The Forrester Wave™: Big Data Hadoop Solutions, Q1 2014

by Mike Gualtieri and Noel Yuhanna, February 27, 2014

KEY TAKEAWAYS

Hadoop's Momentum Is Unstoppable

Hadoop is unstoppable as its open source roots grow wildly and deeply into enterprises. Its refreshingly unique approach to data management is transforming how companies store, process, analyze, and share big data.

Hadoop Solution Vendors Face A Cutthroat Market

The Hadoop buying cycle is on the upswing, and the Hadoop vendors know it. Pure-play upstarts must capture market share quickly to make venture investors happy; stalwart enterprise software vendors must avoid being disintermediated; and cloud vendors must make their solutions cheaper.

Hadoop Is Open Source, But These Vendors Add Differentiated Features

Hadoop is an Apache open source project that anyone can download for free. The vendors in our evaluation support, extend, and augment Apache Hadoop (Common, HDFS, MapReduce) as a core component of the solution; support Hadoop-related projects; and add differentiated features to make their solutions attractive to enterprises.

Access The Forrester Wave Model For Deeper Insight

Use the detailed Forrester Wave model to view every piece of data used to score participating vendors and create a custom vendor shortlist. Access the report online and download the Excel tool using the link in the right-hand column under "Tools & Templates." Alter Forrester's weightings to tailor the Forrester Wave model to your specifications.

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by Mike Gualtieri and Noel Yuhanna
with Holger Kisker, Ph.D. and David Murphy

WHY READ THIS REPORT

Tsssss! That's the sound of Hadoop. It's today's sizzling-hot data management platform because it: 1) offers lower-cost storage than traditional systems, 2) has open source innovation, 3) can scale nicely, as its distributed file system makes it suitable for storing and processing big data, and 4) has opened firms' eyes again to the power and profit potential of data. In Forrester's 32-criteria evaluation of big data Hadoop solutions, we evaluated nine solutions from Amazon Web Services (AWS), Cloudera, Hortonworks, IBM, Intel, MapR Technologies, Microsoft, Pivotal Software, and Teradata. This report details our findings about how well each solution fulfills the criteria, shows where the vendors stand in relation to each other, and helps technology management professionals select the right Hadoop solution for their business needs.

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Notes & Resources

Forrester conducted methodology-based evaluations in Q3 and Q4 2013 of nine Hadoop solutions from the following vendors: Amazon Web Services, Cloudera, Hortonworks, IBM, Intel, MapR Technologies, Microsoft, Pivotal Software, and Teradata. Forrester also spoke with at least two customer references provided by each vendor.

Related Research Documents

The Forrester Wave™: Enterprise Data Warehouse, Q4 2013
December 9, 2013

Deliver On Big Data Potential With A Hub-And-Spoke Architecture
June 12, 2013

The Forrester Wave™: Big Data Predictive Analytics Solutions, Q1 2013
January 3, 2013

HADOOP'S MOMENTUM IS UNSTOPPABLE

Divide and conquer: That's the simple truth of Hadoop. At its core, Hadoop is a distributed file system and distributed MapReduce processing framework that both stores and processes data by dividing workloads across three, five, or thousands of servers. Forrester defines a big data Hadoop solution as:

> *A distributed data platform that includes, extends, and augments Apache Hadoop (Common, HDFS, YARN, MapReduce) as a core component of the solution, supports Hadoop-related projects, and adds differentiated features that make it attractive to enterprises.*

Hadoop is unstoppable as its open source roots grow wildly and deeply into enterprise data management architectures. Its refreshingly unique approach to data management is transforming how companies store, process, analyze, and share data of any size and structure. Forrester believes that Hadoop is a must-have data platform for large enterprises, forming the cornerstone of any flexible future data management platform.[1] If you have lots of structured, unstructured, and/or binary data, there is a sweet spot for Hadoop in your organization.

Hadoop Is A Solution To The Problem Of Big Data

In a recent Forrester survey, technology executives and decision-makers ranked data-related projects at the top of their list for importance and investment.[2] Why? Companies seek deeper insights from the massive amount of structured, unstructured, semistructured, and binary data at their disposal in order to dramatically improve business outcomes. Hadoop can help here by:

- **Capturing and storing all data for all business functions.** Most firms estimate that they are only analyzing 12% of the data that they already have, leaving 88% of it on the cutting-room floor.[3] Repressive data silos and a lack of analytics capabilities are key reasons for this. In addition, it's often impossible to judge what data is valuable and what isn't. In the age of big data, you have to capture and store it all. Data that might seem completely irrelevant to your business now, such as mobile GPS data, might be a gold mine in the future. The effort and cost of capturing and storing all data have often forced decisions on what to store and what to throw away. Hadoop has made it possible for enterprises to capture, store, and analyze lots more data in a much more cost-effective way.

