International Journal of Advance and Innovative Research
Volume 12, Issue 3: July - September 2025
ISSN 2394 - 7780

ENGINEERING SOFTWARE FOR BIG DATA ANALYTICS: ISSUES AND OPPORTUNITIES

Sandeep Kumar Vishwakarma[1] and Prof (Dr) Vikas Kumar[2]
[1]Ph.D Scholar, Department of Computer Sciences & Engineering, Chhatrapati Shivaji Maharaj University, Panvel, Navi Mumbai, Maharashtra, India
[2]Head, Department of Computer, Sciences & Engineering, Chhatrapati Shivaji Maharaj University, Panvel, Navi Mumbai, Maharashtra, India

ABSTRACT:
New data sources such as diverse business transactions, social media, high-resolution sensors, and the Internet of Things, are creating a huge volume of data at enormous speed which needs to be captured, processed, integrated, analyzed, and archived efficiently and effectively. This tsunami of data generated through huge volume of business transactions, social media users of ever increasingly popular whatsapp, facebook, twitter, linked and many more to mention is commonly referred to as Big Data. This Big Data needs to captured, processed, analyzed and archived for effective and efficient usages for Business Intelligence. To Process Big Data we need to develop sound Big data systems for storing and analyzing petabytes of data in many application areas. These systems belong to a family of major enterprise software which needs, long-term investments requiring considerable financial commitments and massive scale software and system deployments.

In this paper we will discuss some key issues which any one need to overcome for developing a Big Data system for Business Intelligence.

Keywords: Big Data, Business Intelligence (BI), Social Media

OBJECTIVES

The main objective of this paper is to provide basic concept of Business Intelligence, Big Data, Software Engineering and proposing a S/W development methodology for Big data to researchers, scientists and practicing Software Engineers. We will propose an integrated approach of software development for Big Data Analytics.

In the fast growing field of Big Data, we note that a disproportionately larger amount of effort is being invested in infrastructure development and data analytics in comparison to applications software development This prompted us to create a Software Engineering model for development of Big Data Software (SEMBD) containing various elements such as development process, Big Data systems, corporate decision-making, and research and their relationships. Our proposed model will consider software development from the perspective of various types of stakeholder like Enterprises, end users developers, researchers etc who are keenly interested in Software development for Big Data Analytics.. From the research perspective, we describe challenges in SEMBD, specifically requirements, architectures, testing and maintenance[2].

I. INTRODUCTION

New data sources such as diverse business transactions, social media, high-resolution sensors, and the Internet of Things, are creating a huge volume of data at enormous speed which needs to be captured, processed, integrated, analyzed, and archived efficiently and effectively. This tsunami of data generated through huge volume of business transactions, social media users of ever increasingly popular whatsapp, facebook, twitter, linked and many more to mention is commonly referred to as Big Data. This Big Data needs to captured, processed, analyzed and archived for effective and efficient usages for Business Intelligence. To Process Big Data we need to develop sound Big data systems for storing and analyzing petabytes of data in many application areas. These systems belong to a family of major enterprise software which needs, long-term investments requiring considerable financial commitments and massive scale software and system deployments. In this paper we will discuss some key issues which any one need to overcome for developing a Big Data system for Business Intelligence.

