Integrated Journal for Research in Arts and Humanities
ISSN (Online): 2583-1712
Volume-3 Issue-3 || May 2023 || PP. 149-165 https://doi.org/10.55544/ijrah.3.3.23

Enhancing UAV Communication through Software-Defined Networking for Dynamic Environments

Sunita Chauhan
Research Scholar, Jiwaji University, Gwalior, INDIA.

www.ijrah.com || Vol. 3 No. 3 (2023): May Issue

Date of Submission: 09-05-2023	**Date of Acceptance:** 19-05-2023	**Date of Publication:** 30-05-2023

ABSTRACT

In the bygone years, Drone or also known as Unmanned Aerial Vehicle (UAV) technology has developed very quickly and has been vastly used in martial operations, medicinal rescue, ecological monitoring, and other fields. the programmability of Drone and self-leading are being the key point of future transportation and safety. Simultaneously, Software-Defined Networks (SDN) the upcoming widespread, trustworthy, and flexible networking for the future. The programmability and center control system of the SDN network It the most important features. that resource management and power-consuming is the main problem faced in the Drone environment. In this paper, we design a Drones network based on Software Defined Network (SDN) to solve these problems. moreover, simulation the proposed network in OMNET++ simulation tool. The proposed system was evaluated based on Throughput, Packet Delivery Ratio (PDR), Data Drop Rate, End to End Delay Time, Packet Losses, and Drone Power Consumption. The results show enhancement in network performance through the results obtained.

Keywords- Drone, UAVs, SDN, Dynamic Controller, Collector, SDN-Drones.

I. INTRODUCTION

Recently, drones or aerial vehicle UAV technology have been used in different places. It has been widely used in various applications of technology especially in the military fields, health care, monitoring of natural disasters, border control, and access to dangerous places that humans cannot reach, in addition to assistance in emergency and rescue situations and many other applications (Erdelj, *et al*, 2017). Drones have gained very great importance because they are easy to set up and have low costs (Yanmaz *et al*, 2018). Drones play an important role in facing difficult risks and tasks, thus reducing material losses from infrastructure and human beings (Euchi, J. 2020; Liu *et al* 2014). Software- Defined Networks (SDN) is a method of network management that enables dynamic, programmatically efficient network configuration in order to ameliorate network performance and monitoring, that makes these networks more like cloud computing, and this is what distinguishes them from traditional networks (E. Haleplidis et al, 2015).

In addition, as it provides the network administrator with the ability to separate the level of control from the level of data and the level of applications in networks. This makes it more flexible as this aspect helped reduce the cost and optimally manage the services provided by the network and help reduce overloading traffic, as well as increasing the security and availability of the network (Xiao Zhang et al, 2018). Central control within SDN network components is a perfect fit for drone applications. As the SDN control provides a stable and efficient connection in a network because it contains a regular link, and the nature of the Drones network changes due to the movements of UAV Drones in different directions (Chetna Singhal et al, 2020; Gökhan Seçinti et al, 2018). So SDN provides flexibility in network management, timely aware delivery of content, and the large capacity to process data traffic in the network. As well as getting quality of service for many network protocols (Vashisht et al, 2019; Zhang et al, 2018). There are many relevant research directions that suggest systems and methods for cooperation between SDN networks and Drones networks. we are summarized some of these research as follow: In (M.F. Bari et al, 2013; De Bruin et al, 2015) this work, the researchers focused on monitoring the necessary infrastructure for transport between nodes in Drones networks, especially in remote areas. Where communications and computing play an important role for real-time applications same as when monitoring data traffic based on computer vision techniques. The results showed that the proposed system improves network efficiency and reduces damages by 81% and the successful implementation of the UAV in the field of control algorithms. While in (Motlagh et al, 2017; Elloumi et al, 2018) they discuss the topic of restrictions resulting from the use of traditional video cameras and how these restrictions were reduced by using UAVs drones. This is by proposing an almost automated, low-cost method for extracting detailed vehicle paths by relying on footage provided by drone video cameras. It has been dealt with to reduce the errors resulting from the instability of the cameras. The results proved that the proposed system can rely upon UAVs to replace or expand the current systems and avoid the errors resulting from them in this field. In (Yuan et al, 2016) they have been suggested an SDN framework based on mobile sensor network for group micro unmanned aerial vehicles (MUAV). The proposed system depends on the construction of a centralized management unit for remote control, which is linked to the Swarm SDN-Controller through the cloud, which is connected to the UAV network. The results showed that the proposed system reduces network resource consumption compared to the traditional network. It also reduces the complexity involved in route algorithms. In (Rahman et al, 2018; A. Alshamrani et al, 2018; M. Tanha et al, 2018) other works The researchers focused on ensuring reliability, increasing tolerance for errors, and the need to ensure the availability of control units, as they were studied computation limited and controlled management. The results proved that the proposed system deals accurately to improve these concepts through linking and making use of SDN controller by controlling the load in the network as well as regulating resource management. In (Karaduman et al, 2019) adopt Video data analysis method acquired from Drones networks. This is done by detecting video recordings based on two algorithms as k-Nearest Neighbor and Hough transformation algorithms to analyze video captured by drones and use the fuzzy approach to classify the road type. The results showed that the proposed system has the ability to find experimental methods in aerial photographs. In (Kumar et al, 2021), A scheme based on the use of the minimum required number of UAVs was used Depending on the centralized SDN controller. Where the proposed system improved the ability to store the current communication records in the network and the performance was measured as well reduces overhead and increase the coverage area of the Drones-SDN network.

The outline of the paper can be sketched in the following way: Section II presents the proposed system as the implementation of Dynamic controller provisioning in SDNs with C++ programming in OMNET++ in Windows 7. Section III presents the proposed scheme of SDN controller in Drone Network. As for Section IV, the simulation results and performance analysis are provided; Section V evaluation the proposed scheme. The concluding remarks are stated in Section VI.

II. THE PROPOSED SYSTEM

The proposed system based on the OMNET++, MIXIM extension and build code with C++. We simulate the Drones or Autonomous Unmanned Aerial Vehicles (UAVs) with Software Defined networking technology (SDN) controller management, The goal of using drones is to reduce the resulting cost from the movement of data within the network and reduce or eliminate the risks resulting from sending a human to difficult or impossible areas and may affect his life, while the goal of using SDN is enhancing monitoring, network performance, decreasing network overhead in resources constraints like drones sensor networks also it enhanced optimal decision intelligently in Drone network.

The proposed system based on the SDN and Drone architecture in Figure 1, which it consists of:

- Data plane as Drone's nodes to gather data.
- Controller plane as:
- Collector to connect and manage data from the source nodes.
- Ground station (SDN controller) which it responsible on data flow and data analysis with application layers to building system results.
- Application Plane

The controller is most important part of SDN networks. Also, its placement has a great impact on the performance of the network. In this work, the controller was placed inside the ground station for several factors, of which are security problems, ease of control and management, and solving energy problems, because stopping the controller will lead to the entire network being stopped. On the other hand, the collector has been added to control plane as a Drone. It acts as a channel to connect the network nodes to the - controller, as well as performing simple control tasks and facilitating the transfer of data and commands from the controller to nodes and vice versa. It also has an important role in improving network performance and increasing the communication space and many other benefits. Besides in some cases when a collector failure occurs, the task will be assigned to another collector to do its function, a pre-synchronization has been made between them. The main simulation parameters of the proposed system described in Table 1

Table 1 The main configuration of the used system in OMNET++

Simulation Parameters	Simulation Values
Play ground Size X	250 m

Play ground Size Y		250 m
Connection Manager.pMax		1.1mW
Connection Manager.sat		-100dBm
Carrier Frequency		2.4GHz
Network interface card (NIC) Physical Layer	Sensitivity	-100dBm
	maxTXPower	1.1mW
Mobility	Speed	2 mps
	Initial X	160 m
	Initial Y	180 m
Network Layer	Route Floods Interval	1200
	Header Length	24 bits
	Network Type	Adaptive Probabilistic Broadcast
Number of Nodes	N	
Controller	scheduler-class	inet::RealTimeScheduler
	localPort	6653
Collector	Idle time for openflow matches	5 s
	Maximum Transmission Unit (MTU)	1500B

The architecture of the used network showed in the Figure 1.

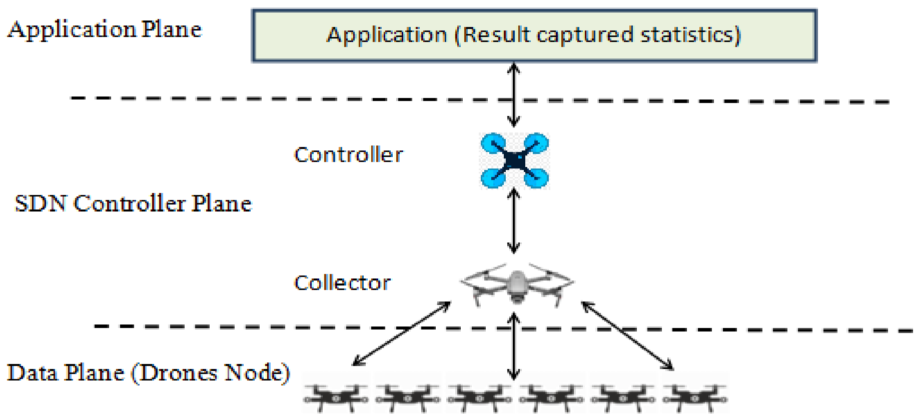

Figure 1 Architecture of Drone Network based on SDN Implementation of the Proposed System

The implementation of the proposed system based on the two sections in the simulation environment as shown in figure 2.

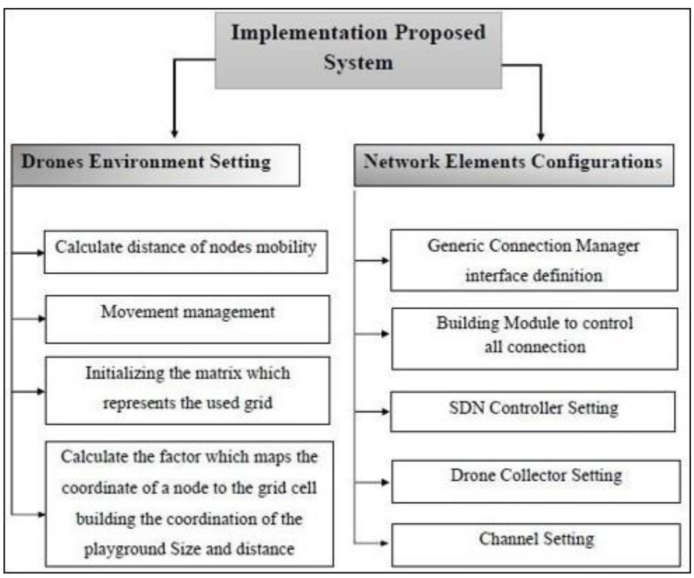

Figure 2 Implementation of the Proposed System

Integrated Journal for Research in Arts and Humanities
ISSN (Online): 2583-1712
Volume-3 Issue-3 || May 2023 || PP. 149-165 https://doi.org/10.55544/ijrah.3.3.23

Besides, the used SDN module algorithm is explained in Algorithm 1.