- **Supporting advanced analytics capabilities.** Traditional business intelligence (BI) tools can benefit from big data, but firms also want to use advanced visualization tools and predictive analytics to explore data in new ways and discover new patterns. A big data solution doesn't just involve supporting large volumes of data; it also has to have the compute horsepower to perform the advanced statistical and machine learning algorithms that data scientists use. Hadoop can do both and is designed to scale out from a single server to thousands of servers for optimized performance.

■ **Sharing customer data quickly and generously with all those who need it.** Organizations can use big data to dramatically improve virtually every function of the business, including product research, design, and development; advertising and marketing management; sales; and the customer experience. But data often sits in silos, making it very difficult to share it across the organization. Data combined from multiple silos can help your organization find answers to complex questions that no one has previously dared ask or known how to ask. Hadoop can be used to create a "data lake" — an integrated repository of data from internal and external data sources.

■ **Continuously accommodating greater data volumes and new data sources.** Your internal applications as well as public sources like social media, mobile platforms, and data services are generating an onslaught of new data. Your big data solution must scale quickly and cost-effectively to handle the increasing volume, velocity, and variety of data. Hadoop can scale linearly to accommodate any amount of data, making it a future-proof solution for your enterprise.

Market Overview: Differentiated, Commercial Hadoop Distributions

The vendors in this Forrester Wave evaluation provide general-purpose Hadoop solutions based on a differentiated, commercial Hadoop distribution. The market for Hadoop solutions breaks down as follows:

■ **Apache open source.** Anyone can download Hadoop from the Apache Hadoop website at hadoop.apache.org. The project includes the core modules: Hadoop Common, Hadoop Distributed File System (HDFS), Hadoop YARN, and Hadoop MapReduce. You can also download additional Hadoop-related projects from their respective Apache websites. Customers who choose this route must cobble together a complete solution and forgo the formal support that the commercial vendors offer.

■ **Pure-play Hadoop distribution vendors.** Cloudera, Hortonworks, and MapR Technologies are venture-backed firms that singly focus on developing, supporting, and marketing unique Hadoop distributions, add-on innovations, and services. These vendors sell their solution directly to customers but also have an aggressive channel strategy of selling through partners, such as large enterprise software vendors.

■ **Enterprise software vendors that also offer Hadoop distributions.** All of the big enterprise software vendors have a Hadoop strategy because it is an essential data management technology. Many of them partner with one or more pure-play vendors: For example, Oracle partners with Cloudera, while SAP partners with both Intel and Hortonworks. Others like IBM, Microsoft, Pivotal, and Teradata — all of which we have included in this evaluation — are in various stages of launching their own unique distributions. Microsoft partners with Hortonworks and has used this as a base to create HDInsight for Windows Azure; and Teradata partners with Hortonworks and has ramped up a significant engineering and services organization to offer the Teradata Hadoop distribution built on Hortonworks.

- **Hadoop in the cloud.** Unsurprisingly, customers can also choose from a growing list of cloud Hadoop solutions. Amazon Web Services offers Elastic MapReduce (EMR) and MapR Technologies in the cloud. Microsoft offers HDInsight in its Azure cloud. Most of the other distributions have some cloud deployment options. Startups like Altiscale have built cloud services for the sole purpose of providing Hadoop and related data management features in the cloud.

- **Big data solution providers.** Managed hosting and cloud vendors like CenturyLink Technology Solutions (formerly Savvis) offer big data solutions that include infrastructure, Hadoop, other data management platforms, and analytical tools that can be customized to meet the specific needs of customers. These big data solution providers partner with Hadoop distribution vendors — CenturyLink partners with Cloudera and MapR Technologies, for example — but don't offer their own Hadoop distributions.

- **Hadoop accessories that build out the ecosystem.** Hadoop is great, but it is only one part of a complete big data analytics solution. Many firms offer Hadoop-specific tools to manage Hadoop clusters, integrate data, model data, perform predictive analytics, and visualize data in Hadoop. Here are just a few of the many firms, both new and established, that offer Hadoop-based tools: Actian, Compuware, DataTorrent, Global IDs, Pentaho, Platfora, Revelytix, Revolution Analytics, SAS Institute, Software AG, Talend, and Zettaset.

