The Forrester Wave™: Big Data Hadoop-Optimized Systems, Q2 2016

Hardware Optimized To Run Hadoop Delivers Quick Setup, Higher Performance, And Automation

by Noel Yuhanna and Mike Guattieri
May 25, 2016

Key Takeaways

We Found Seven Viable Hadoop-Optimized System Vendors
Among the seven vendors evaluated, we found three leaders (Oracle, Teradata, and Cisco Systems) and four strong performers (Cray, IBM, Dell, and NetApp). All offer competitive solutions that provide enterprise scale and proven Hadoop systems.

EA Pros Look At Time-To-Value And Automation
This market is growing because EA pros see Hadoop-optimized systems as a strategic platform to support their big data initiatives. When selecting a system, enterprises should look at modularity, automation, performance, and overall price/performance attributes.

Scale, Automation, And Tooling Are Key Differentiators
While all of the vendors offer compelling value and features, we found three key differentiating factors: automation to simplify most tasks, modular scalability, and comprehensive tooling for hardware and software.

Why Read This Report
On-premises Hadoop deployments just got easier. General-purpose hardware infrastructure requires considerable time and effort to install, configure, tune, upgrade, and monitor Hadoop platforms. Hadoop-optimized systems help overcome these issues by optimizing the infrastructure with automation, balanced system resources, and integrated testing. Enterprise architecture (EA) pros can find the best solution for their needs with Forrester’s 26-criteria evaluation of seven leading vendors: Cisco Systems, Cray, Dell, IBM, NetApp, Oracle, and Teradata.
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by Noel Yuhanna and Mike Gualtieri
with Gene Leganza and Shreyas Warrier
May 25, 2016

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   Strong Performers
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Forrester conducted product evaluations in March 2016 and interviewed seven vendor and user companies: Cisco Systems, Cray, Dell, IBM, NetApp, Oracle, and Teradata.

Related Research Documents

Big Data Fabric Drives Innovation And Growth
The Forrester Wave™: Big Data Hadoop Cloud Solutions, Q2 2016
The Forrester Wave™: Big Data Hadoop Distributions, Q1 2016
Optimized Systems Accelerate Hadoop Deployments

Enterprises agree that speedy deployment of big data Hadoop platforms has been critical to their success, especially as use cases expand and proliferate. However, deploying Hadoop systems is often difficult, especially when supporting complex workloads and dealing with hundreds of terabytes or petabytes of data. Architects need a considerable amount of time and effort to install, tune, and optimize Hadoop. Hadoop-optimized systems offer a new opportunity to deliver next-generation insights quickly rather than first dealing with hardware and technology challenges. Unlike generic hardware infrastructure, Hadoop-optimized systems are preconfigured systems that integrate hardware and software components to deliver optimal performance and support various big data workloads. As a result, organizations spend less time installing, tuning, troubleshooting, patching, upgrading, and dealing with integration- and scale-related issues.

Forrester defines Hadoop-optimized systems as:

Preconfigured hardware platforms comprising CPU, memory, and/or disk that are optimized to run a Hadoop distribution, which includes value-added tools, Hadoop ecosystem software, and/or add-ons appropriate for use by enterprises.

Although this is a relatively new market, it promises to gain significant traction in the coming years as enterprises look to accelerate and scale big data deployments. EA pros choose Hadoop-optimized systems to support:

› **Faster time-to-value.** Hadoop-optimized systems are preconfigured and ready to run — you’ll no longer spend weeks or months acquiring and configuring all the components of a Hadoop cluster. Optimized systems accelerate the deployment of big data use cases, allowing enterprise architects to enable more use cases to be done in a given time frame. They are also designed for quick expansion when data and compute needs grow.

› **Reduced cost.** Hadoop-optimized systems require high upfront capital cost, often more than generic hardware infrastructure. But, in the long run, they save money via deferred system upgrades to address optimization needs, improved administrator productivity, their extensibility because of modular design, and minimized downtime.

