and Intel® SSDs provide integrated, scalable enterprise solutions that help you extract maximum value from your data while helping you manage data center space, cooling and power costs.

The benefits of utilizing Hadoop and an EDW with SAS® and Intel

Many organizations are moving to Hadoop for data storage and processing – and for good reason. Distributed solutions using Hadoop can more efficiently store, process and analyze large volumes of data while running on industry-standard servers. Companies have also utilized Enterprise Data Warehouses (EDWs) for data processing and analysis. These architectures are easily scalable and highly available.

Traditionally, analytical solutions move data from disk to compute nodes and back during processing. This movement comes at big costs in time and bandwidth – and the larger the data sets, the higher the costs. By combining SAS software, Intel platforms, Hadoop and your EDW, you can have a faster, more efficient and less costly approach for data preparation, analytics and model deployment.

The SAS® rack architecture: A SAS® and Intel architecture for big data analytics

The SAS rack architecture connects Hadoop clusters and EDWs to SAS Analytics and SAS Data Management components running on platforms using the Intel Xeon processor E7 v2 family. This architecture delivers:

- Up to 6TB of memory per server for the largest SAS data sets.
- Faster processing when dealing with large data.
- Real-time analytics via in-memory processing.
- Capabilities for managing data of all kinds.
- Scalability that lets you harvest growth in data for new business insights.
- Powerful analytics to help you improve modeling accuracy.
- Increased data governance.

The SAS rack architecture uses SAS Embedded Process to connect the SAS rack to Hadoop and EDWs. This software component supports direct, high-speed, highly parallel data transfers back and forth between SAS compute nodes and Hadoop cluster nodes. It also facilitates the use of SAS Scoring Accelerator, SAS In-Database Code Accelerator, and SAS Data Quality Accelerator inside of the EDW (note: Teradata only), greatly reducing data movement and replication.

With the SAS rack architecture, you can utilize your resources more efficiently and save money for your business by increasing your data analysis productivity and shortening your time to insight.

The power you need for strong analytics

SAS applications provide an integrated environment to solve a variety of complex business problems, so it's no surprise that they require strong computing performance and reliability. Fortunately, they get all that and more with platforms using the Intel Xeon processor E7 v2 family and Intel SSDs with NVMe.

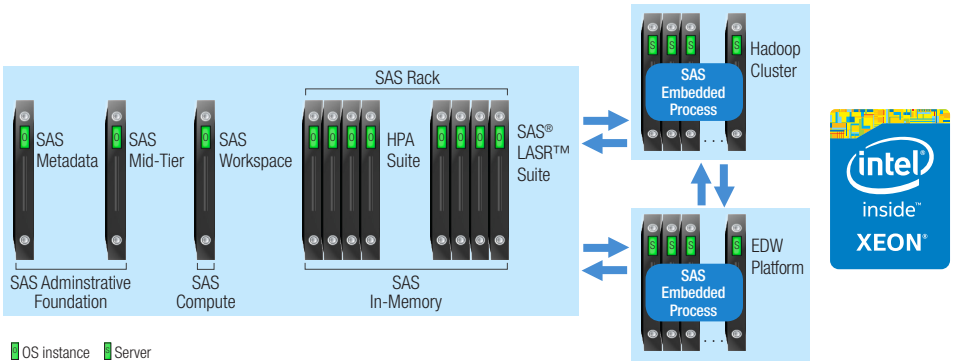
The Intel Xeon processor E7-4890 v2 brings multiple advantages to analytics, data management and business intelligence. This processor can rapidly process large amounts of data in real time, keeping data in memory to overcome data-demanding workloads. Key gains over previous-generation technology include:

- **Higher core count.** Use fewer servers for the same work with 60 cores per server.
- **Increased memory capacity and I/O.** With a capacity of up to 6TB of memory, now solve very large problems through in-memory processing.
- **Increased computational capabilities.** Get both data fidelity and fast analysis.
- **Highly reliable.** Count on world-class uptime with a platform designed for five nines (99.999 percent) of reliability.

Intel Xeon processors E7 v2 work seamlessly with Intel SSDs with NVMe, which provide a fast PCI Express interface improving on previous-generation SATA drives. The Intel SSD DC P3700 Series with NVMe brings high storage performance directly to a server's processors. The Intel SSD DC S3700 Series also combines fast, consistent performance with high endurance and strong data protection.

