

# A Survey on Cloud based Business Intelligence and Analytics

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**Abstract:** The paper discusses the issues of impact of Business Intelligence based on Cloud computing. Cloud computing has become hot topic to research because of the benefits it can provide to the business and one of the best technological developments in restructuring the business world. Being a key component of a company's infrastructure, both small business and large businesses are able to profitable from cloud services that offer rapid scalability to meet demand, lower labor costs, lower infrastructure, lower investments and accessibility. As more companies relocate or move their data and applications to the cloud, business itself changes dramatically. It maintains the businesses finances and time by improving collaboration, improving productivity and promoting innovation.

**Keywords:** Business Intelligence, Cloud Business Intelligence, Cloud computing.

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## I. INTRODUCTION

The economics of cloud computing lets innovative organizations or corporations to create products that either are not possible before or are considerably more cost effective than the competition. There are short windows of chance that competition will typically place the economic benefits of cloud computing into their product formulations quickly after checks that it works for user. Wherever it gets fascinating is that several business concepts that needed restrictive amounts of computing power, scale, or new a business models but could not be implemented because to existing technical limitations or cost-effectiveness, will currently be realized. Each improvement in storage, process power, or technology permits innovations that are not possible before (high speed Internet) and cloud computing makes these opportunities remarkably available (access). Smart companies can take note. Many cloud solutions, particularly as they relate to Software-as-a-Service, would need increasingly less and less involvement by the IT department. Business users are ready to adopt many future cloud computing solutions altogether utilizing self-benefit.

“Business intelligence (BI) includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to enhance and optimize decisions and performance.”[1]

“Business analytics (BA) is used as a solutions to build analysis models and simulations to create scenarios, understand realities and predict future states. Business analytics includes predictive analytics, data mining, applied analytics and statistics, and can be delivered as an application suitable for a business user.”[2]

## II. CLOUD COMPUTING

Cloud computing is an emerging technology; it is cost-effective (“pay as you go”) due to resource multiplexing; at low costs for the service providers are passed on to the cloud users.

Cloud computing is enabled by several technologies, but more than the technologies, cloud computing will be the one way to deliver information system and information technology.



Figure 1: Cloud computing

### 2.1 Types of cloud

Clouds classified into different types:

#### 2.1.1 Private Cloud

Private cloud is one of the forms of cloud computing that is

used by only one company or institution or organization, it ensures that an organization is completely individual from others and built within its own walls on its own hardware and software.

Private cloud is considered as an internal cloud or corporate cloud built solely for the enterprise. It helps as an extension of the organization conventional datacenter to provide storage and processing capabilities for a broad range of functions. Private cloud by and of itself functions within the firewall settings of the company or organization without sharing any of the resources. It provides a scalable and flexible business environment for the company or organization with full of client control over its infrastructure.

### 2.1.2 Public Cloud

Public cloud is one of the forms of cloud computing that can be used by everyone, offers free service or pay per usage and run by a cloud service provider. The cloud service provider offers every single thing from system resources to the security, reliability and maintenance of the cloud system.

Public cloud includes the services that are provided over a network for public (everyone) usage. Public clouds are usually owned by third party providers and accessed through internet. The infrastructure can be shared with other businesses by logically separating the applications and data corresponding to individual business. Since the control is restricted to the third party providers, security risks and availability variation cannot be guaranteed.

### 2.1.3 Hybrid Cloud

A hybrid cloud is a combination of both private and public clouds, it provides both the private and public cloud services based on the requirements. It is also called as “Surge Computing”

## 2.2 Cloud Delivery Models

**Infrastructure as a Service:** In I-a-a-S, the computing resource provided is specifically that of virtualized hardware, computing infrastructure and allows user to deploy and run their software. The IaaS includes such offerings as load balancers, network connections, bandwidth and Internet Protocol addresses. The hardware resources are drawn from many servers and networks generally distributed across many data centers and cloud providers are responsible for maintenance.

**Platform as a Service:** It provides a platform and environment and it allows users to create software applications using programming languages and tools supplied by the provider. Businesses, web developers and software developers can be benefited from P-a-a-S.

