# Cloud Computing: Industry Report & Investment Case

Research shows increase in cloud computing spending is expected to continue

## What is Cloud Computing and Why is it Important?

Cloud computing is the delivery of computing services, such as servers, databases, storage, networking, software, analytics, amongst others, over the internet ("the cloud"). Cloud computing technology is relatively new but there are many corporations, government agencies, and other organizations that are beginning to adopt the use of this technology. Some of the benefits of cloud computing include the following[1]:
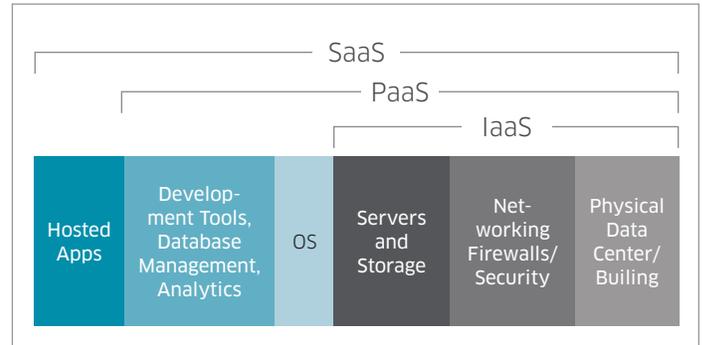
1) Cost: Cloud computing eliminates the capital expenses of buying hardware and software to run datacenters.

2) Speed: Because most cloud computing services are provided on-demand, vast amounts of computing resources can be provisioned in minutes.

3) Scale: Cloud computing provides the ability to scale globally, meaning that companies can get the right amount of resources in virtually any geographic location.

4) Productivity: Cloud computing removes the need for hardware set up, software patching, and other time-consuming tasks, which increases productivity of employees in IT teams across companies.

5) Performance: Since cloud computing services are run on a worldwide network of secure datacenters, they are regularly updated to the latest generation of fast and efficient computing hardware. This offers some benefits over a single corporate datacenter, including greater economies of scale and reduced network latency for applications.

6) Reliability: Cloud computing makes data backup, disaster recovery, and business continuity easier and less expensive, since data can be mirrored at multiple sites on the cloud computing provider's network.

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In general, there are three types of cloud computing services: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS)[2].

1) IaaS is a way of delivering cloud computing infrastructure – servers, storage, network, and operating systems – as an on-demand service, rather than purchasing that infrastructure. In IaaS, resources are distributed as a service, which allows for dynamic scaling. This type of service makes sense when an organization has very volatile demand, and as a result, there is fluctuating demand for the infrastructure as well. It is also great for companies that are new and do not have the capital to invest in new hardware or if a company is growing rapidly and needs to scale its resources.

2) PaaS allows for the creation of web applications quickly and easily without the complexity of buying and maintaining the underlying software and infrastructure. In other words, it is a platform for the creation of software, delivered over the internet. PaaS is different from IaaS in the value added from providing a platform for software development, focused on workflow management regardless of data source, and a platform for the creation of software utilizing data from an application. This type of service makes sense when there are multiple developers working on a development project or other external parties need to interact with the development process. In other words, PaaS makes is easier for developers to create web or mobile applications without worrying about setting up the underlying infrastructure.

3) SaaS is a process for delivering software applications over the internet, on-demand, and typically on a subscription basis. Cloud providers host and manage the software application and underlying infrastructure and handle any maintenance, such as software upgrades and security patching. SaaS has been a growing method of delivering technology, such as in financial management, customer relationship management, healthcare management, etc....