Systems using the Intel Xeon processor E7-4890 v2 and Intel SSDs provide the flexibility, reliability, memory, storage speed and overall performance you need to enable big data analytics. By using the SAS rack architecture to connect SAS Analytics with Hadoop and EDWs, your big data system can yield valuable business insights and help improve your decision making.

SAS® Rack Architecture – Medium Configuration



SAS Rack Architecture					
SAS Administrative Foundation		**SAS Compute**	**SAS In-Memory**		**Hadoop Cluster**
SAS Metadata	SAS Mid-Tier	SAS Workspace	HPA Suite	SAS LASR Suite	Cloudera or Hortonworks
RHEL 6.5	RHEL 6.5	RHEL 6.5	RHEL 6.5	RHEL 6.5	RHEL 6.5
1 OS instance (min) (Physical or Virtualized)	1 OS instance (min) (Physical or Virtualized)	1 OS instance (Physical or Virtualized)	4 OS instances (Physical or Virtualized)	4 OS instances (Physical or Virtualized)	4 servers (min)
2 sockets/server (min) Intel® Xeon® E5-2640 v3 (16 cores)	**2 sockets/server** (min) Intel Xeon E5-2640 v3 (16 cores)	**4 sockets/server** Intel® Xeon® E7-4890 v2 (60 cores)	**4 sockets/server** Intel Xeon E7-4890 v2 (60 cores)	**4 sockets/server** Intel Xeon E7-4890 v2 (60 cores)	Intel® Xeon® E5-2690 v3 (24 cores)
Starting at 128GB per OS instance	Starting at 128GB per OS instance	Starting at 256GB per OS instance	256 - 512GB+ per OS instance (min. 1600 MHz)	256 - 512GB+ per OS instance (min. 1600 MHz)	256GB/server (min)
8+ active cores per OS instance	8+ active cores per OS instance	Up to 60 active cores per OS instance	Up to 60 active cores per OS instance	Up to 60 active cores per OS instance	
Multiple OS instances may share a single physical machine to best leverage resources. Intel recommends 2 Boot Intel SSD DC S3700 Series - 200GB per OS instance running SAS.					
SAS Rack Architecture – Storage and Network					**Hadoop Cluster**
Starts at 800GB Intel® SSD DC S3700 per OS instance	Starts at 800GB Intel SSD DC S3700 per OS instance	Starts at 4 Intel® P3700 1.6TB SSD (PCIe) per OS instance - reference SAS I/O and file system requirements	Starts at 6 Intel SSD DC S3700 (800GB each) for Local data	Starts at 6 Intel SSD DC S3700 (800GB each) for Local data	Starts at 4 Intel SSD DC S3700 (800GB each)
Total Intel SSD DC P3700 Series 1.6TB: 4+, Total Intel SSD DC S3700 Series - 800GB: 18+, Network recommendation: 10Gb Ethernet minimum.					

Software			
SAS Configuration	**Cloudera Hadoop**	**Hortonworks Hadoop**	**Third Party**
HPA Suite, SAS LASR Suite (SAS In-Memory Statistics for Hadoop, SAS Visual Analytics, SAS Visual Statistics), SAS Data Management, SAS Enterprise Model Management, SAS In-Database Code Accelerator, SAS Data Quality Accelerator, SAS Scoring Accelerator, SAS/ACCESS® Interface to Hadoop, SAS/ACCESS Interface to Impala, SAS Office Analytics	Impala, Core Components, Cloudera Manager	Ambari, HDFS, MapReduce, Nagios, Ganglia, Hive	Ganglia, MS Office 2013, PuTTy, MobaXterm

The sample architecture referenced in the table above is for informational purposes only, is not a performance benchmark, and does not constitute a performance guarantee. SAS and Intel recommend that customers engage in a formal sizing exercise before acquiring hardware.

About SAS and Intel

SAS is the leader in business analytics software and services, and the largest independent vendor in the business intelligence market. Through innovative solutions, SAS helps customers at more than 70,000 sites improve performance and deliver value by making better decisions faster. Since 1976 SAS has been giving customers around the world THE POWER TO KNOW®.

Intel (NASDAQ: INTC) is a world leader in computing innovation. The company designs and builds the essential technologies that serve as the foundation for the world's computing devices. Additional information about Intel is available at intel.com.

Learn more

To learn more about how SAS and Intel can help you maximize the value of your data, contact your SAS or Intel representative or visit sas.com/intel.