OBJECT STORAGE *iQ*

White Paper

EXECUTIVE SUMMARY

This Neuralytix *iQ* report evaluates the technology portfolios of ten (10) object storage vendors (all of whom are members of the Object Storage Alliance [OSA]). With the exception of EMC, which requested Neuralytix to provide data on its behalf based on our own research, the data for this report was tabulated based on vendor submissions.

Neuralytix accepted these answers as *bona fide* responses, but we validated all claims prior to publication.

The marketplace for object storage has accelerated dramatically over the last several years.

This report analyzes the portfolio of technologies owned by a given vendor, and is not reflective in ***any*** way of their market performance, any specific markets in which they participate, and absolutely in no way is it a product comparison.

Unique to Neuralytix is the absence of ordinal rankings, despite using a scoring system. This Object Storage *iQ* is illustrative of why rankings give a completely skewed view of the market. The two vendors listed as *Visionaries* in our results differed by only two points.

While one vendor offers proprietary cloud capacity, another has a more mature product. One vendor offers more access protocols than the other. However, despite the two point difference, Neuralytix's assessment is that both solutions offer a very similar set of features, functions, support for third-party integration and scalability to address the needs of the modern enterprise.

Instead of an ordinal ranking system, Neuralytix groups vendors into one of three categories. It is our considered opinion that ordinal rankings does not properly represent the similarities between

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vendors, but artificially suggest that one vendor is decidedly better than another, when the differences are very likely to be marginal.

The participants in this study were Amplidata, China Telecom, Cleversafe, Cloudian, DataDirect, EMC, HDS, HP, NetApp and Quantum.

The results are listed in Table 1. In each category, vendors are listed alphabetically.

Categorization	Vendors (Listed Alphabetically By Category)
Visionary	China Telecom EMC[1]
Promising	Amplidata Cloudian DDN HDS HP NetApp Quantum
Up and Coming	Cleversafe[2]

Table 1: The Object Storage iQ Results (Neuralytix, 2015)

Neuralytix placed a *very* high emphasis on the ability of a vendor to integrate third-party storage systems into the object storage solution. This emphasis is borne from our research that suggests end-user customers want to evolve their storage solutions from traditional DAS, SAN, and NAS to object storage, but do not want to be put in a position where they have to give up existing investments.

Cleversafe **self-reported** that they do not support third-party storage systems. Despite their claims to the contrary, Neuralytix was unable to validate this assertion.

[1] EMC elected not to respond formally to our research request. However, EMC allowed Neuralytix to make its own assessment independent of EMC.

[2] Cleversafe respectfully disagrees with Neuralytix's assessment of our capability with respect to 3rd party integration. Cleversafe has large customers in production with our software running their 3rd party hardware. Our documented strategy and capabilities are to deliver the most scalable, reliable and secure object storage system and enable customers to choose the hardware platform on which they will operate, thus enabling them to utilize the hardware they have to start their build out of their web-scale, object storage environment as they progress, yet Neuralytix did not consider these capabilities in their assessment.

Neuralytix plans to publish updates of this Object Storage iQ on a regular basis. For this reason, we emphasize that our assessment is a temporal one, and that from quarter to quarter, year to year, those vendors categorized as *Up and Coming* or *Promising* can quickly progress to a higher rating based on new acquisitions and inclusions into their portfolios.

We would also note that while China Telecom and EMC are recognized by Neuralytix as *Visionary* in the 2015 object storage market, these two vendors need to understand that the *Up and Coming* and *Promising* vendors are not too far behind them.

In the end, using a normal (Gaussian) distribution, six vendors were classified as *Promising*, with the balance designated as *Up and Coming*.

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INTRODUCTION

This Neuralytix™ White Paper analyzes market leading vendors and emerging vendors of object storage solutions. The emphasis is on vendors. This paper does not evaluate products; Neuralytix evaluates vendors.

As such, this paper will look at vendors from the perspective of whether the vendor owns the technologies to deliver market leading object storage solutions. While it may seem on the surface that this type of analysis might be skewed towards market leaders with a broad portfolio of products, our results tell a very different story.

What this paper does not judge is *how* each vendor bundles its technologies. In our opinion, this is yet another assessment of products on a vendor. Each vendor has its strengths; as such, they will bundle their technologies to meet the needs of their respective customer bases.

Neuralytix considered only technologies and specifications that were current and available in the marketplace as of January 31, 2015.

Background

In 2014, the activity around object storage began to increase. The Object Storage Alliance (OSA) was formed in 2014 to promote enterprise awareness of object storage. It has a membership of over 20 vendors, large and small, that address object storage.