› **Minimized administration effort.** Today, organizations have many Hadoop administrators who manage Hadoop clusters to support their big data initiatives. These administrators spend a considerable amount of time and effort on installing, configuring, tuning, upgrading, and expanding their clusters. Our customer interviews show that organizations that are currently using Hadoop-optimized systems reduce their administration efforts by between 25% and 65% when compared with generic hardware platforms.
Module expansion. Unlike cloud deployments, on-premises Hadoop deployments often require preplanning to deploy the hardware configuration, such as the number of cores, amount of memory, and storage blades. With Hadoop-optimized systems, most vendors support a modular system architecture, whereby staff can add additional hardware components like memory, CPU cores, nodes, and storage as needed.

Big Data Hadoop-Optimized Systems Evaluation Overview

To assess the state of the big data Hadoop-optimized systems market and see how the vendors stack up against each other, Forrester evaluated the strengths and weaknesses of seven Hadoop-optimized systems vendors: Cisco Systems, Cray, Dell, IBM, NetApp, Oracle, and Teradata. IBM was a nonparticipating vendor. After examining past research, user need assessments, and vendor and expert interviews, we developed a comprehensive set of 26 evaluation criteria, which we grouped into three high-level buckets:

- **Current offering.** We evaluated each product’s configuration options, scalability, performance, high availability, disaster recovery, administration, security, core data capabilities, development tools, and other features to establish the capabilities of the vendor’s current offering.

- **Strategy.** We reviewed each vendor’s strategy to assess its ability to compete and grow in the Hadoop-optimized systems market. Key criteria include Forrester’s level of confidence in the vendor’s ability to execute on its stated strategy and to support current and future customers. We also reviewed each vendor’s product road map to assess how it will affect the vendor’s competitive position compared with the others in this evaluation.

- **Market presence.** To determine each vendor’s market presence, we evaluated overall Hadoop revenue, the number of paying customers, the global distribution of paying customers, market awareness of the vendor’s product, and partnerships with other technology and services firms.

Evaluated Vendors And Inclusion Criteria

Each of the evaluated vendors has (see Figure 1):

- **A comprehensive Hadoop-optimized system offering.** The vendors included in this evaluation provide hardware infrastructure that includes server and storage to support Hadoop deployments in a clustered configuration. Vendors have tested the systems to be functional with one or more Hadoop distributions and optimized them for scale, performance, security, and integration. They also offer tools that help with installation, configuration, and management of Hadoop systems. The vendors included must provide installation and support services directly or through partners.

- **Optimized their systems for Hadoop.** We only included vendors that deliver systems for Hadoop to support various enterprise big data use cases. These were standalone systems running only Hadoop and Hadoop-related software.
› **A referenceable install base.** Included vendors have at least two unique enterprise customers using the Hadoop-optimized system offering.

› **Client inquiries or noteworthy technologies that put the vendor on Forrester’s radar.** Forrester monitors which vendors and systems clients discuss through inquiries. We included vendors that were mentioned more often than others. Alternatively, the vendor may, in Forrester’s judgment, warrant inclusion or exclusion because of technology trends and market presence.

› **A publicly available offering.** The participating vendors must have actively marketed a Hadoop-optimized system as of January 1, 2016.
FIGURE 1 Evaluated Vendors: Product Information And Selection Criteria

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco Systems</td>
<td>Cisco UCS</td>
</tr>
<tr>
<td>Cray</td>
<td>Urika-XA 1.0</td>
</tr>
<tr>
<td>IBM</td>
<td>IBM Power Systems including IBM BigInsights, other IBM Software components, and IBM Data Engine for Analytics</td>
</tr>
<tr>
<td>NetApp</td>
<td>NetApp Solutions for Hadoop is the broad name. Specific products include NetApp E5600, E2700, EF560, and NFS Connection for Hadoop as well as SANtricity OS 8.20 and SANtricity Storage Manager 11.20.</td>
</tr>
<tr>
<td>Oracle</td>
<td>Big Data Appliance X5-2</td>
</tr>
<tr>
<td>Teradata</td>
<td>Teradata Appliance for Hadoop 5; supported by Teradata Unified Data Architecture; Teradata Database 15.10; Aster Discovery Platform 6.1; Teradata QueryGrid 15.10; Teradata Listener; and Teradata Cloud</td>
</tr>
<tr>
<td>Dell</td>
<td>Dell</td>
</tr>
</tbody>
</table>