Algorithm 1 The used SDN controller module Algorithm

SDN Controller Module Algorithm
1- Import libraries package from INET extension - inet. applications. contract. IApp [1] Initializing parameters for Controller socket A. Local Address = default("10.1.1.l"); B. Local Port = default(6633) used to listen on some openflow and controller State Flow parameters C. ACK Interval @unit(ms)=default(100ms) D. Messages Waiting Interval @unit(ms)=default(1000ms) for data messages E. features Waiting Interval @unit(ms)=default(500ms) as waiting for specific Features in data capture State from Drones F. Time synchronize for idle and hard (0-5) G. Logging errors to file H. set capturing interface filter to "any" 3- Data processing I. xml flow for system application J. IP address of DB K. DB port setting L. Name of DB user M. DB password (optional) N. Event recording O. socket configuration with P. socketIn/ socketOut with TcpCommand
End of algorithm

Besides, the packet NetwPkt features simulated as in the Algorithm 2:

Algorithm 2 The used network layer packet class

Pseudo code of network layer packet packetNetwPktAlgorithm
Step 1: Building the constructor of destination address from the main class - LAddress::L3Type destAddr; **Step 2**: Building the constructor of source address - LAddress::L3Type srcAddr **Step 3**: Configuring the number of hops for each node based on time to live field (TTL) - ttl = 1; **Step 4**: Adding signed long sequence number - seqNum = 0
End of Algorithm

Furthermore, BasePhyLayer algorithm steps showed in Algorithm 3, as:

Algorithm 3 Building Base Physical Layer Algorithm

Phase 1: Initializing parameters
- debug switch for core framework
- enable/disable tracking of statistics
- defines the length of the phy header (/preamble)

Phase 2: Setting analogue Models
- Specification of the analogue models to use and their parameters
- Specification of the decider to use and its parameters

Phase 3: Physical layer sensitivity
- The sensitivity of the physical layer [dBm]
- The maximum transmission power of the physical layer [mW]

Phase 4: Time Management and switch times
- Elapsed time to switch from receive to send state
- Elapsed time to switch from receive to sleep state
- Elapsed time to switch from send to receive state
- Elapsed time to switch from send to sleep state
- Elapsed time to switch from sleep to receive state
- Elapsed time to switch from sleep to send state

Phase 5: Setting radio channel
- State the radio is initially in (0=RX, 1=TX, 2=Sleep)
- Radios gain factor (attenuation) while receiving
- Radios gain factor (attenuation) while not receiving
- Number of available radio channels. Defaults to single channel radio.

Phase 6: Making Setting for gates
- input upperLayerIn: From the MAC layer
- output upperLayerOut: To the MAC layer
- input upperControlIn: Control from the MAC layer
- output upperControlOut: Control to the MAC layer
- input radioIn: For sendDirect from other physical layers

End of algorithm

III. IMPLEMENTATION RESULTS

The proposed Drone module defines a drone using an IEEE 802.15.4 transceiver at 2.4GHz for wireless communications, that can be used to simulate a Drone network. The dynamic diagram shows that the proposed system reduces the control transmission distance, reduces reconfiguration time and maintains the amount of energy consumption. The proposed system deals with the data captured within drone networks as huge data management with the proposed simulation parameters as Throughput, Mean Power Consumption, Number of Captured Frames and computation power.

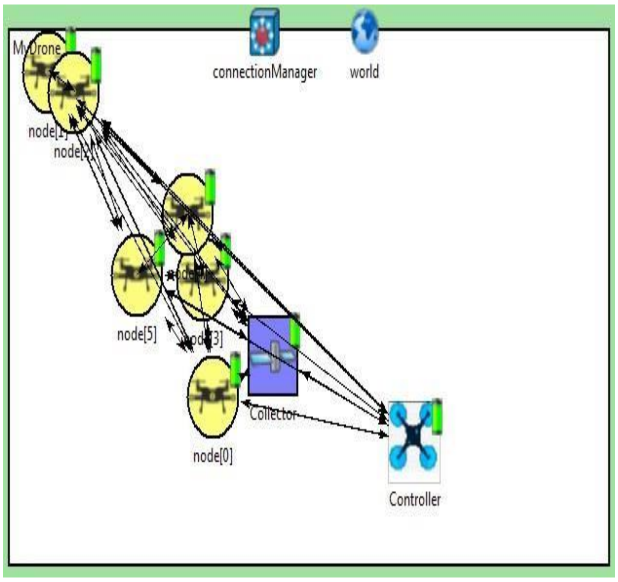

Figure 3 The proposed network topology of SDN-Drone Network Comparative Study

The proposed system comparison based on the three case study of the Drone network, and it evaluated based on the increased number of Drones in the network and the evaluation parameters used explained as follow: Packet Delivery Ratio (PDR): It is one of the important

Integrated Journal for Research in Arts and Humanities
ISSN (Online): 2583-1712
Volume-3 Issue-3 || May 2023 || PP. 149-165 https://doi.org/10.55544/ijrah.3.3.23

metrics to know the ratio of the number of packets successfully received to the destination and the number of packets sent (Khan et al, 2013):

$$PDR = \frac{P_{Received}*100\%}{\sum_{i=1}^{n} P_{generated i}} \quad (1)$$

Data Drop Rate is represented as the ratio of the difference between the total number of packets sent and the total number of packets received to the total number of packets sent, and the used equation is (Kaur et al, 2016):

$$Data\ Drop\ Rate = \frac{\text{Total no.of Sent Packets} - \text{Total no.of}}{\text{Total Number of Sent Pa}}$$
(2)

Delay time is representing the time given for sending packets from the first sending party to the second receiving party based on the following equation(Khan et al, 2020):

$$d_{trans} = L \quad (3)$$

Where d represents as delay time in seconds and L is the packet length in bits and R is the rate of transmitted data in bits per time unit.

Throughput of the network (bps) over number of nodes for variable packet sizes. For each packet size, it is worth noting that the number of packets in the network decreases with the increase in the number of nodes in the network in drones because the probability of error and packet loss increases with the increase of these nodes. This results in a lower rate of data transfer.

Furthermore, in addition, the probability of error is affected by increasing the size of the packet as a result of its fragmentation, where the level of decay of a small packet is less than the level of decay of a large packet to increase the probability of error. This situation makes the estimated decrease in productivity within the network be greater.

Whilst loose packets as depicts number of packets lost versus number of nodes for variable packet sizes. For each packet size, the number of lost packets increases with an increase in the number of Drone nodes between the source and the destination. Increasing the number of nodes causes an increase in the probability that the packet may be dropped while it competes to access the wireless channel at each node to reach its destination. However, when this increase occurs, the number of lost packets will decrease the Packet Transmission Ratio (PTR). The decreasing level of PTR for smaller packet size is less than the decreasing level of PTR for a bigger one, because packet error probability increases as packet size increases, which leads to an increase in the number of lost packets and this case makes the decrease in PTR larger for large packet size. The first case study based on 6 Drones implemented in Drone-SDN scheme and evaluated parameters as Throughput, Packet Delivery Ratio (PDR), Data Drop Rate, End to End Delay Time, Packet Losses and Drone Power Consumption showed in Table 2.

Table 2 Simulation parameters from 6Drone nodes in the networks.

Drone Name	**Number of Captured Packets**	**Packets without Interference**	**Packet Losses**	**Mean Power Consumption**
Drone 1	478	469	9	56.3 %
Drone 2	463	457	6	52.6 %
Drone 3	472	454	18	53.2 %
Drone 4	448	439	9	51.7 %
Drone 5	467	455	12	52.9 %
Drone 6	551	493	58	58.2 %
Summation	2879	2767	112	/
Average	479.833	461.166	18.666	/
Throughput	9.596 bps = 1.1995 Bps			
PDR	Packet Delivery Ratio (PDR) = 0.961 Packets/Sec			
Data Drop Rate	0.0389 bps			
End to End Delay Time in Seconds	4.168 s			

While Table 3show the simulation parameters of the 10 Drones in the network. In addition, the second case of 10 Drones showed the number of packets among drones are 2336 which effect on the number of loose packets and mean power consumption of overall drones, while the throughput and packet delivery ratio decreased, data drop rate and End to End delay are increased compared with the first case study of 6 Drones.

Table 3 The results of 10 Drones in the network

Parameter for 10 drones	**Number of Captured Packets Of 10 drones**	**Packets without Interference**	**Packet Losses**	**Mean Power Consumption**
Summation	2336	2054	282	51.7 %
Average	233.6	205.4	28.2	/
Throughput	7.786 bps = 0.97325 Bps			
PDR	Packet Delivery Ratio (PDR) = 0.879 Packets/Sec			
Data Drop Rate	0.1207 bps			
End to End Delay Time in Seconds	5.137 s			

While the third case of 20 numbers of drones

Integrated Journal for Research in Arts and Humanities
ISSN (Online): 2583-1712
Volume-3 Issue-3 || May 2023 || PP. 149-165 https://doi.org/10.55544/ijrah.3.3.23

shows in Table 4. The comparative case study showed that the 20 Drones effects on packets loose, throughput, packet delivery ratio decreased, data drop rate and End to End delay are increased compared with the 10 Drones case.

Table 4 The results of 20 Drones in the Network.

Parameter for 20 drones	Number of Captured Packets Of 20 drones	Packets without Interference	Packet Losses	Mean Power Consumption
Summation	1410	1015	395	54.8 %
Average	70.5	50.75	19.75	/
Throughput	4.7 bps = 0.5875 Bps			
PDR	Packet Delivery Ratio (PDR) = 0.719 Packets/Sec			
Data Drop Rate	0.2801 bps			
End to End Delay Time in Seconds	8.510 s			

Also, the log file from the proposed system showed in the Figure 3. As the log file show the Drone network elements behavior within SDN framework as it contains on transmission over, route flood, node hand off and handover states for channel acquisition.