Neuralytix estimates that the actual number of object storage vendor participants is closer to 35.

GEOGRAPHY

Furthermore, Neuralytix believes that there are many, as yet, unidentified startups and solutions that are being delivered in Europe. We further believe that many solutions are being packaged by European resellers, but that these solutions are not sold or marketed as specific object storage solutions.

To ignore these *ad hoc* solutions would be naïve. While other research firms focus on US based object storage vendor, Neuralytix believes that any analysis marked with the word “worldwide” must, by deduction, include vendors from all over the world. Excluding

non-US based vendors in a "worldwide" analysis is akin to Major League Baseball's (MLB) World Series competition, whereupon only North American baseball teams are represented!

Despite our endeavors, regretfully, no European- or Pacific-based (as opposed to Asian-based) object storage vendor has self-identified itself, and as such, our exclusion of object storage vendors coming from European and Pacific companies is not a reflection of Neuralytix's ignorance, but rather, it stems from a lack of identifiable vendors.

DEFINITIONS

Included in the portfolio of vendor technologies, applicable technologies from each vendor must follow has strict guidelines. Specifically, they:

- Must have user-definable metadata;
- Must be self-referencing;
- Location independence; and
- **Must be a complete solution – integrating hardware and software as a single solution**.

The last attribute is critical. In today's IT world, where users purchase "solutions" rather than products, any analysis of software or hardware without the other, amounts to gross negligence and should be considered to be incomplete. As a result, in this paper, Neuralytix only considers those vendors that provide object storage *solutions*.

REALITY OF CLOUD

Neuralytix believes that most enterprises have some form of cloud solutions as part of their overall IT design. After all, cloud technology for the enterprise has been available for years, from a variety of sources. Enterprises appreciate their ability to leverage cloud to reduce costs, while containing opex costs through their cloud integration.

Furthermore, a key benefit of object storage is to facilitate the integration of disparate datasets in order to enable discovery across datasets to present a unified view of an enterprise's data. To ignore cloud storage capacity is to suppose that it does not exist.

For this analysis, and for future analyses on object storage, consideration must be given to whether a solution must be able to integrate public or private cloud storage capacity under its control.

METHODOLOGY

Neuralytix will evaluate the portfolio of object storage related technologies from a variety of vendors, from start-ups, through emerging vendors, and market leaders.

Assumptions

Neuralytix does not assume that we have either the capability to test each and every solution evaluated, nor do we believe that if we had the capability, that *any* analysis on our part would translate to applicability to enterprises at large.

Object storage offers a broad array of opportunities for enterprises to leverage data. It also offers opportunities for enterprises to be creative with the use of that data. As such, the combination of the breadth of solutions, breadth of application, and the unknown of undefined uses make any attempt at evaluating each and every solution futile.

Instead, Neuralytix takes the approach that each vendor has put their "best foot forward." The reason for this approach, apart from being fair, is that it does not allow vendors to argue over what is or is not. Neuralytix will assume that the features, functions, benefits and solution offerings describe here were current and complete as of January 31, 2015.

By publication, vendors will have had opportunity to correct any factual inaccuracies, and to defend those edits by pointing to their public website or printed collateral.

Since we are evaluating *vendors* and not products, Neuralytix will consider a vendor's complete portfolio of solutions in the object storage market, and not just one or a select few. The reason for this is that although a vendor may have several object storage solutions, each at various stages of maturity or completeness, an evaluation of *vendors* necessitates the aggregation of a vendor's offerings.

Evaluation criteria

Neuralytix will evaluate our selected vendors based on the following factors and weighting:

Feature/Function	Weighting
Cloud integration	25%
Access protocols	10%
Maturity	10%
End user integration	10%
On-premise deployment options	10%
Third party integration	20%
Scaling	15%
TOTAL:	100%

Table 2: Object Storage iQ Factors and Weightings (Neuralytix, 2015)

Cloud integration

Cloud integration carries the heaviest weighting in our evaluation. Cloud integration evaluates whether a vendor has the ability to integrate third party/public cloud storage capacity (e.g., Amazon S3, Rackspace, Microsoft Azure), private cloud storage (same vendor to same vendor), and/or proprietary cloud capacity (e.g. requiring the same vendor's own proprietary cloud offering).

As noted above, cloud integration is above all, where the future of object storage is heading. The size of the weighting reflects Neuralytix's belief that hybrid datacenters are the way of the future. As such, those vendors that offer one or more cloud integration technologies must be viewed as having leadership in the object storage marketplace.