BIG DATA HADOOP SOLUTIONS EVALUATION OVERVIEW

To assess the state of the big data Hadoop market and see how the vendors stack up against each other, Forrester evaluated the strengths and weaknesses of the top big data Hadoop solutions vendors. Forrester expects the market for big data Hadoop solutions to skyrocket during the next few years as firms simultaneously look to handle increasingly huge volumes of data while minimizing the cost of doing so.

Evaluation Criteria Focus On Vendors' Current Offering, Strategy, And Market Presence

After examining past research, enterprise need assessments, and vendor and expert interviews, we developed a comprehensive set of evaluation criteria. We evaluated vendors against 32 criteria, which we grouped into three high-level buckets:

- **Current offering.** We evaluated each solution's architecture (including workload optimization features); data and processing features; setup, management, and monitoring tools; and compatibility and community features.

- **Strategy.** We reviewed each vendor's strategy to assess how they plan to meet current customer demands and fill gaps for enterprise deployments. Core evaluation criteria included acquisition options; ability to execute on their strategy; product road map; and customer support capabilities.

■ **Market presence.** To determine each vendor's market presence, we evaluated their company financials; global presence and installed base; as well as strategic partnerships with other software vendors, professional services firms, and software-as-a-service (SaaS)/cloud/hosting providers.

Evaluated Vendors Have A Cross-Domain Focus, Market Presence, And Client Interest

Forrester included nine vendors in the assessment: Amazon Web Services, Cloudera, Hortonworks, IBM, Intel, MapR Technologies, Microsoft, Pivotal Software, and Teradata. Each of these vendors has (see Figure 1):

■ **A cross-domain Hadoop solution.** The products included in this evaluation are general-purpose Hadoop solutions that don't focus technologically or functionally on particular functional or horizontal applications — such as enterprise resource planning (ERP); customer analytics; customer relationship management (CRM); business intelligence (BI); data warehousing (DW); extract, transform, load (ETL); or the middleware stack. To be included in our evaluation, the vendors needed to offer a self-sufficient, general-purpose Hadoop solution that can stand alone, meaning that it does not need to be embedded in other applications. Microsoft and Teradata solutions are based on Hortonworks, but they had enough significant differentiation in terms of their implementation product features that we included them in this evaluation.

■ **Customer references.** All of the participating Hadoop vendors provided contact information for at least two customers that agreed to speak to Forrester about their use of the Hadoop solution.

■ **Sparked client inquiries and/or has a solution that put the vendor on Forrester's radar.** Forrester clients often discuss these vendors and products through inquiries; alternatively, the vendor may, in Forrester's judgment, warrant inclusion in this evaluation because of technology trends or their market presence.

Figure 1 Evaluated Vendors: Product Information And Selection Criteria

Vendor	Product evaluated	Product version evaluated	Version release date
Amazon Web Services (AWS)	Amazon Elastic MapReduce (Amazon EMR)	N/A	April 2009
Cloudera	Cloudera Enterprise	4.5	February 2013
Hortonworks	Hortonworks Data Platform	HDP 1.3	May 2013
IBM	InfoSphere BigInsights	2.1, 2.0	June 2013, November 2012
Intel	Intel Distribution for Apache Hadoop	2.5.1	August 2013
MapR Technologies	MapR M3 — Standard Edition, MapR M5 — Enterprise Edition, MapR M7 — Enterprise Database Edition for Hadoop	3	May 2013
Microsoft	Windows Azure HDInsight	N/A	October 2013
Pivotal Software	Pivotal HD	1.x	Summer 2013
Teradata	Teradata Open Distribution for Hadoop (TDH)	1.3	June 2013

Vendor selection criteria

1. A cross-domain Hadoop solution. The vendor must offer a self-sufficient, general-purpose Hadoop solution that can stand alone, meaning that it does not need to be embedded in other applications.

2. Customer references. All of the participating Hadoop vendors provided contact information for at least two customers that agreed to speak to Forrester about their use of the solution.