Vendor inclusion criteria

**Hadoop hardware infrastructure.** The vendors included in this evaluation provide hardware infrastructure that includes server and storage to support Hadoop deployments in a clustered configuration. Vendors have tested the system to be functional with one or more Hadoop distributions and optimized them for scale, performance, security, and integration. The vendors also offer tools that help with installation, configuration, and management of Hadoop systems. The vendors included must provide installation and support services directly or through partners.

**Standalone Hadoop system.** We only included Hadoop systems that are not technologically embedded into any particular application, business intelligence (BI), predictive analytics, ETL, or middleware stacks. It must be supported in a standalone system running Hadoop.

**Referenceable install base.** There should be more than two enterprise customers using the Hadoop-optimized system.

**Publicly available.** The participating vendors must have actively marketing a Hadoop-optimized system as of January 1, 2016.

**Client inquiries and/or technologies that put the vendor on Forrester’s radar.** Forrester clients often discuss the vendors and products through inquiries; alternatively, the vendor may, in Forrester’s judgment, warrant inclusion or exclusion in this evaluation because of technology trends and market presence.
Choose Any Of These Vendors For A Fast, Stable On-Prem Deployment

Forrester’s evaluation of big data Hadoop-optimized systems uncovered a market with three Leaders and four Strong Performers (see Figure 2):

› **Oracle, Teradata, and Cisco Systems lead the pack.** The Leaders have demonstrated mature and comprehensive Hadoop-optimized system offerings for sophisticated big data applications, large and complex deployments, and broad tooling to deliver enterprise-scale business value. They were early to offer Hadoop systems and leveraged their significant experience with both hardware- and software-optimized solutions in data warehousing to build an optimized Hadoop solution.

› **Cray, IBM, Dell, and NetApp offer competitive options.** Strong Performers provide competitive Hadoop-optimized systems to organizations that demand improved performance from their existing generic hardware platforms.
Hardware Optimized To Run Hadoop Delivers Quick Setup, Higher Performance, And Automation

FIGURE 2 The Forrester Wave™: Big Data Hadoop-Optimized Systems, Q2 ’16

Go to Forrester.com to download the Forrester Wave tool for more detailed product evaluations, feature comparisons, and customizable rankings.
**Vendor Profiles**

This evaluation of the big data Hadoop-optimized systems market is intended to be a starting point only. We encourage clients to view detailed product evaluations and adapt criteria weightings to fit their individual needs through the Forrester Wave Excel-based vendor comparison tool. Clients can also schedule an inquiry with the authors of this report to have a conversation about market trends and specific vendor products. In addition, be sure to read our related Forrester Wave evaluations of big data Hadoop distributions and big data Hadoop cloud solutions.¹

### Leaders

› **Oracle’s mature Big Data Appliance continues to make its impact.** Oracle announced Oracle Big Data Appliance (BDA) in October 2011, making it one of the first vendors to offer a Hadoop-optimized system. Oracle BDA is a fully preconfigured, pretested, and pretuned system that includes a full complement of software components, including Cloudera Enterprise Data Hub Edition, Oracle NoSQL Database CE, Oracle R Distribution, Oracle Linux, Oracle Data Integrator, Oracle Loader for Hadoop, Oracle R Advanced Analytics for Hadoop, and Oracle Spatial and

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**FIGURE 2 The Forrester Wave™: Big Data Hadoop-Optimized Systems, Q2 ’16**