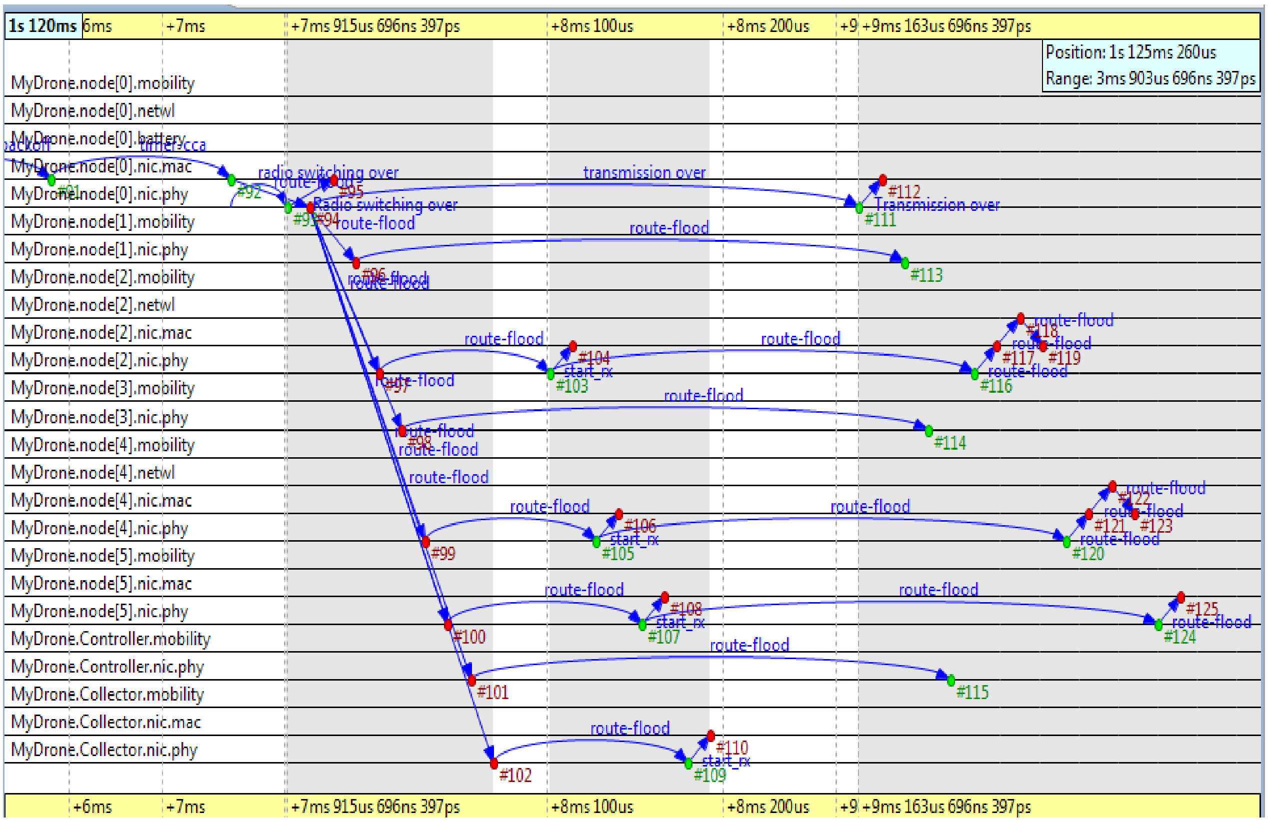

Figure 3 Log File of the proposed system

IV. CONCLUSION

This paper highlights an overall study on the design and implementation of drone networks by using SDN and their service, and applications. There are few existing solutions to improve computation power and resource management within simulation drones-SDN networks compared with different research for real hardware implementation. The proposed system enhanced Drone network implementation based on SDN architecture as the management network traffic enhanced through data traffic controlled by controller and collector to eliminate congestion and decrease traffic load and analysis collecting the required data accurately from drones compared with traditional drone network without SDN. The simulation results show the throughput, Packet Delivery Ratio (PDR) of network traffic decrease with an increase in the number of Drone nodes. As well as, the number of lost packets, the Data Drop Rate increase with an increase in the number of Drone nodes. The results summarized as Throughput is 9.596 bps, PDR is 0.961 Packets/Sec Drop Rate of Data is 0.0389 bps, while Delay

Integrated Journal for Research in Arts and Humanities
ISSN (Online): 2583-1712
Volume-3 Issue-3 || May 2023 || PP. 149-165 https://doi.org/10.55544/ijrah.3.3.23

Time equal to 4.168 seconds for the 6 Drones case study. Alongside, Throughput is 7.786 bps, PDR equal to 0.879 Packets/Sec Drop Rate is 0.1207 bps, Delay Time is 5.137 seconds of 10 Drones case study. While the third case of 20 numbers results as follows: Throughput equal 4.7 bps, PDR is 0.719 Packets/Sec, Drop Rate is 0.2801 bps, and Delay Time is 8.510 seconds.

REFERENCES

[1] Alshamrani, A., Guha, S., Pisharody, S., Chowdhary, A., & Huang, D. (2018). Fault tolerant controller placement in distributed SDN environments. *In 2018 IEEE International Conference on Communications (ICC)*, 1-7.

[2] Singhal, C., & Rahul, K. (2019). Efficient QoS provisioning using SDN for end-to-end data delivery in UAV assisted network. *In 2019 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*, 1-6.

[3] De Bruin, A., & Booysen, T. (2015). Drone-based traffic flow estimation and tracking using computer vision: transportation engineering. *Civil Engineering= Siviele Ingenieurswese, 2015*(8), 48-50.

[4] Haleplidis, E., Pentikousis, K., Denazis, S., Salim, J.H., Meyer, D., & Koufopavlou, O. (2015).

[5] Software-defined networking (SDN): Layers and architecture terminology. RFC 7426.

[6] Elloumi, M., Dhaou, R., Escrig, B., Idoudi, H., & Saidane, L.A. (2018). Monitoring road traffic with a UAV-based system. *In 2018 IEEE Wireless Communications and Networking Conference (WCNC)*, 1-6.

[7] Erdelj, M., Król, M., & Natalizio, E. (2017). Wireless sensor networks and multi-UAV systems for natural disaster management. *Computer Networks, 124*, 72-86.

[8] Euchi, J. (2021). Do drones have a realistic place in a pandemic fight for delivering medical supplies in healthcare systems problems? *Chinese Journal of Aeronautics*, 182-190.

[9] Secinti, G., Darian, P.B., Canberk, B., & Chowdhury, K.R. (2018). SDNs in the sky: Robust end-to-end connectivity for aerial vehicular networks. *IEEE Communications Magazine, 56*(1), 16-21.

[10] Prathyusha Nama, Purushotham Reddy, & Guru Prasad Selvarajan. (2023). Intelligent Data Replication Strategies: Using AI to Enhance Fault Tolerance and Performance in Multi-Node Database Systems. Well Testing Journal, 32, 110–122. Retrieved from https://welltestingjournal.com/index.php/WT/article/view/111

[11] Nama, P., Reddy, P., & Selvarajan, G. P. (2023). Intelligent data replication strategies: Using AI to enhance fault tolerance and performance in multi-node database systems. Well Testing Journal, 32, 110–122. Retrieved from https://welltestingjournal.com/index.php/WT/article/view/111

[12] Nama, P., Pattanayak, S., & Meka, H. S. (2023). AI-driven innovations in cloud computing: Transforming scalability, resource management, and predictive analytics in distributed systems. International Research Journal of Modernization in Engineering Technology and Science, 5(12), 4165. https://doi.org/10.56726/IRJMETS47900

[13] Nama, P., Reddy, P., & Selvarajan, G. P. (2023). Leveraging generative AI for automated test case generation: A framework for enhanced coverage and defect detection. Well Testing Journal, 32(2), 74–91. Retrieved from https://welltestingjournal.com/index.php/WT/article/view/110

[14] Cherukuri, H., Singh, S. P., & Vashishtha, S. (2020). Proactive issue resolution with advanced analytics in financial services. The International Journal of Engineering Research, 7(8), a1-a13.https://tijer.org/tijer/viewpaperforall.php?paper=TIJER2008001

[15] Cherukuri, H., Goel, E. L., & Kushwaha, G. S. (2021). Monetizing financial data analytics: Best practice. International Journal of Computer Science and Publication (IJCSPub), 11(1), 76-87.

[16] Chaturvedi, R., Sharma, S., & Narne, S. (2023). Advanced Big Data Mining Techniques for Early Detection of Heart Attacks in Clinical Data. Journal for Research in Applied Sciences and Biotechnology, 2(3), 305–316. https://doi.org/10.55544/jrasb.2.3.38

[17] Chaturvedi, R., Sharma, S., & Narne, S. (2023). Advanced Big Data Mining Techniques for Early Detection of Heart Attacks in Clinical Data. Journal for Research in Applied Sciences and Biotechnology, 2(3), 305–316. https://doi.org/10.55544/jrasb.2.3.38

[18] Chaturvedi, R., Sharma, S., & Narne, S. (2023). Harnessing Data Mining for Early Detection and Prognosis of Cancer: Techniques and Challenges. Journal for Research in Applied Sciences and Biotechnology, 2(1), 282–293. https://doi.org/10.55544/jrasb.2.1.42

[19] Mehra, A. (2023). Strategies for scaling EdTech startups in emerging markets. International Journal of Communication Networks and Information Security, 15(1), 259-274. Available online at https://ijcnis.org

[20] Mehra, A. (2021). The impact of public-private partnerships on global educational platforms. Journal of Informatics Education and Research, 1(3), 9-28. Retrieved from http://jier.org

[21] Ankur Mehra. (2019). Driving Growth in the Creator Economy through Strategic Content Partnerships. International Journal for Research Publication and Seminar, 10(2), 118–135. https://doi.org/10.36676/jrps.v10.i2.1519

[22] Ankur Mehra. (2023). Web3 and EdTech startups' Market Expansion in APAC. International Journal of Research Radicals in Multidisciplinary Fields, ISSN:

2960-043X, 2(2), 94–118. Retrieved from https://www.researchradicals.com/index.php/rr/article/view/117

[23] Mehra, A. (2023). Leveraging Data-Driven Insights to Enhance Market Share in the Media Industry. Journal for Research in Applied Sciences and Biotechnology, 2(3), 291–304. https://doi.org/10.55544/jrasb.2.3.37

[24] Ankur Mehra. (2022). Effective Team Management Strategies in Global Organizations. Universal Research Reports, 9(4), 409–425. https://doi.org/10.36676/urr.v9.i4.1363

[25] Mehra, A. (2023). Innovation in brand collaborations for digital media platforms. IJFANS: International Journal of Food and Nutritional Sciences, 12(6), 231–250.