The flow chart below illustrates these three cloud computing services and their role in infrastructure, development, and applications[3].
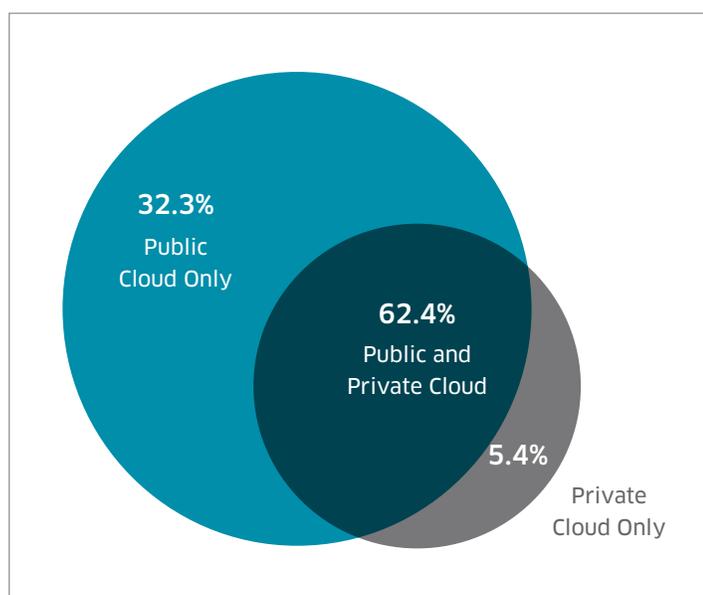
## SaaS, PaaS, IaaS Componets



Bloomberg Intelligence, Anurag Rana, Microsoft Leads Legacy Software Companies in Shift to Cloud

In addition, there are three ways to deploy cloud computing services: public, private, and hybrid[1].

1) Public clouds are operated by a third party cloud service provider, which then delivers computing resources such as servers and storage over the internet to their customers.

2) Private clouds refer to cloud computing resources used exclusively by a single business or organization. Some companies can host private cloud on site or pay a third party service provider to host their private cloud. This type of deployment may be more secure as the resources are not being shared across organizations.

3) Hybrid clouds combine public and private clouds, which allows for more deployment options and greater sharing between data and applications.

In a survey to IT professionals by RightScale, the venn-diagram below illustrates the various types of cloud deployment mentioned above that are used by corporations. While the chart below does show that public clouds lead in terms of the number of organizations using them, the survey also pointed out that private cloud deployment leads in terms of the number of workloads being run. In any case, public and private cloud (e.g. hybrid cloud) deployment is the most popular amongst corporations because, as mentioned above, it gives them greater flexibility in deployment and sharing of data and applications[4].

## RightScale Survey Respondents Using Cloud



32.3%
Public Cloud Only

62.4%
Public and Private Cloud

5.4%
Private Cloud Only

http://www.rightscale.com/blog/cloud-industry-insights/cloud-computing-trends-2015-state-cloud-survey
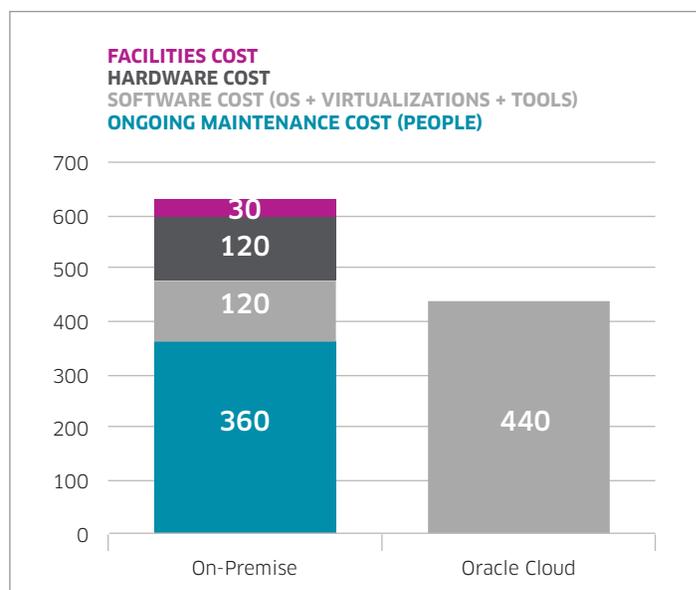
The above clearly explains the myriad of benefits that corporations experience from adopting a cloud framework as well as the advantages of deploying a public, private, or hybrid framework utilizing an IaaS, PaaS, or SaaS cloud service.