3. Sparked client inquiries and/or has a solution that put the vendor on Forrester's radar. Forrester clients often discuss these vendors and products through inquiries; alternatively, the vendor may, in Forrester's judgment, warrant inclusion in this evaluation because of technology trends or their market presence.
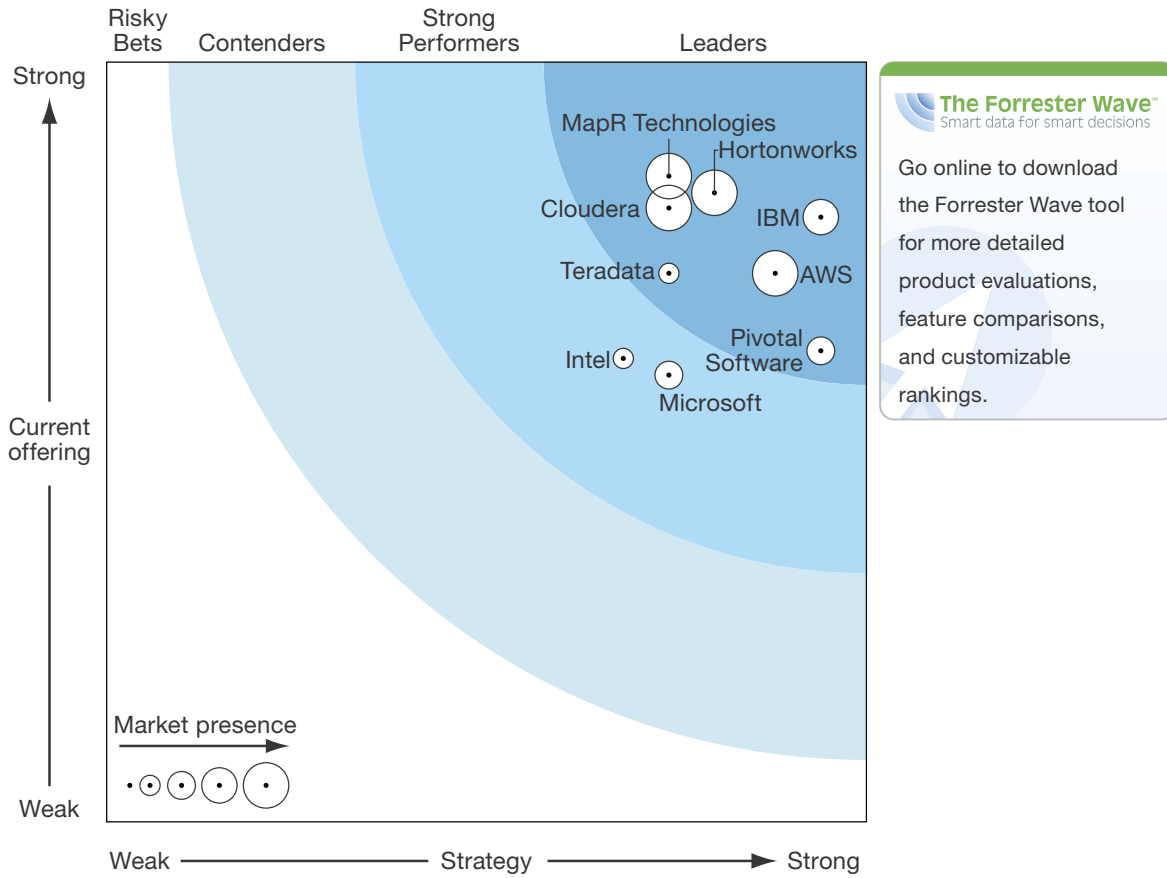
Source: Forrester Research, Inc.

CLIENTS HAVE LOTS OF GOOD CHOICES FOR BIG DATA HADOOP SOLUTIONS

Forrester's evaluation of general-purpose big data Hadoop solutions reveals seven Leaders and two Strong Performers (see Figure 2).

- **We saw lots of Leaders, but none dominate.** The Leaders in this big data Hadoop solution evaluation are Amazon Web Services, Cloudera, Hortonworks, IBM, MapR Technologies, Pivotal Software, and Teradata. Vendors start with the Apache open source project and then add packaging, support, integration, and innovations that fill the Hadoop enterprise gaps. All of the Leaders have done this, albeit in slightly different ways — as the individual vendor scorecards and the vendor profiles make clear.

- **Younger solutions fare well as Strong Performers.** The Strong Performers in this big data Hadoop solution evaluation are Intel and Microsoft. Microsoft has a robust road map for HDInsight that will make it as compelling as any of the Leaders. Microsoft HDInsight is also engineered for Azure, so it is the best solution for Microsoft customers wishing to implement Hadoop on Azure. Intel has focused most of its innovation at the chip level; it needs to beef up its strategy and enterprise tools to make more inroads as an enterprise solution.

This evaluation of the big data Hadoop solutions 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 analysts to discuss specific needs.