[26] Ankur Mehra. (2022). The Role of Strategic Alliances in the Growth of the Creator Economy. European Economic Letters (EEL), 12(1). Retrieved from https://www.eelet.org.uk/index.php/journal/article/view/1925

[27] Swethasri Kavuri. (2022). Optimizing Data Refresh Mechanisms for Large-Scale Data Warehouses. International Journal of Communication Networks and Information Security (IJCNIS), 14(2), 285–305. Retrieved from https://www.ijcnis.org/index.php/ijcnis/article/view/7413

[28] Swethasri Kavuri, Suman Narne, " Implementing Effective SLO Monitoring in High-Volume Data Processing Systems, IInternational Journal of Scientific Research in Computer Science, Engineering and Information Technology(IJSRCSEIT), ISSN : 2456-3307, Volume 6, Issue 2, pp.558-578, March-April-2020. Available at doi : https://doi.org/10.32628/CSEIT206479

[29] Swethasri Kavuri, Suman Narne, " Improving Performance of Data Extracts Using Window-Based Refresh Strategies, International Journal of Scientific Research in Science, Engineering and Technology(IJSRSET), Print ISSN : 2395-1990, Online ISSN : 2394-4099, Volume 8, Issue 5, pp.359-377, September-October-2021. Available at doi : https://doi.org/10.32628/IJSRSET2310631

[30] Swethasri Kavuri, " Automation in Distributed Shared Memory Testing for Multi-Processor Systems, International Journal of Scientific Research in Science, Engineering and Technology(IJSRSET), Print ISSN : 2395-1990, Online ISSN : 2394-4099, Volume 6, Issue 3, pp.508-521, May-June-2019. Available at doi : https://doi.org/10.32628/IJSRSET12411594

[31] Swethasri Kavuri, " Advanced Debugging Techniques for Multi-Processor Communication in 5G Systems, IInternational Journal of Scientific Research in Computer Science, Engineering and Information Technology(IJSRCSEIT), ISSN : 2456-3307, Volume 9, Issue 5, pp.360-384, September-October-2023. Available at doi : https://doi.org/10.32628/CSEIT239071

[32] Shivarudra, A. (2021). Enhancing automation testing strategies for core banking applications. International Journal of All Research Education and Scientific Methods (IJARESM), 9(12), 1. Available online at http://www.ijaresm.com

[33] Ashwini Shivarudra. (2023). Best Practices for Testing Payment Systems: A Focus on SWIFT, SEPA, and FED ISO Formats. International Journal of Communication Networks and Information Security (IJCNIS), 15(3), 330–344. Retrieved from https://www.ijcnis.org/index.php/ijcnis/article/view/7519

[34] Shivarudra, A. (2019). Leveraging TOSCA and Selenium for efficient test automation in financial services. International Journal of All Research Education and Scientific Methods (IJARESM), 7(10), 56–64.

[35] Shivarudra, A. (2021). The Role of Automation in Reducing Testing Time for Banking Systems. Integrated Journal for Research in Arts and Humanities, 1(1), 83–89. https://doi.org/10.55544/ijrah.1.1.12

[36] Ashwini Shivarudra. (2022). Advanced Techniques in End-to-End Testing of Core Banking Solutions. International Journal of Research Radicals in Multidisciplinary Fields, ISSN: 2960-043X, 1(2), 112–124. Retrieved from https://www.researchradicals.com/index.php/rr/article/view/121

[37] Shivarudra, A. (2022). Implementing Agile Testing Methodologies in Banking Software Project. Journal for Research in Applied Sciences and Biotechnology, 1(4), 215–225. https://doi.org/10.55544/jrasb.1.4.32

[38] Bhatt, S. (2021). Optimizing SAP Migration Strategies to AWS: Best Practices and Lessons Learned. Integrated Journal for Research in Arts and Humanities, 1(1), 74–82. https://doi.org/10.55544/ijrah.1.1.11

[39] Bhatt, S. (2022). Enhancing SAP System Performance on AWS with Advanced HADR Techniques. Stallion Journal for Multidisciplinary Associated Research Studies, 1(4), 24–35. https://doi.org/10.55544/sjmars.1.4.6

[40] Bhatt, S., & Narne, S. (2023). Streamlining OS/DB Migrations for SAP Environments: A Comparative Analysis of Tools and Methods. Stallion Journal for Multidisciplinary Associated Research Studies, 2(4), 14–27. https://doi.org/10.55544/sjmars.2.4.3

[41] Bhatt, S. (2023). Implementing SAP S/4HANA on AWS: Challenges and solutions for large enterprises. International Journal of Computer Science and Mobile Computing, 12(10), 71–88.

[42] https://doi.org/10.47760/ijcsmc.2023.v12i10.007

[43] Sachin Bhatt , " Innovations in SAP Landscape Optimization Using Cloud-Based Architectures, IInternational Journal of Scientific Research in Computer Science, Engineering and Information Technology(IJSRCSEIT), ISSN : 2456-3307, Volume 6, Issue 2, pp.579-590, March-April-2020.

[44] Bhatt, S. (2022). Leveraging AWS tools for high availability and disaster recovery in SAP applications. International Journal of Scientific Research in Science, Engineering and Technology, 9(2), 482–496. https://doi.org/10.32628/IJSRSET2072122
[45] Bhatt, S. (2021). A comprehensive guide to SAP data center migrations: Techniques and case studies. International Journal of Scientific Research in Science, Engineering and Technology, 8(5), 346–358. https://doi.org/10.32628/IJSRSET2310630
[46] Bhatt, S. (2023). Integrating Non-SAP Systems with SAP Environments on AWS: Strategies for Seamless Operations. Journal for Research in Applied Sciences and Biotechnology, 2(6), 292–305. https://doi.org/10.55544/jrasb.2.6.41
[47] Paulraj, B. (2023). Enhancing Data Engineering Frameworks for Scalable Real-Time Marketing Solutions. Integrated Journal for Research in Arts and Humanities, 3(5), 309–315. https://doi.org/10.55544/ijrah.3.5.34
[48] Paulraj, B. (2023). Optimizing telemetry data processing pipelines for large-scale gaming platforms. International Journal of Scientific Research in Science, Engineering and Technology, 9(1), 401. https://doi.org/10.32628/IJSRSET23103132
[49] Paulraj, B. (2022). Building Resilient Data Ingestion Pipelines for Third-Party Vendor Data Integration. Journal for Research in Applied Sciences and Biotechnology, 1(1), 97–104. https://doi.org/10.55544/jrasb.1.1.14
[50] Paulraj, B. (2022). The Role of Data Engineering in Facilitating Ps5 Launch Success: A Case Study. International Journal on Recent and Innovation Trends in Computing and Communication, 10(11), 219–225. https://doi.org/10.17762/ijritcc.v10i11.11145
[51] Balachandar Paulraj. (2021). Implementing Feature and Metric Stores for Machine Learning Models in the Gaming Industry. European Economic Letters (EEL), 11(1). Retrieved from https://www.eelet.org.uk/index.php/journal/article/view/1924
[52] Balachandar Paulraj. (2023). Data-Driven Decision Making in Gaming Platforms: Metrics and Strategies. International Journal of Research Radicals in Multidisciplinary Fields, ISSN: 2960-043X, 2(2), 81–93. Retrieved from https://www.researchradicals.com/index.php/rr/article/view/116
[53] Alok Gupta. (2021). Reducing Bias in Predictive Models Serving Analytics Users: Novel Approaches and their Implications. International Journal on Recent and Innovation Trends in Computing and Communication, 9(11), 23–30. Retrieved from https://ijritcc.org/index.php/ijritcc/article/view/11108
[54] Gupta, A., Selvaraj, P., Singh, R. K., Vaidya, H., & Nayani, A. R. (2022). The Role of Managed ETL Platforms in Reducing Data Integration Time and Improving User Satisfaction. Journal for Research in Applied Sciences and Biotechnology, 1(1), 83–92. https://doi.org/10.55544/jrasb.1.1.12
[55] Selvaraj, P. . (2022). Library Management System Integrating Servlets and Applets Using SQL Library Management System Integrating Servlets and Applets Using SQL database. International Journal on Recent and Innovation Trends in Computing and Communication, 10(4), 82–89. https://doi.org/10.17762/ijritcc.v10i4.11109
[56] Vaidya, H., Nayani, A. R., Gupta, A., Selvaraj, P., & Singh, R. K. (2020). Effectiveness and future trends of cloud computing platforms. Tuijin Jishu/Journal of Propulsion Technology, 41(3). https://doi.org/10.52783/tjjpt.v45.i03.7820
[57] Harsh Vaidya, Aravind Reddy Nayani, Alok Gupta, Prassanna Selvaraj, & Ravi Kumar Singh. (2023). Using OOP Concepts for the Development of a Web-Based Online Bookstore System with a Real-Time Database. International Journal for Research Publication and Seminar, 14(5), 253–274. https://doi.org/10.36676/jrps.v14.i5.1502
[58] Aravind Reddy Nayani, Alok Gupta, Prassanna Selvaraj, Ravi Kumar Singh, & Harsh Vaidya. (2019). Search and Recommendation Procedure with the Help of Artificial Intelligence. International Journal for Research Publication and Seminar, 10(4), 148–166. https://doi.org/10.36676/jrps.v10.i4.1503
[59] Aravind Reddy Nayani, Alok Gupta, Prassanna Selvaraj, Ravi Kumar Singh, Harsh Vaidya. (2023). Online Bank Management System in Eclipse IDE: A Comprehensive Technical Study. European Economic Letters (EEL), 13(3), 2095–2113. Retrieved from https://www.eelet.org.uk/index.php/journal/article/view/1874
[60] Sagar Shukla. (2021). Integrating Data Analytics Platforms with Machine Learning Workflows: Enhancing Predictive Capability and Revenue Growth. International Journal on Recent and Innovation Trends in Computing and Communication, 9(12), 63–74. Retrieved from https://ijritcc.org/index.php/ijritcc/article/view/11119
[61] Sneha Aravind. (2021). Integrating REST APIs in Single Page Applications using Angular and TypeScript. International Journal of Intelligent Systems and Applications in Engineering, 9(2), 81 –. Retrieved from https://ijisae.org/index.php/IJISAE/article/view/6829
[62] Sachin Bhatt , " A Comprehensive Guide to SAP Data Center Migrations: Techniques and Case Studies, International Journal of Scientific Research in Science, Engineering and Technology(IJSRSET), Print ISSN : 2395-1990, Online ISSN : 2394-4099, Volume 8, Issue 5, pp.346-358, September-October-2021. Available at doi : https://doi.org/10.32628/IJSRSET2310630
[63] Bhatt, S. (2021). A comprehensive guide to SAP data center migrations: Techniques and case studies. International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), 8(5), 346–358. https://doi.org/10.32628/IJSRSET2310630