One way in which investors can get exposure to the cloud computing industry is through the First Trust ISE Cloud Computing Index Fund (SKYY). The underlying index for this product is the ISE Cloud Computing Index (CPQ). In order to adequately understand the reasons as to why cloud computing is important from an investment perspective, it is first vital to understand the growth drivers for cloud computing as well as the industry outlook. The following research will discuss the growth drivers and industry outlook for cloud computing and then show the ways in which the cloud computing index is poised to capture these positive trends in the cloud computing industry.

## What is Driving the Growth in Cloud Computing?

There are a myriad of benefits, as mentioned above, such as cost, scale, and productivity, which are driving the growth behind the increasing use of cloud computing in IT infrastructure. Cost, however, may be the biggest reason that organizations are switching from on-premise infrastructure to cloud deployments. The chart below illustrates that an organization may incur 30% in cost savings if it were to switch from an on-premise infrastructure (i.e. having physical servers, databases, etc…) over to a cloud framework ($630 per core per month to $440)[5]. This clearly reveals that these significant cost savings are a huge driver behind the increasing adoption of cloud computing across organizations.

## Cost of Ownership - On-Premise vs. Cloud ($ per Core per Month)



**FACILITIES COST**
**HARDWARE COST**
**SOFTWARE COST (OS + VIRTUALIZATIONS + TOOLS)**
**ONGOING MAINTENANCE COST (PEOPLE)**

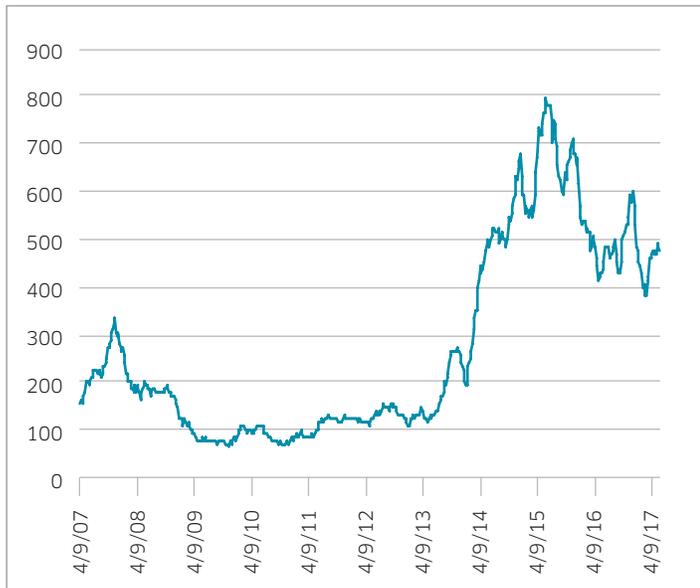On-Premise: 30, 120, 120, 360
Oracle Cloud: 440

Bloomberg Intelligence, Anurag Rana, Longer Term, IT Services Industry Needs New AI-Based Products, April 2017

In addition, the speed and time to market is another major driver of companies switching over to cloud computing. A survey by Skyhigh to 460 senior executives regarding cloud strategy revealed that in adopting a cloud framework, there was an average of 20.66% improvement in the time to market for these businesses, which resulted in an average of 19.63% increase in company growth and an average of 18.80% increase in process efficiency[6]. This shows that utilizing a cloud strategy enables companies to get the products out to market quicker than their competitors which results in faster growth and higher return on investment.