**Software as a Service:** It is called as software-on-demand, it saves costs by reducing the effort of development, software delivery, infrastructure costs, eliminating software licensing and maintenance.[3]

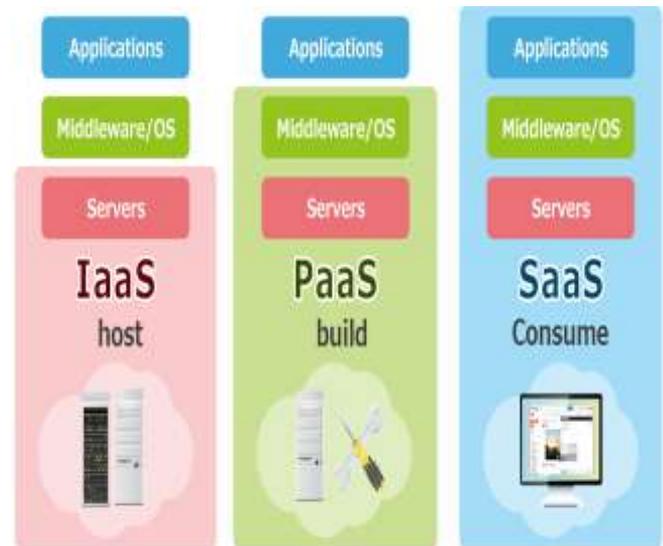


Figure 2: Cloud Delivery Models

## 2.3 Advantages of cloud computing

- With cloud computing, organizations can minimize the size of their own data centers. The reduction of the numbers of servers, the number of staff and the software cost can noticeably reduce IT costs without affecting an organizations IT capabilities.
- The cloud computing offers great flexibility for business by meeting its varied demands, bandwidth or number of users. Scaling up of services and resources relying upon the business demands are one of the great benefits of cloud computing.
- Migrating to cloud based solutions will remarkably reduce the cost of maintaining and managing IT infrastructure. Instead of upgrading or acquiring hardware and equipment for business, can resort to the efficient and effective resources of cloud provider.
- The cloud provider will take care for providing the upgrades and maintenance of the servers and network equipment. Cloud vendors have team to work on network management tasks and use the advanced tools and applications as required.
- The users can access the cloud based solutions wherever whenever using the web based user interfaces. This allows quick implementation process across the businesses with less delay.
- The cloud services offers pay-as-you-go model, pay structure which reduces the risk among the businesses and customers. This also makes it cost-effective for businesses to adopt cloud solutions.

### III. Business Intelligence and Analytics

BI provides the right information at the right time to take the right decision format. The role of business intelligence is very important for decision making. It is used to support a vast range of business decisions ranging from operational to strategic. Basic operating decisions includes product pricing or product positioning. A business decision strategic includes goals, priorities and directions at the broadest level.[4]

It includes the infrastructure, applications and tools, and better practices that enable access to and information analysis to improve and optimize decisions and performance. Business Intelligence is not like model driven business, it is technology-driven process which is used for data analyzing to help the corporate executives, and end users can make more informed business decisions. BI has variety of applications, methodologies and tools that enable organizations to collect information from within the systems and external sources, preparing for analysis, developing and running the queries against the data, and create records, data visualizations and dashboards to form the methodical results accessible to corporate business decision makers.

Business Intelligence technology gives past, present and future predicts of business operations. The roles of business intelligence technologies are online analytical process, predictive analytics, business performance management, process mining, reporting, complex event process, data mining, text mining, and prescriptive analytics and are acceptable to handle massive amount of unstructured and structured data to help identifying, developing and to create new business opportunities. The goal is to allow for the simple interpretation of those massive data. Finding the new opportunity and implement a strategy based on visions will offer businesses with a competitive market benefits.

It helps the companies in handling both internal and external data and transforming them into required business information. Cloud computing has more advantages that brings best outcomes for the companies. By merging cloud computing and BI, the results were even more profitable or beneficial. Cloud based BI&A is growing rapidly in business management solutions, when the economy is going downwards. Organizations continue to spending time on BI&A as it helps them to provide business information and ongoing market drifts that are highly profitable.[7]

### IV. Cloud Business Intelligence

Cloud Business Intelligence is an idea of delivering business intelligence abilities as a service using cloud based architecture that comes at a low cost yet faster deployment and flexibility. Business Intelligence used by many small and medium sized enterprises who are looking to improve their businesses with Business intelligence.

It is very simple and cost-effective way for an organization to get all the components that are required for data access and analytics, dashboards, integration and reporting, all these are available in hosted environment with cost-effective economics i.e. “pay-per-use”. Cloud delivery provides faster deployment, businesses can build an initial Business Intelligence environment in days or weeks compared to months with conventional BI solutions.[6]

#### 4.1 Advantages of Business Intelligence on the cloud

**Deployment:** No need of additional software installations or hardware components, cloud based Business Intelligence applications are easier and faster to deploy. Lacking infrastructure attracts more for small business customers as it's far a low risk business venture which has greater potential reward.[5]

**Elasticity and Scalability:** Cloud based Business Intelligence applications will be effortlessly scaled up to accommodate the expansion of business and more number of users in organization. Business Intelligence hosting on cloud allows the smaller business customers to enhance their computing power of the resources even when the volume of data will increase to unexpected levels. Elasticity and scalability allows the organizations to leverage the huge processing power that are available over the internet based on the business trends.