ISSN (Online): 2583-1712
Volume-3 Issue-3 || May 2023 || PP. 149-165 https://doi.org/10.55544/ijrah.3.3.23

[64] Bhatt, S. (2023). Implementing SAP S/4HANA on AWS: Challenges and solutions for large enterprises. International Journal of Computer Science and Mobile Computing, 12(10), 71–88.
[65] Rinkesh Gajera , "Leveraging Procore for Improved Collaboration and Communication in Multi-Stakeholder Construction Projects", International Journal of Scientific Research in Civil Engineering (IJSRCE), ISSN : 2456-6667, Volume 3, Issue 3, pp.47-51, May-June.2019
[66] Rinkesh Gajera , "Integrating Power Bi with Project Control Systems: Enhancing Real-Time Cost Tracking and Visualization in Construction", International Journal of Scientific Research in Civil Engineering (IJSRCE), ISSN : 2456-6667, Volume 7, Issue 5, pp.154-160, September-October.2023
[67] URL : https://ijsrce.com/IJSRCE123761
[68] Rinkesh Gajera, 2023. Developing a Hybrid Approach: Combining Traditional and Agile Project Management Methodologies in Construction Using Modern Software Tools, ESP Journal of Engineering & Technology Advancements 3(3): 78-83.
[69] Gajera, R. (2023). Evaluating the effectiveness of earned value management (EVM) implementation using integrated project control software suites. Journal of Computational Analysis and Applications, 31(4), 654-658.
[70] Saoji, R., Nuguri, S., Shiva, K., Etikani, P., & Bhaskar, V. V. S. R. (2019). Secure federated learning framework for distributed AI model training in cloud environments. International Journal of Open Publication and Exploration (IJOPE), 7(1), 31. Available online at https://ijope.com.
[71] Savita Nuguri, Rahul Saoji, Krishnateja Shiva, Pradeep Etikani, & Vijaya Venkata Sri Rama Bhaskar. (2021). OPTIMIZING AI MODEL DEPLOYMENT IN CLOUD ENVIRONMENTS: CHALLENGES AND SOLUTIONS. International Journal for Research Publication and Seminar, 12(2), 159–168. https://doi.org/10.36676/jrps.v12.i2.1461
[72] Kaur, J., Choppadandi, A., Chenchala, P. K., Nuguri, S., & Saoji, R. (2022). Machine learning-driven IoT systems for precision agriculture: Enhancing decision-making and efficiency. Webology, 19(6), 2158. Retrieved from http://www.webology.org.
[73] Lohith Paripati, Varun Nakra, Pandi Kirupa Gopalakrishna Pandian, Rahul Saoji, Bhanu Devaguptapu. (2023). Exploring the Potential of Learning in Credit Scoring Models for Alternative Lending Platforms. European Economic Letters (EEL), 13(4), 1331–1241. https://doi.org/10.52783/eel.v13i4.179.
[74] Etikani, P., Bhaskar, V. V. S. R., Nuguri, S., Saoji, R., & Shiva, K. (2023). Automating machine learning workflows with cloud-based pipelines. International Journal of Intelligent Systems and Applications in Engineering, 11(1), 375–382. https://doi.org/10.48047/ijisae.2023.11.1.37
[75] Etikani, P., Bhaskar, V. V. S. R., Palavesh, S., Saoji, R., & Shiva, K. (2023). AI-powered algorithmic trading strategies in the stock market. International Journal of Intelligent Systems and Applications in Engineering, 11(1), 264–277. https://doi.org/10.1234/ijsdip.org_2023-Volume-11-Issue-1_Page_264-277.
[76] Saoji, R., Nuguri, S., Shiva, K., Etikani, P., & Bhaskar, V. V. S. R. (2021). Adaptive AI-based deep learning models for dynamic control in software-defined networks. International Journal of Electrical and Electronics Engineering (IJEEE), 10(1), 89–100. ISSN (P): 2278–9944; ISSN (E): 2278–9952
[77] Varun Nakra, Arth Dave, Savitha Nuguri, Pradeep Kumar Chenchala, Akshay Agarwal. (2023). Robo-Advisors in Wealth Management: Exploring the Role of AI and ML in Financial Planning. European Economic Letters (EEL), 13(5), 2028–2039. Retrieved from https://www.eelet.org.uk/index.php/journal/article/view/1514.
[78] Chinta, U., & Goel, P. (2022). Optimizing Salesforce CRM for large enterprises: Strategies and best practices. International Journal of Creative Research Thoughts (IJCRT), 9(5), 282. https://doi.org/10.36676/irt
[79] Mahadik, S., Chinta, U., Bhimanapati, V. B. R., Goel, P., & Jain, A. (2023). Product roadmap planning in dynamic markets. Innovative Research Thoughts, 9(5), 282. https://doi.org/10.36676/irt
[80] Chinta, U., Aggarwal, A., & Jain, S. (2020). Risk management strategies in Salesforce project delivery: A case study approach. Innovative Research Thoughts, 7(3).
[81] Voola, P. K., Chinta, U., Bhimanapati, V. B. R., Goel, O., & Goel, D. P. (2022). AI-powered chatbots in clinical trials: Enhancing patient-clinician interaction and decision-making. SSRN. https://doi.org/ssrn.4984949
[82] Voola, P. K., & Chinta, U. (2022). AI-powered chatbots in clinical trials: Enhancing patient-clinician interaction and decision-making. International Journal for Research Publication & Seminar, 13(5), 323.
[83] Chinta, U., Goel, O., & Jain, S. (2023). Enhancing platform health: Techniques for maintaining optimizer, event, security, and system stability in Salesforce. International Journal for Research Publication & Seminar, 14(4).
[84] Agarwal, N., Chinta, U., Bhimanapati, V. B. R., & Jain, S. (2023). EEG-based focus estimation model for wearable devices. Journal of Neuroscience Research, 1(2), 102–114.
[85] Arulkumaran, R., Khatri, D. K., Bhimanapati, V., Goel, L., & Goel, O. (2023). Predictive Analytics in Industrial Processes Using LSTM Networks. Shodh Sagar® Universal Research Reports, 10 (4): 512. https://doi.org/10.36676/urr.v10.i4.13, 61.
[86] Bhimanapati, V., Chhapola, A., & Jain, S. (2023). Automation strategies for web and mobile applications in media domains. International Journal for Research Publication & Seminar, 14 (5), 225. https://doi.org/10.36676/jrps.v14.i5 (Vol. 1479).
[87] Bhimanapati, V., Jain, S., & Goel, O. (2023). Cloud-based solutions for video streaming and big data testing. Universal Research Reports, 10 (4), 329. Shodh Sagar.

ISSN (Online): 2583-1712
Volume-3 Issue-3 || May 2023 || PP. 149-165 https://doi.org/10.55544/ijrah.3.3.23