The growth in the adoption of cloud computing services is evidenced in the growth of startups. The chart below shows the venture financing activity for startups over time (it is a good indicator of the number of startups because as the number of startups increases so does the venture financing for those startups).While the number of startups has slowed the last couple of years, it is still up significantly than the previous years.
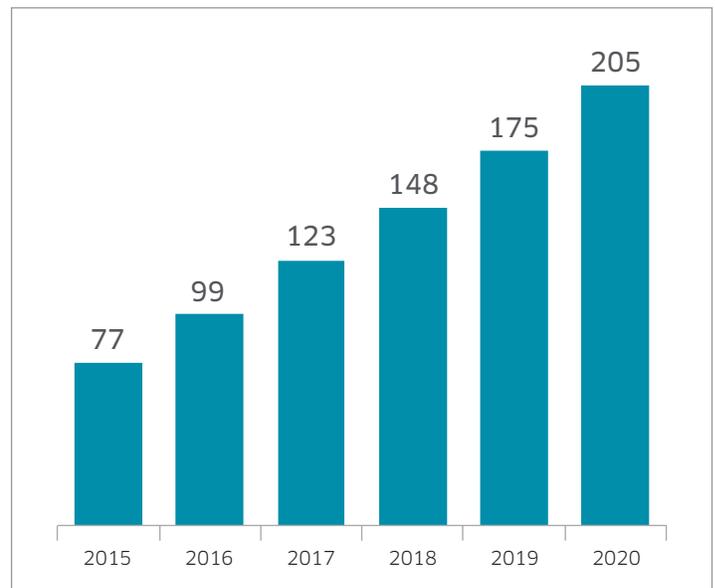
## Bloomberg Startup Barometer



Bloomberg

In a Rackspace survey of 1,300 executives, 62% of respondents agreed with the statement that "cloud computing is a key factor in the recent boom of entrepreneurs and start-ups"[7]. In addition, many of the respondents, about 43% of the group, had said that their businesses had launched within the past 3 years and a majority of them said that they would not have been able to afford on-premises IT resources had it not been for cloud computing[7]. While larger corporations certainly see benefits of cloud computing services, startups in general tend to see the largest benefit, as startups face financial clout and do not always have the cash or resources to spend on physical infrastructure. So, if startups are able to save 30% on IT resources, as was shown above, then it can be a huge boon for them in launching their products and being able to compete with larger businesses.

As a result, this explicitly reveals that cost and speed to market, amongst other reasons, have been a huge driver of the growth in cloud computing. Startups and larger organizations have been increasingly running their businesses on IaaS, PaaS, or SaaS platforms or switching from older physical infrastructure to the cloud in order to achieve massive cost savings and efficiency.

## What is the Industry Outlook for Cloud Computing?

The aforementioned drivers to the growth of cloud computing will continue to bode well for the cloud computing industry going forward. As the chart below shows, IT cloud spending has been increasing and will continue to increase through 2020, from $77 billion in 2015 to $205 billion in 2020[8]. There are similar trends for private and hybrid cloud spending as well.
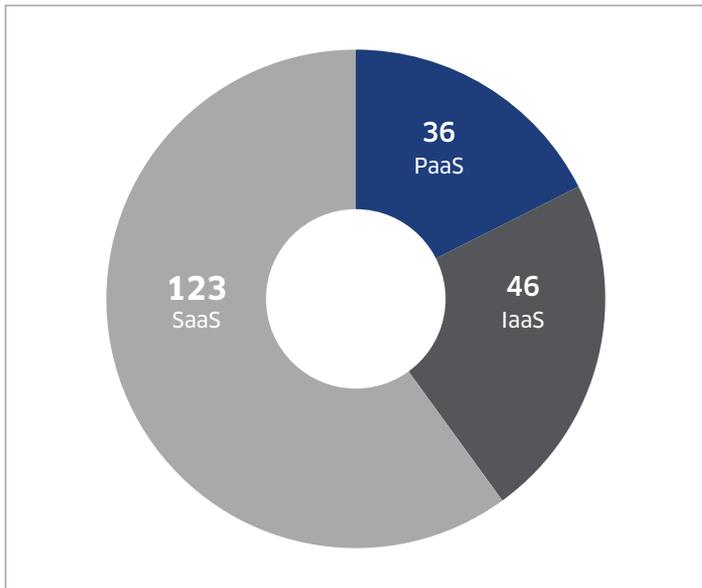
## Public IT Cloud Spending ($Billions)



Bloomberg Intelligence, Anurag Rana, Cloud to Analytics Driving Growth for IT Services, April 2017

