

Interactive Voice Response System Development

S. Umamaheswari, M. Alagumeenaakshi

Abstract--- *Interactive Voice Response System (IVRS) is a automation tool that generates automated voice to address the queries raised by human through interactive voice response (speech recognition) and dual tone multi frequency (DTMF) tones input provided via keypad. This IVRS assistance plays a major role in improving the interactive experience of customers and can handle repetitive addressing of wide range of customers in a public service providing environment. Proper access to right information at appropriate time can solve the issues spawned to different customer situations. This system provides dynamic information to the customers and route them to the appropriate servicing section based on the text input options. This IVR system is an efficient and cost effective solution for establishing a personalized customer experience providing magnificent growth in the productivity of a company. It blends the inbound calls with outbound IVR integrating the self-service applications with agent assisted process and can increase the actual talk-time with customers. This work has been concentrated towards IVR application for one of the tenants. Special effort has been made to develop and test advanced outbound features successfully.*

Keywords: *Interactive voice response, Dual tone multi frequency, self-service applications, agent assisted.*

I. INTRODUCTION

Customer satisfaction is an important factor in determining the market value of a company. Customer satisfaction can be easily achieved by troubleshooting their problems and collecting their feedback through IVR technology [2]. Addressing most of the customer requirements through a single end to end unique solution is the foremost task of any company. The requirement of the customer is understood through DTMF/voice information obtained and the service is extended from the appropriate section. This work has been concentrated in developing an IVR call flow for a health care organization. Designer tool is one of the leading IVR development tool, using which the call flows has been executed according to the tenant's requirement. IVR system usually routes the caller to the exact section or the agent of the company based on their IVR input [4]. There is a significant reduction in the wrong direction of associated servicing sections by using IVR technology for

call diversion [5]. This system as well acts as an Omnichannel work station incorporating perfect milieu and knowledge across each and every channel of service request from any customer [6]. Similar to Web pages, VoiceXML and StateChartXML (SCXML) are the standards followed in Genesys.

IVR type of applications are addressed through VoiceXML codes and IVR routing strategy is addressed by SCXML codes [7].

II. RELATED WORK

The IVR system can be developed with multilingual welcome messages to address the customers call. After getting all the information the call will be disconnected. [1]. Ritesh et al [8] have designed an intelligent system for interaction that has a capacity to provide noble response to the accessed caller. The developed "Personalized IVR" provides a greeting message with the customer's name. This process of greeting the customer with his name is accomplished by retrieving the information from the customer database. The contact center helps in linking the system to the database through the caller's phone number. The prime challenge of any contact center is to provide a cost effective service to its customers with due regards. Mudili Soujanya [3] has proposed a Speech Application Software Development Toolkit (SASDK) which can be used in providing an efficient speech interface using ASP.NET 2003 for supplying the necessary information to the Microsoft Speech Server (MSS) and helps in responding to the customer's request by interacting with the database. The benefits of Machine learning technology and performance of wireless sensor network with wormhole attack is analyzed [9,10]

III. SIP SERVER AND CALL HANDLING

A. Genesys Voice Platform (GVP):

Genesys Voice Platform – GVP is a software suite which integrates several server combination used for call-processing, reporting, management and application purposes. GVP is different from IVR in terms of separating the voice and the call-control applications from the call-processing environment. This software includes both voice and call-control browser for interpreting VoiceXML (Voice Extensible Markup Language) and CCXML (Call Control Extensible Markup Language) documents into call-processing events. It is a software-only solution which runs on off-the-shelf hardware and software.

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GVP is used in managing various tasks such as alarms, start/stop of solutions and application failures through the Management Framework. This platform empowers the Customer Service Department of any company with a 24x7 business service solution for interaction with its valuable customers in providing personalized solution using VoiceXML standard.

This process transforms the phone into a powerful, anywhere-anytime information access tool instead of being a basic communication module. GVP an integrated product of Genesys provides a significant position for delivering an interactive management solution that integrates seamlessly self-service resources of an organization with human agents of various appropriate servicing section and provides a telescopic view of the customer.

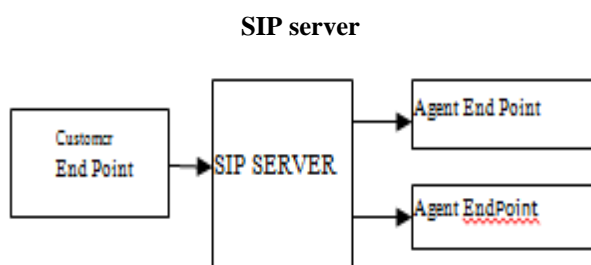


Figure.1. Sip Server

SIP - Session Initiation Protocol can be visualized from the given Figure 1 as a software component that provides an interface between the hardware of tele-communication and the rest of the Genesys software located in an enterprise. It is a TCP/IP-based server that also acts as a messaging interface between SIP server clients. Option for utilizing the Stream Manager for music-on-hold, music-in-queue, and announcement applications by collecting the DTMF (Dual Tone Multi Frequency) signals is also possible.