<table>
<thead>
<tr>
<th></th>
<th>Forrester’s Weighting</th>
<th>Cisco Systems</th>
<th>Cray</th>
<th>Dell</th>
<th>IBM</th>
<th>NetApp</th>
<th>Oracle</th>
<th>Teradata</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURRENT OFFERING</td>
<td>50% 3.55</td>
<td>3.24</td>
<td>2.98</td>
<td>2.75</td>
<td>3.32</td>
<td>4.44</td>
<td>4.34</td>
<td></td>
</tr>
<tr>
<td>System configuration</td>
<td>10% 4.40</td>
<td>2.80</td>
<td>3.80</td>
<td>2.20</td>
<td>3.00</td>
<td>2.80</td>
<td>4.20</td>
<td></td>
</tr>
<tr>
<td>System architecture</td>
<td>40% 4.10</td>
<td>3.70</td>
<td>3.10</td>
<td>2.60</td>
<td>4.30</td>
<td>4.30</td>
<td>3.90</td>
<td></td>
</tr>
<tr>
<td>System administration</td>
<td>30% 3.10</td>
<td>3.60</td>
<td>2.80</td>
<td>2.30</td>
<td>3.20</td>
<td>4.80</td>
<td>4.80</td>
<td></td>
</tr>
<tr>
<td>Data management</td>
<td>10% 2.40</td>
<td>1.00</td>
<td>2.20</td>
<td>5.00</td>
<td>2.40</td>
<td>5.00</td>
<td>4.20</td>
<td></td>
</tr>
<tr>
<td>System integration</td>
<td>10% 3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>1.00</td>
<td>5.00</td>
<td>5.00</td>
<td></td>
</tr>
<tr>
<td>STRATEGY</td>
<td>50% 4.00</td>
<td>3.70</td>
<td>3.20</td>
<td>3.90</td>
<td>2.80</td>
<td>4.80</td>
<td>4.30</td>
<td></td>
</tr>
<tr>
<td>System and support cost</td>
<td>0% 0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Ability to execute</td>
<td>30% 5.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>3.00</td>
<td>5.00</td>
<td>5.00</td>
<td></td>
</tr>
<tr>
<td>System support</td>
<td>10% 4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>3.00</td>
<td>5.00</td>
<td>5.00</td>
<td></td>
</tr>
<tr>
<td>Solution fixes</td>
<td>10% 1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>3.00</td>
<td>1.00</td>
<td>3.00</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>Road map</td>
<td>50% 4.00</td>
<td>4.00</td>
<td>4.00</td>
<td>3.00</td>
<td>4.00</td>
<td>5.00</td>
<td>4.00</td>
<td></td>
</tr>
<tr>
<td>MARKET PRESENCE</td>
<td>0% 2.70</td>
<td>1.59</td>
<td>3.30</td>
<td>3.30</td>
<td>2.97</td>
<td>4.17</td>
<td>3.11</td>
<td></td>
</tr>
<tr>
<td>Company financials</td>
<td>30% 3.20</td>
<td>1.30</td>
<td>3.00</td>
<td>3.20</td>
<td>2.30</td>
<td>4.10</td>
<td>2.30</td>
<td></td>
</tr>
<tr>
<td>Customer base</td>
<td>60% 2.30</td>
<td>1.70</td>
<td>3.60</td>
<td>3.20</td>
<td>3.20</td>
<td>4.20</td>
<td>3.20</td>
<td></td>
</tr>
<tr>
<td>Partnerships</td>
<td>10% 3.60</td>
<td>1.80</td>
<td>2.40</td>
<td>4.20</td>
<td>3.60</td>
<td>4.20</td>
<td>5.00</td>
<td></td>
</tr>
</tbody>
</table>

All scores are based on a scale of 0 (weak) to 5 (strong).
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Graph. Oracle BDA can run a diverse set of workloads, from Hadoop and Spark only to interactive, all-encompassing interactive SQL queries using Oracle Big Data SQL. Currently, Cloudera is the only distribution supported on Oracle BDA. Customers like Oracle BDA for its ability to quickly stand up enterprise-grade Hadoop and Spark clusters and to integrate with Oracle Exadata and Oracle Database. In addition, Oracle is one of the few vendors that have comprehensive data security for Hadoop.