In addition, the chart below breaks down the expected public IT cloud spending in 2020 in the chart above by the type of service. SaaS spending is expected to be about $123 billion of the $205 billion public IT spending in 2020, which shows that the majority of public cloud computing services will be for delivering software applications over the internet[8].
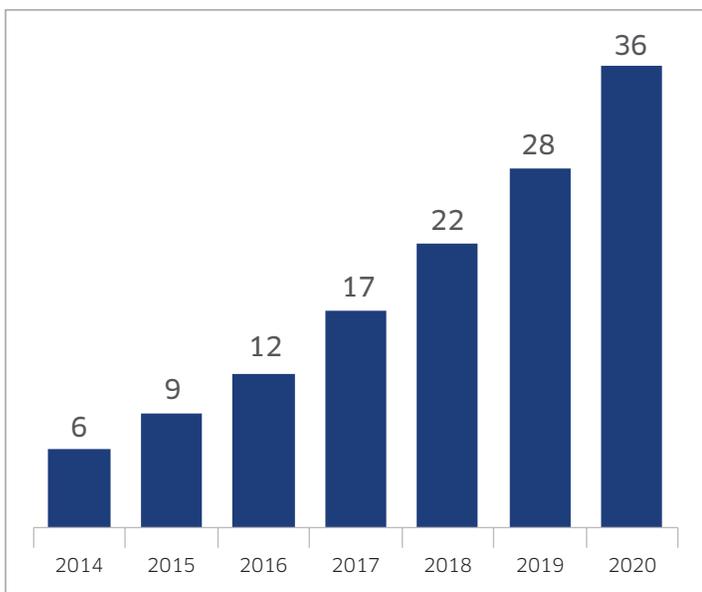
## Cloud Spending by Segment in 2020 ($Billions)



- 36 PaaS
- 46 IaaS
- 123 SaaS

Bloomberg Intelligence, Anurag Rana, Cloud to Analytics Driving Growth for IT Services, April 2017

Further, according to Bloomberg Intelligence, although SaaS is expected to have the majority of public cloud spending, PaaS is the fastest growing segment, as it is expected to expand to $36 billion in 2020 from $6 billion in 2014, growing annually at about 35%[9].
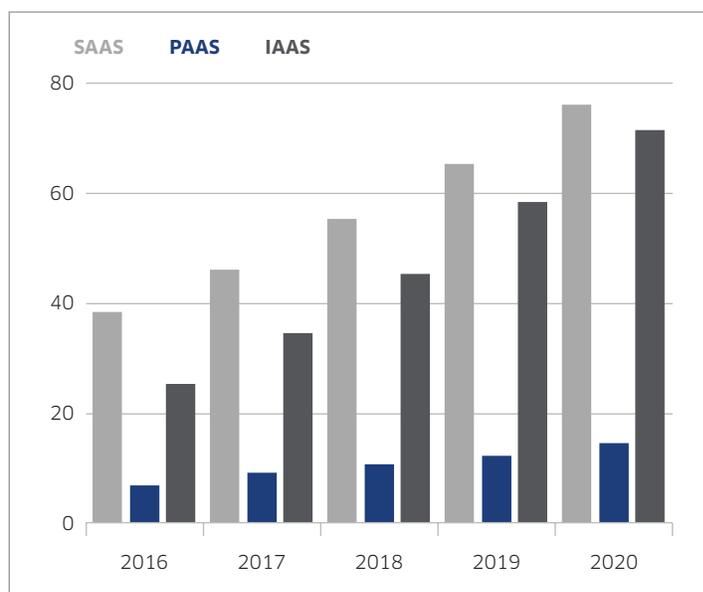
## Public Cloud Spending (PaaS only)



- 2014: 6
- 2015: 9
- 2016: 12
- 2017: 17
- 2018: 22
- 2019: 28
- 2020: 36

Bloomberg Intelligence, Anurag Rana, Platform-as-a-Service is Rapidly Growing Area in Public Cloud, June 2017

Gartner, on the other hand, has slightly different growth projections for the different cloud segments, although the overall trend is the same. The chart below shows that, according to Gartner, IaaS will have the strongest growth of the three major segments in cloud computing services, growing from $25 billion in 2016 to $71.5 billion in 2020[10]. Gartner sees the SaaS market experiencing slower growth relative to previous years as they see the number of SaaS offerings in the human capital management (HCM) and customer relationship management (CRM) maturing in the next few years, while the number of SaaS offerings for financial applications will accelerate[10].