Figure 2 Forrester Wave™: Big Data Hadoop Solutions, Q1 '14

Figure 2 Forrester Wave™: Big Data Hadoop Solutions, Q1 '14 (Cont.)

	Forrester's Weighting	AWS	Cloudera	Hortonworks	IBM	Intel	MapR Technologies	Microsoft	Pivotal Software	Teradata
CURRENT OFFERING	50%	3.61	4.04	4.14	3.98	3.05	4.25	2.94	3.10	3.61
Architecture	30%	3.38	3.07	3.82	3.34	3.29	4.01	2.56	2.92	2.94
Data and processing	25%	3.00	3.50	3.00	4.50	1.25	4.00	2.50	3.50	3.50
Setup, management, and monitoring tools	25%	5.00	5.00	5.00	5.00	3.00	5.00	3.00	3.00	5.00
Hadoop compatibility and community	20%	3.00	5.00	5.00	3.00	5.00	4.00	4.00	3.00	3.00
STRATEGY	50%	4.40	3.70	4.00	4.70	3.40	3.70	3.70	4.70	3.70
Licensing and pricing	15%	3.00	3.00	3.00	3.00	1.00	3.00	3.00	3.00	1.00
Ability to execute	35%	5.00	3.00	3.00	5.00	5.00	3.00	5.00	5.00	5.00
Product road map	35%	5.00	5.00	5.00	5.00	3.00	5.00	3.00	5.00	3.00
Customer support	15%	3.00	3.00	5.00	5.00	3.00	3.00	3.00	5.00	5.00
MARKET PRESENCE	0%	4.85	4.33	4.11	3.58	1.26	4.18	2.38	2.91	1.71
Company financials	30%	5.00	5.00	4.50	4.50	1.00	4.50	3.00	4.50	3.00
Global presence and installed base	60%	5.00	4.00	4.00	3.00	1.00	4.00	2.00	2.00	1.00
Partnerships	10%	3.50	4.30	3.60	4.30	3.60	4.30	2.80	3.60	2.10

All scores are based on a scale of 0 (weak) to 5 (strong).

Source: Forrester Research, Inc.

VENDOR PROFILES

Leaders

- **Amazon Web Services is king of the cloud.** AWS's Elastic MapReduce (EMR) leverages its comprehensive cloud services, such as Amazon EC2 for compute, Amazon S3 for storage, and other services, to offer a very strong Hadoop solution for customers that wish to implement Hadoop in the cloud. Its EMR has already achieved considerable adoption and had the highest score for market presence in this evaluation. AWS's solution road map includes Amazon EMR integration with Amazon Kinesis for stream processing; stronger integration with Amazon Redshift data warehouse and other data sources; autoscaling that will resize clusters based on policies; support for additional NoSQL databases on top of Hadoop; and more BI integration with third-party vendors. AWS has a wide range of partners for Hadoop data access/query, modeling and development, data integration, cluster management, and business applications.

- **Cloudera innovates to meet enterprise demands.** Enterprise customers wanted a management and monitoring tool for Hadoop, so Cloudera built Cloudera Manager. Enterprise customers wanted a faster SQL engine for Hadoop, so Cloudera built Impala using a massively parallel processing (MPP) architecture — the same architecture that EDWs use. Cloudera's approach to innovation is to be loyal to core Hadoop but to innovate quickly and aggressively to meet customer demands and differentiate its solution from those of other vendors. Cloudera has more than 200 paying customers, some of which are fairly large deployments with more than a thousand nodes supporting more than a petabyte of data. Cloudera's solution road map will make its Hadoop solution significantly more competitive by meeting customers' demands. It has strong partnerships with other technology vendors in most of the areas in which its own portfolio lacks an offering.

- **Hortonworks loves and lives open source innovation.** Hortonworks' strategy is to drive all innovation through the open source community and create an ecosystem of partners that accelerate Hadoop adoption among enterprises. Where the open source community isn't moving fast enough, Hortonworks will start new projects and commit Hortonworks resources to get them off the ground. For example, Apache Hadoop lacked a decent cluster management console, so Hortonworks founded Ambari and employs most of its committers. Hortonworks has also landed some key strategic partnerships, including Teradata (also in this evaluation), Microsoft (also in this evaluation), SAP, and others.