[88] Arulkumaran, R., Khatri, D. K., Bhimanapati, V., Aggarwal, A., & Gupta, V. (2023). AI-Driven Optimization of Proof-of-Stake Blockchain Validators. Innovative Research Thoughts, 9 (5): 315. doi: https://doi.org/10.36676/irt.v9.i5, 1490.
[89] Bhimanapati, V., Goel, O., & Garg, D. M. Enhancing Video Streaming Quality through Multi-Device Testing. International Journal of Creative Research Thoughts (IJCRT), ISSN: 2320, 2882, f555-f572.
[90] Mahadik, S., Khatri, D. K., Bhimanapati, V., Goel, L., & Jain, A. (2022). The role of data analysis in enhancing product features. International Journal of Computer Science and Engineering (IJCSE), 11(2), 91–108. https://doi.org/10.
[91] Agrawal, S., Khatri, D., Bhimanapati, V., Goel, O., & Jain, A. (2022). Optimization Techniques in Supply Chain Planning for Consumer Electronics. International Journal for Research Publication & Seminar (Vol. 13, No. 5, p. 356).
[92] Bhimanapati, V., Goel, O., & Pandian, P. K. G. (2022). Implementing agile methodologies in QA for media and telecommunications. Innovative Research Thoughts, 8 (2), 1454.
[93] Bhimanapati, V. B. R., Renuka, A., & Goel, P. (2021). Effective use of AI-driven third-party frameworks in mobile apps. Innovative Research Thoughts, 7 (2).
[94] Arulkumaran, R., Khatri, D. K., Bhimanapati, V., Goel, L., & Goel, O. (2023). Predictive Analytics in Industrial Processes Using LSTM Networks. Shodh Sagar® Universal Research Reports, 10 (4): 512. https://doi.org/10.36676/urr.v10.i4.13, 61.
[95] Bhimanapati, V., Chhapola, A., & Jain, S. (2023). Automation strategies for web and mobile applications in media domains. International Journal for Research Publication & Seminar, 14 (5), 225. https://doi.org/10.36676/jrps.v14.i5 (Vol. 1479).
[96] Bhimanapati, V., Jain, S., & Goel, O. (2023). Cloud-based solutions for video streaming and big data testing. Universal Research Reports, 10 (4), 329. Shodh Sagar.
[97] Arulkumaran, R., Khatri, D. K., Bhimanapati, V., Aggarwal, A., & Gupta, V. (2023). AI-Driven Optimization of Proof-of-Stake Blockchain Validators. Innovative Research Thoughts, 9 (5): 315. doi: https://doi.org/10.36676/irt.v9.i5, 1490.
[98] Bhimanapati, V., Goel, O., & Garg, D. M. Enhancing Video Streaming Quality through Multi-Device Testing. International Journal of Creative Research Thoughts (IJCRT), ISSN: 2320, 2882, f555-f572.
[99] Mahadik, S., Khatri, D. K., Bhimanapati, V., Goel, L., & Jain, A. (2022). The role of data analysis in enhancing product features. International Journal of Computer Science and Engineering (IJCSE), 11(2), 91–108. https://doi.org/10.
[100] Agrawal, S., Khatri, D., Bhimanapati, V., Goel, O., & Jain, A. (2022). Optimization Techniques in Supply Chain Planning for Consumer Electronics. International Journal for Research Publication & Seminar (Vol. 13, No. 5, p. 356).
[101] Bhimanapati, V., Goel, O., & Pandian, P. K. G. (2022). Implementing agile methodologies in QA for media and telecommunications. Innovative Research Thoughts, 8 (2), 1454.
[102] Bhimanapati, V. B. R., Renuka, A., & Goel, P. (2021). Effective use of AI-driven third-party frameworks in mobile apps. Innovative Research Thoughts, 7 (2).
[103]Vijayabaskar, S., Thumati, P. R. R., Kanchi, P., Jain, S., & Agarwal, R. (2023). Integrating Cloud-Native Solutions in Financial Services for Enhanced Operational Efficiency. SHODH SAGAR® Universal Research Reports, 10(4), 402. https://doi.org/10.36676/urr.v10.i4.13, 55.
[104] Kanchi, P., Priyanshi, E., & Vashishtha, S. (2023). Enhancing business processes with SAP S/4 HANA: A review of case studies. International Journal of New Technologies and Innovations, 1(6), a1–a12.
[105] Kanchi, P., Pandey, P., & Goel, O. (2023). Leveraging SAP Commercial Project Management (CPM) in construction projects: Benefits and case studies. Journal of Emerging Trends in Networking and Robotics, 1(5), a1–a20. https://rjpn.org/jetnr/papers/JETNR2305001.pdf
[106] Balasubramaniam, V. S., Thumati, P. R. R., Kanchi, P., Agarwal, R., Goel, O., & Shrivastav, E. A. (2023). Evaluating the Impact of Agile and Waterfall Methodologies in Large Scale IT Projects. International Journal of Progressive Research in Engineering Management and Science, 3(12), 397–412.
[107] Kanchi, P., Goel, P., & Jain, A. (2022). SAP PS implementation and production support in retail industries: A comparative analysis. International Journal of Computer Science and Production, 12(2), 759–771.
[108]Kanchi, P., Jain, S., & Tyagi, P. (2022). Integration of SAP PS with Finance and Controlling Modules: Challenges and Solutions. Journal of Next-Generation Research in Information and Data, 2(2).
[109] Kanchi, P., & Lagan Goel, D. G. S. K. Comparative Analysis of Refurbishment Material Handling in SAP PS. International Journal of Creative Research Thoughts (IJCRT), ISSN: 2320, 2882, f18–f36.
[110] Chopra, P., Goel, O., & Singh, D. T. (2023). Managing AWS IoT Authorization: A Study of Amazon Verified Permissions. International Journal of Research and Analytical Reviews (IJRAR), 10(3), 6-23.
[111] Mahadik, S., Antara, F., Chopra, P., Renuka, A., & Goel, O. (2023, October 30). User-centric design: Emphasizing user experience in product development. Available at SSRN, 4985267. https://doi.org/10.2139/ssrn.4985267
[112] PRonoy Chopra, Akshun Chhapola, & Dr. Sanjouli Kaushik. (2022). Comparative Analysis of Optimizing AWS Inferentia with FastAPI and PyTorch Models. International Journal of Creative Research Thoughts (IJCRT), 10(2), e449-e463. http://www.ijcrt.org/papers/IJCRT2202528.pdf

[113] Nadukuru, S., Antara, F., Chopra, P., Renuka, A., & Goel, O. (2021). Agile methodologies in global SAP implementations: A case study approach. International Research Journal of Modernization in Engineering Technology and Science, 3(11), 1592-1605. https://doi.org/10.56726/IRJMETS17272
[114] Alahari, J., Mangal, A., Singiri, S., Goel, O., & Goel, P. (2023). The impact of augmented reality (AR) on user engagement in automotive mobile applications. Innovative Research Thoughts, 9(5), 202–212. https://doi.org/10.36676/irt.v9.i5.1483
[115] Vijayabaskar, S., Mangal, A., Singiri, S., Renuka, A., & Chhapola, A. (2023). Leveraging Blue Prism for scalable process automation in stock plan services. Innovative Research Thoughts, 9(5), 216. https://doi.org/10.36676/irt.v9.i5.1484
[116] Khair, M. A., Mangal, A., Singiri, S., Chhapola, A., & Goel, O. (2023). Advanced security features in Oracle HCM cloud. Universal Research Reports, 10(4), 493–511.
[117] Mangal, A. (2023). An analytical review of contemporary AI-driven hiring strategies in professional services. ESP Journal of Engineering & Technology Advancements, 3(3), 52–63. https://doi.org/10.56472/25832646/JETA-V3I7P108
[118]Mangal, A. (2023). Revolutionizing project management with generative AI. ESP Journal of Engineering & Technology Advancements, 3(4), 53–60. https://doi.org/10.56472/25832646/JETA-V3I8P106
[119]Mangal, A., & Gupta, P. (2023). Comparative analysis of optimizing SAP S/4HANA in large enterprises. International Journal of Creative Research Thoughts (IJCRT), 11(4), j367–j379. http://www.ijcrt.org/papers/IJCRT23A4209.pdf
[120] Mahadik, S., Mangal, A., Singiri, S., Chhapola, A., & Jain, S. (2022). Risk mitigation strategies in product management. International Journal of Creative Research Thoughts (IJCRT), 10(12), 665.
[121] Mangal, A., & Gupta, D. S., Prof. (Dr) Sangeet Vashishtha. (2022). Enhancing supply chain management efficiency with SAP solutions. IJRAR-International Journal of Research and Analytical Reviews (IJRAR), 9(3), 224–237.
[122] Agarwal, N., Gunj, R., Mangal, A., Singiri, S., Chhapola, A., & Jain, S. (2022). Self-supervised learning for EEG artifact detection. International Journal of Creative Research Thoughts (IJCRT), 10(12).
[123] Mangal, A. (2022). Envisioning the future of professional services: ERP, AI, and project management in the age of digital disruption. ESP Journal of Engineering & Technology Advancements, 2(4), 71–79. https://doi.org/10.56472/25832646/JETA-V2I4P115
[124]Mangal, A. (2022). Cost-benefit analysis of implementing automation in IT incident management to minimize financial losses. ESP Journal of Engineering & Technology Advancements, 2(2), 27–34. https://doi.org/10.56472/25832646/JETA-V2I2P106
[125]Mangal, A. (2021). Evaluating planning strategies for prioritizing the most viable projects to maximize investment returns. ESP Journal of Engineering & Technology Advancements, 1(2), 69-77. https://doi.org/10.56472/25832646/JETA-V1I2P110
[126]Mangal, A. K. (2013). Multithreaded Java applications performance improvement. International Journal of Advanced Research in Computer Science and Software Engineering (IJARCSSE), 3(3), 47-50.
[127]Mangal, A., Jain, V., Jat, R. C., Bharadwaj, S., & Jain, S. (2010). Neuro pharmacological study of leaves of Camellia sinensis. International Journal of Pharmacy and Pharmaceutical Sciences, 2(3), 132-134.
[128]Mangal, A., Gaur, U., Jain, A., Goyal, U., Tripathi, R., & Rath, R. (2007). Alkaline phosphatase and placental alkaline phosphatase activity in serum of normal and pregnancy-induced hypertensive mothers. Journal of the International Medical Sciences Academy, 20, 117-120.
[129]Mangal, A., Shrivastava, P., Gaur, U., Jain, A., Goyal, U., & Rath, G. (2005). Histochemical analysis of placental alkaline phosphatase in hypertensive disorders complicating pregnancy. Journal of the Anatomical Society of India, 54(2), 2005-12.
[130] Cherukuri, H., Mahimkar, S., Goel, O., Goel, D. P., & Singh, D. S. (2023). Network traffic analysis for intrusion detection: Techniques for monitoring and analyzing network traffic to identify malicious activities. International Journal of Creative Research Thoughts (IJCRT), 11(3), i339–i350.
[131] Agarwal, N., Gunj, R., Mahimkar, S., & Shekhar, S. Prof. Arpit Jain, & Prof. Punit Goel. (2023). Signal Processing for Spinal Cord Injury Monitoring with sEMG. Innovative Research Thoughts, 9(5), 334. https://doi.org/10.36676/irt.v9.i5.1491.
[132] Salunkhe, V., Mahimkar, S., & Shekhar, S. Prof. (Dr.) Arpit Jain, & Prof. (Dr.) Punit Goel. (2023). The Role of IoT in Connected Health: Improving Patient Monitoring and Engagement in Kidney Dialysis. SHODH SAGAR® Universal Research Reports, 10(4), 437.
[133] Voola, P. K., Mahimkar, S., & Shekhar, S. Prof. (Dr.) Punit Goel, & Vikhyat Gupta. (2022). Machine Learning in ECOA Platforms: Advancing Patient Data Quality and Insights. International Journal of Creative Research Thoughts, 10, 12.
[134] Vijayabaskar, S., Mahimkar, S., Shekhar, S., Jain, S., & Agarwal, R. (2022). The Role of Leadership in Driving Technological Innovation in Financial Services. International Journal of Creative Research Thoughts, 10(12). https://ijcrt.org/download.php?file=IJCRT2212662.pdf.
[135]Mahimkar, S., Pandey, D. P., & Goel, O. Utilizing Machine Learning for Predictive Modelling of TV Viewership Trends. International Journal of Creative Research Thoughts (IJCRT), ISSN, 2320–2882.
[136] Mahimkar, S., & Lagan Goel, D. G. S. K. (2021). Predictive Analysis of TV Program Viewership Using Random Forest Algorithms. IJRAR-International Journal of Research and Analytical Reviews (IJRAR), 309–322.