## Public Cloud Spending ($Billions)



SAAS  PAAS  IAAS

http://www.gartner.com/newsroom/id/3616417

In any case, the above shows that the cloud computing industry is expected to continue to expand rapidly as it has done so in the past few years, as more businesses will continue to shift their physical, on-premise infrastructure over to the cloud to reap the aforementioned benefits.

## How can People Invest in Cloud Computing?

As mentioned above, one of the ways in which people can invest in the cloud computing industry is through the First Trust ISE Cloud Computing Index Fund (SKYY) and the underlying index for this ETF is the ISE Cloud Computing Index (CPQ). The methodology for CPQ is stated as follows[11]:
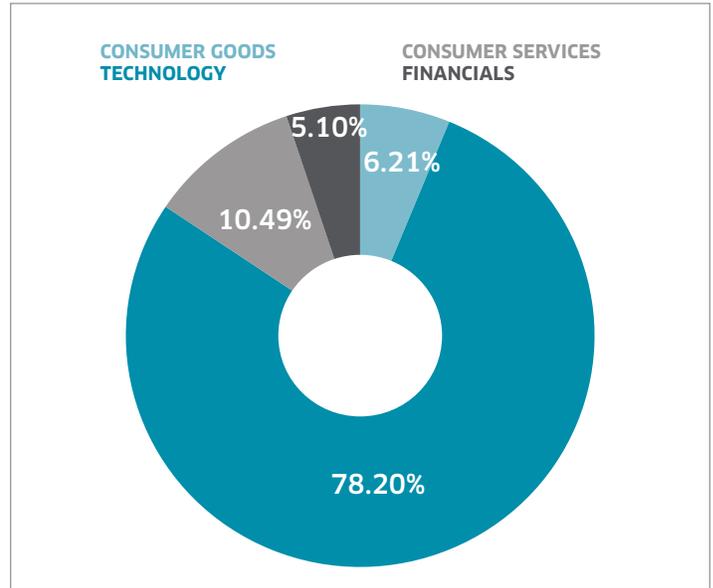
ISE Cloud Computing Index provides investors with securities that are actively engaged in a business activity supporting or utilizing the cloud computing space:

1) Companies that are direct service providers for the cloud computing space or companies whose business model relies on delivering goods and services that utilize cloud computing technology are classified as "pure play" cloud computing companies.

2) Companies that focus outside the cloud computing space but provide goods and services in support of the cloud computing space are classified as "non-pure play" cloud computing companies.

3) Large broad based companies whose business model indirectly utilize or support the use of cloud computing technology are classified as "technology conglomerate" cloud computing companies.

In addition, a security must have a minimum float market capitalization of $100 million.

Not coincidentally, most of the companies in the ISE Cloud Computing Index are technology companies, as shown in the chart to the right. About a quarter of the index, however, is companies that are not in the technology industry. This shows that, while investors will get strong exposure to the technology industry when they invest in the product tied to this index, they are also getting exposure to companies outside of the technology industry that are also invested in the cloud computing space (i.e. in general the "non-pure play" and "technology conglomerate" companies noted above from the CPQ methodology guide).
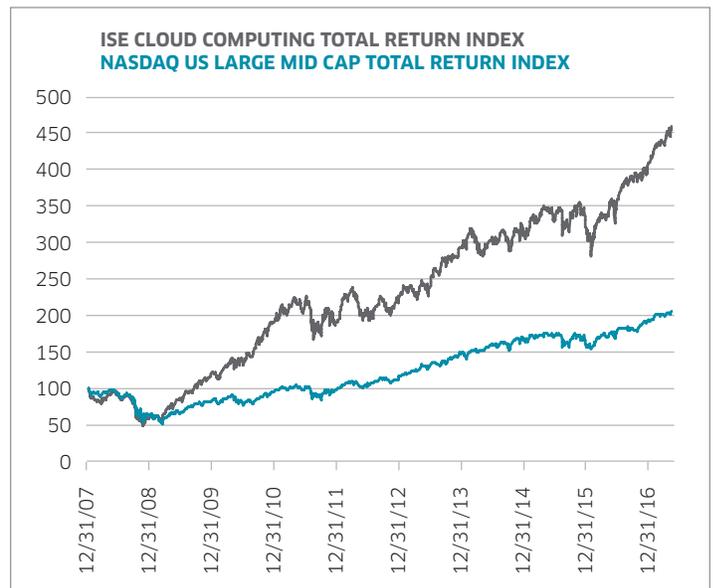
## ISE Cloud Computing Index ICB Industry Classification