ISSN 2394 - 7780

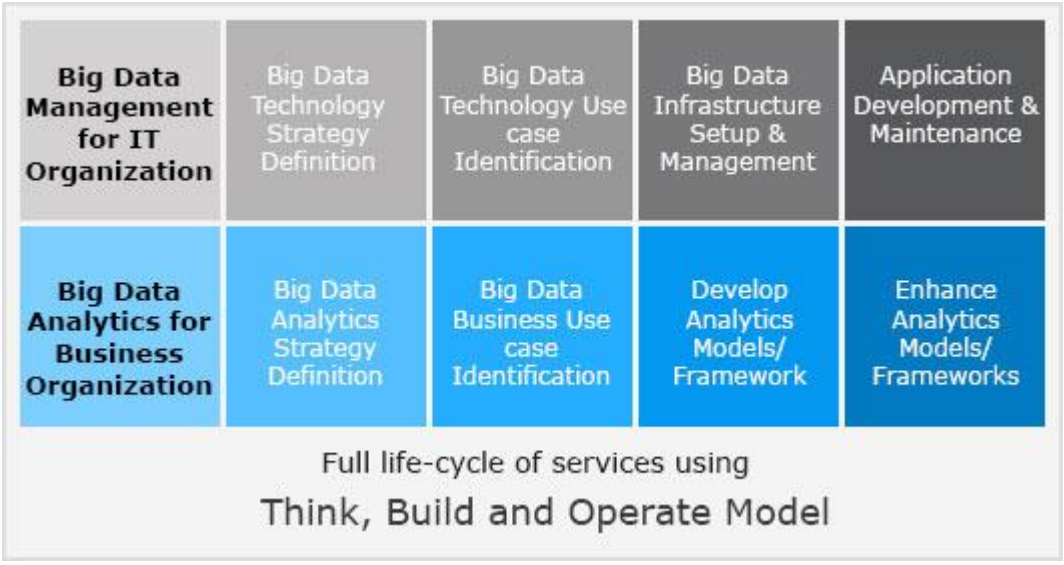

Figure 1: Big Data analytics: Think Build and Operate Model

(Source: www.slideshare.net)

- As described in Figure:1 Big Data Analytics Think , Build and Operate model represents various services offered by Big data Analytics in two layers:
- Big data Management for IT organizations:

This layer consist of following services:

- Big Data Technology Strategy Definition.
- Big data Technology Use Case Identification.
- Big Data Infrastructure setup and Management.
- Application Development and Maintenance.
- Big Data Analytics for Business Organizations:

This layer consists of following services:

- Big Data Analytics Strategy Definition.
- Big Data Business Use Case Identification.
- Develop Analytics Model/Framework.
- Enhance Analytics Model/Framework.

What is BI?

Business intelligence (BI) can be defined as a set of tools and techniques for acquiring and transforming raw data into useful information for business analysis purposes**.**

BI technologies provide historical, current and predictive views of business operations. Common functions of business intelligence technologies are: OLAP, reporting, data analysis, data mining, and text mining, benchmarking predictive and prescriptive analytics.

Integration of Big Data and Business Intelligence: Big data is growing fast as organizations devote technology resources to tapping the terabytes and petabytes of data flowing into their organizations and externally in social media data and other sources. In order to tap benefits of Big Data and Business Intelligence we need to answer these questions:

How Big data and BI go hands in hands together?

What does this all mean for business intelligence (BI) users and systems?

With all the attention on advanced analytics for big data, what's the role for BI?

ISSN 2394 - 7780

Integrating advanced analytics for big data with BI systems is an important step toward gaining full return on investment. Advanced analytics and BI can be highly complementary; advanced analytics can provide the deeper, exploratory perspective on the data, while BI systems provide a more structured user experience. In the process of designing and developing software for big data we need to identify sources and targets applications of big data. A better understanding of BI and Big data integration will help in designing better Big Data Application Software.

Big Data Sources	Big Data Target Applications
• Science • Telecom • Industry • Business • Social Media and Networking sites.	• Scientific Discovery • New technologies • manufacturing, Process control and Transport. • Personal Services.

Table 1: Big Data Origin and Target Applications

(Source: http://www.uazone.org/demch/worksinprogress/sne-2013-02-techreport-bdaf-draft02.pdf)

II. Basics of SEBDI (Software Engineering for Big Data and BI):

Designing and developing software for Big data analytics and BI involve handling various issues related to Data Modeling, Visualization and reporting services along with its integration with Business Intelligence. In order to develop highly efficient and potentially successful Software for Big Data and BI involves dealing with following challenges:

- The key challenges of handling and processing big data that are generated at exponential rate. Business operations, intelligence analysis, logistics, and health care all represent big data applications with data growing at exponential rates and the need for scalable software solutions to sustain future operations.
- Another key problem is non-standardized technologies.
- Using these new technologies to design and construct a massively scalable big data system creates an immense software architecture challenge for software architects.