Teradata’s fifth-generation Hadoop appliance is efficient and refined. Teradata is one of the few vendors that have had significant success with data management appliances over the past decade. Teradata Appliance for Hadoop comes integrated with multiple software components (open source and commercial), including the latest versions of Hadoop from Cloudera or Hortonworks, Teradata Connector for Hadoop, and Teradata Hadoop Command Line Interface. The data-center-ready stack includes high-performance and high-availability components in Teradata BYNETV5 and InfiniBand for faster networking speeds and the flexibility to optimize hardware configurations for performance, capacity, and balance. It also includes Teradata Vital Infrastructure for proactive monitoring, troubleshooting, and support. Teradata QueryGrid enables on-the-fly data access and pushdown processing from other Teradata data warehouse appliances. Teradata also provides solutions consulting through its ThinkBig consulting group to design and build integrated business solutions.

Cisco Systems provides a viable midsized system at attractive price point. Cisco UCS Integrated Infrastructure for Big Data provides a secure and scalable infrastructure to support enterprise requirements. Cisco’s UCS solution comes pretested and prevalidated for Cloudera, Hortonworks, IBM, and MapR, providing a lower-cost and scalable storage platform to support Hadoop deployments. Management tools such as Cisco UCS Manager and Cisco UCS Director allow for simple configuration of big data Hadoop clusters that can adapt dynamically to changing workloads. Cisco’s key differentiators lie in its ability to offer a wide range of configurations, its strong focus on internet-of-things (IoT) use cases, and its broad partner ecosystem.

Strong Performers

Cray brings its high-performance computing experience to Hadoop. When it comes to supercomputers, Cray is a brand that has been around for more than 40 years, and this tradition and experience is now making its way into big data architectures. Cray offers strong capabilities for interconnected, memory-centric architectures, and its optimized performance lets it handle various workloads. The Cray system is shipped installed with a pre-integrated and optimized software stack using high-density on-node memory as well as SSD and HDD drives to efficiently support Hadoop and Spark workloads. Cray includes fast interconnects and an on-node dense memory hierarchy architecture that positions its analytics platform well for supporting new and emerging in-memory workloads, such as graph analytics, machine learning, and IoT. Cray’s strong high-performance computing history, good technical support, and continued focus and commitment to analytics and big data will appeal to a larger audience in the coming years.
IBM’s new Hadoop system on power will increase its competitiveness. Today, IBM’s customers use Linux-based IBM Power Systems in integrated solutions for Hadoop and Spark deployments, including IBM BigInsights and other software components. IBM Data Engine for Analytics uses a centralized storage model that eliminates data replication, which is ideal for large-scale environments. Our scoring reflects the product available as of January 1, 2016, but the recent announcement of IBM Data Engine for Hadoop and Spark will expand IBM’s competitiveness. These products include IBM’s newly added line of OpenPower Linux servers designed for big data, with support for larger caches, memory bandwidth, and optimized resource management. The vendor is also likely to extend its capabilities to support vertical-specific and use-case-driven systems. Partners such as Avnet, Mainline, and Vion continue to build fully integrated, end-to-end, custom-built Hadoop systems based on IBM’s reference architecture. IBM is a nonparticipating vendor in this Forrester Wave.

Dell takes a simplified reference architecture approach to Hadoop. Dell offers engineered solutions for a variety of workloads, including data warehouse optimization using ETL offload and Hadoop deployments. Dell’s Hadoop reference architecture utilizes Cloudera support for the Hadoop distribution in a highly configurable, optimized hardware package. Besides leveraging various partners from the Hadoop ecosystem, it supports native integration with Dell Boomi for data integration and Syncsort for data transformation jobs in Hadoop. While Dell continues to develop and expand its Hadoop appliance portfolio, its commitment to supporting a broader range of servers, its growing data management capabilities, and its attractive price and performance have proven appealing to many enterprises.