CONSUMER GOODS
TECHNOLOGY
CONSUMER SERVICES
FINANCIALS

5.10%
6.21%
10.49%
78.20%

Components as of 5/31/2017

In addition, the performance of this index reveals the high growth that this industry has seen historically. In fact, the chart below shows the total return version of the ISE Cloud Computing Index versus the total return version of the Nasdaq US Large Mid Cap Index, and immediately the outperformance is evident. This shows that investing in cloud computing, a niche area in the market, would have yielded a significantly higher return over the benchmark.

## ISE Cloud Computing Total Return Index



ISE CLOUD COMPUTING TOTAL RETURN INDEX
NASDAQ US LARGE MID CAP TOTAL RETURN INDEX

As of 5/31/2017

| PERFORMANCE STATISTICS | ISE CLOUD COMPUTING TOTAL RETURN INDEX | NASDAQ US LARGE MID CAP TOTAL RETURN INDEX |
|---|---|---|
| Return | 358.74% | 106.96% |
| Annualized Return | 17.49% | 8.00% |
| Average Daily Return | 0.08% | 0.04% |
| Volatility | 25.04% | 20.81% |
| Sharpe Ratio | 0.698 | 0.384 |
| Max Drawdown | -52.10% | -50.47% |
| Information Ratio | 0.805 | -- |
| Alpha | 8.79% | -- |
| Up Capture Ratio | 1.119 | -- |
| Down Capture Ratio | 1.045 | -- |

As of 5/31/2017 (Nasdaq US Large Mid Cap Total Return Index is the benchmark)

| ANNUALIZED RETURNS | ISE CLOUD COMPUTING TOTAL RETURN INDEX | NASDAQ US LARGE MID CAP TOTAL RETURN INDEX |
|---|---|---|
| 1Y | 28.56% | 17.41% |
| 3Y | 15.36% | 9.65% |
| 5Y | 17.97% | 15.17% |
| Since Inception | 17.49% | 8.00% |

As of 5/31/2017

In the tables above, the outperformance is clearer as the sharpe ratio of the ISE Cloud Computing Index is almost 82% higher than that of the Nasdaq US Large Mid Cap Index. Additionally, the the chart to the right shows the excess returns that the ISE Cloud Computing Index had over the Nasdaq US Large Mid Cap Index, and in most months, CPQ had a positive return over the benchmark. In fact, CPQ has outperformed the benchmark in approximately 62% of the months since December 2007.
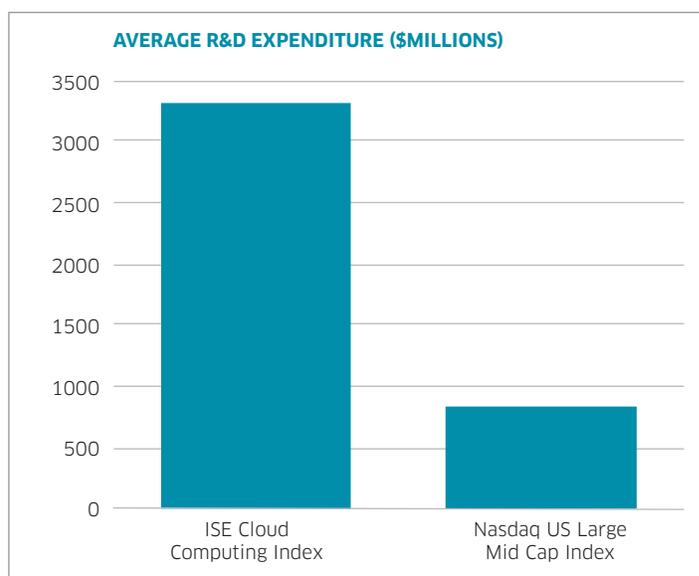
## Excess Returns Over Nasdaq US Large Mid Cap Index



