International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 12 | Dec 2018 www.irjet.net p-ISSN: 2395-0072

Search Improvement using Digital Thread in Data Analytics

Sagar Latake[1], Mohini Jayashette[2], Priti Khadtare[3], Trupti Biradar[4]

[1,2,3]Student, Bachelor of Engineering, Dept. Of Computer Engineering, ISB&M School of Technology, Pune Maharashtra, India
[4]Asst. Professor Dept. Of Computer Engineering, ISB&M School of Technology, Pune, Maharashtra, India

---

Abstract - *Digital Thread is nothing but a communication system which connect the elements present in the manufacturing processes and provides the complete view of an element throughout the overall manufacturing lifecycle. Between organizations, especially with complex products, it's fairly evident that communication is important. In complex products, if we're looking for an efficient design process, that means sharing information in some way that will allow suppliers from different levels of the organizations supply chain to have input on design of the product. The stream which starts from the creation of any product concepts and continues to get data throughout the overall product life cycle. It is the process in which the required changes will be done and it will ultimately influences the future of manufacturing by using digital thread. Digital Thread can bring quality gains for those manufacturers in organization who needs to manage huge amounts of data and manage complex and complicated supply chains. Even in a complex discrete environment of the organization, where data volumes are low, manufacturing enterprises have to be able for redesign quickly and meet required timelines. The Digital Thread helps enterprises to maintain a clear view of every component's journey from receiving source through to the final product and beyond to tracking and records for quality standards and product lifecycle management.*

Key Words: **Digital Thread, Neo4j Graph Database, Cloud, Data Analytics.**

1. INTRODUCTION

1.1 Digital Thread

Digital Thread is nothing but a data-driven architecture that links information generated from the overall product lifecycle together. Digital thread is getting more and quality as it is a communication system for designing, manufacturing and used in operational processes for designing, building and maintaining the engineering product in an organization more efficiently. There is a scientific formulation describes where digital thread is used for complete design decisions may be absent.

Full traceability across a full lifecycle is the synonym for the digital thread. Digital thread is developed for achieving the product lifecycle's digital measurement from the way will be back to the capabilities of model based system engineering, where the concepts for the vehicle were originally explored for taking complex designs" in[2].

1.2 Neo4j

Neo4j is an open-source graph database based on Java with high performance, high reliability and high extensibility. A graph database is a data management system with the Create, Delete, Update, and Read(CRUD) operations which exposes the graph data model, the ability to deal with relationships are the most distinctive properties of graph database when comparing with other traditional or NoSQL databases. Neo4j is the most magnificant graph database currently all Durability(ACID). Differing from traditional RDBS, the kernel of Neo4j is a fast topological engine, which focus on the processing of huge amount of data and complex links between data. As shown in, the information modeling of Neo4j mainly contains three structure units, i.e., nodes, relationships and properties. There can be multiple relationships between two different nodes and relationships have directions. Nodes and relationships can contain variable properties in[3].

1.3 Data Analytics

With the increase in universal data volume, the technology of big data and its analytical processes are generally used to provide the description about massive datasets. Compared with other traditional datasets and its processes, big data includes semi structured and unstructured data which needs more real time analysis. Big data also gets details about new prospects for determining new values, It also supports us for understanding of hidden values deeply and it will also experiences newly created challenges, For instance, how to exceptionally organize and manipulate such big datasets. The volume of information from various sources is growing large, it also provides about some challenging issues demanding rapid resolutions. Big data visualization process is another vital process which takes an important place in big data analytics problems. Because through data visualization only the final report of data analytics will be visualized in [4].

1.4 Cloud(AWS)

Cloud Computing is a recently emerged model which is becoming popular among almost all enterprises. It involves the concept of on demand services which means using the cloud resources on demand and we can scale the resources as per demand. Cloud computing provides various benefits and it is a cost effective model in[5]. It is the approaching IT industry murmured words- the users move their

applications and data to the remote cloud so that they can have a simple and pervasive way of accessing.

2. LITERATURE SURVEY

2.1 Information about Digital Thread

In product overall lifecycle digital twins are extended by the digital thread for enclosing all flows during the manufacturability, serviceability, engineering, design, identification and performance . It is the thread which will run in all organization and a condition with which the product or service interacts in [7]. The right information at the right places and at the right time. Depending upon how it is used and by whom it is used the data will be transferred into the information and then this information is transferred into the intelligence. With the crossing of the physical and digital world the data which transferred into the intelligence is transferred into the actions. The main challenge is that the information or data access and understanding which present at the right place and the right time so that it is can be used as part of new value added products, so that it can help make better informed decisions of particular complex design decision in[8].