- **IBM flexes its enterprise muscles with InfoSphere BigInsights.** Distributed computing platforms and data management are certainly not new to IBM. It has offerings in grid computing, databases, and many other data management technologies that it can bring to a comprehensive Hadoop solution. In addition, IBM has advanced analytics tools, a global presence, and implementation services, so it can offer a complete big data solution that will be attractive to many customers. IBM's road map includes continuing to integrate the BigInsights Hadoop solution with related IBM assets like SPSS advanced analytics, workload management for high-performance computing, BI tools, and data management and modeling tools. Today, IBM has more than 100 Hadoop deployments, some of which are fairly large and run to petabytes of data.

- **MapR Technologies scored highest for its current offering of all the vendors.** The score speaks for itself. MapR Technologies has added some unique innovations to its Hadoop distribution, including support for Network File System (NFS), running arbitrary code in the cluster, performance enhancements for HBase, as well as high-availability and disaster recovery features. However, MapR Technologies has lagged behind the other pure-play vendors, Cloudera and Hortonworks, in terms of market awareness; Forrester clients often ask about Cloudera and Hortonworks — but not about MapR Technologies. MapR Technologies has a leading solution; it must now make more noise in the market and accelerate its partnerships and distribution channels.

- **Pivotal Software puts its Greenplum engineers to work.** Pivotal has its own Hadoop distribution, including a massively parallel processing (MPP) Hadoop SQL engine called HAWQ, which offers MPP-like SQL performance on Hadoop. Pivotal was the first EDW vendor to provide a full-featured enterprise-grade Hadoop appliance; it was also the first to roll out an appliance family that integrated its Hadoop, EDW, and data management layers in a single rack. Pivotal's road map will make its Hadoop solution significantly more competitive; its innovations focus on improving the HAWQ SQL engine and integration with other Pivotal products. Pivotal has less than 100 Hadoop customers and most are typically small to midsize deployments. It has an extensive professional services force of EMC technical consultants and data scientists with Hadoop expertise as well as partnerships with complementary solution vendors.

- **Teradata aims to offer the best Hadoop appliance.** Leveraging its expertise in EDW appliances and partnership with Hortonworks, Teradata has moved aggressively to offer Hadoop solutions as an appliance. The Teradata distribution for Hadoop includes integration with Teradata's management tool and SQL-H, a federated SQL engine that lets customers query data from its data warehouse and Hadoop. It also has Aster for analytics against Hadoop. Although Teradata has fewer than 100 customers, Teradata's extensive financial, technical, and management resources can create a unique, high-performance Hadoop appliance that few other vendors can match.

Strong Performers

- **Intel is late to the game but has unique innovations.** Intel only recently entered the Hadoop market with its own Hadoop distribution, which takes advantage of the capabilities of Intel Xeon chips. It is the first vendor to deliver hardware-enhanced performance and security capabilities for Hadoop. Intel's road map in the next year will bring it closer to and on par with other vendors in the Hadoop solutions market. In addition, Intel continues to focus on hardware-enhanced performance and security features, native task optimization, Lustre, and graph analytics, which will differentiate its distribution and make it attractive to prospects.

- **Microsoft starts with a cloud solution and makes Hadoop shine on Windows.** Microsoft's Windows Azure HDInsight is based on the Hortonworks Data Platform and is exclusively designed and offered for Windows Azure cloud. Microsoft has worked closely with the Hadoop community and Hortonworks to release Hadoop for Windows. Microsoft also offers Polybase to allow SQL Server customers to execute queries that also include data stored in Hadoop. Microsoft has significant engineering efforts on other open source community Hadoop subprojects, including the next generation of Hive. Microsoft's significant presence in the database, data warehouse, cloud, OLAP, BI, spreadsheet (PowerPivot), collaboration, and development tools markets offers an advantage when it comes to delivering a growing Hadoop stack to Microsoft customers.

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 data sources to assess the strengths and weaknesses of each solution:

- **Product demos.** Vendors spent 1 hour with a team of analysts who performed a hands-on evaluation of the product using a guided demo methodology. We evaluated each product using the same methodology, thus 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.

- **Customer reference calls.** To validate product and vendor qualifications, Forrester also conducted reference calls with at least 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 document — and then score the vendors based on a clearly defined scale. These default weightings are intended only as a starting point, and we 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.

February 27, 2014

ENDNOTES

[1] At the center of the architecture is a data hub (or lake) that serves as a central location for raw, detailed data. Many firms choose an open source platform like Hadoop because of its low cost and treatment of data in an unstructured manner. See the June 12, 2013, "Deliver On Big Data Potential With A Hub-And-Spoke Architecture" report.

[2] Source: Forrsights Software Survey, Q4 2013.

[3] Source: Forrsights Strategy Spotlight: Business Intelligence And Big Data, Q4 2012.

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