In this category, vendors will be awarded points based on the inclusion of certain technologies within its portfolio:

Cloud integration	Points
Proprietary cloud	5
Private cloud	10
Public cloud	10
TOTAL	25

Table 3: Cloud Integration Factors and Weightings (Neuralytix, 2015)

A proprietary cloud is one that is owned and operated by the vendor itself. It does not include partnered solutions.

A private cloud is one in which on-premise solution can be integrated with another solution (either at a remote location, or a solution that a vendor partners with in-cloud).

Finally, the public cloud refers to the ability to integrate data capacity at cloud based storage services. Examples of this include Amazon S3, Microsoft Azure, etc.

Access protocols

While access protocols are ignored in the definition of object storage, they nonetheless plays an important role in usability. Traditional block and file protocols such as Fibre Channel, SMB and NFS represent the majority of ways in which data can be ingested an object storage solutions. Additionally, new standards such as Amazon's S3, CDMI, and proprietary RESTful APIs provide new ways in which data can be utilized.

Various points will be given for the inclusion of each protocol as laid out below (in the following table):

Access Protocols	Points
Fibre Channel	1
iSCSI	1
SMB/CIFS	2
NFS	2
Amazon S3	2
CDMI	1
Other RESTful APIs	1
TOTAL	10

Table 4: Access Protocols Factors and Weightings (Neuralytix, 2015)

If a vendor uses a partnered solution to provide a particular protocol, Neuralytix awards half the points for each protocol.

Maturity

The maturity rating is based on how long a vendor has released product in the object storage space. While longevity does not always equate to leadership, Neuralytix believes that maturity weighs heavily in an enterprise's procurement decision.

One point will be given for every year since inception of a given vendor's participation in the object storage market, with a maximum of 10 points in this category

End user integration

Object storage is not just an enterprise function. In fact, the ability for end-users to access an object storage solution can play a very large role in understanding usage patterns and the criticality of data objects.

Understanding end-user behavior can also be vital in compliance and governance.

This category carries a maximum of 10 points, and points are allotted, as shown in the table below:

End-User Integration	Points
Microsoft Windows and/or Mac OS client	5
Android and/or iOS client	5
TOTAL	10

Table 5: End-User Integration Factors and Weightings (Neuralytix, 2015)

The total points allotted in this category will be halved if the end-user integration is not native to the vendor. (For example, if the vendor offers third-party end-user integration, the points allocated for Android and/or iOS client will be 5 ÷ 2 = 2½)

On-premise deployment options

Enterprises come in many sizes. Some are large, others are small; some are centralized, while others are distributed. Therefore, the ability to deliver various deployment options and form factors becomes a critical consideration for object storage solutions.

With a maximum of 10 points, Neuralytix is rating more flexible deployment options higher than traditional "appliance" deployment models. (For the purposes of this paper, the term *appliance* is a general reference to an integrated hardware and software solution, as opposed to virtual or software only deployment options).

By default, all vendors will be awarded two points in this category, as shown in Table 6.

On-Premise Deployment Options	Points
Software only	3
VSA	5
Appliance	2
TOTAL	10

Table 6: On-Premise Deployment Options Factors and Weightings (Neuralytix, 2015)

Third party integration

With storage investment representing the majority of an enterprise's annual capital expenditure (capex) budget, the ability to integrate third party storage systems is absolutely a key factor in the progressiveness and inclusiveness of any given vendor.

In this category, with 20 points at stake, Neuralytix simply sought a binary answer to this category – a simple "Yes" or "No". As such, those vendors that integrate third party storage systems will be awarded 20 points, while those that do not will score zero in this category.

In our opinion, those vendors that fail to meet the third-party integration test are at risk of being seen as a "rip-and-replace" solution. Neuralytix believes that enterprises do not welcome a rip-and-replace strategy, as it immediately eliminates any value in existing investments.

Why such a big emphasis on third party integration?

One of the biggest challenge facing enterprises today is how they can take advantage of price competitive technologies such as *Big Data*. For the most part, enterprises do not want to invest in vast amounts of net additional storage to extract-transform-load (ETL) data from legacy systems to *Big Data* systems (such as a Hadoop cluster).

Object storage solutions offer a way of providing an intelligent key-value (KV) interface, with rich metadata that can provide key analytics on storage performance, usage, security, etc.

This is why Neuralytix has placed such a big emphasis (20% of the available score) on third-party storage integration.

The ability for an enterprise to leverage its existing data (through an object storage interface), can be the impetus that proves the value of *Big Data* to that enterprise.

Although Cleversafe claims it can integrate third-party storage systems, Neuralytix was unable to validate this assertion, and did not award the 20% weighting associated with this associated with this category.