As of 5/31/2017

Since this index invests in companies that operate in a small segment of the market, cloud computing, it is imperative that these companies are continuously investing in research and development to ensure that they are evolving to adapt to the newest technologies that they can offer to their customers. As the chart below explicitly illustrates, the average R&D expenditure is much higher for the ISE Cloud Computing Index than it is for the Nasdaq US Large Mid Cap Index, which confirms the fact that the companies in CPQ have been continuously investing in this industry to keep up with the evolving landscape.

## R&D Expenditure



As of 5/31/2017

This clearly shows that CPQ offers a unique exposure to the cloud computing industry when compared to the benchmark. Investors will not only get exposure to the technology industry but also to companies in other industries as well. In addition to this, the outperformance of the index over the benchmark as well as the higher investment in R&D by the companies in this index is evidence that the components in CPQ are well-positioned to capture the growth in the cloud computing industry.

## Conclusion

In conclusion, the above explained that cloud computing has ample benefits including but not limited to cost savings, efficiency, and speed, and can be deployed in numerous ways via public, private, or hybrid cloud. In addition, cloud computing services can be offered in different ways such as Infrastructure-as-a-Service, Platform-as-a-Service, and Software-as-a-Service, each with its own advantages. Additionally, the analysis in this piece shows that there have been many drivers to the growth of cloud computing, including the significant cost savings that organizations have reaped along with the countless businesses that have been able to compete with larger organizations by scaling their infrastructure (storage, servers, etc.) in the cloud rather than implementing the IT resources on premise. This has led to an increase in cloud computing spending, and this spending is projected to continue to increase as organizations continue to divest from physical infrastructures. As a result, the ISE Cloud Computing Index (CPQ) is poised to capture the projected growth in this industry going forward, as it was shown to have done so historically. The analysis of the index shows that it has significantly outperformed the benchmark historically and the companies within the index invest more in R&D than the benchmark, which reveals that they are positioned to take advantage of any innovations within the cloud computing industry. Investors looking to invest in the product tied to CPQ can invest in the First Trust ISE Cloud Computing Index Fund (SKYY).

**FOOTNOTES:**

1) https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/

2) https://support.rackspace.com/white-paper/understanding-the-cloud-computing-stack-saas-paas-iaas/

3) Bloomberg Intelligence, Anurag Rana, Microsoft Leads Legacy Software Companies in Shift to Cloud, May 2017

4) http://www.rightscale.com/blog/cloud-industry-insights/cloud-computing-trends-2015-state-cloud-survey

5) Bloomberg Intelligence, Anurag Rana, Longer Term, IT Services Industry Needs New AI-Based Products, April 2017

6) https://www.skyhighnetworks.com/cloud-security-blog/11-advantages-of-cloud-computing-and-how-your-business-can-benefit-from-them/

7) https://www.forbes.com/sites/joemckendrick/2013/02/20/cloud-computing-boosts-next-generation-of-startups-survey-shows/#1c3c4a98103c

8) Bloomberg Intelligence, Anurag Rana, Cloud to Analytics Driving Growth for IT Services, April 2017

9) Bloomberg Intelligence, Anurag Rana, Platform-as-a-Service is Rapidly Growing Area in Public Cloud, June 2017

10) http://www.gartner.com/newsroom/id/3616417

11) https://indexes.nasdaqomx.com/docs/Methodology_CPQ.pdf

12) Data mentioned in the piece is from Nasdaq Index Research, Bloomberg, and/or Factset, unless otherwise stated