[137] Arulkumaran, R., Mahimkar, S., Shekhar, S., Jain, A., & Jain, A. (2021). Analyzing Information Asymmetry in Financial Markets Using Machine Learning. International Journal of Progressive Research in Engineering Management and Science, 1(2), 53–67. https://doi.org/10.58257/IJPREMS16.
[138] Agarwal, N., Gunj, R., Mahimkar, S., & Shekhar, S. Prof. Arpit Jain, & Prof. Punit Goel. (2023). Signal Processing for Spinal Cord Injury Monitoring with sEMG. Innovative Research Thoughts, 9(5), 334. https://doi.org/10.36676/irt.v9.i5.1491.
[139] Salunkhe, V., Mahimkar, S., & Shekhar, S. Prof. (Dr.) Arpit Jain, & Prof. (Dr.) Punit Goel. (2023). The Role of IoT in Connected Health: Improving Patient Monitoring and Engagement in Kidney Dialysis. SHODH SAGAR® Universal Research Reports, 10(4), 437.
[140] Voola, P. K., Mahimkar, S., & Shekhar, S. Prof. (Dr.) Punit Goel, & Vikhyat Gupta. (2022). Machine Learning in ECOA Platforms: Advancing Patient Data Quality and Insights. International Journal of Creative Research Thoughts, 10, 12.
[141] Vijayabaskar, S., Mahimkar, S., Shekhar, S., Jain, S., & Agarwal, R. (2022). The Role of Leadership in Driving Technological Innovation in Financial Services. International Journal of Creative Research Thoughts, 10(12). https://ijcrt.org/download.php?file=IJCRT2212662.pdf.
[142]Shekhar, S., Prof. (Dr.) Punit Goel, & Prof. (Dr.) Arpit Jain. Comparative Analysis of Optimizing Hybrid Cloud Environments Using AWS, Azure, and GCP. International Journal of Creative Research Thoughts (IJCRT), ISSN: 2320–2882, e791–e806.
[143] Shekhar, S., SHALU, J., & Tyagi, D. P. (2020). Advanced Strategies for Cloud Security and Compliance: A Comparative Study. IJRAR-International Journal of Research and Analytical Reviews (IJRAR), E-ISSN 2348–1269, P-ISSN 2349–5138, 396–407.
[144] Agarwal, N., Gunj, R., Chintha, V. R., Pamadi, V. N., Aggarwal, A., & Gupta, V. (2023). GANs for Enhancing Wearable Biosensor Data Accuracy. SHODH SAGAR® Universal Research Reports, 10(4), 533. https://doi.org/10.36676/urr.v10.i4.13,62.
[145] Agrawal, S., Chintha, V. R., Pamadi, V. N., Aggarwal, A., & Goel, P. (2023). The Role of Predictive Analytics in Inventory Management. Shodh Sagar Universal Research Reports, 10(4), 456. https://doi.org/10.36676/urr.v10.i4.13,58.
[146] Vadlamani, S., Agarwal, N., Chintha, V. R., Shrivastav, A., Jain, S., & Goel, O. (2023). Cross-platform data migration strategies for enterprise data warehouses. International Research Journal of Modernization in Engineering, Technology, and Science, 5(11), 1–26. https://doi.org/10.56726/IRJMETS46858.
[147]Salunkhe, V., Chintha, V. R., Pamadi, V. N., Jain, A., & Goel, O. (2022). AI-Powered Solutions for Reducing Hospital Readmissions: A Case Study on AI-Driven Patient Engagement. International Journal of Creative Research Thoughts, 10(12), 757-764.
[148]Agarwal, N., Gunj, R., Chintha, V. R., Kolli, R. K., Goel, O., & Agarwal, R. (2022). Deep Learning for Real Time EEG Artifact Detection in Wearables. International Journal for Research Publication & Seminar, 13(5), 402.
[149]Alahari, J., Thakur, D., Goel, P., Chintha, V. R., & Kolli, R. K. (2022). Enhancing iOS Application Performance through Swift UI: Transitioning from Objective-C to Swift. International Journal for Research Publication & Seminar, 13(5), 312.
[150] Chintha, V. R., & Priyanshi, P. Sangeet Vashishtha. (2020). 5G Networks: Optimization of Massive MIMO. IJRAR-International Journal of Research and Analytical Reviews (IJRAR), 7(1), 389-406.
[151] Agarwal, N., Gunj, R., Chintha, V. R., Pamadi, V. N., Aggarwal, A., & Gupta, V. (2023). GANs for Enhancing Wearable Biosensor Data Accuracy. SHODH SAGAR® Universal Research Reports, 10(4), 533. https://doi.org/10.36676/urr.v10.i4.13, 62.
[152] Agrawal, S., Chintha, V. R., Pamadi, V. N., Aggarwal, A., & Goel, P. (2023). The Role of Predictive Analytics in Inventory Management. Shodh Sagar Universal Research Reports, 10(4), 456. https://doi.org/10.36676/urr.v10.i4.13, 58.
[153] Pamadi, V. N., Chhapola, A., & Agarwal, N. (2023). Performance analysis techniques for big data systems. International Journal of Computer Science and Publications, 13(2), 217-236. https://rjpn.org/ijcspub/papers/IJCSP23B1501.pdf.
[154] Salunkhe, V., Chintha, V. R., Pamadi, V. N., Jain, A., & Goel, O. (2022). AI-Powered Solutions for Reducing Hospital Readmissions: A Case Study on AI-Driven Patient Engagement. International Journal of Creative Research Thoughts, 10(12), 757-764.
[155] Vishesh Narendra Pamadi, Dr. Priya Pandey, Om Goel. (2021). Comparative Analysis of Optimization Techniques for Consistent Reads in Key-Value Stores. International Journal of Creative Research Thoughts (IJCRT), 9(10), d797-d813. http://www.ijcrt.org/papers/IJCRT2110459.pdf
[156] Pamadi, V. N., Chaurasia, D. A. K., & Singh, D. T. (2020). Comparative Analysis OF GRPC VS. ZeroMQ for Fast Communication. International Journal of Emerging Technologies and Innovative Research (www.jetir.org), 7(2), 937-951.
[157] Pamadi, V. N., Chaurasia, D. A. K., & Singh, D. T. (2020). Effective Strategies for Building Parallel and Distributed Systems. International Journal of Novel Research and Development (www.ijnrd.org), 5(1), 23-42.
[158]Mahadik, S., Antara, F., Chopra, P., Renuka, A., & Goel, O. (2023, October 30). User-centric design: Emphasizing user experience in product development. Available at SSRN 4985267. https://doi.org/10.2139/ssrn.4985267
[159]4. Antara, E. F. N., Khan, S., & Goel, O. (2023). Workflow management automation: Ansible vs. Terraform. Journal of Emerging Technologies and Network Research, 1(8), a1-a11. (rjpn https://rjpn.org/jetnr/papers/JETNR2308001.pdf)

[160]5. Antara, F. N. U., Goel, O., & Gupta, D. P. (2022). Enhancing Data Quality and Efficiency in Cloud Environments: Best Practices. International Journal of Research and Analytical Reviews (IJRAR), 9(3), 210-223.
[161]6. Nadukuru, S., Antara, F., Chopra, P., Renuka, A., & Goel, O. (2021). Agile methodologies in global SAP implementations: A case study approach. International Research Journal of Modernization in Engineering Technology and Science, 3(11), 1592–1605. https://doi.org/10.56726/IRJMETS17272
[162] Bhimanapati, V., Goel, O., & Pandian, P. K. G. (2023). Implementing agile methodologies in QA for media and telecommunications. Innovative Research Thoughts, 8(2), 1454.
[163] Bhimanapati, V. B. R., Jain, S., & Pandian, P. K. G. (2023). Mobile application security best practices for fintech applications. International Journal of Creative Research Thoughts (IJCRT), ISSN: 2320-2882.
[164] Mahadik, S., Chinta, U., Bhimanapati, V. B. R., Goel, P., & Jain, A. (2023). Product roadmap planning in dynamic markets. Innovative Research Thoughts, 9(5), 282. https://doi.org/10.36676/irt
[165] Bhimanapati, V. B. R., Renuka, A., & Goel, P. (2022). Effective use of AI-driven third-party frameworks in mobile apps. Innovative Research Thoughts, 7(2).
[166]Voola, P. K., Chinta, U., Bhimanapati, V. B. R., Goel, O., & Goel, D. P. (2022). AI-powered chatbots in clinical trials: Enhancing patient-clinician interaction and decision-making. SSRN. https://doi.org/ssrn.4984949
[167]Agarwal, N., Chinta, U., Bhimanapati, V. B. R., & Jain, S. (2023). EEG-based focus estimation model for wearable devices. Journal of Neuroscience Research, 1(2), 102–114.
[168] Voola, P. K., Avancha, S., Gajbhiye, B., Goel, O., & Jain, U. (2023). Automation in mobile testing: Techniques and strategies for faster, more accurate testing in healthcare applications. Shodh Sagar® Universal Research Reports, 10(4), 420–434. https://doi.org/10.36676/urr.v10.i4.1356
[169] Avancha, S., Jain, S., & Pandian, P. K. G. (2023). Risk management in IT service delivery using big data analytics. Universal Research Reports, 10(2), 272–285. https://doi.org/10.36676/urr.v10.i2.1330
[170] Salunkhe, V., Avancha, S., Gajbhiye, B., Jain, U., & Goel, P. (2022). AI integration in clinical decision support systems: Enhancing patient outcomes through SMART on FHIR and CDS Hooks. International Journal for Research Publication & Seminar, 13(5), 338–354. https://doi.org/10.36676/jrps.v13.i5.1506
[171] Avancha, S., Khan, S., & Goel, O. (2021). AI-driven service delivery optimization in IT: Techniques and strategies. International Journal of Creative Research Thoughts (IJCRT), 9(3), 6496–6510. Retrieved from http://www.ijcrt.org/
[172] Avancha, S., Chhapola, A., & Jain, S. (2021). Client relationship management in IT services using CRM systems. Innovative Research Thoughts, 7(1).
[173] Khair, M. A., Avancha, S., Gajbhiye, B., Goel, P., & Jain, A. (2021). The role of Oracle HCM in transforming HR operations. Innovative Research Thoughts, 9(5), 300. doi: 10.36676/irt.v9.i5.1489
[174] Eeti, S., Jain, A., & Goel, P. (2023). A comparative study of NoSQL databases: MongoDB, HBase, and Phoenix. International Journal of New Trends in Information Technology, 1(12), a91–a108. Retrieved from https://rjpn.org/ijnti/papers/IJNTI2312013.pdf
[175]Alahari, J., Kolli, R. K., Eeti, S., Khan, S., & Verma, P. (2022). Optimizing iOS user experience with SwiftUI and UIKit: A comprehensive analysis. International Journal of Creative Research Thoughts, 10(12), f699.
[176]Mahadik, S., Kolli, R. K., Eeti, S., Goel, P., & Jain, A. (2021). Scaling startups through effective product management. International Journal of Progressive Research in Engineering Management and Science, 1(2), 68–81.
[177] Eeti, S., & Goel, P., & Renuka, A. (2021). Strategies for migrating data from legacy systems to the cloud: Challenges and solutions. TIJER (The International Journal of Engineering Research, 8(10), a1–a11.
[178] Shanmukha, E., & Priyanshi, P. Sangeet Vashishtha(2022). Optimizing data pipelines in AWS: Best practices and techniques. International Journal of Creative Research Thoughts (IJCRT), ISSN 2320-2882, i351–i365.
[179] Arulkumaran, R., Khatri, D. K., Bhimanapati, V., Goel, L., & Goel, O. (2023). Predictive analytics in industrial processes using LSTM networks. Shodh Sagar® Universal Research Reports, 10(4), 512. https://doi.org/10.36676/urr.v10.i4.1361
[180] Arulkumaran, R., Khatri, D. K., Bhimanapati, V., Aggarwal, A., & Gupta, V. (2023). AI-driven optimization of proof-of-stake blockchain validators. Innovative Research Thoughts, 9(5), 315. https://doi.org/10.36676/irt.v9.i5.1490
[181] Khatri, D., Aggarwal, A., & Goel, P. (2022). AI chatbots in SAP FICO: Simplifying transactions. Innovative Research Thoughts, 8(3), Article 1455.
[182] Agrawal, S., Khatri, D., Bhimanapati, V., Goel, O., & Jain, A. (2022). Optimization techniques in supply chain planning for consumer electronics. International Journal for Research Publication & Seminar, 13(5), 356.
[184]Agrawal, S., Khatri, D., Bhimanapati, V., Goel, O., & Jain, A. (2022). Optimization techniques in supply chain planning for consumer electronics. International Journal for Research Publication & Seminar, 13(5), 356.
[185]Khatri, D. K., Chhapola, A., & Jain, S. (2021) AI-enabled applications in SAP FICO for enhanced reporting. International Journal of Creative Research Thoughts (IJCRT), ISSN: 2320-2882, k378-k393