**Accessibility:** Business Intelligence applications which are based on cloud can be accessed from anyplace by using the web browser on any gadgets. The Business Intelligence applications are flexible enough and can be effortlessly changed so the technical users access the reporting features, analytics and can easily share the data, remote access capabilities as they are not dependent on application deployment and infrastructure.

**Affordability:** Cloud based Business Intelligence solution remarkably decreases the capital expenditure as there is no infrastructure or hardware set up. Cloud service provider is in charge of the maintenance costs on the resources and ongoing upgrades. The businesses or companies who wants to use the cloud business intelligence solutions for short time period can avail for “pay-per-use” models.

**Reliability and Security:** Cloud based Business Intelligence applications uses several redundant sites which thus makes it more secure and reliable as they provide disaster recovery and possible data storage.[5]

### V. Cloud BI solutions affects Day to Day Business processes

The cloud technology is like a trend-changer for organizations with its profits extremely hard to ignore.

**Flexibility:** In cloud computing, employees are allowed to access data and services from anyplace through their devices. Hybrid cloud solution allows businesses to use the public cloud as and when spikes in demand.

**Big Data:** Big data refines the analytic capabilities of large organizations over their databases. Cloud allows companies to place and manage their data on cloud and provides business intelligence ideas to succeed in competitive market and obtain long-term stabilities.

**Improve Agility:** Cloud technology improves responsiveness to customer wants that have an affect on in day-to-day business processes. Business agility leads to profits like improvement in development of projects and new products, better delivery of resources, simplified internal operations and new options for employees to collaborate and connect.

**Reduced costs:** Cloud services offers a great opportunity in businesses to manage the investments based on the operational expenditures. Rather than buying and maintaining the IT infrastructure, cloud allows the users to make use of the scalable subscription option wherever the users can pay based upon their usage.

**Risk management and Disaster recovery:** Cloud computing serves as an effective tool for risk management. The cloud architecture allows the integration of additional capabilities via horizontal scaling of similar nodes which streamlines risk management and disaster recovery.

**Security measures:** A Cloud provider provides cloud security that includes continuous monitoring, reviewing and auditing. A part from this, cloud performs with higher level of standardization with respect to software applications, network equipment and hardware. This results in reducing irregularities and vulnerabilities in security violation.

**Business upgradeability:** In earlier days traditional IT environments needed continuous updates and regular security checks for systems that would take more time on administration. Cloud computing reduces such regular administration tasks and more resources will be spent on achieving business goals.

### **When Should a Business Consider Moving to the Cloud?**

**Easy access, anytime:** The Cloud storage and software platforms can be easily accessed from anyplace on the world, till the client has an Internet facility. Applications that are hosted on cloud can keep running on any compatible devices

(mobile, laptop), system up gradation can also be done automatically.

**New Business Startups:** No need to worry about the technology infrastructure for new business startups. Earlier, new business startups would cost more in getting done with the whole set up of IT infrastructure, office space, business applications and many more. With cloud services, the initial investments for components like applications and servers will be discounted to a greater extent.

**Focuses on key business objectives:** Cloud allows user in businesses to concentrate more on the important tasks than thinking about whether their IT systems are up-to-date. With saving business money, can also focus on serving customers requirements and growing in business.

**Challenging Business Needs:** In case, things are constantly changing in business front, it is very challenging to evaluate the actual requirements. In such cases, it is better to switching into a new cloud environment to optimize resources and make use of Virtual Machines to enhance performance makes sense.

**Launching New Product:** Existing businesses, entering into a new market with a new product may be the apt time to think about moving to the cloud and this turns out to be an effective in reducing workloads as well as cost

**Scope for Future Growth:** When business is growing with increasing customer base that basically requires scalability and network demands, then deploying Virtual Machines through dedicated cloud will allow to meet the future needs without spending more.

## **VI. CONCLUSION**

The growth of Business Intelligence field can't ignore the cloud computing solutions. Cloud computing saves the cost when usage is low and provides scalability for peak periods. Cloud Business Intelligence has been developed to improve the flexibility of implementation, scalability, availability, productivity and efficiency of BI and increase the performance of software. This helps in shorting business intelligence implementations, cost reduction on business intelligence applications. As the organizations continue to strive in reducing the expenses to run business and stay focused (competition), cloud computing and services will continue to evolve. Cloud computing has more profits that are not easier to measure, but brings valuable cultural changes. Cloud makes the business more agile and hence address market needs more efficiently, bringing products and services to market faster and directly improves the bottom line.

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