NetApp’s scalable storage solution attaches to Hadoop. NetApp is a computer storage and data management vendor that supports various use cases, including big data for enterprises. It provides validated and supported designs as well as a certified architecture for major Hadoop distributions, including Cloudera, Hortonworks, and MapR. NetApp also offers SANtricity software to check storage performance and ensure optimization for various workloads, and NetApp AutoSupport provides proactive monitoring and predictive analytics on the NetApp storage system. While the vendor has a strong storage offering and NetApp NFS Connector for Hadoop, it relies on third-party vendors for servers, such as its integration with Cisco UCS Servers. Enterprises looking for optimized Hadoop storage solutions will find NetApp to be a viable option, especially for those that run into petabyte-sized deployments.
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Supplemental Material

Online Resource

The online version of Figure 2 is an Excel-based vendor comparison tool that provides detailed product evaluations and customizable rankings.

Data Sources Used In This Forrester Wave

Forrester used a combination of vendor briefings and customer interviews to assess the strengths and weaknesses of each solution. We evaluated the vendors participating in this Forrester Wave, in part, using materials that they provided to us by May 16, 2016.

› Hands-on lab evaluations. Vendors spent one day with a team of analysts who performed a hands-on evaluation of the product using a scenario-based testing methodology. We evaluated each product using the same scenario(s), creating a level playing field by evaluating every product on the same criteria.

› Vendor surveys. Forrester surveyed vendors on their capabilities as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls where necessary to gather details of vendor qualifications.
› **Product demos.** We asked vendors to conduct demonstrations of their products’ functionality. We used findings from these product demos to validate details of each vendor’s product capabilities.

› **Customer reference calls.** To validate product and vendor qualifications, Forrester also conducted reference calls with two of each vendor’s current customers.

**The Forrester Wave Methodology**

We conduct primary research to develop a list of vendors that meet our criteria to be evaluated in this market. From that initial pool of vendors, we then narrow our final list. We choose these vendors based on: 1) product fit; 2) customer success; and 3) Forrester client demand. We eliminate vendors that have limited customer references and products that don’t fit the scope of our evaluation.

After examining past research, user need assessments, and vendor and expert interviews, we develop the initial evaluation criteria. To evaluate the vendors and their products against our set of criteria, we gather details of product qualifications through a combination of lab evaluations, questionnaires, demos, and/or discussions with client references. We send evaluations to the vendors for their review, and we adjust the evaluations to provide the most accurate view of vendor offerings and strategies.

We set default weightings to reflect our analysis of the needs of large user companies — and/or other scenarios as outlined in the Forrester Wave evaluation — and then score the vendors based on a clearly defined scale. We intend these default weightings to serve only as a starting point and encourage readers to adapt the weightings to fit their individual needs through the Excel-based tool. The final scores generate the graphical depiction of the market based on current offering, strategy, and market presence. Forrester intends to update vendor evaluations regularly as product capabilities and vendor strategies evolve. For more information on the methodology that every Forrester Wave follows, go to http://www.forrester.com/marketing/policies/forrester-wave-methodology.html.

**Integrity Policy**

We conduct all our research, including Forrester Wave evaluations, in accordance with our Integrity Policy. For more information, go to http://www.forrester.com/marketing/policies/integrity-policy.html.

**Endnotes**

1 Forrester’s evaluation of five leading Hadoop distribution vendors — Cloudera, Hortonworks, IBM, MapR Technologies, and Pivotal Software — is based on 35 criteria. Forrester’s 37-criteria evaluation of eight leading big data Hadoop cloud solution vendors — Altiscale, Amazon Web Services (AWS), Google, IBM, Microsoft, Oracle, Qubole, and Rackspace — will help EA pros understand the available solutions and recommend the best one for their organization. See the “The Forrester Wave™: Big Data Hadoop Distributions, Q1 2016” Forrester report and see the “The Forrester Wave™: Big Data Hadoop Cloud Solutions, Q2 2016” Forrester report.


3 IBM Data Engine for Hadoop and Spark is a new offering that combines the recently added line of OpenPower Linux Servers designed for big data and analytics with open source Apache Hadoop and Spark distribution along with optional advanced analytics capabilities. Source: “IBM Data Engine for Hadoop and Spark - Power Systems Edition:
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ETL: extract, transform, load.
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› Enterprise Architecture
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Sourcing & Vendor Management

Technology Industry Professionals
Analyst Relations

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