[186] Voola, P. K., Avancha, S., Gajbhiye, B., Goel, O., & Jain, U. (2023). Automation in mobile testing: Techniques and strategies for faster, more accurate testing in healthcare applications. Shodh Sagar® Universal Research Reports, 10(4), 420–434. https://doi.org/10.36676/urr.v10.i4.1356

[187] Voola, P. K., Avancha, S., Gajbhiye, B., Goel, O., & Jain, U. (2023). Automation in mobile testing: Techniques and strategies for faster, more accurate testing in healthcare applications. SSRN. Available at https://ssrn.com/abstract=4984957

[188] Khair, M. A., Avancha, S., Gajbhiye, B., Goel, P., & Jain, A. (2023). The role of Oracle HCM in transforming HR operations. Innovative Research Thoughts, 9(5), 300. https://doi.org/10.36676/irt.v9.i5.1489

[189] Gajbhiye, B., Aggarwal, A., & Goel, P. (2023). Security automation in application development using robotic process automation (RPA). Universal Research Reports, 10(3), 167.

[190] Salunkhe, V., Avancha, S., Gajbhiye, B., Jain, U., & Goel, P. (2022). AI integration in clinical decision support systems: Enhancing patient outcomes through SMART on FHIR and CDS Hooks. SSRN. Available at https://ssrn.com/abstract=4984977

[191] Pakanati, D., Chhapola, A., & Kaushik, S. . Comparative analysis of Oracle Fusion Cloud's capabilities in financial integrations. International Journal of Creative Research Thoughts (IJCRT), 2320-2882.

[192]Pakanati, D. (2023). Optimizing procurement processes: A study on Oracle Fusion SCM. International Journal of Research and Analytical Reviews (IJRAR), 10(1), 35. Available at www.ijrar.org

[193] Dasaiah Pakanati, Prof.(Dr.) Punit Goel, Prof.(Dr.) Arpit Jain, "Optimizing Procurement Processes: A Study on Oracle Fusion SCM", IJRAR - International Journal of Research and Analytical Reviews (IJRAR), E-ISSN 2348-1269, P- ISSN 2349-5138, Volume.10, Issue 1, Page No pp.35-47, March 2023. - https://www.ijrar.org/papers/IJRAR23A3238.pdf

[194] Pakanati, D., Goel, P., & Jain, A. (2023, March). Optimizing procurement processes: A study on Oracle Fusion SCM. International Journal of Research and Analytical Reviews (IJRAR), 10(1), 35–47. https://www.ijrar.org/papers/IJRAR23A3238.pdf

[195] Pakanati, D., Goel, E. L., & Kushwaha, D. G. S. (2023). Implementing cloud-based data migration: Solutions with Oracle Fusion. Journal of Emerging Trends in Network and Research, 1(3), a1-a11. https://rjpn.org/jetnr/viewpaperforall.php?paper=JETNR2303001

[196] Pakanati, D., Rao, P. R., Goel, O., Goel, P., & Pandey, P. (2023). Fault tolerance in cloud computing: Strategies to preserve data accuracy and availability in case of system failures. International Journal of Creative Research Thoughts (IJCRT), 11(1), f8-f17.

[197] Alahari, Jaswanth, Dasaiah Pakanati, Harshita Cherukuri, Om Goel, & Prof. (Dr.) Arpit Jain. (2023). "Best Practices for Integrating OAuth in Mobile Applications for Secure Authentication." SHODH SAGAR® Universal Research Reports, 10(4): 385. https://doi.org/10.36676/urr.v10.i4.

[198] Pakanati, D., Goel, E. L., & Kushwaha, D. G. S. (2023). Implementing cloud-based data migration: Solutions with Oracle Fusion. Journal of Emerging Trends in Network and Research, 1(3), a1-a11.

[199] Cherukuri, H., Pandey, P., & Siddharth, E. (2020). Containerized data analytics solutions in on-premise financial services. International Journal of Research and Analytical Reviews (IJRAR).

[200] Pakanati, D., Goel, B., & Tyagi, P. (2021). Troubleshooting common issues in Oracle Procurement Cloud: A guide. International Journal of Computer Science and Public Policy, 11(3), 14-28. https://rjpn.org/ijcspub/papers/IJCSP21C1003.pdf

[201] Pakanati, D., Goel, B., & Tyagi, P. (2021). Troubleshooting common issues in Oracle Procurement Cloud: A guide. International Journal of Computer Science and Public Policy, 11(3), 14-28. https://rjpn.org/ijcspub/papers/IJCSP21C1003.pdf

[202] Kushwaha, G. S. (2021). Monetizing financial data analytics: Best practice. International Journal of Computer Science and Publication (IJCSPub), 11(1), 76-87. https://rjpn.org/ijcspub/papers/IJCSP21A1011.pdf

[203]Cherukuri, H., Pandey, P., & Siddharth, E. (2020). Containerized data analytics solutions in on-premise financial services. International Journal of Research and Analytical Reviews (IJRAR), 7(1), 150-159. https://www.ijrar.org/papers/IJRAR19Y3150.pdf

[204] Cherukuri, H., Goel, E. L., & Kushwaha, G. S. (2021). Monetizing financial data analytics: Best practice. International Journal of Computer Science and Publication (IJCSPub), 11(1), 76-87. https://rjpn.org/ijcspub/papers/IJCSP21A1011.pdf

[205] Prathyusha Nama, Purushotham Reddy, & Guru Prasad Selvarajan. (2023). Intelligent Data Replication Strategies: Using AI to Enhance Fault Tolerance and Performance in Multi-Node Database Systems. Well Testing Journal, 32, 110–122. Retrieved from https://welltestingjournal.com/index.php/WT/article/view/111

[206] Nama, P. (2023). AI-driven innovations in cloud computing: Transforming scalability, resource management, and predictive analytics in distributed systems. International Research Journal of Modernization in Engineering Technology and Science, 5(12), 4165-4174. IRJMETS.

[207] Prathyusha Nama, Purushotham Reddy, & Guru Prasad Selvarajan. (2023). Leveraging Generative AI for Automated Test Case Generation: A Framework for Enhanced Coverage and Defect Detection. Well Testing Journal, 32(2), 74–91. Retrieved from https://welltestingjournal.com/index.php/WT/article/view/110

[208] Vijayabaskar, S., Thumati, P. R. R., Kanchi, P., Jain, S., & Agarwal, R. (2023). Integrating cloud-native

ISSN (Online): 2583-1712
Volume-3 Issue-3 || May 2023 || PP. 149-165 https://doi.org/10.55544/ijrah.3.3.23

solutions in financial services for enhanced operational efficiency. SHODH SAGAR® Universal Research Reports, 10(4), 402. https://doi.org/10.36676/urr.v10.i4.1355

[209] Rao, P. R., Chaurasia, A. K., & Singh, S. P. (2023). Modern web design: Utilizing HTML5, CSS3, and responsive techniques. Journal of Novel Research and Innovative Development, 1(8), 1–18. https://jnrid.org

[210]Rao, U. P. R., Goel, L., & Kushwaha, G. S. (2023). Analyzing data and creating reports with Power BI: Methods and case studies. International Journal of Novel Trends and Innovation, 1(9), 1–15. IJNTI.

[211] Rao, P. R., Goel, P., & Renuka, A. (2023). Creating efficient ETL processes: A study using Azure Data Factory and Databricks. The International Journal of Engineering Research, 10(6), 816–829.

[212] Rao, P. R., Priyanshi, E., & Vashishtha, S. (2023). Angular vs. React: A comparative study for single-page applications. International Journal of Current Science, 13(1), 1–20. IJCSPUB.

[213] Balasubramaniam, V. S., Thumati, P. R. R., Kanchi, P., Agarwal, R., Goel, O., & Shrivastav, E. A. (2023). Evaluating the impact of agile and waterfall methodologies in large-scale IT projects. International Journal of Progressive Research in Engineering Management and Science, 3(12), 397–412.

[214] Pattabi Rama Rao, E., & Vashishtha, S. (2023). Angular vs. React: A comparative study for single-page applications. International Journal of Computer Science and Programming, 13(1), 875–894.

[215] Gajbhiye, B., Aggarwal, A., & Goel, P. (2023). Security automation in application development using robotic process automation (RPA). Universal Research Reports, 10(3), 167.

[216] Rao, P. R., Goel, P., & Jain, A. (2022). Data management in the cloud: An in-depth look at Azure Cosmos DB. International Journal of Research and Analytical Reviews, 9(2), 656–671. https://www.ijrar.org/