2.2 Use of Digital Thread in Data Analytics

Data analytics (DA) is the process of examining datasets in order to draw conclusions about the information they can contain, increasingly with the specialized systems and software. In commercial industries to enable the organization to become more informative for taking informative decisions and various data analytics techniques are used in [9]. The product is the lifeline of an enterprise of organization. While it is developed, launched and deployed in service, it generates complex and large amount of data. A connected enterprise must be geared towards tapping this continuous stream of data throughout the value chain to extract actionable, real time insights that are used for newer and more efficient outcomes, which are lending the organization a competitive edge. Yet, the majority of businesses lack the agility to adapt to the connected world due to various challenges that only a digital thread can address in [10].

3. APPLICATIONS OF DIGITAL THREAD

3.1 Data Flows From Shop Floor(Administrative Decisions) To The Top Floor(System Wide Visibility)

Manufacturing is generally characterized by the hierarchical nature. In the automation pyramid the control loops which are local are supervised by the MC, PLC and industrial PC(IPC) where actuators and sensors are the inputs.

3.2 In Production Automation – Fewer Tradeoffs between Cost, Quality And Speed

Manufacturing growth of productivity has become slower in worldwide according to the data from the ILC program from the conference board.

3.3 In Predictive Maintenance – Machine Downtime Visibility and Reduction

Predictive Maintenance is nothing but the application of predictive analytical algorithms against the real time observed data to proactively identify the potential concerns before they arise and to make guided recommendations to address the issues.

4. ADVANTAGES OF DIGITAL THREAD

4.1 For Velocity

Even in a complex discrete environment, where volumes become low, manufacturing enterprises have to change quickly and meet demanding or required timelines.

4.2 For Change Management

The various layers of change by using dimensions can be measured by the digital thread.

4.3 More Benefits of the Adopting of Digital Thread

Adaptation of the DT(Digital Thread) is the first step towards building the Model Based Enterprise for the Smart Factory Revolution.

5. CONCLUSION

In our paper we are implemented the digital thread. In our project we had created the graph database from structured data and hosted this graph database on the cloud and gave the security level by level as well.

ACKNOWLEDGEMENT

We would like to express our deepest appreciation to all those who provided us the possibility to complete this paper. A special thanks we give to our project guide Prof. Sagar Latake and our HOD of computer department Dr. Pallavi Jha whose contribution in suggestions and encouragement and helped us to coordinate in our project mainly in writing this paper.

REFERENCES

[1] Engineering Design with Digital Thread written By Victor Singh* and Karen E. Willcox Massachusetts Institute of Technology, Cambridge, MA, 02139.

[2] What Are the Digital Threads and Digital Twins?https://www.adandp.media/articles/what-are-digital-twins-and-digital-threads.

[3] 2014 International Conference on Power System Technology (POWERCON 2014) Chengdu, 20-22 Oct. 2014

[4] INTERNATIONAL CONFERENCE ON INFORMATION, COMMUNICATION & EMBEDDED SYSTEMS (ICICES 2017) 978-1-5090-6135-8/17/$31.00 ©2017 IEEE A Survey Paper on Big Data Analytics By M.D. Anto Praveena1 Dr. B. Bharathi2 1Research Scholar, Sathyabama University, Chennai, Tamilnadu, India.

[5] 2015 The Fifth International Conference on Advanced Computing & Communication Technologies, CLOUD COMPUTING SECURITY:AMAZON WEB SERVICE, written by Arushi Jain M.tech Student Department of CSE & IT ITM University Gurgaon ,India arushijain_1992@yahoo.com

[6] Exploring the Cloud from Passive Measurements: the Amazon AWS Case Ignacio Bermudez, Stefano Traverso, Marco Mellia, Maurizio MunafˋoDET, Politecnico di Torino, Italy – {lastname}@tlc.polito.it, 2013 Proceedings IEEE INFOCOM

[7] https://www.ibaset.com/blog/what-is-the-digital-thread/

[8] https://www.tatatechnologies.com/us/72351-digital-thread-digital-twins-predictive-twins-process-intelligence/

[9] https://searchdatamanagement.techtarget.com/definition/data-analytics/

[10] https://www.tcs.com/blogs/digital-thread-unlocking-insights-from-product-data-stream/

[11] IEEE TRANSACTION PAPER ON BIG DATA, VOL. 1, NO. 1, JANUARY-MARCH 2015