Why Scale Matters in Big Data Management?

- Scale has many implications for software architecture. Scale induces changes in software architecture. The second is based upon economics, where small optimizations in resource usage at very large scales can lead to huge cost reductions in absolute terms. The following briefly explores these two issues:
  - **Designing for scale.** Big data systems are inherently distributed systems. Hence, software architects must explicitly deal with issues of partial failures, unpredictable communications latencies, concurrency, consistency, and replication in the system design.
  - **Economics at scale.**

Big data applications employ many thousands of compute-and-storage resources.

Designing for Scalability with Big Data

To mitigate the risks associated with scale and technology, a systematic, iterative approach is needed to ensure that initial design models and database selections can support the long-term scalability and analysis needs of a big data application.

ISSN 2394 - 7780

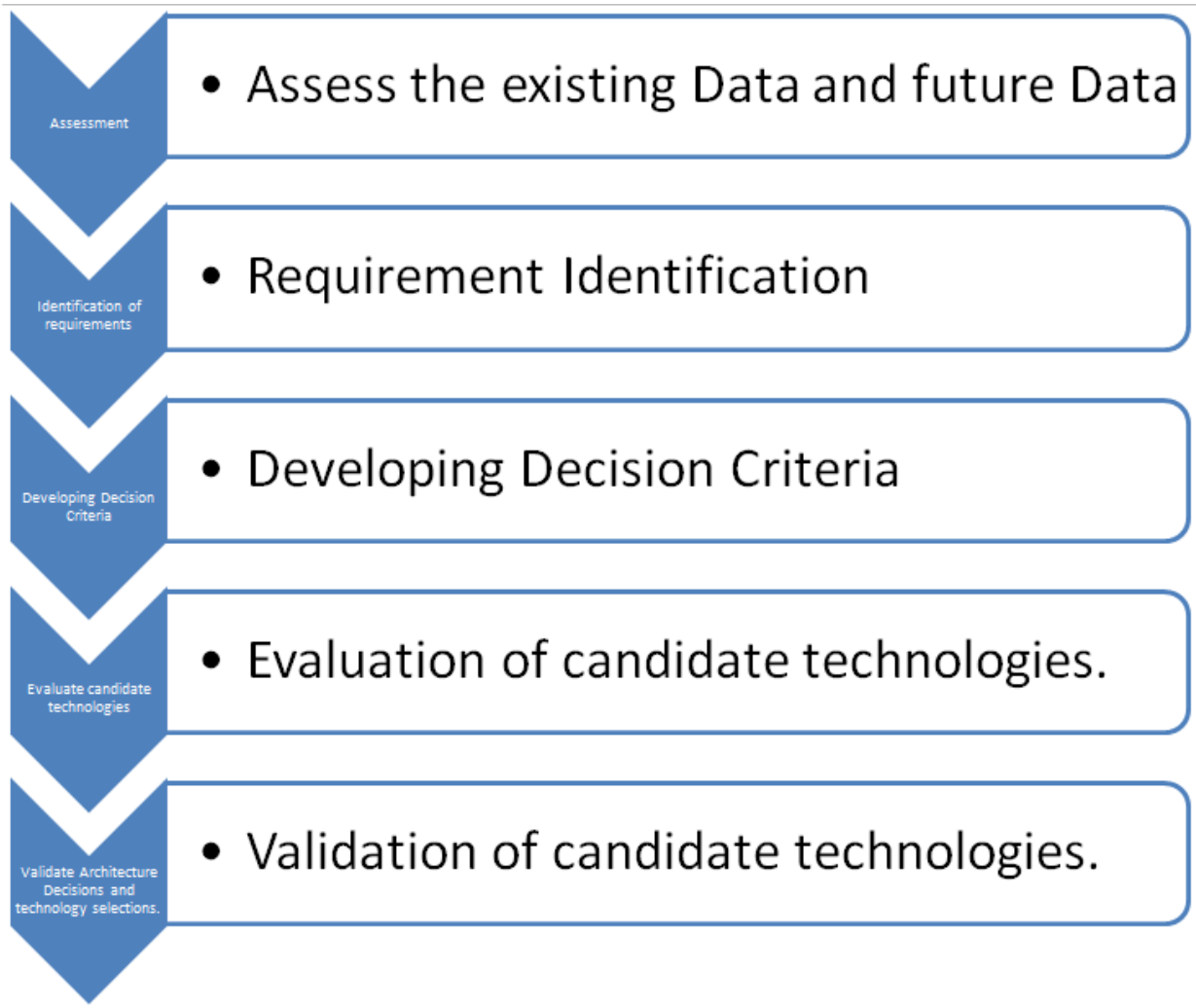

Figure 3: Software Engineering for Big data

Implementation of Big Data and BI involves evaluation, selection and validation of required Hardware and software Platform. Selection of tools and technologies for developing Enterprise Software for Data analytics and Business Intelligence. One need to develop and implement software for visualisation and presentation for data in suitable format for business decision making. Big data means volume, variety and velocity. These things have become critically important thanks to a flourishing social media revolution. Internet, digital and online advertising companies are dependent on technology because of the sheer volume of data they deal with every day. Further there is a need to deal with Integration of Big data system with Business Intelligence of an enterprise. Here are some of major obstacles which we need to overcome while implementing software for Big Data and BI:

- **Immature Vendors and Naïve Products:**

• Infrastructure Investment:

• Extended Gestation Periods:

• Capacity Planning:

• Commitment Concerns:

• Big Data Platform and Analytics Framework

• Perfection of Big Data BI Solutions

• Need for Big Data BI Solution Implementation Versus Current Daily Operations

• IT Budget Constraints:

ISSN 2394 - 7780

Opportunities of Software for Big data and Business Intelligence (BI):

Big data and BI integration software has huge market potential for coming few decades. As per some prominent quotes from Industry leaders like Forbes, SAS IBM and Forester, Sales force. and many more market leaders BI and Big data will grow by leap and bound for coming future. These two promising technologies are going to be a boon for various Industries verticals like Transport, Healthcare, Financial sectors, Government, Military organizations, and many more sectors are ready to join soon and earn huge profit and market share in their respective verticals

III. CONCLUSION:

In this paper we covered fundamentals of developing software for Big Data and Business Intelligence. We have discussed issues and challenges which one need to tackle in order to develop software for Big data and Business Intelligence. We have also advocated that these two technologies has great market potential. Developing software for Big data and Integration of BI can be a promising field for Researchers, scientists, Software engineers and Software development organizations. Big data and BI opens plethora of new and emerging fields of software developments to be explored further:

Some of key areas are: Developing tools for Data Modeling, Data analysis, visualization and integration of BI with Big Data.

IV. RESOURCES & REFERENCES

[1] Big Data: Challenges and Opportunities Roberto V. Zicari.

[2] http://dl.acm.org/citation.cfm?id=2849782&CFID=587294006&CFTOKEN=88916027

[3] Turner, Dawn M. "What is Venture Management?". www.VentureSkies.com. VentureSkies. Retrieved 24 February 2016.

[4] (Rud, Olivia (2009).) Business Intelligence Success Factors: Tools for Aligning Your Business in the Global Economy. Hoboken, N.J: Wiley & Sons. ISBN 978-0-470-39240-9.

[5] https://en.wikipedia.org/wiki/Business_intelligence.

[6] http://www.uazone.org/demch/worksinprogress/sne-2013-02-techreport-bdaf-draft02.pdf)