Scaling

The scalability of a solution, both in terms of scaling up and scaling out, greatly impacts the performance and manageability of a solution. Those that can scale up can certainly benefit from higher performance per "node" or other form of a modular performance focused building block that addresses a given object storage solution.

While scaling out often provides the ability to scale in capacity, scaling out can also turn into a management nightmare, due to increased management and maintenance costs associated with IT staff time.

Since our evaluation of vendors is based on applicability on enterprises at large, Neuralytix will take into account how low a solution can scale, as well as how high it can scale.

Of all the criteria in this white paper, scaling is perhaps the most subjective. With 15 points at stake, it can change a vendor's overall standing in this evaluation.

Presentation of results

Neuralytix will not be releasing our calculation of scores. While any relative evaluation results in rankings, Neuralytix's objective is to highlight those vendors that demonstrate leadership in the object storage market, versus those that can be considered emerging to be or Up and Coming (slower to integrate these technologies).

The presentation of results will be in the form of categorization in one of three groups:

Leader
Emerging
Up and Coming

Vendors in each group will be listed in alphabetical order. The order of the vendors in **no way** represents that one vendor is better or "outranks" another vendor within each group.

Neuralytix has determined that the specific ranking of vendors presents an artificial distinction between vendors. For example, if one vendor received an Object Storage *i*Q rating of 94, and another receives a 93, does that necessarily make the former vendor better? The single point distinction may be as simple as the inclusion an access protocol by the first vendor; but does not necessarily make the former vendor better than the latter.

It is our opinion that these small point differences in the evaluation does not make one vendor "better" than the next. This is why we elected to group vendors into the groups presented in this paper.

The contenders

For this evaluation, ten vendors, based on their membership in the Object Storage Alliance were evaluated. Software only vendors were disqualified. Partnered solutions were also disqualified. (A partnered solution for the purposes of this white paper is an object storage solution in which two or more vendors have partnered together to offer an object storage solution).

The exclusion of partnered solutions is deliberate. Because this paper is evaluating vendors, Neuralytix believes that it is unfair to group two or more vendors together and to compare a partnership against an individual vendor. Inclusion would grossly skew the results.

THE RESULTS

Based on our research, the vendors we evaluated (at January 31, 2015) are divided into three categories based on our methodology, as described in this paper. The results were plotted against a normal (Gaussian) distribution.

Categorization	Vendors (Listed Alphabetically By Category)
Visionary	China Telecom EMC[3]
Promising	Amplidata Cloudian DDN HDS HP NetApp Quantum
Up and Coming	Cleversafe[4]

Table 7: The Object Storage iQ Results (Neuralytix, 2015)

Visionary

Those vendors listed as a visionary scored above the first standard deviation (1σ) in our assessment. These vendors have incorporated most of the technologies and capabilities that Neuralytix expects a vendor should own and deliver in the object storage marketplace.

Promising

Those vendors listed as a promising vendor scored within the standard deviations (1σ and -1σ). These vendors show a lot of potential to challenge the visionaries, but have not yet released or integrated some key technologies and capabilities.

[3] EMC elected not to respond formally to our research request. However, EMC allowed Neuralytix to make its own assessment independent of EMC.

[4] Cleversafe respectfully disagrees with Neuralytix's assessment of our capability with respect to 3rd party integration. Cleversafe has large customers in production with our software running their 3rd party hardware. Our documented strategy and capabilities are to deliver the most scalable, reliable and secure object storage system and enable customers to choose the hardware platform on which they will operate, thus enabling them to utilize the hardware they have to start their build out of their web-scale, object storage environment as they progress, yet Neuralytix did not consider these capabilities in their assessment.

Up and Coming

Regretfully, in any analysis of any population, there will be vendors that do not fare well. Up and Coming vendors are those that have not integrated technologies that, in Neuraylytix's opinion, are critical to long term success. These vendors are those that have recognized and integrated certain technologies and/or functions; but have not yet incorporated enough of them to challenge the visionaries, for now. These vendors scored less than the standard deviation (-1σ).

As noted earlier, Neuralytix places a very heavy emphasis on a vendor's ability to integrate third party storage systems. This category alone determined which vendors were categorized as Promising or *Up and Coming*.

CONCLUSION

Neuralytix plans to publish updates of this Object Storage *i*Q on a regular basis. For this reason, we emphasize that our assessment is a temporal one, and that from quarter to quarter, year to year, those vendors categorized as *Up and Coming* or *Promising* can quickly progress to a higher rating based on new acquisitions and inclusions into their portfolios.

Those vendors that are considered *Visionary* – China Telecom and EMC – are already clear leaders in the portfolio of object storage technologies they own.