B. Call Handling:

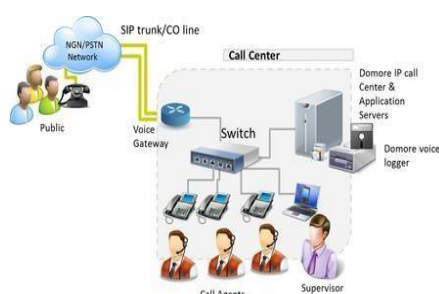


Figure.2.Call Handling

The process of call handling is obvious from figure 2. On arrival of a call in the cloud, it first hits the Session Border Controller – SBC, which is used to segregate the calls in to Private and Public calls. Only the calls intended for Genesys will be routed to the SIP Server which in turn routes it to the Configuration Server with stored routing link information. This server helps in returning the application with the appropriate customer information. The part of the application, Voice Extensible Markup Language – VXML is sent to the Genesys Voice Platform – GVP. The part with State Chart Extensible Markup Language – SCXML is sent to the Orchestration Server – ORS which can be processed

later and sent to the Universal Routing Server – URS. The predominant difference between the VXML and SCXML is that, VXML files are just the IVR part and SCXML is the routing part. All statistics such as agent availability, position in queue and other stats are usually obtained from URS. This describes the procedure of call handling process in the Genesys Cloud Environment.

C. Genesys designer

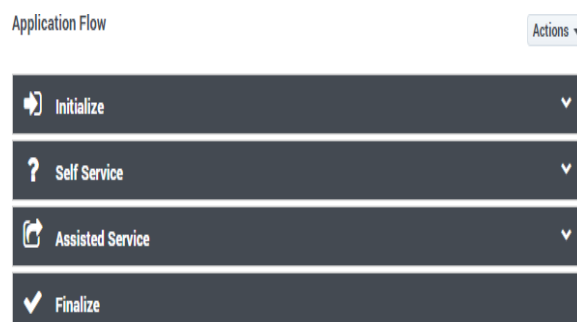


Figure.3.Phases In Designer

D. Phases of application flow:

Application flow consists of several application phases such as initialize, Self-service, assisted service, finalizes as shown in Figure 3.

Initialize – This phase is used to initialize the application-level user variables and parameters required for the execution.

The application is initialized during this phase. By default, the following blocks (actions) are executed:

1. Individual related parameters are started.
2. Variables are moved from origin.
3. Subroutine will be called. Initial needed Parameters are started.

E. Automated phase

During this stage without any external user, mechanically the solution will be given to the customer. Finding the required track is not needed here. By means of asking several queries, the needed answer will be given to the end point. Suppose if self service is not able to answer for queries then by further getting lot of information from customer and by utilizing internal programs through the suitable track the user query will be routed.

Helping phase – Based upon the queries the problem will be transmitted to the operator. By using previous history the query will be given to the company person. Time period is also there for each caller. But after customer satisfaction only the route will be blocked. Then robotically the call will be moved to the end block.

End – After the query was processed every conversation will be recorded. The purpose of recording is to enhance the system. And sometimes it will be used to solve the customer query also.

Genesys designer page is shown in Figure.4.

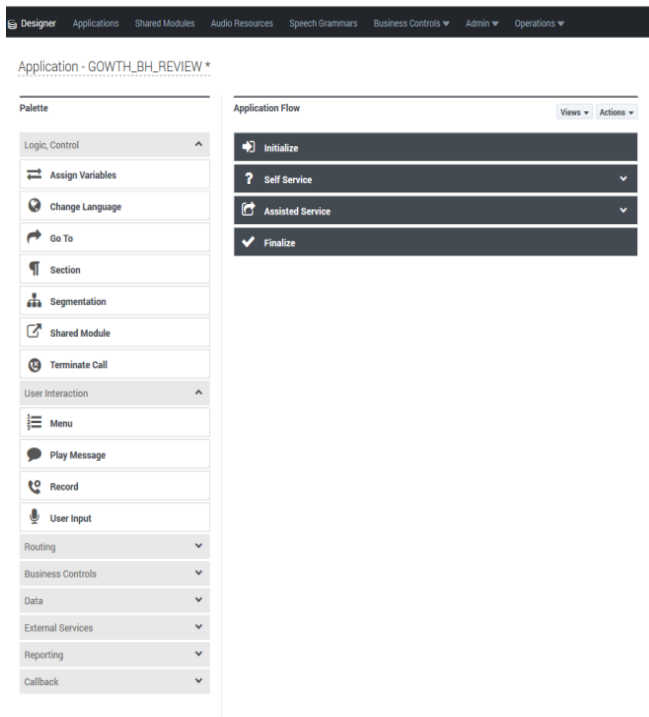


Figure.4. Genesys Designer

F. Several kinds of phases in Designer:

a. Working duration:

Working duration will be loaded in the program. The program will be planned in such a way that the caller will not be answered if he calls outside the duration. Option is there to automate the system during holidays.

b. Transmitting:

In a big organization different queries will come to the system in different area of the product. So operators with different specializations will also be there to answer for the query. So based upon the talk the call will be forwarded to the suitable person. At the same if any expert is busy at that time automatically the call will be forwarded to the second expert. So priorities can also be loaded here. If the query process was successful automatically the procedure moves to end phase ignoring the subsequent phases.

