ABSTRACT

The Contact Centers play an important role in customer interactions. They provide information to differentiate company products and services and build loyalty relations with customers. The Contact Center is the central point where customer contacts are managed. Multichannel means several ways of managing customer contacts. The Multichannel Contact Center allows your business to interact with different communication media like text/sms, email, fax, web chats including the traditional phone calls. The Multichannel Contact Center offer customers a variety of ways to communicate with the organizations and enhance customer relationships and provide quality of service. We design and implement a system that supports Multichannel Contact Center and present the performance analysis for the system.

Keywords: Multichannel, Contact Center, Unified Communication, work item, agent, customer, communication manager, media director, media store.

INTRODUCTION

The unified communication plays a very important role in customer interactions. It is very important that the customers must be able to communicate at anytime from anywhere. Some of the leaders in unified communication are Avaya, Cisco, Interactive Intelligence, Genesys and Wipro etc. These companies need to provide quality services to the customers to stay ahead in the competitive market. Unified communication is integration of real – time as well as non real – time communication services. It supports real – time services like instant messaging and chats and non real – time services like email and sms. The unified communication is not a single product, but a set of different products together which provide a consistent user interface across multiple media types.

The Multichannel Contact Center is a solution of unified communication. It allows the customers to communicate using various multimedia options. The customers may contact using multimedia options like text, emails, web chats and fax etc. Communication using different multimedia is known as a multichannel approach. Hence, the system that supports this is known as a Multichannel Contact Center. Multichannel Contact Center allows customers to communicate using a wide range of integrated components. We present a system that supports Multichannel Contact Center that allows customers to communicate through traditional voice calls along with different multimedia options like email, text, web chats.

The rest of the paper is organized as follows: The next section describes the methodology used to support Multichannel Contact Center system. The following section presents the performance analysis of the system. The following sections present the Future Work and Conclusion of the paper.

IMPLEMENTATION

The Multichannel Contact Centers are used to accept and manage customer contacts. They are an extension to the traditional call centers. The call centers allow customers to make contact through voice calls whereas Multichannel contact centers allow customers to contact the business using a variety of multimedia options like text, email, fax and web chats etc. The contact center agents resolve the customer queries. The customer contacts must be managed till the time it reaches the skilled agent. The customer query must be solved with customer satisfaction.

The Communication Manager is an important component in Multichannel Contact Center. The communication manager organizes and routes voice, data and video transmissions. The communication manager is connected to the
Multichannel Contact Center Server to which the agent is connected. The Server consists of an XML Server and the Media Director that are used to deliver the voice and data work items. The Media Director is connected to different Media Stores. It is connected to Email Media Store that enables receiving and sending emails. These are connected to Simple Messaging Media Store that enables receiving and sending SMS. The Simple Messaging Media Store that enables receiving web chat.

The following diagram explains the work item flow from customer to the Multichannel Contact Center agent. The work items can be a voice call, an sms, an email or a web chat through Facebook, Twitter, AOL Messenger, Yahoo Messenger and MSN Messenger.

RESULT ANALYSIS

We present a performance analysis of the Multichannel Contact Center with the existing Elite Multichannel Contact Center system. The following parameters are taken under consideration for performance analysis:

1) **CPU Utilization**

![Graph1. CPU utilization](image1)

The graph shows the CPU usage of the systems. We compare both the existing system and the proposed system. For this purpose, we logged on 1000 agents together at a time on the Server and calculated the CPU utilization for a time period for a day. The results were as follows:

The existing system was not able to handle a load of 1000 agents and after a specific period of time, the system would crash and then it was started again but at a load of 1000 agents the system would crash repeatedly. This was recovered in the proposed system. The Customized Elite Multichannel (EMC) system was able to handle a load of 1000 agents and it did not crash. Hence, the CPU usage improved and reduced crashes. The charts show that there are no crashes in the existing system and hence it is better to the previously existing EMC system.

2) **Memory Utilization**

![Graph2. Memory Utilization](image2)
The above chart shows the memory utilization of the system. We compare the existing Elite Multichannel (EMC) and the Customized EMC to check the memory utilization of the system. The performance analysis was performed by logging 1000 agents on the Server.

The results are as follows:

The previous system uses memory from about a range of 1200MB to 2000 MB. But comparatively, the Customized EMC uses a less memory. We see in the chart that the customized EMC requires a memory of 900MB to 1000MB. We have removed all the unwanted objects which results in less memory usage.

3) IO Read operations/sec

Graph3. IO Read operation/sec

The chart shows the comparison of the IO read operations / sec for the existing system and the proposed system. We compare the existing Elite Multichannel (EMC) and the Customized EMC to check the memory utilization of the system. The performance analysis was performed by logging 1000 agents on the Server.

The results clearly show that the previous system had many read operations as compared to the proposed system. The range of the IO read operations is been reduced and hence it gives a better performance as compared to the previous Elite MultiChannel (EMC).

4) IO write operations/sec

Graph4. IO Write operations/sec

The chart shows the comparison of the IO write operations / sec for the existing system and the proposed system. We compare the existing Elite Multichannel (EMC) and the Customized EMC to check the memory utilization of the system. The performance analysis was performed by logging 1000 agents on the Server at a given instance of time.

The results clearly show that the previous system had many write operations as compared to the proposed system. The range of the IO write operations is been reduced and hence it gives a better performance as compared to the previous Elite MultiChannel (EMC).

5) Scalability

Graph5. Scalability

The main aim of the project is to increase the number of agents in the system. The previous system was able to log on a maximum of 600 agents at a given instance of time. But this was not suitable for large organizations which required increased number of agents. The previous system could load more than 600 agents but as a result the server crashed as it could not handle such large amount of load. Hence, we developed a system that now supports increased number of agents. The system is now improved which can handle a total of 1000 agents at a given time instance without crashes.

6) Processing time

Graph6. Processing Time
The other important factor that needs to be considered is the processing time of the system. The processing time of the system should be reduced so that the performance of the system is improved. Hence, the proposed system is implemented with the aim to reduce the processing time of the system. The chart compares the processing time of the previous Elite Multichannel (EMC) and the Customized Elite Multichannel system. The results show that processing time for each of the individual work item has been considerably reduced. This results in improved overall performance of the system and enhances the customer satisfaction which is an important factor.

7) **Total Calls Answered**

As the performance of the system has improved, the agents are now able to process more number of work items. The charts show the results that are calculated with different number of agents logged into the system. The total calls answered by the system are compared for the Elite Multichannel (EMC) and the Customized Elite Multichannel (EMC). The results clearly show that the Customized Elite Multichannel (EMC) gives a better performance.

**FUTURE WORK**

The current Multichannel Contact Center supports POP3 and SMTP which are not secure for the exchange of emails. We plan to implement secure protocols like secure POP3 and secure SMTP which provide security. We plan to improve real – time reports to calculate agent performance by the supervisors. We also plan to scale the number of agents supported by the system. We also plan to improve the localization features.

**CONCLUSION**

Hence, we implemented a Multichannel Contact Center system to support different types of multimedia communication options. The Multichannel Contact Center supports traditional phone calls along with support to different multimedia options like – Email, sms, web chat, Facebook, Twitter, and Gtalk.

The results of the system are promising with the best results. The CPU utilization of the system improved and the system does not crash with the increase in the number of agents. The memory usage of the system reduced. The IO read/write operations were reduced. Hence, improve the performance of the system. We are able to increase the number of agents to the Multichannel Contact Center system. With the increased number of agents we are able to improve the customers attended by 20%.

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