But these visionaries have to understand that the *Promising* vendors are not too far behind them.

For those identified as *Up and Coming* in this space, the first thing they must do is to provide the capability to integrate third party storage. The lack of support for third-party integration is the sole reason that they did not score nearly as high as their competition.

APPENDIX I – THE VENDORS

(Listed alphabetically)

Amplidata

Amplidata, is one of the more mature portfolio in the market. Its technology also underpins Quantum's StorNext solution.

The solution scored marginally above the mean score of the population. One area that challenged Amplidata's ability to score higher is the number of features that are partnered (specifically access protocols, and degree of end-user integration).

China Telecom

Neuralytix is somewhat surprised at China Telecom's full-featured portfolio. In fact, China Telecom's biggest challenge is the maturity of its portfolio. But for its maturity, China Telecom would have been awarded a rating that is close to a perfect score.

This demonstrates how first mover advantage does not always translate into leadership in the marketplace. China Telecom's integration of the demands of the market has resulted in a unified object storage portfolio that is highly flexible and scalable, and easily adopted by enterprise customers

We were equally surprised with the scale of deployment (primarily in China) that China Telecom has already received.

China Telecom is only one only three vendors that offers its own proprietary cloud service. Neuralytix defines a proprietary cloud service as cloud storage capacity that is owned and hosted by the vendor itself.

Cleversafe

One of only two listed in this report as Up and Coming, Cleversafe's lack of third-party integration immediately took it out of the running to be a promising portfolio of object storage solutions.

Like Amplidata, Cleversafe also self-reported that apart from the S3 and RESTful protocols, other access methods along with end-user integration is a result of multiple partnerships.

Cloudian

Cloudian scored close to the mean and median out of the population. Cloudian lacked end-user integration, and does not have the largest number of access protocols.

Its third-party integration was a key factor towards Cloudian's relatively strong score.

DDN

DDN represents one of the most mature vendor in the object marketplace.

Unlike most of the other vendors in this analysis, DDN's strategy is not on the general enterprise. Instead, DDN's leadership includes cloud and web companies; oil and gas companies; service providers; and life sciences.

EMC

Like China Telecom, EMC's portfolio of object storage technologies is very complete. The areas that affected EMC's near perfect score included a proprietary cloud capacity, and, relying on its partners to deliver public and private cloud capacity.

EMC's portfolio of technologies related to object storage does not include some access protocols – those that have a lower weighting.

It is clear to Neuralytix that the combination of its mature and near complete portfolio of technologies makes EMC a leader in the object storage provider.

HDS

Like EMC, HDS has one of the more mature portfolios in the market. However, compared to the other vendors' portfolios the assessment of Neuralytix is that the scalability of HDS' portfolio is more limiting than others.

It is in this area that the score for HDS was reduced.

Neuralytix notes that the score HDS received was very close to the first standard deviation (1σ), and had the scalability of HDS' solution been just slightly broader, it would have made it into the *Visionary* group.

HP

HP represents one of a select number of object storage vendors that offer proprietary cloud object storage solution. This is

impressive for a vendor of HP's size, and it demonstrates a commitment to provide its customers with a wide variety of options to manage and enrich their business data.

Based on the ratings methodology, one area affecting HP's rating was in its range of deployment options. While most of the portfolios from other vendors allowed object storage solutions to be deployed as software only and in a VSA, HP did not offer this solution as of January 31, 2015.

In our opinion this somewhat limits HP's portfolio to larger single datacenter installations, and does not address the needs of remote offices or small-to-medium businesses (SMBs) particularly well. However, HP could change this quickly, and that will be taken into account with the next round of Object Storage *i*Q evalutations.

NetApp

NetApp's overall portfolio scored very well, and its ratings in this report fell just short of being included in the *Visionary* category. Neuralytix was impressed by NetApp's access protocols, scoring a perfect score in this area. This is important because it means that NetApp customers have the greatest flexibility in terms of their ability to ingest data in all different ways into NetApp's object storage portfolio of solutions.

Areas where NetApp were not able to score high enough for the *Visionary* category were the omission of proprietary cloud capacity, and the company's dependency on partners for end-user integration.

Quantum

Considering that Quantum's solution is based on Amplidata, it is not surprising that Quantum's score is similar to Amplidata's. The only difference between the two came by way of Quantum's decision not to offer a software-only approach to its portfolio.

Quantum (surprisingly) offers two extra access protocols compared to Amplidata.

CONCLUSION

Neuralytix plans to publish an update of this Object Storage *i*Q on a regular basis. Our current intent is to update this report in October, 2015. Future updates to the Object Storage *i*Q will minimize vendor self-reporting.