Kinds of Forwarding:

Based on expert— Call will be automatically transmitted to the specialized person.

Mathematical models transmitting —. Mathematical models are developed priorly. Based upon the satisfaction of that models the calls will be transmitted.

Club based transmitting— Lot of clubs are also created for various fields. Calls will be forwarded to that various clubs.

ID Forwarding —Ids will be given to various experts. Based on ids the call will be forwarded.

Common point Forwarding — Calls will be sometimes forwarded to common point. The common point will move the information to the relevant operator.

Numerical value forwarding ---Numbers will also be used to forward the query.

IV. CHECKING VARIOUS DEVICES

A. Genesys junction

All the user related menus can be taken from the junction. Any customer query can be solved using this junction. Three main divisions are in this genesis junction.

1. User layer: Administration and complaining related menus will be present here. These menus are effectively used by persons in interactive response system.

2. Management layer: Customer and operator are linked and framed in this layer. It is also used by management level persons. This Genesys icon will be prepared in such a way that it is different for various companies. Based on their requirement and customer service this will be prepared.

B. Proposed system and discussions

a. Ivr Call Flow Using Designer:

Using the designer application developed a small application for a health care organization. When the customer of the health care organization calls the toll free number, they will be routed to specific agents according to the options they choose. The given call flow is divided into

- Start call
- Routing

b. Automation phase:

By asking various questions the call will be mechanically routed to the relevant expert. Suppose if that expert is busy with some other operator then the call will be routed to second expert.

c. Assisted service:

Assisted service is designed according to the call flow. According to the option chosen by the caller, the variable var_Skill, var_Priority, var_VQ will get their dynamic values. Taking these values in account, the caller will be routed to suitable agent.

C. Gax framing process

a. Creating skill in Gax:

Expert qualities are created and installed to this layer. These qualities will be different for each application. By entering into gax these creation and all possible.

V. RESULT AND CONCLUSION

The application is successfully developed according to the tenant's requirement. The Call flow is tested using eyebeam soft phone. Multiple inputs were given to check the working flow of the call. The calls were routed to agents according to the option they choose. When wrong input or no input was fed to IVR, they were automatically routed to agents with default skills. When the call fails to transfer to an agent, another chance was given to the caller to get connected to the agent.

Need of developing this tool is to provide good automated service to customers. Extracting work from manpower is a major problem for companies. So by using this type of

interactive software the query of customer will be solved efficiently with high performance. Time is also consumed for company employees.

Only thing is the customer should have the knowledge of using this interactive response system. But by using one or two times the customers will also become well versed. Because satisfying customer is a major role to enhance the business.

The existing IVR software include ringba, voiceblade, composer, Zeotel and many more. In Composer you cannot see the log files directly and the routing process is too complex. There are many blocks which demand high level of coding. It is very difficult to combine composer with gax. Designer overcomes all these problems. It is highly advanced and very easy to connect with gax. Only drag and drop of blocks is enough and very few block demand ECMA scripts.

REFERENCES

1. 0020 Santosh A. Kulkarni, Dr. A.R. Karwankar, "IVRS For college automation", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 1, Issue 6, August 2012.
2. Xiaoqing Wang, Penghua Sun, "Research and Implementation Of Large Scale Enterprise-class Call Center", 978-0-7695-4647-6/12 \$26.00 © 2012 IEEE DOI 10.1109/ICCSEE.2012.313.
3. Mudili Soujanya, Sarun Kumar, "Personalized IVR system in Contact Center", 978-1-4244-7681-7/\$26.00 © 2010 IEEE.
4. Atul Gaikwad, Viraj Gaikwad, Girish Gaikwad, Rahul Dhere, "TELEPURCHASING USING IVR SYSTEM", IJESS Volume 2, Issue 5 (May-2012) ISSN: 2249- 9482.
5. Anil Kumar, S. Niranjana, "Design, Development and Implementation of an Automated IVR System with feature based TTS using Open Source Tools.", International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 Vol. 1 Issue 3, May – 2012.
6. <http://en.m.wikipedia.org/wiki/telemarketing>.
7. Michael Massoth and Thomas Bingel "Performance of different mobile payment service concepts compared with a NFC-based solution", 2009 Fourth International Conference on Internet and Web Applications and Services
8. Ritesh Chauhan, Vivek Joshi and Aanchal Jain, "A Comprehensive Study of Design, Development and Implementation of an Automated IVR Systems", IRACST - International Journal of Computer Science and Information Technology & Security (IJCSITS), ISSN: 2249-9555, Vol. 2, No. 6, December 2012
9. Umamaheswari, S., C. Kavitha, S. M. Chandru and J. N. Swaminathan, Nov 2017 "Machine learning for connecting humans for different applications-A critical review". IJPAM, Volume 117 No. 8, PP- 167-171, Nov 2017.
10. Umamaheswari, S. & J. N. Swaminathan, "Percentage of time analysis for wormhole attack using different topology", IJPAM, Dec 2017.